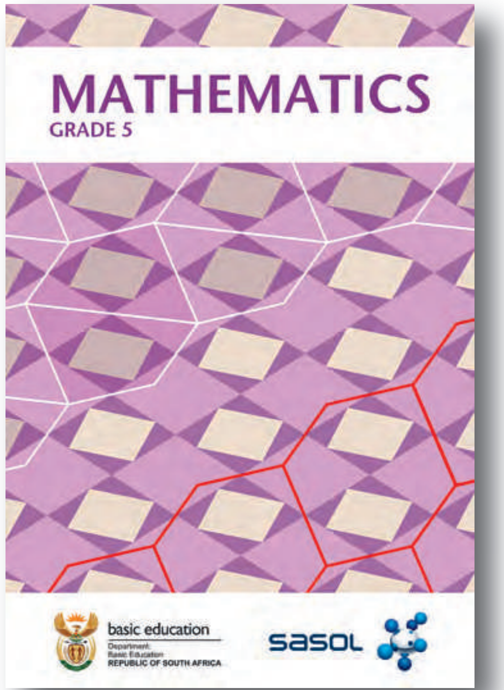

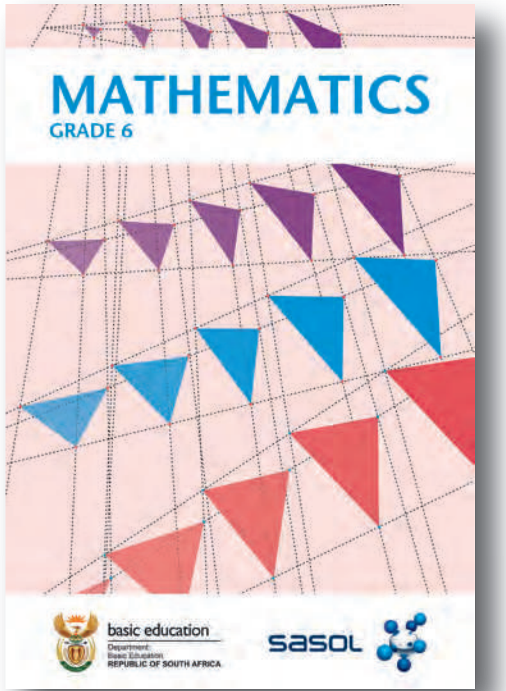

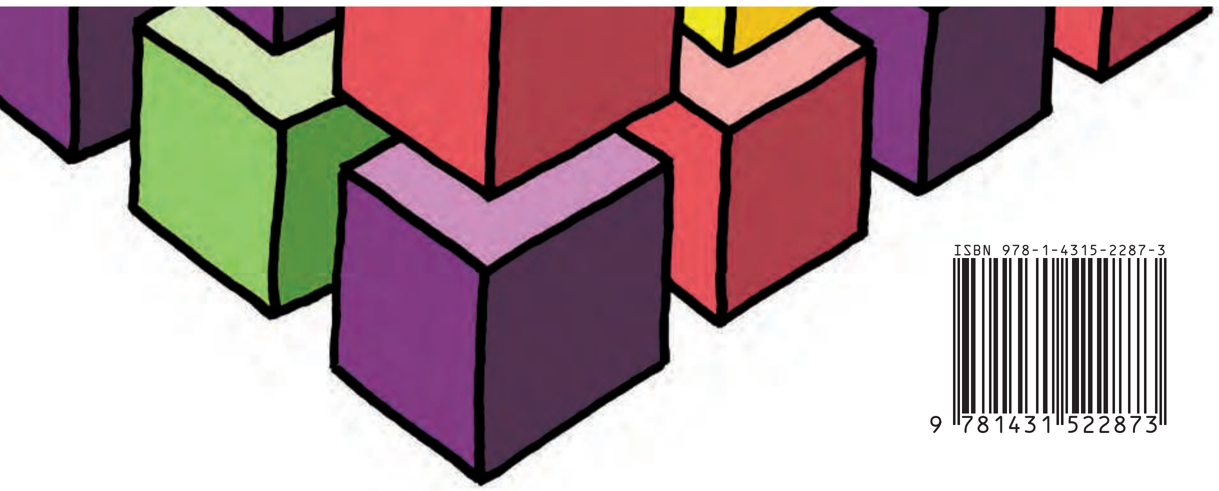

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MATHEMATICS GRADE 4

MATHEMATICS
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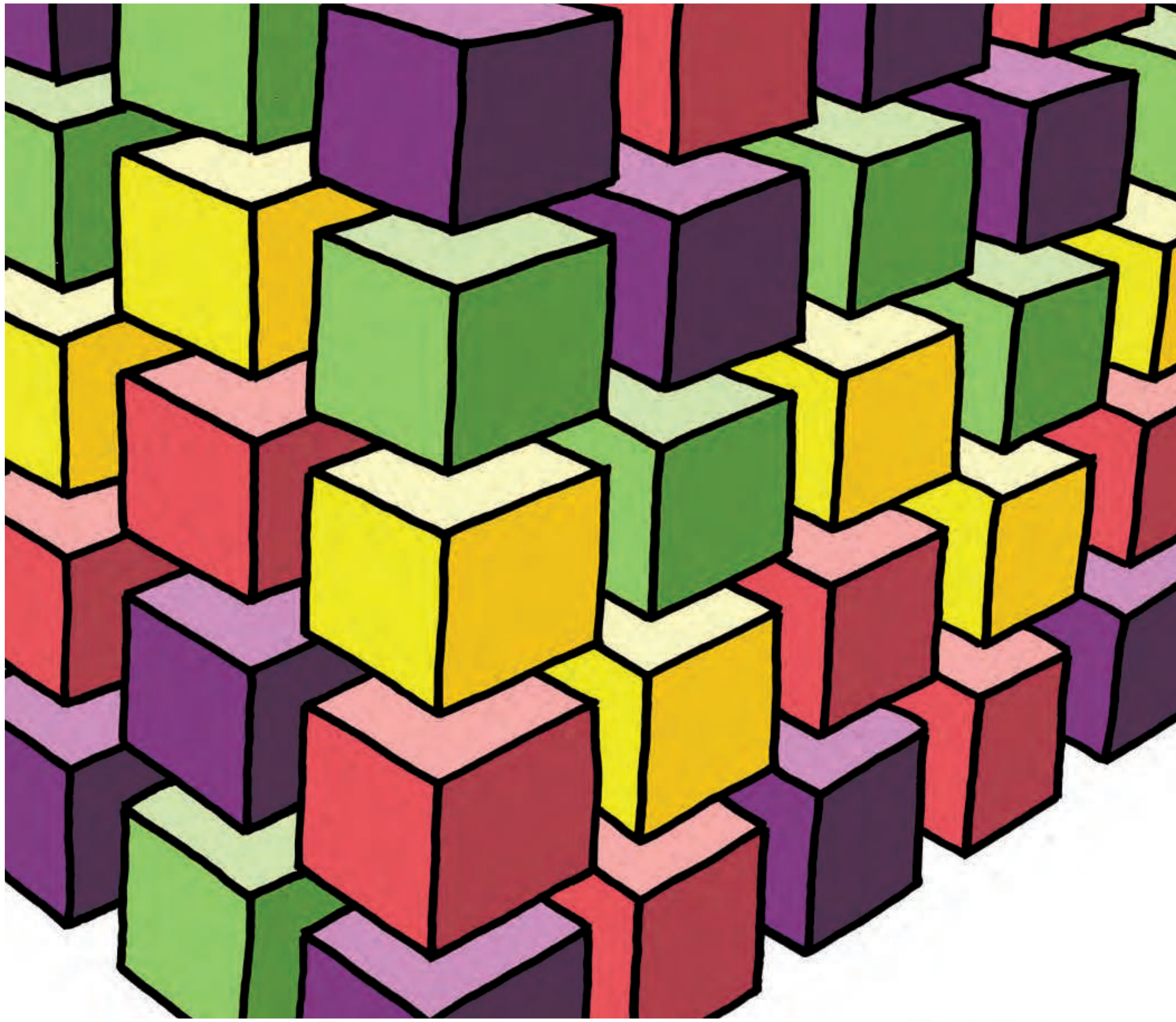

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Mathematics

Grade 4

Learner Book

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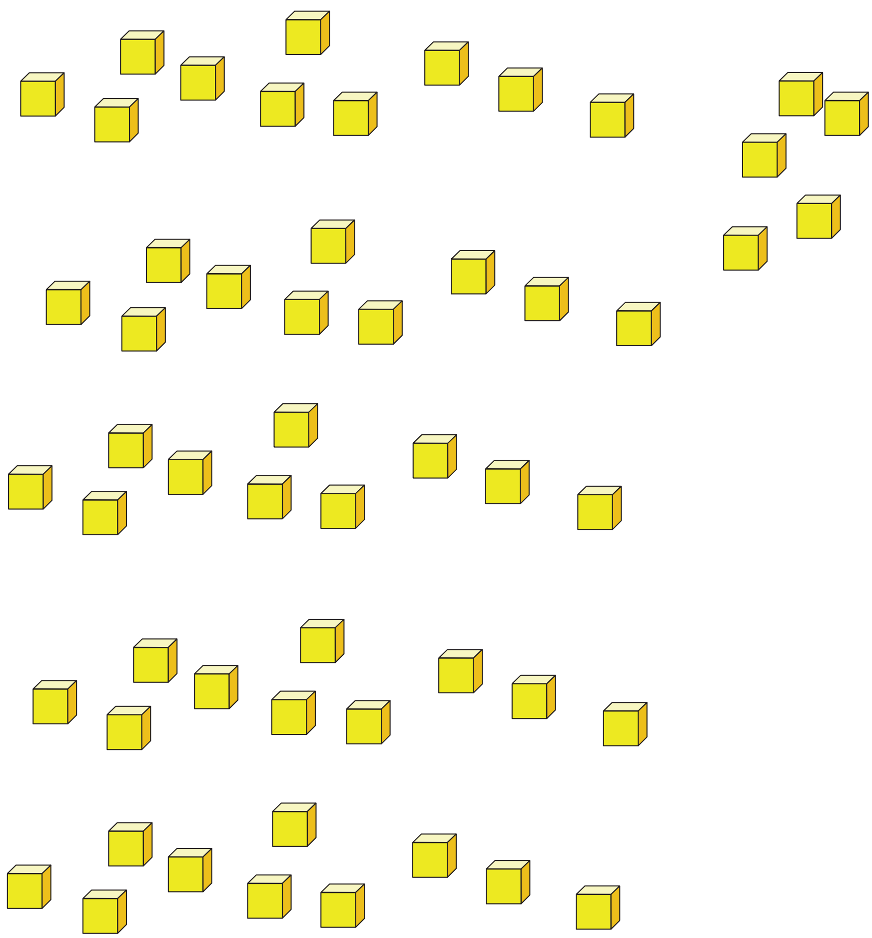
Unit 4: Numeric patterns

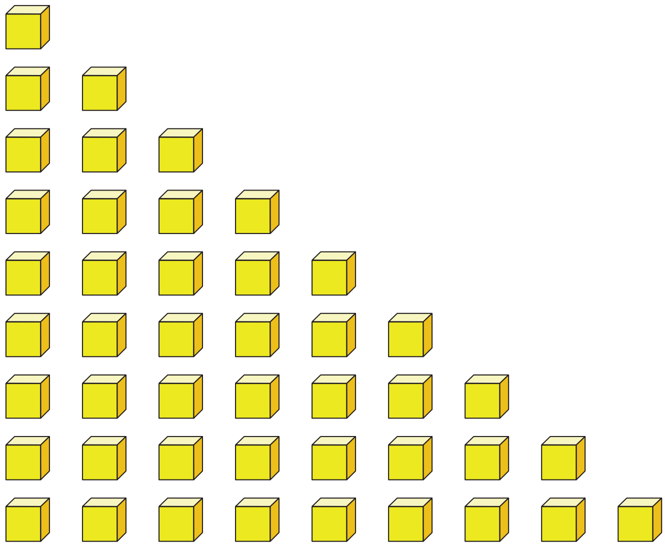
Unit 1 Whole numbers

1.1 Number names and number symbols

1. Count softly or aloud in a group from *one* to *one hundred and twenty*.
2. How many cubes are shown below?
   Write your answer in words, for example *thirty-four*.

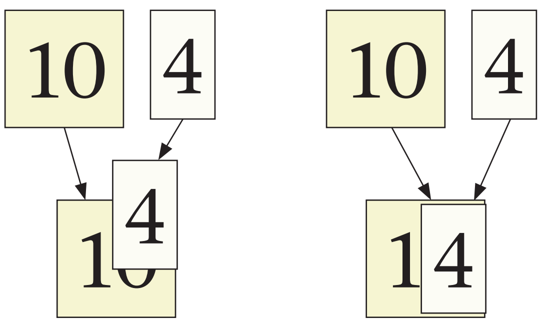


You already know that we have *single* symbols for the numbers one to nine, as shown below.

one	1	
two	2	
three	3	
four	4	
five	5	
six	6	
seven	7	
eight	8	
nine	9	

You also know that we do not have a single symbol for ten, or for numbers larger than ten.

For larger numbers we use *combined* symbols like 10, 11, 12, 17, 34, 68 and so on. Look at number 14, for example:



The combined symbol 14 shows that the number has two parts: 10 and 4. The 4 sits on top of the 0, as shown here.

The **number name** *fourteen* means *four and ten*.

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3. (a) What does the number name *fifteen* mean?
   (b) What does the number name *sixteen* mean?

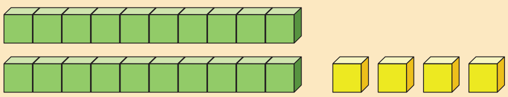
eighteen

18 

10 8

The number eighteen has two parts: ten and eight.
The **number symbol** for eighteen is 18.

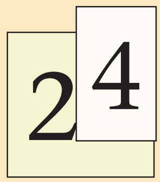
4. (a) What are the parts of nineteen?
   (b) What is the number symbol for nineteen?



twenty-four

24 = 20 + 4

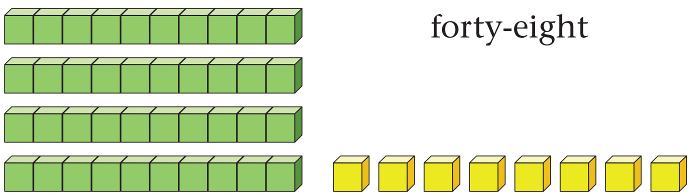
The number symbol is 24.



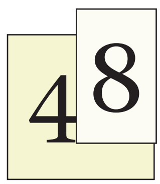
When you write this number as 20 + 4, you are using the **expanded notation**.

The English number name *twenty-four* tells you that the expanded notation is 20 + 4.

5. Look at number 48:

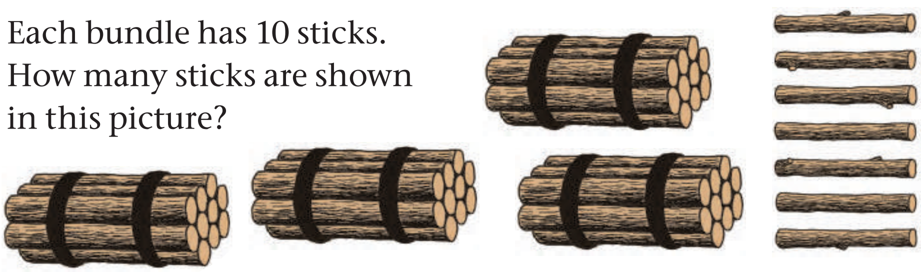


forty-eight



   (a) What are the parts of 48?
   (b) Write the expanded notation for 48.

6. Each bundle has 10 sticks. How many sticks are shown in this picture?



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7. Write the numbers from 1 to 100, with ten numbers in each row as shown below.

1	2	3	4	5	6	7	8	9	10
11	12	13	. . .	. . .	. . .	. . .	. . .	. . .	. . .
21	22	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .

31 32 and so on.

8. Count in fives by yourself, up to 100. Write the number symbols as you go along:

5 10 15 . . .

The numbers that you have to write in questions 8 and 9 are called **multiples of 5**.

9. Count backwards in fives from 100, and write the number symbols as you go along. Continue until you cannot go any further.

100 95 90 85 . . .

10. Draw a line in your book, and write the numbers 0, 10, 20, 30 . . . and so on up to 100 above the line. Leave more or less equal spaces between the numbers. Make a mark at each number.

This is called a **number line**.

You have shown the first ten multiples of 10 on your number line.

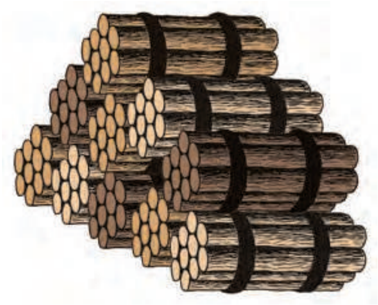
11. Draw a number line that starts at 0 and shows the multiples of 5 up to 50.

12. Draw a number line that starts at 0 and shows the multiples of 2 up to 20.

13. Draw a number line that starts at 50. Show the multiples of 2 from 50 up to 70.

1.2 Count in hundreds, tens and units

Look at what this picture shows you:

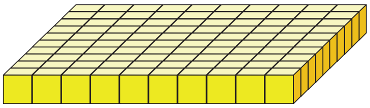


A heap of ***hundred*** *sticks (10 bundles of 10 sticks each)*

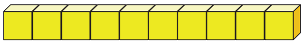
A bundle of ten sticks

One stick

A hundred, ten and one may also be represented in cubes as follows:



One ***hundred*** *cubes*



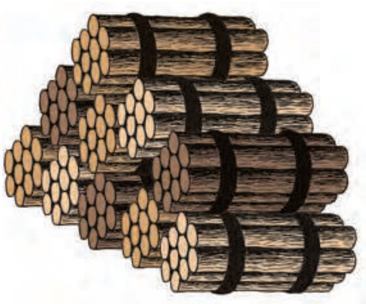
Ten cubes

One cube

1. (a) How many sticks are there in 2 bundles of 10 sticks each?
   (b) How many sticks are there in 5 bundles of 10 sticks each?
   (c) How many sticks are there in 7 bundles of 10 sticks each?
   (d) How many sticks are there in 10 bundles of 10 sticks each?
   (e) How many sticks are there in 12 bundles of 10 sticks each?

> The symbol for **one hundred** is **100**.
> The symbol for three hundred is 300.
> The symbol for eight hundred is 800.

300 sticks are shown below, in three heaps of 100 each.



2. (a) How many sticks are there in 2 heaps of 10 bundles each?
   (b) How many sticks are there in 5 heaps of 10 bundles each?
   (c) How many sticks are there in 7 heaps of 10 bundles each?
   (d) How many sticks are there in 10 heaps of 10 bundles each?

10 hundreds is called **one thousand**.
The symbol for one thousand is **1 000**.

When we write the number symbol **1 000**, we usually leave a space between the 1 and the 000. This makes it easier to read the number.

3. (a) How many bundles of 10 are there in 2 heaps of 100 sticks each?
   (b) How many bundles of 10 are there in 4 heaps of 100 sticks each?
   (c) How many bundles of 10 are there in 8 heaps of 100 sticks each?
   (d) How many bundles of 10 are there in 10 heaps of 100 sticks each?

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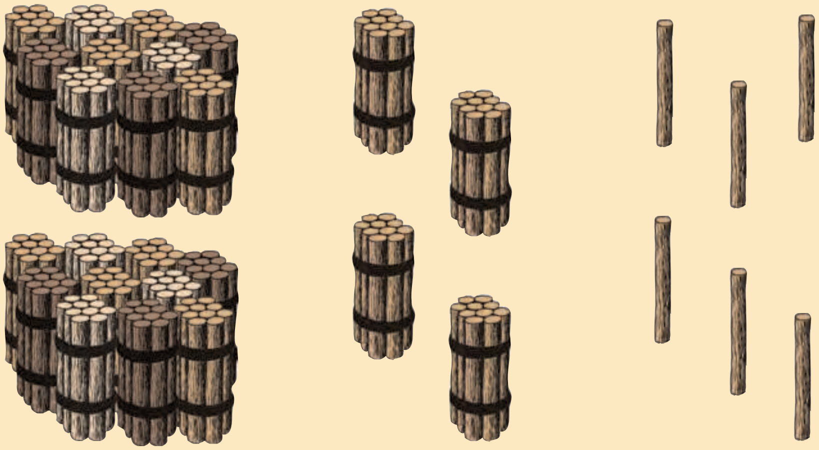
Two hundred and forty-six sticks are shown below.

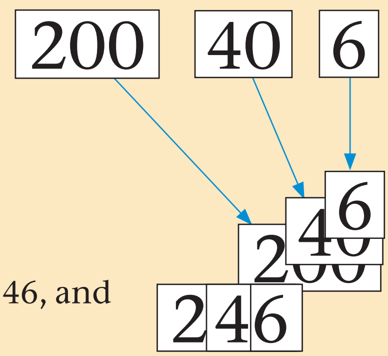


200 sticks *40 sticks* *6 sticks*

The number *two hundred and forty-six* is made up of three parts.
The three parts are:

- two hundred $\boxed{200}$ This is the **hundreds part**.
- forty $\boxed{40}$ This is the **tens part**.
- six $\boxed{6}$ This is the **units part**.

The three parts can be combined to form the number symbol 246:



In the number symbol 246,
the 00 of the 200 is hidden behind the 46, and
the 0 of the 40 is hidden behind the 6.

4. How many sticks are shown below?

5. Which is more?
   (a) 501 sticks or 389 sticks (b) 699 sticks or 822 sticks
6. How many sticks is 4 heaps, 7 bundles and 5 loose sticks?
7. (a) How many heaps of hundred can be made up from 384 sticks, and how many sticks will remain?
   (b) How many bundles of ten can be made from the sticks that remain?
8. Which number has the parts shown below?

   400 2 60

   Write the number name and the number symbol.
   Also write the number in expanded notation.
9. Which number has the parts 700 and 2?
10. Write down the parts of 607.
11. Write down the parts of each of these numbers.

(a) 647	(b) 746	(c) 476	(d) 467
(e) 764	(f) 674	(g) 270	(h) 207

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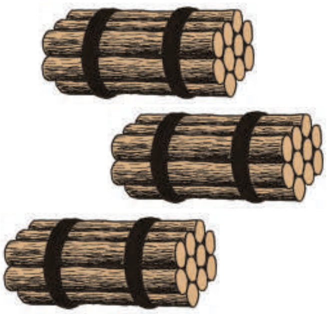
1.3 Building up and breaking down numbers

The numbers 30 and 4 can be combined to form the single number 34.

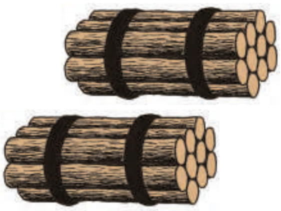


30 + 4 = 34

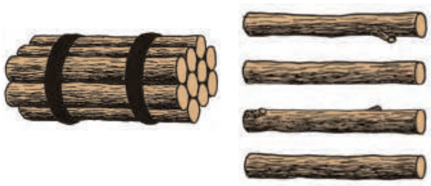
30

4

The number 34 can also be formed by combining two other numbers, for example 20 and 14.



20 + 14 = 34



There are many more ways in which 34 can be formed by combining two *other* numbers, for example:

18 + 16 = 34   25 + 9 = 34   28 + 6 = 34

1. Write down another three different ways in which 34 can be formed by combining two numbers.

You have seen that there are different ways in which 34 can be formed by combining two numbers. The same is true for any other number.

The English number name *thirty-four* and the number symbol *34* tell us *one* of the many ways in which 34 can be formed from two different numbers: they tell us that 34 = 30 + 4.

2. Look at the two parts given in each item below. Which number is formed by combining the two parts? Write the number name and the number symbol.

(a) 40 and 7	(b) 60 and 3
(c) 30 and 8	(d) 80 and 4

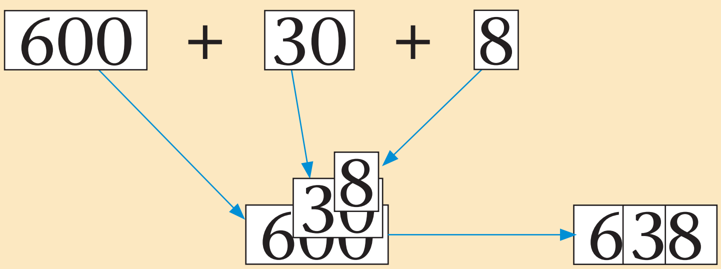
The parts that are mentioned in the name of a number are called the **place value parts**. For example, the place value parts of thirty-seven are 30 and 7.

3. What are the place value parts of each of the following numbers?

(a) seventy-four	(b) fifty-nine
(c) forty-seven	(d) 83

The cards that you use in school to show numbers can be called **place value cards**. This is because each card that you use to build a number shows one of the place value parts. Look at this example:

six hundred and thirty-eight is



4. (a) Which place value cards do you need to build 527?

   (b) Which place value cards do you need to build 725?

   (c) Which place value cards do you need to build 572?

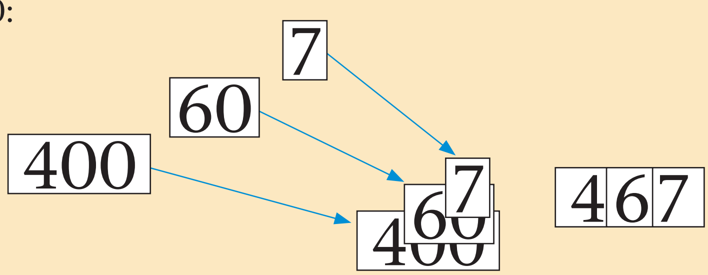
1.4 Number names, expanded notation and number symbols

400 + 60 + 7 is called the **expanded notation** for the number 467.

Four hundred and sixty-seven can be written **in symbols** like this:

400 + 60 + 7

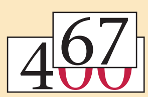
In the short **number symbol** 467, the 60 is written on top of the two zeros of the 400, and the 7 is written on top of the zero of the 60:



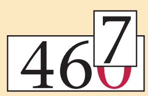
1. Write down the place value parts that make up the number *two hundred and eighty-three*.
2. Write the number symbol for two hundred and eighty-three.
3. Write the expanded notation for the number two hundred and eighty-three.
4. Write the number name for 836.
5. Write 836 in expanded notation.
6. Write down the place value parts that make up the number 836.

The number symbol also tells us what the parts of the number are. Look at the number symbol 467, for example:

The "4" tells us that 400 is one of the parts of 467.



The symbol "6" tells us that 60 is one of the parts of 467.



7. What does the “7” in each of the following number symbols tell us about the number?

   (a) 573 (b) 357 (c) 735

8. (a) How do you know that the “7” in 573 means 70, and not 7 or 700?

   (b) How do you know that the “7” in 357 means 7, and not 70 or 700?

   (c) How do you know that the “7” in 735 means 700, and not 7 or 70?

Place values

hundreds	tens	units
2	9	8

The “9” in 298 is in the place where the number of tens is shown. The “9” in 298 tells us that there are 9 tens in 298.

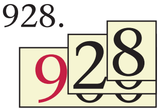
298 = 200 + 90 + 8

298 = 2 hundreds + 9 tens + 8 units

We can say the place value of the “9” in 298 is tens.

hundreds	tens	units
9	2	8

The “9” in 928 is in the place where the number of hundreds is shown. The “9” in 928 tells us that there are 9 hundreds in 928.



928 = 900 + 20 + 8

928 = 9 hundreds + 2 tens + 8 units

We can say the place value of the “9” in 928 is hundreds.

hundreds	tens	units
8	2	9

The “9” in 829 is in the place where the number of units is shown. The “9” in 829 tells us that there are 9 units in 829.

829 = 800 + 20 + 9

829 = 8 hundreds + 2 tens + 9 units

We can say the place value of the “9” in 829 is units.

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Note the following:

- The number symbol for twenty-eight is 28 *not* 208.
  208 is the number symbol for two hundred and eight.
- The number symbol for one hundred and eighteen is 118 *not* 10018.
- The number symbol for one hundred and twenty-four is 124, *not* 10024 or 100204.
- The expanded notation for one hundred and twenty-four is 100 + 20 + 4.
- The number name *forty* does not have a letter u.
  We write *four* and *fourteen* but *forty*!

9. Write the number symbols for all the whole numbers from one hundred up to one hundred and fifty.

   Start like this:

   100 101 102 . . .

10. Write the number symbols for all the whole numbers from four hundred and twenty up to four hundred and sixty.

11. Draw three columns in your book.

    (a) Write the number names for all the whole numbers from 637 up to 652 in the first column.

    (b) In the second column, write the number symbols for these numbers.

    (c) In the third column, write the numbers in expanded notation.

1.5 Represent, order and compare numbers

1. (a) Count in threes from 150 until you pass 200. Write down the number symbols as you go along.

   150; . . .; 156; . . .; . . .; 165; . . .; . . .; . . .; 177; . . . .

   (b) Count backwards in threes from 450 until you reach 399. Write down the number symbols as you go along.

   450; . . .; 444; . . .; . . .; 435; . . .; . . .; 426; 423; . . . .

2. Eight numbers are missing on this number line. Write the numbers from smallest to biggest in your book. You have to count in 30s to do this.

3. Arrange these numbers from smallest to biggest. (Hint: start by looking at the hundreds part of the numbers.)

   479 989 201 609 183 685 748

4. Arrange these numbers from biggest to smallest.

   810 775 309 899 785 459 293

5. Count in thirties from 450 until you reach 900. Write down the number symbols as you go along.

   450; . . .; 510; . . .; . . .; 600; . . .; . . .; . . .; 720; . . .; 780; . . .; . . .; . . .; 900

6. Count in 25s and complete the number grid.

125	150			
	275			
		425		
			575	
				725

7. (a) Make a number line from 225 to 525.
Show 225, 250, 275 and so on on your number line. (Look at the example in question 2.)

(b) Make a number line from 0 to 1 000. Show 100, 200, 300 and so on.

8. Count backwards in 25s from 900 until you reach 500.
Write down the number symbols as you go along.
Start like this:

900; 875; 850; . . .

9. Copy and complete this table.

Number symbol	**Number name**	**Expanded notation**
	six hundred and thirty-four	
546		
		300 + 20 + 9
910		
		700 + 30 + 4
	two hundred and four	
703		
		900 + 40 + 8

10. In each case, decide which is the bigger of the two numbers.
Then represent them in this way:
- If the first number is bigger than the second then use >, for example 600 > 500.
- If the first number is smaller than the second then use <, for example 500 < 600.

Notice that the open part of the sign is always towards the bigger number.

(a) 498 and 902 (b) 676 and 687
(c) 291 and 289 (d) 653 and 635

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UNIT 2

NUMBER SENTENCES

2.1 State addition and subtraction facts

If something is not true, we say it is false.
For example, this sentence is false:

A bird has eight legs.

Sentences such as the following are called **number sentences**:

If you add 3 to 10 you get the same as when you add 4 to 9.

We can also write number sentences in symbols:

$9 + 4 = 10 + 3$

1. Which of the following sentences are true, and which are false?
   (a) Four apples and three apples, altogether, is seven apples.
   (b) Six apples and three apples, altogether, is ten apples.
   (c) Six apples and one apple, altogether, is seven apples.
   (d) Five apples and two apples, altogether, is seven apples.

2. (a) How much is $5 + 5$? 
   (b) How much is $5 + 4$?
   (c) How much is $7 + 3$? 
   (d) How much is $7 + 5$? 
   (e) How much is $8 + 4$?

3. Nathi says 5 cubes + 4 cubes is the same number of cubes as 7 cubes + 3 cubes.
   He writes $5 + 4 = 7 + 3$.
   Is this true or false?

4. Mpho says $5 + 5$ is the same number as $7 + 3$.
   She writes $5 + 5 = 7 + 3$.
   Is this true or false?

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5. Decide which of the sentences below are false.
If a sentence is false, make it true. Keep the left-hand side the same and change the right-hand side. Then write two more true number sentences with the same left-hand side.

Example: $5 + 3 = 6 + 4$ is false.
But $5 + 3 = 6 + 2$ is true.
$5 + 3 = 2 + 6$ and $5 + 3 = 1 + 7$ are also true number sentences.

(a) $8 + 5 = 10 + 3$
(b) $8 + 6 = 7 + 7$
(c) $2 + 9 = 9 + 2$
(d) $80 + 70 = 100 + 20$
(e) $70 + 50 = 80 + 50$
(f) $19 - 5 = 20 - 4$
(g) $13 - 7 = 14 - 8$
(h) $13 - 7 = 15 - 9$
(i) $13 - 7 = 20 - 14$
(j) $20 + 8 = 10 + 18$
(k) $10 + 6 = 20 - 4$
(l) $30 + 17 = 40 + 7$

The number sentence $7 + 5 = 9 + 3$ can also be said in words, for example in any of the following ways:
The sum of 7 and 5 is equal to the sum of 9 and 3.
If you add 5 to 7 you will get the same answer as when you add 3 to 9.
Seven plus five is equal to nine plus three.

6. Write each of the following number sentences in words, in the three different ways shown above.
(a) $7 + 9 = 10 + 6$
(b) $13 + 7 = 15 + 5$
(c) $19 - 5 = 20 - 6$
(d) $5 + 3 + 6 = 6 + 5 + 3$
(e) $4 + 4 + 4 + 4 + 4 + 4 = 6 + 6 + 6 + 6$

7. Write each number sentence in symbols.
(a) The difference between 10 and 3 is equal to the sum of 5 and 2.
(b) If you subtract 8 from 13 you will get the same answer as when you subtract 10 from 15.
(c) Ten plus four is equal to eight plus six.

2.2 Equivalence

1. (a) Ben picked 50 mangoes. Later he picked 30 more mangoes. How many mangoes did he pick altogether?

   (b) Sissy picked 30 mangoes in the morning. Later she picked 50 more mangoes. How many mangoes did she pick altogether?

When you add 30 to 50 you get the same answer as when you add 50 to 30.

We can write this number sentence in symbols:

$50 + 30 = 30 + 50$

When you *add* two numbers, it does not matter which one you take first.

Adding 30 to 50 gives the same result as adding 50 to 30.

Lea, Ada and Piet have to calculate $20 + 30 + 50$.
Lea plans to first calculate $20 + 30$ and then add 50 to the answer.
Piet plans to first calculate $30 + 50$ and then add the answer to 20.
Ada plans to first calculate $20 + 50$ and then add 30 to the answer.

2. (a) Do you think Lea and Piet will get the same answer?

   (b) Do you think Ada will also get the same answer?

All over the world, people sometimes use brackets to indicate which calculations they plan to do first.

Piet can write his plan like this: $20 + (30 + 50)$.
Ada can write her plan like this: $(20 + 50) + 30$.

3. How can Lea write her plan?

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4. Below are four different plans to calculate 8 + 5 + 7.
   The brackets indicate which calculations must be done first.
   Do each calculation in the way the plan states.
   (a) (8 + 5) + 7
   (b) 8 + (5 + 7)
   (c) 8 + (7 + 5)
   (d) (8 + 7) + 5

5. Which other plans can be followed to calculate 8 + 5 + 7?

Read this before you answer question 6:

In some cases in question 6, you may have to *do* the calculations to find out whether the two plans give the same result or not. The calculations given inside the brackets must be done first.

6. Which of the number sentences below are false?
   For each false number sentence, make a true number sentence by writing a different plan on the right-hand side.
   (a) (20 + 8) – 5 = 20 + (8 – 5)
   (b) (20 – 8) – 5 = (20 – 5) – 8
   (c) (20 – 8) – 5 = 20 – (8 – 5)
   (d) (8 + 2) + (7 + 3) = (8 + 3) + (7 + 2)
   (e) (8 + 7) + (2 + 3) = (8 + 3) + (7 + 2)
   (f) (20 + 4) + (10 + 2) = (20 + 10) + (4 + 2)

When you have to *add* many numbers, it does not matter where you start.

7. Which of the number sentences below are false?
   (a) 63 + 26 = (60 + 20) + (3 + 6)
   (b) 8 + 5 = (8 + 2) + 3
   (c) (20 + 7) – (10 + 4) = (20 – 10) + (7 – 4)
   (d) (30 + 6) – (10 + 8) = (20 – 10) + (16 – 8)

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2.3 Describe patterns with number sentences

In each **row** in Diagrams A, B and C, the total number of cubes = the number of red cubes + the number of yellow cubes.

The rows go from left to right.

1. For the first row in Diagram A, you can write the number sentence 10 + 1 = 11.

   For the second row you can write the number sentence 9 + 2 = 11.

   Write number sentences for all the other rows.

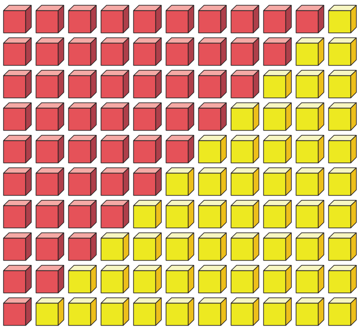

Diagram A

Now look at the **columns** in Diagram A. The columns go from top to bottom.

2. For the first column in Diagram A, you can write the number sentence 10 + 0 = 10.

   For the second column you can write the number sentence 9 + 1 = 10.

   Write number sentences for all columns.

3. (a) Write number sentences for all the rows in Diagram B.

   (b) Write number sentences for all the columns in Diagram B.

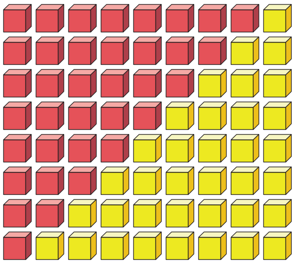

Diagram B

4. How do Diagrams A and B differ?

5. (a) Write number sentences for all the rows in Diagram C.

   (b) Write number sentences for all the columns in Diagram C.

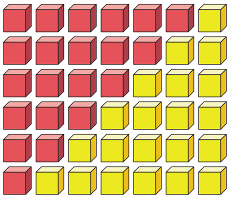

Diagram C

6. We can write the number sentence 10 + 10 = 20 to describe the bottom row in Diagram D.

   Write a number sentence for each of the other rows.

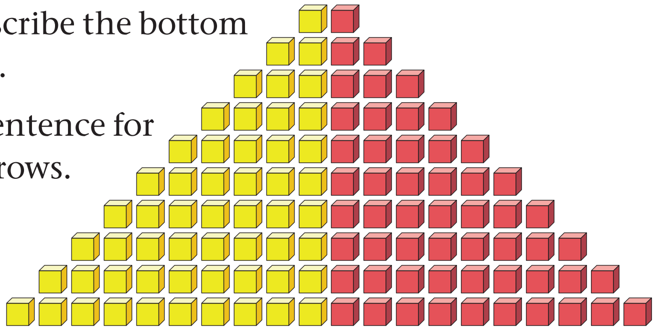

Diagram D

7. Write a number sentence for each row in Diagram E.

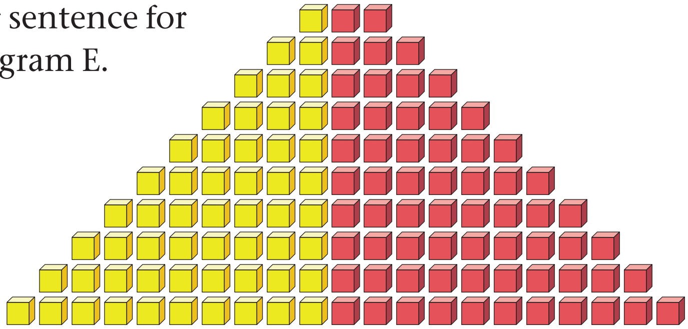

Diagram E

8. Write a number sentence for each row in Diagram F.

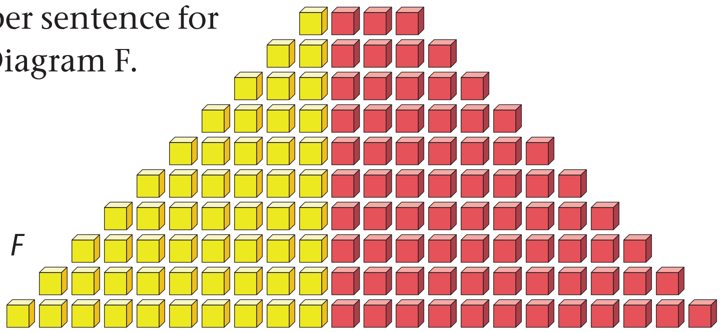

Diagram F

9. (a) There are more red cubes in Diagram E than in Diagram D. How many more?

   (b) There are more red cubes in Diagram F than in Diagram E. How many more?

10. What is the same about Diagrams A and D, and what is different?

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2.4 Solve and complete number sentences

The number sentence below is incomplete.
One of the numbers is missing.

$4 + 6 = 2 + \textbf{?}$

An incomplete number sentence is also called an **open number sentence**.

The number 8 will make the above number sentence true:

$4 + 6 = 2 + \mathbf{8}$

The sentence $4 + 6 = 2 + 8$ is called a **closed number sentence**.

Instead of a question mark, a little block $\square$ or dots . . . or the word *number* may be used to write an open number sentence:

$4 + 6 = 2 + \ldots$ or $4 + 6 = 2 +$ *a number* or $4 + 6 = 2 + \square$

1. In each case, find the number that will make the number sentence true.

(a) $7 + 3 = 5 + \ldots$
(b) $70 + 30 = 40 + \square$
(c) $700 + 300 = 800 + \ldots$
(d) $80 + 50 = 80 + 20 + \square$
(e) $7 + 9 = 10 + \ldots$
(f) $75 + \ldots = 100$
(g) $\ldots + 500 = 1\,000$
(h) $120 + \ldots = 150 + 50$
(i) $\ldots + 750 = 1\,000$
(j) $487 + \ldots = 500$

2. (a) Find two different numbers that will make this number sentence true:
8 + *a number* = 10 + *a different number*

(b) Find two other numbers that will also make the above number sentence true.

(c) Find another two numbers that will make the above number sentence true.

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3. Complete the number sentences:

(a) 3 + 7 = . . .	(b) 30 + 70 = . . .	(c) 300 + 700 = . . .
(d) 3 + 6 = . . .	(e) 30 + 60 = . . .	(f) 300 + 600 = . . .
(g) 2 + 6 = . . .	(h) 20 + 60 = . . .	(i) 200 + 600 = . . .
(j) 4 + 6 = . . .	(k) 40 + 60 = . . .	(l) 400 + 600 = . . .
(m) 3 + 5 = . . .	(n) 30 + 50 = . . .	(o) 300 + 500 = . . .
(p) 3 + 4 = . . .	(q) 30 + 40 = . . .	(r) 300 + 400 = . . .
(s) 9 + 4 = . . .	(t) 90 + 40 = . . .	(u) 80 + 40 = . . .
(v) 8 + 5 = . . .	(w) 80 + 50 = . . .	(x) 70 + 40 = . . .

4. Complete the number sentences:

(a) 10 – 3 = . . .	(b) 100 – 30 = . . .	(c) 1 000 – 300 = . . .
(d) 9 – 3 = . . .	(e) 90 – 30 = . . .	(f) 900 – 300 = . . .
(g) 8 – 3 = . . .	(h) 80 – 30 = . . .	(i) 800 – 300 = . . .
(j) 7 – 3 = . . .	(k) 70 – 30 = . . .	(l) 700 – 300 = . . .
(m) 7 – 4 = . . .	(n) 70 – 40 = . . .	(o) 700 – 400 = . . .
(p) 8 – 4 = . . .	(q) 80 – 40 = . . .	(r) 800 – 400 = . . .
(s) 9 – 4 = . . .	(t) 90 – 40 = . . .	(u) 900 – 400 = . . .
(v) 10 – 4 = . . .	(w) 100 – 40 = . . .	(x) 1 000 – 400 = . . .

5. Complete the number sentences:

(a) 9 + 5 = . . .	(b) 90 + 50 = . . .	(c) 190 + 50 = . . .
(d) 14 – 5 = . . .	(e) 140 – 50 = . . .	(f) 240 – 50 = . . .
(g) 13 – 5 = . . .	(h) 130 – 50 = . . .	(i) 230 – 50 = . . .
(j) 430 – 50 = . . .	(k) 430 – 60 = . . .	(l) 430 – 70 = . . .
(m) 8 + 7 = . . .	(n) 80 + 70 = . . .	(o) 60 + 70 = . . .
(p) 15 – 8 = . . .	(q) 150 – 80 = . . .	(r) 750 – 80 = . . .
(s) 13 – 8 = . . .	(t) 130 – 80 = . . .	(u) 430 – 80 = . . .
(v) 12 – 7 = . . .	(w) 120 – 70 = . . .	(x) 130 – 70 = . . .

Unit 3 Whole numbers: Addition and subtraction

3.1 Adding on

1. How much is each of the following?

(a) 35 + 1	(b) 35 + 2	(c) 35 + 3
(d) 35 + 4	(e) 35 + 5	(f) 35 + 6

2. How much is each of the following?

(a) 70 + 10	(b) 70 + 20	(c) 70 + 30
(d) 70 + 40	(e) 70 + 50	(f) 70 + 60

3. (a) What number is seven more than 56?

   (b) What number is three more than 56?

   (c) What number is seven less than 63?

   (d) What number is five less than 63?

   (e) What is the difference between 56 and 58?

You can use one addition fact to find another addition fact.

You know that 11 is 1 more than 10.

So if you know that 5 + 5 = 10, you know that 5 + 6 = 11.

You know that 3 + 3 = 6.

Two more than 6 is 8, so 3 + 5 = 8.

If you always have to count, you will work so slowly that you will never perform well in Mathematics!

Do the questions below without counting on your fingers or other objects.

4. How much is each of the following?

(a) 48 + 1	(b) 48 + 2	(c) 49 + 1	(d) 48 + 3
(e) 10 + 10	(f) 10 + 11	(g) 10 + 12	(h) 10 + 13
(i) 11 + 14	(j) 12 + 14	(k) 13 + 14	(l) 14 + 14

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5. How much is each of the following?

(a) 6 + 6	(b) 6 + 7	(c) 7 + 7	(d) 7 + 8
(e) 5 + 5	(f) 10 + 5	(g) 15 + 5	(h) 20 + 5
(i) 35 – 5	(j) 30 – 5	(k) 25 – 5	(l) 20 – 5
(m) 7 + 3	(n) 6 + 4	(o) 5 + 5	(p) 4 + 6
(q) 10 – 3	(r) 10 – 7	(s) 10 – 4	(t) 10 – 6
(u) 8 + 2	(v) 16 + 4	(w) 26 + 4	(x) 36 + 4

To calculate 543 + 236 you can break the numbers down into their place value parts:

$\boxed{500}\ \boxed{40}\ \boxed{3}$ $\qquad$ $\boxed{200}\ \boxed{30}\ \boxed{6}$

You can add the hundreds parts 500 + 200 = 700 $\boxed{700}$

and the tens parts 40 + 30 = 70 $\boxed{70}$

and the units parts. 3 + 6 = 9 $\boxed{9}$

You can then build the answer up: 700 + 70 + 9 = 779 $\boxed{779}$

To add numbers in this way you need to know facts like those below and many others very well.

8 + 5 = 13	80 + 50 = 130	50 + 80 = 130
13 – 8 = 5	130 – 50 = 80	6 + 4 = 10
60 + 40 = 100	70 + 30 = 100	800 – 300 = 500

You need to know the answer immediately, or you must be able to work out the answers very quickly.

In this Unit, you will strengthen your knowledge of basic addition facts, and you will learn ways to quickly form facts that you do not know immediately.

6. Copy and complete the number sentences. Do not count!
   (a) 3 + 7 = . . . (b) 3 + 8 = . . .
   (c) 11 – 3 = . . . (d) 11 – 8 = . . .

7. Ma Susan is collecting her hens' eggs. She knows that if she finds 6 eggs more, she will have 44 eggs in total in her basket.


+ 6 = 44

   To her surprise Ma Susan finds 9 eggs more, not only 6. How many eggs does she now have in total?

3.2 Add without counting

If you always have to count to find facts like 7 + 5 = 12, it will always take you very long to do calculations. *You have to learn to make addition and subtraction facts without counting!*

A good way to do that is to make new facts from facts that you already know. For example if you know that 35 + 2 = 37, it is easy to know that 35 + 3 = 38, because it is just 1 more.

In this section you will learn different ways to form new facts from facts that you already know.

1. You know that 10 + 10 = 20.
   Try to use this fact to quickly find the answers to the following. Start from 10 + 10 = 20 in each case.
   (a) 8 + 12 (b) 10 + 13
   (c) 9 + 11 (d) 7 + 13

An easy way to make a new addition fact from a fact that you know, is to **shift** part of one number to the other number, for example:

3

10 + 20 = 30

By shifting 3 from the 20 to the 10, you get the new fact 13 + 17 = 30.

2. (a) Shift 5 from the one 20 to the other 20 to make a new fact from 20 + 20 = 40.

   (b) Shift 3 to make another fact from 20 + 20 = 40.

   (c) Make three more facts from 20 + 20 = 40.

3. (a) Make three different facts from 10 + 5 = 15.

   (b) Make three different facts from 10 + 7 = 17.

The examples below show another way how you can use an addition fact that you already know to build other addition facts.

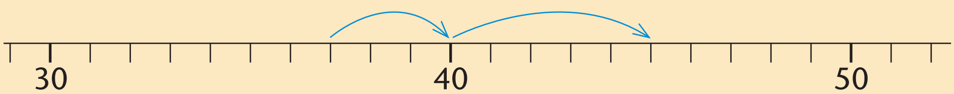
15 + 15 = 30	15 + 15 = 30	15 + 15 = 30
+ 1 + 1 + 2	– 1 – 1	+ 3 – 1 + 2
16 + 16 = 32	14 + 15 = 29	18 + 14 = 32

4. Start with 20 + 10 = 30 and make ten other addition facts, all with answers different than 30.

5. Zweli knows that 8 + 8 = 16.
   How can he use this knowledge to find out how much 6 + 9 is?

Here is a different way to find addition facts.

To find out how much 37 + 8 is, you can fill up to 40 and then add what remains of the 8:



You can describe your thinking by using an arrow:

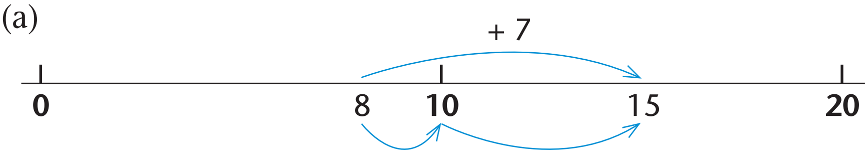
$$37 + 3 \rightarrow 40 + 5 = 45$$

By first adding 3 and then adding 5 you have added 8 in total.

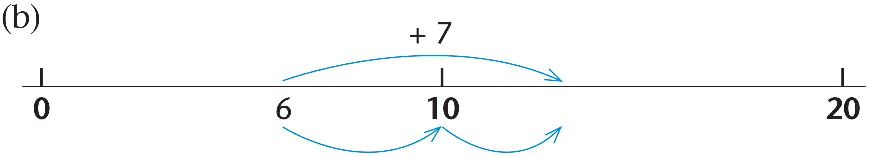
6. Use arrows to show how 16 + 9 and 28 + 7 can be calculated by filling up to 20 and 30.

7. Show how 15 + 8, 35 + 8, 17 + 7 and 46 + 9 can be calculated by filling up to tens.
8. The number line diagrams below show how you could be thinking when you are calculating 8 + 7, 6 + 7 and 8 + 9. Use arrows as shown on the previous page to show the same thinking.

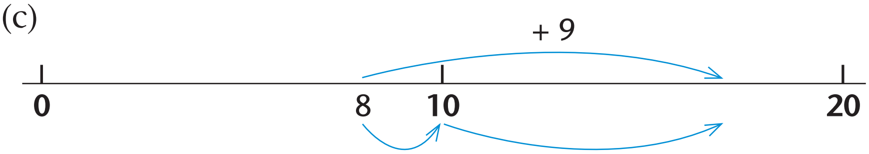
(a)



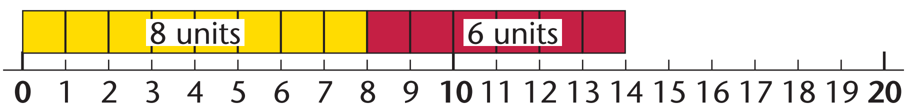
(b)



(c)



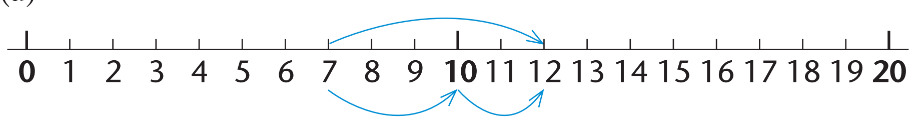
You can see on this number line that 8 + 6 = 14.



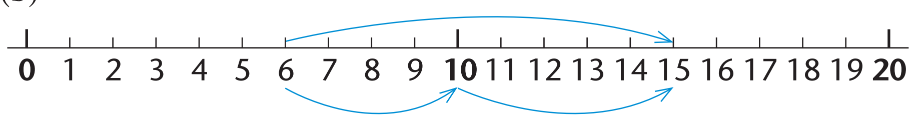
You can also see that 14 – 8 = 6, and 14 – 6 = 8.

9. Which addition fact, and which two subtraction facts can you see on each number line below?

(a)



(b)



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10. Copy the number sentences for which you *cannot* find the answers quickly.

(a) 10 + 7 = . . .	(b) 7 + 8 = . . .	(c) 7 + 9 = . . .
(d) 9 + 7 = . . .	(e) 7 + 7 = . . .	(f) 7 + 6 = . . .
(g) 7 + 10 = . . .	(h) 7 + 4 = . . .	(i) 7 + 3 = . . .
(j) 10 + 9 = . . .	(k) 9 + 8 = . . .	(l) 9 + 2 = . . .
(m) 9 + 10 = . . .	(n) 9 + 4 = . . .	(o) 9 + 3 = . . .
(p) 10 + 6 = . . .	(q) 6 + 8 = . . .	(r) 6 + 7 = . . .
(s) 6 + 9 = . . .	(t) 6 + 6 = . . .	(u) 6 + 5 = . . .
(v) 6 + 10 = . . .	(w) 6 + 4 = . . .	(x) 6 + 3 = . . .

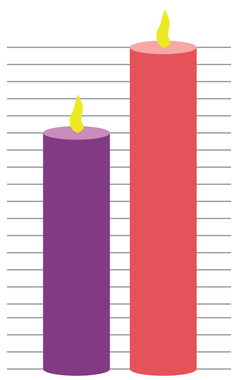
11. Now complete the sentences you have copied in question 10. You may work from the facts that you know, or fill up to 10, or work in any other way you prefer.

3.3 Differences between numbers

The red candle below is 19 units long and the purple candle is 14 units long.

The **difference** between the lengths is 5 units, or

19 – 14 = 5



1. A certain tree is 16 m tall, and another tree is 9 m tall. What is the difference between the heights of the two trees?
2. Calculate each of the following.
   (a) 16 – 9 (b) 9 + 7
   (c) 8 + 9 (d) 17 – 8
   (e) 17 – 9 (f) 6 + 9
   (g) 15 – 9 (h) 15 – 6
3. The blue line is 7 cm long, and the red line is 12 cm long.

   By how much do the lengths of the two lines differ?

4. One candle is 15 units long and another candle is 7 units long.
   (a) What is the difference between the two lengths?
   (b) How long are these two candles together?
5. This candle was 18 cm long. It burned for half an hour and then it was 5 cm shorter.

   (a) How long is the candle after half an hour of burning?
   (b) In the next half hour of burning, the candle loses another 5 cm in length. How long is it now?
   (c) How long do you think the candle will be after one and a half hours of burning?
6. How much is each of the following?

(a) 18 – 5	(b) 13 – 5	(c) 8 – 5
(d) 15 – 8	(e) 20 – 10	(f) 20 – 9
(g) 20 – 8	(h) 20 – 7	(i) 20 – 6

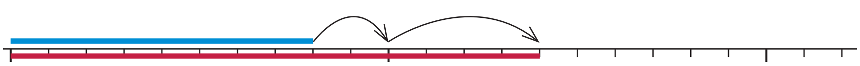
7. How much is each of the following?

(a) 9 – 4	(b) 12 – 5	(c) 12 – 7
(d) 15 – 9	(e) 5 + 8	(f) 11 – 7

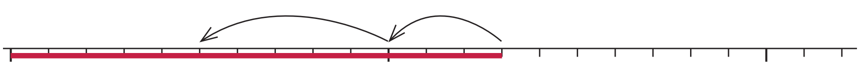
8. Write the missing number in each of these number sentences.

(a) 6 + . . . = 10	(b) 10 – 6 = . . .	(c) 10 – 4 = . . .
(d) 10 – 5 = . . .	(e) 8 + . . . = 12	(f) 12 – 4 = . . .
(g) 8 + . . . = 18	(h) 18 – 8 = . . .	(i) 8 + . . . = 17
(j) 17 – 8 = . . .	(k) 8 + . . . = 15	(l) 15 – 8 = . . .

9. What should you add to 8 to get 14?



10. How much is 13 – 8?



11. What must you add to 8 to get 13?

12. What is the difference between 15 m and 9 m?

13. (a) Copy and complete these calculations:

    14 + 6 → . . . + 10 → . . . + 2 = . . .

    (b) How much did you add on to 14 in total?

    (c) How much is 14 + 18?

    (d) How much is 32 – 18?

    (e) How much is 32 – 14?

> Subtraction is the **inverse** of addition. Addition is the **inverse** of subtraction.

14. Copy the number sentences for which you *cannot* find the answers quickly.

(a) 10 – 5 = . . .	(b) 15 – 8 = . . .	(c) 15 – 7 = . . .
(d) 15 – 9 = . . .	(e) 15 – 5 = . . .	(f) 15 – 6 = . . .
(g) 15 – 10 = . . .	(h) 15 – 4 = . . .	(i) 5 – 3 = . . .
(j) 10 – 7 = . . .	(k) 17 – 8 = . . .	(l) 17 – 9 = . . .
(m) 9 – 7 = . . .	(n) 17 – 7 = . . .	(o) 17 – 6 = . . .
(p) 17 – 10 = . . .	(q) 7 – 4 = . . .	(r) 7 – 3 = . . .
(s) 10 – 4 = . . .	(t) 14 – 8 = . . .	(u) 14 – 7 = . . .
(v) 14 – 9 = . . .	(w) 14 – 4 = . . .	(x) 14 – 6 = . . .

15. Copy the number sentences for which you *cannot* find the answers quickly.

(a) 14 – 10 = . . .	(b) 14 – 5 = . . .	(c) 14 – 3 = . . .
(d) 10 – 9 = . . .	(e) 19 – 8 = . . .	(f) 19 – 7 = . . .
(g) 19 – 9 = . . .	(h) 19 – 2 = . . .	(i) 19 – 6 = . . .
(j) 19 – 10 = . . .	(k) 19 – 4 = . . .	(l) 19 – 3 = . . .
(m) 10 – 6 = . . .	(n) 16 – 8 = . . .	(o) 16 – 7 = . . .
(p) 16 – 9 = . . .	(q) 16 – 6 = . . .	(r) 16 – 5 = . . .

16. Copy the number sentences for which you *cannot* find the answers quickly.

(a) 18 – 9 = . . .	(b) 18 – 8 = . . .	(c) 18 – 6 = . . .
(d) 18 – 10 = . . .	(e) 8 – 4 = . . .	(f) 8 – 3 = . . .
(g) 10 – 3 = . . .	(h) 13 – 8 = . . .	(i) 13 – 7 = . . .
(j) 13 – 9 = . . .	(k) 13 – 3 = . . .	(l) 13 – 6 = . . .
(m) 13 – 10 = . . .	(n) 13 – 4 = . . .	(o) 13 – 5 = . . .
(p) 10 – 2 = . . .	(q) 12 – 8 = . . .	(r) 12 – 7 = . . .
(s) 12 – 9 = . . .	(t) 12 – 4 = . . .	(u) 12 – 6 = . . .

17. Now complete the sentences that you copied in questions 14, 15 and 16. You may work from the facts that you know, or fill up to tens, or work in any other way you prefer.

3.4 Addition facts for multiples of 10 and 100

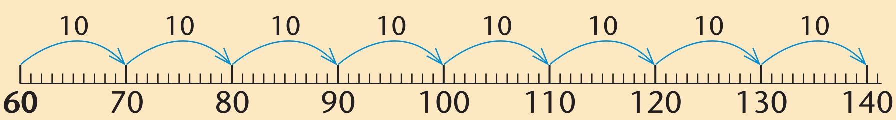
30 + 50 is 3 tens plus 5 tens.
300 + 500 is 3 hundreds plus 5 hundreds.
So, if you know that 3 + 5 = 8,
you can also know that 30 + 50 = 80 and 300 + 500 = 800.

1. How much is each of the following?

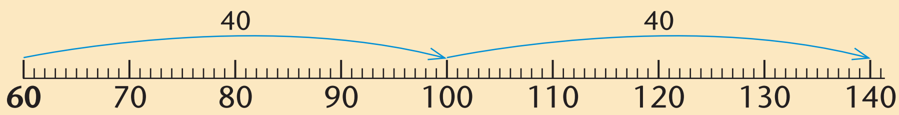
If you don't know the answers immediately, read the text below and on the next page first. Then try again.

(a) 80 + 70	(b) 700 + 200
(c) 30 + 90	(d) 500 + 400
(e) 80 – 30	(f) 900 – 500
(g) 70 + 90	(h) 140 – 80
(i) 130 – 40	(j) 900 + 500

You can think of **movements on a number line** when you count on in tens to do addition:



Instead of eight steps of 10 each, you may calculate 60 + 80 in two bigger steps of 40 and 40, by filling up to 100:



You do not have to draw a number line to think like this. You can just think of a number line and write as follows:
60 + 40 → 100 + 40 = 140

You can also use **doubling** to calculate 60 + 80:
Start with 60 + 60 = 120; then add 20 to make 60 + 80 = 140.

2. How much is each of the following?

(a) 80 + 70	(b) 80 + 50	(c) 70 + 60
(d) 100 – 40	(e) 50 + 70	(f) 90 + 80
(g) 70 + 90	(h) 160 – 90	(i) 70 + 80

3. What is the sum in each case?

(a) 20 + 20	(b) 200 + 200	(c) 30 + 30
(d) 300 + 300	(e) 40 + 40	(f) 400 + 400

A double can be used to make other facts.
For example, you can **transfer** 100 from the one 300 in 300 + 300 = 600 to the other 300:

100
300 + 300 = 600 ⟶ 200 + 400 = 600

You can make a different fact by transferring 200:

200
300 + 300 = 600 ⟶ 100 + 500 = 600

4. (a) Use 50 + 50 = 100 to make four other facts.
   (b) Use 500 + 500 = 1 000 to make four other facts.
   (c) Use 40 + 40 = 80 to make three other facts.
   (d) Use 400 + 400 = 800 to make three other facts.

You can also **add to numbers** in facts that you know, to make new facts about multiples of ten and hundred:

$$\begin{array}{ccccc} 30 & + & 50 & = & 80 \\ \downarrow{\scriptstyle +10} & & \downarrow & & \downarrow{\scriptstyle +10} \\ 40 & + & 50 & = & 90 \end{array} \qquad \begin{array}{ccccc} 300 & + & 300 & = & 600 \\ & & \downarrow{\scriptstyle +200} & & \downarrow{\scriptstyle +200} \\ 300 & + & 500 & = & 800 \end{array}$$

5. (a) Make five other facts from 20 + 30 = 50.
   (b) Make five other facts from 200 + 300 = 500.
   (c) Make five other facts from 300 + 400 = 700.

6. Copy the number sentences for which you *cannot* find the answers quickly.

(a) 80 + 90 = . . .	(b) 80 + 80 = . . .	(c) 80 + 60 = . . .
(d) 80 + 10 = . . .	(e) 80 + 40 = . . .	(f) 80 + 30 = . . .
(g) 10 + 30 = . . .	(h) 30 + 80 = . . .	(i) 30 + 70 = . . .
(j) 30 + 90 = . . .	(k) 30 + 30 = . . .	(l) 30 + 60 = . . .
(m) 30 + 10 = . . .	(n) 30 + 40 = . . .	(o) 30 + 50 = . . .

7. Now complete the number sentences that you have copied in question 6. You may work from the facts that you know, or fill up to hundreds, or work in any other way you prefer.

8. Copy the number sentences for which you *cannot* find the answers quickly.

(a) 100 + 700 = . . .	(b) 700 + 200 = . . .
(c) 900 + 100 = . . .	(d) 300 + 700 = . . .
(e) 800 + 900 = . . .	(f) 600 + 400 = . . .
(g) 100 + 400 = . . .	(h) 400 + 300 = . . .
(i) 400 + 200 = . . .	(j) 200 + 300 = . . .

9. Now complete the sentences that you copied in question 8. You may work from the facts that you know, or work in any other way you prefer.

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10. Find the numbers that are missing from the number sentences below. Write the answers only.

(a) 400 + . . . = 1 000
(b) 1 000 – 400 = . . .
(c) 40 + 60 = . . .
(d) 340 + 60 = . . .
(e) 570 + 30 = . . .
(f) 570 + 130 = . . .
(g) 570 + 330 = . . .
(h) 270 + . . . = 300
(i) 210 + . . . = 300
(j) 530 + . . . = 600
(k) 160 + . . . = 200
(l) 740 + . . . = 800
(m) 400 + 370 = . . .
(n) 300 + 195 = . . .

11. How much is each of the following?

(a) 300 + 400 + 20 + 60
(b) 200 + 300 + 400
(c) 500 + 30 + 400 + 20
(d) 200 + 300 + 80 + 70

3.5 Subtraction facts for multiples of 10 and 100

1. Farmer Nhlapo has 700 chickens. His wife has no chickens.

   (a) Farmer Nhlapo gives 200 of his chickens to his wife. How many chickens does he have left?

   (b) How many chickens do Farmer Nhlapo and his wife have altogether?

2. (a) Calculate 200 + 500.

   (b) Calculate 700 – 200.

3. What number is missing from this number sentence?
   $\square$ – 300 = 200

4. Farmer Marais has many sheep. He gives 300 sheep to his brother. Now he has 200 sheep left.

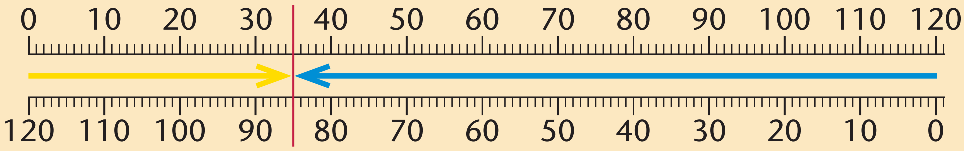
   How many sheep did farmer Marais have, before he gave 300 sheep to his brother?

5. (a) How much is 500 – 200?

   (b) How much is 500 – 300?

When you know an addition fact, you can easily find two subtraction facts.

For example if you know that 35 + 85 = 120, you also know that 120 – 35 = 85 and 120 – 85 = 35.



6. In each case give the answer, and write two subtraction facts. Follow the above example of 35 + 85 = 120.
   (a) 40 + 50
   (b) 300 + 600
   (c) 30 + 50
   (d) 200 + 700

One way to subtract is to ask yourself what must be added to the smaller number to make up the difference.

For example, to calculate 160 – 70 you may ask yourself what must be added to 70 to get to 160, and first fill up to 100. It is like finding the missing numbers in number sentences:

70 + *what number?* → 100 + *what number?* = 160

When you have found the missing numbers, you can add them to get the final answer.

70 + **30** → 100 + **60** = 160

So, 160 – 70 = 30 + 60 which is 90.

So 160 – 70 = 90

You can also subtract piece by piece, filling up to 100 first.

For example, to calculate 130 – 80 you may think like this:

130 – 30 = 100. *Now there is 50 more to subtract.*

100 – 50 = 50

So, 130 – 80 = 50

The above thinking can also be described as follows:

130 – **30** → 100 – **50** = 50, so 130 – 80 = 50

7. Make a rough drawing of a number line to show how 160 – 70 can be calculated by adding on to 70 as shown on the previous page.
8. Make a rough drawing of a number line to show how 130 – 80 can be calculated by subtracting 80 piece by piece.
9. Use arrows as you did before to show how the following can be calculated by filling up to 100.

(a) 120 – 70	(b) 140 – 50
(c) 160 – 70	(d) 130 – 50

10. Show how the following can be calculated by subtracting piece by piece.

(a) 120 – 80	(b) 140 – 70
(c) 150 – 80	(d) 130 – 80

11. Check each of your answers for questions 9 and 10 by doing addition.
12. Write the answers for the questions that you can do quickly, and show with addition that your answers are right. Copy the number sentences for which you *cannot* find the answers quickly.

(a) 100 – 70 = . . .	(b) 170 – 80 = . . .	(c) 170 – 90 = . . .
(d) 130 – 90 = . . .	(e) 170 – 70 = . . .	(f) 170 – 60 = . . .
(g) 170 – 10 = . . .	(h) 130 – 60 = . . .	(i) 160 – 50 = . . .
(j) 100 – 40 = . . .	(k) 140 – 80 = . . .	(l) 140 – 70 = . . .
(m) 140 – 90 = . . .	(n) 140 – 40 = . . .	(o) 140 – 60 = . . .
(p) 100 – 90 = . . .	(q) 190 – 80 = . . .	(r) 190 – 70 = . . .
(s) 100 – 60 = . . .	(t) 160 – 80 = . . .	(u) 160 – 70 = . . .
(v) 160 – 90 = . . .	(w) 160 – 60 =	(x) 150 – 70 = . . .

13. Now complete the sentences you have copied in question 12. You may work in any way you prefer.

There are eight different ways to form 900 by adding two multiples of hundred:

100 + 800 = 900	200 + 700 = 900
300 + 600 = 900	400 + 500 = 900
500 + 400 = 900	600 + 300 = 900
700 + 200 = 900	800 + 100 = 900

If you know that 300 + 600 = 900, you also know two subtraction facts, namely 900 – 600 = 300 and 900 – 300 = 600.

14. Write all the other subtraction facts that you can know if you know the different addition facts given above.

15. How much is each of the following?
    (a) 900 – 400 (b) 900 – 600
    (c) 1 000 – 600 (d) 1 000 – 400
    (e) 800 – 300 (f) 700 – 300
    (g) 1 000 – 300 (h) 600 – 200

3.6 Add and subtract with multiples of 10

1. Calculate each of the following. You may think of movements on a number line and filling up to the nearest 100 to help you to do this.
    (a) 260 + 90 (b) 280 + 70
    (c) 170 + 60 (d) 670 + 150

You need not draw a number line when you add *by filling up*. You can just write as follows:

280 + 20 → **300** + 70 = 370, so 280 + 90 = 370

2. Calculate.
    (a) 270 + 80 (b) 480 + 60
    (c) 560 + 90 (d) 370 + 70

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A different method to add multiples of 10 is to break numbers down into hundreds parts and tens parts, for example:

$$\begin{aligned} 260 + 90 &= 200 + 60 + 90 \\ &= 200 + 150 \\ &= 200 + 100 + 50 \\ &= 300 + 50 \\ &= 350 \end{aligned}$$

You need not write down all the steps when you work like this.

3. Calculate each of the following in two ways.
   Do it by breaking numbers down into hundreds and tens.
   Also do it by filling up to a multiple of hundred.
   Show your thinking clearly in writing in each case.

   (a) 270 + 70 (b) 660 + 80 (c) 350 + 280

4. Calculate each of the following in the way that you prefer.
   You may prefer different methods for different calculations.

   (a) 780 + 30 (b) 580 + 230
   (c) 470 + 60 (d) 60 + 230
   (e) 630 + 90 (f) 420 + 340
   (g) 480 + 340 (h) 70 + 380
   (i) 730 + 100 (j) 730 + 160

It sometimes makes addition easier if you switch the numbers around.

Addition can be used to check whether subtraction was done correctly.

You can calculate 940 – 380 by **adding on** to 380 until you reach 940, as shown here:

380 + **20** → 400 + **540** = 940
So 940 – 380 = 20 + 540, which is 560.

You can also subtract by **rounding off and compensating**.
For example, you can calculate 830 – 270 by first subtracting 300:

830 – 300 = 530 but you have now subtracted 30 too much.
So you have to compensate by putting the 30 back:
530 + 30 = 560, so 830 – 270 = 560.

5. (a) Calculate 850 – 360 and 730 – 270 in any way you prefer.
   (b) Check your answers by doing the same calculations in a different way.
   (c) Also check your answers by doing addition.

6. Calculate in any way you prefer, and check each answer by doing addition.

(a) 780 – 520	(b) 520 – 280
(c) 430 – 160	(d) 760 – 280
(e) 630 – 290	(f) 420 – 340
(g) 480 – 340	(h) 970 – 380

Another way to subtract is to **break the numbers down** and **work with the parts**, then **build the answer up**.

For example, to calculate 720 – 450 you can think like this:
720 is 700 and 20 and
450 is 400 and 50.

It is easy to subtract 400 from 700 but to subtract 50 from 20 creates a problem.

To make it easier, you can replace 700 + 20 with 600 + 120.
Then you can subtract 50 from 120 and 400 from 600.
So, 720 = 600 + 120 and 450 = 400 + 50.

$$\begin{aligned} \text{Hence } 720 - 450 &= \underbrace{600 - 400}_{200} + \underbrace{120 - 50}_{70} \\ &= 200 + 70 \\ &= 270 \end{aligned}$$

Instead of the curly signs $\underbrace{\qquad}$ we may use brackets to indicate the plan to calculate 600 – 400 and 120 – 50 separately:

$$\begin{aligned} 720 - 450 &= (600 - 400) + (120 - 50) \\ &= 200 + 70 \\ &= 270 \end{aligned}$$

7. Break down, work with parts and build up the answer to calculate the following.
   (a) 430 – 160 (b) 760 – 280
   (c) 630 – 290 (d) 420 – 340

8. Check whether you got the same answers for the above calculations as when you did them in question 6.

9. Use any method that you prefer to calculate the following. Check all your answers by doing addition.
   (a) 810 – 220 (b) 710 – 120
   (c) 630 – 330 (d) 630 – 460
   (e) 640 – 370 (f) 820 – 280

10. Lerato calculated 840 – 550 like this:

    840 – 540 = 300 so 840 – 550 is 10 less than 300, and that is 290.

    Do you think Lerato was clever to work like this? Write a short paragraph about it.

3.7 Round off and estimate

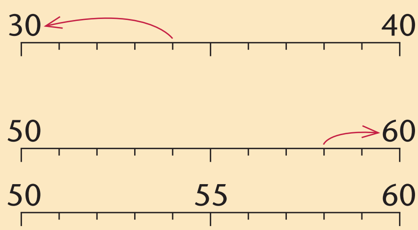
It is often useful to quickly make approximate answers for calculations. Imagine you buy items for R34 and R58 and do not have time to accurately calculate R34 + R58.

It can help you to know that you need to pay about R30 + R60, which is R90.

34 can be **rounded off** to the **nearest multiple of ten**, which is 30.

58 can be rounded off to 60.

55 is equally far from 50 and 60.



People all over the world have agreed to round off "upwards" in a case like this, so 55 is normally rounded off to 60.

678 rounded off to the nearest multiple of ten is 680.

678 can also be rounded off to the **nearest multiple of hundred**, which is 700.

634 rounded off to the nearest multiple of hundred is 600.

634 rounded off to the nearest multiple of ten is 630.

1. Round off each number to the nearest ten.

   (a) 387 (b) 484 (c) 185 (d) 594
   (e) 249 (f) 255 (g) 250 (h) 63

2. Round off the numbers in question 1 to the nearest hundred.

3. In each case round off to the nearest ten, then calculate the sum or difference of the rounded numbers.

   (a) 43 + 52 (b) 46 + 52 (c) 46 + 57
   (d) 74 – 35 (e) 76 – 35 (f) 76 – 34

4. In each case round off to the nearest hundred, then calculate the sum or difference of the rounded numbers.

   (a) 267 + 466 (b) 932 – 437
   (c) 343 + 549 (d) 886 – 278

Rounding off can be used to **estimate** the answers for calculations.

Example

A traveller has driven 268 kilometres of the 859 kilometres to his destination. Approximately how far does he still have to drive?

268 and 859 rounded off to the nearest hundred are 300 and 900.

The traveller still has to drive approximately 900 – 300 kilometres, that is 600 kilometres.

Round off to *the nearest hundred* when you do questions 5 and 6.

5. There are 108 houses in one town, 362 houses in another town and 269 houses in a third town. Approximately how many houses are there in the three towns together?

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6. A farmer has 734 cows. A veldfire breaks out and 568 of the cows are killed. Approximately how many cows are left?
7. Do questions 5 and 6 again, but this time round off the numbers to *the nearest ten* before you calculate.
8. Mrs Tshabalala wrote the prices of items she bought on a paper slip.
   Round off each price to the nearest ten rand.
   Then estimate the total by adding the rounded-off prices.

   47
   132
   34
   74
   58
   58
   198
   66

To calculate 78 + 64 you can first **round off** to the nearest ten and get an approximate answer: 80 + 60 = 140.
Then you can **compensate** to get the accurate answer: 140 – 2 + 4 = 142.

9. Compensate to get the accurate answers for questions 5, 6 and 8.

3.8 Break down and build up numbers

To add numbers, it helps to break them down into place value parts first. For example, when you have to calculate 364 + 588, the numbers may be taken apart like this:

364: 4 300 60

588: 80 8 500

The hundreds can be added to the hundreds, the tens to the tens and the ones to the ones:

300 + 500 = 800 60 + 80 = 140 4 + 8 = 12

So, 364 + 588 = 800 + 140 + 12

1. Write 800 + 140 + 12 as a single number.

2. Two numbers are given in expanded notation below. Add the two numbers and write the answer as a single number.

   The numbers are 400 + 30 + 4 and 300 + 50 + 3.

3. Calculate 364 + 678.

To calculate 458 + 276 you may **break down the numbers** and **work with the parts**, then **build up the answer**:

Break down:

458 = 400 + 50 + 8 and 276 = 200 + 70 + 6

Work with the parts:

400 + 200 = 600 50 + 70 = 120 8 + 6 = 14

Build up the answer:

600 + 120 + 14

100

= 700 + 20 + 14

10

= 700 + 30 + 4

= 734

4. Calculate.

   (a) 239 + 456 (b) 387 + 288

   (c) 368 + 446 (d) 532 + 234

Two different ways to calculate 734 – 568 are shown below.

A. The filling-up or add-on method

To calculate how much 734 – 568 is you may ask yourself how much you must add to 568 to reach 734.

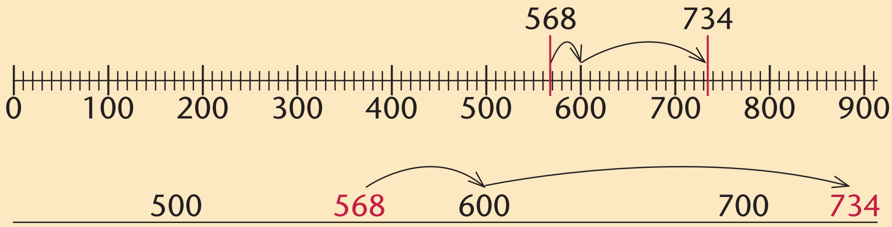
You may then do this in steps as shown below.

568 + **32** → 600 + **134** = 734

You had to add 32 and 134 which is a total of 166.

So 734 – 568 = 166.

Some people think of movements on a number line to help them to keep track of their thinking when they use the above method of subtraction:



B. The break down and build up method

In a case such as 786 – 523, the *break down and build up method* is quite easy:

786 = 700 + 80 + 6	or	**700** and **80** and **6**.
523 = 500 + 20 + 3	or	**500** and **20** and **3**.

500 can be taken from 700 to give 200: **700 – 500 = 200**
20 can be taken from 80 to give 60: **80 – 20 = 60**
3 can be taken from 6 to give 3: **6 – 3 = 3**
Hence 786 – 523 = 200 + 60 + 3, which is 263.

5. Use the *break down and build up method* to calculate each of the following.
   (a) 937 – 624 (b) 876 – 445
   (c) 348 – 33 (d) 987 – 352
6. Do the calculations in question 5 with the *filling-up method*. Then compare the answers that you got with the two methods to check whether you worked correctly.
7. Try to calculate 924 – 637 using the *break down and build up method*.
8. Write each of the following as a single number.
   (a) 800 + 40 + 3 (b) 700 + 130 + 13
   (c) 600 + 70 + 19 (d) 400 + 260 + 39

When we have to calculate 843 – 385 and we **break down** 843 and 385, we find that the parts are not convenient for calculating 843 – 385:

843 = 800 + 40 + 3

385 = 300 + 80 + 5

Fortunately we can make a plan:
We can replace 800 + 40 + 3 with 700 + 130 + 13.

843 = 700 + 130 + 13

385 = 300 + 80 + 5

It is now easy to **work with the parts**, that is to subtract the hundreds parts, the tens parts and the units parts:

700 – 300 = 400 130 – 80 = 50 13 – 5 = 8

Now you can **build up the answer**:

843 – 385 = 400 + 50 + 8, which is 458.

9. Use the *break down and build up method* to calculate these.
   (a) 934 – 676 (b) 845 – 469
   (c) 348 – 165 (d) 952 – 387

10. Do the calculations in question 9 by using the *filling-up method*. Then compare the answers that you got with the two methods to check whether you worked correctly.

11. Use any method that you prefer to do each calculation below. Use addition to check your answers.
    (a) 876 – 345 (b) 766 – 232
    (c) 734 – 476 (d) 624 – 387

12. Janice and Zain both calculate 760 – 340 + 260.
    Janice first calculates 760 – 340; then she adds 260.
    Zain first calculates 340 + 260; then he subtracts from 760.

    (a) Do you expect them to get the same answer?

    (b) Investigate whether your expectation is right.

3.9 Solve problems

1. In each question below you will compare two sticks. You can make rough drawings to help you to think about the questions.

   (a) One stick is 153 cm long and the other stick is 78 cm shorter.
   How long is the shorter stick?
   How long are the two sticks together?

   (b) One stick is 364 cm long and the other stick is 118 cm long.
   What is the difference between the lengths?
   How long are the two sticks together?

   (c) The longer of two sticks is 387 cm long and the difference between the lengths of the two sticks is 185 cm.
   How long is the shorter stick?
   How long are the two sticks together?

2. 276 m of the road from the school gate to the office is tarred. The total distance is 349 m.

   You can sometimes make rough drawings to help you to understand questions.

   (a) Estimate, to the nearest 100 m, how much of the road still needs to be tarred.

   (b) Estimate, to the nearest 10 m, how much of the road still needs to be tarred.

   (c) Calculate exactly how much of the road still needs to be tarred.

   (d) How far out was your estimate in (a)?

   (e) How far out was your estimate in (b)?

In all the questions below, make an estimate of the answer before you do the accurate calculations. Write your estimates down.

3. Johannes has 168 peach trees, 392 plum trees and 279 pear trees in his orchard. How many fruit trees are there altogether?
4. Out of the 902 children in a school, 507 are boys. How many girls are there in the school?
5. What number is missing from this number sentence?

   $902 = 507 + \square$
6. John saved R374 for a bike in one year. The next year he saved another R536. How much did he save over the two years?
7. What number is missing from $308 + \square = 855$?
8. A farmer has already pruned 308 of her 855 peach trees. How many trees must she still prune?
9. Write a number sentence, such as in question 5 or 7, that will have the same answer as the question below.

   During the year, 324 houses were built in a housing development. At the end of the year there were 713 houses. How many houses were there at the beginning of the year?
10. After Rallai had withdrawn R275 of his savings, there was still R428 left. How much money did he originally have in his savings account?
11. Shop A sold 462 hamburgers and Shop B sold 148 hamburgers more. How many hamburgers did Shop B sell?
12. Jan has saved R568. He wants to buy a jacket that costs R734. How much more must he save?
13. Katharina grows pumpkins on her plot. Last month she harvested 867 pumpkins and sold 235 to shops in her village. She sent the rest to the fresh produce market in Durban. How many pumpkins did she send to the market?

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Unit 4 Numeric patterns

4.1 Seeing patterns

The more patterns you can see in mathematics,
the better you are at mathematics!
How good are you at seeing patterns?

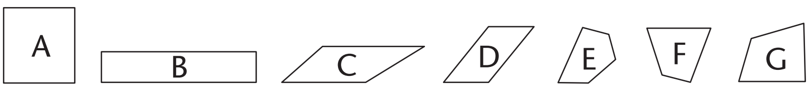
1. In each case, say which item does not fit with the others. Explain why you say so.

   (a) 5, 10, 30, 45, 56, 25, 55, 20, 35

   (b) 12, 36, 10, 48, 23, 32, 40, 66, 24, 98

   (c) *abc*, *bca*, *cab*, *bac*, *aca*, *acb*, *cba*

   (d)



2. Here are Lindi's answers for question 1. Do you agree with her? Or did you see different patterns?

   (a) The numbers are all different. But what is the same is that they are all multiples of 5; except 56, which is not.

   (b) The numbers are all different. But what is the same is that they are all even numbers; except 23, which is an odd number.

   (c) The "words" are all different. But what is the same is that they all have the letters *a*, *b* and *c*, in any order; except *aca* which does not have a *b*.

   (d) The figures are all different. But what is the same is that they all have 4 sides; except Figure E, which has 5 sides.

Different, but the same!
To see a **pattern**, we look for what is the *same* in ALL the *different* things.

4.2 Making patterns

A row of numbers that follow each other in a pattern, is called a **sequence**. Each number is calculated from the previous number in the same way.

Here are two examples of sequences that you already know:

- When the teacher asks Sally to "count in fives", she counts like this by adding 5 each time:
  5, 10, 15, 20, 25, ...
- For the instruction "start at 1 and count on in fives", Sally counts like this:
  1, 6, 11, 16, 21, ...

We use the following words and notation to write and to talk about sequences. For example, in the case of the first sequence above:

2nd number 4th number

5, 10, 15, 20, ... Three dots means it goes on forever

1st number 3rd number

We can also write the sequence in a table and indicate the **position number**, like this:

Position number	1	2	3	4	5	6	7	100
Sequence	5	10	15	20	25			

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When learning about sequences, you will learn how to *recognise* patterns, *describe* patterns, and *continue* patterns.

You will learn how to answer questions such as these. You can try to answer them now, if you like.

- If Sally continues counting in the same way, what are the next two numbers she will count in each sequence?
- What will be the 100th number Sally will count in each sequence?
- If Sally continues and continues, will the number 325 be in her sequences or not? How do you know?

1. For each of the instructions in (a) to (f) below:
   - write down the sequence according to the instruction.
   - describe in your own words what is different and what is the same for all the numbers in the sequence.
   - write down the 100th number in the sequence.

   (a) Count in fives.

   (b) Start at 1 and count on in fives.

   (c) Start at 2 and count on in fives.

   (d) Start at 3 and count on in fives.

   (e) Start at 4 and count on in fives.

   (f) Start at 5 and count on in fives.

2. What is different, and what is the same for *all* the sequences in question 1?

3. Write down your own instruction for a sequence, and then write down the sequence.

4.3 Describing patterns

1. When a son was born, his father was 30 years old. How old is the father when the son is 10 years old?

Over the years, the son's mother wrote down the father's and the son's ages in a table, like this:

Age of son (years)	0	1	2	3	4	5	12	20
Age of father (years)	30	31	32	33	34	35		

2. Describe any patterns that you can see in the table. (What is different and what remains the same?)
3. Complete the table. This means:
   (a) Work out how old the father will be when the son is 12.
   (b) Work out how old the father will be when the son is 20.

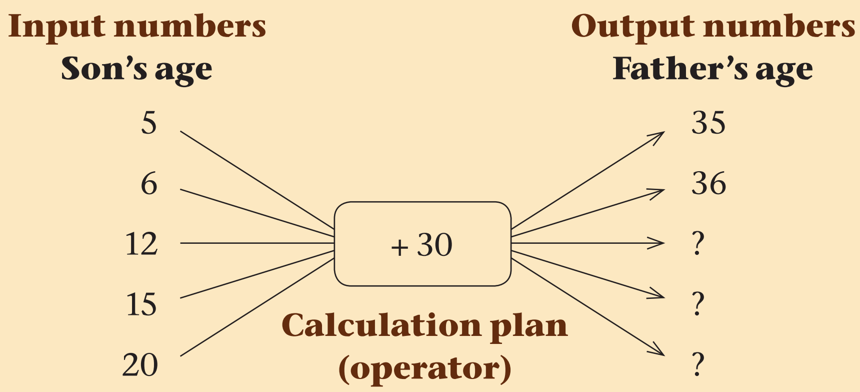
We can describe the father and son's ages in different ways:

- In **words**:
  The father is always 30 years older than the son.
- As a **calculation plan (rule)**:
  Father's age = *Son's age* + 30

  Although their ages change all the time, the calculation plan remains the same for all ages:

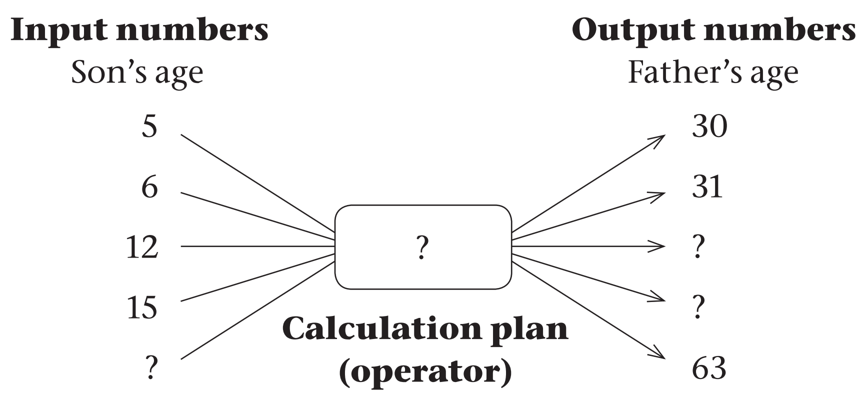
Son's age	1	2	3	4	… 10	11
	$\downarrow +30$	$\downarrow +30$	$\downarrow +30$	$\downarrow +30$	$\downarrow +30$	$\downarrow +30$
Father's age	31	32	33	34	… 40	41

- With a **flow diagram**, such as the one on the next page.



This flow diagram shows that we must, for example, take the **input number** 5 and add 30 to it to give the **output number** 35.

4. Find the three missing output numbers; this means the father's age when the son was 12, 15 and 20.
5. How do you calculate the input number for the output number 60? This is the same as finding the missing number in the open number sentence $\square + 30 = 60$. Calculate it.
6. Find the son's age when the father is 37, 40, 43, 46 and 50.
7. This flow diagram shows the ages of another father and son.



   (a) What is the calculation plan (operator) connecting the input and output numbers?
   (b) Find the missing input and output numbers.

4.4 Recognising and describing patterns

1. Theo's mother often sends him to buy candles for their home. The candles cost R4 each.

   (a) Complete this table to calculate the cost of different numbers of candles.

   (b) Describe your method.

No. of candles	1	2	3	4	5	6	10	20	
Cost (rands)	4								100

2. This is Theo's method:

No. of candles	1	2	3	4	5	6	7	20
Cost (rands)	4	8	12	16	20			
		+4	+4	+4	+4			

   (a) Is Theo's method correct?

   (b) Describe his method in words.

   (c) Use Theo's method to calculate the cost of 6, 7 and 20 candles.

3. This is Nadia's method:

No. of candles	1	2	3	4	5	6	7	20
	×4	×4	×4	×4	×4	×4		
Cost (rands)	4	8	12	16	20			

   (a) Is Nadia's method correct?

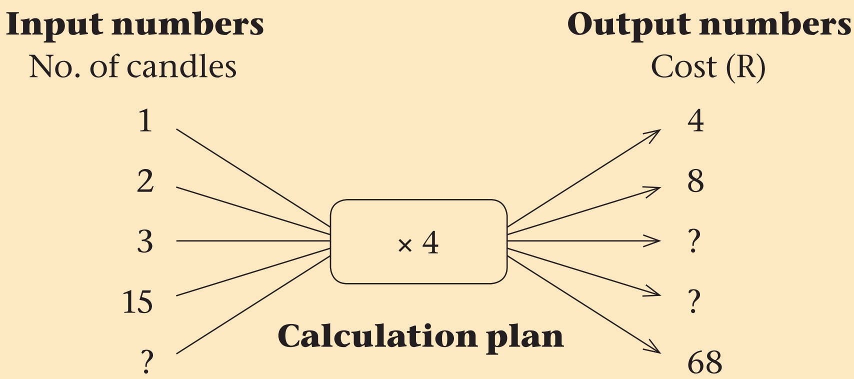
   (b) Describe her method in words.

   (c) Use Nadia's method to calculate the cost of 6, 7 and 20 candles.

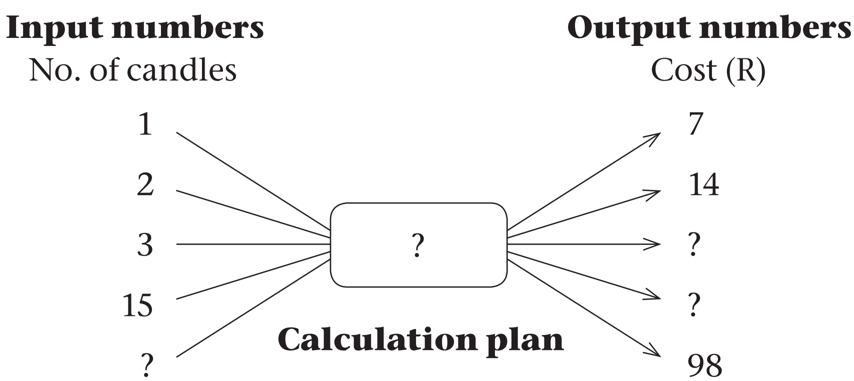
4. Which method do you prefer, Theo's method or Nadia's method? Why? Discuss.

We can describe the cost of the candles in different ways:

- In **words**:
  The candles cost R4 each.
- As a **calculation plan (rule)**:
  Cost of candles = Number of candles × 4
- With this **flow diagram**:



5. Calculate the missing numbers in the flow diagram.
6. This flow diagram shows the cost of candles at another shop.



   (a) What is the calculation plan connecting the input and output numbers?
   (b) Find the missing input and output numbers.

4.5 Tables or multiples

Here is part of the multiplication table.

×	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15					
4	4	8	12							
5	5	10	15	20	25					
6	6	12	18							
7	7	14	21							

1. Complete the table.
2. Which methods did you use to complete the table? Discuss.
3. Discuss what patterns you see in the table, and how that helps you to "remember" the tables.

The multiplication table consists of sequences of **multiples**. For example:

2, 4, 6, 8, 10, 12, ... are the **multiples of 2** (or even numbers).
3, 6, 9, 12, 15, ... are the **multiples of 3**.

These sequences are all different, but they are the same in two ways:

- In all the "tables" or sequences of multiples we add the same number (the multiple) to get the next number in the sequence. For example:

$$2 \xrightarrow{+2} 4 \xrightarrow{+2} 6 \xrightarrow{+2} 8 \xrightarrow{+2} 10 \xrightarrow{+2} 12 \xrightarrow{+2} \ldots$$

$$3 \xrightarrow{+3} 6 \xrightarrow{+3} 9 \xrightarrow{+3} 12 \xrightarrow{+3} 15 \xrightarrow{+3} 18 \xrightarrow{+3} \ldots$$

We can, for example, describe the sequence 3, 6, 9, 12, ... by saying that we add 3 to each number to get the next number. So, we can also use it as a calculation plan.

- The sequences of multiples all have the same kind of calculation plan (rule), namely multiplication only:

Position no.	1	2	3	4	5	6	...
	↓ ×2	↓ ×2	↓ ×2	↓ ×2	↓ ×2	↓ ×2	
Multiple no.	2	4	6	8	10	12	...

Position no.	1	2	3	4	5	6	...
	↓ ×3	↓ ×3	↓ ×3	↓ ×3	↓ ×3	↓ ×3	
Multiple no.	3	6	9	12	15	18	...

So, we can describe the sequence 3, 6, 9, 12, ... with a calculation plan:

Multiple number = *Position number* × 3

So: multiple 100 = 100 × 3 = 300

4. (a) Calculate the next five numbers and the 100th number in each sequence. Describe your methods.

Sequence A: 2, 4, 6, 8, 10, 12, 14, 16, ...

Sequence B: 3, 6, 9, 12, 15, 18, 21, ...

Sequence C: 5, 10, 15, 20, 25, 30, 35, ...

Sequence D: 7, 14, 21, 28, 35, 42, 49, ...

Sequence E: 9, 18, 27, 36, 45, 54, 63, ...

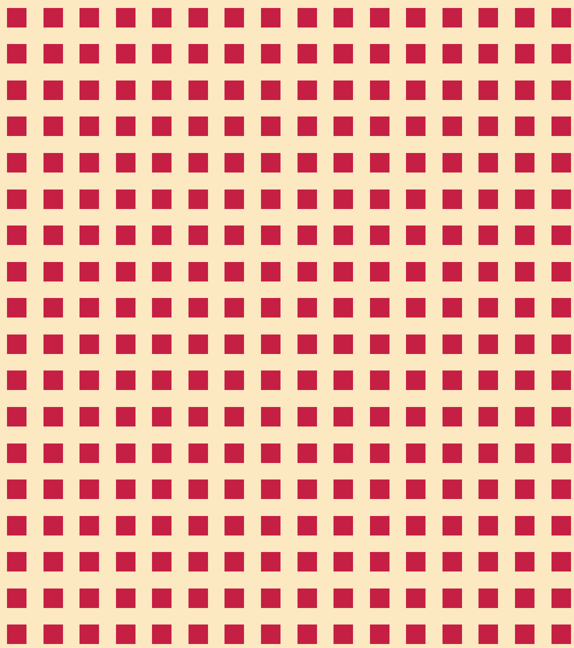
Sequence F: 10, 20, 30, 40, 50, 60, 70, ...

(b) What is the same and what is different in each and in all of these sequences?

UNIT 5 WHOLE NUMBERS: MULTIPLICATION AND DIVISION

5.1 Multiplication

Counting takes a lot of time, especially when there are many objects to be counted. For instance, it may take a lot of time to count all the squares shown below.



A quicker way is to add 16 repeatedly: 16 + 16 + 16 + …

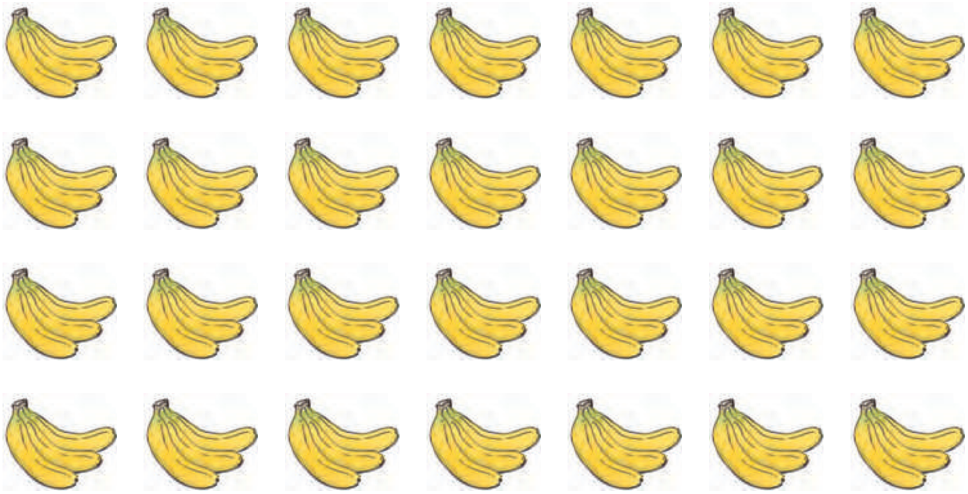
But if you can calculate 18 × 16, it is even quicker!

To be able to calculate something like 18 × 16, you need to know some multiplication facts, such as 10 × 6 = 60, 8 × 6 = 48, 10 × 10 = 100 and 8 × 10 = 80.

In this unit you will learn many facts like these.

1. How many squares are shown on this page?
2. Compare your answer with that of a classmate.

5.2 Count objects



1. (a) How many bananas are there in one bunch?
   (b) How many bananas are there in five bunches?
   (c) How many bananas are there in ten bunches?
   (d) How many bananas are there in nine bunches?
   (e) How many bananas are there in seven bunches?
   (f) How many bananas are there in six bunches?

What you did to answer questions 1(b) to (f) is called **multiplication**.

In question 1(b) you multiplied 3 by 5. This can be written **in symbols**: 5 × 3. You may write 5 × 3 = 15. You can also write 3 × 5 = 15, because 5 × 3 = 3 × 5.

2. Write your answer to question 1(d) in symbols.
3. Copy the numbers below and count on in threes to write the first 20 numbers in this pattern:
   3 6 9 12 . . .

4. Use the numbers in the counting pattern that you wrote for question 3 to say how much each of the following is.
   (a) 6 × 3   (b) 7 × 3   (c) 8 × 3   (d) 4 × 3
5. Check your answers to question 4 by counting bananas on page 61.
6. How much is each of the following?
   (a) 10 × 3   (b) 9 × 3   (c) 7 × 3   (d) 5 × 3
   (e) 2 × 3   (f) 3 × 3   (g) 6 × 3   (h) 4 × 3

You have now learnt some important multiplication facts that you should try to remember. This set of facts is sometimes called the "three times table". Knowing these facts will help you to solve many problems easily and quickly.

7. Copy and complete the three times table.

×	1	2	3	4	5	6	7	8	9	10
3	3	6	9	12						

8. Use your knowledge of the three times table to quickly find out how much each of the following is, just by doing addition or subtraction:
   (a) 5 × 3 + 3 × 3   (b) 12 × 3
   (c) 6 × 3 + 6 × 3   (d) 10 × 3 – 4 × 3
   (e) 9 × 3 – 4 × 3   (f) 4 × 3 + 5 × 3

Each item in question 8 is a **plan** to do a calculation.
We can say each item is a **calculation plan** or **expression**.

People all over the world have agreed that when multiplication, addition and subtraction appear in the same plan, multiplication is done first unless otherwise indicated.

So, the plan 5 × 3 + 3 × 3 tells you to multiply 5 by 3, then multiply 3 by 3 and add the two totals together.

9. (a) How many bunches of 3 make 18 bananas?
   (b) How many bunches of 3 make 24 bananas?
   (c) How many bunches of 3 make 21 bananas?
   (d) How many bunches of 3 make 30 bananas?

10. (a) How many bananas are there in 3 bunches of 5 bananas each?

   (b) How many bananas are there in 5 bunches of 3 bananas each?

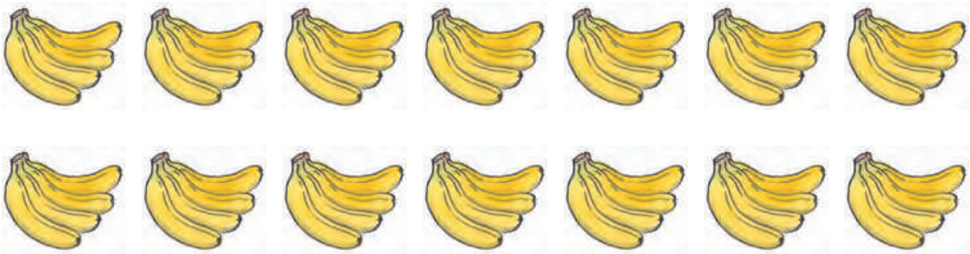
11. What do you notice about 3×5 and 5×3?

> When two numbers are multiplied, they can be swopped around: the answer remains the same. This is a **property** of multiplication.

12. Do you think addition also has this property? Investigate whether two numbers can be swopped around when they are added.

13. Do you think subtraction also has this property? Investigate whether two numbers can be swopped around when the one number is subtracted from the other number.

5.3 Learn more multiplication facts



1. (a) How many bananas are there in ten bunches?
   (b) How many bananas are there in nine bunches?
   (c) How many bananas are there in eight bunches?
   (d) How many bananas are there in seven bunches?
2. Copy the numbers below and count on in fours to write the first 20 numbers in this pattern:

   4 8 12 16 . . .
3. Use the numbers in the counting pattern you wrote for question 2 to say how much each of the following is.
   (a) 6×4 (b) 7×4
   (c) 8×4 (d) 4×4
   (e) 9×4 (f) 10×4
4. Copy and complete the four times table.

×	1	2	3	4	5	6	7	8	9	10
4	4	8	12	16						

5. (a) How many bunches of 4 make 20 bananas?
   (b) How many bunches of 4 make 28 bananas?
   (c) How many bunches of 3 make 42 bananas?
   (d) How many bunches of 3 make 36 bananas?
   (e) How many bananas should be in each bunch so that 5 bunches are 15 bananas?

(f) How many bananas should be in each bunch so that 7 bunches is 28 bananas?

6. Use your knowledge of multiplication facts to quickly find out how much each of the following is, just by doing addition or subtraction:
   (a) $5 \times 4 + 4 \times 4$
   (b) $10 \times 4 - 4 \times 4$
   (c) $6 \times 4 + 6 \times 4$
   (d) 12×4
   (e) $4 \times 9 - 4 \times 4$
   (f) $4 \times 4 + 4 \times 5$

7. Copy and complete the five times table.
   You will have to make your own plan to find the facts.

×	1	2	3	4	5	6	7	8	9	10
5	5	10	15	20						

8. Describe the plan that you made to find the facts to one of your classmates.

9. How much is each of the following?
   (a) 10×5
   (b) 9×5
   (c) 7×5
   (d) 5×5
   (e) 2×5
   (f) 6×5
   (g) 8×5
   (h) 3×5
   (i) 4×5

10. (a) How many bananas are there in six bunches of five bananas each?

    (b) How many bananas are there in ten bunches of five bananas each?

    (c) How many bananas are there in nine bunches of five bananas each?

    (d) How many bananas are there in eight bunches of five bananas each?

    (e) How many bananas are there in seven bunches of five bananas each?

11. (a) Copy and complete the ten times table.

×	1	2	3	4	5	6	7	8	9	10
10	10	20	30	40						

(b) How much is $3 \times 10 + 5 \times 10$?

(c) How much is $8 \times 10 - 4 \times 10$?

12. Copy and complete the six times table. If you wish, you may use the three times table that you made earlier to help you.

×	1	2	3	4	5	6	7	8	9	10
6										

13. There are six bottles of juice in one pack.

(a) How many bottles are there in 8 packs?

(b) How many bottles are there in 9 packs?

14. Copy and complete the table, to show the multiplication facts you have learnt so far. Try to do it without looking at the 3 times, 4 times, 5 times, 10 times and 6 times tables that you completed earlier.

×	2	4	8	3	6	7	5	10	9
10	20		80						
5									
3									
6		24							
4			32			28			

15. Did you use some of the facts that you knew well to make it easier to complete this table? Describe your plans to one of your classmates, and explain them if you can.

16. How much is each of the following?

(a) 6×8 (b) 4×9 (c) 8×6 (d) 9×4

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5.4 Multiply by 7, 8 and 9

1. Make a copy of the table and fill in the facts you already know.

×	2	3	4	8	1	6	7	5	10	9
8										
7										
9										

2. How much is each of the following? To find the answers, you may count in nines if you wish, or you can use different methods.

   (a) $9 + 9 + 9 + 9 + 9 + 9 + 9$

   (b) $9 + 9 + 9 + 9 + 9 + 9 + 9 + 9$

   (c) $9 + 9 + 9 + 9 + 9 + 9 + 9 + 9 + 9$

   (d) $9 + 9 + 9 + 9 + 9 + 9 + 9 + 9 + 9 + 9$

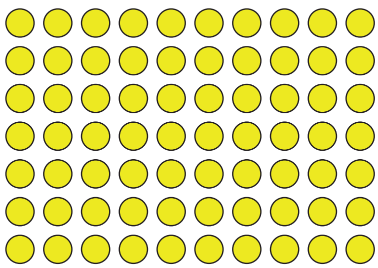
   Use your answers to answer question 3.

   Also use your answers to fill in more cells of your table.

3. (a) Make your own plans to find the facts that you need to fill in cells that are still open in your table for question 1.

   (b) Explain the plans that you made to one of your classmates.

4. There are 7 rows with 10 dots each in this diagram.



   Which of the following multiplication facts can you use to know how many dots there are in the diagram, altogether?

   (a) $7 \times 7 = 49$ (b) $7 \times 8 = 56$

   (c) $7 \times 9 = 63$ (d) $7 \times 10 = 70$

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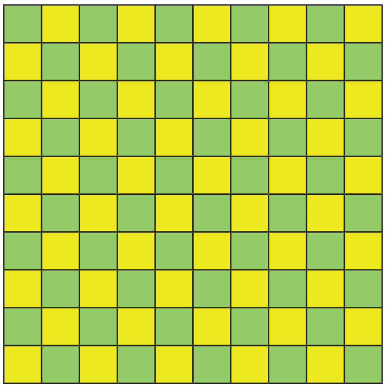
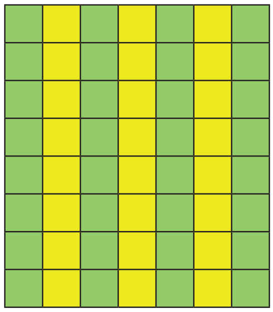
5. Use the multiplication facts that you know to state how many squares there are in each of the diagrams below.

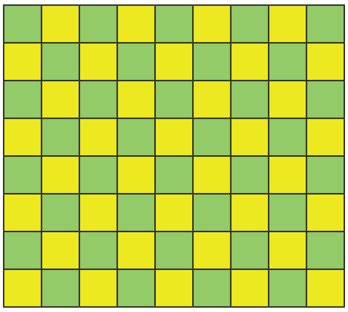
(a)



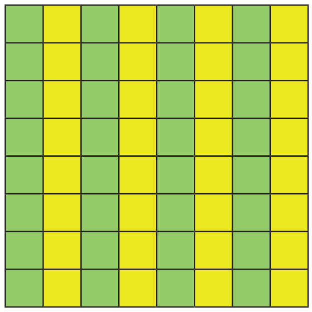
(b)



(c)



(d)



6. Copy and complete the table.

×	1	2	4	8	3	6	7	5	10	9
8				64						
3										
6										
7										
9										

7. What will each of the following cost in total?

(a) 9 apples at R7 each
(b) 8 cans of juice at R9 each
(c) 7 pencils at R8 each
(d) 6 pens at R9 each
(e) 6 oranges at R8 each
(f) 8 pears at R8 each

5.5 Multiplication in reverse

You will now learn to use your knowledge of multiplication facts to solve problems like the following.

A. David paid R63 for 7 packets of sweets. How much did each packet cost?

B. How many loaves of bread at R6 each can Musi buy with R48?

The following table can help you to solve problems like problems A and B above.

×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

1. Look at the table. Note that the numbers 48 and 63 are coloured in. Now use the table to find the answers to the following questions.

   (a) How many sixes make up 48?

   (b) 7 × *which number*? = 63

What you did to find the answers to question 1 is called **division**.

2. Find the missing number in each of the following number sentences.
   Try to do this by using your knowledge of multiplication facts. The table on the previous page may also be helpful.

(a) $4 \times \ldots = 24$	(b) $\ldots \times 8 = 32$	(c) $27 = 3 \times \ldots$
(d) $\ldots \times 9 = 36$	(e) $3 \times \ldots = 18$	(f) $49 = \ldots \times 7$
(g) $8 \times \ldots = 56$	(h) $\ldots \times 8 = 64$	(i) $63 = 7 \times \ldots$
(j) $\ldots \times 6 = 60$	(k) $6 \times \ldots = 54$	(l) $35 = \ldots \times 5$

The correct answer for question 2(a) is 6, because $4 \times 6 = 24$.

There is a different way in which question 2(a) can be asked. Instead of asking $4 \times ? = 24$, we can ask the question "How much is 24 divided by 4?"

We can write "24 divided by 4" in symbols, like this: $24 \div 4$.

3. Calculate, and check your answers by doing multiplication.

(a) $10 \div 2$	(b) $9 \div 3$	(c) $12 \div 2$	(d) $12 \div 3$
(e) $12 \div 4$	(f) $20 \div 4$	(g) $10 \div 5$	(h) $25 \div 5$

4. How much is each of the following? You can get the first four answers from your work in question 2.

(a) $63 \div 7$	(b) $35 \div 5$	(c) $64 \div 8$
(d) $56 \div 8$	(e) $100 \div 10$	(f) $90 \div 9$
(g) $90 \div 10$	(h) $81 \div 9$	(i) $45 \div 5$
(j) $28 \div 7$	(k) $49 \div 7$	(l) $72 \div 9$

5. (a) One mango costs R8. How many mangoes can Christelle buy with R32?
   (b) Emma paid R45 for five bars of soap. What was the price of one bar of soap?

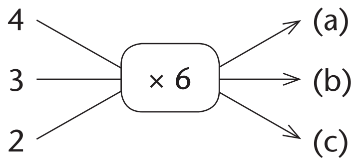
5.6 Multiplying in steps

A flow diagram consists of three parts:

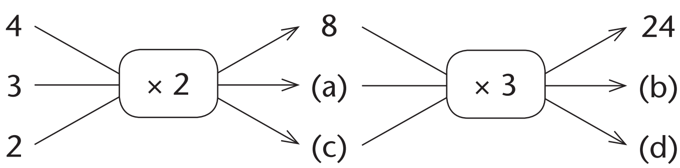
- the **input numbers**, for example 4, 3 and 2 in the flow diagrams below
- the **operator(s)**, for example × 6 in question 1, and × 2 and × 3 in question 2
- the **output numbers**, for example the number 24 in question 2.

In question 2, the number 8 is an output number for the first flow diagram, and it is also an input number for the second flow diagram.

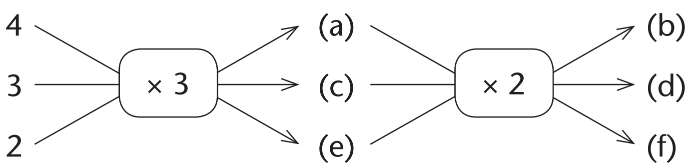
1. What are the output numbers at (a), (b) and (c)?



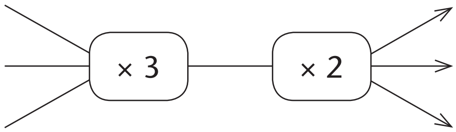
2. What are the numbers at (a), (b), (c) and (d)?



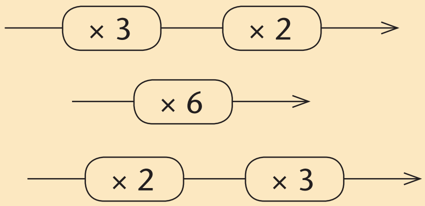
3. Write the numbers that are missing below.

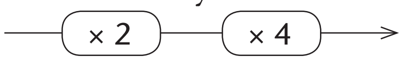


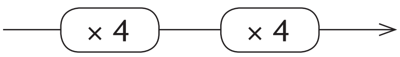
Each flow diagram in question 3 has one operator. Two flow diagrams with one operator each can be combined into one flow diagram with two operators:

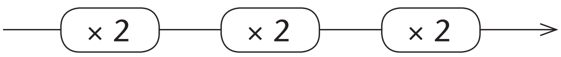


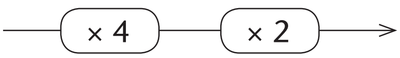
The three flow diagrams below are different. However, they produce the same results, so we say they are **equivalent**.

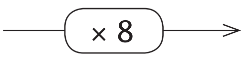


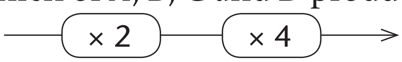
4. (a) Which of Flow diagrams A to D below do you think will produce the same results as  ?

A 

B 

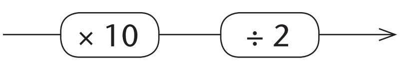
C 

D 

(b) Use 2, 3 and 5 as input numbers and calculate the output numbers to investigate which of A, B, C and D produce the same output numbers as  .

Flow diagram D above has only one operator, but it produces the same results as Flow diagram C which has two operators.

5. Which flow diagram with one operator only will produce the same results as the flow diagram below?



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UNIT 6

TIME

6.1 Days, weeks, months and years

There are **365 days** in a normal calendar year.

There are **12 months** in a year. Eleven of the months have either 30 or 31 days.

But February, the second month of the year, has 28 days for three consecutive years. In the fourth year, called a **leap year**, February has 29 days. (Why?)

There are **52 complete weeks** in a year. Each week has **7 days**.

We use **calendars** to measure time in years, months, weeks, and days.

Below is the calendar for 2016. The public holidays are marked in yellow.

JANUARY 2016

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

FEBRUARY 2016

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29					

MARCH 2016

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

APRIL 2016

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MAY 2016

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

JUNE 2016

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

JULY 2016

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

AUGUST 2016

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

SEPTEMBER 2016

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

OCTOBER 2016

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

NOVEMBER 2016

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

DECEMBER 2016

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

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1. (a) Name the months with 30 days.
   (b) Name the months with more than 30 days.
   (c) Name the months with fewer than 30 days.
2. Is there a pattern that you can use to quickly say how many days there are in any month?
3. Is 2016 a leap year? How do you know that?
4. How many public holidays are there in 2016?

Here is a list of the public holidays:

January 1	New Year's Day	June 16	Youth Day
March 21	Human Rights Day	August 9	Women's Day
March 25	Good Friday	September 24	Heritage Day
March 28	Family Day	December 16	Day of Reconciliation
April 27	Freedom Day	December 25	Christmas Day
May 1	Workers' Day	December 26	Day of Goodwill

5. (a) On what day of the week is Workers' Day in 2016?
   (b) 2 May is also indicated as a public holiday on the 2016 calendar but it is not in the list of public holidays above. Why is that? Discuss with a classmate.
   (c) April 27 is known as Freedom Day in South Africa. Why is this specific day important for our nation? Find out from someone if you do not know.
   (d) Does September have a public holiday? If so, what is it called and when is it?
6. How many months, weeks and days have passed since the beginning of the year until today?
7. How old are you today in years, months, weeks and days?

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Study the calendar below and answer the questions on page 76.

My school calendar

JANUARY

M	T	W	T	F	S	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

FEBRUARY

M	T	W	T	F	S	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	

MARCH

M	T	W	T	F	S	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	**21**	22
23	24	25	26	27	28	29
30	31					

APRIL

M	T	W	T	F	S	S
		1	2	**3**	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

MAY

M	T	W	T	F	S	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

JUNE

M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	**16**	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

JULY

M	T	W	T	F	S	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

AUGUST

M	T	W	T	F	S	S
					1	2
3	4	5	6	7	8	**9**
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

SEPTEMBER

M	T	W	T	F	S	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	**24**	25	26	27
28	29	30				

OCTOBER

M	T	W	T	F	S	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

NOVEMBER

M	T	W	T	F	S	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

DECEMBER

M	T	W	T	F	S	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	**16**	17	18	19	20
21	22	23	24	**25**	**26**	27
28	29	30	31			

SCHOOL TERMS	First Term	Second Term	Third Term	Fourth Term
Coastal provinces Eastern Cape • KwaZulu-Natal • Northern Cape • Western Cape	14.01 – 25.03	13.04 – 26.06	20.07 – 02.10	12.10 – 09.12
Inland provinces Free State • Gauteng • Mpumalanga • North West • Limpopo	21.01 – 01.04	13.04 – 26.06	20.07 – 02.10	12.10 – 09.12

PUBLIC HOLIDAYS					
New Year's Day	1 January	Thursday	Youth Day	16 June	Tuesday
Human Rights Day	21 March	Saturday	National Women's Day	9 August	Sunday
Good Friday	3 April	Friday	Public holiday	10 August	Monday
Family Day	6 April	Monday	Heritage Day	24 September	Thursday
Freedom Day	27 April	Monday	Day of Reconciliation	16 December	Wednesday
Workers' Day	1 May	Friday	Christmas Day	25 December	Friday
			Day of Goodwill	26 December	Saturday

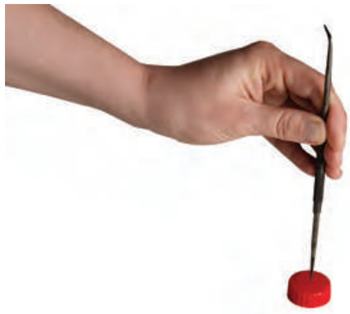
8. Study the school calendar. The first column in each month is a Monday. In the calendar of 2016, the first column is a Sunday. Is this a mistake in one of the calendars? Why or why not? Discuss with a classmate.
9. (a) On the school calendar, 8 February is on a Sunday. What other dates in February will also be on a Sunday in this year? Find the answer without looking at the calendar.
   (b) If 20 June is on a Monday in a certain year, what other dates in June will also be on a Monday?
   (c) How did you think to get the answer in (b)?
10. (a) Is your school in a coastal or inland province?
    (b) When does your Second Term start and when does it end?
    (c) How long are your winter school holidays? Give your answer in weeks and days.
    (d) When do the summer holidays start?
    (e) In which school term does Workers' Day fall?
11. Copy and complete the table for your school.

Term no. and dates		**No. of days**	**No. of public holidays**	**Actual no. of school days**
1	Starts: .... Ends:			
2	Starts: .... Ends:			
3	Starts: 20 July Ends: 2 October			
4	Starts: 12 October Ends: 9 December			
	TOTAL			

6.2 Measuring time

Many years ago water clocks were used to keep track of short periods of time. These clocks measured time based on how much water flowed from one container into the next. You are going to make a simple water clock.

1. Form groups of 4 to 6 learners. Each group will need the following: *a plastic 2-litre bottle, a sharp knife or scissors, a tool with a sharp narrow point, a bottle or jug of water and a permanent marker.*

Step 1  *Cut the body of the bottle in half.*	**Step 2**  *Puncture the bottle top. The hole should not be smaller than this circle:* ●
Step 3  *Screw the bottle top back on. Slip the top part of the bottle into the bottom part.*	**Step 4**  *Pour water into the top half. As soon as the water starts to flow into the bottom half, one of the group members must start to count from 1 to 240.*

Step 5	Step 6
 *Use the permanent marker to mark how much water has flowed into the bottom half when 60, 120, 180 and 240 counts are reached.*	*Empty the top and bottom half of the bottle.* *Repeat steps 3 to 5.* [Source: http://www.wikihow.com/Make-a-Water-Clock-(Clepsydra)]

You can now use the water clock to measure the time it takes to do something in units of 60 counts.

2. Each group uses their water clock to measure how long one of the learners in the class can hold her or his breath. Compare the time taken according to the different water clocks. What do you notice? Explain why this is so.
3. Place all the water clocks next to each other. What do you notice about the marks you made earlier at 60, 120, 180 and 240?

Counting is not a good way to measure time, because some people count faster than others. People decided long ago to use the changing of days to measure time.

The sun appears each day, it disappears later, and it appears again the next day. The period of time that starts when the sun appears on one day, and ends when the sun appears on the next day, is called **one day**. The day is divided into 24 equal periods which are called **hours**.

1 day = 24 hours

1 hour = 60 minutes

1 minute = 60 seconds

4. For approximately how many minutes are you in school each day of the week?

5. It takes Learner A 65 seconds to write ten words. It takes Learner B 1 minute and 5 seconds to write ten words. Who takes the longest to write ten words?
6. It takes Grandma 120 minutes to walk to the shop. It takes Grandpa 2 hours to walk to the shop. Who takes the longest?

6.3 Understanding the 12-hour clock

This clock shows 12 hours. It measures the time from midnight to midday and from midday to midnight. The starting point (or the zero point) is at the top of the clock where the 12 is.

The clock face is divided into 60 sections to show 60 minutes. The short hand is the **hour hand**. The long hand is the **minute hand**.

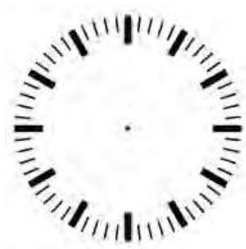
The minute hand moves around the clock face once every 60 minutes. While the minute hand moves around the clock once, the hour hand moves to the next hour.

One hour is the same length of time as **60 minutes**. So:

15 minutes = $\frac{1}{4}$ hour

30 minutes = $\frac{1}{2}$ hour

45 minutes = $\frac{3}{4}$ hour

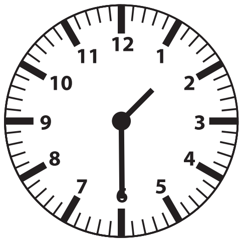


1. Copy this circle. It has the same markings as the 12-hour clock above. Start counting the minutes at 12. Show where the markings are for the following number of minutes:
   (a) 10 minutes
   (b) 25 minutes
   (c) 40 minutes
   (d) three quarters of an hour
   (e) a quarter of an hour
   (f) half an hour

2. What times do these clocks show? Write the time in numbers and in words, for example: *6:15 quarter past 6*.

(a) 

(b) 

(c) 

(d) 

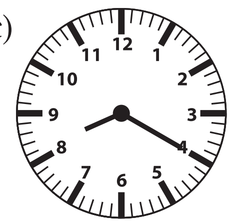
Minutes past the hour

As the minute hand moves from 12, at the top of the clock, we talk about minutes *past* the hour. We say: 1 minute past ..., 2 minutes past ..., 3 minutes past ... until we get to 30 minutes past, or half past the hour.

3. What times do these clocks show? Write the time in numbers and in words.

(a) 

(b) 

(c) 

Minutes to the hour

As the minute hand moves on past the 30 minute mark, we talk about minutes *to* the hour. We say 29 minutes to ..., 28 minutes to ..., 27 minutes to ... and so on, until we get to 1 minute to ... and then reach the next hour.

4. What times do these clocks show? Write the time in numbers and in words.

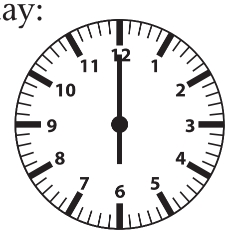
(a)  (b)  (c) 

5. Copy the circle on page 79. Draw hands to show the time:
   (a) quarter to 7
   (b) 25 minutes past 3 o'clock
   (c) 4 o'clock
   (d) 22 minutes to 12 o'clock

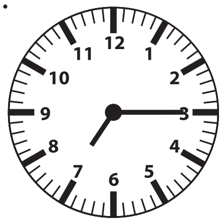
Before midday and after midday

You already know that a 12-hour clock shows only 12 hours. The short hand goes around the clock once in 12 hours and twice around the clock in 24 hours. So, when we talk about time on a 12-hour clock we must say whether the time is **before midday (a.m.)** or **after midday (p.m.)**.

6. Give the times on the clocks. Remember to write a.m. or p.m.
   (a) Nathi wakes up to start his day:

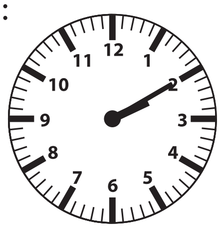


   (b) Nathi starts walking to school:



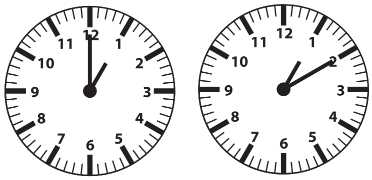
   (c) School starts:

   (d) Soccer practice starts after school:



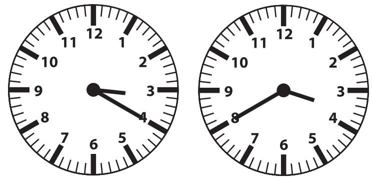
7. The clocks below show when an activity started and when it ended. Say how long each activity took.

(a)



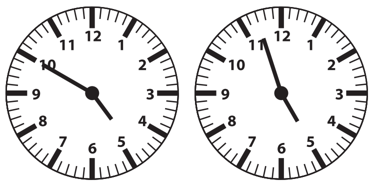
Start End

(b)



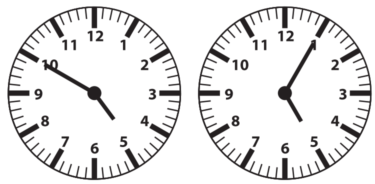
Start End

(c)



Start End

(d)



Start End

8. How many minutes are there in each of these time intervals?
   (a) half an hour
   (b) a quarter of an hour
   (c) 2 hours
   (d) two and a half hours
   (e) 6:15 a.m. to 6:25 a.m.
   (f) 12:18 p.m. to 12:25 a.m.
   (g) 12:50 p.m. to 1:10 a.m.
   (h) 7:34 a.m. to 7:34 p.m.

9. A school starts at 7:30 a.m. and finishes at 12:30 p.m. How many hours are the learners at school?

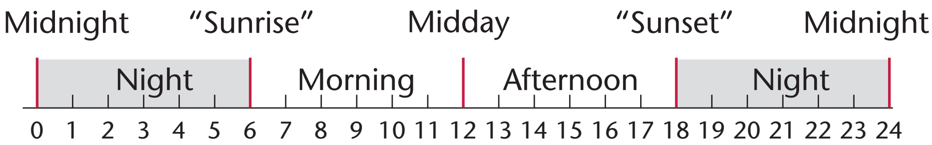
10. Soccer practice starts at ten past two in the afternoon and it is one hour long. What time does soccer practice end?

11. Margaret started sweeping her garden at a quarter past 9 in the morning and finished 12 minutes later. What time did she finish?

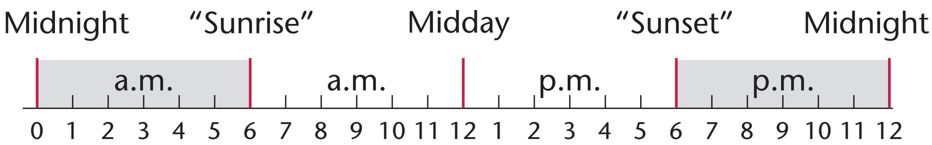
12. Which is longer: two and a quarter hours or 124 minutes? Explain your answer.

6.4 Understanding the 24-hour clock

The 24-hour clock



The 12-hour clock

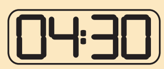


Two kinds of clocks

An **analogue clock** is usually a 12-hour clock. The 12-hour clock on the right shows half past four.

The hour hand is halfway between 4 and 5. The minute hand is on 30 minutes.

Analogue 12-hour clock



Digital 24-hour clock

A **digital clock** is usually a 24-hour clock. The time on the 24-hour clock on the right is **04:30**; this is 4 hours and 30 minutes after midnight or 4:30 a.m.

If you wake up at six o'clock in the morning, the time on a 24-hour clock will show **06:00**. This is the same as 6 a.m. If we have supper at six o'clock in the evening, the time on the 24-hour clock will show **18:00**. This is the same as 6 p.m.

On the 24-hour clock, midnight is 24:00. But because the new day begins at the same time as the old day ends, midnight is usually indicated as 00:00.

1. Write the 24-hour time for the following:
   (a) 7 o'clock in the morning (b) 7 p.m.
   (c) 12 midnight (d) noon or midday
   (e) 11 a.m. (f) 11 p.m.

2. Write the 24-hour time for the following:
   (a) an hour before midnight (b) an hour before midday
   (c) two hours after midnight (d) two hours after midday
   (e) six hours before midnight (f) six hours after midday

3. Write the 24-hour time for the following:
   (a) 20 minutes after 1 p.m.
   (b) 20 minutes to 1 p.m.
   (c) quarter past 3 in the afternoon
   (d) 25 minutes past 4 a.m.

4. Write these 24-hour times as 12-hour times. Write the times in numbers and in words.
   (a) 10:00 (b) 10:15 (c) 10:30 (d) 10:45
   (e) 12:00 (f) 24:00 (g) 08:35 (h) 16:35

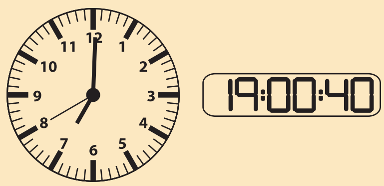
6.5 Hours, minutes and seconds

1. Ask your teacher for a stopwatch. A stopwatch counts seconds and minutes. Let a classmate time you. Practise until you can count to 10 in 10 seconds.
2. (a) Estimate how many times you can bounce a tennis ball in one minute.
   (b) Ask your teacher for a tennis ball. Let the teacher time you on the stopwatch. Bounce the tennis ball and count the number of bounces in one minute.

3. How many activities can you think of that will take about one second to complete? Make a list.
   Here are three examples to get you going: switching on a light; snapping your fingers once; sneezing.
4. As a class, think of three activities that will take less than a minute to complete. Estimate how many seconds it will take a classmate to do each of the three activities. Let a classmate do each activity while the teacher times him or her with a watch or stopwatch. How close were your estimates?

Many 12-hour and 24-hour clocks show seconds too.

These clocks both show 40 seconds past 7 o'clock in the evening.



5. Match the times on the 24-hour clocks with the times given in words below:

A

B

C

   (a) 12 minutes and 5 seconds after midnight
   (b) 12 minutes and 5 seconds after midday
   (c) 20 minutes and 30 seconds before 6 p.m.

UNIT 7 DATA HANDLING

In this unit you are going to need your ruler to measure the length of fish. The measurements and other information about the fish will be our data to tell a story about a fish farmer.

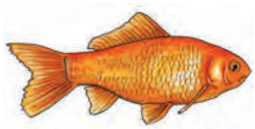
7.1 Collect and organise data

Jabu farms with goldfish. He sells the fish to people who keep them as pets. He has three kinds of goldfish: Huna (blue-grey), Hibuna (gold) and Syubunkin (spotty).

Goldfish live up to 20 years and they require good care.

Fish of different sizes have different prices. We are going to imagine we use data to help Jabu find the sizes of his goldfish.

Huna goldfish



Hibuna goldfish

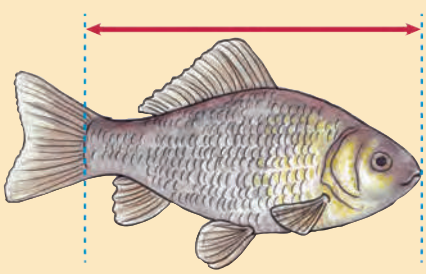
Syubunkin goldfish

Jabu has 20 goldfish in Tank A. Imagine that they are the goldfish that you see on pages 88 and 89. You have to measure these goldfish and make a list of their measurements.

Plan ahead

Make a plan so that you will know which measurements are of Huna fish and which are of Hibuna fish.

Plan how to measure accurately. Measure from the nose to the end of the body. Fish don't keep their tails still, so you can't measure their tails accurately!

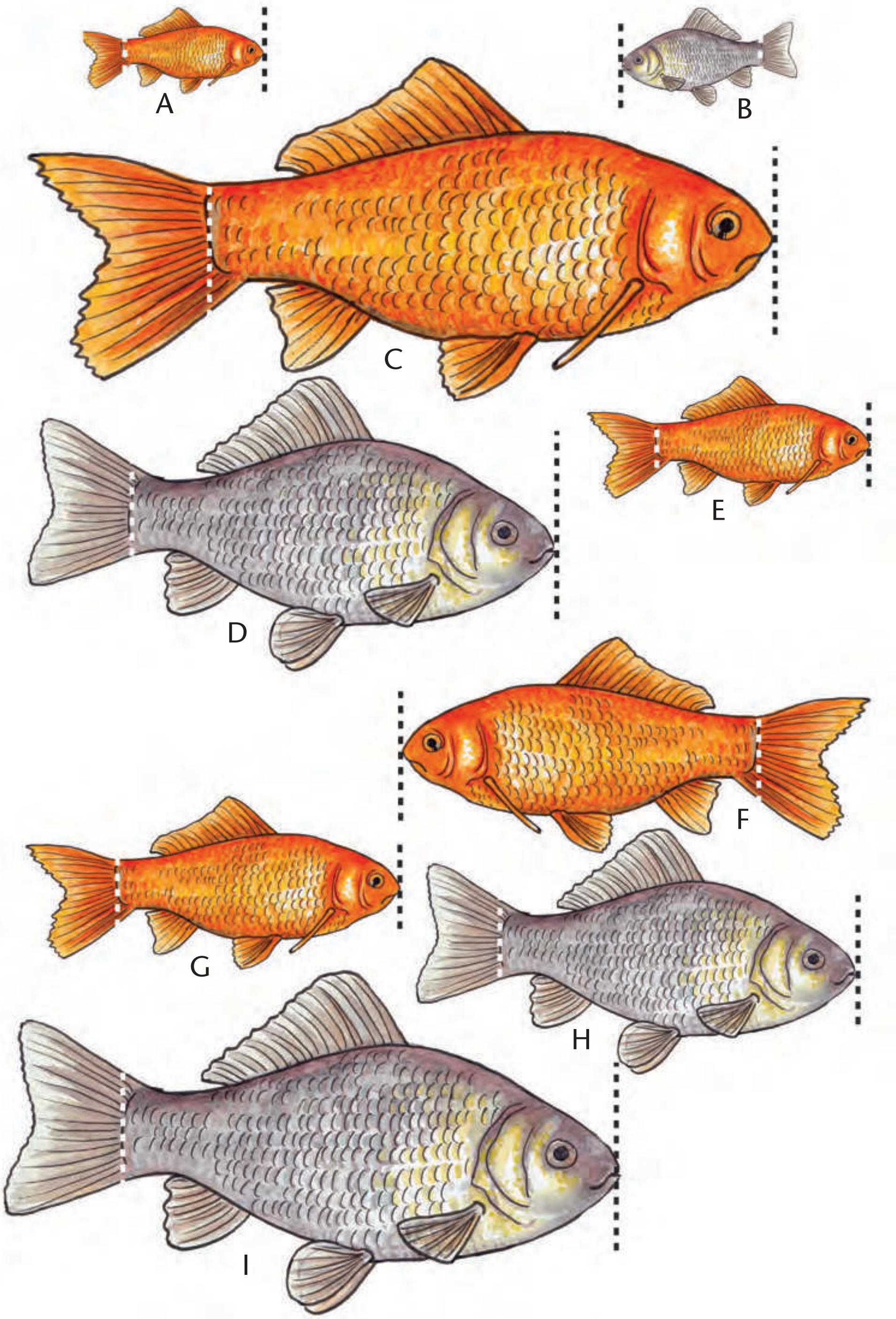


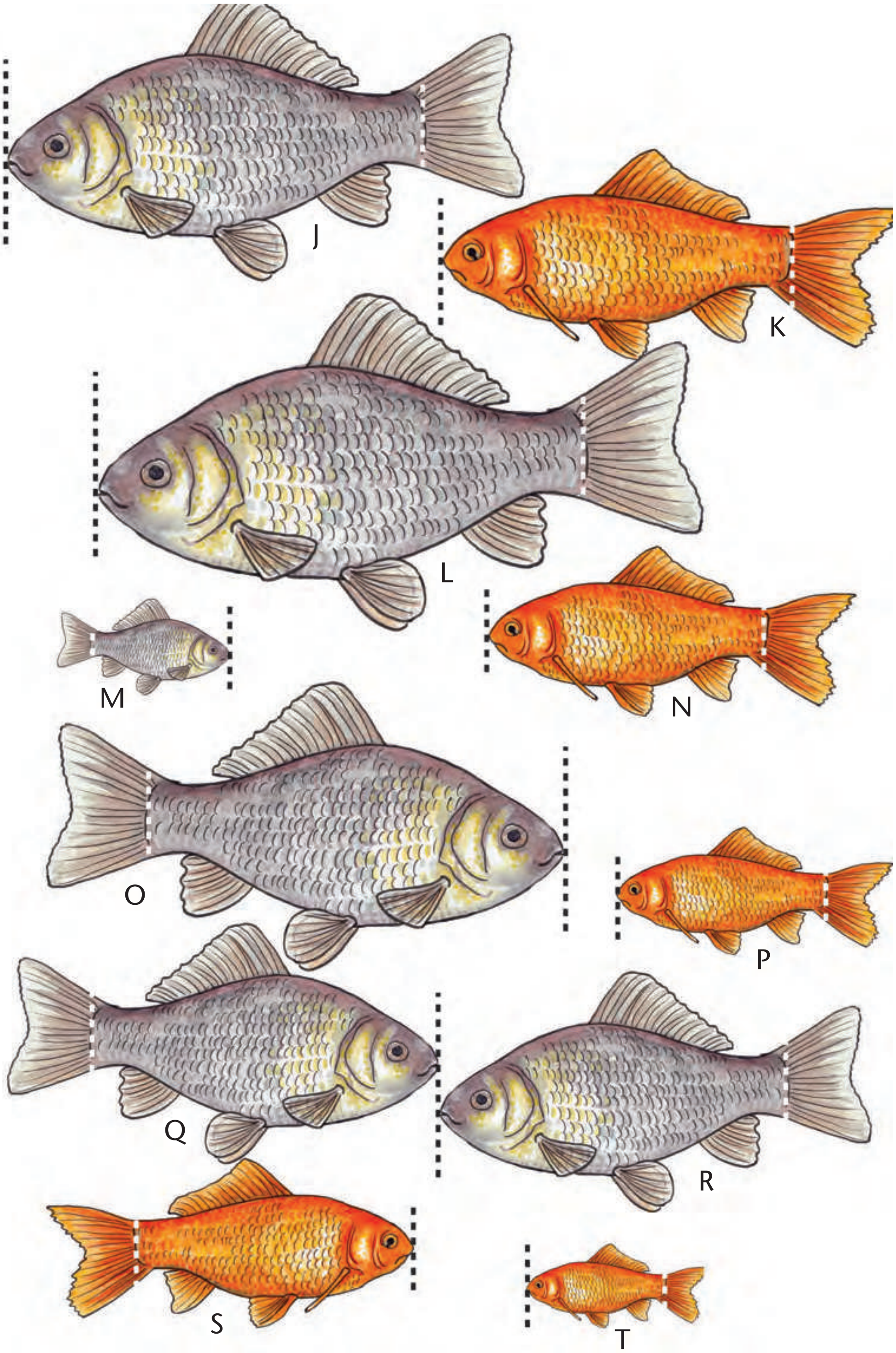
1. Work with a classmate.
   (a) Decide how you will share the work and make sure that you do not leave out fish or measure them twice. Write down what you decided.
   (b) Now measure the fish and write down your measurements in your book.
   (c) Compare your measurements with another pair of classmates. If your measurements are not the same, discuss the reasons and write them down.
   (d) Measure again where you differed. Measure accurately. If you have new measurements, write them down.

The measurements you made are called **data**. Data are measurements of a property that **varies**. The lengths of goldfish vary because the fish are not all the same age, and because they do not all eat exactly the same amount of food, and just because some fish grow faster and get bigger than others.

The measurements you made may also be a little different from the measurements your classmates made, because you may not have been completely accurate. We must plan to be completely accurate when we gather data.

2. Jabu asks how long the fish in Tank A are. Which of sentences A to D below best describes the lengths of the Hibuna fish?
   A The Hibuna fish are not more than 8 cm long.
   B The Hibuna fish are all longer than 2 cm.
   C The Hibuna fish are between 2 cm and 8 cm long.
   D The Hibuna fish are between 2 cm and 8 cm long, but most are between 3 cm and 5 cm long.
3. Look at your measurements. Write a sentence to tell Jabu how big his Huna fish are.


A
B
C
D
E
F
G
H
I



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7.2 Representing data in tables

In Tank B Jabu has 50 Syubunkin fish. He measured them and wrote his measurements in this **tally table**. It helps him to organise his measurements. He makes a mark (tally) in the appropriate place in the table. Have a look at what he did.

Syubunkin in Tank B

Length	Tallies	Total number of fish
2 cm	///	3
3 cm	卌 //	7
4 cm	卌 卌 卌	15
5 cm	卌 卌 /	11
6 cm	卌 //	7
7 cm	///	3
8 cm	////	4

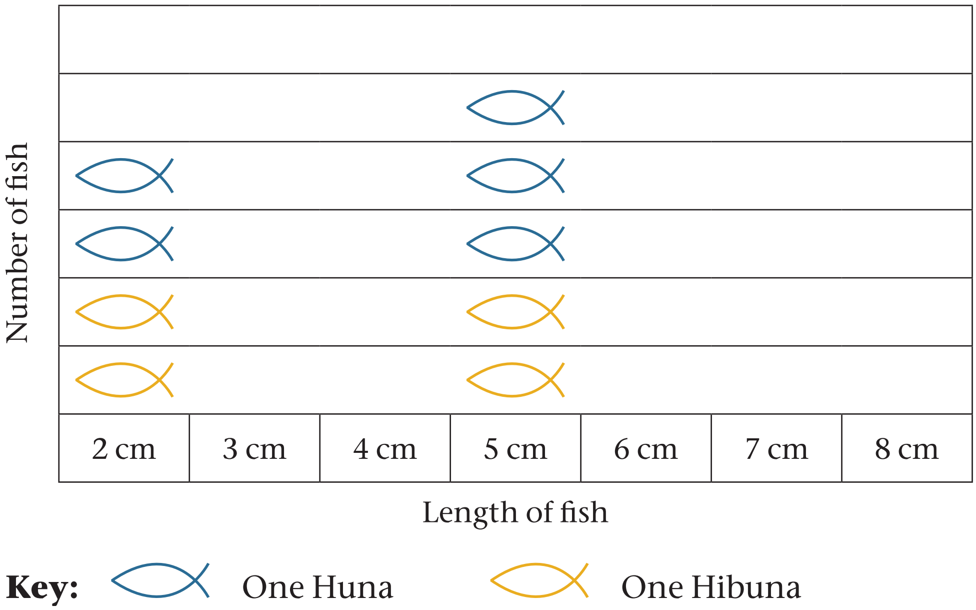
1. What can you tell about the length of the fish from Jabu's tally table? Write down your story and compare it with that of a classmate.
2. Do you agree or disagree with the following statements? Explain why.
   (a) Most Syubunkins are between 5 cm and 8 cm long.
   (b) Most Syubunkins are 4 cm long.
   (c) The number of Syubunkins that are 3 cm long is the same as the number of Syubunkins that are 6 cm long.
   (d) Half of the Syubunkins are 5 cm up to 8 cm long.
3. Jabu asks you to put together the information about the fish in Tank A (that is, the fish on pages 88 and 89). Make a tally table like the one above to show the lengths of the Hibuna and Huna fish that you measured.

7.3 Pictographs and bar graphs

1. The graph below is called a **pictograph**. Complete a pictograph of your own to show the Huna and Hibuna fish of different lengths.

> A pictograph has a **heading** and a **key** to tell the meaning of the pictograph.

Number of Huna and Hibuna of different lengths in Tank A



2. Jabu wants a bar graph of the small, medium and large fish in Tank A.
   (a) If a fish is shorter than 4 cm it is *small*. How many small fish are there in Tank A?
   (b) A fish that is 4 cm or 5 cm long is *medium*. How many medium fish are there in Tank A?
   (c) A fish that is 6 cm or longer is *large*. How many large fish are there in Tank A?

(d) Complete the bar graph below. Draw bars to show the number of fish. Use one block for each fish you count. Draw another bar graph for the Hibuna.

Number of Huna of different lengths in Tank A

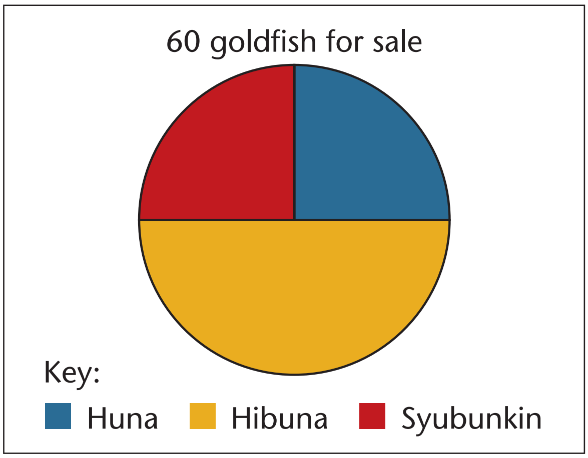
Number of fish

8			
7			
6			
5			
4			
3			
2			
1			
	Small	Medium	Large

Groups

7.4 Information in pie charts

Jabu sees an advertisement on the internet of a pet shop owner who wants to sell her tank of fish. She wants R480 for 60 goldfish. The advertisement has only this pie chart.



A pie chart has a **heading** and a **key** to tell the meaning of the pie chart.

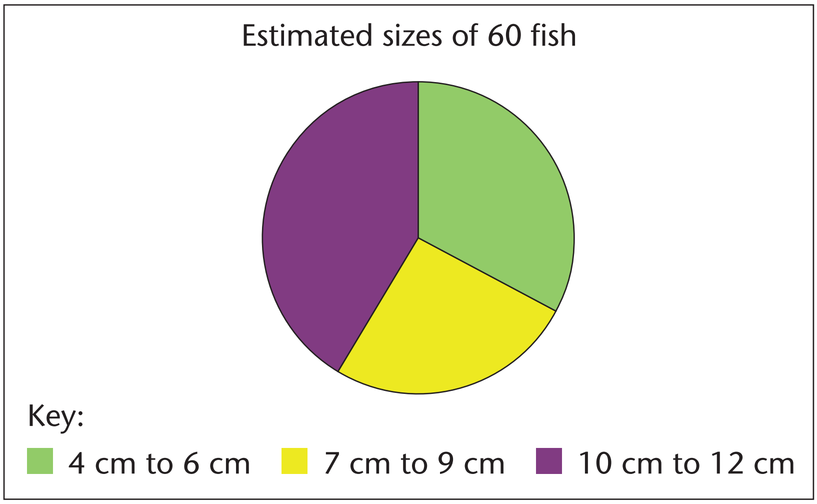
In a pie chart the parts are **fractions** of the pie (circle). For example, we work out *what fraction* of the fish are Huna and then we colour *the same fraction* of the pie.

1. (a) What is the heading of the chart?
   (b) What does the key tell you?
   (c) What does the graph tell you about the fish in this tank?

Jabu says: "A fish tank costs about R240. If the fish tank is part of the sale, then the pet shop owner asks about R4 per fish. That's a bargain!"

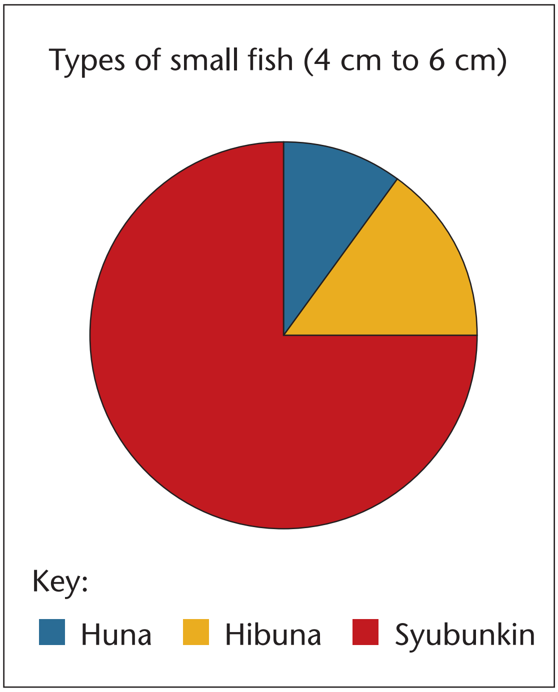
2. Check if Jabu is correct about the price.

Jabu asked the pet shop owner to let him know what size the fish are. She sent this pie chart:



3. What story does the pie chart tell about the sizes of the 60 goldfish? Write the information in your book.
4. Read each statement and say whether you agree or disagree. Explain why.
   (a) More than half of the fish are between 7 cm and 9 cm long.
   (b) About a third of the fish are between 4 cm and 6 cm long.
   (c) About a third of the fish are between 10 cm and 12 cm long.
   (d) The big fish (10 cm to 12 cm) are almost twice as many as the medium fish (7 cm to 9 cm).

Jabu does not want to buy big fish. Big fish need more food and that is expensive. He asked the pet shop owner which fish are between 4 cm and 6 cm long. She sent this pie chart.



5. What story does the pie chart tell about the kinds of small fish? Write the information in your book.
6. Read each statement and say whether you agree or disagree. Explain why.
   (a) About three quarters of the small fish are Syubunkins.
   (b) About one third of the small fish are not Syubunkins.
   (c) About one eighth of the small fish are Hunas.
   (d) The number of small Hunas is the same as the number of small Hibunas.
7. Use the information in all the previous pie charts to work out how many of the fish are small Syubunkins.

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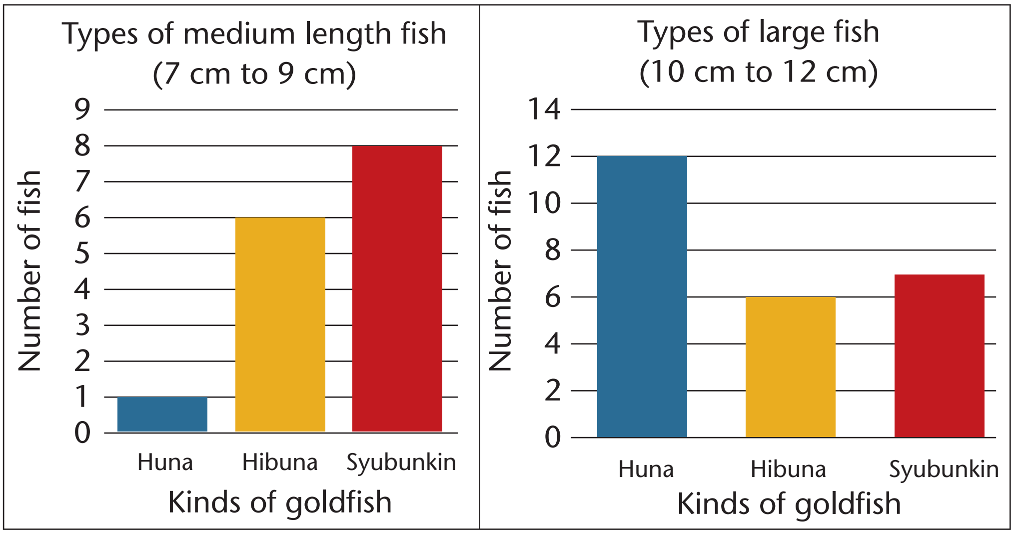
7.5 Information in bar graphs

Jabu wants even more information.

He says: "I know now that three quarters of the small fish she wants to sell are Syubunkins. And I know the Syubunkins are about one quarter of all the fish she wants to sell. I also want to know how many of the Hunas and Hibunas are small."

Jabu asked the seller for bar graphs. This is what she sent:



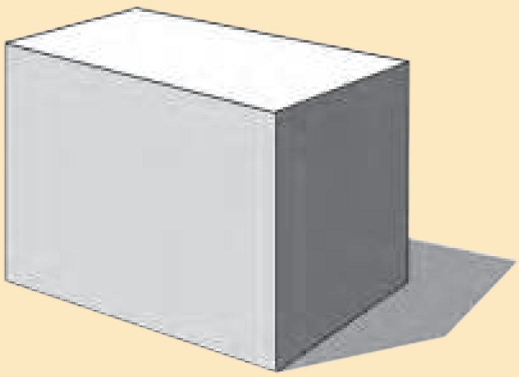
Read the graphs to answer the questions. Look carefully at the number lines.

1. How many Hibunas are medium length fish?
2. How many Hunas are large fish?
3. Compare the number of Hibunas that are medium and large.
4. Compare the number of Syubunkins that are medium and large.
5. Work out how many Hunas and Hibunas are small. Use the information in all the previous bar graphs and pie charts.

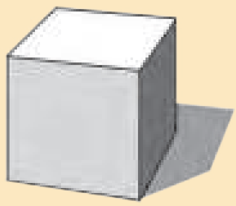
Unit 8 Properties of two-dimensional shapes

8.1 Surfaces with different shapes

These boxes or blocks have flat surfaces.
The surfaces are called **faces**.

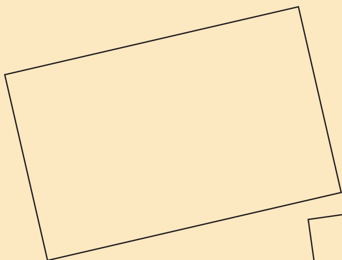


Block A

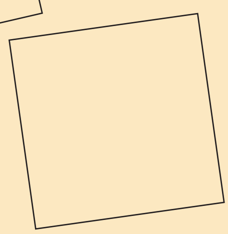


Block B

Each face of Block A is a **rectangle**.
The four corners look exactly the same.



Each face of Block B is a **square**.
The four corners look exactly the same.
The four sides of a square have the same length.



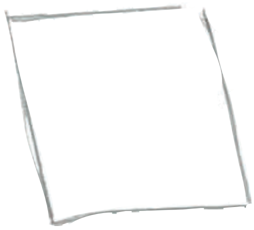
1. Use your pencil only and try to draw a square. Do not use a ruler or some other straight object.

   Your drawing must be bigger than the square shown here.

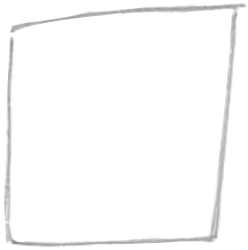
   Use about half of a page.

2. Other learners also tried to draw a square, without using a ruler or other straight object.

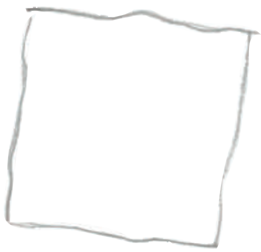
   Which of these drawings is the best attempt to draw a square?



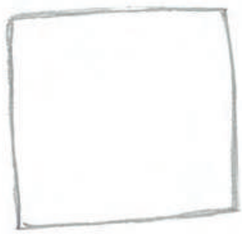
Drawing A



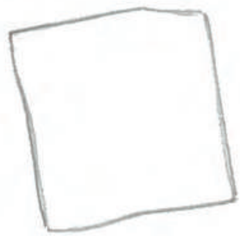
Drawing B



Drawing C



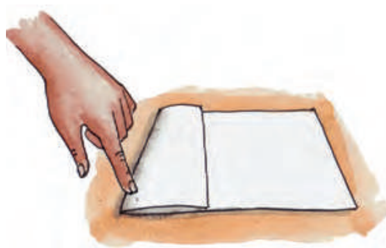
Drawing D



Drawing E

3. In each case, state why it is not a good drawing of a square. Describe what is wrong.
   (a) Drawing A
   (b) Drawing B
   (c) Drawing C
   (d) Drawing E

4. To get a straight line, like the side of a rectangle or a square, you can fold a sheet of paper as shown below.



Use your finger(s) to make a sharp crease.

Fold over once or twice or more times and *make a sharp crease each time*.

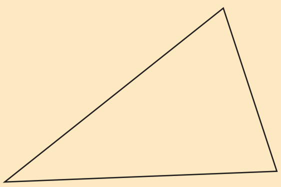
You have made yourself a tool that you can use to draw straight lines. A tool like this is called a **straight edge**.

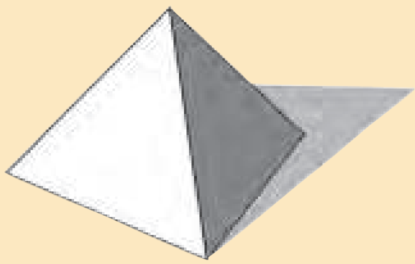
5. Use your straight edge to draw a square as well as you can.
6. Also draw a rectangle that is not a square, as well as you can.

Keep your straight edge! You will use it again later!

8.2 Surfaces with other shapes

Some of the faces of Block C are **triangles**.

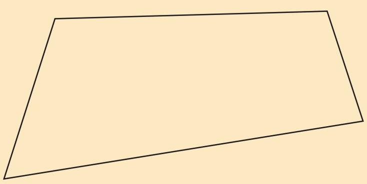


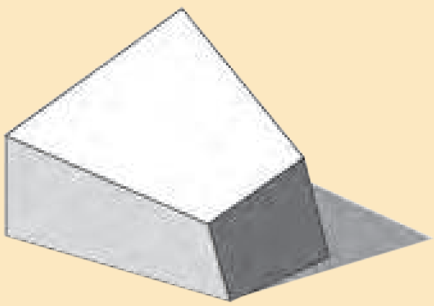


Block C

The faces of Block D have four sides each.

Such figures are called **quadrilaterals**.





Block D

A quadrilateral has four straight sides.

Rectangles and squares are also quadrilaterals. The four corners of a rectangle or a square look the same.

1. Which of these figures are *not* quadrilaterals?

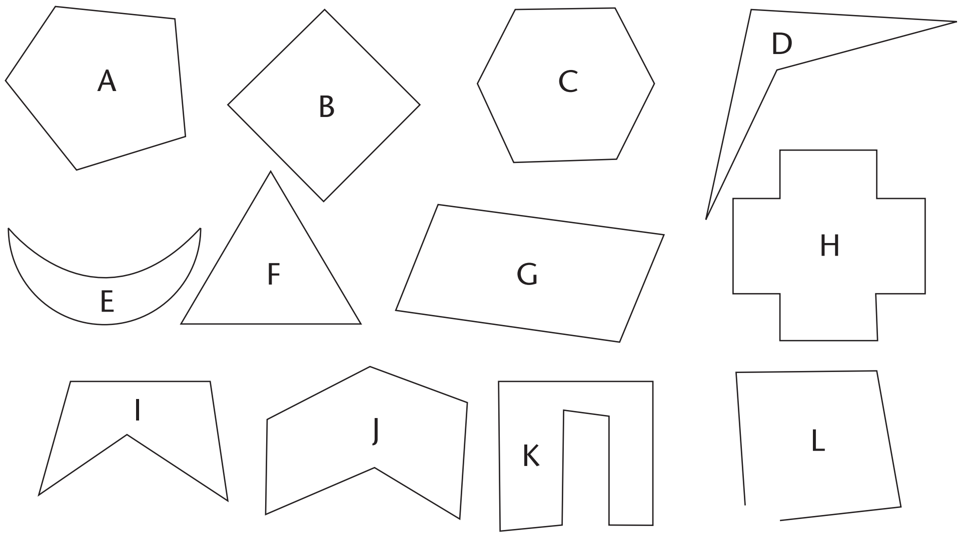
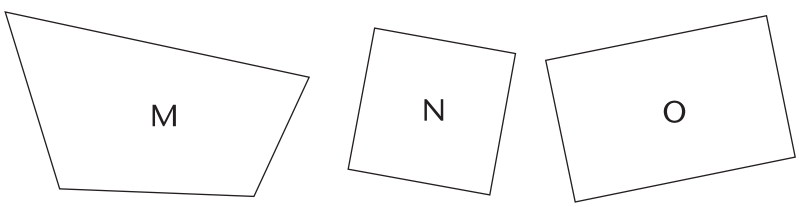
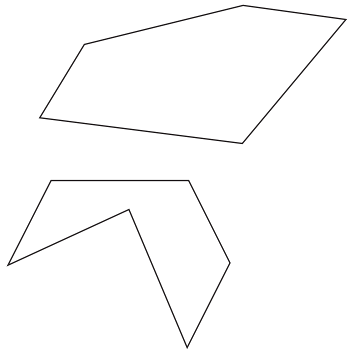


Figure L is not called a quadrilateral because it is **open** at one place. Only **closed** figures, such as those below, are called quadrilaterals.



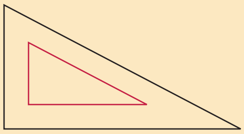
2. The corners of Figure M do not all look the same.
   In which of all the figures on this page do the four corners look the same?
3. (a) Which of the figures on this page are rectangles?
   (b) Which figures on this page are rectangles but not squares?

A closed figure with *four straight sides* is called a **quadrilateral**.
A quadrilateral of which all four corners look the same is called a **rectangle**.
A closed figure with *three straight sides* is called a **triangle**.
A closed figure with *five straight sides* is called a **pentagon**.
A closed figure with *six straight sides* is called a **hexagon**.
Any closed figure with *straight sides* is called a **polygon**.

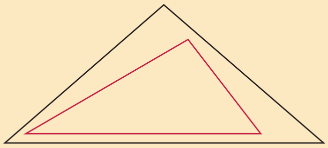


4. (a) Which figures in question 1 are not polygons?
   (b) Name all the pentagons in question 1.
   (c) Name all the hexagons in question 1.
   (d) Name the polygons in question 1 that are not triangles, quadrilaterals, pentagons or hexagons.

The red and black triangles on the right have the same shape. The one is just bigger than the other.



These two triangles do not have the same shape.



5. Use your straight edge and a sharp pencil to draw three triangles of about the same size, but with different shapes.

When you make a drawing without using a straight edge or other tool, it is called a **freehand drawing**.

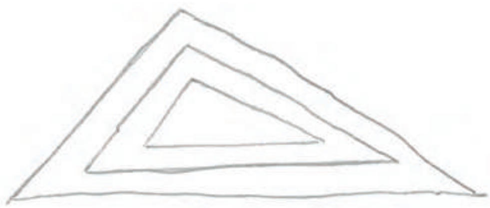
Artists mainly make freehand drawings.

6. Make freehand drawings of the following:

   (a) a triangle (b) a quadrilateral that is not a rectangle
   (c) a pentagon (d) a hexagon

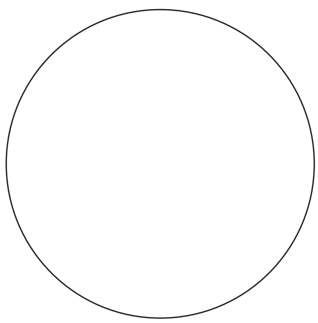
7. Make a freehand drawing of three triangles with the same shape, one inside the other.

   Make your drawings large so that they fill a whole page.



8. Draw three triangles, not inside each other, with the same shape but different sizes. Do not use a straight edge.
9. How did you try to make sure that your three triangles have the same shape? Write a short paragraph about it. You may make drawings to help you explain.
10. Now use your straight edge to again draw three triangles with the same shape. Draw your triangles inside each other.
11. Use your straight edge to draw a quadrilateral that is not a square or a rectangle.
12. Draw two more quadrilaterals that are different from each other, and are not squares or rectangles.
13. A figure like this is called a **circle**.

    Make a good freehand drawing of a circle. You can make a nice circle by going round and round and making it better all the time.



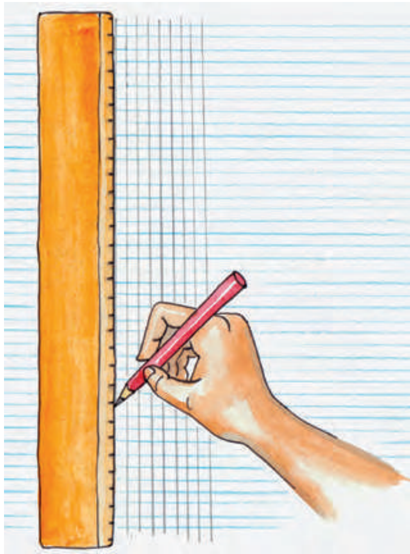
8.3 Make drawings on grid paper

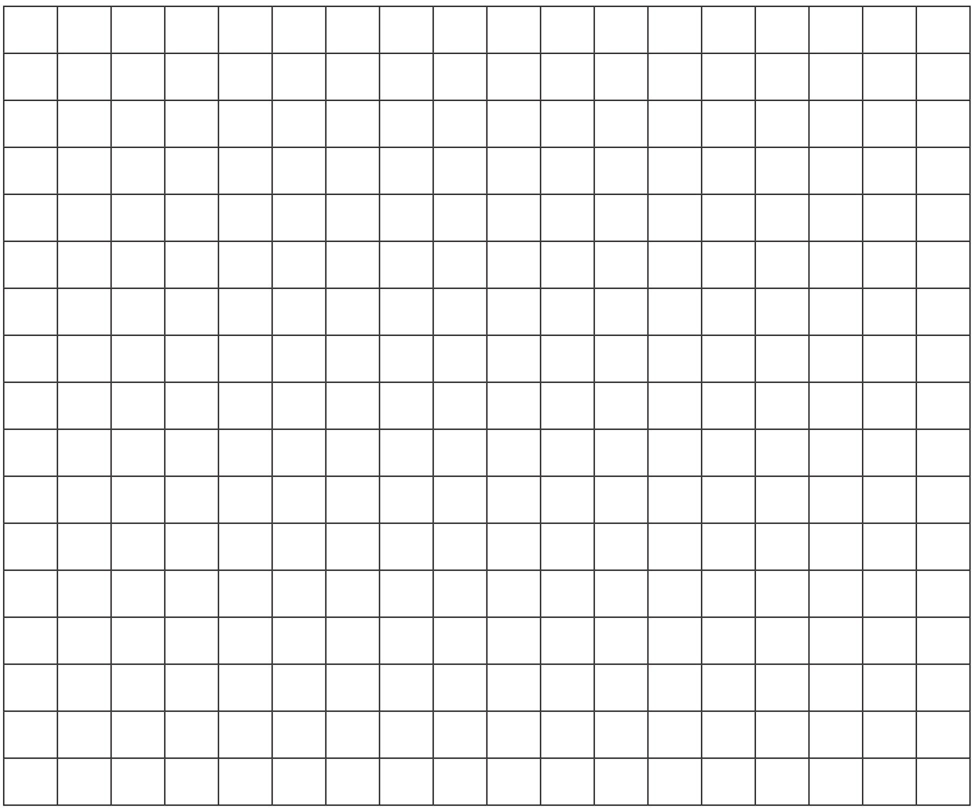
1. You need to make grid paper before you can do the next task.

   Use your ruler and a sharp pencil as shown here, to make a grid on a whole clean page of ruled paper.

   Your grid should consist of small squares, as shown below.

   You will need at least three sheets of grid paper.





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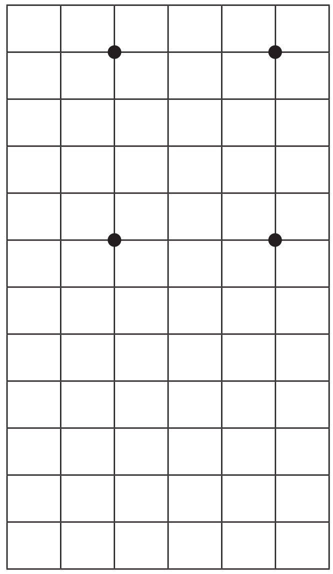
2. The places where the grid lines meet are called **grid points**.



   (a) Draw a large rectangle on a grid by joining four grid points. Use your straight edge. Your rectangle must not be a square.

   (b) Draw a square as big as possible inside the rectangle.

   (c) Draw a line inside your square so that it forms two triangles with the same shape.

3. (a) Draw a large triangle by joining three points on one half of a new grid sheet.

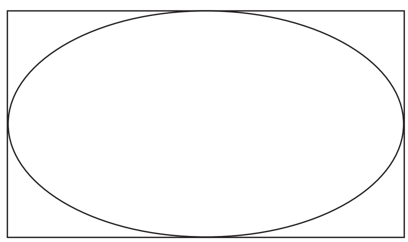
   (b) Draw another triangle, of exactly the same shape and size, on the other half of the grid sheet.

4. (a) Draw a polygon with seven sides on grid paper.

   (b) Divide your polygon into triangles.

5. Draw a square on less than half of a grid sheet.
   Then draw a circle as neatly as you can tightly inside the square.

6. Draw a rectangle that is not a square on less than half of a grid sheet.
   Then draw a figure that looks like an egg tightly inside the rectangle.



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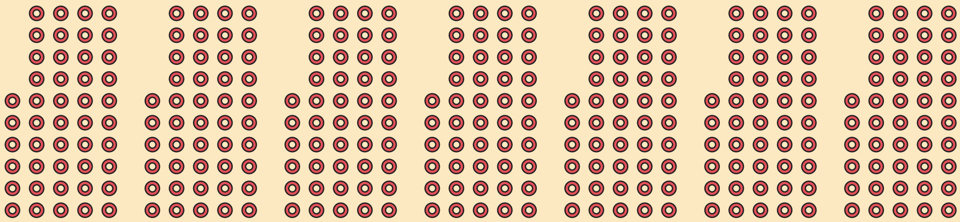
Unit 9 Whole numbers: Multiplication and division

9.1 Learn to multiply with bigger numbers

In this unit you will learn to multiply with bigger numbers, for example how to calculate 6 × 54 or 73 × 5.

If you can do such calculations, you can easily and quickly find out how many rings there are in the diagram below, without counting all the rings.

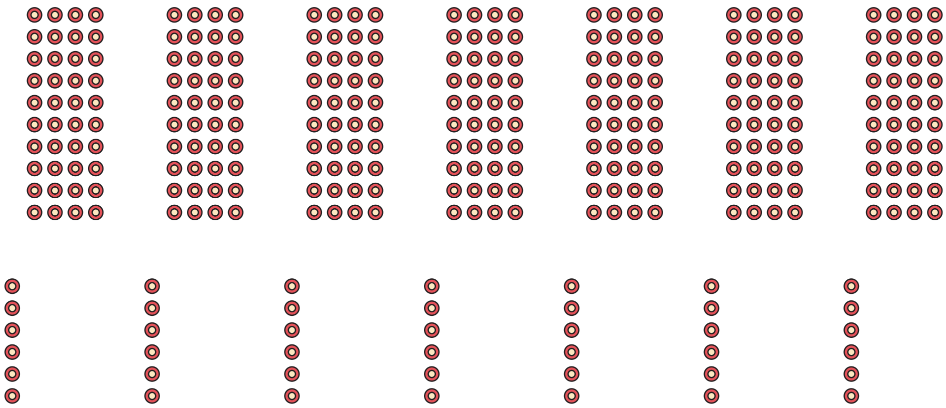


Zweli knows that 7 × 40 = 280.

He also knows that 7 × 6 = 42.

Zweli thinks he can use this knowledge to quickly find out how many rings there are in the above diagram.

1. Do you think the diagram below has the same number of rings as the diagram above?



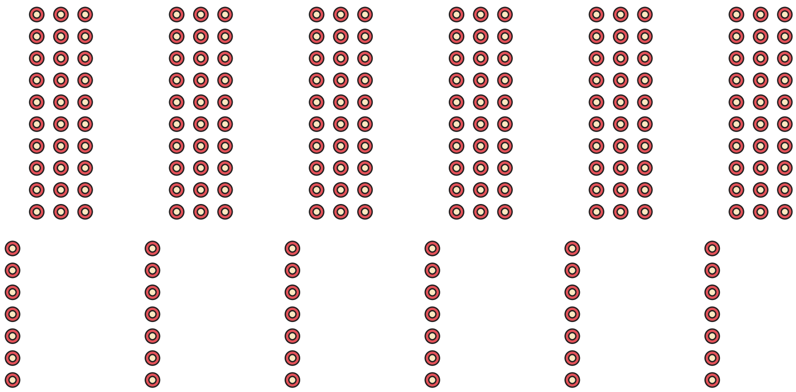
2. (a) Do you agree that in the diagram in question 1, there are 7×40 rings and another 7×6 rings?

   (b) If $7 \times 40 = 280$ and $7 \times 6 = 42$, how many rings are there altogether?

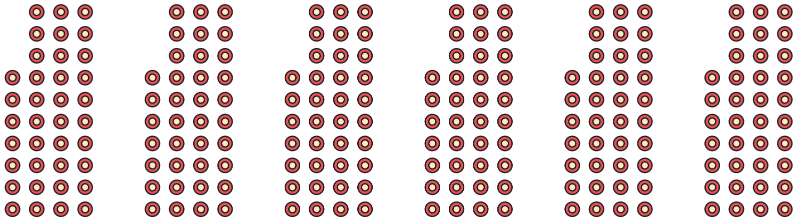
3. Copy the four numbers below. Then add 30 each time to write the next six numbers in the pattern.

   30 60 90 120 . . .

4. Work out how many rings there are in this diagram.



5. How many rings do you think there are in this diagram?

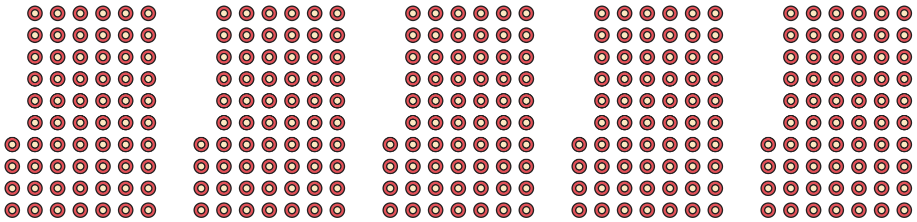


6. What is 6×67? How did you work that out?

7. Complete the table.

×	2	3	4	5	6	7	8	9	10
30	60	90	120						
50				250					

8. Work out how many rings there are in this diagram.



9. Work out how many apples there are in 6 boxes with 54 apples in each box.

9.2 Build knowledge for multiplication

In this section you will learn more multiplication facts so that you can calculate quickly with larger numbers.

1. How much is each of the following?

(a) 5 × 20 (b) 6 × 20 (c) 4 × 20
(d) 20 × 9 (e) 20 × 7 (f) 5 × 20
(g) 3 × 20 (h) 20 × 8 (i) 10 × 20
(j) 8 × 20 (k) 4 × 20 + 4 × 6 (l) 4 × 26

2. Complete the 20 times row and the 30 times row.

×	2	3	4	5	6	7	8	9	10
20	40	60	80						
30				150					
40									
50									

3. How much is each of the following?

(a) 5 × 30 (b) 6 × 30 (c) 4 × 30
(d) 30 × 9 (e) 30 × 8 (f) 7 × 30
(g) 30 × 3 (h) 5 × 30 + 5 × 8 (i) 5 × 38

4. Now complete the 40 times row in your table.

5. How much is each of the following?

(a) 5×40	(b) 6×40	(c) 4×40
(d) 40×9	(e) 40×7	(f) 5×40
(g) 3×40	(h) 40×8	(i) 10×40
(j) 8×40	(k) 7×46	(l) 46×9

6. Complete the 50 times row in your table.

7. How much is each of the following?

(a) 5×50	(b) 6×50	(c) 4×50
(d) 50×9	(e) 50×7	(f) 5×50
(g) 3×50	(h) 50×8	(i) 10×50
(j) 8×50	(k) 7×56	(l) 56×9

9.3 Use your knowledge of multiplication facts

Use the multiplication facts for 20, 30, 40 and 50 that you have developed in Section 9.2 to do questions 1 and 2.

1. Write the missing number in each number sentence.

(a) $30 \times \ldots = 270$	(b) $450 = 50 \times \ldots$
(c) $120 = \ldots \times 20$	(d) $\ldots \times 40 = 120$
(e) $30 \times \ldots = 5 \times 30$	(f) $4 \times \ldots = 8 \times 20$
(g) $50 \times \ldots = 600$	(h) $400 = 40 \times \ldots$
(i) $800 = 40 \times \ldots$	(j) $30 \times \ldots = 210$
(k) $40 \times \ldots = 360$	(l) $280 = 40 \times \ldots$

2. Calculate.

(a) $3 \times 20 + 5 \times 20$	(b) $5 \times 30 + 4 \times 30$
(c) $40 \times 4 + 50 \times 6$	(d) $9 \times 40 - 5 \times 40$
(e) $10 \times 30 - 4 \times 30$	(f) 6×30

3. When you calculate 9 × 40 – 5 × 40, is it necessary to first calculate 9 × 40 and 5 × 40 separately, or is there a quicker way?

4. Calculate.

(a) 9 × 30 – 5 × 30 (b) 8 × 50 – 3 × 50
(c) 3 × 40 + 3 × 6 (d) 3 × 46
(e) 5 × 30 + 5 × 8 (f) 5 × 38
(g) 6 × 45 (h) 4 × 58

9.4 Build more knowledge of multiplication facts

1. Copy and complete this table.

×	2	3	4	5	6	7	8	9	10
60									
70									
80									
90									
100									

2. How much is each of the following?

(a) 5 × 60 (b) 6 × 70
(c) 90 × 4 (d) 60 × 9
(e) 80 × 7 (f) 5 × 40
(g) 3 × 90 (h) 60 × 8
(i) 10 × 7 (j) 8 × 60
(k) 8 × 80 (l) 90 × 9

3. How much is each of the following?

(a) 5 × 70 (b) 8 × 60
(c) 40 × 4 (d) 40 × 9
(e) 70 × 7 (f) 5 × 80
(g) 6 × 90 (h) 70 × 8

4. Complete the table.

×	10	50	40	80	30	60	70	100	90
10				800					
5									
2									
4			160						
8				640					
3									
6									
7									
9									

5. Mia is selling pancakes. One pancake costs R7. Complete this table to help her calculate the cost of *any* number of pancakes up to 100.

Number of pancakes	1	2	3	4	5	6	7	8	9
Cost (in rands)	7	14							

Number of pancakes	10	20	30	40	50	60	70	80	90
Cost (in rands)	70	140							

6. What is the cost of each of the following, if you buy from Mia?

(a) 8 pancakes

(b) 20 pancakes

(c) 28 pancakes

(d) 6 pancakes

(e) 50 pancakes

(f) 56 pancakes

(g) 86 pancakes

(h) 43 pancakes

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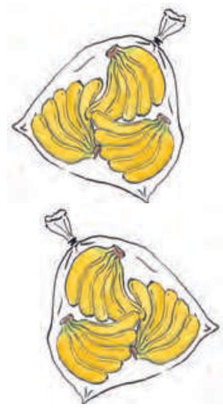
Mia calculates the cost of 27 pancakes like this:
I look at the cost of 20 pancakes and add that to the cost of 7 pancakes.

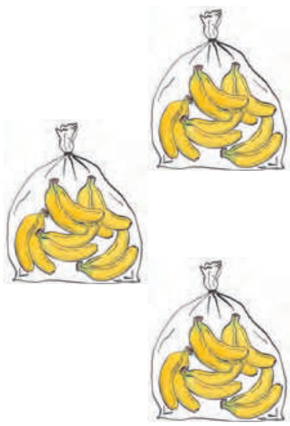
> To calculate 68 × 7, the 68 can be broken down into 60 and 8:
> 60 × 7 = 420 and 8 × 7 = 56.
> So, 68 × 7 = 420 + 56
> which is 476.

7. How much is each of the following?
   (a) 36 × 6 (b) 78 × 4 (c) 8 × 39 (d) 9 × 63

9.5 Multiplying three or more numbers



1. Mrs Mentoor bought 2 bags of bananas with 3 bunches of 5 bananas in each bag.
   (a) How many bananas did she buy?
   (b) Write down how you can calculate the number of bananas, without actually counting them, but by multiplication.
   (c) You can check your calculation by counting the bananas.



2. Mr Nene bought 3 bags of bananas with 5 bunches of 2 bananas in each bag.
   (a) How many bananas did he buy?
   (b) Write down how you can calculate the number of bananas, without actually counting them, but by multiplication.
   (c) You can check your calculation by counting the bananas.

3. Daisy wrote 2 × 3 × 5 for question 1.
   She wrote 3 × 5 × 2 for question 2.
   Her answer for both calculation plans was 30.
   (a) How many bananas are there altogether in 5 bags with 2 bunches of 3 bananas in each bag?
   (b) What will happen if we change the order of the numbers in the calculation plan 5 × 2 × 3?

When three or more numbers are multiplied, they can be swopped around: the answer remains the same. This is a **property** of multiplication.

If you have to multiply three or more numbers, you can rearrange the numbers so that the calculation is easier.

4. Do the following multiplications as quickly as you can. Try to do it in a way that will make it easy for you.
   (a) 2 × 7 × 5
   (b) 25 × 7 × 4
   (c) 4 × 47 × 5
   (d) 12 × 2 × 5
   (e) 10 × 17 × 5
   (f) 2 × 7 × 55

9.6 Use your knowledge in a different way

1. How much is each of the following?
   (a) 7 × 60 (b) 4 × 80
   (c) 6 × 70 (d) 9 × 50

2. Find the missing number in each number sentence. Your answers for question 1 may help you.
   (a) . . . × 80 = 320 (b) . . . × 70 = 420
   (c) . . . × 50 = 450 (d) . . . × 60 = 420

3. Now find the missing number in each of these number sentences. Your answers for question 1 may again help you.
   (a) $4 \times \ldots = 320$ (b) $6 \times \ldots = 420$
   (c) $9 \times \ldots = 450$ (d) $7 \times \ldots = 420$

4. (a) How much money will each person get if R360 is shared equally between four people?
   (b) If R20 more is available to be shared equally between four people, there is R380 which can be shared. How much will each person get?

What you did when you found the missing numbers in questions 2, 3 and 4 is called **division**.

When you found the missing number 80 for the number sentence $4 \times \ldots = 320$, you divided 320 by 4. You can write this as $320 \div 4$.

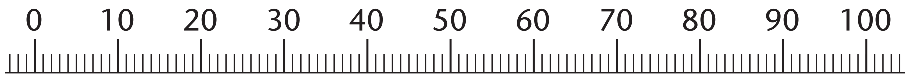
What you will do in question 5 is also called division.

$320 \div 4 = 80$
$4 \times 80 = 320$
Division is called the **inverse** of multiplication.

5. (a) How many books at R80 each can you buy with R320?
   (b) How many books at R40 each can you buy with R320?

6. (a) How many pencils at R10 each can you buy with R100?
   (b) How many pencils at R5 each can you buy with R100?
   (c) How many pencils at R5 each can you buy with R25?
   (d) How many pencils at R5 each can you buy with R50?
   (e) How many pencils at R5 each can you buy with R60?

7. Use the number line below to find out how many 15s there are in 60.



8. Now find the missing numbers in these number sentences:
   (a) . . . × 15 = 60 (b) 60 ÷ 15 = . . .

9. (a) How many 15s are there in 120?
   (b) How much is 6 × 15?

9.7 Practise and use your skills

Ask your teacher if there are words that you do not know.

Answer the questions below.

Read each question carefully and make sure that you understand what is asked.

Each time first estimate the answer and write your estimated answer down.

When you have solved the problem, look at the answer and decide if that answer is possible in the real situation.

1. The Williams family of six people are having lunch at a café. They each order a hamburger for R38, chips for R19 and a cooldrink for R16. How much will the family's lunch cost in total?
2. Loyiso wants to buy a soccer ball that costs R387. He has saved R158. How much more money does he need?
3. Mr Faku pays R76 for 4 kg tomatoes. What is the price of 1 kg tomatoes?

4. Mrs Jacobs is baking cookies. She places 6 rows of cookies on a baking tray. There are four cookies in one row. If she fills five baking trays, how many cookies is she baking?
5. The Lucky Store charges R90 for a box of 15 avocado pears. The Big Grocer charges R63 for a bag of 9 avocado pears. Which is the best deal?
6. Mr Zweli bought one large box of bananas. He saw that there were
   5 bunches with 4 bananas in a bunch,
   6 bunches with 5 bananas in a bunch,
   12 bunches with 3 bananas in a bunch and
   7 bunches with 8 bananas in a bunch.
   How many bananas did Mr Zweli buy?
7. Kholeka has saved R85. She wants to buy bottles of juice for her birthday party. Each bottle costs R25.
   (a) How many bottles can she buy?
   (b) How much money will she have left?
8. Suzi buys T-shirts on a sale. Each T-shirt costs R16. Suzi has R90. How many T-shirts can she buy?
9. Werner is paid R90 for three hours' work. How much will he get paid for the following number of hours?
   (a) 6 hours
   (b) 12 hours
   (c) 1 hour
   (d) 4 hours
10. Dirkie packs bottles into crates. He packs 12 bottles in each crate. There are 250 bottles.
    (a) How many crates can he fill?
    (b) How many bottles will be left over?
11. Mr Daniels sells gem squashes in bags of 8. He has a large box with 94 gem squashes.
    (a) How many bags can he fill?
    (b) How many gem squashes are left over?

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9.8 Dividing into equal parts

Knowledge of **multiplication facts** makes you powerful.

You can answer many different questions by using one multiplication fact.

For example, if you know the multiplication fact $4 \times 16 = 64$, you can answer all the different parts of question 1 easily. You will also be able to answer many other questions.

1. (a) Large bottles of juice cost R16 each.
How much will four of these bottles cost altogether?

   (b) Janice paid R64 for four facecloths. They cost exactly the same. What did she pay for each facecloth?

   (c) Sixteen apples are cut into quarters.
How many quarter-apples is this, altogether?

   (d) Four people will sit at each table at a wedding function.
Sixty-four people are invited to the wedding.
How many tables are needed?

   (e) For every blue bead in a string of beads, there are four red beads. How many blue beads are there, if there are 64 red beads in total?

2. How much is each of the following?

(a) 7×11	(b) 7×9	(c) 7×8
(d) 7×6	(e) $(7 \times 8) + 4$	(f) $(7 \times 7) + 4$
(g) $(7 \times 4) + 6$	(h) 7×12	(i) 7×5

3. (a) A loaf of bread costs R8 at a spaza shop. How many loaves of bread can you buy with R60, and how much change will you get?

   (b) There are 63 tiles on a floor. The tiles are laid in rows of 7 tiles each. How many rows are there?

Your answer for question 3(a) can be written like this:
$60 \div 8 = 7$ **remainder** 4.

4. How much is each of the following?
   (a) $53 \div 7$
   (b) $34 \div 4$
   (c) $84 \div 4$
   (d) $77 \div 7$

5. How much is each of the following?
   (a) $48 \div 6$
   (b) $48 \div 8$
   (c) $50 \div 6$
   (d) $81 \div 9$
   (e) $100 \div 10$
   (f) $60 \div 10$
   (g) $58 \div 10$
   (h) $58 \div 5$
   (i) $63 \div 7$
   (j) $63 \div 9$
   (k) $80 \div 4$
   (l) $80 \div 20$
   (m) $60 \div 4$
   (n) $60 \div 15$
   (o) $80 \div 3$
   (p) $75 \div 25$
   (q) $90 \div 3$
   (r) $90 \div 6$

6. Devin takes 65 minutes to wash 5 cars. How long does it take him to wash one car?

7. The teacher has 35 rubber bands. The learners sit and work in 5 equal groups. How many rubber bands will each group get if the teacher gives every group the same number of rubber bands?

8. Rico is 7 years old. His grandpa is 84 years old. How many times older is Rico's grandpa than Rico?

9. Calculate:
   (a) $65 \div 8$
   (b) $65 \div 4$
   (c) $36 \div 9$
   (d) $54 \div 9$
   (e) $27 \div 3$
   (f) $42 \div 6$
   (g) $60 \div 5$
   (h) $45 \div 7$
   (i) $20 \div 6$
   (j) $24 \div 3$
   (k) $98 \div 7$
   (l) $58 \div 3$

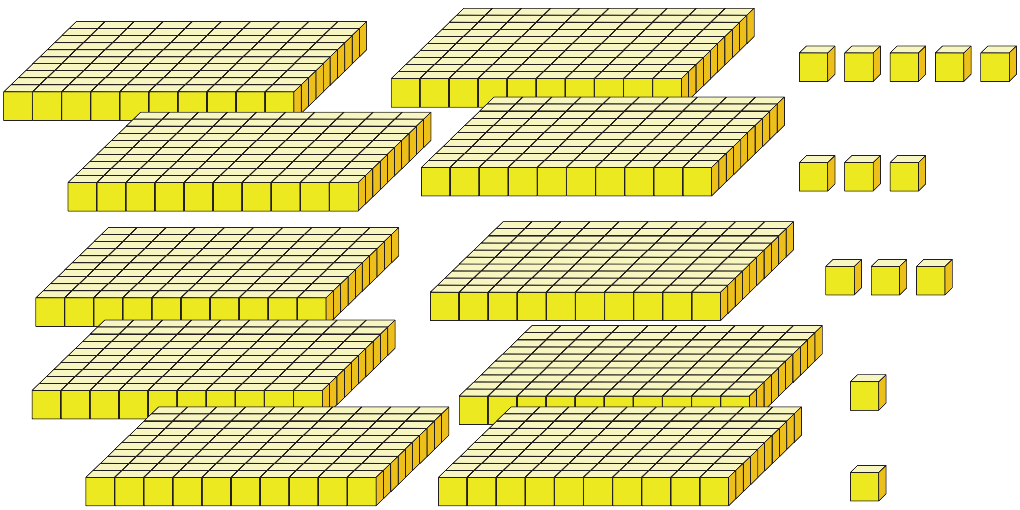
Term Two

Unit 1 Whole numbers

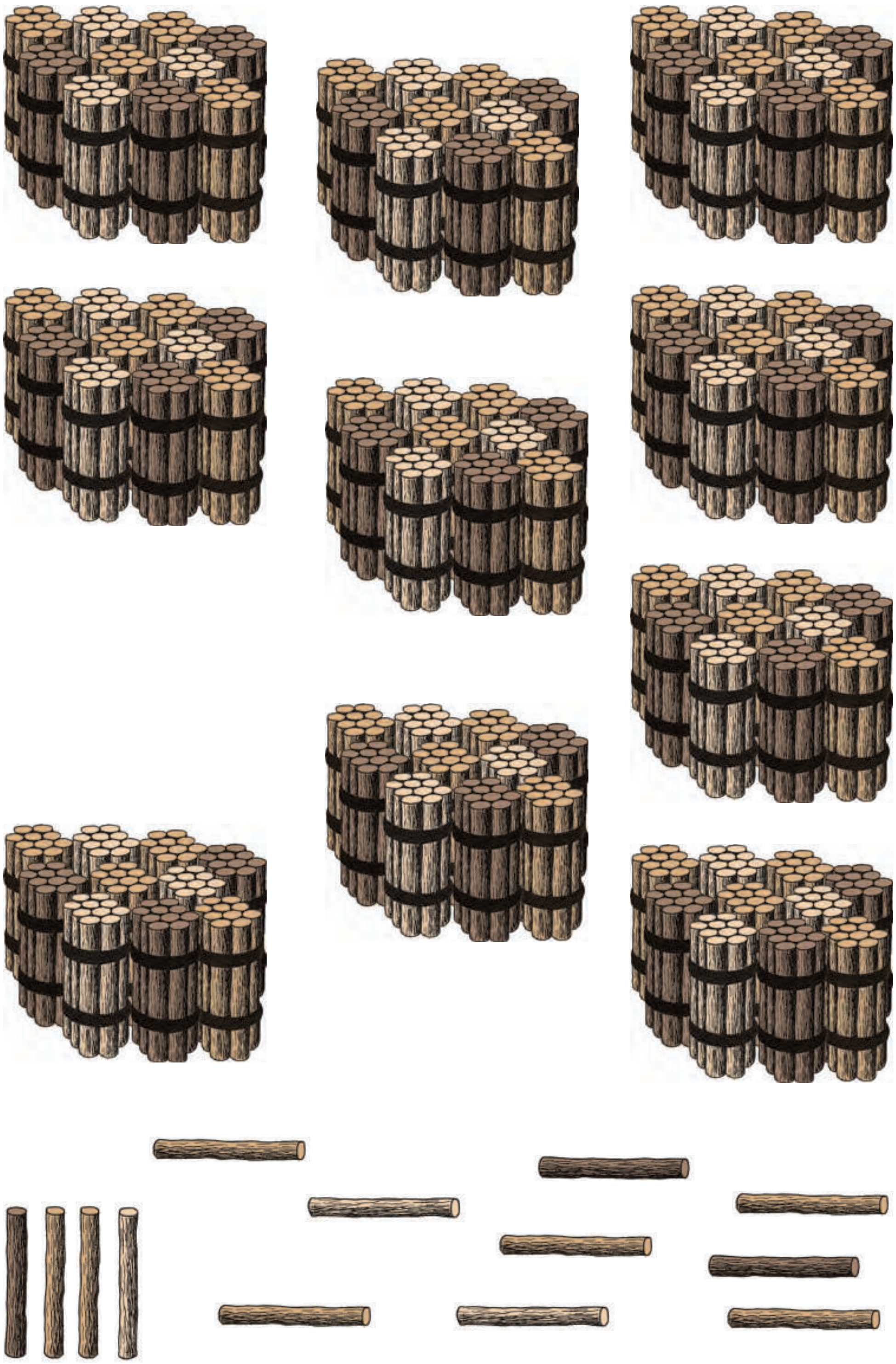
1.1 Compare bigger numbers

Ten hundreds is **one thousand**.
The number symbol for one thousand is **1 000**.

1. How many tens make up 1 000?
2. Which are more, the cubes below or the sticks on the next page?



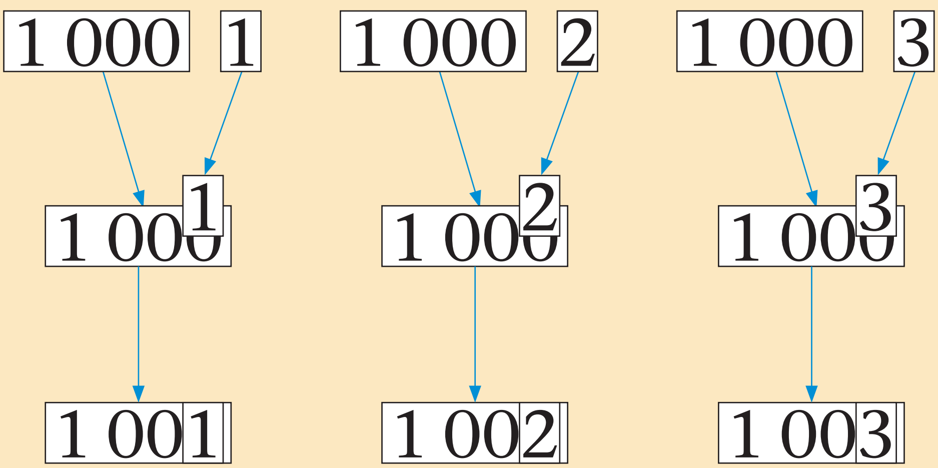
3. How many cubes are shown here, *one thousand and five* or *one thousand and twelve* or *one thousand and thirteen* or *one thousand and fourteen*?
4. How many sticks are shown on the next page?



The number symbols, number names and expanded notation for some consecutive numbers are given below.

Consecutive numbers are numbers that follow on each other.

Number symbol	Number name	Expanded notation
997	nine hundred and ninety-seven	900 + 90 + 7
998	nine hundred and ninety-eight	900 + 90 + 8
999	nine hundred and ninety-nine	900 + 90 + 9
1 000	one thousand	1 000
1 001	one thousand and one	1 000 + 1
1 002	one thousand and two	1 000 + 2



5. Write the symbols, names and expanded notation for the five numbers that follow on 1 002.

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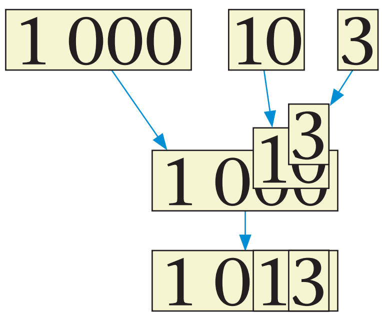
The different ways of writing some other numbers are given below.

Number symbol	Number name	Expanded notation
1 010	one thousand and ten	1 000 + 10
1 011	one thousand and eleven	1 000 + 10 + 1
1 012	one thousand and twelve	1 000 + 10 + 2
. . .	. . . .	. . . .
1 023	one thousand and twenty-three	1 000 + 20 + 3
1 600	one thousand six hundred	1 000 + 600
1 607	one thousand six hundred and seven	1 000 + 600 + 7
1 670	one thousand six hundred and seventy	1 000 + 600 + 70
1 677	one thousand six hundred and seventy-seven	1 000 + 600 + 70 + 7

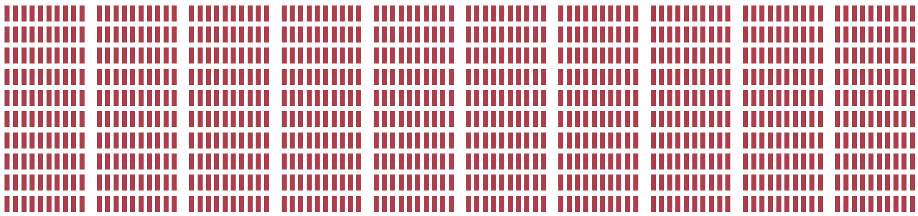
6. Write the symbols, names and expanded notation for the ten numbers that follow on 1 012.



7. Write the number symbols and expanded notation for the numbers indicated by the arrows on the number line below.

1.2 Counting thousands

This is one thousand stripes.



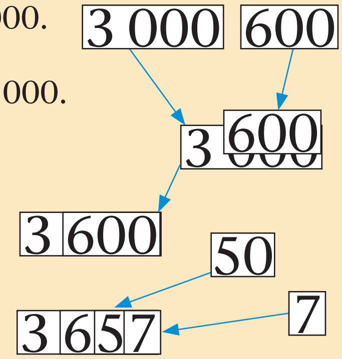
1. How many blocks of hundred make up one thousand?
2. How many stripes are shown below?

The number symbol for *one thousand* is 1 000.

The number symbol for *three thousand* is 3 000.

The number symbol for *three thousand six hundred* is 3 600.

The number symbol for *three thousand six hundred and fifty-seven* is 3 657.



3. Write the number symbols for these numbers:
   (a) two thousand seven hundred
   (b) five thousand three hundred

4. Write the number names for 7 200 and 3 800.

5. How many stripes are shown below?

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1.3 Represent numbers in different ways

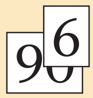
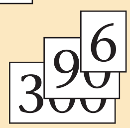
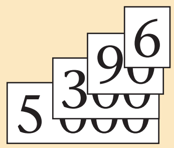
The number *5 thousand 3 hundred and ninety-six* has four place value parts:

$\boxed{5\ 000}$ $\boxed{300}$ $\boxed{90}$ $\boxed{6}$

This number can be written in expanded notation:

5 000 + 300 + 90 + 6

With place value cards, the short number symbol for 5 thousand 3 hundred and ninety-six is built by

- putting the 6 on top of the 0 of the 90, 
- putting the 96 on top of the 00 of the 300,  and
- putting the 396 on top of the 000 of the 5 000. 

With all the zeros hidden, the **number symbol** for 5 thousand 3 hundred and ninety-six is 5 396.

$\boxed{5}\boxed{3}\boxed{9}\boxed{6}$

The **place value parts** of 5 396 are 5 000, 300, 90 and 6.
The **expanded notation** for 5 396 is 5 000 + 300 + 90 + 6.

1. Write down the place value parts of each number:
   (a) three thousand eight hundred and seventy-four
   (b) six thousand two hundred and fifty-nine
   (c) nine thousand four hundred and twenty-three

2. Now write the number symbols and the expanded notation for the numbers in question 1.

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3. Write down the place value parts of each number:

(a) 6 285	(b) 5 862
(c) 2 568	(d) 8 652
(e) 3 046	(f) 1 504

4. Now write the number names and expanded notation for the numbers in question 3.

5. The place value parts of some numbers are given below. Write the number name and number symbol for each number.

   (a) 3; 4 000; 800 and 60

   (b) 600; 4; 80 and 3 000

   (c) 40; 8; 300 and 6 000

   (d) 8 000; 30; 400 and 6

   (e) 6 000; 60 and 4

   (f) 8 and 3 000

1.4 Count beyond 1 000

1. Start at 900 and count in hundreds up to 3 000. Write the number symbols as you go along:
   900 1 000 1 100 and so on.

2. Start at 2 000 and count backwards in hundreds down to 800. Write the number symbols as you go along:
   2 000 1 900 1 800 and so on.

3. In each case below, first count softly by yourself without writing. When you have finished counting to the specified number, write the number symbols as you did in questions 1 and 2.

   (a) Start at 4 995 and count forwards in twos up to 5 023.

   (b) Start at 7 012 and count backwards in twos down to 6 996.

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4. In each case below, first count softly by yourself without writing. When you have finished counting to the specified number, write the number symbols.
   (a) Start at 3 850 and count forwards in hundreds up to 5 250.
   (b) Start at 3 950 and count backwards in hundreds down to 1 650.
5. In your book, write the numbers that are missing on these number lines, for example (c) = 8 650.

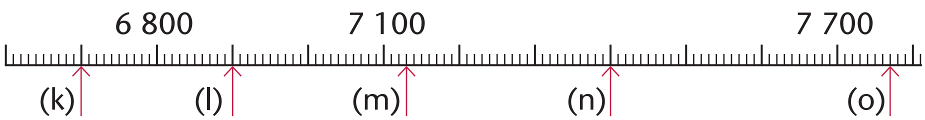
8 600	8 610	8 620	(a)	(b)	(c)	(d)	(e)	(f)	8 690

1 403	1 400	1 397	(g)	1 391	1 388	(h)	1 382	(i)	1 376

6. Arrange these numbers from smallest to biggest.

   6 152   9 987   5 423   9 899   4 777   3 365
7. Arrange these numbers from biggest to smallest.

   2 710   9 356   6 553   5 121   3 499   4 001
8. Write the number names and number symbols for the numbers indicated by the arrows on the number lines below.

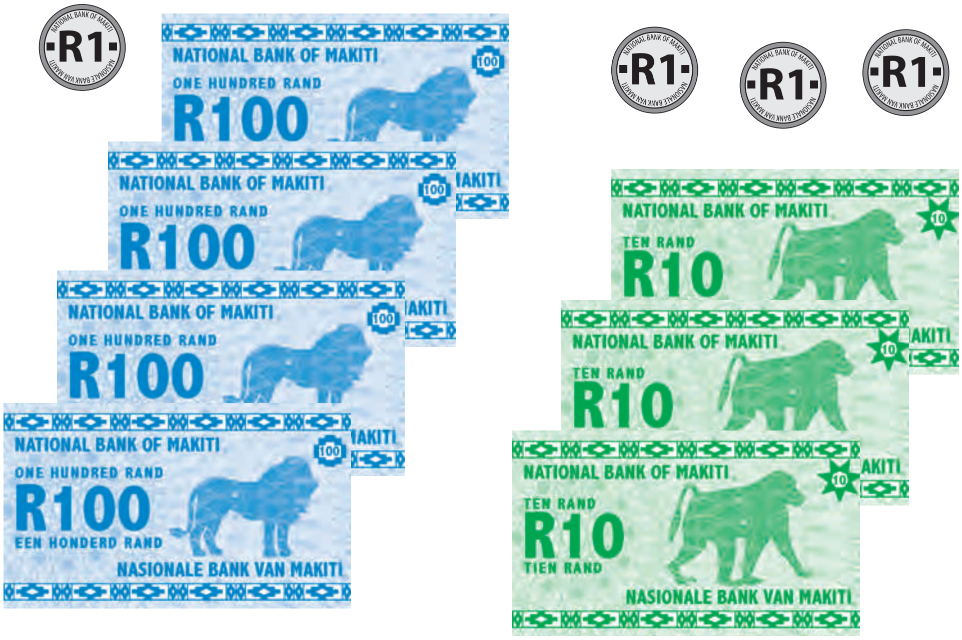


UNIT 2 WHOLE NUMBERS: ADDITION AND SUBTRACTION

2.1 Add and subtract with money

1. Simanga has saved R378.

   (a) He adds the money below to his savings. How much has he now saved in total?



   (b) Simanga adds another R400 to his savings. How much has he now saved in total?

2. The school fee at a certain school is R460.
   Manare’s mother pays with one R200 note, two R100 notes and three R20 notes.
   Elizabeth’s father pays with four R100 notes, one R50 note and one R10 note.

   Describe three other ways in which R460 can be made up from different banknotes.

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3. 1 000 can be formed by adding up three different multiples of 100. For example:

   1 000 = 300 + 200 + 500 and 1 000 = 600 + 100 + 300.

   (a) Describe two other ways in which 1 000 can be formed by adding up three different multiples of 100.

   (b) Describe three different ways in which 1 200 can be formed by adding up different multiples of 100.

4. How much is each of the following?

   (a) 583 – 300
   (b) 583 – 80
   (c) 4 327 – 4 000
   (d) 4 327 – 2 000
   (e) 4 327 – 320
   (f) 6 724 – 700
   (g) 6 724 – 720
   (h) 6 724 – 6 000
   (i) 6 724 – 704
   (j) 5 932 – 5 032
   (k) 5 932 – 900
   (l) 5 932 – 4 821
   (m) 6 287 – 6 277
   (n) 7 023 – 26

5. (a) Is it true that three R200 notes, two R100 notes, one R50 note, two R20 notes and one R10 note make up R1 000?

   (b) How can R750 be made up with R200 notes, R20 notes and R10 notes?

   (c) Describe a different way to make up R750 with R200 notes, R20 notes and R10 notes.

6. Daniel has R200 notes, R100 notes, R50 notes, R20 notes and R10 notes.

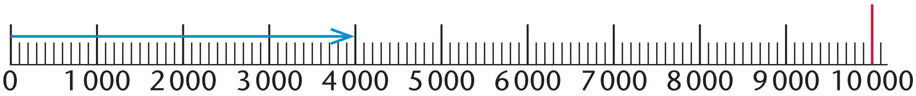
   Describe two different ways in which Daniel can make up R800 with the notes, using at least one of each kind of note he has. Use number sentences to describe the two ways.

7. (a) Willem has R1 000. He spends R300. How much is left?

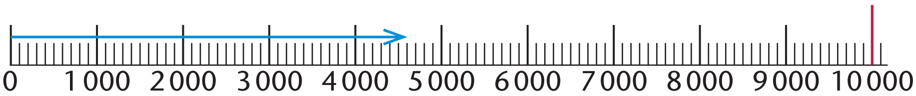
   (b) Sarah has R7 000. She spends R3 000. How much is left?

   (c) Bongi has R3 000. She needs R7 000. How much money is she short of?

8. (a) Lea has already run 4 000 m of a 10 000 m race. How far does she still have to run?



(b) Ben has already run 4 600 m of a 10 000 m race. How far does he still have to run?



9. How much is each of the following? Try to be smart and find the answers with as little work as possible.

(a) 10 000 – 4 000
(b) 10 000 – 4 600
(c) 7 000 – 3 000
(d) 7 500 – 3 500
(e) 7 267 – 3 267
(f) 8 365 – 5 000
(g) 6 000 – 2 000
(h) 6 000 – 1 990
(i) 6 000 – 2 010
(j) 6 000 – 3 010

10. Calculate each of the following.

(a) 4 000 + 6 000
(b) 4 600 + 5 400
(c) 7 000 + 3 000
(d) 6 800 + 3 200
(e) 5 000 + 4 000
(f) 5 300 + 4 700
(g) 3 000 + 4 000
(h) 2 060 + 4 040

11. Find the missing number in each case. You can do it in steps, and use arrows to show your thinking if you wish.

(a) 4 287 + . . . = 4 300
(b) 4 690 + . . . = 5 000
(c) 5 624 + . . . = 6 000
(d) 5 624 + . . . = 8 000
(e) 3 063 + . . . = 4 000
(f) 3 063 + . . . = 6 000
(g) 3 063 + . . . = 6 400
(h) 3 063 + . . . = 6 437

12. How much is each of the following? You can use the work you did in the previous question.

(a) 8 000 – 5 624
(b) 6 437 – 3 063

2.2 Methods to add and subtract

Add by filling up multiples of 10 and 100 and 1 000

This method is useful when one number is smaller than the other one, for example when 6 768 + 476 has to be calculated.

In this case, part of the second number is added to reach the next multiple of 10:

6 768 + 2 → 6 770 (**Step 1**)

Since 476 = 2 + 474, we must still add 474.

Part of the 474 is now added on to reach the next multiple of 100:

6 768 + 2 → 6 770 + 30 → 6 800 (**Step 2**)

Since 474 = 30 + 444, we must still add 444.

Part of the 444 is added on to reach the next multiple of 1 000:

6 768 + 2 → 6 770 + 30 → 6 800 + 200 → 7 000 (**Step 3**)

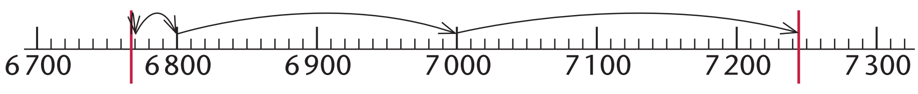
Since 444 = 200 + 244, there is still 244 to be added:

6 768 + 2 → 6 770 + 30 → 6 800 + 200 → 7 000 + 244 = 7 244 (**Step 4**)

If you look back at the steps, you will notice that the 476 was broken down into four parts:

2 + 30 + 200 + 244 = 476

1. (a) What part of 476 was added on to 6 768 in Step 1?
   (b) What part of 476 was added on in Step 2?
   (c) What part of 476 was added on in Step 3?
   (d) What part of 476 was added on in Step 4?
   (e) The steps are shown on this number line. What are the numbers at the two red lines, and how far apart are they?



2. Use the filling-up method to calculate the following.
   (a) 5 876 + 468
   (b) 7 783 + 673
   (c) 3 364 + 447
   (d) 4 849 + 633

Subtract by adding on

Subtraction can also be done by filling up multiples of 10, 100 and 1 000.

For example, 7 234 – 4 876 can be calculated by finding out how much should be added to 4 876 to reach 7 234, as shown below.

We add on in steps from 4 876 until we reach 7 234, and then check how much we had to add on in total:

4 876 + **24** → 4 900 + **100** → 5 000 + **2 234** = 7 234.

In total we added on 24 + 100 + 2 234 which is 2 358.

So, 4 876 + 2 358 = 7 234 and 7 234 – 4 876 = 2 358.

3. Use the add-on method of subtraction to calculate the following.

(a) 7 236 – 2 875

(b) 6 721 – 4 503

(c) 9 000 – 1 234

(d) 8 187 – 5 592

(e) 7 386 – 3 163

(f) 8 396 – 5 273

Add by adding on place value parts

To calculate 3 465 + 4 574 the number that is to be added can be broken down into its place value parts. The place value parts can then be added one by one to the first number:

4 574 = 4 000 + 500 + 70 + 4

So, 3 465 + 4 574 = 3 465 + 4 000 + 500 + 70 + 4 and it can be calculated like this:

3 465 + 4 000 = 7 465

7 465 + 500 = 7 965

7 965 + 70 = 8 035

8 035 + 4 = 8 039

The work can also be shown like this:

3 465 + 4 000 → 7 465 + 500 → 7 965 + 70 → 8 035 + 4 = 8 039

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4. Add on the place value parts of the second number to calculate the following:
   (a) 4 628 + 2 775 (b) 4 775 + 2 628
5. Check your answers for question 3 by adding in the way you just did in question 4.
6. When 3 465 + 4 574 is calculated, do you think it matters which of 4 000, 500, 70 and 4 is added to 3 465 first and which part is added next?

   Complete these calculations to check your answer:

   (a) 3 465 + 4 → . . . . + 70 → . . . . + 500 → . . . . + 4 000 = ...

   (b) 3 465 + 70 → . . . . + 4 → . . . . + 4 000 → . . . . + 500 = ...

   (c) 3 465 + 500 → . . . . + 4 000 → . . . . + 4 → . . . . + 70 = ...

In question 6(a) the instructions are to add 4 first, then 70, then 500 and then 4 000.

In question 6(c) the instructions are to add 500 first, then 4 000, then 4 and then 70.

7. Write like in question 6 to give the following instructions:
   Calculate 3 465 + 4 574 by first adding 70, then 500, then 4 and then 4 000.
8. (a) Calculate 5 374 + 2 824 by adding the second number in parts. You can add the parts in any order you prefer.

   (b) Calculate 5 374 + 2 824 again but now add the parts of the second number in a different order.

   (c) Calculate 6 785 – 3 241 by subtracting the place value parts of 3 241 one by one.

   (d) Calculate 6 785 – 3 241 by subtracting the place value parts of 3 241 in a different order.

2.3 Round off and estimate

Numbers can be rounded off to make estimates of the answers for calculations before you do the calculations accurately.

3 567 rounded off to the nearest 10 is 3 570
3 567 rounded off to the nearest 100 is 3 600
3 567 rounded off to the nearest 1 000 is 4 000

3 565 rounded off to the nearest 10 is 3 570
3 564 rounded off to the nearest 10 is 3 560

3 550 rounded off to the nearest 100 is 3 600
3 549 rounded off to the nearest 100 is 3 500

3 500 rounded off to the nearest 1 000 is 4 000
3 499 rounded off to the nearest 1 000 is 3 000

1. Round each of these numbers off to the nearest 1 000, in the same way as in the above examples.
   (a) 6 499
   (b) 6 500
   (c) 4 450
   (d) 4 449
   (e) 3 235
   (f) 3 234
   (g) 7 249
   (h) 7 250
   (i) 7 500
   (j) 7 499
   (k) 6 008
   (l) 6 015
2. Round each number in question 1 off to the nearest 10.
3. Round each number in question 1 off to the nearest 100.
4. Jana has already paid back R2 386 of the R4 437 she borrowed from Petra.
   (a) Round the numbers off to the nearest 1 000 and make an estimate of how much Jana still has to pay back.
   (b) Also make an estimate by rounding off to the nearest 100.

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5. Give *approximate answers* for the questions below, by first rounding off the numbers to the nearest 1 000.

    (a) Selina uses 3 524 litres of water from the tank to water her small field of maize. If there is then 4 852 litres water left, how much water was in the tank?

    (b) A store sold 8 563 packets of chips during a month. Of these, 2 047 were sold during the last week. How many packets were sold during the first three weeks of the month?

    (c) Willem has to lay 8 675 bricks. So far he has laid 2 357 bricks. How many bricks must he still lay?

    (d) Lerato walked 5 683 m. In the same period of time, Sipho walked 7 349 m. How much further than Lerato did Sipho walk?

6. Give *better approximate answers* to the above questions, by rounding off the numbers to the nearest 100.

7. Give *even better approximate answers* to the above questions, by rounding off the numbers to the nearest 10.

8. Calculate the *accurate answers* to the above questions.

9. Find out by how much your estimates in question 5 differed from your accurate answers. Report your errors in a table like the one below.

    These differences are called the **estimation errors**.

    Also find the estimation errors for your estimates in question 6 and in question 7, and report them in your table.

Question	(a)	(b)	(c)	(d)
5. Error when rounding to the nearest 1 000				
6. Error when rounding to the nearest 100				
7. Error when rounding to the nearest 10				

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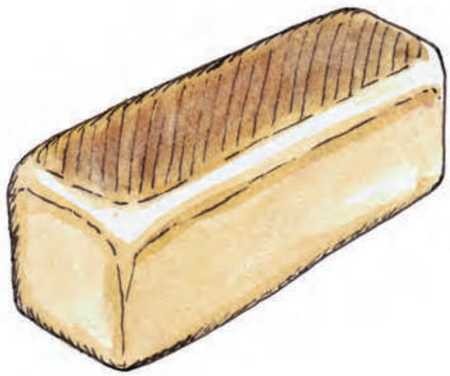
UNIT 3 COMMON FRACTIONS

3.1 Equal sharing into fractions

In this section, we will look at sharing bread, oranges and peanuts in different ways.

Note: Do not use symbols to write the answers. Use *words* to describe the parts in your answers.

1. Five children share this loaf of bread equally.
   "Equally" means that every child gets the same.



What can we call the part that each child gets?

To share the loaf of bread in this way, it is divided into **five equal parts**.

Each of these parts is called **one fifth** of the loaf.

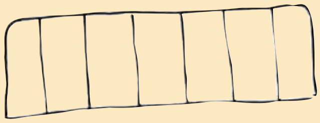
If a loaf of bread or some other object is divided into seven equal parts, each part is called **one seventh** of the whole.

2. A whole sausage is shared between six children so that every child gets the same.
   What part of the sausage does each child get?
   Make a drawing to show how the sausage must be cut.

3. Five children share a loaf of bread equally. Nothing is left over. Make a *rough sketch* to show how they can do it.

Remember, to share **equally** means that everyone gets the same.

This rough sketch shows how a loaf of bread can be cut to share it equally between seven people.

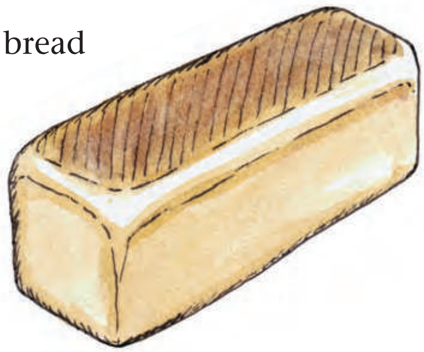


4. Make *rough sketches* to show how each of the following can be shared equally between six children:

   (a) one slice of bread

   (b) one whole loaf of bread

   (c) 24 peanuts



5. Change the sketches you have made to now show how each of the following can be shared equally between 12 children:

   (a) one slice of bread
   (b) one whole loaf of bread
   (c) 24 peanuts

6. Change your sketches again to show how each of the following can be shared equally between 3 children:

   (a) one slice of bread
   (b) one whole loaf of bread
   (c) 24 peanuts

7. Five people share 11 slices of bread. Every person must get the same. Nothing is left over. Make a rough sketch to show how they can do it.

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8. Make rough sketches to show how each of these equal sharings can be done:

   (a) 8 children share a loaf of bread.

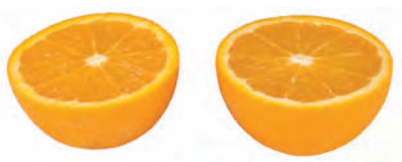
   (b) 4 children share a loaf of bread.

   (c) 5 children share a loaf of bread.

   (d) 10 children share a loaf of bread.

9. In Photograph A an orange is cut into halves. In Photograph C an orange is cut into eighths.

   Into what fraction parts is the orange cut in Photographs B and D?



Photograph A

Photograph B

Photograph C

Photograph D

10. Make rough sketches to show different ways in which a slice of bread can be cut into quarters.

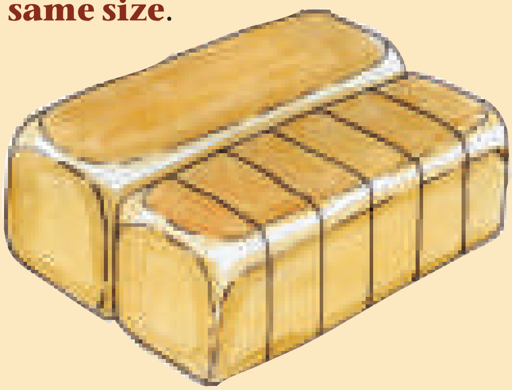
11. 8 people share 5 loaves of bread equally. How much bread does each person get? You can make a drawing to help you.

12. 12 people share 8 loaves of bread equally. How much bread does each person get?

3.2 Naming fractions

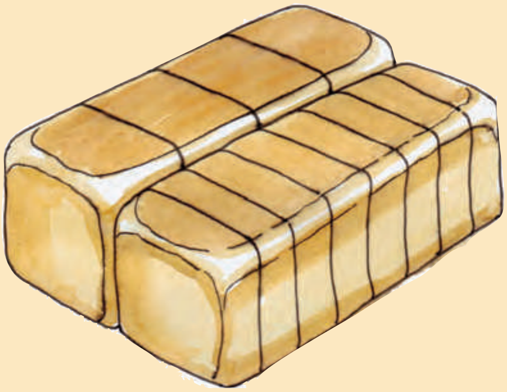
Equal parts are parts of **the same size**.

If we cut a loaf of bread into six equal parts, each part is called **one sixth** of a loaf.



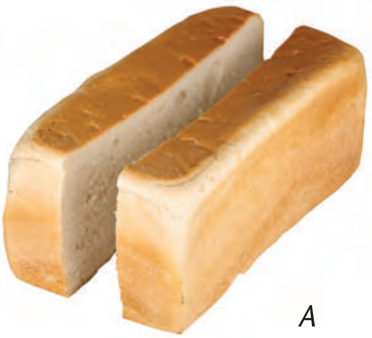
If we divide something into four equal parts, each part is called **one fourth** (or **one quarter**) of the whole.

If we divide something into eight equal parts, each part is called **one eighth** of the whole.



1. What can we call each part in the following cases?
   (a) The loaf is divided into five equal parts.
   (b) The loaf is divided into three equal parts.
   (c) The loaf is divided into ten equal parts.
2. A cake is divided into equal pieces and each piece is a seventh of the whole cake. How many pieces are there?
3. Which is greater, one sixth of a cake or one fifth of the same cake? Do not use a drawing to explain your answer.

Three different ways of halving a loaf of bread are shown by Photographs A, B and C.



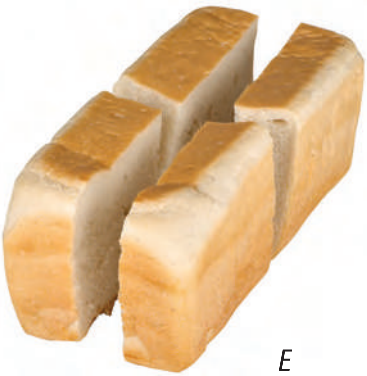
A

B

C

4. Can the halves in Photograph B be cut to form smaller parts such as those shown in Photograph D?
5. Can the halves in Photograph B be cut to form smaller parts such as those shown in Photographs E and F?

D



E

F

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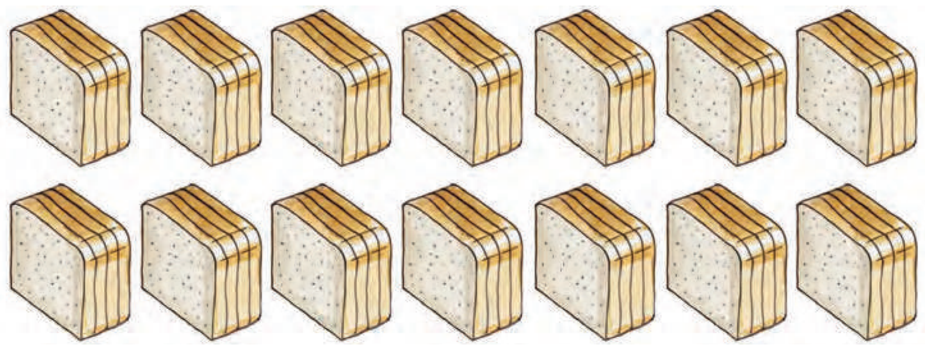
6. What fraction parts of a whole loaf of bread are shown in Photographs D, E and F?
7. Which halves can be cut to form smaller parts such as those shown in Photograph E?
8. Which halves can be cut to form smaller parts such as those shown in Photograph F?
9. (a) How many slices are there in one whole loaf, if each of these stacks is one fifth of a whole loaf?



(b) Susan ate one of the above stacks of slices in the morning and two of them in the evening. What part of a loaf did she eat, altogether?

(c) How many full loaves can be made up by putting these stacks together, and what part of a full loaf will be left over?

(d) How many slices is 3 quarters of the whole loaf?

(e) Which is more, 3 quarters of the whole loaf or 3 fifths of the whole loaf?

(f) How many whole loaves can be made by putting 8 quarters together?

(g) How many whole loaves can be made by putting 20 quarters together?

3.3 Comparing fractions

If the teacher divides a group of 15 learners into five smaller, equal groups, each small group is **one fifth** of the whole group.

Can you see it in the picture?

1. (a) How many are three fifths of 15 people?

   (b) How many are one third of 15 people? Show how you can use division to find the answer.

   (c) 15 people are divided into five equal groups. How many people are in each group? Show how you can use a fraction to find the answer.

   (d) 20 people are divided into groups of 4 each. How many groups are there?

   (e) How many are one fifth of 20 people?

When you **divide** something into **5 equal parts**, each part is **one fifth** of the whole.

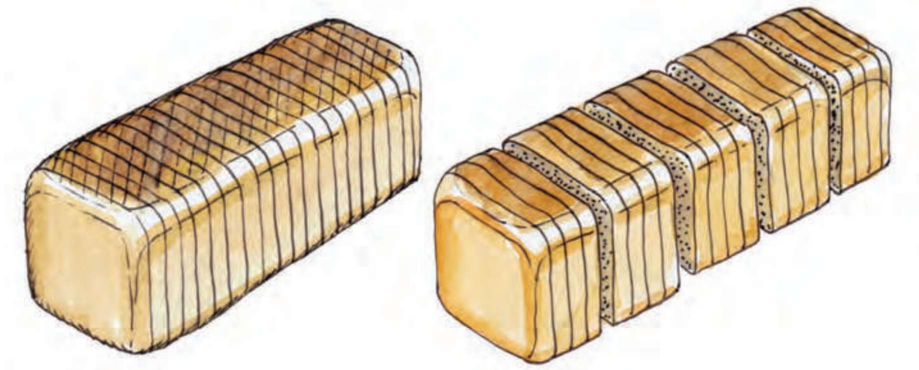
2. Maggie spent a quarter of her money, and Lizzie spent half of her money. Who spent the most money in each case below?

   (a) Maggie had R40 and Lizzie had R100.

   (b) Maggie had R100 and Lizzie had R40.

   (c) Maggie and Lizzie both had R40.

3. Make a rough drawing of a loaf of bread that is cut into slices so that each slice is one tenth of the whole loaf.

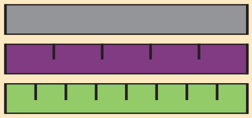


4. (a) Write three sentences to say what you see in the picture.
   (b) How many slices are there in the whole loaf?
   (c) How many slices are there in each fifth of the loaf?
   (d) How many slices are there in 3 fifths of the whole loaf?
   (e) How many slices are there in a quarter of the whole loaf?
   (f) How many slices are there in 3 quarters of the whole loaf?
   (g) How many quarter-loaves can you make up from 5 full loaves?
   (h) How many full loaves do you need to make up 12 quarter-loaves?
   (i) Which is more, 3 fifths or 3 quarters of a loaf?
5. A different loaf of bread is cut into 12 equal slices.
   (a) How many slices are three quarters of this loaf?
   (b) How many slices are two sixths of this loaf?
   (c) How many slices are one third of this loaf?
   (d) Peter eats 8 slices of this loaf. What part of the loaf does he eat?

   You can make a rough drawing if it will help you.

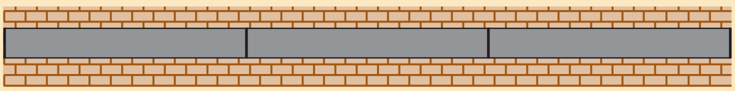
3.4 Using fractions to measure

Billy uses these measuring sticks to take measurements on a building site.



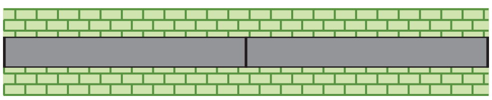
1. (a) Are the three sticks the same length?
   (b) How do the green and purple sticks differ from the grey stick?
   (c) How do the green and purple sticks differ from each other?
   (d) How many equal parts can you see on the purple stick?
   (e) What name can you give to these parts?
   (f) What name can you give to the parts on the green stick?

This brick wall is exactly **3 sticks long**:

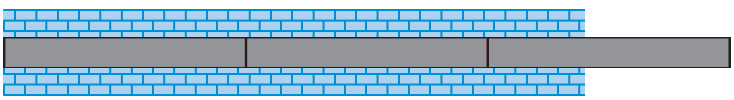


2. Can you say exactly how long each brick wall below is? Give reasons for your answers.

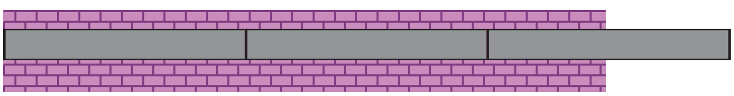
(a)



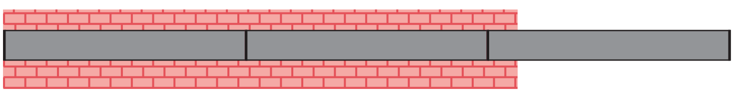
(b)



(c)



(d)



3. Think of a plan to measure the blue and red walls accurately.

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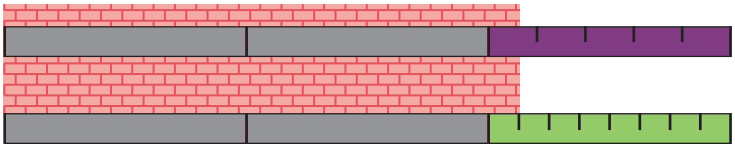
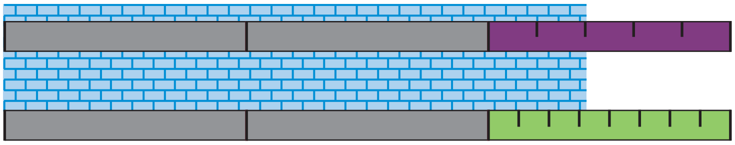
4. Here you can see the blue and red walls again.
   Can you now say exactly how long they are?

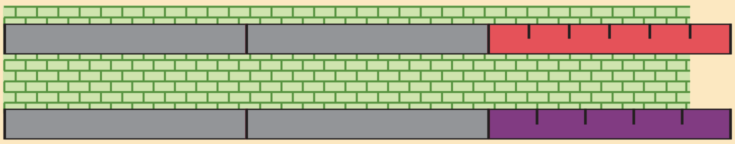
   (a)



   (b)

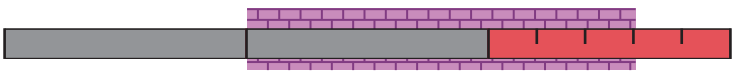


The green wall below is **two and 5 sixths of a stick** long.

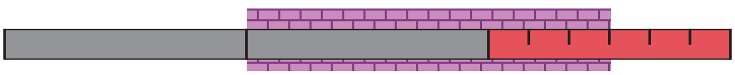


5. Which is longer, 5 sixths of Billy's measuring stick or 4 fifths of Billy's measuring stick?
6. Check your answers for question 4, and write them in the same way that the length of the green wall is written above.
7. Which of the walls below is one and 3 eighths of a stick long?

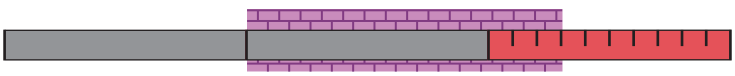
   (a)



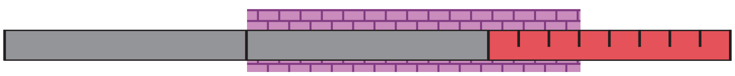
   (b)



   (c)



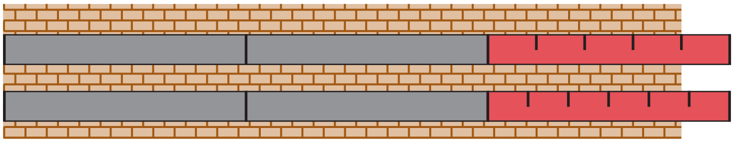
   (d)



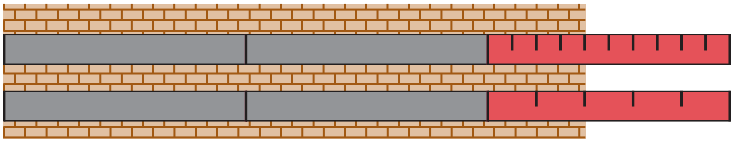
8. How long is each of the other walls in question 7?
9. Billy says the wall in 7(b) is one-and-a-half sticks long.
   Do you agree?
   Explain in writing why you agree or why you disagree.

10. How long is each wall below?

(a)



(b)



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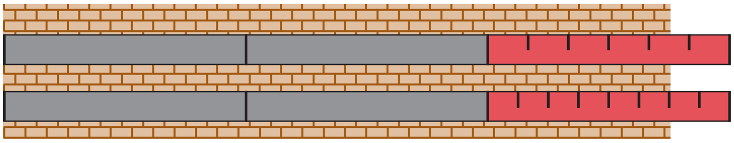

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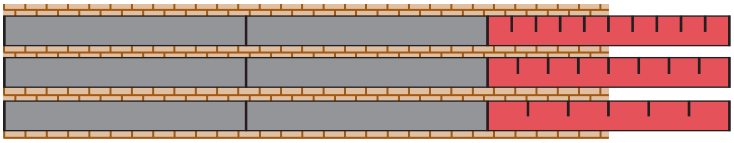

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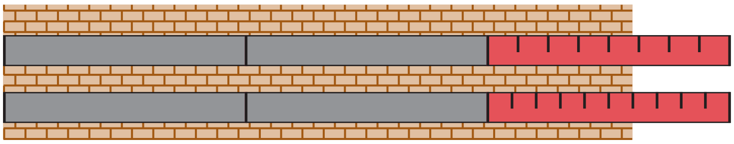


11. (a) Which of the walls is two and 3 quarters of a stick long?

    (b) Which of the walls is two and 6 eighths of a stick long?

3 quarters and 6 eighths are called **equivalent fractions**, because they are just different ways to describe the same fraction part of a whole object.

12. Which of the walls is two and 3 fifths of a stick long? Explain how you know that.

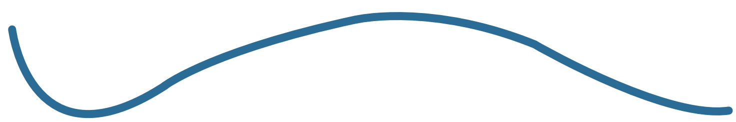
13. One section of a wall is 5 eighths of a stick long, and another section is 5 eighths of a stick long. How long are the two sections together?

Unit 4 Length

4.1 Comparing and measuring length

People need to be able to agree on how big things are. If this cannot happen, it will be very difficult to build houses or roads and many other things we need. This means we have to be able to measure things.

1. Which of the following pairs of things is longer?
   (a) the height of a classroom door or the length of a desk
   (b) the width of a classroom door or the width of a chalkboard
   (c) the height of your teacher or the length of your teacher's table
   (d) the distance from your classroom door to the office or the distance from the Grade 6 classroom door to the office
   (e) the length of your hand or the length of your foot
   (f) the distance from your chin to your ear or the distance between your ears
2. What did you do to find the answers to question 1? Write down your answers.
3. How can you find out what the length of this blue line is? Discuss your idea with one or two classmates.



4. Senzo took a piece of string. He placed it carefully all along the curved line above. He marked the end of the line on the string and then measured the length of the string. Use Senzo's method to measure the length of the curved line.

5. Give two examples from everyday life where you would measure:
   (a) length (b) distance (c) height
   (d) width (e) depth

In all of the comparisons you made in question 1, you could only tell which object or distance is longer. You were not able to tell *how much longer* it was.

6. Which is longer, the pencil or the matchstick?

It is quite easy to see that the pencil is longer than the matchstick. However, we need another way to compare them if we want to be more exact.

Themba says: "The pencil is 4 times as long as the matchstick."

7. (a) Is Themba correct?
   (b) How can you find out if Themba is correct, without using a ruler?
   (c) How can you find out if Themba is correct by using a ruler?

Themba did this:

Matchsticks are used above to measure the length of the pencil. We say that the matchstick is the **unit of measurement**. However, not all people will use a matchstick as a unit of measurement, or some people's matchsticks may be shorter or longer than others. This means that different people will get different measurements for the same object. So we need a *standard* unit of measurement, which is a unit that everyone can use and that is always the same length.

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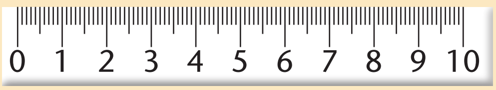
4.2 Standard units of measurement

Today, in many parts of the world, we use the same system of units to measure length. That makes it possible for us to tell other people how long an object is. The system is called the International System of Units (SI).

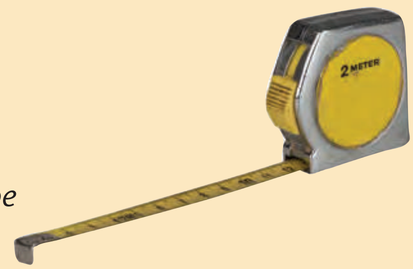
We call these units the **standard units**. They are the same everywhere in the world where they are used.

1. What is the difference between a standard unit and a unit that is not standard? Talk about this with a classmate.

We use different instruments that are marked in standard units to measure the length of objects. Here are two of the instruments that we use to measure shorter lengths.



Ruler



Measuring tape

Your teacher can show you another commonly used ruler. It is 1 m long and it is called a *metre stick*.

In 1793, people in France decided that they would use the **metre (m)** as the **standard unit for length**. *One metre* is the standard and the other units are named for how they relate to the metre.

A **centimetre (cm)** is one of the parts if 1 m is divided into 100 equal parts.

There are 100 cm in 1 m.
Centi- in centimetre means hundredth.

100 cm = 1 m

A **millimetre (mm)** is one of the parts that is formed when 1 m is divided into 1 000 equal parts.

1 000 mm = 1 m

There are 1 000 mm in 1 m. *Milli*- in millimetre means thousandth.

There are 10 mm in 1 cm.

10 mm = 1 cm

A **kilometre (km)** is 1 000 times as long as 1 m. *Kilo*- in kilometre means thousand.

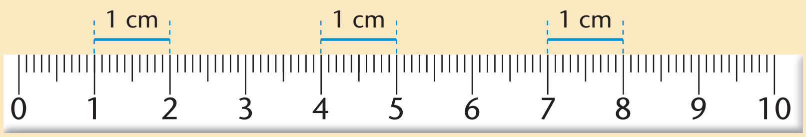
1 000 m = 1 km

2. Which of the units will you use if you have to measure the length of each of these objects?
   (a) the length of your textbook
   (b) the length of the classroom
   (c) the thickness of your pencil
   (d) the distance between two towns

Most **rulers** have centimetres (cm) and millimetres (mm) as their units. We use rulers to measure shorter lengths such as the length of a book or the length in a geometric figure.

On **measuring tapes** you will see millimetres, centimetres and metres (m). We use measuring tapes to measure longer lengths, such as the height of a person or the length of a skirt. For even longer distances, such as the length of a wall in a building, there are builder's tape measures and surveyor's tape measures.

Now look at the ruler below. There are 1 cm spaces on the ruler.



Each centimetre space is divided into 10 equal smaller spaces. So every centimetre is divided into tenths of a centimetre. This means that the space of 1 cm is the same length as the space that is 10 mm long. You already know that **1 cm = 10 mm**.

3. Name three objects that are about the length of a centimetre. (Hint: look at your hands or look around in the classroom.)

4. Name three objects that are about 10 cm long or wide.

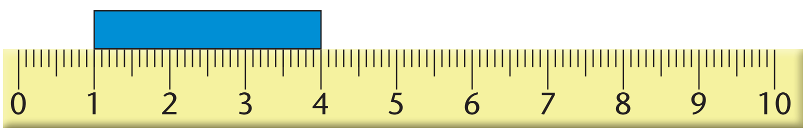
5. Name three objects that are about 30 cm long or wide.

6. Name an object that is about 30 cm long and 20 cm wide.

7. Now use some of the objects that you named in questions 3 to 6 to help you estimate the following:
   (a) Estimate how long your thumb is.
   (b) Estimate how long your desk is.
   (c) Estimate how wide the distance is between two desks in your classroom.

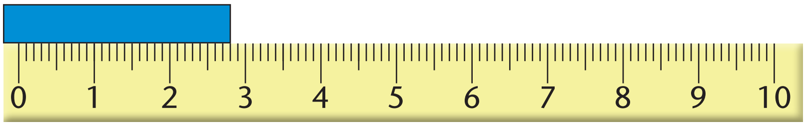
4.3 Measuring short lengths accurately

1. Kholeka measures the length of the blue bar below.



   (a) Kholeka says the blue bar is 4 cm long. Is she correct?
   (b) If 4 cm is wrong, give the correct answer and explain to Kholeka what she did wrong.

2. Luke measured the length of the blue bar like this:



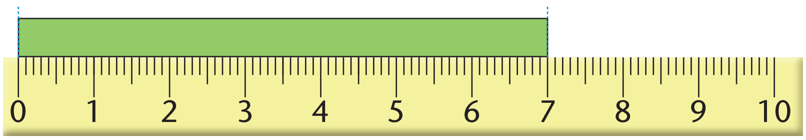
He says it is almost 3 cm long.

(a) Is Luke correct?

(b) Explain your answer.

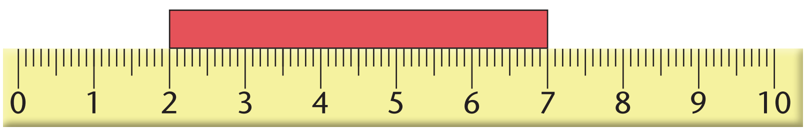
3. Explain in your own words how you will measure the length of an object like the blue bar accurately.

4. What is the length of the green bar?



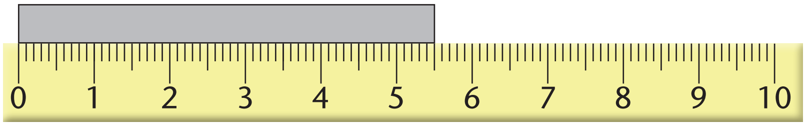
The easy correct way to use the ruler is to put one end of the object that you measure on the 0 mark of the ruler. Read the measurement where the other end of the object is.

5. (a) What is the length of this red bar?



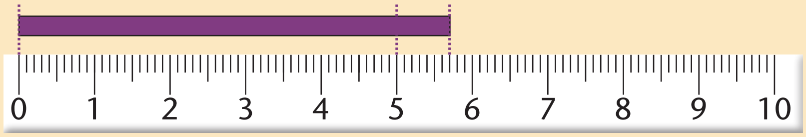
(b) How did you find the answer?

6. (a) What is the length of this grey bar in millimetres?



(b) What is the length of the grey bar in centimetres?

We can also record the length of an object with a combination of two different units. The length of the grey bar in question 6 can be given as 5 cm and 5 mm, or $5\frac{1}{2}$ cm.



The bar above is more than 5 cm but less than 6 cm long.
It is 7 mm longer than 5 cm. We can therefore say that the bar is 5 cm and 7 mm. Or we can record it as 57 mm.

7. Discuss with one or two classmates why we can also record the length of the purple bar as 57 mm.

8. First estimate the centimetre length of each of the bars on the next page. Then measure each bar with your ruler. Complete this table.

Bar	**Estimated length**	**Measured length**
Red		
Blue		
Purple		
Light green		
Dark green		
Grey		

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9. Estimate the lengths below and then measure them.

   (a) First discuss with a friend how you can use a piece of string to measure the lengths.

   (b) Complete this table.

Object	**Estimated length**	**Measured length**
The length of the purple curved bar		
The length of the green curved bar		
The distance around the red circle		

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4.4 Writing lengths in different units

You already know the following:

- There are 10 millimetres in 1 centimetre.
- There are 100 centimetres in 1 metre.
- There are 1 000 metres in 1 kilometre.

1. (a) How many millimetres are there in 5 cm?
   (b) How many centimetres are there in 20 mm?
   (c) How many centimetres are there in 25 mm?
   (d) What do you do to write a length which is given in centimetres in millimetres?
   (e) What do you do to write a length which is given in millimetres in centimetres?
   (f) Take a ruler and check your answers. Discuss this with a classmate.
2. (a) How many metres are there in 6 km?
   (b) How many kilometres are there in 3 000 m?
   (c) How many kilometres are there in 7 500 m?
   (d) What do you do to write a length which is given in kilometres in metres?
   (e) What do you do to write a length which is given in metres in kilometres?
3. Write the following lengths in millimetres:
   (a) 2 cm
   (b) 23 cm
   (c) one half of a centimetre
   (d) one fifth of a metre
4. Write the following lengths in centimetres:
   (a) 50 mm
   (b) 2 300 mm
   (c) 7 m
   (d) 72 m
   (e) 5 mm
   (f) 10 m

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5. Write the following lengths in metres:
   (a) 400 cm (b) 4 000 mm
   (c) 1 050 cm (d) 10 000 cm

6. 1 342 mm can be written as 1 m 34 cm and 2 mm.
   Write 2 073 mm as m, cm and mm.

7. Write the following lengths in metres:
   (a) 25 km (b) 14 km
   (c) $3\frac{1}{2}$ km (d) $1\frac{1}{4}$ km

8. Write the following lengths in kilometres:
   (a) 7 000 m (b) 26 000 m
   (c) 1 500 m (d) 10 000 m

4.5 Measuring distances accurately

For distances longer than 2 m, a **measuring tape** or a **builder's tape measure** works better than a metre stick.

1. (a) You can use a builder's tape measure to measure the distance from the door of the classroom to the teacher's desk. Write the distance in metres and centimetres. What plan can you make if you do not have a builder's tape measure?

   (b) Estimate how far it is from the back of the class to the teacher's desk. Use your measurement in (a) to help you.

   (c) Compare your estimate with the estimates of other learners. Discuss how much your estimates differ.

   Measure the distance from the back of the class to the teacher's desk. Whose estimate was closest?

   (d) Work in pairs. Measure the distance around the class. Compare your measurements. Discuss how much your measurement differs from other learners' measurements.

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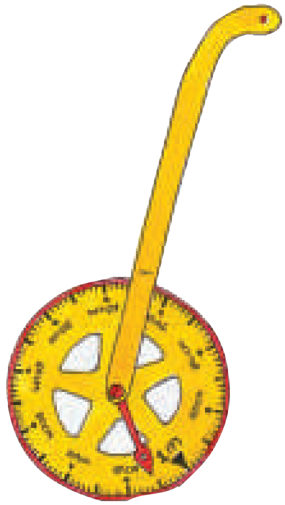
A **trundle wheel** is a simple device for measuring distances that are too long for a tape measure, or that are not always in a straight line. It consists of a wheel with a scale around its edge. The wheel is attached to a long handle. You can push it along the path that you want to measure. Every time it completes a full turn, it makes a click.

To use a trundle wheel to measure distances, you need to know what distance is covered if the wheel turns around once.



A trundle wheel

2. If your school has a trundle wheel, use it to measure some distances. First estimate the distance and then measure it.

3. Which instrument will you use to measure the following lengths or distances?
   (a) the length of the longest wall of your school building
   (b) the distance around a soccer field
   (c) the length of your pencil
   (d) the thickness of a toffee
   (e) the height of the door in your classroom

4.6 Rounding off

In mathematics, we often round off numbers to numbers that are easy to work with. **Rounding** is a way of estimating. Numbers that are rounded off are approximations.

An approximation is close to the exact number, a little more or a little less.

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Sometimes it is not necessary to give the exact number or measurement, even if it is possible. For example: The annual school fun walk has an exact distance of 5 km 346 m. If someone asked you the distance of the fun walk, you will probably answer (about) 5 km.

1. Discuss these questions with one or two classmates.
   (a) When do you think it would be a good thing to round off a number or a measurement?
   (b) When do you think it is necessary to give the exact number or quantity?

2. The newspaper said there were 30 000 people at the soccer game. Do you think that is the exact number of people that attended the game?

To round a number usually means to find a multiple of 10, 100 or 1 000 that is close to the number. We say that we round up or down to the nearest 10 or 100 or 1 000.

Examples:

142 is closer to 140 than to 150, so 142 rounded to the nearest 10 is 140.

147 is closer to 150 than to 140, so 147 rounded to the nearest 10 is 150.

145 is the same distance from 140 and 150. “Halfway” numbers are usually rounded up to the larger of the possibilities. So, 145 rounded to the nearest 10 is 150.

3. Round off to the nearest 10:
   (a) 26 cm
   (b) 144 mm
   (c) 1 231 m
   (d) 50 335 mm
   (e) 6 km
   (f) 5 km

4. Round off to the nearest 100:
   (a) 78 cm (b) 145 cm (c) 991 mm
   (d) 56 072 km (e) 301 mm (f) 23 450 km

5. Round off to the nearest 1 000:
   (a) 1 991 mm (b) 6 072 km (c) 4 490 cm
   (d) 2 500 m (e) 690 mm (f) 1 932 m

6. Mr Bengu is driving to Cofimvaba this weekend. The distance is 543 km. How far is the distance to the nearest 100 km?

7. The course for the Comrades marathon race varies from year to year. In 2015 the official distance was 87 720 m. But, there were road works on the course. So, the organisers were forced to add another 877 m to the course. What was the total distance to the nearest 100 m?

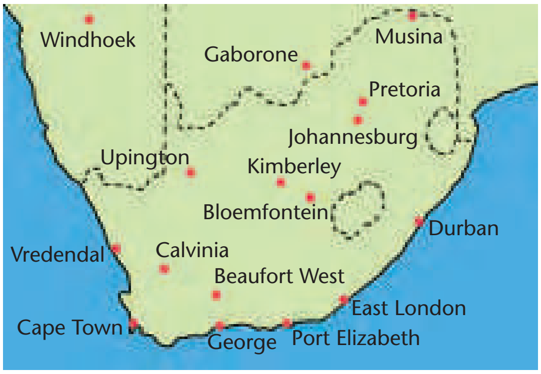
4.7 Apply your skills

1. Arrange from the longest to the shortest:
   (a) 1 000 mm; 900 cm; 2 m
   (b) 39 m; 395 mm; one quarter of a km; 100 cm
   (c) 125 cm; 248 mm; 2 km; 500 m
   (d) 449 m; 944 cm; 4 944 mm

2. Mrs Tailor bought 5 m of material with a width of 2 m. She wants to make serviettes. The serviettes are squares with side length 23 cm. How many serviettes will she be able to make? Allow 2 cm for seams around each serviette.

3. A skyscraper has 90 floors. Each floor is 3 m 50 cm high. About how high is the building?

4. Study the map and answer the questions:



Distances

Johannesburg to Cape Town: 1 398 km

East London to Beaufort West: 575 km

Port Elizabeth to Cape Town: 749 km

Musina to Pretoria: 460 km

(a) It is 1 398 km from Johannesburg to Cape Town. Round off the distance to the nearest 100 km.

(b) It is 749 km from Cape Town to Port Elizabeth. Round off that distance to the nearest 100 km.

(c) *About* how far is it from Johannesburg to Kimberley? Estimate the distance.

(d) *About* how far is it from East London to Bloemfontein?

(e) *About* how far is it from Upington to Bloemfontein?

Hint: Look at the distances given next to the map. Use your ruler to compare and measure distances on the map.

Unit 5 Whole numbers: Multiplication

5.1 Revision

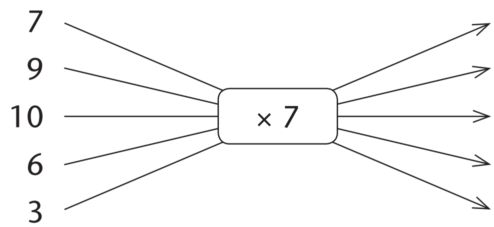
This term you will learn to do multiplication with two two-digit numbers, such as 34 × 47.

To be able to do this, you need to know your multiplication facts very well and learn some more facts, such as 30 × 60 = 1 800 and 40 × 70 = 2 800.

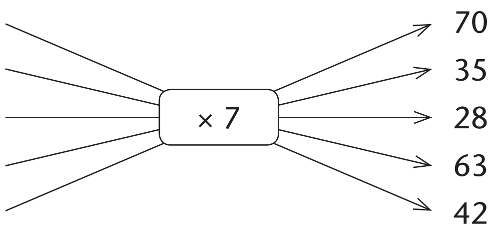
Before we start with the bigger numbers, you need to revise the multiplication facts you learnt in Term 1.

1. Complete the following flow diagrams.

(a)



(b)

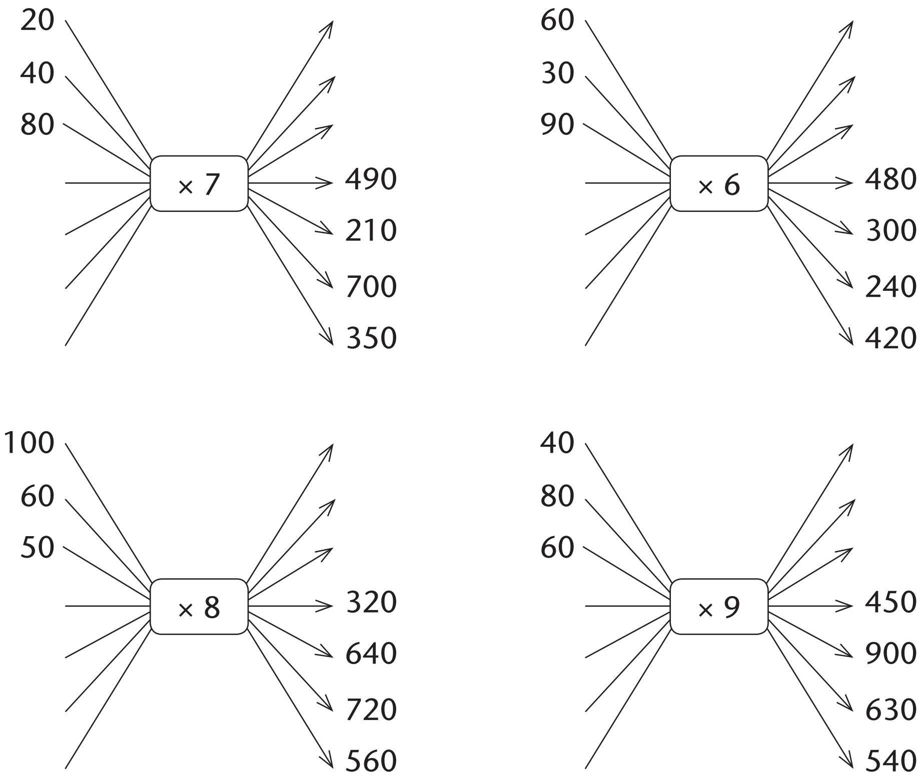


2. Copy this table and write your answers for question 1 in it.

Number	7	9	10	6	3					
Number × 7						70	35	28	63	42

Division is called the **inverse** of multiplication, and multiplication is called the **inverse** of division.

3. Do not copy these flow diagrams. Copy the tables below and write the missing input and output numbers in the tables.



(a)

Number	20	40	80				
Number × 7				490	210	700	350

(b)

Number	30	60	90				
Number × 6				480	300	240	420

(c)

Number	100	60	50				
Number × 8				320	640	720	560

(d)

Number	40	80	60				
Number × 9				450	900	630	540

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4. How much is each of the following?

(a) 30 + 30 + 30 + 30 + 30 + 30 + 30 + 30 + 30 + 30

(b) 30 + 30 + 30 + 30 + 30 + 30 + 30 + 30 + 30 + 30 + 30

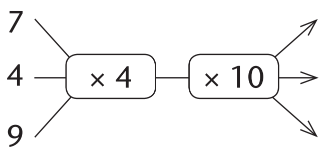
(c) 30 + 30 + 30 + 30 + 30 + 30 + 30 + 30 + 30 + 30 + 30 + 30

5. Calculate.

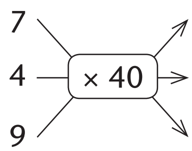
(a) 10 × 30
(b) 20 × 30
(c) 40 × 30
(d) 80 × 30
(e) 20 × 30 + 40 × 30
(f) 60 × 30
(g) 10 × 30 + 80 × 30
(h) 90 × 30

6. Write the missing output numbers in each case.

(a)

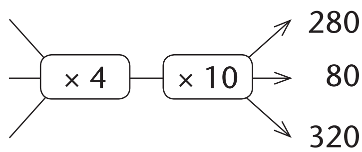


(b)

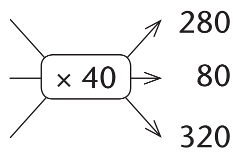


7. Write the missing input numbers in each case.

(a)

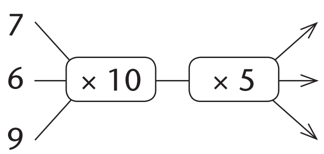


(b)



8. Write the missing output numbers in each case.

(a)



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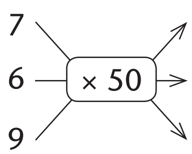
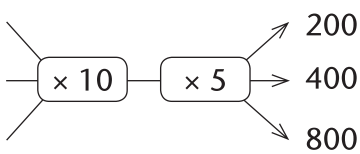
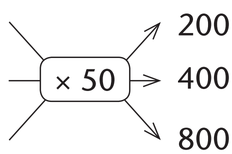


9. Write the missing input numbers in each case.

(a)



(b)



5.2 Learn more multiplication facts

1. Copy this table.

×	10	20	30	40	50	60	70	80	90	100
2										
20										
3										
30					1 500					
4										
40										
5										
50										
6										
60					3 000					
7										
70										
8										
80										
9										
90										
10										
100										

2. Complete the rows for 2, 3, 4, 5, 6, 7, 8, 9 and 10. If you know the answers for some other cells, you can fill them in too.

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3. Write the next five numbers in each pattern.

(a) 20	40	60	80	100	120
(b) 200	220	240	260		
(c) 300	320	340	360		

4. (a) How much is 20 × 10 and how much is 20 × 20?

   (b) Write your answers in the correct places in the table you made in question 1.

   (c) Double your answer for 20 × 20. Can you use this to fill in another cell in your table?

5. How much is each of the following?

   (a) 10 × 30 (b) 10 × 40
   (c) 10 × 60 (d) 10 × 90

6. (a) Enter your answers for question 5 in your table.

   (b) Double each of your answers, and double them again.

   (c) Can you use this to fill in more cells in your table?

7. Complete your table. You may see some patterns that can help you. (This is an investigation.)

8. How much is each of the following?

   (a) 3 × 3 (b) 4 × 4 (c) 5 × 5 (d) 6 × 6 (e) 7 × 7 (f) 9 × 9

   Write your answers as number sentences, such as 8 × 8 = 64.

9. How much is each of the following?

   (a) 20 × 20 (b) 30 × 30 (c) 40 × 40
   (d) 50 × 50 (e) 60 × 60 (f) 70 × 70
   (g) 80 × 80 (h) 90 × 90 (i) 60 × 50
   (j) 40 × 30 (k) 60 × 70 (l) 60 × 80
   (m) 70 × 90 (n) 60 × 90 (o) 80 × 90
   (p) 70 × 80 (q) 60 × 30 (r) 40 × 50

5.3 Multiplying with bigger numbers

1. (a) If $20 \times 43 = 860$ and $7 \times 43 = 301$, how much is 27×43, and how much is 43×27?

   (b) If $30 \times 24 = 720$ and $5 \times 24 = 120$, how much is 35×24, and how much is 24×35?

   (c) If $40 \times 23 = 920$ and $6 \times 23 = 138$, how much is 46×23, and how much is 23×46?

   (d) If $60 \times 14 = 840$ and $9 \times 14 = 126$, how much is 69×14, and how much is 14×69?

2. (a) If $30 \times 20 = 600$ and $30 \times 7 = 210$ and $4 \times 20 = 80$ and $4 \times 7 = 28$, how much is 34×27?

   (b) If $40 \times 20 = 800$ and $40 \times 6 = 240$ and $3 \times 20 = 60$ and $3 \times 6 = 18$, how much is 43×26?

   (c) If $30 \times 20 = 600$ and $30 \times 8 = 240$ and $3 \times 20 = 60$ and $3 \times 8 = 24$, how much is 33×28?

   (d) If $20 \times 20 = 400$ and $20 \times 9 = 180$ and $7 \times 20 = 140$ and $7 \times 9 = 63$, how much is 27×29?

3. (a) Calculate 7×36 by breaking 36 down into parts.

   (b) Calculate 30×36 by breaking 36 down into parts.

   (c) How much is $30 \times 36 + 7 \times 36$?

   (d) Can you now just add some of your answers to find out how much 37×36 is?

4. Write the four multiplication facts that will make it easy to calculate each of the following.

(a) 46 × 34	(b) 73 × 68
(c) 54 × 93	(d) 82 × 29

43 × 57 can be calculated as follows:

43 = 40 + 3 hence 43 × 57 = 40 × 57 + 3 × 57

40 × 57 and 3 × 57 are now calculated separately:

40 × 57 = 40 × 50 + 40 × 7 = **2 000** + **280**

3 × 57 = 3 × 50 + 3 × 7 = **150** + **21**

To get the answer for 43 × 57 all the parts now have to be added up:

43 × 57 = 2 000 + 280 + 150 + 21
= 2 280 + 150 + 21
= 2 430 + 21 = 2 451

When you do your own calculations you need not write it in so much detail.

5. Calculate each of the following.

(a) 23 × 64	(b) 64 × 23
(c) 26 × 34	(d) 34 × 26
(e) 62 × 43	(f) 43 × 62
(g) 32 × 46	(h) 46 × 32
(i) 41 × 14	(j) 14 × 41
(k) 15 × 16	(l) 45 × 18
(m) 12 × 35	(n) 25 × 55

6. (a) If 30 × 53 = 1 590, how much is 53 × 60?
(b) If 50 × 34 = 1 700, how much is 17 × 50?
(c) If 80 × 23 = 1 840, how much is 23 × 40?
(d) If 40 × 43 = 1 720, how much is 43 × 80?
(e) If 36 × 67 = 2 412, how much is 37 × 67?

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5.4 Apply your knowledge

1. There are 88 bags with 35 oranges each on a truck.
   How many oranges are there in total?
2. Joe buys 73 chickens at R38 each.
   How much does he pay in total?
3. There are 42 seats on a bus.
   How many seats are there on 67 such buses?
4. One packet of sugar costs R37.
   Calculate the total price of each of the following:
   (a) 25 packets
   (b) 46 packets
   (c) 74 packets
   (d) 89 packets
5. Jason must cut 45 pieces of string, each 28 cm long.
   How much string does he need?
6. A certain bead design consists of 38 rows of beads, each with 23 beads. How many beads are there in total?
7. A wheel on a certain machine makes 17 turns each minute.
   How many turns does the wheel make in 56 minutes?
8. A certain brick wall has 45 bricks in each row. How many bricks are there in 45 rows?
9. Lebogang walks approximately 42 m each minute.
   (a) Approximately how far will she walk in 26 minutes?
   (b) Approximately how far will Lebogang walk from 10:17 a.m. until 10:54 a.m.?
   (c) Approximately how far will Lebogang walk from 10:54 a.m. until 11:38 a.m.?
   (d) Approximately how far will Lebogang walk from 11:48 a.m. until 1:18 p.m.?

5.5 Difference, ratio and rate

We can compare two quantities by stating what the **difference** is.

If Musi eats 8 slices of bread and Mary eats 5 slices, we can say that Musi eats **3 slices more** than Mary.

You will soon learn about a different way of comparing two quantities.

1. Jansen picked 643 oranges and Gertrude picked 855 oranges. How many more oranges did Gertrude pick than Jansen?
2. Two machines are used to make rope. The lengths of rope made by the two machines in different periods after they were switched on, are given in the table.

	after 2 seconds	after 3 seconds	after 5 seconds	after 8 seconds	after 10 seconds
Machine A	10 m	15 m	25 m	40 m	50 m
Machine B	16 m	24 m	40 m	64 m	80 m

(a) Which machine do you think will first complete 100 m of rope? Why do you think so?

(b) What is the difference between the lengths of rope made after 2 seconds?

(c) What is the difference between the lengths of rope made after 3 seconds?

(d) What lengths of rope do you think will each of the two machines make in a period of 12 seconds? Give reasons for your answer.

(e) How much rope does Machine B make while Machine A makes 10 m of rope?

(f) How much rope does Machine B make while Machine A makes 50 m of rope?

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The speed of rope making by Machines A and B can be compared by saying: *For every 5 m of rope made by Machine A, 8 m of rope is made by Machine B.*

3. Check whether this statement is true for the lengths of rope made by the two machines in a period of 5 seconds, and in a period of 10 seconds.
4. Sally makes juice by mixing juice concentrate with water. For every 3 cups of concentrate, she uses 5 cups of water.
   (a) How many cups of water will she use with 6 cups of concentrate?
   (b) How many cups of water will she use with 12 cups of concentrate?
   (c) How many cups of water will she use with 15 cups of concentrate?
   (d) How many cups of concentrate will she use with 20 cups of water?

The word **ratio** can be used to describe situations like the above.

In the juice that Sally makes, concentrate and water are mixed **in the ratio 3 to 5**.

This means that for every 3 parts of concentrate, there are 5 parts of water.

5. Betty has 3 red beads for every 2 blue beads that she has. How many red beads does she have, if she has 24 blue beads?
6. Jackson is baking bread. He mixes white flour and wholewheat flour in the ratio 2 to 3.
   (a) How many cups of white flour will he mix with 24 cups of wholewheat flour?
   (b) How many cups of wholewheat flour will he mix with 24 cups of white flour?

7. For the bread she bakes, Melanie mixes white flour and wholewheat flour in the ratio 4 to 6.

   (a) How many cups of white flour will she mix with 24 cups of wholewheat flour?

   (b) How many cups of wholewheat flour will she mix with 24 cups of white flour?

8. Compare your answers for questions 6 and 7.
   What can you say about the ratios 4 to 6 and 2 to 3?

9. The distances covered by two long-distance runners after different periods of time are given in the table.

	after 5 minutes	after 8 minutes	after 10 minutes	after 14 minutes
Athlete A	300 m	480 m	600 m	840 m
Athlete B	400 m	640 m	800 m	1 120 m

   (a) Use ratio to compare the running of the two athletes.

   (b) Make sure that your comparison is correct for all the time periods in the table.

10. (a) Is it correct to say that Athlete A runs about 60 m in each minute?

   (b) Approximately what distance does Athlete B run in one minute?

We can say that Athlete A runs at a **rate** of approximately **60 m per minute**.

Note that **rate** is a different word than **ratio**.

We say "approximately" because he may sometimes run a bit faster, and sometimes a bit slower.

11. A certain tree was 1 387 cm tall at the end of 2015.
    If it grows at a rate of 34 cm per year, how tall can you expect it to be at the end of 2018?

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5.6 Breaking down in a different way to multiply

1. Calculate the following.

(a) 80×2	(b) 40×4	(c) 20×8
(d) 90×2	(e) 30×6	(f) 10×18

2. Do not do these calculations now. Just state which of the calculations you think will have the same answer.

(a) 24×40	(b) 34×30	(c) 48×20
(d) 44×20	(e) 96×10	(f) 12×80

3. Do the calculations in question 2 now and check your answer for question 2.

4. Calculate.

(a) 2×2	(b) $2 \times 2 \times 3$
(c) $2 \times 2 \times 3 \times 3$	(d) $2 \times 2 \times 2 \times 3$
(e) $2 \times 3 \times 3$	(f) $2 \times 3 \times 3 \times 3$

5. (a) Which calculation in question 4 has the answer 36?

   (b) Which calculation in question 4 has the answer 54?

32×18 can be calculated like this:

$$
\begin{aligned}
32 \times 18 &= 32 \times 2 \times 9 \\
&= 32 \times 2 \times 3 \times 3 \\
&= 64 \times 3 \times 3 \\
&= 192 \times 3 \\
&= (100 + 90 + 2) \times 3 \\
&= 300 + 270 + 6 \\
&= 576
\end{aligned}
$$

6. Calculate each of the following in the way 32×18 was calculated above.

(a) 27×36	(b) 43×12	(c) 37×24
(d) 23×54	(e) 67×27	(f) 58×48

UNIT 6 PROPERTIES OF THREE-DIMENSIONAL OBJECTS

6.1 Objects with different shapes

The moon has the same shape as a golf ball or tennis ball.

Objects with this shape are called **spheres**.

The photograph on the right shows two wooden **cylinders**.

You can easily roll a sheet of paper to form a **tube** with the shape of a cylinder.

1

2

3

4

5

You can cut off the ends of a Vienna sausage to make a cylinder-shaped sausage.

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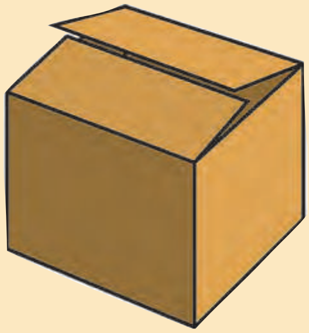
The surface of a sphere is **curved**.

The surfaces of a box like this are not curved, they are **flat**.

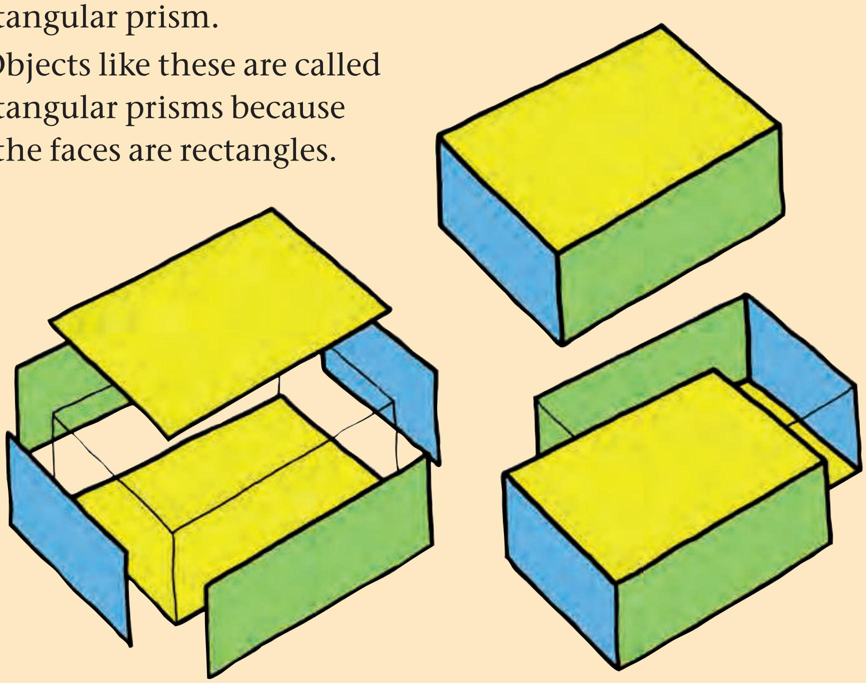
A flat surface of a 3-D object is called a **face**.

An object with a shape like this is called a **rectangular prism**.

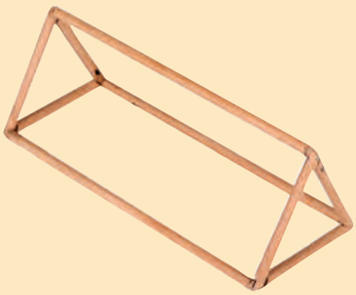


This book, and your classroom, also have the shape of a rectangular prism.

Objects like these are called rectangular prisms because all the faces are rectangles.



The roof of the house below has the shape of a **triangular prism**.



1. Look at the objects in the photographs.
   (a) Which of the objects have the shape of a sphere?
   (b) Which of the objects have the shape of a cylinder?
   (c) Which of the objects have the shape of a rectangular prism?
   (d) Which of the objects have flat surfaces only?
   (e) Which of the objects have curved surfaces only?
   (f) Which of the objects have curved and flat surfaces?

A brick

A potato

A pyramid

A cooking pot

A clay pot

A battery

2. What is the shape of the face of the glass that touches the table?

3. In each case state what kind of 3-D object it can be.
   (a) It has only one surface, and the surface is curved.
   (b) It has six surfaces, and the surfaces are all flat.
   (c) It has two flat surfaces and one curved surface.

6.2 Make prisms, pyramids and cones

1. Follow these instructions to make a tube in the shape of a rectangular prism:

   Use a sheet of paper and roll it into a tube. You can use sticky tape to keep the tube together.

   Press it flat and make the creases sharp.

   Continue as shown in the photographs to make two more edges.

1

2

3

4

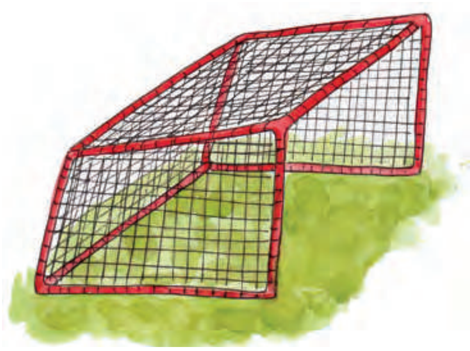
5

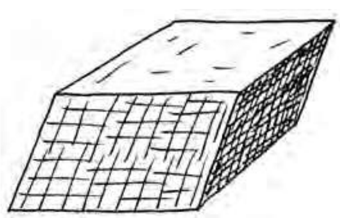
6

7

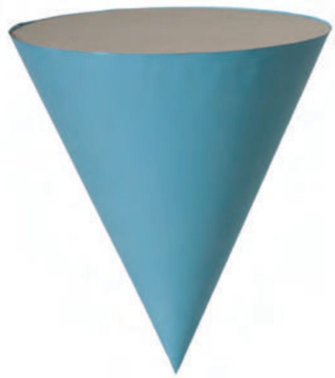
8

These objects have a prism shape, but they are not rectangular.





A cone has a curved surface and one flat face called the **base**. The base of a cone is in the form of a circular disk.



2. To make a cone, roll a sheet of paper as shown in these photographs.

1

2

3

4

5

6

7

You can use sticky tape to keep the cone together. You can cut off some of the paper to give it a proper cone shape.

A 3-D object with flat triangular faces that all meet at one point (apex) is called a **pyramid**.

*This pyramid has a square base, hence it is called a **square-based pyramid**.*

3. (a) How do cones and pyramids differ from cylinders and rectangular prisms?

   (b) How do pyramids and rectangular prisms differ from cones and cylinders?

4. To make a square-based pyramid, first make an open cone and then do what the person in the photographs is doing.
   Use sticky tape to keep it together, and cut off waste paper to make a neat pyramid.

1

2

3

4

5

6

7

8

9

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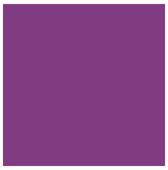
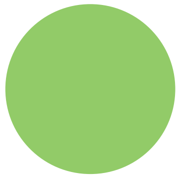
6.3 Put faces together

Suppose you have pieces of cardboard like these.



purple square card

red triangular card



green circular disk

green rectangular card

red rectangular card

yellow disk

yellow rectangular card

1. What kind of object can you make with the cards in each case?
   (a) the purple square card and four red triangular cards
   (b) the yellow disk and the green circular disk
   (c) the green rectangular card and two smaller green circular disks
   (d) two green rectangular cards, two red rectangular cards and two yellow rectangular cards

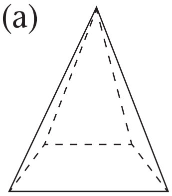
2. Make a freehand drawing of each of the objects you named in question 1, as well as you can. Use a whole page for each drawing.

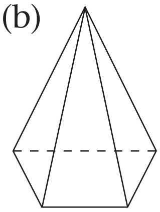
When you make a freehand drawing, you do not use a ruler, and you know you cannot be quite accurate.

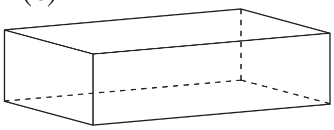
6.4 Differences between shapes

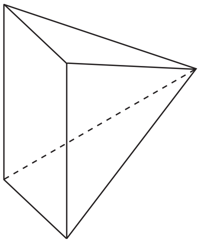
1. You know about spheres, cylinders, rectangular prisms, cones and square-based pyramids. Which of these objects have
   (a) only flat surfaces?
   (b) only curved surfaces?
   (c) flat and curved surfaces?
   (d) only rectangular surfaces?
   (e) triangular and rectangular surfaces?

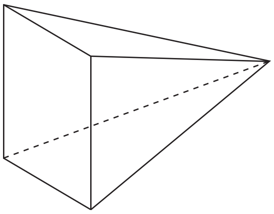
2. Which drawings below show rectangular prisms?

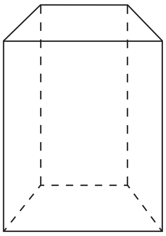
(a)


(b)


(c)


(d)


(e)


(f)


3. Which of the above drawings show square-based pyramids?

4. Complete this table.

	Number of faces	Shapes of faces	Number of curved surfaces
Rectangular prism			
Sphere			
Cylinder			
Cone			
Square-based pyramid			

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Unit 7 Geometric patterns

7.1 Our geometric art heritage

In this unit we study geometric patterns, such as the decorations on the walls of the homes of the Ndebele people in Mpumalanga.

The Ndebele like to decorate the outside of their homes with colourful designs.

The Ndebele also make and wear beautiful bead necklaces and bracelets.

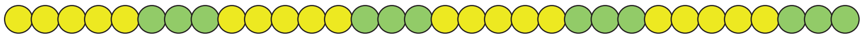
They love geometric patterns! Do you?

A **geometric pattern** is a repeated decorative design.

In this unit we will not focus on the types of figures (such as triangles, rectangles, and so on) but on the *number* of figures or beads in such repeating patterns.

7.2 Clever counting

1. (a) How many beads are there in this string? Explain your method.



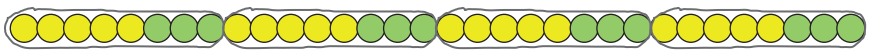
(b) Look at these methods that other learners used. Who is correct? Which method do you think is the best?

Simon points with his finger and counts the beads one by one: "One, two, three ... 28, 29."

Amir says: "There are five yellows in each group and three greens. So I count 5, 8, 13, 16, 21, 24, 30, 33."

Mia says: "There are five yellows in each group and three greens. So I count the yellows first: 5, 10, 15, 20. Then I continue to count the greens: 23, 26, 29, 32."

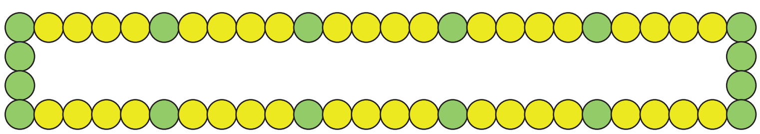
Thea says: "I group the yellows and greens together like this and then count in eights: 8, 16, 24, 32."



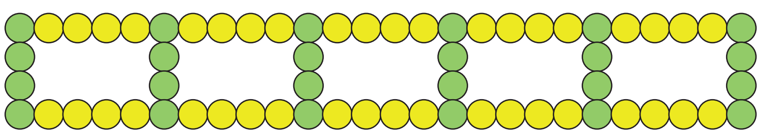
2. Use clever counting to easily find the number of beads in each of the four bracelets below. Explain how you do it. Compare your method with some of your classmates' methods.

Simon counted the beads one by one. The other learners counted *bigger units* like 3 and 5 and 8. They used **clever counting**!

(a)



(b)



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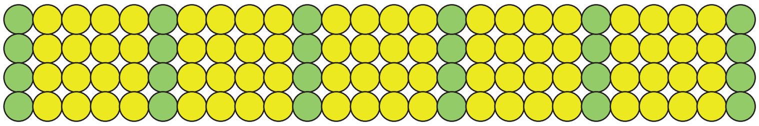
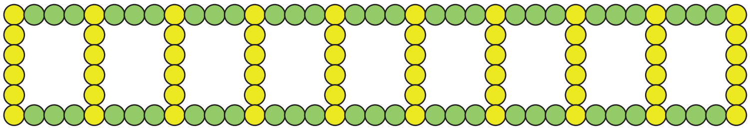
(c)



(d)



7.3 Do not count – *calculate*!

When we count many objects, it can take a very long time and we may make mistakes!

A better way is to first write down your thinking as a **calculation plan**. Write down what you are going to do.

Then you can *calculate* the answer instead of counting. For example:

A **plan** describes your **method**. You can write a plan in **words**, as a **calculation plan** or as a **flow diagram**.

Amir: Number of beads = 5 + 3 + 5 + 3 + 5 + 3 + 5 + 3

Mia: Number of beads = 5 + 5 + 5 + 5 + 3 + 3 + 3 + 3 = 4 × 5 + 4 × 3

Thea: Number of beads = 8 + 8 + 8 + 8 = 4 × 8

For each bracelet on the next page, write down your calculation plan to find out:

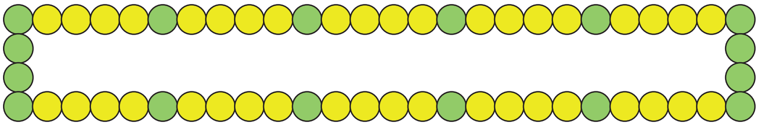
(a) how many yellow beads there are

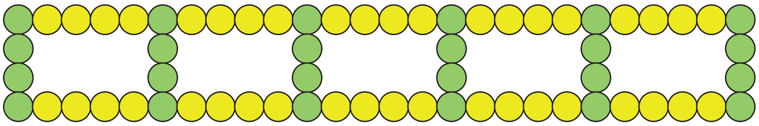
(b) how many green beads there are

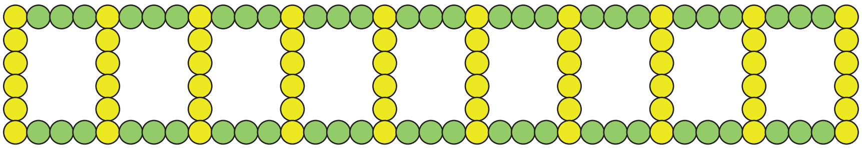
(c) how many beads there are altogether.

Note: *Do not calculate now.* The method (plan) is the important thing! You can calculate later or even use a calculator once you have written down your plans.

4 × 5 + 4 × 3 and 4 × 8 and 5 + 3 etc. are calculation plans. A **calculation plan** says what calculations we are going to do before we actually do them.

1. 

2. 

3. 

7.4 Growing patterns

1. Lindiwe is making this growing pattern of pictures with squares:

Picture 1 Picture 2 Picture 3 Picture 4 Picture 5

Lindiwe plans to continue the pattern.

(a) Describe Picture 6 and Picture 7 in words.
Now draw Picture 6 and Picture 7.
How many squares are there in Picture 6 and how many in Picture 7?

(b) Describe Picture 60 and Picture 70 in words. *Do not draw them!* Imagine them; "see" them in your head!
Calculate the number of squares in Picture 60 and in Picture 70.

2. Simphiwe is making these growing patterns of pictures with squares.

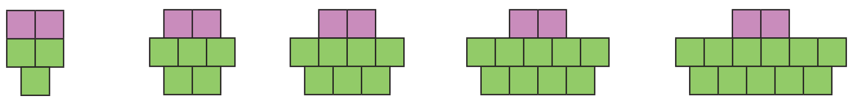
Pattern A

Picture 1 Picture 2 Picture 3 Picture 4 Picture 5

Pattern B

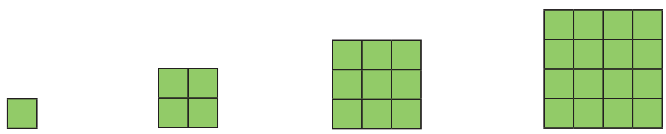
Picture 1 Picture 2 Picture 3 Picture 4 Picture 5

Pattern C



Picture 1 Picture 2 Picture 3 Picture 4 Picture 5

Pattern D



Picture 1 Picture 2 Picture 3 Picture 4

Answer questions (a) and (b) for each of Patterns A, B, C and D.

(a) Describe Picture 6 and Picture 7 in words.
Then draw Picture 6 and Picture 7.
How many squares are there in Picture 6 and how many in Picture 7?

(b) Describe Picture 60 and Picture 70 in words. *Do not draw them!* Imagine them; “see” them in your head!
Calculate the number of squares in Picture 60 and in Picture 70.

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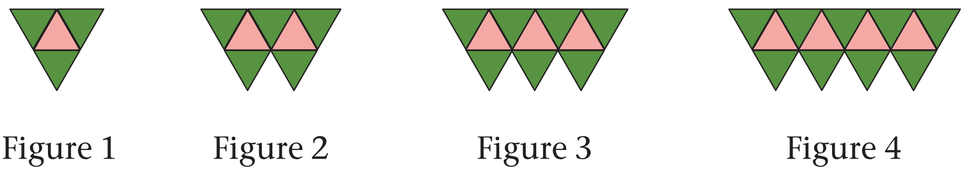
7.5 From pictures to tables

Elspeth is making this growing pattern of pictures with pink and green triangles.



1. Complete this table and describe your methods.

Figure number	1	2	3	4	5	6	10
No. of pink triangles	1	2	3				
No. of green triangles	3	5	7				
Total no. of triangles	4	7					

2. Describe the number patterns you see in the table.

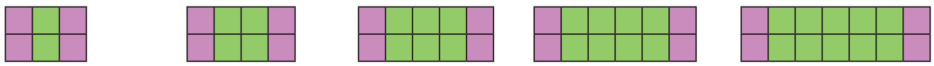
3. Describe Figure 30 in words.
   (a) How many pink triangles are there in Figure 30?
   (b) How many green triangles are there in Figure 30?
   (c) How many triangles are there in Figure 30?

4. If Elspeth makes a figure with 31 pink triangles, how many green triangles does the figure have?

5. If Elspeth makes a figure with 31 green triangles, how many pink triangles does the figure have?

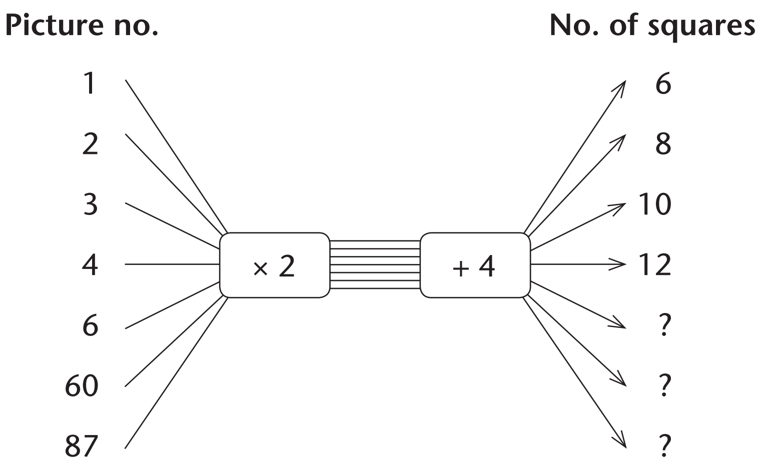
7.6 Writing our plans as flow diagrams

You have already seen this growing pattern in Section 7.4. We will now look at it again, but in a different way. How will you calculate the number of squares in Picture 6, Picture 60 and Picture 87? What is *your* plan?



Picture 1 Picture 2 Picture 3 Picture 4 Picture 5

Mia writes her plan as a flow diagram:



A **flow diagram** describes a plan (method) using **input → rule → output**.

This flow diagram shows that you must first multiply any **input number** by 2 and then add 4 to get the **output number**.

$3 \times 2 \rightarrow 6;\ 6 + 4 \rightarrow 10$

$4 \times 2 \rightarrow 8;\ 8 + 4 \rightarrow 12$

1. First check if Mia's flow diagram (plan) is correct for the input and output numbers that we already have. Discuss with your classmates how you can check her plan.

2. If Mia's plan is correct, use her plan to calculate the missing output numbers.
3. Mia says, with the flow diagram it is easy to calculate the number of squares in Picture 60 or in Picture 87 or in *any* Picture number. Do you agree?
4. If you or your classmates have a different plan than Mia, write it as a flow diagram.
5. Write your plans for each of these patterns as flow diagrams, and calculate the number of squares in Picture 6, Picture 60 and Picture 87. Then compare your methods with some classmates' methods.

(a)

Picture 1 Picture 2 Picture 3 Picture 4 Picture 5

(b)

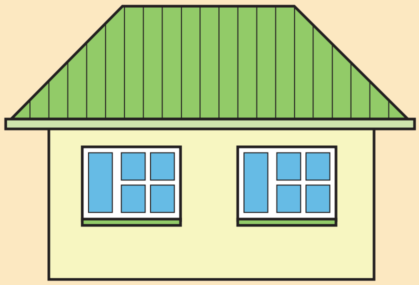
Picture 1 Picture 2 Picture 3 Picture 4 Picture 5

6. Make your own growing geometric pattern with squares.
   (a) Draw the first four pictures.
   (b) Calculate the number of squares in Picture 5, Picture 6, Picture 50 and Picture 60.
   (c) Now let some classmates solve your problem in (b) and check if they are correct.

Unit 8 Symmetry

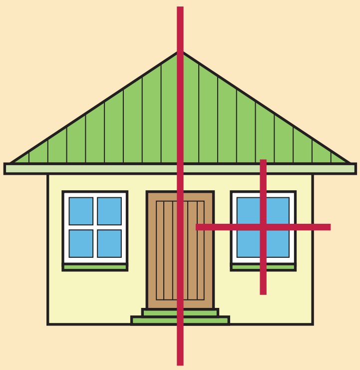
8.1 Identical parts that fit onto each other

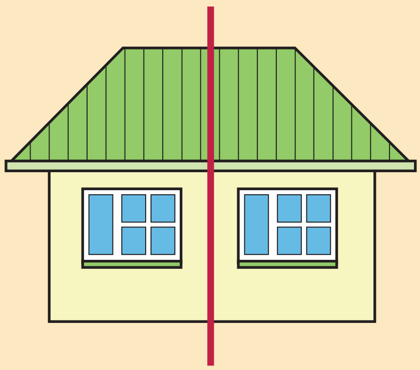
Front view



Side view

If you fold the picture of the front view of the house on the red line, the part that is on the left of the line will fold exactly onto the part that is on the right of the line.





The front view of this house is **symmetrical**. It has one **line of symmetry**. The side view is not symmetrical.

Each front window of the house is also symmetrical, and has two lines of symmetry.

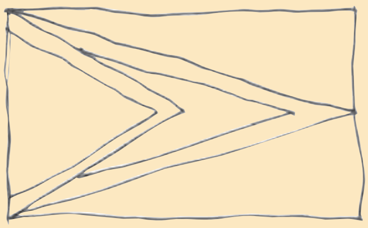
1. Are the windows on the side of the house symmetrical?
2. Is the roof as seen from the side symmetrical?
3. Why can we say that the side view of the house is not symmetrical?

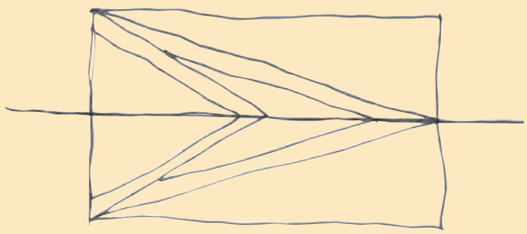
8.2 Lines of symmetry

This is a picture of the flag of Guyana.

The different colours and the different lines and shapes make it interesting.

You can easily make a rough drawing of the lines and shapes in this flag, as shown on the left below.





The same sketch is shown on the right, with a line of symmetry drawn on the sketch.

You can think of the line of symmetry as a "fold line". If you fold a picture on the line of symmetry, the parts of the picture will fit exactly on top of each other. Imagine you fold the flag in half so that the parts fit exactly onto each other.

1. The flags of some countries are shown on the next page. Some flags have only one line of symmetry, and others have two or more lines of symmetry.

   For each flag, make a rough drawing to show the shapes and lines on the flag. Draw the line or lines of symmetry on the drawing.

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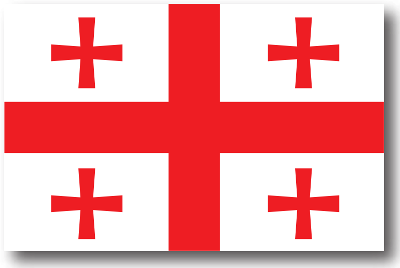
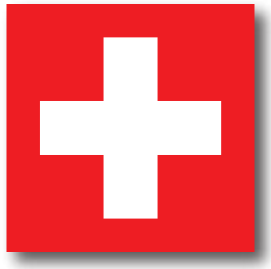
(a) The flag of Georgia



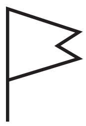
(b) The flag of Jamaica

(c) The flag of Sweden

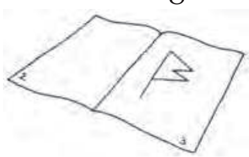
(d) The flag of Switzerland



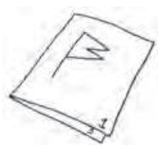
2. Fold a clean sheet of paper in the middle and number the pages 1, 2, 3 and 4.
   Draw a large figure like the one on the right on page 3.

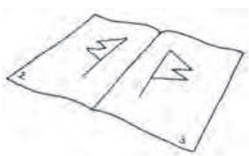
   Use a blunt pencil to make a thick dark line.

   Fold half of the sheet over. On page 1, trace a copy of the sketch you have made on page 3.

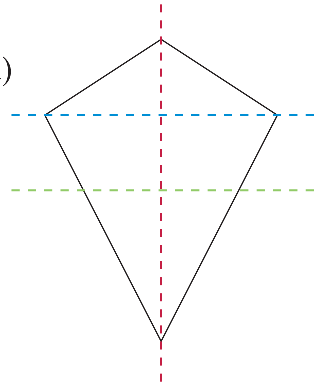
   Open the sheet again. On page 2, trace a copy of what you have drawn on page 1.

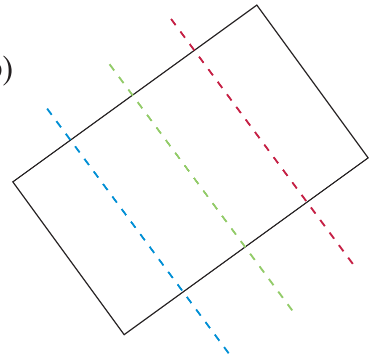
   Did you make a symmetrical drawing? Draw the line of symmetry.
3. Make two drawings on two halves of a clean page, so that you have symmetry.

4. For each figure below, state which of the coloured broken lines are lines of symmetry.

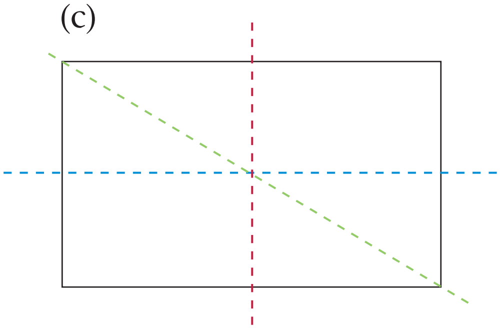
(a)



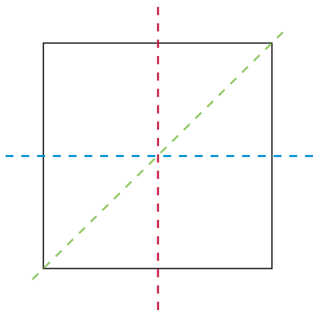
(b)



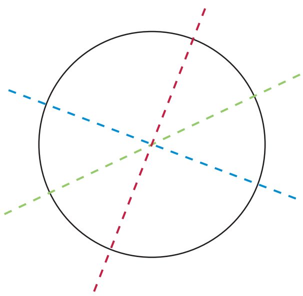
(c)



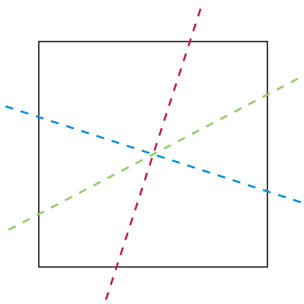
(d)



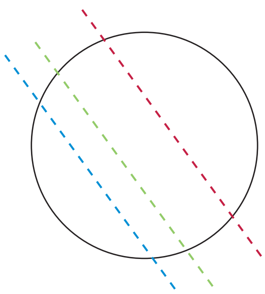
(e)



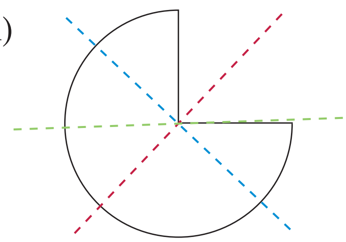
(f)



(g)



(h)



Unit 9 Whole numbers: Addition and subtraction

9.1 Another way to add

One way to calculate 3 785 + 4 667 is to break the 4 667 down into its place value parts and add them one by one to 3 785:

4 667 = 4 000 + 600 + 60 + 7
3 785 + 4 000 = 7 785
7 785 + 600 = 8 385
8 385 + 60 = 8 445
8 445 + 7 = 8 452

The smaller parts can be added first if you prefer to do so:

3 785 + 7 = 3 792
3 792 + 60 = 3 852
3 852 + 600 = 4 452
4 452 + 4 000 = 8 452

1. Calculate.
   (a) 1 212 + 8 688
   (b) 5 421 + 3 399
   (c) 5 583 + 3 489
   (d) 7 354 + 1 687
   (e) 4 675 + 4 588
   (f) 4 789 – 2 334

2. (a) Calculate 2 000 + 600 + 40 + 5 + 3 000 + 200 + 30 + 3 in the order in which the numbers are given.
   (b) Will you get the same answer if you rearrange the numbers as done in the line below, and do the calculations in the order in which the numbers are now written?
   2 000 + 3 000 + 600 + 200 + 40 + 30 + 5 + 3
   (c) Do the calculations to check your answer.

3. Rearrange the numbers in
   5 000 + 800 + 60 + 4 + 3 000 + 500 + 70 + 3
   so that the thousands parts are together, also the hundreds parts, the tens parts and the units parts.

To calculate 3 465 + 4 574 you can break *both* numbers down, work with the parts of the same kind, and then build the answer up.

Writing the expanded notations in separate lines makes it easier to see which parts belong together.

Break down:

3 465 = 3 000 + 400 + 60 + 5
4 574 = 4 000 + 500 + 70 + 4

Work with the parts:

3 000 + 4 000 = 7 000
400 + 500 = 900
60 + 70 = 130
5 + 4 = 9

Build up the answer:

3 465 + 4 574
= 7 000 + 900 + 130 + 9
Transfer 100 from 130 to 900
= 7 000 + 1 000 + 30 + 9
Transfer 1 000 to 7 000
= 8 000 + 0 + 30 + 9
= 8 039

4. Break all numbers down to calculate the following:
   (a) 4 478 + 3 827
   (b) 6 289 + 1 877
   (c) 866 + 967 + 678
   (d) 1 287 + 991 + 658 + 786

5. Calculate.
   (a) 387 + 387 + 387 + 387 + 387
   (b) 387 + 387 + 387 + 387 + 387 + 387
   (c) 387 + 387 + 387 + 387 + 387 + 387 + 387

6. Use your answers for question 5 to state how much each of the following is.
   (a) 387 × 5
   (b) 387 × 7
   (c) 1 935 ÷ 387
   (d) 1 935 ÷ 5

9.2 Another way to subtract

1. (a) Vusi has this money in his purse. How much is it?

   (b) Vusi takes R1 359 from his purse to pay for a pair of shoes. How much money is left in his purse?

2. Tebogo also has R3 787 in her purse.
   She pays R2 545 for a washing machine.
   How much money does she have left?

3. Sarah has R4 958. She buys a refrigerator for R2 336.
   How much money does she have left?

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4. Find the missing number in each case.
   (a) 2 137 + . . . = 2 200 (b) 3 437 + . . . = 3 500
   (c) 2 364 + . . . = 2 400 (d) 4 917 + . . . = 5 000
   (e) 4 286 + . . . = 4 300 (f) 5 324 + . . . = 5 400
5. Calculate 5 968 – 3 324 by adding on.
   3 324 + ... → . . . .
6. (a) How much is each of the following?
   5 000 – 3 000   900 – 300   60 – 20   8 – 4
   (b) Calculate (5 000 – 3 000) + (900 – 300) + (60 – 20) + (8 – 4).
7. If your answers for questions 5 and 6(b) are not the same, you have made a mistake. Correct it if this is the case.

To calculate 6 878 – 4 465 you can break *both* numbers down into place value parts, work with the parts of the same kind, and then build the answer up.

Break down:

6 878 = 6 000 + 800 + 70 + 8
4 465 = 4 000 + 400 + 60 + 5

Work with the parts:

6 000 – 4 000 = 2 000
800 – 400 = 400
70 – 60 = 10
8 – 5 = 3

Build up the answer:

6 878 – 4 465 = 2 000 + 400 + 10 + 3 = 2 413

The above actions can also be described by using brackets:

6 878 – 4 465 = (6 000 + 800 + 70 + 8) – (4 000 + 400 + 60 + 5)
= (6 000 – 4 000) + (800 – 400) + (70 – 60) + (8 – 5)
= 2 000 + 400 + 10 + 3
= 2 413

8. Calculate each of the following by breaking both numbers down into place value parts, working with the parts and building the answers up.

(a) 7 698 – 2 354	(b) 6 567 – 4 143
(c) 6 559 – 3 325	(d) 6 552 – 3 325

9. Describe the work that you did in question 8(a) by using brackets, as demonstrated at the bottom of the previous page.

10. Ben has R4 325 and he has to pay R2 768 rent for his house. How much money will he have left?

11. Calculate 6 254 – 2 876.

In a case like 6 254 – 2 876, some place value parts of the bigger number are smaller than the parts you have to subtract.

In a case like this, you can make **transfers** (shifts) between the place value parts of the bigger number to make it easier to do the subtractions with the place value parts:

6 254 = 6 000 + 200 + 50 + 4

1 000   100   10

= 5 000 + 1 100 + 140 + 14

2 876 = 2 000 + 800 + 70 + 6

5 000 – 2 000 = 3 000
1 100 – 800 = 300
140 – 70 = 70
14 – 6 = 8

6 254 – 2 876 = 3 000 + 300 + 70 + 8
= 3 378

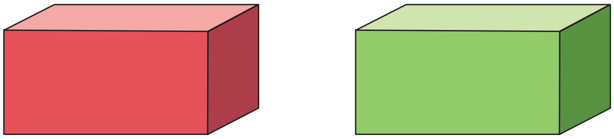
12. Calculate by breaking both numbers down into place value parts. Check each answer by doing addition.

(a) 5 346 – 3 128	(b) 5 346 – 2 274
(c) 5 346 – 1 825	(d) 5 346 – 3 177
(e) 5 346 – 2 559	(f) 7 132 – 3 654

9.3 Solve problems

1. There are 128 lemons in the red box.

   There are 248 lemons in the two boxes together.



   (a) How many lemons are there in the green box?

   (b) 38 lemons are moved from the red box to the green box. How many lemons are left in the red box?

   (c) How many lemons are there in the green box now?

2. Calculate.

   (a) 248 – 128 (b) 128 – 38 (c) 120 + 38

3. Find the number that makes the number sentence true:

   128 + ... = 248

4. Check to make sure that your answers for question 1 are correct.

5. Farmer Cele has two farms. He calls them Farm A and Farm B.
   He has 2 347 goats on Farm A.
   Altogether, there are 5 479 goats on the two farms.

   (a) How many goats are there on Farm B?

   (b) Farmer Cele takes 1 234 goats from Farm A to Farm B. How many goats are left on Farm A?

   (c) How many goats are there on Farm B now?

6. Calculate.

   (a) 5 479 – 2 347

   (b) 2 347 – 1 234

   (c) 3 132 + 1 234

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7. Find the number that makes this number sentence true:

$$2\ 347 + \square = 5\ 479$$

8. Calculate 6 573 – 2 176.
9. Find the numbers that are missing from these number sentences.
   (a) $\square + 2\ 176 = 6\ 573$
   (b) $2\ 176 + \square = 6\ 573$
   (c) $6\ 573 - 2\ 176 = \square$
10. Between 10 o'clock and 11 o'clock 2 176 people enter a soccer stadium. At 11 o'clock there are 6 573 people in the stadium. How many people were there at 10 o'clock?
11. A refrigerator costs R5 775 at a shop. The same model costs R5 999 at another shop. What is the difference between the two prices?
12. There are 4 788 Grade 4 learners in School District A and 3 866 learners in School District B.
    (a) How many more Grade 4 learners are there in District A than in District B?
    (b) How many Grade 4 learners are there in the two districts together?
13. On five consecutive days a supermarket sold 657, 358, 724, 547 and 622 chickens. How many chickens were sold altogether?
14. A contractor has to build 8 276 flush toilets in a township. He has completed 5 377. How many are still outstanding?
15. An airline charges a fare of R4 480 for a return flight from Johannesburg to Nairobi. There are also additional fees and taxes of R3 448. What is the total cost of the air ticket?

UNIT 10 WHOLE NUMBERS: DIVISION

10.1 What is division?

Division and multiplication go together.

If you multiply 15 by 6 you get 90:

$15 \times 6 = 90$

Suppose 12 was multiplied by some number and the answer was 60:

$12 \times \ldots = 60$

What you do to find the missing number 5 in this case is called **division**.

The symbol ÷ is used to indicate division.

The fact that $12 \times 5 = 60$ can also be stated by writing $60 \div 5 = 12$ or $60 \div 12 = 5$.

1. Mzwi bought 72 apples. The apples came in bags of 8 apples each. How many bags did he buy? (Only some of the bags are shown here.)

How did you find the answer to question 1?

One way is to find the number of bags by counting in eights:

No. of apples	8	16	24	32	40	48	56	64	72
No. of bags	1	2	3	4	5	6	7	8	9
Apples in 1 bag	8	8	8	8	8	8	8	8	8

But it is not necessary to count in eights if you know that $8 \times 9 = 72$. Then you can give the answer straightaway.

To find the answer to question 1, you can divide 72 by 8 and then the answer is 9. You can describe this with the number sentence $72 \div 8 = 9$.

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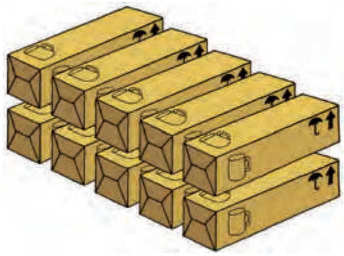
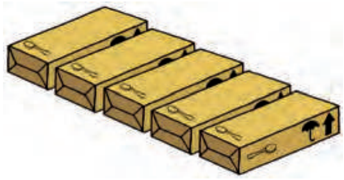
2. Cindy bought 90 plastic cups.
The cups came in 10 small boxes.
How many cups were in each box?



3. Cindy also bought 90 plastic teaspoons.
The teaspoons came in 5 boxes.
How many teaspoons were in each box?



4. Calculate each of the following.

(a) 8×9	(b) 4×18
(c) 3×24	(d) 6×6
(e) 6×12	(f) 18×4

5. 72 apples must be put into bags.
   (a) How many bags of 8 apples each can be made?
   (b) How many bags of 9 apples each can be made?
   (c) How many bags of 18 apples each can be made?
   (d) How many bags of 6 apples each can be made?
   (e) How many bags of 12 apples each can be made?
   (f) How many bags of 24 apples each can be made?
   (g) How many bags of 3 apples each can be made?
   (h) How many bags of 4 apples each can be made?
   (i) How many bags of 10 apples each can be made?
   (j) How many bags of 5 apples each can be made?
   (k) How many bags of 15 apples each can be made?

6. How much is each of the following?

(a) $72 \div 3$ (b) $72 \div 24$

(c) $72 \div 12$ (d) $72 \div 6$

(e) $72 \div 18$ (f) $72 \div 4$

(g) $72 \div 9$ (h) $72 \div 8$

7. When you have answered question 6, you can use these four diagrams to check your answers.
For each item in question 6, find the diagram that you can use to check your answer. Write the letter of that diagram next to your answer.

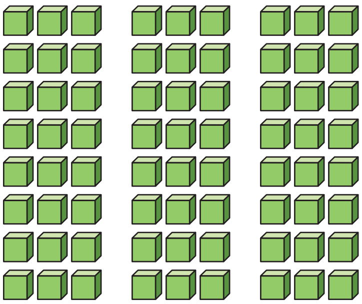


Diagram A

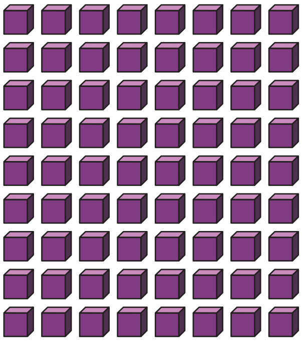


Diagram B

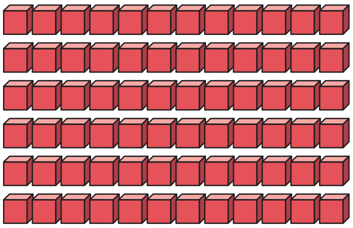


Diagram C

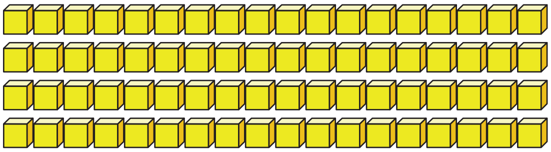


Diagram D

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10.2 Remainders

You have answered this question before:

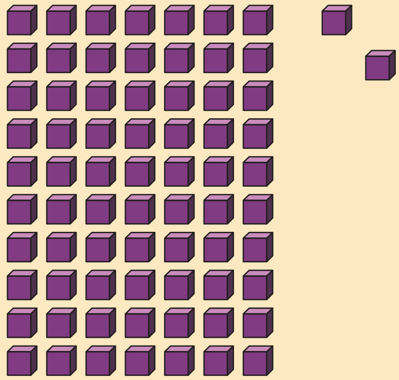
If you have 72 apples, how many bags of 10 apples each can you make?

Clearly, you can make 7 bags of 10 apples each and 2 apples will be left over.

The leftover apples are called the **remainder**.

This situation can be described with the following number sentence:

72 ÷ 10 = 7 remainder 2



1. Is it true that 76 ÷ 10 = 7 remainder 6?
2. (a) How much is 6 × 8 + 5?

   (b) Is it true that 53 ÷ 8 = 6 remainder 3?
3. How can you check whether it is true that 40 ÷ 7 = 5 remainder 3?
4. Which of these number sentences are true, and which are false? Write true number sentences to replace the false ones.

   (a) 44 ÷ 7 = 6 remainder 3

   (b) 67 ÷ 7 = 8 remainder 8

   (c) 58 ÷ 8 = 7 remainder 2

   (d) 75 ÷ 7 = 10 remainder 5
5. (a) How many pencils at R7 each can you buy with R100?

   (b) How many pencils at R7 each can you buy with R200?

   (c) How many pencils at R7 each can you buy with R300?

People all over the world agree that $7 \times 8 + 5$ or $5 + 7 \times 8$ is a way to say that 7×8 must be calculated before 5 is added.

If we want to say that addition should be done first, we use brackets:

$7 \times (8 + 5)$ means $8 + 5 = 13$ and $7 \times 13 = 91$.

But $7 \times (8 + 5)$ can also be replaced with $7 \times 8 + 7 \times 5$, which can be calculated like this:

$7 \times 8 + 7 \times 5 = 56 + 35 = 91$

$(5 + 7) \times 8$ means $5 + 7 = 12$ and $12 \times 8 = 96$

6. How much is each of the following?
   (a) 7×8 (b) $7 \times 8 + 5$ (c) $6 \times 9 + 3$
   (d) $7 \times 9 + 5$ (e) $20 \times 6 + 13$ (f) $12 \times 11 + 5$

You may use your results for question 6 when you answer questions 7, 8 and 9.

7. (a) 68 apples have to be shared equally between 7 people. How many apples will each one get and how many apples will remain?
   (b) 57 apples have to be shared equally between 9 people. How many apples will each one get and how many apples will remain?
   (c) 61 apples have to be shared equally between 8 people. How many apples will each one get and how many apples will remain?
8. 137 eggs have to be packed in cartons that can take 12 eggs each.
   (a) How many cartons are needed?
   (b) How many cartons can be filled?
   (c) How many eggs will be in the carton that is not filled?
9. (a) Isaac has R133. How many pens at R20 each can he buy?
   (b) Write the answer for $133 \div 20$.

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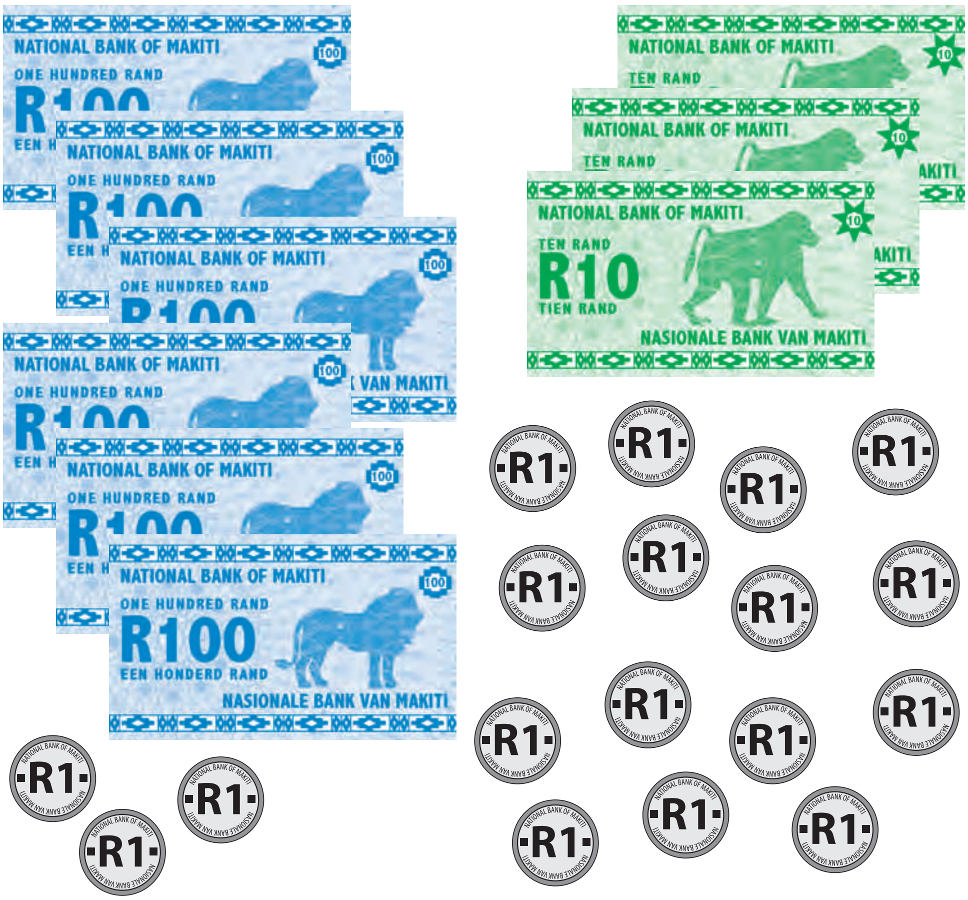
10.3 Dividing bigger numbers into equal parts



1. How much will each person get if the money shown here is shared equally between 3 people?
2. How many pears at R4 each can be bought with the money?
3. How many lemons at R6 each can be bought with the money?
4. How much will each person get if the money is shared equally between 5 people?
5. How much will each person get if the money is shared equally between 8 people?
6. How many pies at R10 each can be bought with the money?

7. How much can each person get if R367 is available to be shared equally between 5 people?
8. How many tins of juice at R8 each can be bought with R367?

10.4 Use multiplication facts to solve problems

You will now learn to use multiplication facts to solve division problems with bigger numbers. When you do question 1, you will see how you can find out how many peaches you can buy with R776, if each peach costs R3.

1. (a) How much is 3×200, and how much is 3×100?
   (b) If the peaches cost R3 each and you have R776, can you buy 200 peaches?
   (c) Can you buy another 100 peaches with the money that is left over?
   (d) Can you buy another 50 peaches?
   (e) How many peaches can you buy with the money that is left over from R776 after having bought 250 peaches?

The work you have done for question 1 can be written up as shown below.

To calculate $776 \div 3$, you have to find out by what 3 must be multiplied to get 776.

$3 \times 200 = 600$, so the answer is more than 200.

$3 \times 50 = 150$

So $3 \times \mathbf{200} + 3 \times \mathbf{50} = 600 + 150 = 750$.

But there is still 26 left over because $776 - 750 = 26$.

$3 \times \mathbf{8} = 24$

So $3 \times \mathbf{258} = 750 + 24 = 774$, and 2 is left over.

$776 \div 3 = 258$ remainder 2

2. How many tins of juice at R6 each can you buy with R700?
3. How much does one book cost if 6 books cost R696?

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4. Kado makes up bags with 4 avocados in a bag. If he has 136 avocados, how many bags can he fill?
5. A bakery produces 952 loaves of bread and delivers the same number of loaves to 8 grocery stores. How many loaves of bread go to each store?

Always check your answers for division by doing multiplication.

6. Mrs Mbete plans a dinner for 128 guests. She wants to seat 8 guests at a table. How many tables does she need?
7. In an orchard, 168 olive trees are planted in 7 equal rows. How many trees are planted in each row?
8. Calculate.

(a) 272 ÷ 8	(b) 714 ÷ 6
(c) 252 ÷ 7	(d) 240 ÷ 5
(e) 365 ÷ 5	(f) 605 ÷ 5
(g) 714 ÷ 3	(h) 504 ÷ 7
(i) 250 ÷ 5	(j) 750 ÷ 3

9. (a) 198 beads are arranged in 9 equal rows. How many beads are there in each row?

   (b) 238 beads are arranged in 7 equal rows. How many beads are there in each row?
10. 688 trees are planted in 8 equal rows. How many trees are there in each row?

CHALLENGE

11. For every 3 red beads in a bead pattern, there are 6 blue beads.

    (a) How many red beads are there, if there are 72 blue beads in the pattern?

    (b) How many blue beads are there, if there are 270 red beads in the pattern?

12. A farmer plants his vegetables in neat rows.
    (a) He has 136 bean seedlings and plants 8 seedlings in a row. How many rows are there?
    (b) He has 126 pumpkin seeds and plants 7 seeds in a row. How many rows are there?
13. (a) Nina bought 9 plates for R162. How much did one plate cost?
    (b) Nina also bought spoons for R162. Each spoon cost R6. How many spoons did she buy?
14. Carla likes to play with numbers. She multiplied three numbers and got 288 as the answer, but now she has forgotten which numbers she used.
    (a) Make a list of all the possible answers.
    (b) Write down what you did to find the numbers.
15. A citrus farmer hires small trucks to transport her lemons to markets all over the country. The load on a truck may not be more than 900 kg. One bag of lemons has a mass of 8 kg. How many bags of lemons can be transported in one load?
16. One hundred and thirty R1 coins are shared equally between 8 children. How many coins does each child get, and how many coins remain?

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Term Three

Unit 1: Common fractions

Unit 2: Capacity and volume

Unit 3: Whole numbers

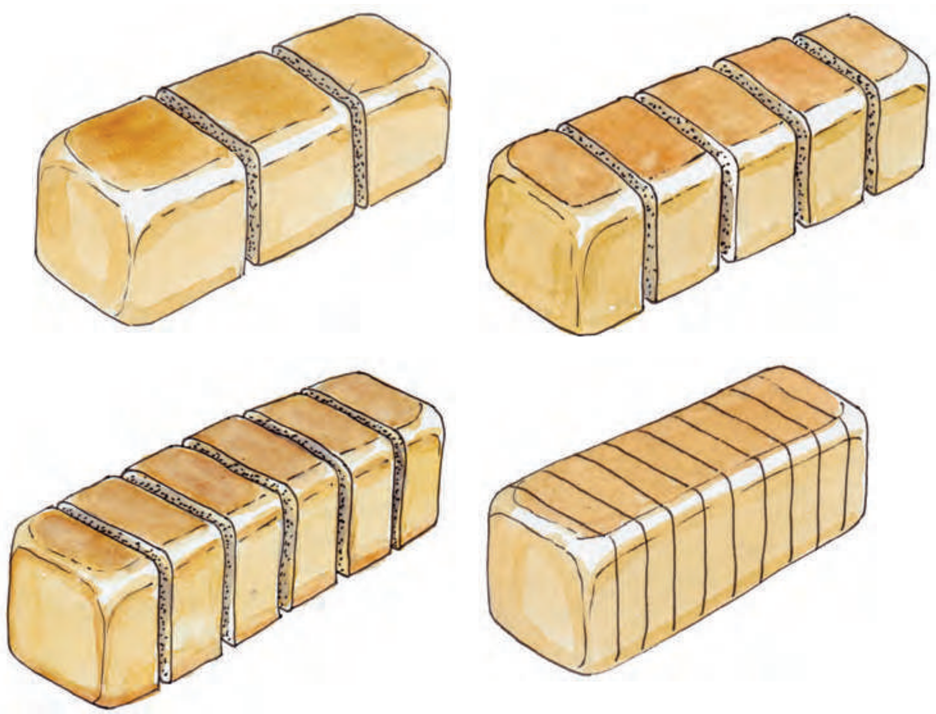
Unit 4: Whole numbers: Addition and subtraction

Unit 5: Viewing objects

UNIT 1

COMMON FRACTIONS

1.1 Compare fractions



1. Which is more, one third of a loaf or one fifth of a loaf?
2. In each case state which is more.
   (a) 1 sixth or 1 tenth of a loaf (b) 2 fifths or 3 sixths of a loaf
   (c) 1 third or 1 quarter of a loaf (d) 2 sixths or 1 third of a loaf
   (e) 4 fifths or 8 tenths of a loaf (f) 3 thirds or 5 fifths of a loaf
3. (a) Willem eats 5 tenths of a loaf of bread. What part of the loaf is left over?
   (b) Moshanke eats 2 fifths of a loaf of bread. What part of the loaf is left over?
   (c) How many eighths make up a whole loaf?
   (d) How many eighths make up a half of a loaf?

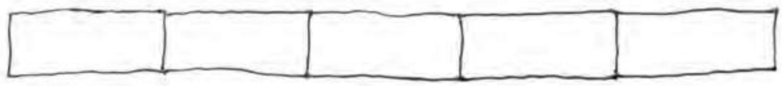
Follow the instructions in the questions below to make drawings that show fifths, quarters, eighths and tenths.

Do not use a ruler, but try to draw neatly.

Use a pencil, not a pen.

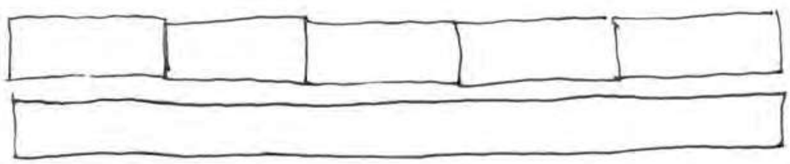
4. (a) Draw a rectangle more or less like this.

(b) Draw four more rectangles next to it, as close to the same shape and size as you can without using a ruler.

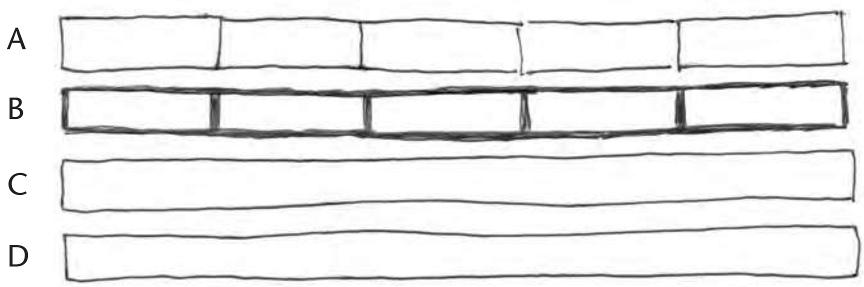


Your five rectangles together form a strip. Each rectangle is one fifth of the whole strip.

(c) Draw a strip of the same length and width, below the one you already have:



(d) Use the first strip as a guide to divide the new strip into fifths as well. Make the lines of your new fifths dark. Draw two more strips, and name your strips as shown below. All your strips must be the same length.



5. (a) Divide each fifth in your Strip B into two equal parts as shown below.

   (b) How many equal parts do you now have in Strip B and what can each part be called?

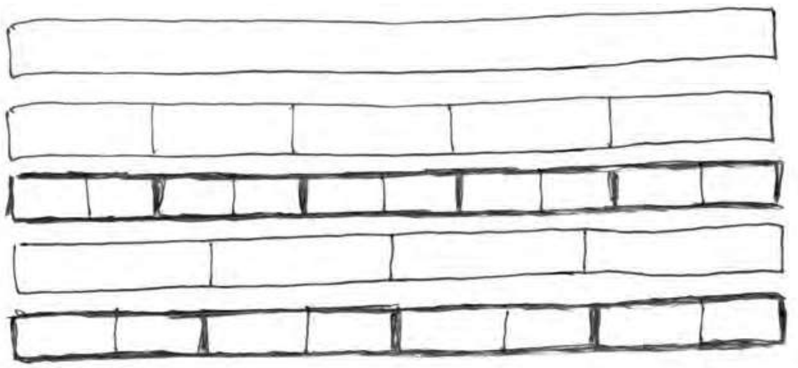
   (c) Divide Strip C into quarters, and Strip D into eighths.

A

B

C

D



   (d) Which is bigger, a quarter or a fifth?

   (e) Which is bigger, a tenth or an eighth?

   (f) How many tenths are the same as four fifths?

   (g) How many eighths are a whole strip?

6. (a) Which do you think is bigger, 2 thirds or 4 fifths?

   (b) Make drawings like the above to check your answer.

   (c) Which is bigger, 3 tenths or 2 sixths?

7. Draw a strip of sixths below your strip of eighths.

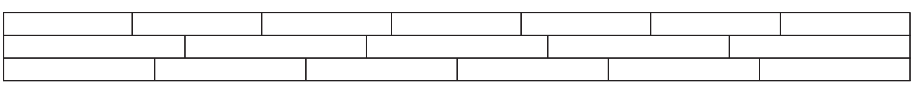
   (a) Which do you think is bigger, 5 sixths or 7 eighths?

   (b) Which is bigger, 5 sixths or 3 quarters?

8. (a) Which is bigger, 2 fifths or 3 sevenths?

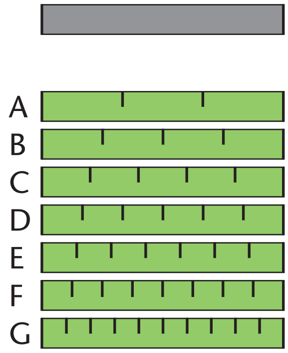
   (b) Which is bigger, 3 fifths or 4 sevenths?

   (c) Which is bigger, 5 sevenths or 4 sixths?



1.2 Measure with fractions

In this activity you will measure ribbons with the measuring stick shown on the right.



Measuring sticks A to G on the right are divided into different fraction parts.

The fraction parts on Stick D are sixths.

1. What fraction parts are shown on each of the other marked measuring sticks?

2. The red ribbon below is 2 and 6 eighths of a stick long.

   (a) Can we also say that the red ribbon is 2 and 3 quarters of a stick long?

   (b) How many eighths are equal to one quarter?

   (c) How many eighths are equal to two quarters?

   (d) How many eighths are equal to one whole?

3. (a) How long is the blue ribbon below? Describe the length in two different ways.

   (b) How many fifths are equal to 6 tenths?

4. (a) Which is longer, a ribbon that is 2 and 5 eighths of a stick long, or a ribbon that is 2 and 7 tenths of a stick long?

   (b) Which number is bigger, 4 tenths or 3 eighths?

   (c) Which number is bigger, 6 tenths or 5 eighths?

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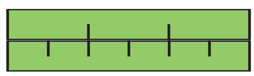
A short way to write **one half** is $\frac{1}{2}$.
This way of writing is called the **fraction notation**.
The fraction notation for **two sevenths** is $\frac{2}{7}$.
The fraction notation for **one quarter** or **one fourth** is $\frac{1}{4}$.
The fraction notation for **five sixths** is $\frac{5}{6}$.

5. Write the following numbers in fraction notation:
   (a) one fifth
   (b) three quarters
   (c) four sixths
   (d) two thirds
   (e) nine tenths
   (f) seven eighths

6. Write the following numbers in words:
   (a) $\frac{5}{6}$
   (b) $\frac{1}{3}$
   (c) $\frac{5}{7}$
   (d) $\frac{4}{8}$
   (e) $\frac{5}{8}$
   (f) $\frac{9}{10}$

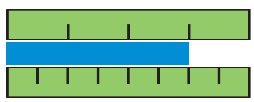
1.3 Equivalent fractions

1. Use sixths to state how long this blue ribbon is.



Different ways to describe the same part of a whole are called **equivalent fractions**.

For example, **3 quarters** is equivalent to **6 eighths**.



We can write $\frac{3}{4} = \frac{6}{8}$ to indicate that 3 quarters is equivalent to 6 eighths.

You may find these diagrams helpful when you answer the questions below.
The diagrams all have the same size.

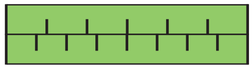


Diagram A

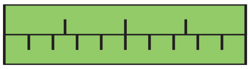


Diagram B

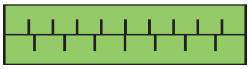


Diagram C

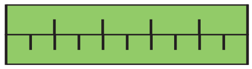


Diagram D

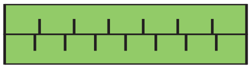


Diagram E

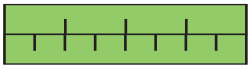


Diagram F

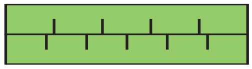


Diagram G

2. In each case state whether the two fractions are equivalent.

(a) $\frac{5}{8}$ and $\frac{5}{6}$ (b) $\frac{4}{8}$ and $\frac{4}{6}$ (c) $\frac{4}{8}$ and $\frac{3}{6}$

(d) $\frac{2}{8}$ and $\frac{1}{4}$ (e) $\frac{1}{5}$ and $\frac{2}{10}$ (f) $\frac{7}{8}$ and $\frac{9}{10}$

(g) $\frac{5}{7}$ and $\frac{6}{8}$ (h) $\frac{1}{6}$ and $\frac{1}{5}$ (i) $\frac{5}{10}$ and $\frac{4}{8}$

3. In which cases in question 2 is the first fraction bigger than the second fraction?

4. In each case, arrange the fractions from smallest to biggest. The different fractions all refer to the same whole.

(a) $\frac{4}{5}$, $\frac{3}{4}$ and $\frac{2}{3}$ (b) $\frac{4}{5}$, $\frac{6}{8}$ and $\frac{5}{6}$

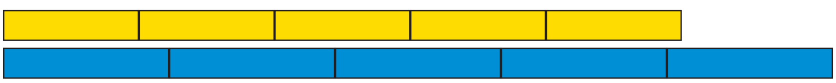
(c) $\frac{5}{8}$, $\frac{3}{8}$ and $\frac{7}{8}$ (d) $\frac{5}{7}$, $\frac{4}{6}$ and $\frac{3}{5}$

(e) $\frac{3}{4}$, $\frac{7}{10}$ and $\frac{2}{3}$ (f) $\frac{2}{5}$, $\frac{3}{8}$ and $\frac{4}{7}$

5. (a) Write three fractions that are all equivalent to $\frac{1}{2}$.

(b) Make drawings to show that your answers are correct.

6. Which is longer, $\frac{3}{5}$ of the blue ribbon or $\frac{3}{5}$ of the yellow ribbon?



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1.4 Calculate with fractions

1. Joe eats 3 eighths of a loaf of bread. He then eats another 2 eighths of the same loaf. What part of the loaf has he eaten altogether?
2. Jenny joins planks of wood to make longer planks. Work out the total length of the plank in each case.
   (a) 3 tenths of a metre and 7 tenths of a metre
   (b) 5 eighths of a metre and 2 eighths of a metre
   (c) two planks that are 3 quarters of a metre each
   (d) 1 and 3 fifths of a metre and 6 fifths of a metre
3. Casper has a piece of rope that is 4 sevenths of a metre long. He has another piece that is 3 sevenths of a metre. How much rope does he have altogether?
4. Thuni has a piece of rope that is 140 cm long. He cuts off 3 sevenths of the rope. How much rope is left over?
5. Calculate:
   (a) $\frac{2}{8} + \frac{4}{8}$ (b) five sixths + three sixths
   (c) $\frac{2}{5} + \frac{2}{5}$ (d) two tenths + three tenths
6. A mother buys a box of sweets. There are 12 sweets in the box.
   (a) The mother wants to share the sweets equally between her 3 children. How many sweets will each child get?
   (b) How many sweets is one third of the box of sweets?
   (c) How many sweets is one quarter of the box of sweets?
   (d) How many sweets is one sixth of the box of sweets?
7. Bonnie has 30 marbles.
   (a) What fraction of all the marbles is 10 marbles?
   (b) What fraction of all the marbles is 20 marbles?
   (c) What fraction of all the marbles is 5 marbles?

8. Calculate the following:

(a) one fifth of a box with 30 biscuits

(b) one third of a bag with 36 marbles

(c) one quarter of a class of 40 children

(d) one tenth of a period which is 40 minutes long

(e) one sixth of a tray which has 24 eggs

(f) two fifths of a box which has 20 chocolates

9. One fifth of the learners in a class are absent. There are seven learners absent. How many learners are in the class?

10. There are 24 cows in a camp.

(a) What fraction of all the cows is 6 cows?

(b) What fraction of all the cows is 8 cows?

11. Write each of the following as one number:

(a) $\frac{1}{3} + \frac{1}{3} + \frac{1}{3}$

(b) $\frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6}$

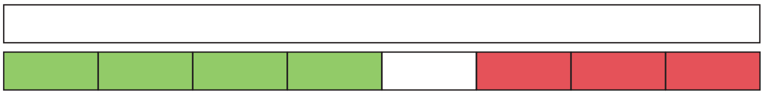
(c) $\frac{2}{7} + \frac{3}{7}$

(d) $\frac{1}{6} + \frac{5}{6}$

(e) $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4}$

We know that $\frac{3}{3}$ is the same as 1, so we can write 1 for $\frac{3}{3}$.

12.



(a) What fraction of the lower strip is green?

(b) What fraction of the lower strip is red?

(c) What fraction of the lower strip is white?

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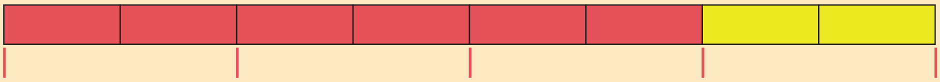
1.5 Fraction parts

Three quarters of this strip are red.



We can also write in fraction notation:
$\frac{3}{4}$ of this strip is red.

1. (a) Can we also say that 6 eighths of the above strip are red?

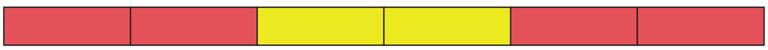
   (b) What fraction of the strip below is red?

   (c) What fraction of the strip is yellow?

2. What fraction of each strip below is red? Write your answers in words and in fraction notation.

   (a) 

   (b) 

   (c) 

   (d) 

   (e) 

   (f) 

   (g) 

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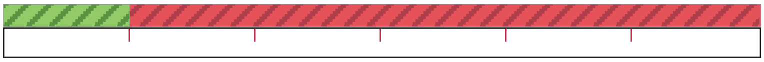
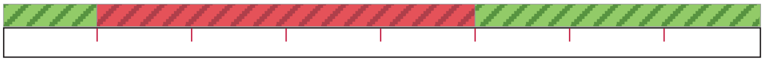
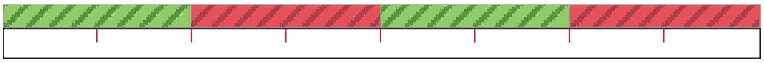
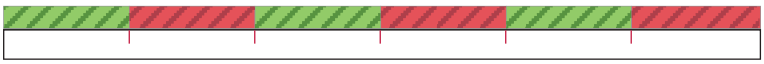
3. What part of each piece of string is red? Write your answers in words and in fraction notation.

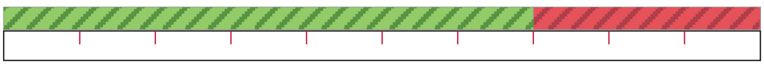
(a) 

(b) 

(c) 

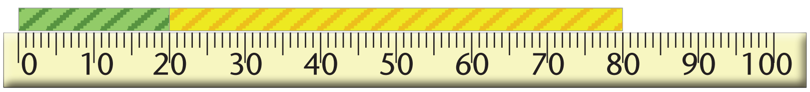
(d) 

(e) 

(f) 

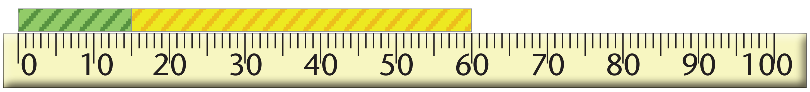
4. 24 ℓ of water is shared equally between a number of people. Each person gets one sixth of the water.
   (a) How many people share the water?
   (b) How much water does each person get?
5. 60 apples are packed into 5 boxes. The same number of apples are put into each box.
   (a) What fraction of the apples is put into each box?
   (b) How many apples are put into each box?
6. R40 is divided equally between a number of people. Each person gets R5.
   (a) How many people share the money?
   (b) What fraction of the money does each person get?

7. A bag of flour is divided into 8 portions of 2 kg each.
   (a) How much flour was in the bag, before it was divided into portions?
   (b) What fraction of the whole bag is each portion?
8. (a) Calculate 140 + 140 + 140 + 140 + 140.
   (b) How much is one fifth of 700?
   (c) 140 g of white bread flour is mixed with 560 g of wholewheat flour to make bread dough. What fraction of the flour mixture is white bread flour?
9. What fraction of each mixture is cement?
   (a) 200 kg of cement is mixed with 600 kg of sand.
   (b) 25 kg of cement is mixed with 175 kg of sand.
10. The ruler below is marked in millimetres.
    What fraction of this piece of rope is green?

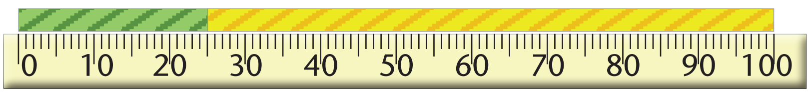


11. What fraction of each piece of rope is green?

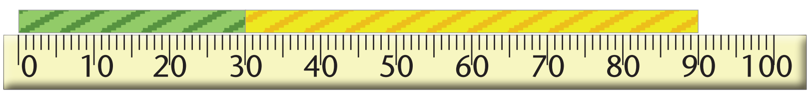
(a)



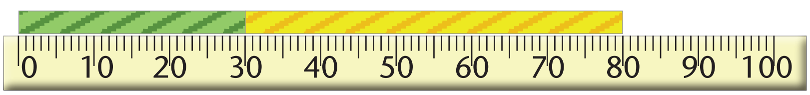
(b)



(c)



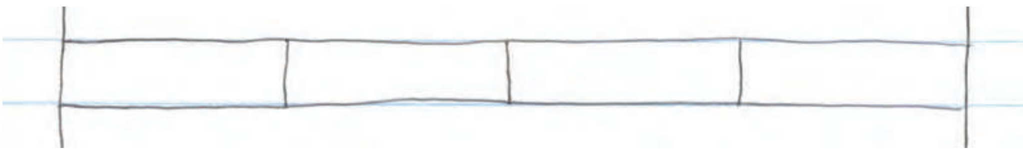
(d)



1.6 Compare fractions

1. (a) Draw two vertical lines on a clean page in your exercise book, about 12 cm from each other. Your lines must be long enough to have 9 printed lines between them, as shown below. Do not use a ruler.

(b) You now have 8 strips of equal length.
Divide one of them into quarters as shown below.
Do this as accurately as you can without measuring.



(c) Divide your other strips into eighths, halves, thirds, sixths, fifths, sevenths and tenths.

What you have drawn in question 1 is called a **fraction wall**. You can use it to help you to compare fractions.

2. Use your fraction wall to arrange these fractions from smallest to biggest:

5 eighths 4 sevenths 3 fifths 3 quarters

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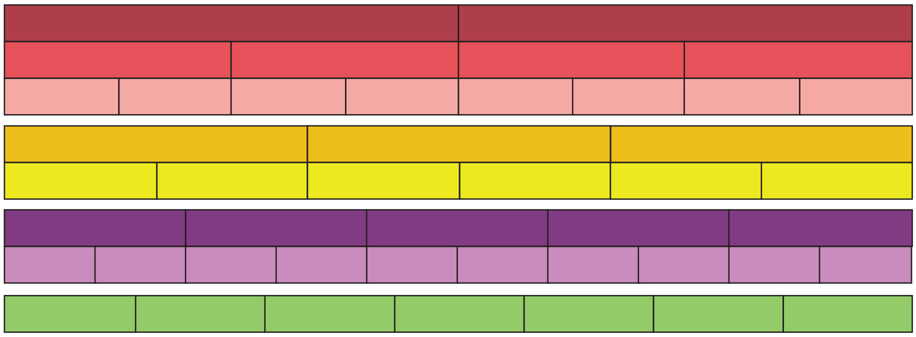
3. Use this accurate fraction wall to check your answer to question 2.



4. Which is more? You may use the above fraction wall to answer this question.

(a) $\frac{3}{7}$ or $\frac{3}{6}$

(b) two thirds or three quarters

(c) $\frac{4}{8}$ or $\frac{3}{6}$

(d) six sevenths or seven eighths

(e) $\frac{2}{5}$ or $\frac{1}{3}$

(f) three sixths or four eighths

(g) $\frac{3}{5}$ or $\frac{2}{3}$

(h) two fifths or two thirds

5. Arrange the fractions from the smallest to the biggest.

(a) $\frac{1}{2}$; $\frac{3}{4}$; $\frac{5}{8}$; $\frac{3}{8}$

(b) $\frac{3}{6}$; $\frac{3}{5}$; $\frac{3}{7}$; $\frac{3}{4}$

(c) $\frac{2}{6}$; $\frac{1}{3}$; $\frac{1}{4}$; $\frac{2}{5}$

(d) $\frac{3}{8}$; $\frac{2}{7}$; $\frac{3}{7}$; $\frac{2}{6}$

6. (a) Is $\frac{6}{8}$ equivalent to $\frac{3}{4}$?

(b) Write a fraction that is equivalent to $\frac{2}{3}$.

7. Write a fraction that is equivalent to:

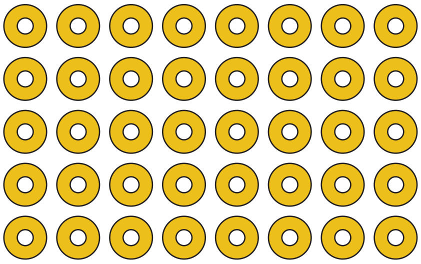
(a) $\frac{2}{3}$

(b) $\frac{1}{3}$

(c) $\frac{1}{4}$

(d) $\frac{2}{4}$

8. Write three different fractions that are all equivalent to $\frac{1}{2}$.



9. (a) How many beads is one eighth of 40 beads?

(b) How many beads is three eighths of 40 beads?

(c) How many beads is three fifths of 40 beads?

(d) Which is more, $\frac{3}{8}$ of 40 beads or $\frac{3}{5}$ of 40 beads? How many more is it?

(e) Which is more, $\frac{5}{8}$ of 40 beads or $\frac{3}{5}$ of 40 beads? How many more is it?

(f) Which is more, $\frac{5}{8}$ of 40 beads or $\frac{3}{4}$ of 40 beads? How many more is it?

10. (a) Which is more, $\frac{3}{8}$ of 80 beads or $\frac{3}{8}$ of 40 beads? How many more is it?

(b) Which is more, $\frac{5}{8}$ of 40 beads or $\frac{3}{5}$ of 50 beads? How many more is it?

(c) Which is more, $\frac{7}{8}$ of 80 beads or $\frac{4}{5}$ of 80 beads? How many more is it?

(d) Which is more, $\frac{5}{8}$ of 120 beads or $\frac{2}{3}$ of 120 beads? How many more is it?

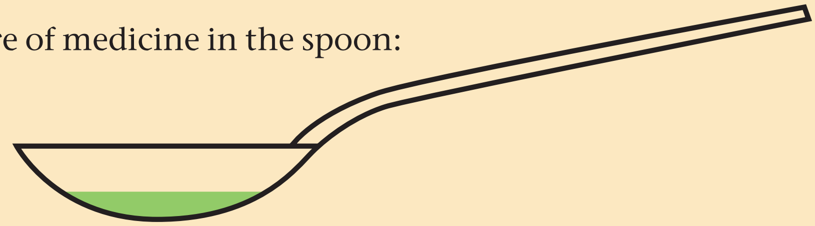
(e) Which is more, $\frac{5}{6}$ of 90 beads or $\frac{4}{5}$ of 150 beads? How many more is it?

Unit 2 Capacity and volume

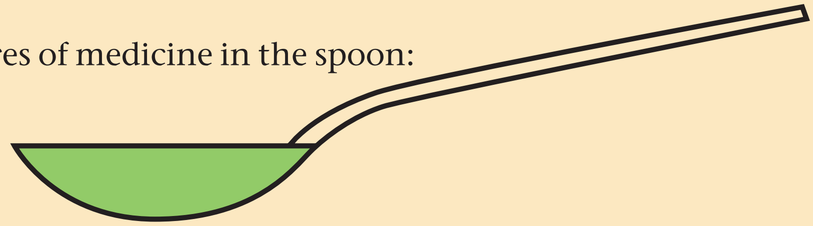
2.1 Measure in millilitres

The photo shows about **1 millilitre** of milk.

1 millilitre of medicine in the spoon:



5 millilitres of medicine in the spoon:

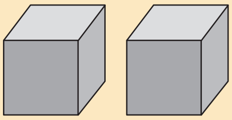


A full cup of tea is about 250 millilitres of tea.

1. Approximately how many teaspoonfuls of sugar are needed to fill one cup with sugar?

The **symbol for millilitre** is **ml**.

A small ice cube with side lengths of 1 cm is 1 ml of ice.



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2. About how many millilitres of clay do you think you need to make a clay model of your pencil?
3. About how many millilitres of clay do you think you need to make a clay model of this book?

Milk is sold in containers of various sizes.

1 litre is 1 000 millilitres.

These pictures are much smaller than actual 1-litre containers.

4. How many glasses can you fill with 200 ml of milk from a full 1-litre container of milk?
5. (a) Approximately how many millilitres water do you drink if you drink half a cup of water?

   (b) Approximately how many millilitres water do you drink if you drink two full cups of water?

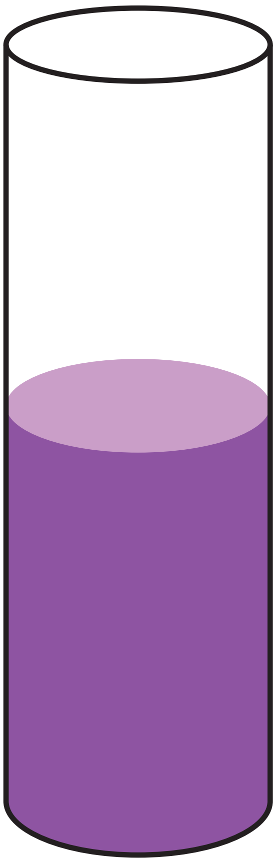
2.2 Volume and capacity

A normal size tin contains 330 ml juice.

When the glass below is filled to the top, it will hold 100 ml juice.

Some juice was poured from the tin into the glass.

1. Approximately how much juice is in this glass now?

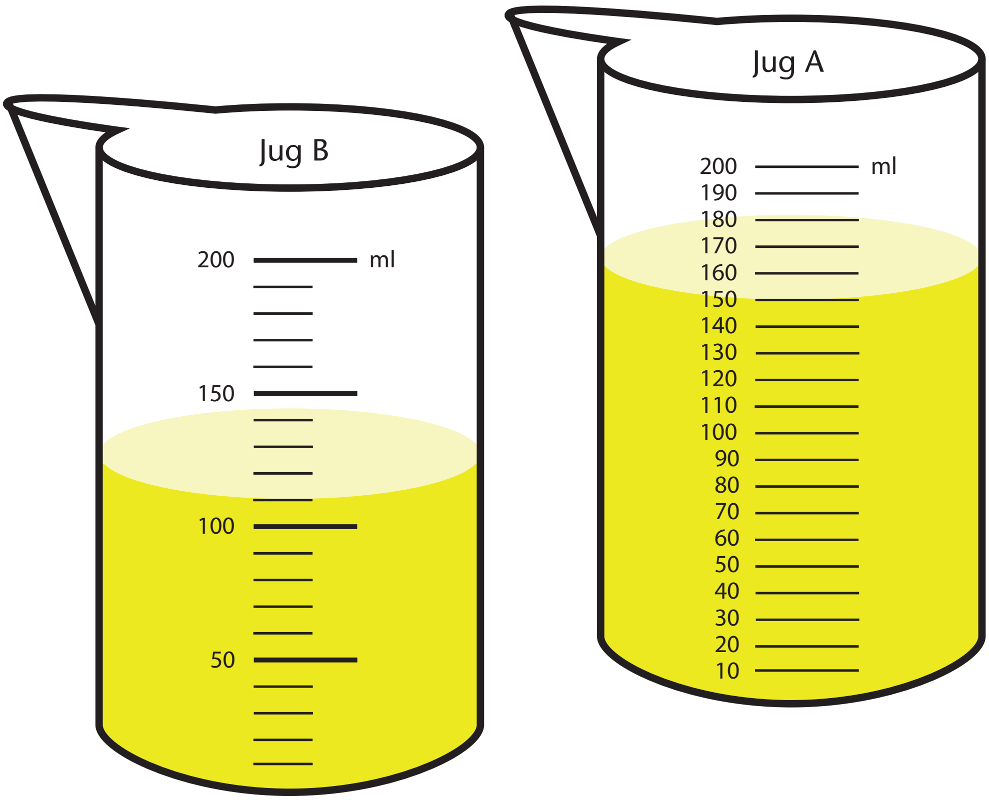


2. Approximately how much juice is left in the tin?

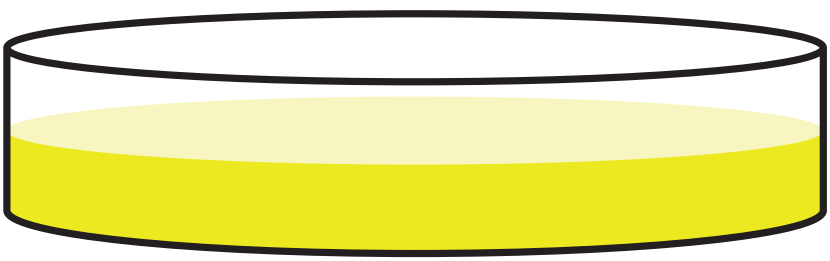
3. How many 100 ml glasses can be filled from one full tin, and how much juice will be left over?

Each of these jugs can hold 200 ml of liquid (or sand or salt or sugar). We say the **capacity** of each jug is 200 ml.

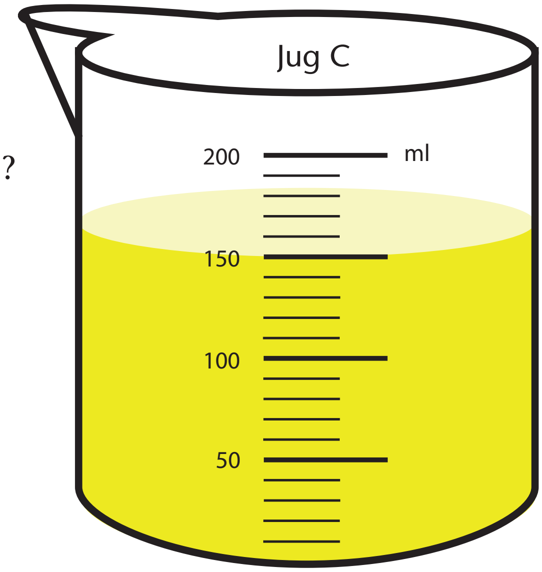
There is 110 ml of juice in Jug B, and 150 ml of juice in Jug A. We say the **volume** of the juice in Jug B is 110 ml, and the volume of the juice in Jug A is 150 ml.

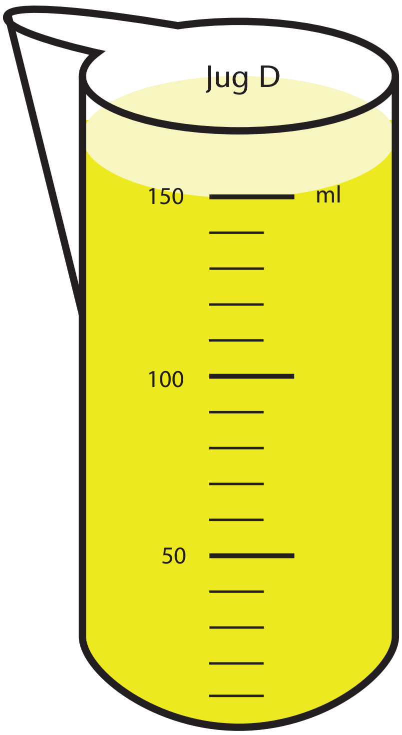


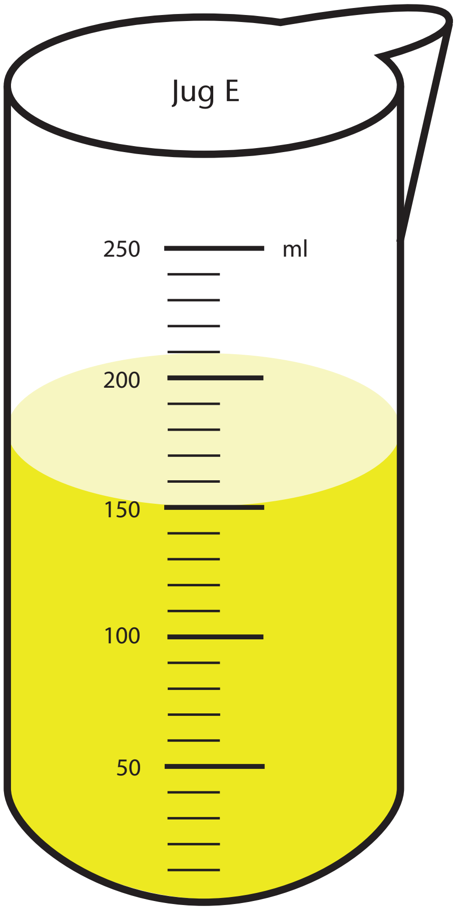
4. Do you think the juice in the 200 ml container below is less than or more than the juice in Jug B?



5. What is the volume of juice in each of these jugs?
6. What is the capacity of each of these jugs?







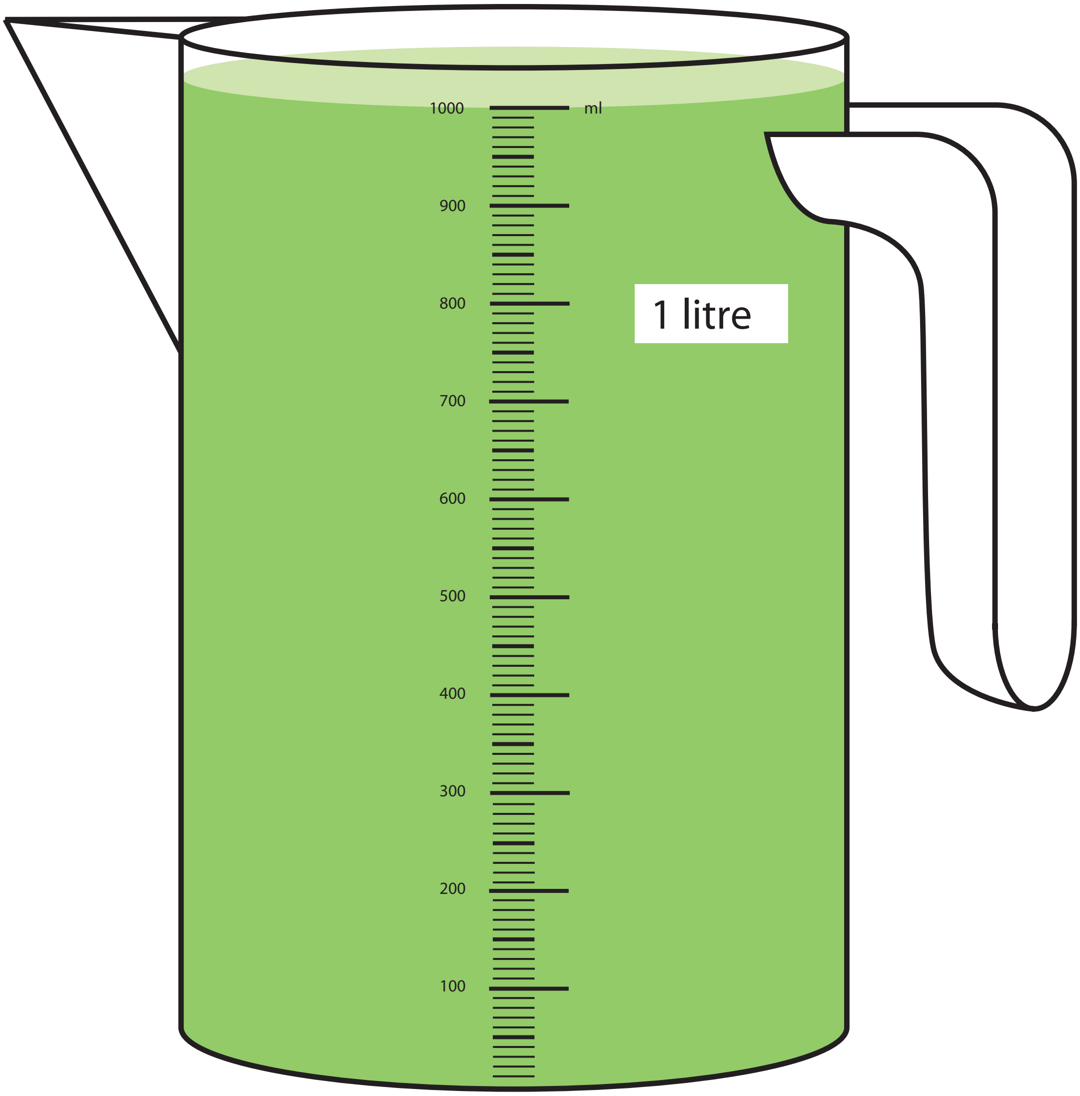
7. What is the capacity of Jug F?
8. What is the capacity of Jug G?
9. (a) Can all the juice in Jug G be poured into Jug F?
   (b) How much more juice can be poured into Jug F?

10. Which jug is bigger, Jug F or Jug G?

11. How much juice is there altogether in Jugs A to G?
12. Which of the jugs contains the biggest volume of juice?
13. Which of the jugs have the biggest capacity?

2.3 Litre and millilitre

- 1 000 ml is 1 litre.



500 ml is half of a litre.

1. (a) How many millilitres make up a quarter of a litre?
   (b) How many millilitres make up half of a quarter-litre?
2. What part of a litre is 750 ml?
3. How many millilitres are each of the following?
   (a) 3 litres
   (b) $2\frac{1}{4}$ litres
   (c) $3\frac{1}{2}$ litres
   (d) $1\frac{3}{4}$ litres

$3\frac{1}{2}$ litres can also be written as 3,5 litres.

4. How many portions of 200 ml milk can be poured from a full 1-litre container of milk?
5. Four portions of 125 ml each are poured from a full 1-litre container of milk.
   (a) How much milk is left in the container?
   (b) How many more portions of 125 ml each can be poured from the container?
   (c) How many millilitres is one eighth of a litre?
   (d) How many millilitres is three eighths of a litre?
   (e) How many millilitres is one eighth of three litres?
   (f) How many eighths-of-a-litre portions can be poured from a full 2-litre container of milk?

6. If a teaspoon holds 5 ml, how many teaspoonfuls of honey will fill a 1-litre container?

Tablespoons have a capacity of about 15 ml. Cooks and nurses use spoons of several different sizes.

7. The biggest of these measuring spoons has a capacity of 25 ml. Estimate the capacity of each of the other spoons.

8. (a) How many 10 ml spoonfuls of honey will you need to fill a 1-litre container?

   (b) How many 10 ml spoonfuls of honey will you need to fill a container marked 200 ml?

   (c) How many 10 ml spoonfuls of honey will you need to fill a container marked 250 ml?

   (d) How many 5 ml spoonfuls of honey will you need to fill a container marked 200 ml?

   (e) How many tablespoonfuls of honey will you need to fill a container marked 300 ml?

9. Would your answers for question 8 be different if the questions were about sugar instead of honey?

The **symbol for litre** is **ℓ**.

10. How many millilitres are each of the following?

(a) 2 ℓ	(b) 5 ℓ	(c) 9 ℓ	(d) 3 ℓ
(e) 1,5 ℓ	(f) $\frac{1}{4}$ ℓ	(g) $3\frac{3}{4}$ ℓ	(h) $2\frac{1}{4}$ ℓ

11. How many litres are each of the following? Give your answer as a fraction if necessary.

(a) 3 000 ml	(b) 8 000 ml	(c) 2 500 ml	(d) 500 ml
(e) 4 250 ml	(f) 750 ml	(g) 6 000 ml	(h) 5 250 ml

1 600 ml can be written as 1 ℓ and 600 ml.

12. Write in litres and millilitres, as shown in the example above.

(a) 1 750 ml	(b) 3 503 ml
(c) 8 649 ml	(d) 4 050 ml
(e) 9 098 ml	(f) 12 005 ml

13. Write the answers of the following as ℓ + ml.

(a) 575 ml + 822 ml	(b) 1 734 ml + 306 ml
(c) 3 784 ml – 2 574 ml	(d) 802 ml – 555 ml
(e) 7 785 ml – 6 564 ml	(f) 1 772 ml – 802 ml
(g) 4 ℓ – 2 558 ml	(h) 7 ℓ – 5 391 ml
(i) 5 ℓ + 406 ml – 3 875 ml	(j) 3 ℓ + 683 ml – 2 ℓ + 1 693 ml

14. Ansie bought three different bottles of vinegar. According to the labels, the bottles contain the following volumes of vinegar: 2,5 ℓ, 800 ml and 450 ml.

    How many litres plus millilitres of vinegar did Ansie buy in total?

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15. On a Monday morning Katy sold milk in the farm stall. The buyers brought their own containers. She filled two containers with $2\frac{1}{2}$ ℓ milk each, three containers with 750 ml each and one container with 850 ml milk. How many litres + millilitres milk did she sell?
16. Peter makes milk puddings. He needs 150 ml milk for each pudding. How many litres + millilitres milk does he need for 7 puddings?
17. Jacob has 2 ℓ milk. For one chocolate cake he needs 200 ml milk. How many chocolate cakes can he bake?
18. (a) Add these volumes: 545 ml + 6 253 ml + 3 823 ml. Write the answer as ℓ + ml.

    (b) Round the volumes in (a) off to the nearest 10 ml. Add the rounded numbers.

    (c) Round the volumes in (a) off to the nearest 100 ml. Add the rounded numbers.

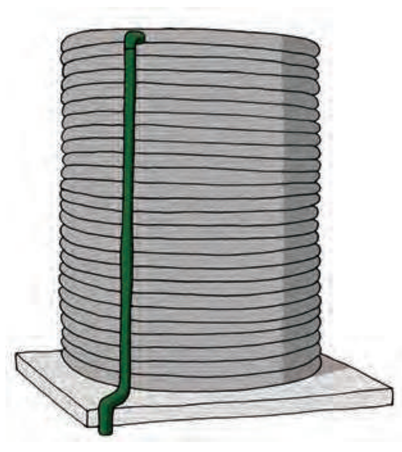
    (d) Round the volumes in (a) off to the nearest litre. Add the rounded numbers.

    (e) Which one of the three additions with rounded numbers in (b), (c) and (d) is closest to your answer in (a)?

    (f) Discuss what you can learn from your answer in (e).
19. There is 5 784 ℓ water in the tank. Dadla uses 1 006 ℓ to water the vegetable garden and the fruit trees. He uses another 942 ml to water a pot plant.

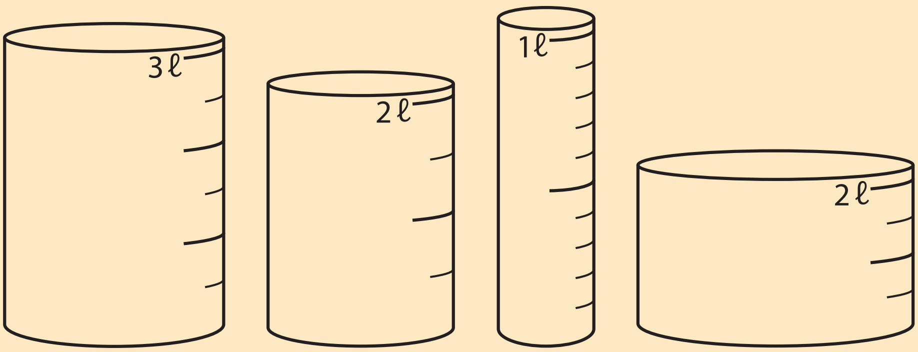
    (a) How much water does he use?

    (b) How much water is left in the tank? Write your answer in litres + millilitres.



2.4 Measuring and reading capacity and volume

Measuring containers are marked in different ways.



A *B* *C* *D*

Container A is marked to show 6 equal parts. The top mark reads 3 ℓ. We can calculate what the other marks should read by dividing 3 ℓ into 6 equal parts.

3 ℓ = 3 000 ml and 3 000 ÷ 6 = 500

The lowest mark would therefore indicate 500 ml or $\frac{1}{2}$ ℓ.

1. Use a ruler to draw the right side of Container C horizontally in your book.

   Here is the line for Container A:

0	500	1 000	1 500	2 000	2 500	3 000	ml
0	$\frac{1}{2}$	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	ℓ

   Write what each mark on your line indicates, in litres and in millilitres, as in the above example.

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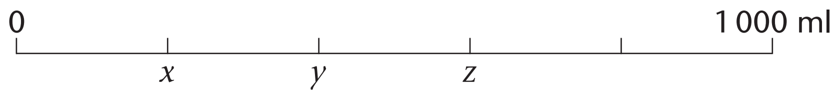
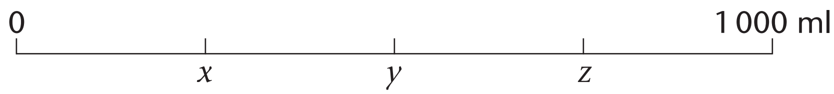
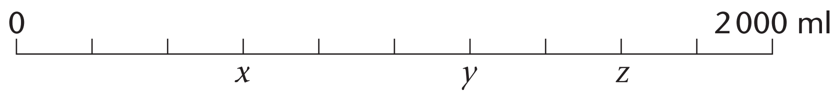
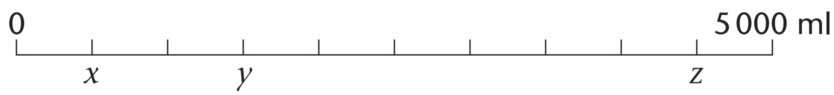
2. Write the numbers, for litres and for millilitres, that should be at the marks at x, y and z on each line below.

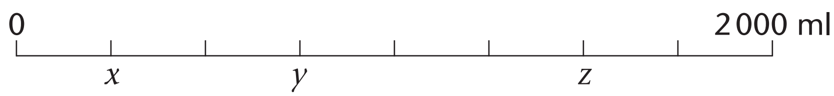
For example, you can write $x = 200$ ml $= \frac{1}{5}$ ℓ.

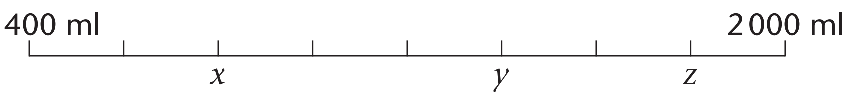
(a)


(b)


(c)


(d)


(e)


(f)


3. Count in millilitres.

(a) 1 125 + 125 → ____ + 125 → ____ + 2 125 = ____ ml = ____ ℓ

(b) 500 + 250 + 150 + 250 = ____ ml = ____ ℓ and ____ ml

4. Count in fractions of a litre.

(a) $\frac{1}{2} + \frac{1}{2} \rightarrow$ ____ $+ \frac{1}{2} \rightarrow$ ____ $+ \frac{1}{2} \rightarrow$ ____ $+ \frac{1}{2} \rightarrow$ ____ ℓ = ____ ml

(b) $\frac{1}{4} + \frac{1}{4} \rightarrow$ ____ $+ \frac{1}{4} \rightarrow$ ____ $+ \frac{1}{4} + \frac{1}{4} =$ ____ ℓ = ____ ml

(c) $1\frac{1}{2} + \frac{1}{4} \rightarrow$ ____ $+ \frac{1}{4} =$ ____ ℓ = ____ ml

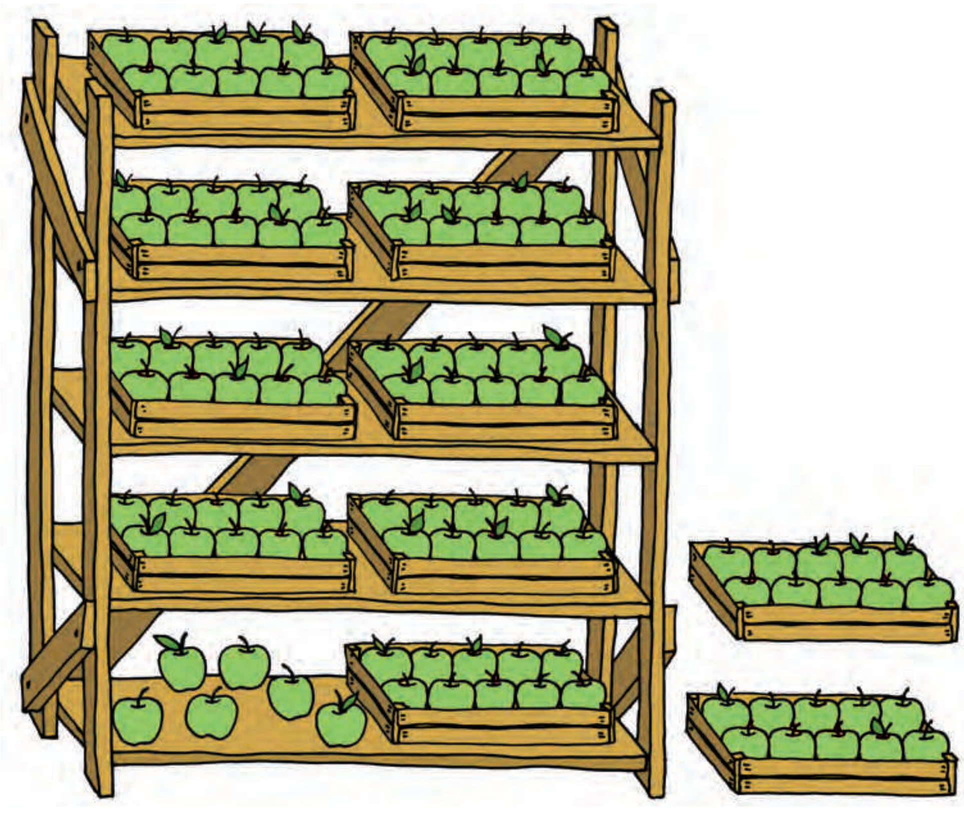
(d) $\frac{3}{4} + \frac{3}{4} \rightarrow$ ____ $+ \frac{3}{4} \rightarrow$ ____ $+ \frac{3}{4} \rightarrow$ ____ ℓ = ____ ml

Unit 3 Whole numbers

3.1 Counting

In this section you will count apples. The apples are packed in boxes.

1. (a) How many apples are shown on this page?



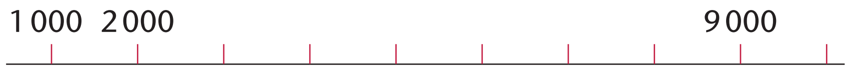
(b) How many apples should be added to this page to make 1 000 apples?

2. (a) How many apples are shown on this page?

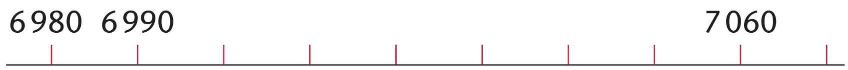
(b) How many apples should be added to this page to make 3 000 apples?

3.2 Represent, order and compare numbers

1. Which numbers are missing on the number lines below? Write them in the correct order in your book.

   (a) 

   (b) 

   (c) 

   (d) 

2. In each case write the numbers as you count.
   (a) Count in hundreds from 783 to 1 583.
   (b) Count in 25s from 1 875 to 2 050.
   (c) Count in 25s from 2 883 to 3 083.
   (d) Count in 3s from 2 983 to 3 013.

3. Write the numbers.
   (a) 1 more than 4 287
   (b) 2 less than 3 862
   (c) 10 more than 999
   (d) 3 less than 6 000
   (e) 2 000 more than 1 981
   (f) 500 less than 1 456
   (g) half of 8 400
   (h) double 1 234

4. Write the number names.
   (a) 6 154
   (b) 9 650
   (c) 8 030
   (d) 1 311
   (e) 2 222
   (f) 9 009

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5. Write the numbers in question 4 from biggest to smallest.

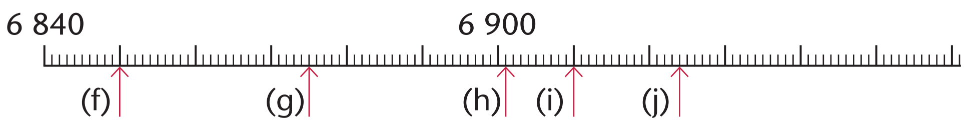
6. Write the number symbols of the numbers that are given in expanded notation.

   (a) 9 000 + 600 + 50 + 7
   (b) 1 000 + 300 + 10 + 1
   (c) 9 000 + 9
   (d) 5 000 + 300 + 20 + 9
   (e) 2 000 + 900 + 9
   (f) 7 000 + 50

7. Write the number symbols.

   (a) three thousand seven hundred and sixty-three
   (b) seven thousand two hundred and five
   (c) two thousand nine hundred and thirty-six
   (d) five thousand and twenty

8. Write the numbers indicated by the arrows.



3.3 Even and odd numbers

1. Calculate each of the following.

   (a) 2 + 2
   (b) 2 + 2 + 2
   (c) 2 + 2 + 2 + 2
   (d) 2 + 2 + 2 + 2 + 2

2. Add 1 to each of your answers in question 1.

All the numbers that can be formed by adding 2s together, like you did in question 1, are called **even numbers**.

When you add 1 to any even number, you get an **odd number**.

3. Count in twos from 2 460 up to 2 490 and write down the numbers while you count.
4. Write down five numbers between 2 460 and 2 490 that you left out (didn't use) when you counted in question 3.

The numbers you left out when you did question 3 are *odd numbers*.

5. The first nine even numbers are given below:

   2 4 6 8 10 12 14 16 18

   Write down the next ten even numbers.
6. The first nine odd numbers are given below:

   1 3 5 7 9 11 13 15 17

   Write down the next ten odd numbers.
7. (a) Write all the odd numbers between 7 230 and 7 250.

   (b) Write all the even numbers between 7 230 and 7 250.
8. Is it true that when you add any two odd numbers the answer is always an even number?

Unit 4 Whole numbers: Addition and subtraction

4.1 Addition and subtraction facts and skills

100 can be formed by adding 30 and 70:

100 = 30 + 70

100 can be formed in different ways by adding two multiples of 10, for example:

100 = 20 + 80   100 = 50 + 50

100 = 40 + 60   100 = 70 + 30

30 = 3 × 10
70 = 7 × 10
Numbers like 30 and 70 are called **multiples** of 10.
200 is also a multiple of 10 because 200 = 20 × 10.

3 000 can be formed in different ways by adding two multiples of 100, for example:

3 000 = 1 400 + 1 600

3 000 = 2 000 + 1 000

We can also say:

3 000 can be **expressed** as the **sum** of two multiples of 100.

1. 1 000 = 600 + 400. Write number sentences to describe four other ways in which 1 000 can be formed by adding two multiples of 100.
2. Write number sentences to describe five different ways in which 2 500 can be formed by adding two different multiples of 100.

2 500 can be formed by adding three different multiples of 100, for example:

2 500 = 1 000 + 800 + 700   2 500 = 900 +1 100 + 500

2 500 = 600 + 1 500 + 400   2 500 = 100 + 200 + 2 200

3. Write number sentences to describe five different ways in which 3 000 can be formed by adding three different multiples of 100.

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4. Write number sentences to describe five different ways in which each of the following can be formed by adding three different multiples of 100.

(a) 2 300 (b) 3 500

(c) 5 000 (d) 4 200

5. Copy and complete the following.

(a) 870 + . . . → 1 000 + . . . → 3 600 + . . . → 4 000 + . . . = 7 234

(b) . . . + 300 → 2 000 + 4 000 → . . . + . . . → 7 450 + . . . = 8 000

(c) 920 + . . . → 1 200 + . . . → 3 000 + . . . → 4 700 + . . . = 4 900

(d) 900 + 800 → . . . + 70 → . . . + 60 → . . . + 8 → . . . + 5 = ...

(e) 900 + 70 → . . . + 8 → . . . + 800 → . . . + 60 → . . . + 5 = ...

6. Calculate 230 + 420 + 80 + 130 + 60.

To calculate 340 + 280 we can shift 200 from the 280 to the 340:

200

340 + 280 = 540 + 80

The 80 can now be added in steps, by filling up to 600 first:

540 + 60 → **600** + 20 = 620

So 340 + 280 = 620.

7. Transfer the hundreds part of the second number to the first number in each case, and then add on to find the answer.

Transfer is another word for shift.

(a) 670 + 280 (b) 870 + 460

(c) 740 + 690 (d) 1 240 + 690

(e) 8 460 + 330 (f) 5 940 + 590

(g) 6 660 + 840 (h) 3 780 + 770

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You can form two subtraction facts from any addition fact.
For example, if you know that 1 800 + 700 = 2 500, you also know that 2 500 – 1 800 = 700 and 2 500 – 700 = 1 800.

8. Form two subtraction facts from each of the addition facts you formed in question 7.

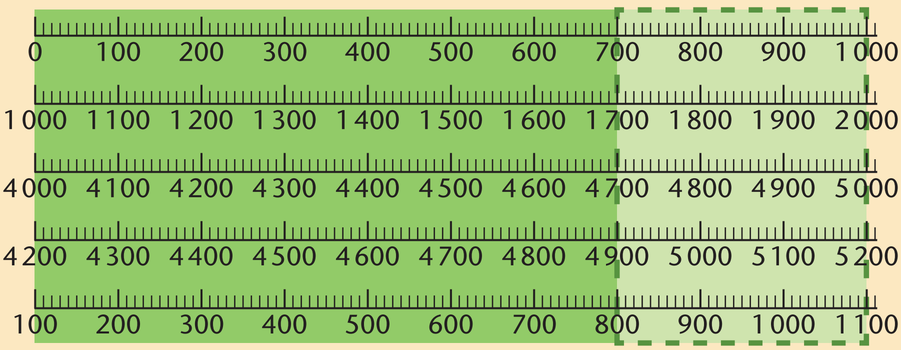
9. Complete each addition fact and form two subtraction facts from it.

(a) 800 + 700	(b) 1 800 + 700
(c) 2 800 + 500	(d) 4 600 + 900
(e) 5 970 + 50	(f) 5 700 + 500

You can easily form new subtraction facts from a subtraction fact you already know.

For example if you know that **1 000 – 300 = 700**, it is easy to form the following facts and others too:

2 000 – 300 = 1 700	5 000 – 300 = 4 700
1 000 – 300 = 700	**1 000 – 300 = 700**
+ 1 000 + 1 000	+ 4 000 + 4 000
2 000 – 300 = 1 700	5 000 – 300 = 4 700



10. How much is each of the following?

(a) 5 200 – 300	(b) 1 100 – 300
(c) 1 100 – 400	(d) 1 100 – 500

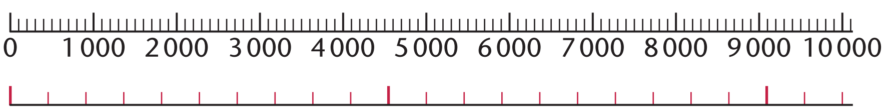
11. Make five subtraction facts from each of the following facts.
   (a) 1 000 – 600 = 400   (b) 1 000 – 500 = 500
   (c) 1 000 – 800 = 200   (d) 1 600 – 600 = 1 000
   (e) 1 600 – 1 000 = 600   (f) 3 400 – 400 = 3 000

12. Write the answers for the questions that you can do quickly. Copy the number sentences for which you *cannot* give the answers quickly.
   (a) 3 100 – 500 = . . .   (b) 4 500 – 300 = . . .
   (c) 5 500 – 400 = . . .   (d) 7 400 – 500 = . . .
   (e) 8 500 – 800 = . . .   (f) 8 100 – 800 = . . .
   (g) 8 100 – 1 800 = . . .   (h) 3 700 – 1 200 = . . .
   (i) 7 200 – 500 = . . .   (j) 7 200 – 700 = . . .
   (k) 7 200 – 3 700 = . . .   (l) 7 200 – 4 000 = . . .
   (m) 7 200 – 4 100 = . . .   (n) 7 200 – 4 200 = . . .
   (o) 4 400 – 600 = . . .   (p) 5 700 – 900 = . . .
   (q) 9 300 – 800 = . . .   (r) 5 700 – 1 900 = . . .
   (s) 3 600 – 800 = . . .   (t) 4 500 – 700 = . . .

When you cannot quickly find the answer for a simple subtraction, you may think of another fact that may help you.

For example, when you cannot quickly find out how much 9 300 – 5 800 is, you may think of 9 300 – 6 000. If you know how much 9 300 – 6 000 is, you know that 9 300 – 5 800 is 200 more.

13. Work on the sentences that you wrote down in question 12. You can think of subtraction facts that you know. You can also think of steps on the number line.



4.2 Practise addition and subtraction

1. First estimate the answers to the nearest thousand. Then calculate the answers.

   (a) 3 467 + 5 231 (b) 4 736 + 3 263
   (c) 4 891 + 4 119 (d) 3 714 + 6 156
   (e) 9 653 – 7 643 (f) 6 487 – 3 397
   (g) 8 345 – 7 558 (h) 5 352 – 1 963

2. First estimate the answers to the nearest thousand. Then calculate the answers.

   (a) 765 + 427 + 388 + 628 + 794

   (b) 626 + 792 + 425 + 763 + 386

3. Is your answer for question 2(a) ten more than your answer for question 2(b)?
   If the difference between the answers is not ten, you have made a mistake somewhere.
   In this case, go back to your work in question 2, find your mistakes, and correct your work.

4. Is the calculation below correct or are there mistakes?

   2 376 = 2 000 + 300 + 70 + 6
   5 669 = 5 000 + 600 + 80 + 9
   2 376 + 5 669 = 7 000 + 900 + 150 + 15
   = 7 035

   Describe any mistakes you find, and then do the calculation correctly.

5. Check your answers for questions 1(e), (f), (g) and (h) by doing addition. If some of your answers are wrong, go back to your work, find your mistakes and correct them.

To calculate 5 726 + 2 685 you can break both numbers down, work with the parts of the same kind, and then build the answer up:

5 726 = 5 000 + 700 + 20 + 6
2 685 = 2 000 + 600 + 80 + 5

5 000 + 2 000 = 7 000
700 + 600 = 1 300
20 + 80 = 100
6 + 5 = 11

  5 726 + 2 685
= 7 000 + 1 300 + 100 + 11
Transfer 10 to 100
= 7 000 + 1 300 + 110 + 1
Transfer 100 to 1 300
= 7 000 + 1 400 + 10 + 1
Transfer 1 000 to 7 000
= 8 000 + 400 + 10 + 1
= 8 411

6. Calculate 4 758 + 2 765 in the above way, and also write your work down in the way it is done above.

A different way to show the above thinking is to use brackets to indicate that certain calculations are thought of separately or done before others. The above thinking can be written like this:

$$\begin{aligned}
5\,726 + 2\,685 &= (5\,000 + 700 + 20 + 6) + (2\,000 + 600 + 80 + 5)\\
&= (5\,000 + 2\,000) + (700 + 600) + (20 + 80) + (6 + 5)\\
&= 7\,000 + 1\,300 + 100 + 11\\
&= 7\,000 + 1\,300 + 110 + 1\\
&= 7\,000 + 1\,400 + 10 + 1\\
&= 8\,000 + 400 + 10 + 1\\
&= 8\,411
\end{aligned}$$

7. Rewrite the work you did to calculate the answer to question 6 but this time, make use of brackets.

4.3 Find some real information

1. While practising, an athlete ran 5 253 m on a Saturday and 4 667 m on a Sunday. How far did he run during the weekend? Give your answer in kilometres + metres.
2. Riana invested R7 755 for 10 years. Then she was paid out R9 637. How much money did she receive as interest? (In other words, how much more than R7 755 did she receive?)
3. In a plantation, 3 492 of the 8 550 trees have been harvested. How many trees are still standing?
4. At the last count, there were 3 104 kudus in a provincial nature reserve. The cows and calves made up 2 206. How many of the kudus were bulls?
5. Bobby withdrew R6 025 from his savings account, leaving him with R3 785 in the account. How much money did he have before the withdrawal?
6. On a Friday evening, 2 473 people attended a music festival and on the Saturday 4 068 people attended.
   (a) How many people went to the festival during that weekend?
   (b) How many more people were at the festival on Saturday than on Friday?
7. This year, 9 104 learners will be writing the ANA tests in the primary schools of a certain town. Last year, 7 933 learners wrote the tests. How many more learners will write the test this year than last year?
8. At Sun College, Zulu is the home language of 5 879 of the 8 054 students. How many students do not speak Zulu as their home language?

Unit 5 Viewing objects

5.1 What you see from where you are

What you see of something depends on from where you look at it.

When a bird sits on the ground and you look down at it, you may see this:

A

When you look up at the bird when it sits high up in a tree, you may see this:

B

When the same bird sits on a low branch, so that you do not have to look up or down to see it, you may see this:

C

1. (a) Which of Drawings A, B and C show what you will see when the bird is higher from the ground than your head is?

   (b) Which of the drawings show what you will see when your head is higher from the ground than the bird is?

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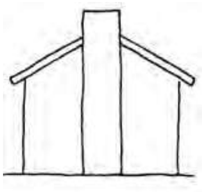
2. Mary and Jane sit at a table. There is a teacup on the table. They both made drawings of the teacup. Why do you think their drawings are so different?

Mary's drawing

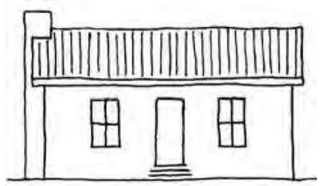
Jane's drawing

3. This is how Mary's little brother Sibu saw the teacup. Where do you think he was, when he looked at the teacup?

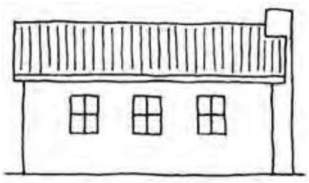
4. Nathi, Lebogang, Peter and Miriam all look at the same house. This is what each one sees:



Nathi



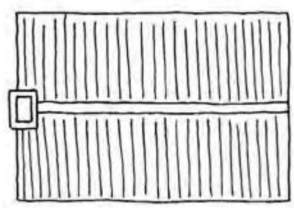
Lebogang



Peter

Miriam

Make a rough drawing to show how a bird will see the house from above. Write the names of the four friends on your drawing to show where they were when they looked at the house.

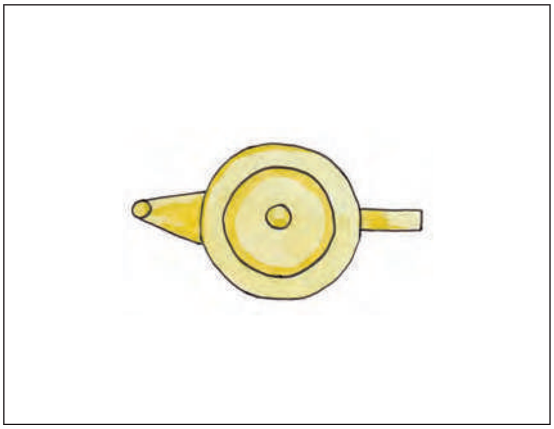


5.2 Looking from different positions

Nathi, Lebogang, Peter and Miriam sit around a table.
This is a **top view** or **plan** of the teapot and the table.

Nathi

Miriam



Peter

Lebogang

Each of the four friends makes a drawing of how they see the teapot from where they sit.

1. Who drew each picture?

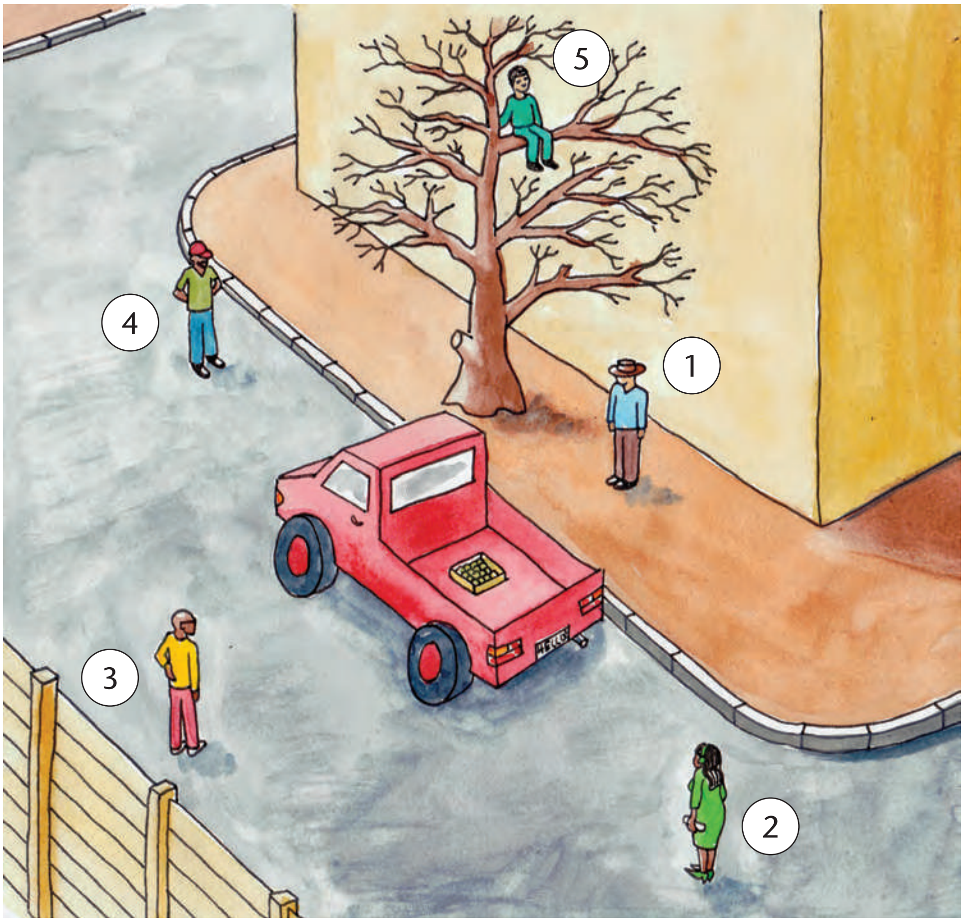
(a)

(b)

(c)

(d)

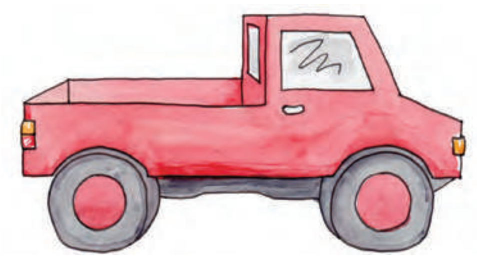
Five people look at a bakkie.



2. Which person sees the bakkie like this?

3. For each drawing, write down the number of the person who will see the bakkie as shown.

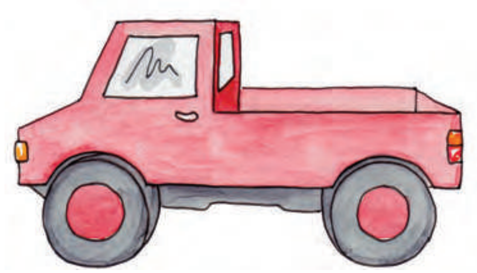
(a)



(b)

(c)

(d)



4. This is a top view of a cup and saucer.

(a) Draw the cup as you would see it from the side of the red dot.

(b) Draw the cup as you would see it from the side of the blue dot.

(c) Draw the cup as you would see it from the side of the yellow dot.

(d) Draw the cup as you would see it from the side of the green dot.

UNIT 6

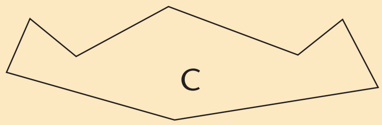
PROPERTIES OF TWO-DIMENSIONAL SHAPES

6.1 Classify 2-D figures

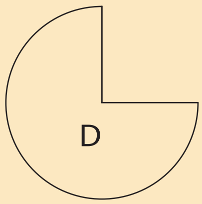
This is a piece of straight line:

This is a piece of curved line:

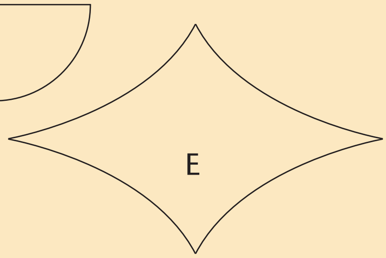
This figure has only straight sides:



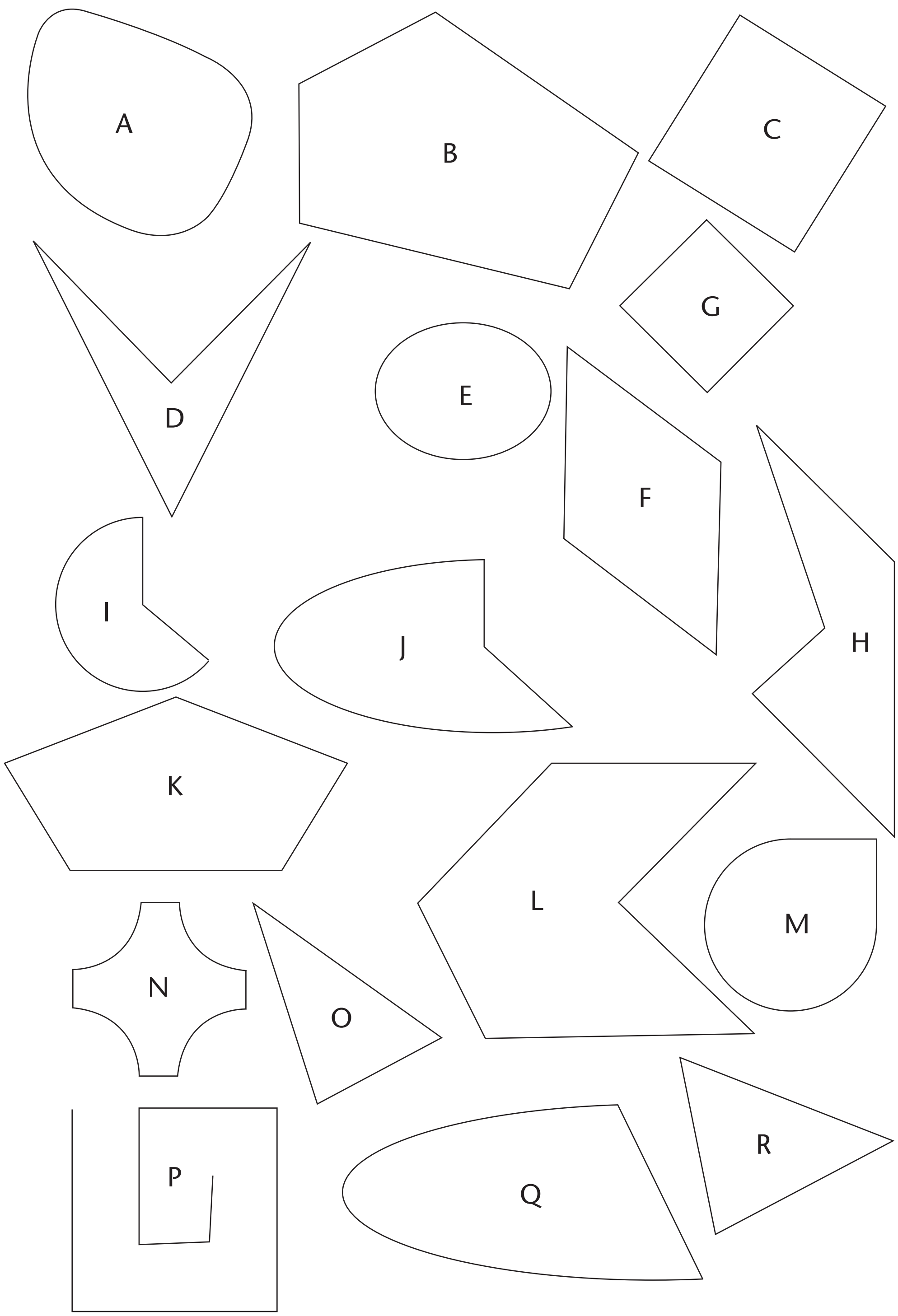
This figure has two straight sides and one curved side:



This figure has curved sides only:



1. (a) Some of the above figures are precisely symmetrical. Quickly make a rough drawing of each of them. Do not use a ruler.
   (b) Draw the lines of symmetry on your drawings.
   (c) Which of the above figures is approximately symmetrical, but not quite?
2. State which of the figures on the next page
   (a) have curved sides only.
   (b) have straight sides only.
   (c) are triangles.
   (d) are hexagons.
   (e) are pentagons.
   (f) are quadrilaterals.
   (g) have straight and curved sides.


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R

6.2 Draw 2-D figures

1. Write an explanation for a Grade 3 learner of how to draw each of the following figures:
   (a) a triangle
   (b) a square
   (c) a rectangle that is not a square
   (d) a pentagon
   (e) a quadrilateral that is not a square or a rectangle
2. Draw the following figures on grid or dot paper:
   (a) a rectangle with two sides each 4 units long, and two sides each 2 units long
   (b) a rectangle with each side 4 units long
   (c) a triangle with two sides each 4 units long
   (d) a triangle with one side 4 units long; the top corner of the triangle is 4 units above this side
   (e) a pentagon with three sides each 4 units long
   (f) a hexagon with four of the sides equal
   (g) a circle that is 4 units wide at its widest (Hint: choose a dot or a place where the grid lines on your paper cross to be the centre of the circle)
   (h) a hexagon with all the sides a different length
   (i) a rectangle that is not a square
   (j) a hexagon with only one line of symmetry
   (k) a hexagon with two lines of symmetry
   (l) a quadrilateral with only one line of symmetry
   (m) a quadrilateral with only two lines of symmetry
   (n) a quadrilateral with four lines of symmetry

UNIT 7

DATA HANDLING

7.1 Reading data in tables

To understand data, we have to understand the situations that give the data. Hold a class discussion about the problem of rhino poaching. Ask your Social Sciences teacher to help you understand where the Kruger National Park is.

Data about rhino poaching

Rhino deaths	2010	2011	2012	2013	2014
Kruger National Park	146	252	425	606	827
Gauteng	15	3	1	8	5
Limpopo*	52	80	59	114	110
Mpumalanga*	17	31	28	92	83
North West	57	21	77	87	65
Eastern Cape	4	11	7	5	15
Free State	3	4	0	4	4
KwaZulu-Natal	38	34	66	85	99
Western Cape	0	6	2	0	1
Northern Cape	1	0	0	0	5

* The parts of Limpopo and Mpumalanga that are not in the Kruger National Park

[Source: www.wessa.org.za]

1. Study the table to say if you agree with the statements below. Explain why you say so.
   (a) About half of all the rhinos killed in 2010 in South Africa were killed in the Kruger National Park.
   (b) In 2010 about the same number of rhinos were killed in Limpopo and in North West.
   (c) Western Cape and Northern Cape do not seem to have a problem with rhino poaching.

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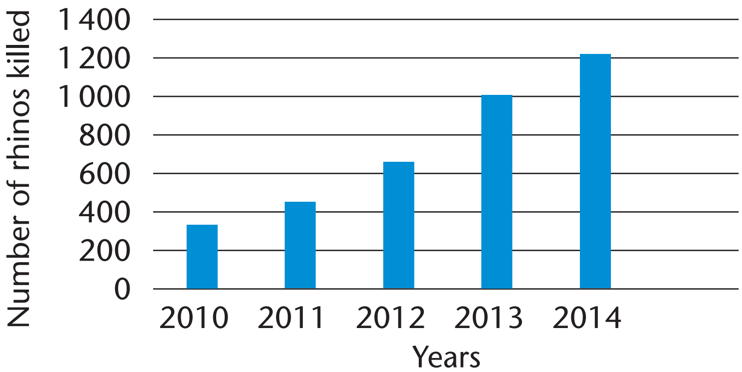
2. (a) If you have not yet done so, calculate how many rhinos were killed in total every year from 2010 to 2014.
   (b) Calculate the number of rhinos killed in each of the provinces between 2010 and 2014.
   (c) Do you think the problem of rhino poaching is getting worse or better? Explain why you say so.

7.2 Reading data in bar graphs

We draw graphs to help us see quickly how to compare data. Bar graphs are not as accurate as data in tables, so we have to estimate carefully when we read graphs.



1. (a) Give the graph a heading. Write the heading in your book. Your heading must tell what the graph is about.
   (b) Estimate the number of rhinos killed each year.
   (c) How many rhinos were killed altogether from 2010 to 2014?
   (d) How many more rhinos were killed in 2014 than in 2013?
   (e) If you look at the graph, how many rhino killings do you expect in 2015? Explain why you say so.
2. Write a short paragraph to tell the story about rhino poaching in South Africa between 2010 and 2014.

7.3 Reading data in pie charts and in bar graphs

1. The pie charts show where rhinos were killed in 2014.

   (a) What does the top pie chart say about rhino killings in South Africa?

   (b) How can you estimate the fraction of the pie chart which is shaded blue?

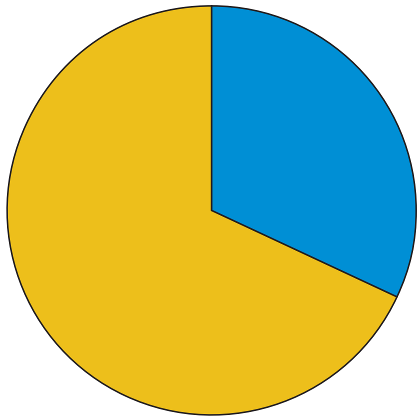
   (c) In which four provinces were most rhinos killed in 2014? Look at the bottom pie chart.

   (d) Four provinces seem to have very few rhino killings. Which provinces are they?

   (e) Why do you think so many rhino killings happened in the Kruger National Park?

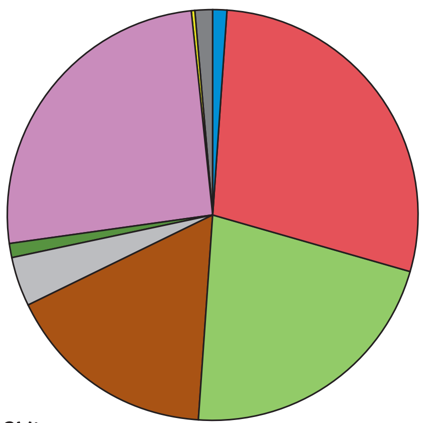
   (f) Estimate the fraction of rhino killings that happened in Mpumalanga and Limpopo together.

Where rhinos were killed in SA in 2014



Key:
Kruger National Park
Rest of SA

Rhinos killed in the rest of SA in 2014



Key:
Gauteng
Limpopo
Mpumalanga
North West
Eastern Cape
Free State
KwaZulu-Natal
Western Cape
Northern Cape

   (g) Which two provinces seem to have the biggest problems with rhino poaching?

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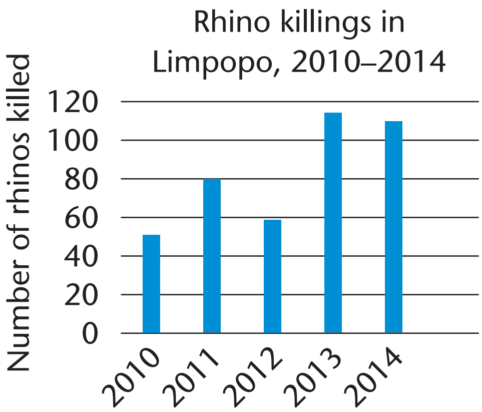
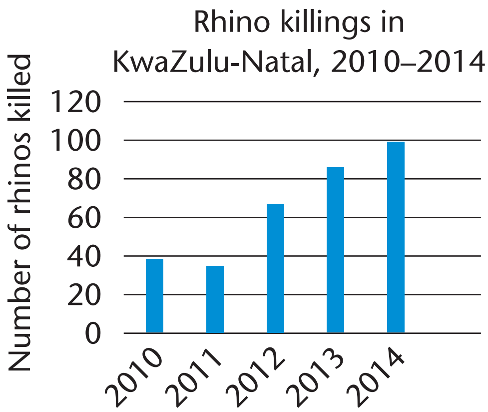
2. Compare the bar graphs of the number of rhinos killed in Limpopo and KwaZulu-Natal from 2010 to 2014.





(a) In which of the two provinces is the number of rhinos killed in 2010 the highest?

(b) In which province did the number of rhinos killed decrease from 2010 to 2011?

When numbers decrease, they become smaller. When numbers increase they become bigger.

(c) How did the number of rhinos killed in Limpopo change from 2010 to 2014?

(d) How did the number of rhinos killed in KwaZulu-Natal change from 2010 to 2014?

(e) In which province do you think the number of rhinos killed is getting more and more as the years go on?

(f) What do you think about rhino poaching in Limpopo? Do you think rhino poaching in Limpopo is decreasing?

Unit 8

Numeric patterns

8.1 Patterns in times tables

×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70

You know that in all horizontal and vertical sequences in the multiplication table, **the same number is added** to get the next number in the sequence. Here is an example:

$$4 \xrightarrow{+4} 8 \xrightarrow{+4} 12 \xrightarrow{+4} 16 \xrightarrow{+4} 20$$

We say there is a **constant difference** between consecutive numbers. For example:
8 – 4 = 4; 12 – 8 = 4; 16 – 12 = 4; ...

Consecutive numbers are numbers that follow after one another in a pattern.

We will now look at other sequences in the multiplication table, and see what patterns they have.

1. Find this sequence in the multiplication table on page 262.
   1, 4, 9, 16, 25, 36, 49, ...

   (a) How will you describe this sequence? What **horizontal calculation plan** (going from one number to the next) is used to make each next number in the sequence?

   > **Horizontal** means from side to side (in this instance, from left to right).
   > **Vertical** means from top to bottom.

   (b) Continue the sequence for another five numbers.

   (c) Can you find a **vertical calculation plan** describing how the numbers are made?

Position no.:	1	2	3	4	5	6	...
	↓ ?	↓ ?	↓ ?	↓ ?	↓ ?	↓ ?	
Sequence no.:	1	4	9	16	25	36	...

   (d) Calculate the 20th and the 100th number in the sequence. Did you use a horizontal plan or did you use a vertical plan? Which one is easier?

2. Find this sequence in the multiplication table:
   2, 6, 12, 20, 30, 42, 56, ...

   (a) How will you describe this sequence? What horizontal calculation plan (going from one number to the next) is used to make each next number in the sequence?

   (b) Continue the sequence for another five numbers.

   (c) Can you find a vertical calculation plan describing how the numbers are made?

Position no.:	1	2	3	4	5	6	...
	↓ ?	↓ ?	↓ ?	↓ ?	↓ ?	↓ ?	
Sequence no.:	2	6	12	20	30	42	...

(d) Calculate the 20th and the 100th number in the sequence. Did you use a horizontal plan or did you use a vertical plan? Which one is easier?

3. Find this sequence in the multiplication table:

   3, 8, 15, 24, 35, 48, 63, ...

   (a) How will you describe this sequence? What horizontal calculation plan is used to make each next number in the sequence?

   (b) Continue the sequence for another five numbers.

   (c) Can you find a vertical calculation plan describing how the numbers are made?

Position no.:	1	2	3	4	5	6	...
	↓ ?	↓ ?	↓ ?	↓ ?	↓ ?	↓ ?	↓ ?
Sequence no.:	3	8	15	24	35	48	...

   (d) Calculate the 20th and the 100th number in this sequence. Did you use a horizontal plan or did you use a vertical plan? Which one is easier?

CHALLENGE

4. Find this sequence in the multiplication table:

   9, 16, 21, 24, 25, ...

   (a) How will you describe this sequence? What horizontal plan is used to make each next number in the sequence?

   (b) Continue the sequence by writing down the next four numbers in the sequence.

8.2 Tables, rules and flow diagrams

You know that for the sequence 4, 8, 12, 16, 20, 24, ... we have *horizontal and vertical patterns* with which we can continue the pattern, for example:

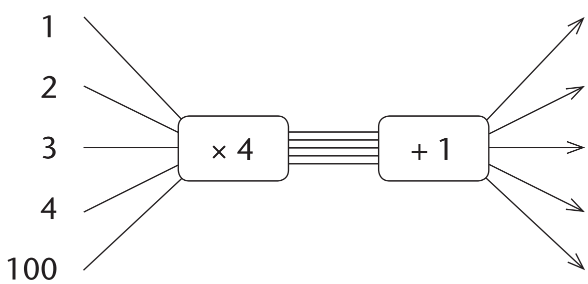
1	2	3	4	5	6	... 100
↓×4	↓×4	↓×4	↓×4	↓×4	↓×4	
4	8	12	16	20	...	
	+4	+4	+4	+4		

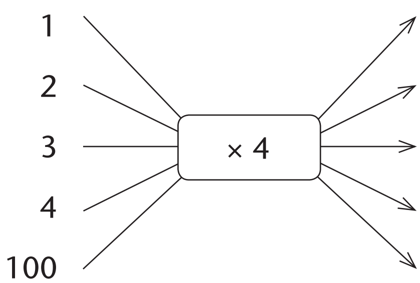
But can you find the 100th number in 5, 9, 13, 17, 21, ...?

1. Below are two tables and two flow diagrams. Which flow diagram is equivalent to which table (gives the same output numbers for the same input numbers)? Calculate all the missing numbers.

Input numbers	1	2	3	4	5	6	100
Output numbers	4	8	12	16	20		

Input numbers	1	2	3	4	5	6	100
Output numbers	5	9	13	17	21		





2. For each of the Sequences A to E below:
   (a) Write a flow diagram for the sequence.
   (b) Continue the sequence for another five numbers.
   (c) Calculate the 100th number in the sequence.
   (d) How are the sequences the same and different?
   How are the flow diagrams the same and different?

   Sequence A: 4, 8, 12, 16, 20, 24, 28, ...
   Sequence B: 5, 9, 13, 17, 21, 25, 29, ...
   Sequence C: 6, 10, 14, 18, 22, 26, 30, ...
   Sequence D: 7, 11, 15, 19, 23, 27, 31, ...
   Sequence E: 8, 12, 16, 20, 24, 28, 32, ...

3. For each of the Sequences A to F below:
   (a) Write a calculation plan (rule) for the sequence.
   (b) Continue the sequence for another five numbers.
   (c) Calculate the 100th number in the sequence.
   (d) How are the sequences the same and different?
   How are the rules the same and different?

   Sequence A: 5, 10, 15, 20, 25, 30, ...
   Sequence B: 6, 11, 16, 21, 26, 31, ...
   Sequence C: 7, 12, 17, 22, 27, 32, ...
   Sequence D: 8, 13, 18, 23, 28, 33, ...
   Sequence E: 12, 17, 22, 27, 32, 37, ...
   Sequence F: 4, 9, 14, 19, 24, 29, ...

8.3 Computer sequences

To make Tables P, Q, R and S, a computer used Rules A, B, C and D given below.

Rules (calculation plans)

A $\textit{Output number} = 3 \times \textit{Input number} + 4$

B $\textit{Output number} = 4 \times \textit{Input number} + 3$

C $\textit{Output number} = 2 \times \textit{Input number} + 5$

D $\textit{Output number} = 5 \times \textit{Input number} + 2$

Tables

P

Input numbers	1	2	3	4	5	6		100
Output numbers	7	12	17	22	27		57	

Q

Input numbers	1	2	3	4	5	6		100
Output numbers	7	9	11	13	15		57	

R

Input numbers	1	2	3	4	5	6		100
Output numbers	7	11	15	19	23		55	

S

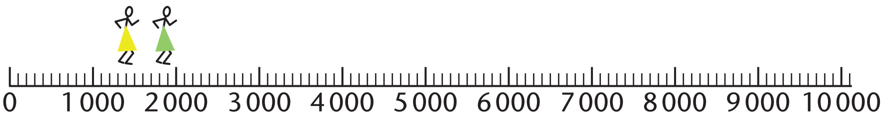
Input numbers	1	2	3	4	5	6		100
Output numbers	7	10	13	16	19		58	

1. Which rule did the computer use for which table? Match the rules and the tables. Describe how you know and how you can be sure that you are right.
2. Complete the tables for the missing input and output numbers.
3. Draw a flow diagram for each of the four rules. Insert the operators, input and output numbers.

UNIT 9 WHOLE NUMBERS: ADDITION AND SUBTRACTION

9.1 Add and subtract distances

Annie and Ellen compete in a race over 10 000 m.



During the first 10 minutes of the race,
Annie runs 1 867 m and Ellen runs 1 768 m.
During the second 10 minutes of the race,
Annie runs 1 835 m and Ellen runs 1 778 m.

1. Who do you expect will win the race? Why do you think so?

2. (a) How far from the starting point is Annie after 20 minutes?
   (b) How far from the endpoint is Annie after 20 minutes?
   (c) How far is the gap between Annie and Ellen after 20 minutes?

After 30 minutes, Annie has covered 5 504 m of the race, and Ellen has covered 5 345 m.

3. (a) How far has Annie run during the third 10 minutes?
   (b) How far has Ellen run during the third 10 minutes?
   (c) How much further than Ellen has Annie run during the third 10-minute period?

4. Approximately how long, to the nearest 10 minutes, do you think Ellen will need to complete the race?

5. Who do you expect will win the race? Why do you think so?

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6. Copy Tables A and B to help you to keep a record of the race.

Table A: The distance covered after different times

Time	0 min	10 min	20 min	30 min	40 min	50 min
Annie	0	1 867		5 504		
Ellen	0	1 768		5 345		
Gap	0	99				

Table B: The distances covered in different 10-minute periods

Period	First 10 min	Second 10 min	Third 10 min	Fourth 10 min	Fifth 10 min
Annie	1 867	1 835			
Ellen	1 768	1 778			
Difference					

7. Complete as much of the tables as you can. Use the information you produced when you did questions 2 and 3. Write your answer for question 3(c) in the row for "difference" in Table B.

During the fourth 10-minute period of the race, Annie runs 1 774 m and Ellen runs 1 809 m.

8. (a) Is Ellen now ahead of Annie in the race?

   (b) Write all the new information into Tables A and B.

9. Think about the distances that Ellen ran over the first, second, third and fourth 10-minute periods.

   (a) Is she running faster or slower as the race progresses?

   (b) How much further does she run in the second 10 minutes, than in the first 10 minutes?

   (c) How much further does she run in the third 10 minutes, than in the second 10 minutes?

10. (a) Make a copy of Table C.
    (b) Write your answers for questions 9(b) and (c) in the table.
    (c) Complete this table as far as you can with the information you now have.

Table C: The differences between the distances covered in different 10-minute periods

Periods	1st and 2nd periods	2nd and 3rd periods	3rd and 4th periods	4th and 5th periods
Annie				
Ellen				

11. Who do you expect will win the race? Why do you think so?

50 minutes after the start of the race, Annie has completed 9 014 m and Ellen has completed 8 952 m.

12. Complete all the tables as far as you can with the information you now have.

9.2 Be smart with addition and subtraction

1. How much is each of the following?
   (a) 1 001 + 999 + 1 001 + 999 + 1 001 + 999 + 1 001 + 999
   (b) 1 002 + 998 + 1 002 + 998 + 1 002 + 998 + 1 002 + 998
   (c) 1 003 + 997 + 1 003 + 997 + 1 003 + 997 + 1 003 + 997
   (d) 1 336 + 664 + 1 336 + 664 + 1 336 + 664 + 1 336 + 664

2. How much is

   997 + 997 + 997 + 997 + 997 + 997 + 997 + 997 + 997 + 997?

3. Calculate:

   (a) The sum of 7 982 and 2 648

   (b) The difference between 8 002 and 796

   (c) The sum of 895, 6 853 and 9 342

   (d) Add 1 021 to the difference between 7 178 and 3 099.

   (e) Subtract 3 505 from 4 050 and add the difference to the sum of 2 999 and 1 878.

   (f) 3 784 + 2 737

   (g) 7 243 – 3 569

It is often possible to replace a calculation with an easier calculation that will produce the same answer.

For example, if you have to calculate 3 784 + 2 737 you can first transfer 16 from 2 737 to 3 784, to fill it up to 3 800. Then you can transfer 200 from the 2 721 that remains, to fill the 3 800 up to 4 000. Now you can calculate 4 000 + 2 521, which is much easier than calculating 3 784 + 2 737.

$$3\,784 + \overset{16}{2\,737} = 3\,800 + \overset{200}{2\,721} = 4\,000 + 2\,521 = 6\,521$$

If you have to calculate 7 243 – 3 569, you can add 31 to both numbers to get 7 274 – 3 600. You can further add 400 to both numbers to get 7 674 – 4 000. This is much easier to calculate than 7 243 – 3 569, but will produce the same answer.

$$7\,243 - 3\,569 \xrightarrow{+\,31} 7\,274 - 3\,600 \xrightarrow{+\,400} 7\,674 - 4\,000 = 3\,674$$

4. In each case, first make transfers so that the calculation is replaced with an easier calculation.

   (a) 3 403 + 2 265   (b) 7 259 + 2 135

   (c) 3 459 + 2 265   (d) 7 259 + 1 875

5. In each case, replace the given calculation with a different easier calculation that will produce the same answer.

(a) 6 145 + 2 975	(b) 4 509 + 2 793
(c) 6 978 – 3 123	(d) 5 346 – 1 218
(e) 7 966 – 4 663	(f) 6 243 – 4 185
(g) 8 396 – 5 579	(h) 5 532 – 1 873
(i) 4 008 – 2 399	(j) 5 399 + 3 006
(k) 2 305 + 5 032 + 1 019	(l) 9 098 – 4 105 – 1 199

6. Calculate.

(a) 8 764 – (4 596 – 1 389)

(b) 8 764 – 4 596 + 1 389

(c) (8 764 – 4 596) – 1 389

(d) 8 764 – 4 596 – 1 389

7. What number is:

(a) 200 more than 2 945?

(b) 2 000 more than 2 945?

(c) 2 200 more than 2 945?

(d) 2 220 more than 2 945?

(e) 200 less than 2 945?

(f) 2 000 less than 2 945?

(g) 2 200 less than 2 945?

(h) 2 220 less than 2 945?

8. The sum of four numbers is 9 500.
Three of the numbers are 2 341, 578 and 4 690.
What is the fourth number?

9. Calculate.
   (a) 3 878 + 2 727
   (b) 5 179 + 4 111
   (c) 7 402 – 3 339
   (d) 9 973 – 2 485
   (e) 7 153 – 6 108
   (f) 2 804 – 1 909

10. (a) Which of the following do you think will have the same answer, if the calculations in brackets are done first?
    A. (5 395 + 3 005) – 2 002
    B. (5 395 – 3 005) + 2 002
    C. 5 395 – (3 005 – 2 002)
    D. 5 395 – (3 005 + 2 002)

    (b) Do the calculations.

9.3 Add and subtract to find information

1. For a school concert there are 1 178 seats available in the hall. On Monday, 457 tickets were sold and on Tuesday, 228 tickets. How many more tickets need to be sold for all the seats to be filled?
2. During a weekend the corner cafe sold 3 657 tins of cooldrink. On Monday morning the cafe had only 274 tins of cooldrink left. How many tins of cooldrink did the cafe have in stock before the weekend?
3. Of the 1 589 learners in our school 873 are boys. How many more boys than girls are in our school?
4. A stove costs R2 099 and a fridge costs R299 more. How much do a fridge and a stove cost altogether?
5. Mrs Hlope wants to buy a washing machine that costs R3 478. She has saved R1 460. How much more does she need to save?

6. Juanita earns R4 756 per month. Latifa earns R1 297 more than Juanita per month.
   (a) How much does Latifa earn?
   (b) How much will Juanita have left over if she pays R1 300 for her rent?
   (c) How much will Latifa have left over after she pays R230 for her TV licence, R2 400 for rent and R489 for life insurance?
7. A tank can hold 5 000 ℓ of water. At the beginning of the rainy season, it contains 1 457 ml of water. How much more water does the tank need to be full?
8. Bongi has 1 286 pear trees on his farm. Josh has 2 745 pear trees on his farm. How many more pear trees than Bongi does Josh have?
9. Red Ribbon Bakery delivers 1 856 loaves of bread daily and Tangwa Bakery delivers 2 774 loaves daily. What is the difference between the numbers of loaves delivered daily by the two bakeries?
10. A road grader scraped 1 254 m of a gravel road on Tuesday. On Wednesday the grader worked 1 898 m of the road and on Thursday 1 424 m.
    (a) How much of the road was scraped altogether?
    (b) How much more of the road was scraped on Tuesday and Thursday together than on Wednesday?
11. Hannah bought a new sewing machine for R5 628 and a new tumble dryer for R3 509.
    (a) How much did she spend altogether?
    (b) How much more did she spend on the sewing machine than on the tumble dryer?

UNIT 10 WHOLE NUMBERS: MULTIPLICATION

10.1 Revision

23 × 7 is 7+7+7+7+7+7+7+7+7+7+7+7+7+7+7+7+7+7+7+7+7+7+7 (23 times)

This is

$$\underbrace{7+7+7+7+7+7+7+7+7+7}_{10 \times 7} + \underbrace{7+7+7+7+7+7+7+7+7+7}_{10 \times 7} + \underbrace{7+7+7}_{3 \times 7}$$

So if you know how much 10 × 7 and 3 × 7 is,
you can easily find out how much 23 × 7 is.

1. How much is 23 × 7?
2. Do you think you can calculate 23 × 7 even more quickly if you know how much 20 × 7 is?
   Show how this can be done.
3. Calculate 54 × 7.
4. This is how Raina started to calculate 46 × 78:

   46 × 78 = 40 × 78 + 6 × 78

   Complete Raina's work.

5. This is what Ben did when he tried to calculate 28 × 56:

   28 × 56 = 20 × 50 + 8 × 6 = 1 000 + 48

   Is this right?

   If you think it is not right, describe what Ben should do to get it right.

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6. This is what Jaamiah did when she tried to calculate 46 × 67:

   46 × 67 = 40 × 67 + 6 × 67 = 40 × 60 + 40 × 6 + 7 × 40 + 7 × 7

   Where did Jaamiah go wrong?

7. Copy this multiplication table and complete it.

×	70	8	30	40	5	60	7	80	9	90
4										
80										
7										
60					300					
40										
8										
50										

64 × 78 can be calculated like this:

64 is 60 + 4, so 64 × 78 = **60 × 78 + 4 × 78**.

To calculate 60 × 78, we can think of 78 as 70 + 8.

60 × 70 = 4 200 and 60 × 8 = 480, so 60 × 78 = **4 680**.

78 is 70 + 8, so 4 × 78 = 4 × 70 + 4 × 8
which is 280 + 32, so 4 × 78 = **312**.

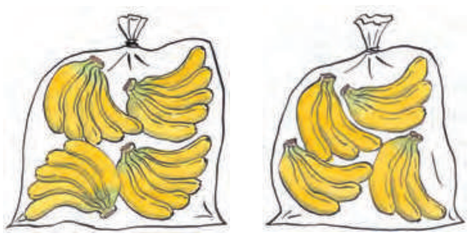
So 64 × 78 = 4 680 + 312 = 4 992.

This work can be recorded more systematically, for example like this:

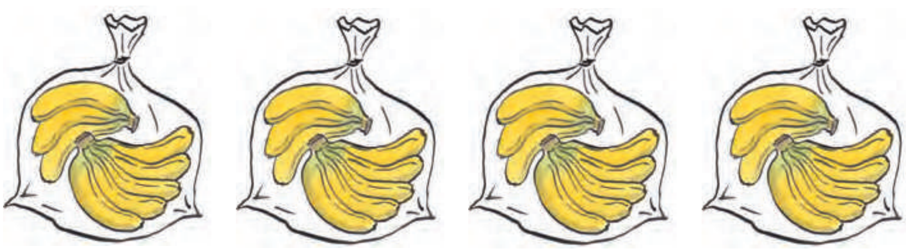
$$\begin{aligned}
64 \times 78 &= 60 \times 78 + 4 \times 78 \\
&= 60 \times 70 + 60 \times 8 + 4 \times 70 + 4 \times 8 \\
&= 4\,200 + 480 + 280 + 32 \\
&= 4\,000 + 200 + 400 + 80 + 200 + 80 + 30 + 2 \\
&= 4\,000 + 800 + 190 + 2 \\
&= 4\,992
\end{aligned}$$

8. How much is each of the following?
   (a) 43 × 38 (b) 37 × 28
   (c) 32 × 57 (d) 64 × 57

9. Frans bought 4 bunches of bananas with 3 bananas each and 4 bunches of bananas with 5 bananas each. How many bananas did Frans buy?



10. Ahmed bought 4 bags of bananas. In each bag there were one bunch of bananas with 3 bananas and one bunch of bananas with 5 bananas. How many bananas did Ahmed buy?



11. (a) Do not calculate this now:
    28 × 14 + 28 × 9 + 28 × 27 + 28 × 6 + 28 × 11 + 28 × 3

    Think about how you may find out how much it is with as little work as possible.
    Describe your plan in writing.

    (b) Compare your plan with the plans of one or two classmates.

    (c) Find out how much the following is:
    28 × 14 + 28 × 9 + 28 × 27 + 28 × 6 + 28 × 11 + 28 × 3.

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10.2 Different methods of multiplication

1. This is how Percy calculates 34 × 54:

$$
\begin{array}{ccccccccc}
54 + 54 & \rightarrow & 108 + 108 & \rightarrow & 216 + 216 & \rightarrow & 432 + 432 & \rightarrow & 864 \\
1 \quad 1 & & 2 \quad 2 & & 4 \quad 4 & & 8 \quad 8 & & 16
\end{array}
$$

16 × 54 = 864

16 × 54 = 864

32 × 54 = 1 728

34 × 54 = 1 728 + 108 = 1 836

Use Percy's method to calculate 64 × 42.

2. This is how Busi calculates 34 × 54:

10 × 54 = 540

10 × 54 = 540

10 × 54 = 540

30 × 54 = 1 620

4 × 54 = 4 × 50 + 4 × 4 = 200 + 16 = 216

34 × 54 = 1 620 + 216 = 1 836

Use Busi's method to calculate 46 × 28.

3. This is how Faiza calculates 34 × 54:

$$
\begin{aligned}
34 \times 54 &= 30 \times 54 + 4 \times 54 \\
&= 30 \times 50 + 30 \times 4 + 4 \times 50 + 4 \times 4 \\
&= \quad 1\,500 \quad + \quad 120 \quad + \quad 200 \quad + \quad 16 \\
&= 1\,620 + 216 \\
&= 1\,836
\end{aligned}
$$

Use Faiza's method to calculate 37 × 28.

4. Siba starts to calculate 34 × 54 like this:
34 × 100 = 3 400
Continue as you think Siba may continue.

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To calculate 33 × 93, Thembi rounded 93 off to 100.

She knows that 33 × 100 = 3 300, but this is 33 × 7 too much.

Thembi now has to **compensate**. That means she has to make a correction. She has to subtract 33 × 7 from 33 × 100.

33 × 7 = 30 × 7 + 3 × 7 = 210 + 21 = 231.

Now Thembi knows that 33 × 93 = 3 300 – 231 = 3 069

5. Round off and compensate, like Thembi did, to calculate each of the following.
   (a) 44 × 98 (b) 34 × 19
   (c) 47 × 17 (d) 38 × 23

10.3 Think and make plans

1. (a) Write the next 10 numbers in this pattern:

   25; 50; 75; . . .

   (b) If this pattern is continued, which of the following numbers will be in it?

   2 115; 1 125; 1 375; 1 040; 2 035; 1 085; 3 050; 1 115

   (c) How did you decide which numbers will be in the pattern?

   (d) What is 14 × 25?

   (e) How many 25s are in 500?

2. (a) Write the next 10 numbers in this pattern:

   15; 30; 45; . . .

   (b) If this pattern is continued, which of the following numbers will be in it?

   300; 1 490; 6 000; 915; 1 800

   (c) Will 145 be in the pattern? Give a reason for your answer.

3. Thandi takes 3 skirts and 4 blouses along on her holiday. All of the blouses match all of the skirts.

   (a) How many different outfits does she have to wear? Show how you got your answer.

   (b) She decides to also take two jackets that she can wear with all of the blouses and skirts. From how many different outfits can she now choose?

4. 5 is added to a number and the answer is multiplied by 3. The answer is 27. What is the original number?

5. Estimate the answer first and write it down before you do the multiplications.

   (a) 23 × 56 (b) 56 × 23
   (c) 45 × 92 (d) 75 × 45
   (e) 38 × 26 (f) 26 × 38
   (g) 29 × 78 (h) 42 × 29
   (i) 57 × 64 (j) 68 × 93

When you estimate an answer, you make a very good guess. You can round off the numbers to numbers that are easy to work with, and calculate with them.

6. Determine the total cost of each of the following.

   (a) 86 boxes of cereal at R57 each

   (b) 46 sets of cutlery at R83 for one set

   (c) 53 sets of glasses at R47 for one set

   (d) 72 pairs of socks at R46 for one pair

   (e) 64 T-shirts at R89 for one T-shirt

   (f) 78 caps at R79 for one cap

7. (a) One diary costs R39. How much will 48 diaries cost?

   (b) If one bread roll costs 55c, how much will you pay for 36 bread rolls?

   (c) There are 24 hours in a day. How many hours are there in a week?

   (d) There are 60 minutes in an hour. How many minutes are there in 24 hours?

Unit
11 Number sentences

11.1 Learn to use number sentences

Sometimes it is easy to see which calculations you have to do to find information, for example:

Ben has R120 and he pays R50 for food.

How much money does he have left?

Sometimes it is more difficult to see which calculations you must do, for example:

Bettina spent R60 on food and then she had R80 left.

How much money did she have before she bought the food?

In a case like this, it may help to write a number sentence to understand what you must do. We can write:

The money Bettina had – 60 = 80

A number sentence like this will help you to see that in this case you can calculate 80 + 60 to find out how much money Bettina had.

80 + 60 = 140 so she had R140.

To check, you can put your answer into the number sentence: 140 – 60 = 80, so R140 is the right answer.

1. Answer the questions that you find easy. Skip the other questions.

   (a) Gwede has 60 goats. He buys more goats and now he has 75 goats. How many goats did he buy?

(b) Zweli has 75 goats. He buys another 60 goats. How many goats does he have now?

(c) Lerato has 75 goats. This is 60 goats more than Willem has. How many goats does Willem have?

2. Find the missing number in each of these number sentences.

(a) 75 – . . . = 60	(b) . . . + 60 = 75
(c) 60 + . . . = 75	(d) 60 + 75 = . . .
(e) 75 – 60 = . . .	(f) 75 + 60 = . . .
(g) . . . – 60 = 75	(h) . . . – 75 = 60

3. Go back to the parts of question 1 that you skipped because you found them difficult. For each one, find a number sentence in question 2 that can help you. Try to answer all the parts of question 1 now.

4. Answer the questions that you find easy. Skip the other questions.

(a) Ishmael has 75 goats and Simon has 60 goats. How many more goats does Ishmael have than Simon?

(b) Pieter had 75 goats. He sold 60 goats. How many goats does he have left?

(c) Lettie had 75 goats. Some goats were stolen and now she has only 60 goats left. How many goats were stolen?

(d) Moses buys 60 goats and now he has 75 goats. How many goats did he have before he bought more goats?

(e) Johan sold 60 goats and now he has 75 goats left. How many goats did he have before he sold some of his goats?

(f) Mpho has 60 goats and her sister Nellie has 75 goats. How many goats do the two sisters have altogether?

5. Go back to the parts of question 4 that you skipped because you found them difficult. For each one, find a number sentence in question 2 that can help you. Try to answer all the parts of question 4 now.

11.2 Use number sentences

For some of the questions below you will know immediately which calculations to do. For other questions you may need to write a number sentence first.

1. There are 78 learners on two buses together. There are 42 learners on the one bus. How many learners are on the other bus?
2. There are 2 378 learners in two schools together. There are 1 426 learners in the one school. How many learners are there in the other school?
3. After 5 478 chickens were killed in a storm, Nomvula had 3 243 chickens left. How many chickens did she have before the storm?
4. Jamie paid R384 for a pair of shoes and Vusi paid R423 for his shoes. How much more did Vusi pay than Jamie?
5. Peter bought 3 chairs for his house, all at the same price. He also bought a refrigerator for R2 780. Peter paid R3 677 in total. How much did each of the chairs cost?

6. Gertie walks 184 m to school and back home every day, and Simon walks 124 m to school and back home. How much further than Simon does Gertie walk to school and back, in five days?

7. John is 143 cm tall and Janet is 157 cm tall. How much taller than John is Janet?
8. Ma Minah bought 3 chickens for R44 each. She also bought a bag of potatoes. Ma Minah paid R174 in total. How much did the potatoes cost?

11.3 Try a number and improve

1. (a) Is the number sentence below true if you put 6 in both places where a number is missing?

   5 × *a number* + 8 = 3 × *the same number* + 22

   (b) Is the number sentence true if you put 10 in both places?

   (c) Is it true if you put 7 in both places?

2. (a) Which of these numbers do you think will make the number sentence below true?

   5   20   10   25   9   8   7

   6 × *a number* + 10 = 10 × *the same number* – 26

   (b) Put the number you think will work in the two places and calculate to see if it works. If it does not work, try another number.

   (c) Continue until you find a number that makes the number sentence true.

3. In each case, try different numbers until you find the number that makes the number sentence true:
   (a) 20 × *the number* + 40 = 30 × *the same number* + 10
   (b) 23 × *the number* – 60 = 15 × *the same number* + 20
   (c) 6 × *the number* + 5 = 10 × *the same number* – 55
   (d) 6 × *the number* + 5 = 10 × *the same number* – 47
   (e) 6 × *the number* + 5 = 10 × *the same number* – 39
   (f) 400 – 10 × *the number* = 4 × *the same number* + 50
   (g) 8 × *the number* + 14 = 10 × *the same number* – 20
   (h) 37 × *the number* + 15 = 15 × *the same number* + 37

11.4 Practice in answering multiple-choice questions

Choose the correct answer and write down the letter only.

1. Choose the correct answer for 3 000 + □ + 80 + 4 = 3 684.
   A. 6 B. 60 C. 600 D. 100
2. For which pairs of numbers can you use the rule "multiply the first number by 3 and add 5 to get the second number"?

	First number	Second number
A.	3	5
B.	3	8
C.	3	14
D.	1	6

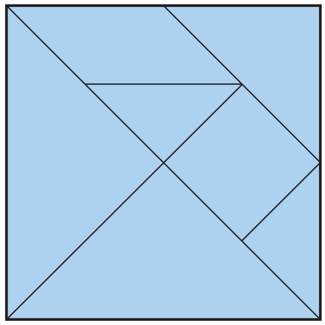
3. Which of the following statements are true?
   A. 3 × (□ + 2) = 3 × □ + 2 B. 3 × (□ + 2) = 3 × □ + 6
   C. 3 × (□ + 2) = (□ + 2) × 3 D. 3 × (□ + 2) = 3 × (2 + □)
4. How much more is 17 × 37 than 14 × 37?
   A. 3 B. 20 C. 3 × 37 D. 37

UNIT 12

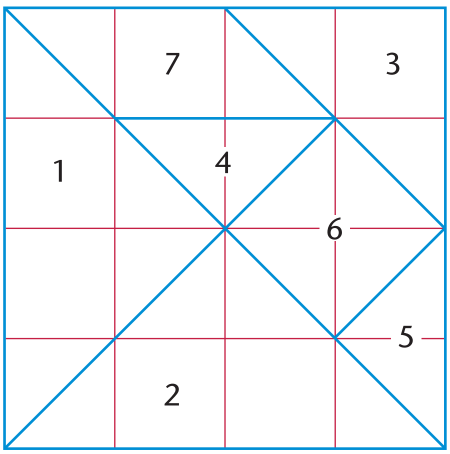
TRANSFORMATIONS

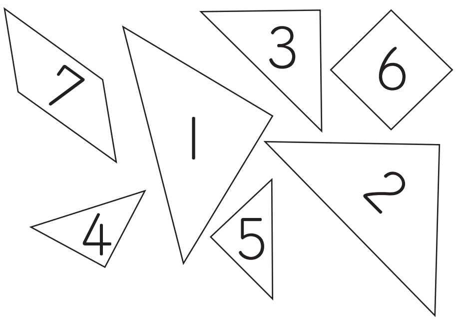
12.1 Combining figures

A Chinese **tangram** is a pattern of seven figures that form a square.

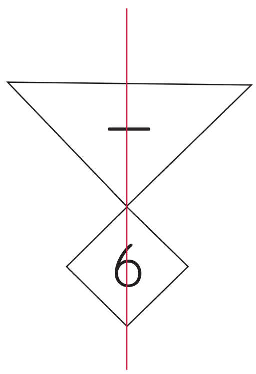


1. Make your own tangram by following these steps:
   - Draw a square with sides 16 cm long on a piece of thick paper or cardboard.
   - Divide the square into 16 smaller squares as shown by the red lines on the right. Then draw the blue lines to divide the square into the seven pieces.
   - Number the pieces as shown.
   - Cut out the pieces.





Pieces 1 and 6 can be placed together to form a symmetrical figure:



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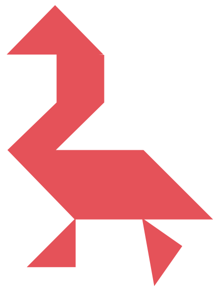
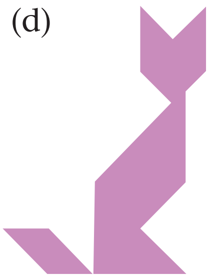
2. Make a symmetrical figure with each combination of tangram pieces given below. Also draw each figure you make, and its line or lines of symmetry.
   (a) Pieces 1 and 2
   (b) Pieces 1 and 2 differently
   (c) Pieces 1 and 3
   (d) Pieces 7 and 5
   (e) Pieces 4, 5 and 6
   (f) Any pieces you like

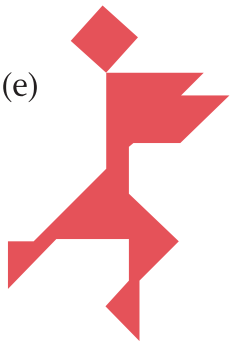
3. Use all seven tangram pieces each time to make each of the following figures. The pieces may not overlap.

(a)


(b)

(c)


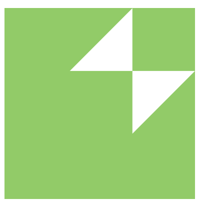
(d)


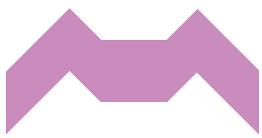
(e)


(f)

4. Use all seven tangram pieces each time to make the following symmetrical diagrams. The pieces may not overlap. Then draw each diagram and its line of symmetry.

(a)

(b)


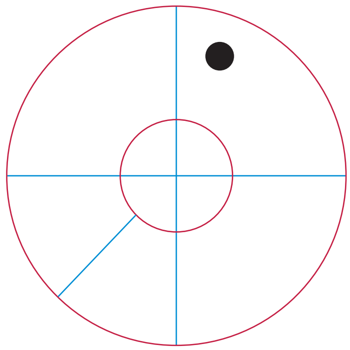
(c)


5. Explain to someone else how to make tangram figures. What makes it easy?

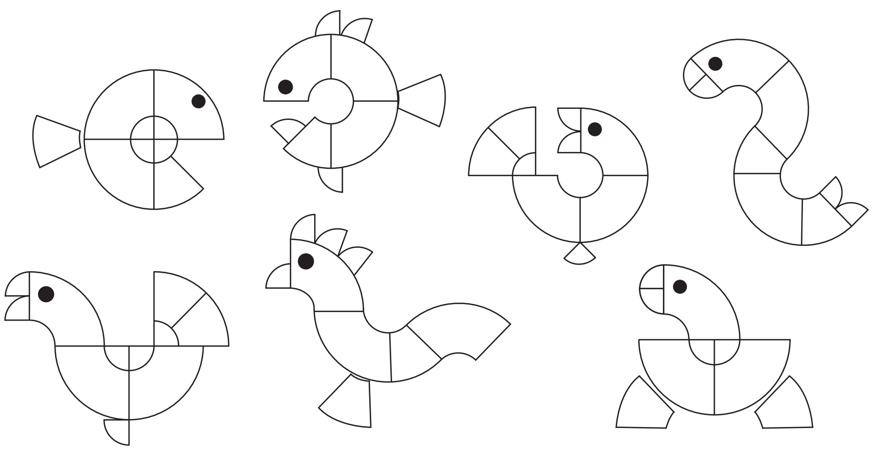
6. Make drawings to show all the different ways in which
   (a) two tangram pieces can be used to make a square, and
   (b) three tangram pieces can be used to make a rectangle.

7. Make drawings to show how to make each of the following figures by using all seven tangram pieces each time:
   (a) a triangle (b) a square
   (c) a pentagon (d) a hexagon
   (e) a rectangle that is not a square
   (f) a quadrilateral that is not a rectangle

12.2 Using figures to make pictures



1. Use two round objects to draw two circles with the same centre, about three times as big as this.
2. Draw the blue lines to divide the figure into nine pieces. Draw the black dot in the right place. Then cut out the nine pieces.
3. Use the pieces to make these pictures of animals.



Term Four

Unit 1: Whole numbers

Unit 2: Whole numbers: Addition and subtraction

Unit 3: Mass

Unit 4: Properties of three-dimensional objects

Unit 5: Common fractions

Unit 6: Whole numbers: Division

Unit 7: Perimeter, area and volume

Unit 8: Position and movement

Unit 9: Transformations

Unit 10: Geometric patterns

Unit 11: Whole numbers: Addition and subtraction

Unit 12: Probability

Unit 1

Whole numbers

1.1 Refresh your knowledge of numbers

1. Count in 250s from 6 500 until you pass 8 500. Write down the numbers as you go along. Start like this:

   6 500   6 750   7 000   . . . . .

2. Arrange these numbers from smallest to biggest.

   5 599   3 769   2 006   7 309   4 123   1 628

3. Arrange these numbers from biggest to smallest.

   7 803   5 182   8 901   2 853   6 351   3 736

4. Write down the numbers as you go along.

   (a) Count in 500s from 4 000 until you reach 9 000.

   (b) Count in 1 500s from 1 000 until you reach 10 000.

5. In each case decide which is the bigger of the two numbers. Use the < and > signs. The open part of the sign is always towards the bigger number.

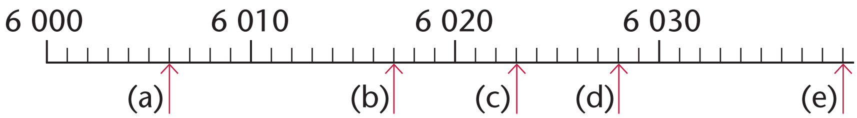
   Examples: 2 000 < 2 500   7 000 > 3 465

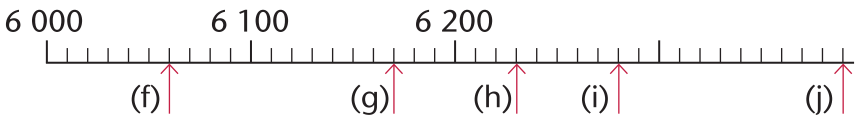
   (a) 1 492 and 1 942   (b) 3 678 and 6 873
   (c) 2 892 and 2 929   (d) 8 506 and 7 505
   (e) 1 999 and 2 001   (f) 4 089 and 4 890

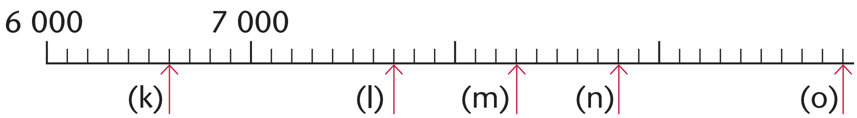
6. Write the numbers.
   (a) 500 smaller than 2 500   (b) 500 bigger than 7 500
   (c) 150 smaller than 9 400   (d) 250 bigger than 3 500
   (e) 2 800 bigger than 100   (f) 15 smaller than 9 000

1.2 Numbers on number lines

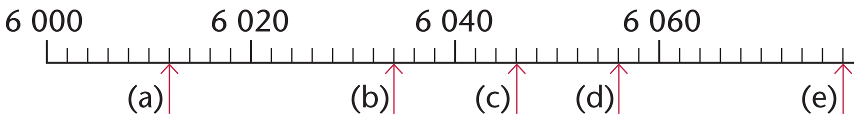
1. Write the numbers shown by the arrows.

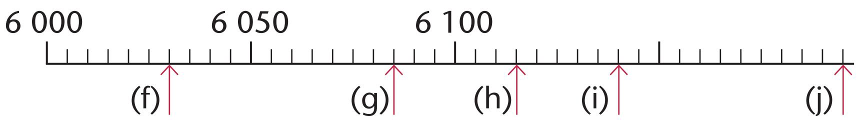




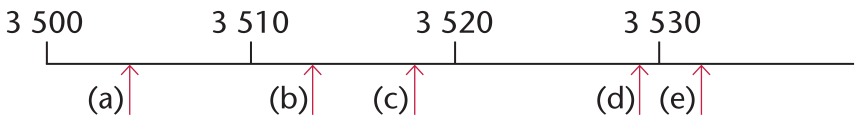


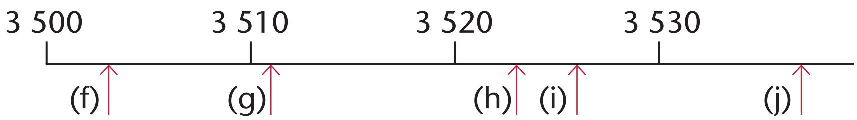
2. Write the numbers shown by the arrows.





3. Write the numbers shown by the arrows. Estimate as well as you can.





Unit 2 Whole numbers: Addition and subtraction

2.1 Practice

1. Write as little as possible to calculate, but write down your final answer in each case.

   (a) 80 + 50 + 40 + 30 + 70 + 80 + 90 + 20

   (b) 800 + 500 + 400 + 300 + 700 + 800 + 900 + 200

   (c) 300 + 500 – 400 + 600 – 500 + 700 – 600

   (d) 1 300 + 1 500 – 400 + 1 600 – 500 + 1 700 – 600

   (e) 2 300 + 2 500 – 400 + 2 600 – 500 + 2 700 – 600

   (f) 1 300 + 1 500 – 1 400 + 1 600 – 1 500 + 1 700 – 1 600

   (g) 2 300 + 2 500 – 2 400 + 2 600 – 2 500 + 2 700 – 2 600

2. Estimate roughly how much each of the following will be, without rounding off the given numbers.

   (a) 383 + 527 + 313 + 683 + 432

   (b) 627 + 783 + 483 + 532 + 413

   (c) 632 + 513 + 727 + 883 + 583

   (d) 613 + 732 + 983 + 827 + 683

A set of numbers that have to be added together is called a **sum**.
You see four different sums in question 2.

3. (a) Calculate each sum in question 2 accurately.

   (b) If your answers do not differ by 500 from one question to the next, you have made mistakes. If so, correct your mistakes.

4. Calculate each of the following.

   (a) 2 964 + 3 588 + 1 036 + 2 412

   (b) 5 257 – 3 578 + 2 642 – 1 432

   (c) 2 964 + 1 036 + 3 588 + 2 412

   (d) 5 257 + 2 642 – 3 578 – 1 432

5. Your answers for questions 4(a) and 4(c) should be the same, and your answers for questions 4(b) and 4(d) should be the same. If this is not the case, you have made mistakes.

   Go back to what you have written when you did the calculations and find your mistakes. Correct them.

6. Do the calculations inside the brackets first when you do these calculations.

   (a) (2 964 + 1 036) + (3 588 + 2 412)

   (b) (5 257 + 2 642) – (3 578 – 1 432)

   (c) (5 257 + 2 642) – (3 578 + 1 432)

7. Compare your answers for question 6 with your correct answers for question 4. Write down what you notice.

8. A cyclist has covered 1 456 km of a 2 745 km journey. How far does he still have to go?

9. Jerry paid off some of his study debt. He now owes R6 735 of an amount of R9 758. How much did he pay off?

10. 1 768 elephants in a game reserve died of disease, and now there are 6 577 elephants left. How many elephants were there before the disease started?

11. There are 9 283 registered voters in a certain area. 7 587 votes were cast during a municipal election. How many registered voters did not cast their votes?

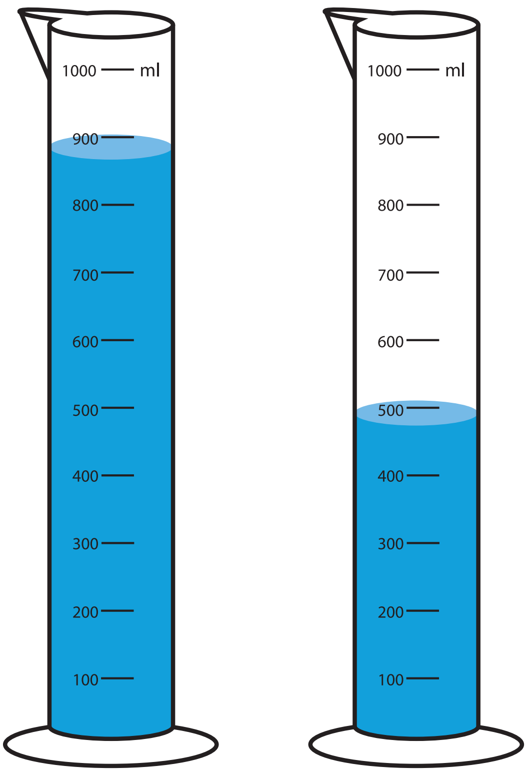
12. Candidate A received 8 843 votes during an election, and Candidate B received 9 224 votes. By how many votes did Candidate B win?

13. Mr Nhlapo has to pay R1 286 school fees for each of his three children in high school. He also has to pay R874 for each of his four children in primary school. How much is that in total?

2.2 Increases, decreases and differences

1. There is 868 ml of water in the measuring cylinder on the left. If Merrill pours 287 ml water out of the cylinder, how much water is left?

2. If there is 868 ml of water in the cylinder on the left, how much more water is needed to fill it up to the 1 000 ml mark?



Increase means by how much an amount or quantity has become more.
Decrease means by how much an amount or quantity has become less.
Difference means how much more one amount or quantity is than another.

3. The water level in the cylinder on the right is 472 ml.
   (a) How much less water is there in this cylinder than in the cylinder on the left?
   (b) How much water is there in the two cylinders together?
   (c) What will the volume of water in the cylinder on the right be if 244 ml is added?

Mr Naidoo has three 10 000-litre water tanks in his vegetable garden. While watering his plants one day, he measures the water levels in the tanks each hour. His readings in litres are shown in the tables below.

Tank A

Time of the day	10:00	11:00	12:00	13:00	14:00	15:00
Water level (in ℓ)	6 392	5 627	4 845	4 072	3 308	2 530

Tank B

Time of the day	10:00	11:00	12:00	13:00	14:00	15:00
Water level (in ℓ)	8 654	7 991	7 315	6 611	5 863	5 052

Tank C

Time of the day	10:00	11:00	12:00	13:00	14:00	15:00
Water level (in ℓ)	7 358	6 571	5 743	4 942	4 163	3 333

4. (a) How much water was there in Tank B at 13:00?

   (b) How much water flowed out of Tank C between 12:00 and 14:00?

   (c) Which tank lost the most water in the period 11:00 to 12:00?

   (d) Which tank lost the most water in the period 14:00 to 15:00?

   (e) How much water, in total, flowed out of the three tanks between 10:00 and 15:00?

5. Complete a table like this for each of the three tanks.

Period of time	10:00 – 11:00	11:00 – 12:00	12:00 – 13:00	13:00 – 14:00	14:00 – 15:00
Water lost (in ℓ)					

6. Look at the numbers in the tables that you completed in question 5. If Mr Naidoo continues to water his plants for the next 24 hours, at what times do you think the different tanks will be empty?

UNIT 3 MASS

3.1 Heavy and light

1. Which packet is heavier: the packet in Tebogo's left hand or the packet in Tebogo's right hand?

   Explain your answer.

2. Work with five classmates. Order your school bags from lightest to heaviest.

   Explain what you did to order the bags.

3. Which is easier to carry: six empty bottles or six full bottles?

We say: The **mass** of six full bottles is greater than the mass of six empty bottles. The mass of six empty bottles is less than the mass of six full bottles.

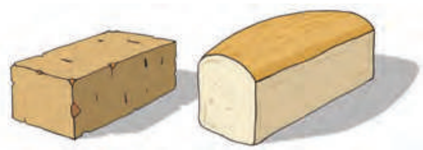
4. Look at the pictures below and on the next page. Compare each pair of objects: A and B; C and D; E and F; G and H.

   (a) Which object is bigger?

   (b) Which object has the greater mass?

A *B*

A pillow *5 kg mealie meal*



C *D*

A brick *A loaf of bread*

	
E	*F*
A pair of socks	*A stone*

	
G	*H*
Jam	*Toilet paper*

5. Crumple waste paper into balls. Fill a plastic bag with these crumpled paper balls. Hold your Mathematics textbook in one hand and the bag of paper balls in the other. Which is heavier?
6. (a) Which has less mass: your Mathematics exercise book or your Mathematics textbook?
   (b) Find three things with a mass that is greater than the mass of your Mathematics textbook.
   (c) Find three things with a mass that is less than the mass of your Mathematics textbook.

3.2 Using a balance to compare mass

We often decide which of two objects is heavier just by estimating how difficult it is to lift the objects.

We can also compare mass by using a **balance**.

You can make your own balance using a clothes hanger and two shopping bags.

1. Use your balance to find which has less mass:
   (a) your eraser or your pencil (b) 3 rulers or a sock
   (c) 3 rulers or 20 bottle tops

2. Use your balance to find out how many bottle tops have the same mass as:
   (a) your ruler (b) your sharpener (c) your eraser

   Order your ruler, sharpener and eraser from lightest to heaviest.
3. Compare your answers in questions 1 and 2 with the answers of some of your classmates.
   (a) Did you get the same answers?
   (b) Is everyone's pencil the same size?
   (c) Did everyone use the same kind of rulers?
   (d) Did everyone use the same kind of bottle tops?

If we want to measure how heavy something is, we need a **unit**. The unit you used in question 2 was bottle tops.

If you used different kinds of bottle tops than your classmates, you cannot compare your measurements because your units were different.

3.3 Estimating and measuring mass in kilograms

When mass measurements need to be accurate, we have to agree to compare the mass of all objects to the standard unit. The standard for mass measurement is **one kilogram (kg)**.

The mass of 1 ℓ of water is about 1 kg.

1. Fill a 1 ℓ plastic bottle with water and use it to estimate the mass of the following objects:
   (a) the heaviest book in the class (b) a shoe
   (c) a desk (d) a chair
   (e) your school bag (f) a pencil

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2. Think again about your estimates in question 1.
   (a) Which of the objects are heavier than 1 kg? Say how much heavier you estimate them to be.
   (b) Which objects are lighter than 1 kg? Say how much lighter you estimate them to be.

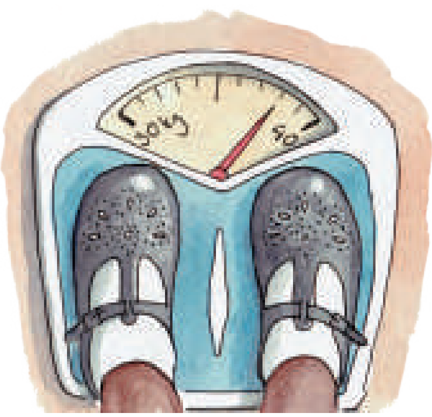
3. Place your litre bottle of water in your balance.
   (a) Check if your shoe is heavier or lighter than 1 kg.
   (b) How many cups of sand have a mass of 1 kg?
   (c) Are 30 rulers heavier or lighter than 1 kg?

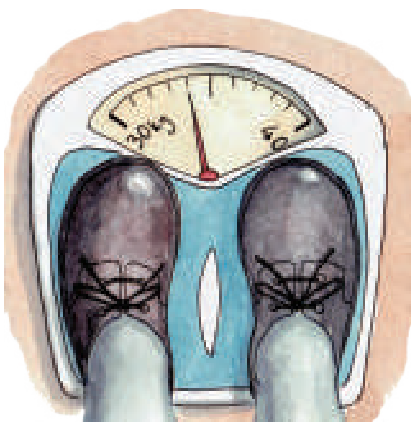
3.4 Reading bathroom scales

A **scale** is an instrument used to measure mass.

1. (a) What unit of measurement is used on a bathroom scale?
   (b) What is the smallest mass that a bathroom scale can measure?
   (c) What is the biggest mass that a bathroom scale can measure?

2. Look at the pictures and answer the questions on the next page.





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(a) Who weighs more: the girl on the scale on the left or the boy on the scale on the right?

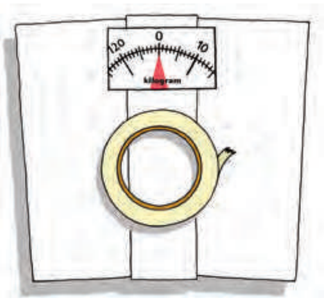
(b) What is the mass of the girl on the left?

(c) What is the mass of the boy on the right?

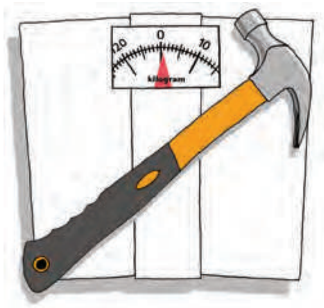
(d) Whose mass is closer to 30 kg?

(e) Whose mass is closer to 40 kg?

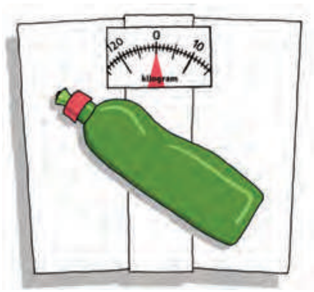
3. The bathroom scale is as accurate as the smallest mass it can measure. Estimate and write down the mass of the following objects.



(a) a roll of tape



(b) a hammer



(c) a bottle of soap

On the bathroom scale, the hammer, the roll of tape and the bottle of soap look as if they have the same mass. It looks as if their mass is nothing. Their mass is less than 1 kg. Their mass is too small to show on the bathroom scale. We need to use another instrument and another unit of measurement to find their mass.

3.5 Estimating and calculating in grams and kilograms

Many objects are lighter than 1 kg. We can measure lighter objects in grams.

1 kg = 1 000 g

2,5 kg = $2\frac{1}{2}$ kg = 2 kg and 500 g = 2 500 g

1. Write the mass in grams.
   (a) 1 kg
   (b) 2 kg
   (c) $\frac{1}{2}$ kg
   (d) $\frac{1}{4}$ kg

2. Write the mass in kilograms or fractions of kilograms.
   (a) 1 000 g
   (b) 500 g
   (c) 250 g
   (d) 3 000 g
   (e) 750 g
   (f) 5 500 g

3. Fill in the missing numbers to make the sentences true.
   (a) 4 kg and 125 g = ___ g
   (b) 2 350 g = ___ kg and 350 g
   (c) 250 g + 250 g → ___ g + 250 g → ___ g + 250 g → ___ g
   (d) 200 g + 200 g → ___ g + 200 g → ___ g + 200 g → ___ g

4. Count in kilograms and grams.
   (a) 1 kg and 500 g + 250 g → 1 kg and ___ g + 250 g →
   ___ kg + ___ g + 250 g → ___ kg + ___ g + 250 g →
   ___ kg + ___ g + 250 g → ___ kg + ___ g + 250 g →
   ___ kg
   (b) 2 kg and 800 g + 200 g → ___ kg and ___ g + 200 g →
   ___ kg + ___ g + 200 g → ___ kg + ___ g + 200 g →
   ___ kg + ___ g + 200 g → ___ kg and ___ g + 200 g →
   ___ kg

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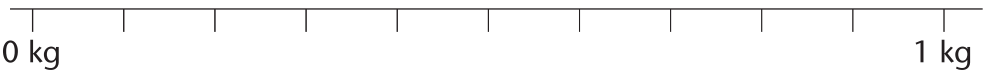
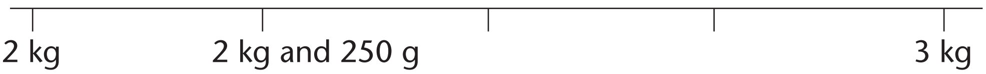
5. Copy the number lines below. Fill in the grams, or kilograms and grams, on your number lines.





We can hardly feel the mass of 1 g. It is very difficult to estimate the mass of very light objects by holding them in your hand.

6. Collect objects that have a small mass that would be measured in grams, for example a pencil, a paper clip, an eraser, a sheet of paper or a coin.
Estimate the mass of each in grams.

If we work with estimates of measurements, our answers must always say "*about* so much". We say this is the **approximate** measurement.

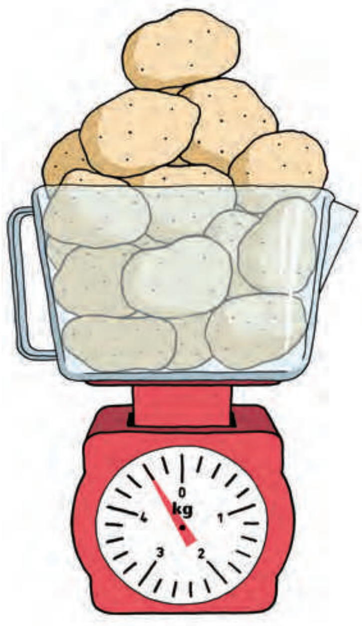
3.6 Measuring in grams and kilograms

We can use kitchen scales to measure in grams and kilograms.

Rulers and bathroom scales have 10 spaces between each numbered line.

Some kitchen scales have 10 spaces between each numbered line. Other kitchen scales have fewer spaces between each numbered line.

To work out the values in grams at the unnumbered lines, you first count the spaces and divide this number into 1 000. Use your answer to count on or back from the nearest numbered line.



1. What is the mass of the sugar?
2. What is the mass of the potatoes?

3.7 Solving mass problems

If an answer is bigger than 1 000 g, give the answer in kilograms and grams.

1. (a) A hammer weighs 824 g and a roll of tape weighs 126 g. How much heavier is the hammer than the tape?

   (b) A bottle of salt weighs 69 g and a small bottle of soap weighs 126 g. How much lighter is the bottle of salt than the bottle of soap?

   (c) The mass of a box of matches is 8 g. What is the mass of a pack of 20 boxes of matches? How many packs have a mass of 1 kg?

   (d) The mass of a bar of soap is 227 g. What is the mass of a pack that has 6 bars of soap?

(e) The mass of a box with 6 eggs is 318 g. What is the mass of 24 eggs packed in the same way?

(f) How many 200 g blocks can you cut from a 1 kg brick of margarine?

2. Zolani has 2 kg and 500 g of sugar. Can Zolani say that she has $2\frac{1}{2}$ kg of sugar? Explain your answer.

3. (a) How many $2\frac{1}{2}$ kg packets are there in a 5 kg box of milk powder?

   (b) How many 500 g packets can you fill with $2\frac{1}{2}$ kg of sugar?

   (c) How many $2\frac{1}{2}$ kg bags can you fill with 25 kg of flour?

   (d) How many 250 g packets can you make from 5 kg of dog food?

   (e) How many 100 g packets can you make from 1 kg of washing powder?

4. The mass of 1 ℓ of water is about 1 kg.

   (a) Estimate the mass of a teaspoonful (5 ml) of water.

   (b) Estimate the mass of a drumful of water. The drum takes about 50 ℓ of water. The drum itself weighs about 4,5 kg.

4,5 kg = $4\frac{1}{2}$ kg

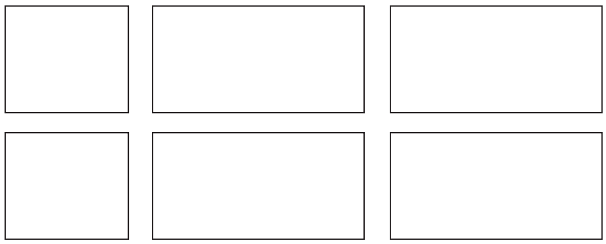
UNIT 4

PROPERTIES OF THREE-DIMENSIONAL OBJECTS

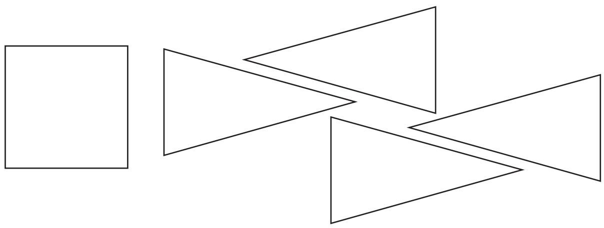
4.1 Making objects from cut-out 2-D shapes

1. Name the 3-D objects that have faces as shown in each case below.

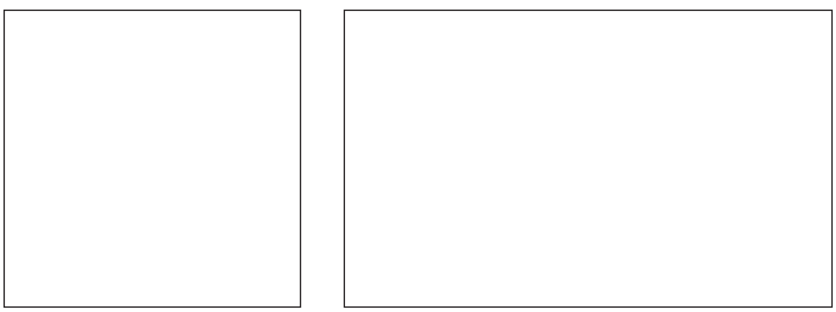
(a)



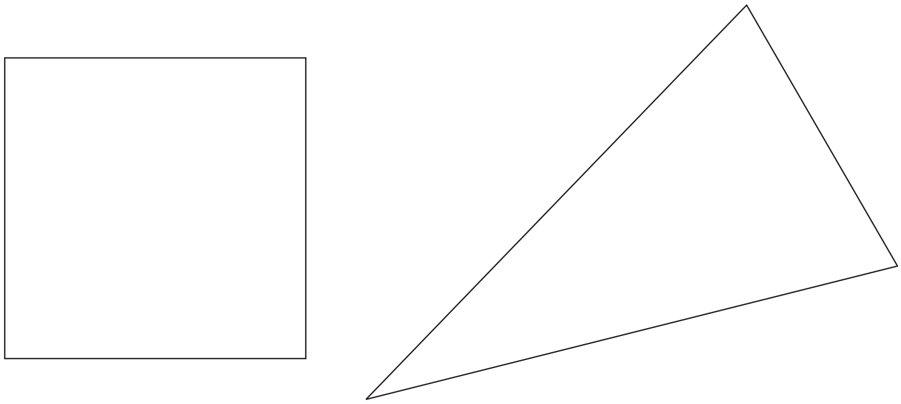
(b)



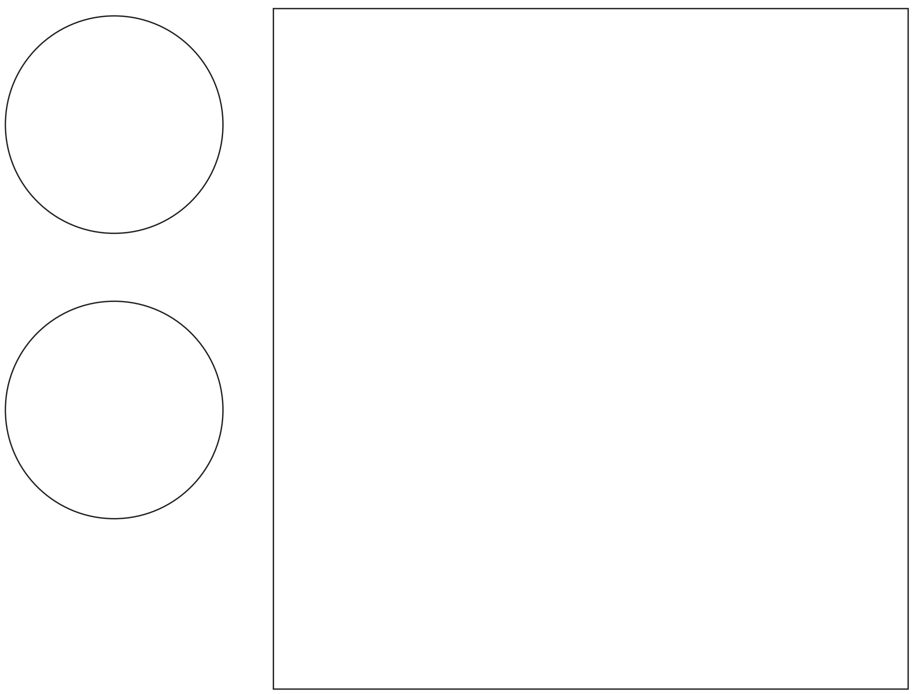
2. Cut out two small and four large rectangles like those shown below, from stiff paper or cardboard. Use sticky tape or clay to join them to form a rectangular prism.



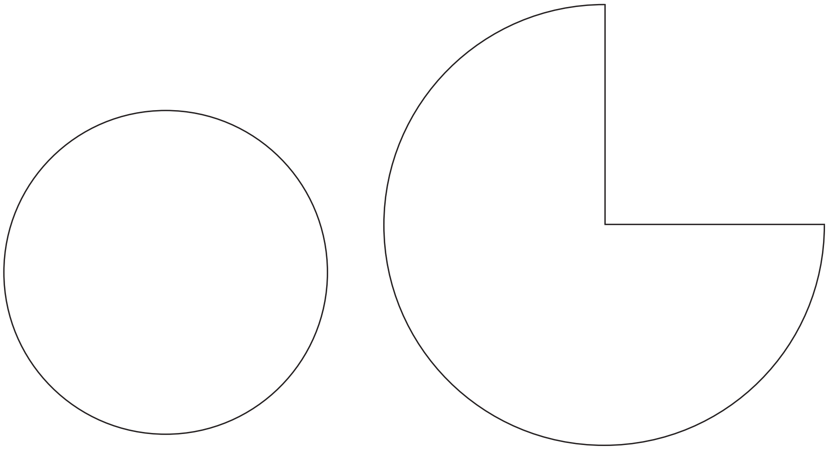
3. Cut out one square and four triangles like those shown below, from stiff paper or cardboard. Use sticky tape or clay to join them to form a square-based pyramid.



4. Trace these figures on a loose sheet. Cut the figures out. Roll the rectangle into a tube. Join the tube and the two circles with tape or clay to make a cylinder.



5. Trace these figures on a loose sheet. Cut the figures out. Roll the figure on the right into an open cone. Join the cone and the circle with tape or clay to make a closed cone.



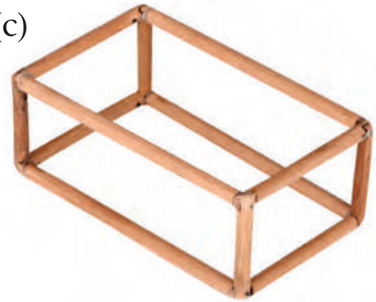
4.2 Identifying the shapes of objects

1. Name the 3-D objects that you see below, and write the names of the 2-D shapes of the faces of each object.

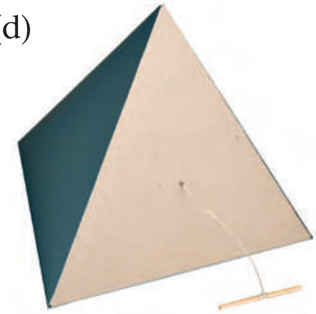
(a)

(b)

(c)

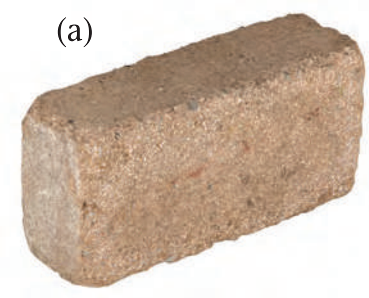


(d)



2. Name the 3-D objects that you can see in these pictures.

(a)

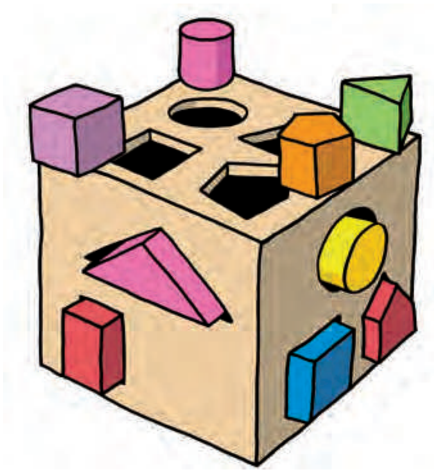


(b)

(c)

(d)

3. Zinzi's uncle makes wooden toys. As you can see, the toy below consists of a number of different 3-D objects.



(a) What kind of prism is the box into which the small objects are put?

(b) What kind of prism can go through the square hole at the top of the box?

(c) What do we call the curved object that can go through the circular hole?

(d) What do we call the object that goes through the triangular hole?

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Unit 5 Common fractions

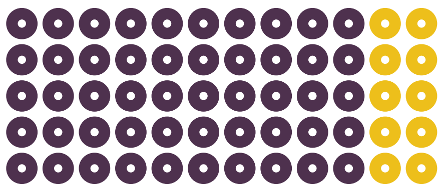
5.1 Grouping and sharing into fraction parts

1. A cake is cut into eight equal slices. Katie eats 2 slices and Farida eats 1 slice and Ben eats 3 slices. What fraction of the cake did they eat?

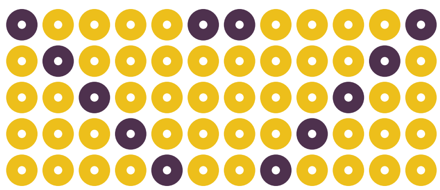
2. Musi puts 40 apples in bags. He puts 5 apples into each bag.
   (a) How many bags will he fill?
   (b) What fraction of all the apples is in one bag?

3. Three children are helping old Mr Botha in his garden. He gives them R210 for helping him. The children share the money equally.
   (a) What fraction of the money does each child get?
   (b) How much money does each child get?

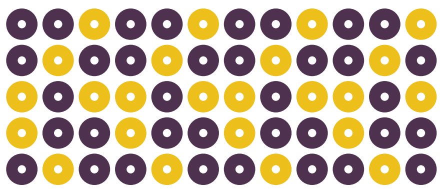
4. What fraction of the beads in this bead mat is purple, and what fraction is yellow?



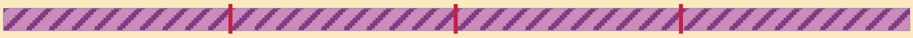
5. What fraction of the beads in this bead mat is purple, and what fraction is yellow?



6. What fraction of the beads in this bead mat is purple, and what fraction is yellow?

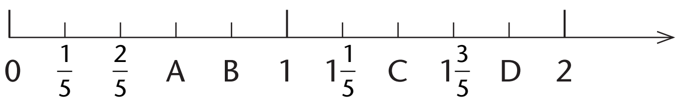


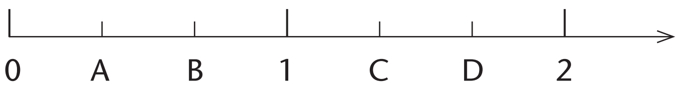
This piece of string is 12 cm long.

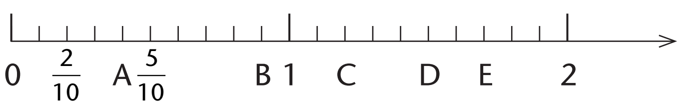


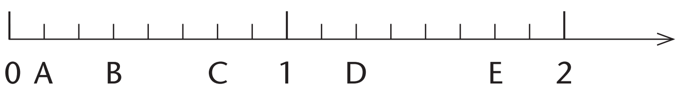
The marks show how the string can be divided into four equal parts, or quarters.

7. The piece of string is 12 cm long. It is divided into quarters. How long is each quarter?
8. A piece of string is 10 cm long. It is divided into fifths. How long is each fifth?
9. 12 cm of string is divided into equal pieces of 2 cm each. What fraction part of 12 cm is each of these pieces?
10. 20 cm of string is divided into equal pieces of 4 cm each. What fraction part of 20 cm is each of these pieces?
11. The numbers 0, 1 and 2 are shown on each of the number lines below. Write down the fractions that can replace the letters on each number line.

(a)


(b)


(c)


(d)


5.2 Problem solving with fractions

1. 34 loaves of bread are shared equally among 8 families. How much bread does each family get?
2. 12 loaves of bread are equally shared by 5 families. How much bread does each family get?
3. Jacob bakes cakes. For one cake he needs:

   $\frac{1}{5}$ cup margarine $\frac{3}{4}$ cup sugar 1 egg

   $2\frac{1}{3}$ cups flour $\frac{1}{4}$ teaspoon salt $\frac{3}{5}$ cup milk

   $2\frac{1}{2}$ teaspoons baking powder

   How much of each ingredient does he need for 5 cakes?
4. A quarter of an hour is 15 minutes. How many minutes are each of the following?

   (a) $\frac{1}{5}$ of an hour (b) $\frac{3}{5}$ of an hour

   (c) $\frac{2}{3}$ of an hour (d) $2\frac{1}{2}$ hours

   (e) $\frac{1}{6}$ of an hour (f) $\frac{5}{6}$ of an hour
5. Write as single fractions.

   (a) 1 fifth + 3 fifths (b) $\frac{2}{8} + \frac{6}{8}$

   (c) 5 eighths + 7 eighths (d) $\frac{2}{7} + \frac{2}{7}$
6. How many *millilitres* are each of the following?

   (a) $\frac{1}{5}\ \ell + \frac{3}{5}\ \ell$ (b) $\frac{2}{8}\ \ell + \frac{6}{8}\ \ell$

   (c) $\frac{5}{8}\ \ell + \frac{7}{8}\ \ell$ (d) $\frac{2}{10}\ \ell + \frac{3}{10}\ \ell$

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UNIT 6 WHOLE NUMBERS: DIVISION

Multiplication can be used to work out the answers for division questions like the following.

How many sweets will each child get if 120 sweets are shared equally between 5 children?

If you know that 5 × 24 = 120, you know that each child will get 24 sweets and that no sweets will be left over.

We can also say that 120 is divided into 5 equal parts. We write this as 120 ÷ 5 = 24.

Multiplication can also be used to answer division questions like the following:

How many children can each get 5 sweets from a packet of 180 sweets?

If you know that 36 × 5 = 180, you know that 36 children can each get 5 sweets.

We can also say that 180 is divided into 36 equal parts of 5 each. We write this as 180 ÷ 5 = 36.

6.1 Multiply so that you can divide

1. How much is each of the following?

(a) 3 × 200	(b) 3 × 300	(c) 3 × 50	(d) 3 × 60
(e) 3 × 90	(f) 3 × 70	(g) 3 × 8	(h) 3 × 4

2. How much is each of the following? Do the calculations in brackets first.

   (a) (3 × 200) + (3 × 60) + (3 × 8)

   (b) (3 × 100) + (3 × 80) + (3 × 4)

   (c) (3 × 100) + (3 × 70) + (3 × 6)

Your answers for questions 1 and 2 can serve as a **clue board** when you do question 3.

3. How much is each of the following?

(a) $804 \div 3$ (b) $806 \div 3$

(c) $780 \div 3$ (d) $624 \div 3$

(e) $552 \div 3$ (f) $528 \div 3$

(g) $530 \div 3$ (h) $570 \div 3$

4. Calculate the following.

(a) $911 \div 3$ (b) $555 \div 3$

(c) $629 \div 3$ (d) $280 \div 3$

5. How much is each of the following?

(a) $(7 \times 100) + (7 \times 30) + (7 \times 8)$

(b) $(7 \times 50) + (7 \times 6)$

(c) $(7 \times 50) + (7 \times 30) + (7 \times 4)$

(d) $(7 \times 50) + (7 \times 10) + (7 \times 7)$

6. Calculate the following.

(a) $966 \div 7$ (b) $970 \div 7$

(c) $392 \div 7$ (d) $400 \div 7$

(e) $469 \div 7$ (f) $475 \div 7$

The mathematical statement $970 = 138 \times 7 + 4$ tells us that $970 \div 7 = 138$ remainder 4.

Division is called the **inverse** of multiplication.

The mathematical statement $970 \div 7 = 138$ remainder 4 tells us that $970 = 138 \times 7 + 4$.

Multiplication is called the **inverse** of division.

To **invert** means to go the opposite way.

6.2 Equal parts in different situations

Read the story below. Think about the two situations and the questions that are asked. Try to see how they differ.

During a water shortage, drinking water is supplied to households from a water truck.

Situation A

Each household gets 8 litres of water. The water truck carries 720 litres of water. How many households can be supplied with water?

In Situation A, the question is **how many equal parts** of 8 each can be made from 720.

Situation B

720 litres of water is available to be shared equally between 8 households. How much water should each household get?

In Situation B, the question is **how big is each part** if 720 is arranged into 8 equal parts.

In Situation A, the size of each part is given, and the number of parts is unknown. Situations like these are sometimes called **grouping** situations.

In Situation B, the number of parts is given, and the size of each part is unknown. Situations like these are sometimes called **sharing** situations.

1. Now read the questions in Situation A and Situation B again. Then check whether the two statements below are true. Write good reasons for your answers.
   (a) In Situation A, 90 households can be provided with 8 litres of water each.
   (b) In Situation B, each household should get 90 litres of water.

Here are three more situations in which the numbers 720 and 8 appear. Read them carefully and think about the questions that are asked.

Situation C

Simon prepares drinks for a big soccer game, by adding concentrated fruit juice to water.

For every 8 litres of water, he uses 1 litre of concentrated fruit juice.

How many litres of concentrated fruit juice should he add to 720 litres of water?

Situation D

A printing machine works at the same pace all the time. It takes 8 hours to print 720 booklets on the machine.
How many booklets are printed each hour?

Situation E

720 booklets have to be printed on another machine, which prints 8 booklets each minute.
How long will it take to print all 720 of these booklets?

2. Now check whether the statements below are true. Write good reasons for your answers.
   (a) In Situation C, Simon should add 90 litres of concentrated fruit juice to 720 litres of water.
   (b) In Situation D, 90 booklets are printed each hour.
   (c) In Situation E, it will take 90 minutes to print the 720 booklets.
3. Which of Situations A to E can be described with the number sentence $720 \div 8 = \square$?

6.3 Practice

Check all your answers by doing multiplication.

1. Calculate.

   (a) 738 ÷ 9   (b) 399 ÷ 7   (c) 744 ÷ 8
   (d) 656 ÷ 9   (e) 856 ÷ 6   (f) 378 ÷ 6

2. (a) What is the length of each piece if 644 mm of lace is cut into 4 equal pieces?

   (b) What is the length of each piece if 644 mm of lace is cut into 7 equal pieces?

3. Taro baked 108 bread rolls.

   (a) If he puts 6 bread rolls in a bag, how many bags can he fill?

   (b) How many bags can he fill with 4 bread rolls each?

4. Jamal pays R456 for 8 kg of dried fruit. What is the cost of 1 kg?

5. Willem takes nine minutes to walk one kilometre.

   (a) How far can he walk in 90 minutes if he does not get tired?

   (b) How far can he walk in 135 minutes if he does not get tired?

6. A watering can has a capacity of 10 ℓ. A small cup has a capacity of 100 ml. How many full cups will fill the watering can?

7. Naledi bought 7 tickets for a show. She paid R266 altogether for the tickets. What was the price of one ticket?

8. 200 sheets of paper must be shared equally between 9 learners. How many sheets will each learner get, and how many sheets will remain?

9. Mike sells onions in bags. He puts 8 onions in one bag. He bought 635 onions from a farmer. How many bags can he fill?

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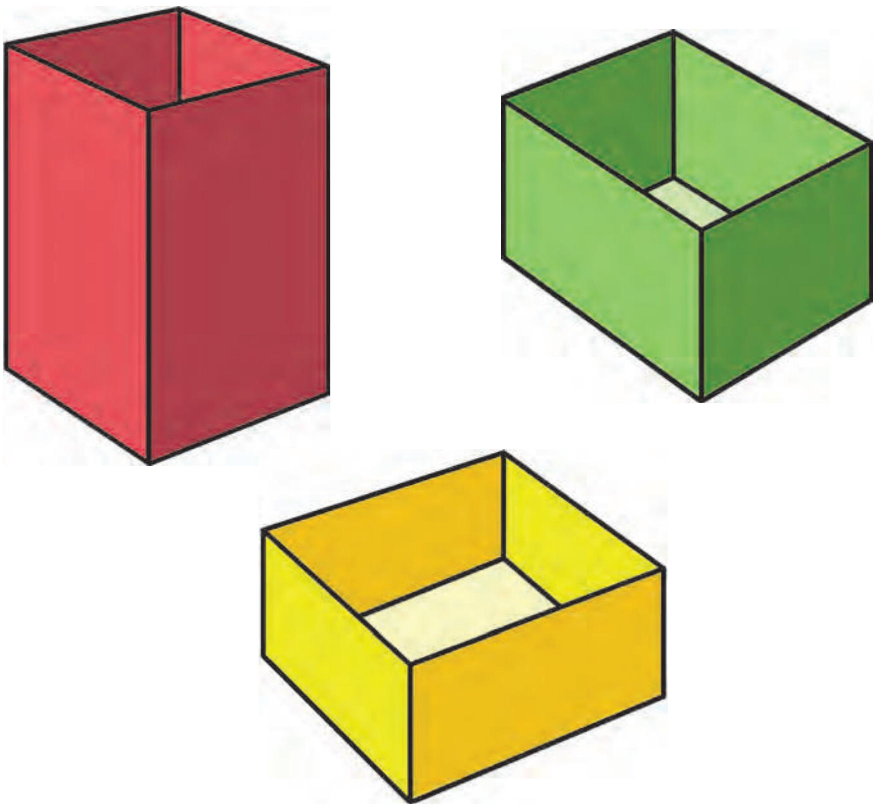
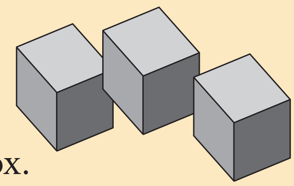
UNIT 7 PERIMETER, AREA AND VOLUME

7.1 Perimeter, area and capacity

How can we know which box is the biggest?





We can find out how many cubes like these can be packed into each box.

The maximum number of cubes that the box can hold is called the **capacity** of the box.

There are some other ways too of saying how big the boxes are.

1. How many of the grey cubes do you think can be packed into each of the three boxes?

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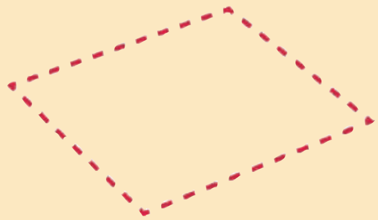
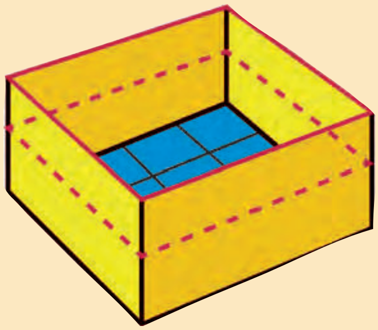
We can measure the total length, right around the top edge of each box. This length is called the **perimeter**.



The perimeter can be measured using a measuring tape or a ruler.

You can also put a piece of string right around the box or the edge of the box, and then measure the length of the string.

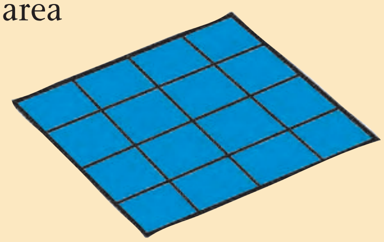


Here is another way to say how big a box is:

You may say how many square stickers or tiles are needed to cover the bottom or the "floor" of the box.

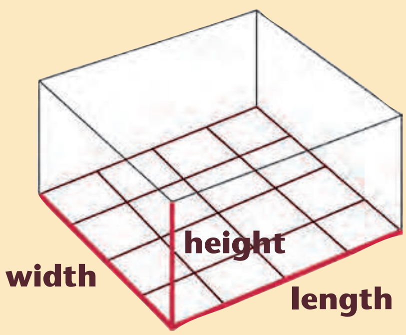
This is called the floor **area** of the box.

When people describe the size of a house or piece of land, they normally use the area rather than the perimeter.



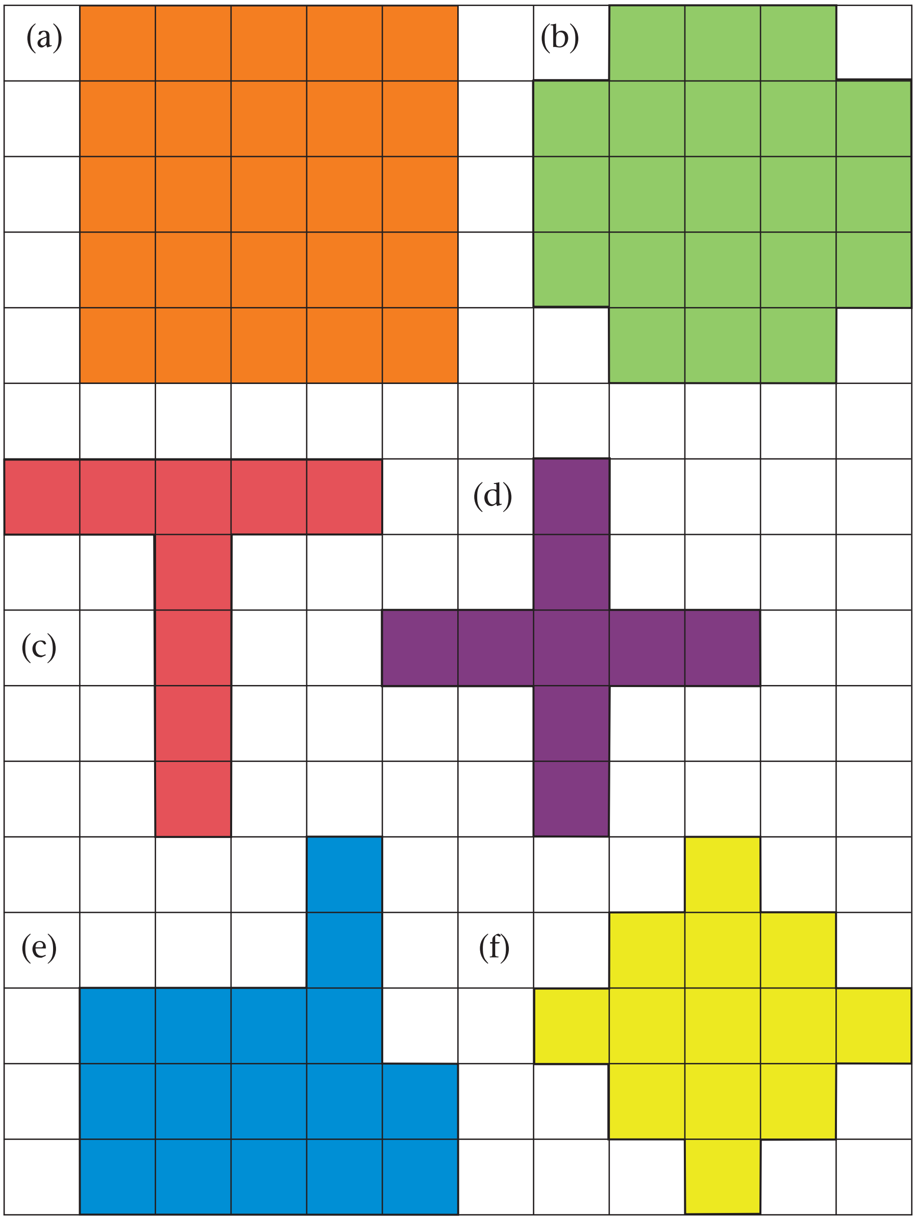
You may also describe the size of a box by saying how wide, how long and how high it is.

The length and the width and the height are called the **dimensions** of a box or a room.



Each side of the squares in the grid below is 1 cm long.
The area of the green figure is 21 grid squares.
The perimeter of the green figure is 20 cm.

2. Find the area and perimeter of each figure.

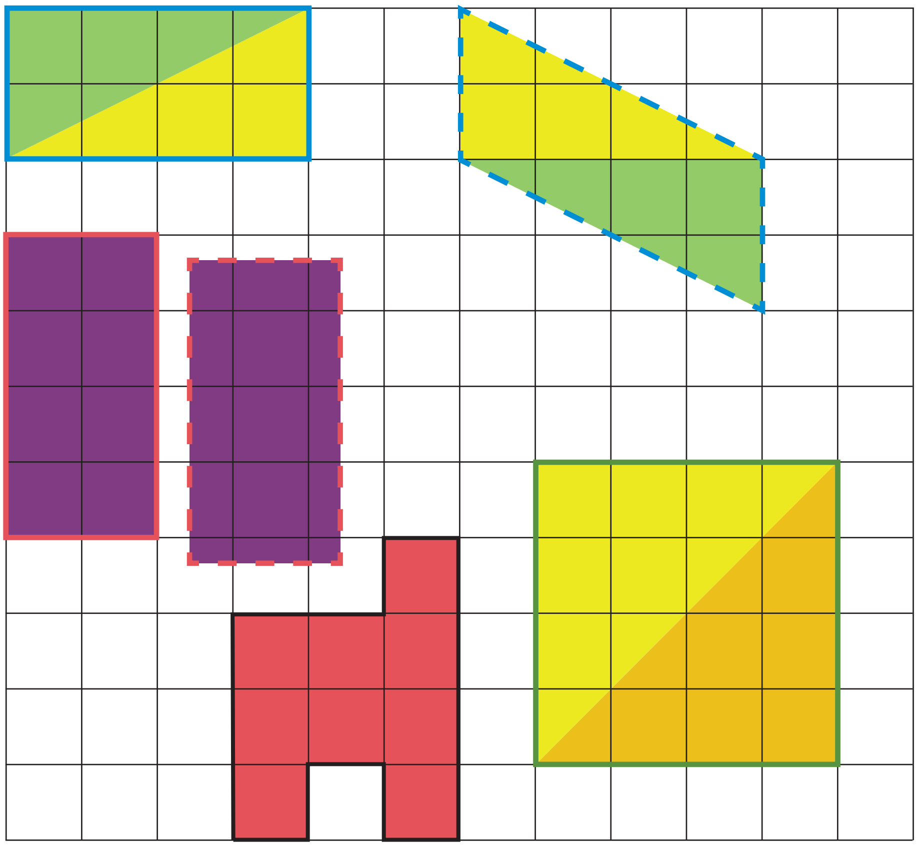


3. Find the area and the perimeter of each of the following figures:

   (a) the rectangle with the blue edge

   (b) the rectangle with the solid red edge

   (c) the rectangle with the green edge



4. (a) Do you think the areas of the two purple rectangles are the same?

   (b) Do you think the areas of the red figure on this page and the red figure on the next page are the same?

5. (a) What is the area of the figure with the dotted blue edge?

   (b) Use your ruler to find the perimeter of this figure.

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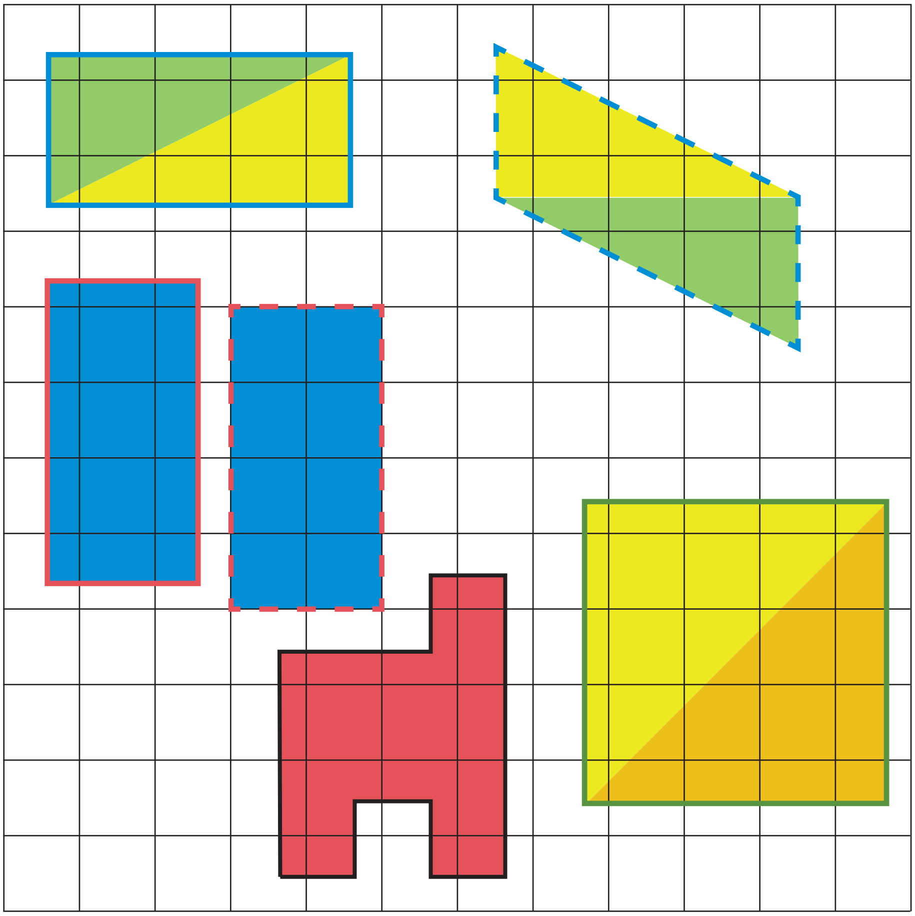
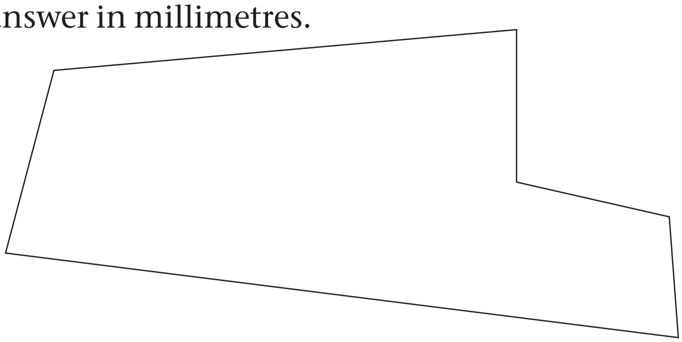
6. The rectangle with the blue edge is divided into two parts.

   (a) Do the two parts have the same area or different areas?

   (b) What is the area of the yellow part?



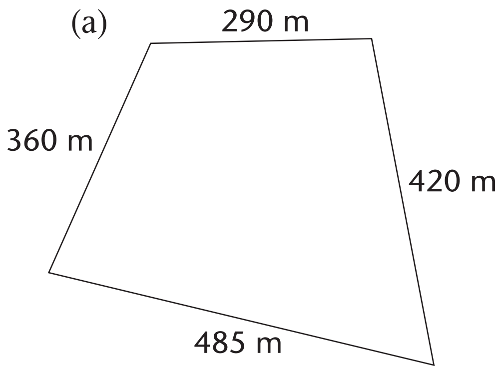
7. Use your ruler to find the perimeter of the figure below. Give your answer in millimetres.



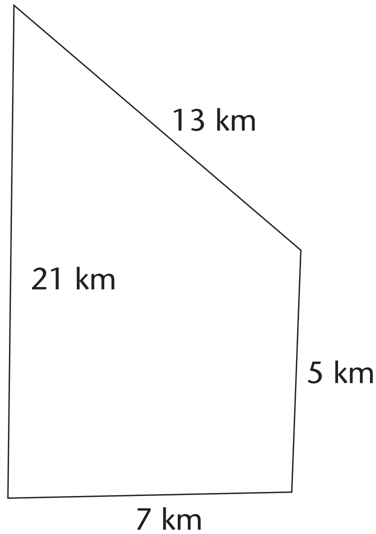
7.2 Calculate perimeter

1. The figures below are maps of different plots of land. Calculate the perimeter of each plot and state your answer in the unit used on the map.

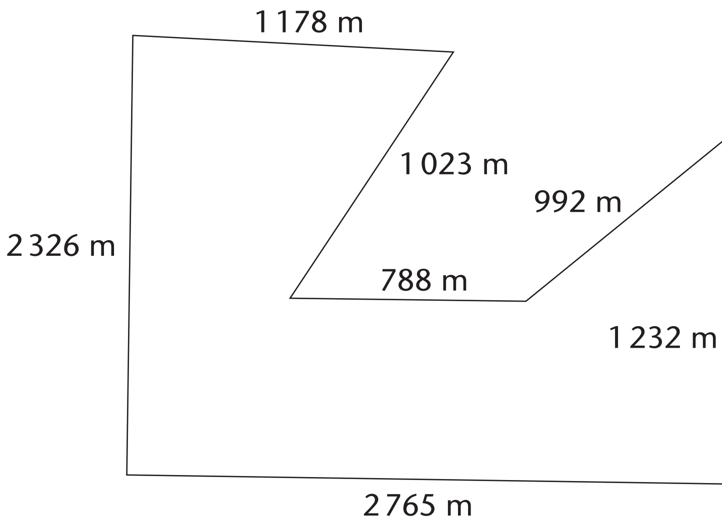
(a)



(b)



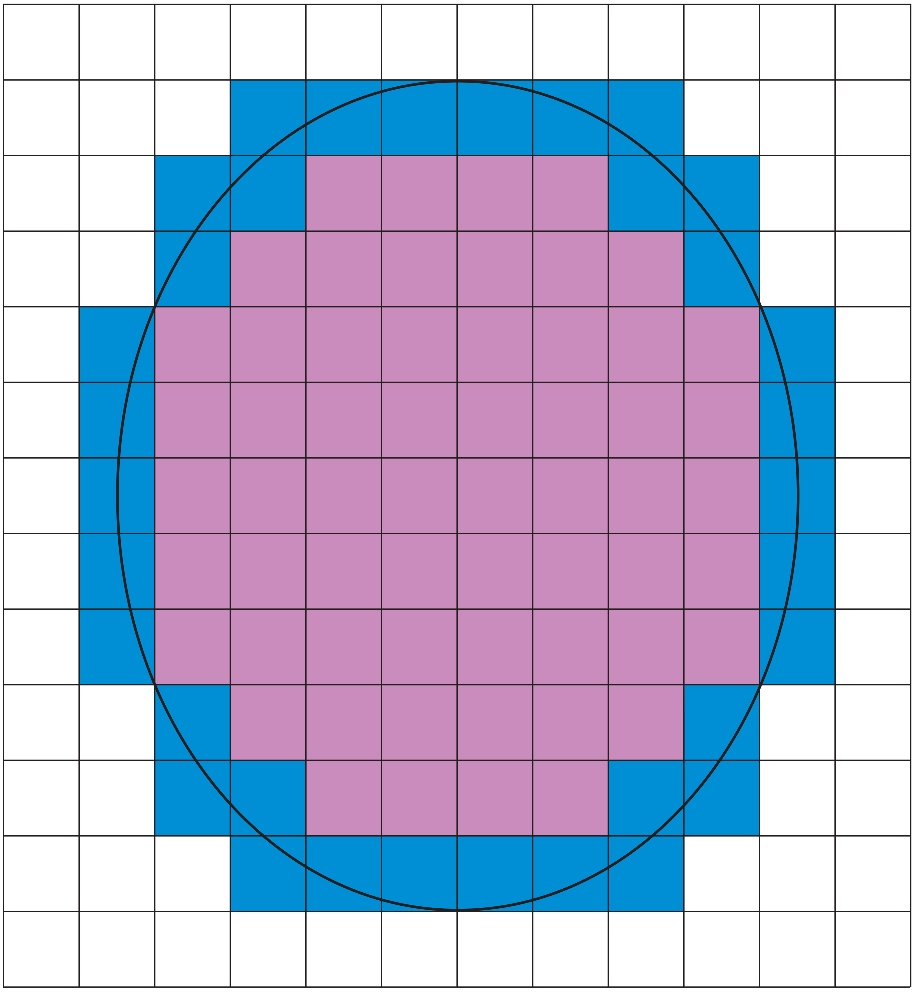
(c)



2. If fencing costs R6 per metre, how much will it cost to put a fence around the plot in question 1(a)?

7.3 Perimeter and area of curved figures

1. Find the areas of the purple and blue figures.



2. (a) Do you think the area of the curved figure is smaller or bigger than the area of the blue figure?

   (b) Do you think the area of the curved figure is smaller or bigger than the purple figure?

   (c) If someone asks you what the area of the curved figure is, what will your answer be?

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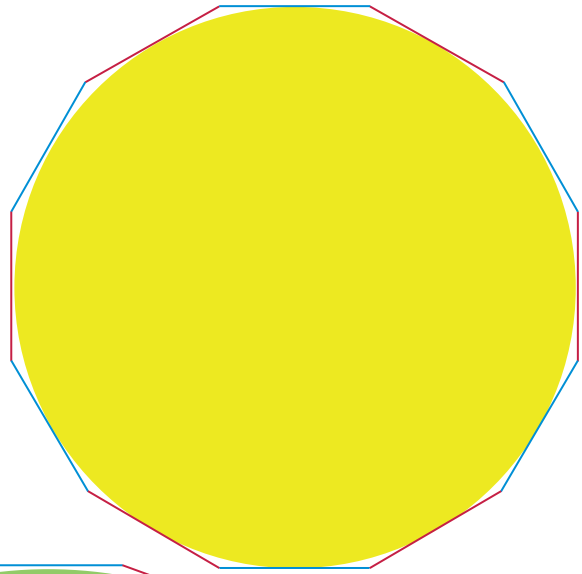
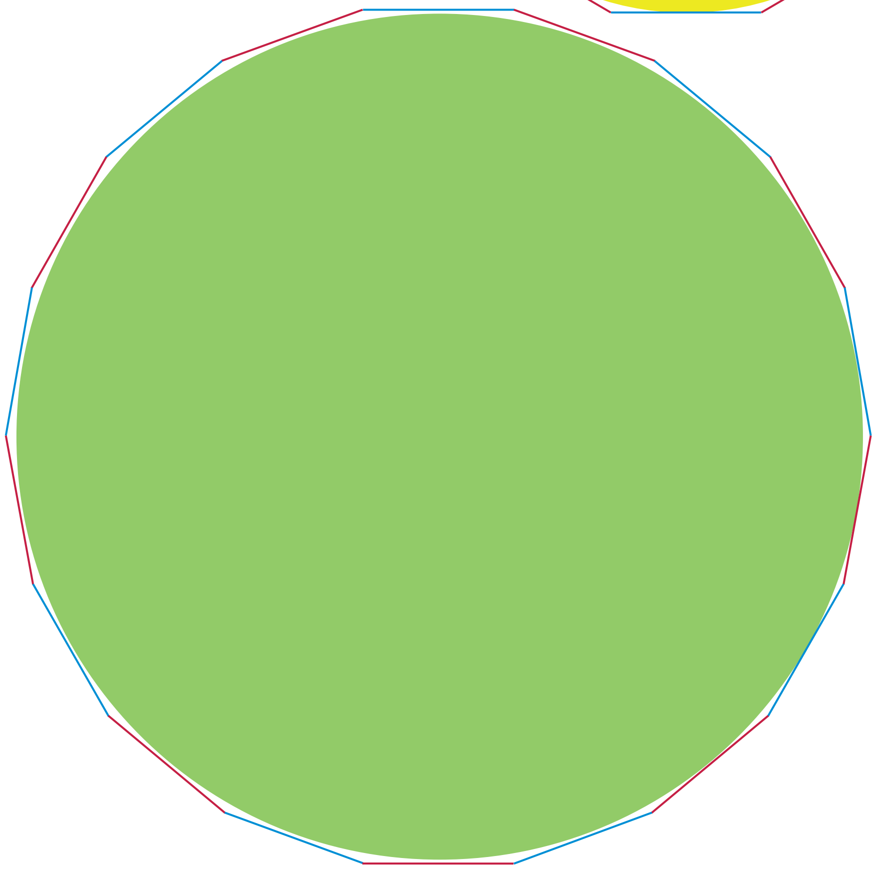
3. The red and blue straight lines around the circles are all 2 cm long.

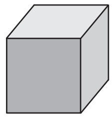
   Use these straight lines to estimate the perimeter of the yellow circle and the perimeter of the green circle.

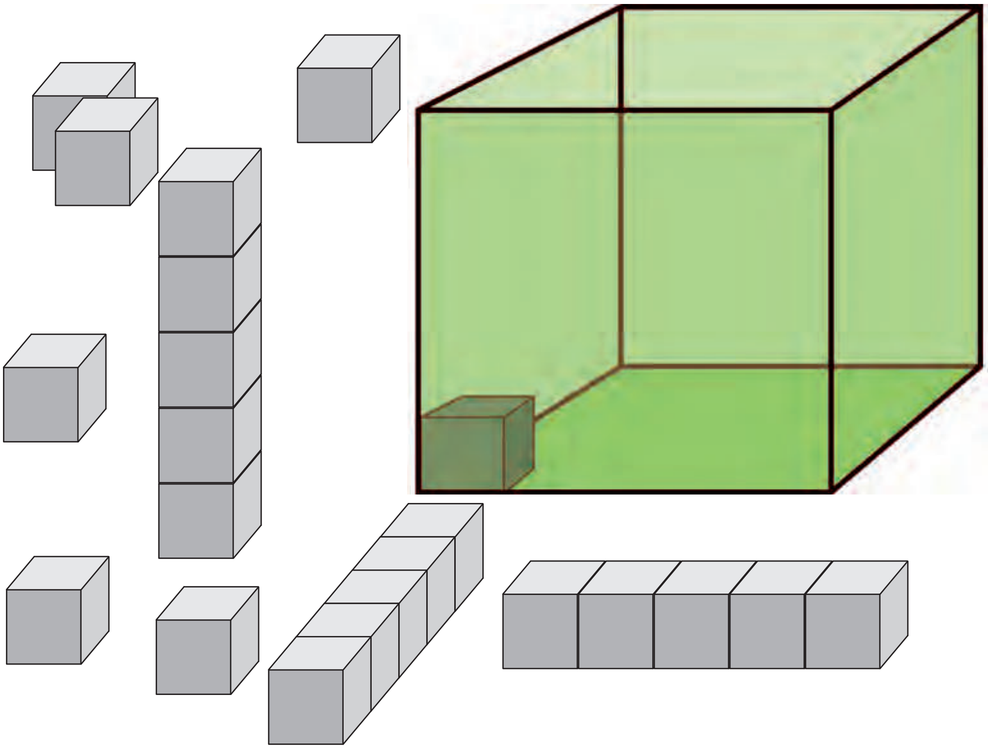




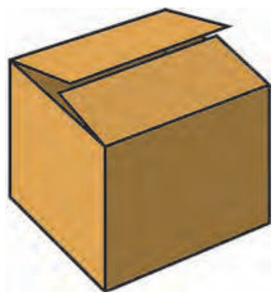
7.4 Capacity and volume

1. Do you think more than a hundred small cubes like this can fit into the green box?
   Or do you think fewer than a hundred cubes will fill the box?



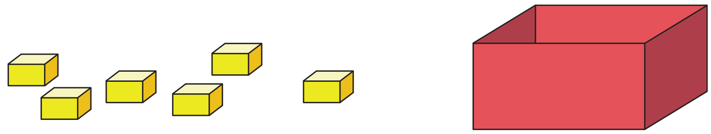


2. Think of a cardboard box that is 1 m by 1 m by 1 m.



   (a) Do you think you can roll yourself up so that you can fit into such a box?
   (b) Do you think your desk can fit into the box?
   (c) How many such boxes do you think can fit into your classroom, if all the desks, chairs and other stuff are taken out first?

3. To do this task, you need many small blocks of equal size and a box. You could, for example, use many empty matchboxes and a shoebox.



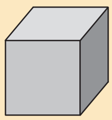
(a) Estimate, to the nearest hundred or ten, how many of your small blocks can be neatly packed into your box.

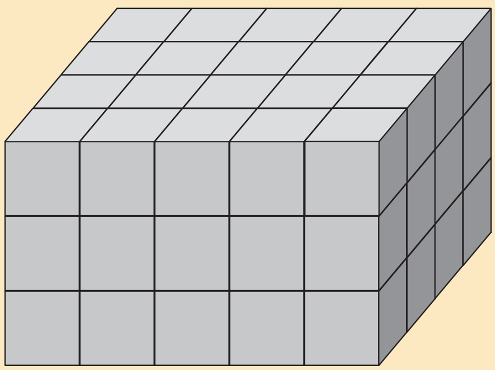
(b) Pack the small blocks neatly into your box, until it is full.

(c) Take out the small blocks and count them.

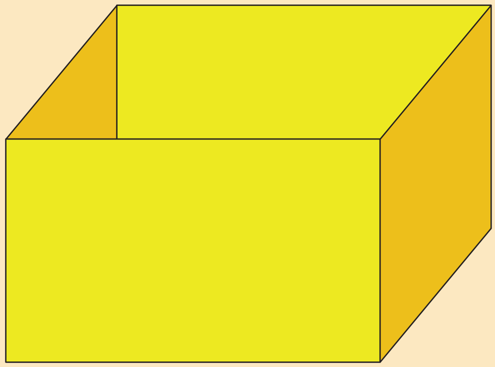
(d) How close was your estimate?

There are 60 small cubes in this stack.





The **volume of the stack** is 60 cubes.



This stack of cubes fits exactly into the yellow box, and fills the yellow box.

The **capacity of the box** is 60 cubes.

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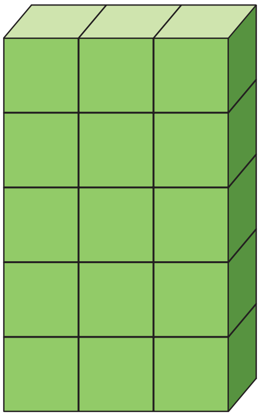
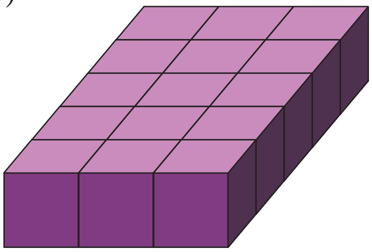
4. What is the volume of each stack?

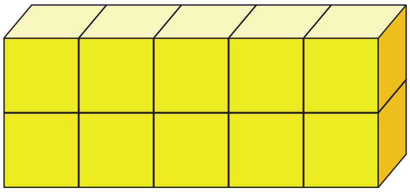
(a)



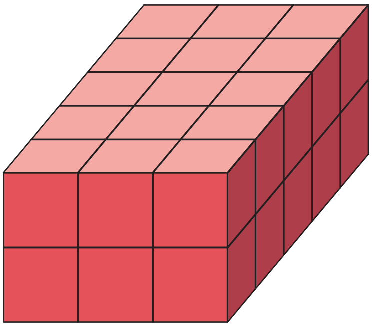
(b)



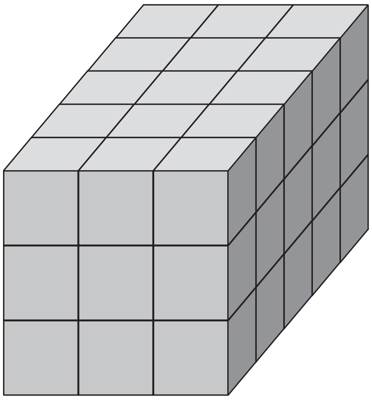
(c)



(d)



(e)



5. (a) How many cubes do you need to build a stack that is 3 cubes wide and 5 cubes long like in question 4(e), but 5 cubes high?

   (b) How many cubes do you need to build a stack that is 4 cubes wide, 6 cubes long and 7 cubes high?

Unit 8 Position and movement

8.1 Positions on a grid

The map below shows where different learners sit in a classroom.

1. Describe in words where you sit in the classroom.
2. Describe where Nathi sits.
3. Describe where Phil sits.
4. Describe where the teacher's table is.

		Board		Cupboard
			Teacher's table	
Sophia				
		Miriam	Jack	
				Phil
	You			
			Nare	
	Sally			
	Gert	Nathi		Lerato
			Zweli	
Nkhosi	Sibu			
Busi				
				Mpho
		Julius		

You will now learn how to make a better map, so that it is easier to say where people or objects are.

There is a grid on the map below.
The grid has 8 rows, marked 1 to 8 from bottom to top.
The grid has 5 columns, marked A to E from left to right.

Nathi sits in Column C, in Row 4.

5. In which column does Jack sit?

6. In which row does Jack sit?

8			Board	Teacher's table	Cupboard
7	Sophia		Miriam	Jack	
6					Phil
5		You		Nare	
4		Sally Gert	Nathi		Lerato
3				Zweli	
2	Nkhosi Busi	Sibu			
1			Julius		Mpho
	A	B	C	D	E

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All the questions on this page are about the map on the previous page.

7. In which column, and in which row does Lerato sit?
8. In which column and in which row do these learners sit?
   (a) Sophia
   (b) Busi
   (c) Miriam
   (d) Nare
   (e) Sally
   (f) Gert

The squares in a grid are called **cells**.

Zweli sits in Cell D3.
This means Zweli sits in Column D, in Row 3.

9. Who sits in Cell A2?
10. In which cell is the board?
11. In which cell is the cupboard?
12. In which cells do the following learners sit?
    (a) Nkhosi
    (b) Sibu
    (c) Julius
    (d) Mpho
13. How many rows are there on this map?
14. How many columns are there on this map?
15. How many cells are there on this map?

Cell C3 is empty.

16. Name five other cells that are also empty.

8.2 Make your own maps

1. (a) Draw a grid with 8 columns and 8 rows on a clean sheet of paper. Use most of the sheet for the grid.
   Label the columns A, B, C, D, E, F, G and H from left to right.
   Label the rows 1 to 8 from bottom to top.

   (b) Now work as follows:

Write 5 in Cell A1.	Write 10 in Cell B2.
Write 13 in Cell B3.	Write 26 in Cell A8.
Write 20 in Cell A6.	Write 17 in Cell A5.
Write 30 in Cell F6.	Write 13 in Cell E1.
Write 12 in Cell C2.	Write 7 in Cell B1.
Write 11 in Cell A3.	Write 11 in Cell D1.

   (c) What numbers do you think should be in each of the following cells?

   B6 C4 E3 H1 H8

2. (a) How many rows will you need to make a map of your own classroom?

   (b) How many cells will you need to make a map of your own classroom?

   (c) Draw a map of your own classroom on a clean sheet of paper.
   On your map, indicate where the board is, and where the teacher's table is.

   (d) In which cell do you sit in your classroom?

   (e) On your map, write the names of ten of your classmates in the correct cells.

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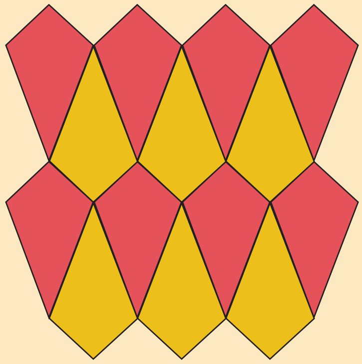
Unit 9

Transformations

9.1 Tessellations

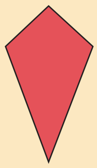
A pattern like this is called a **tiling pattern** or a **tessellation pattern**.



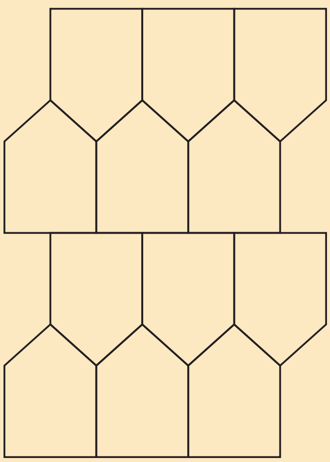
The figure that is repeated is called the tile.

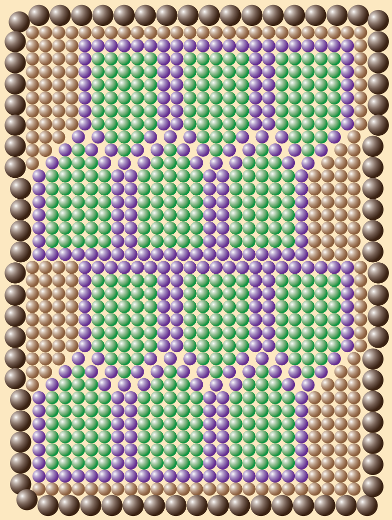
"Tessella" is the Latin word for small stone or tile.

This quadrilateral is the tile in the above tessellation.



On the table mat below you can see a tessellation pattern with pentagons.





The small drawing alongside shows the tessellation pattern with a curved shape that you can see on the fish.

1. (a) Make a drawing of part of the pattern that you can see in this piece of honeycomb.
   (b) Describe the pattern in words.

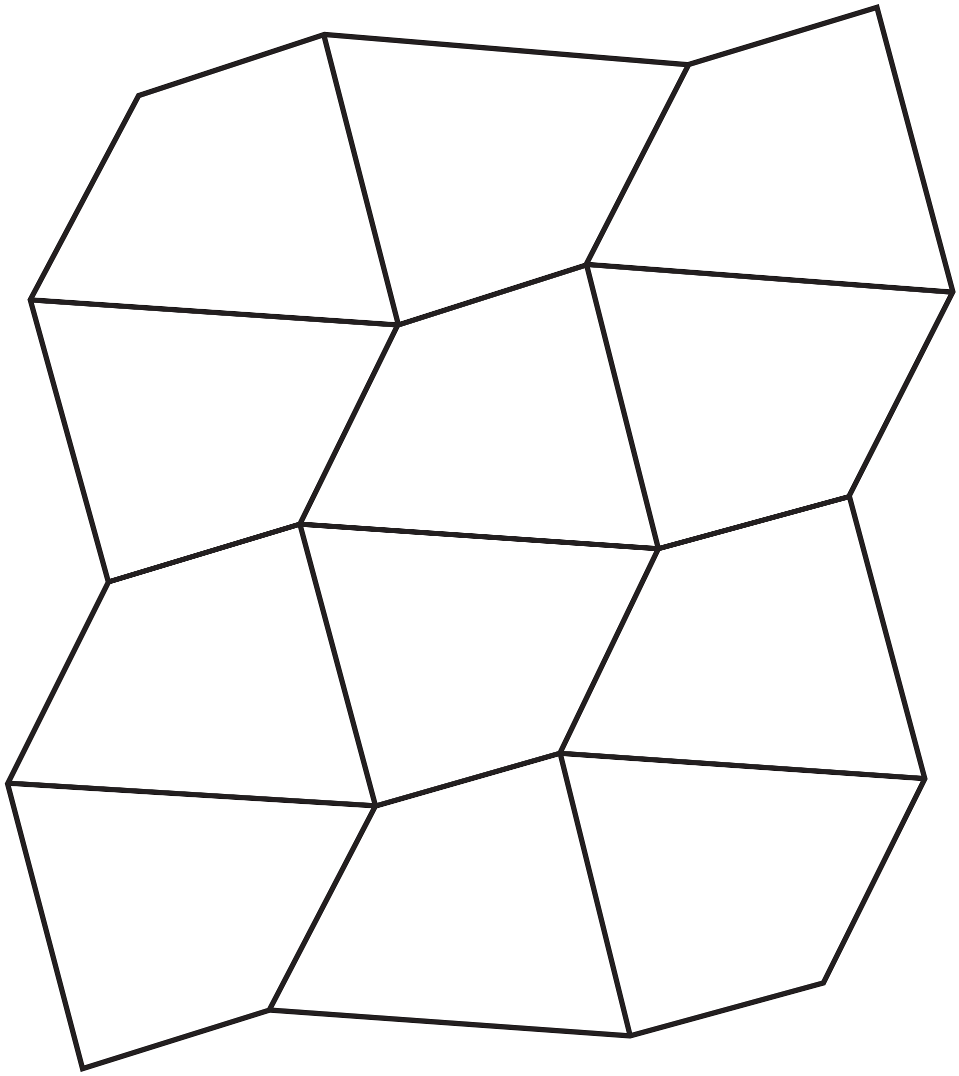
2. (a) Make a drawing of the pattern that you can see in the photograph of the brick wall below.

   (b) Describe the pattern in words.

3. (a) Make a drawing of the pattern that you can see in the photograph of the pavement below.

   (b) Describe the pattern in words.

4. (a) Put a clean sheet on top of this page and trace the figure below.

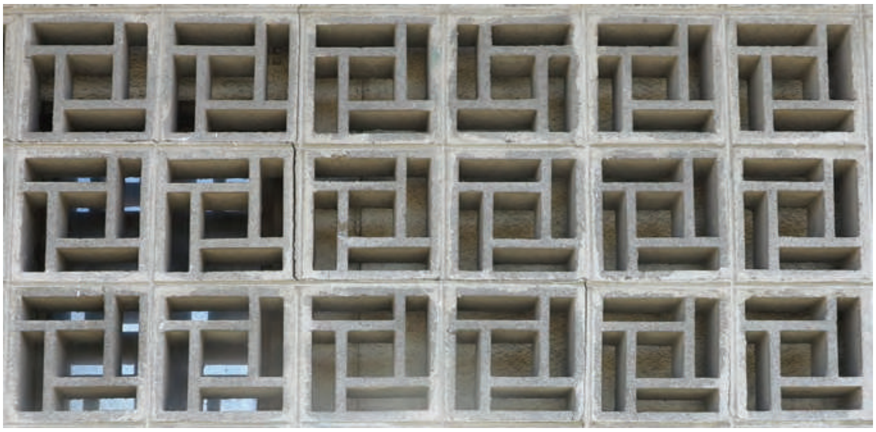


(b) Cut out all 12 tiles.

(c) Arrange the 12 tiles on your desk, so that they fit together neatly to form a copy of the above tessellation.

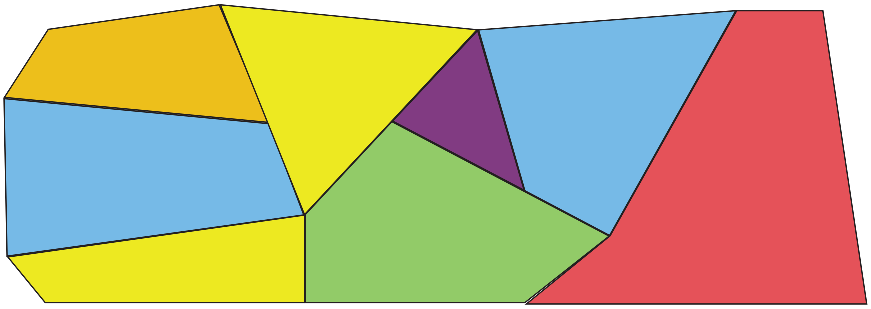
9.2 Tessellate

A **tessellation** is a pattern made up by fitting identical figures together, with no gaps or overlaps between them.

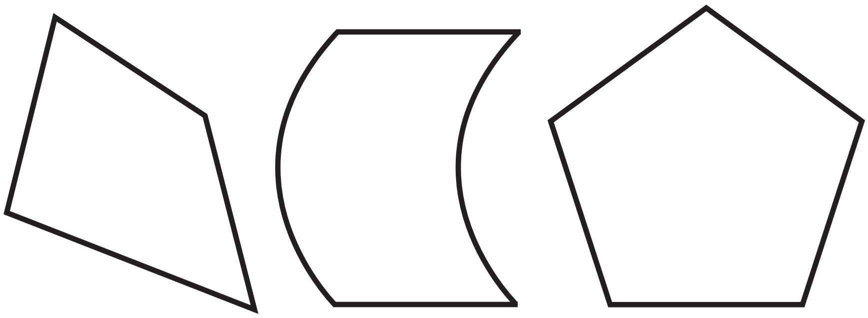


Three examples of tessellations

The diagram below is not a tessellation, because the pieces are different. A figure like this is sometimes called a **mosaic**.



1. (a) Trace and cut out 12 copies of each of the figures below.

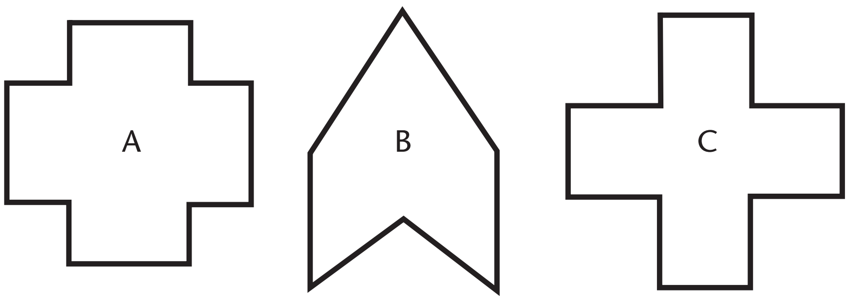


(b) Try to tessellate with the quadrilateral tile.
This means you have to arrange the 12 tiles in such a way that they fit together to form a tessellation.

(c) Try to tessellate with the other two tiles.

(d) You can tessellate in two different ways with the rounded tile. Find out what the two ways are, and make rough drawings to show how they differ.

2. (a) Which of these figures do you think will work to make a tessellation pattern?

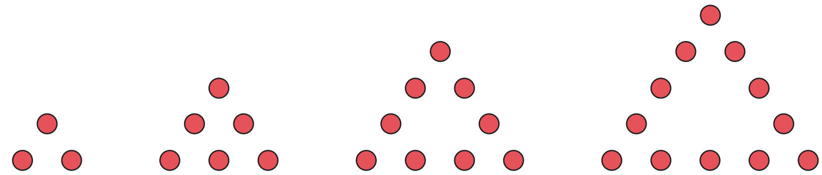


(b) Explain why you think the other figures will not work.
Also make drawings to show why you think they will not work.

Unit 10 Geometric patterns

10.1 Investigate and extend patterns

1. (a) Describe in words how this growing pattern of triangles is made.



Triangle 1 Triangle 2 Triangle 3 Triangle 4

   (b) Describe Triangle 6 and Triangle 7 in words. How many dots are there in Triangle 6 and how many in Triangle 7?

   (c) Describe Triangle 60 and Triangle 70 in words. Calculate the number of dots in Triangle 60 and in Triangle 70.

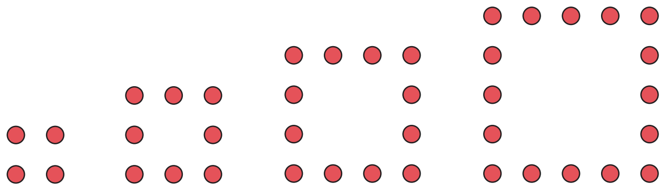
   (d) Complete this table. Describe and discuss your methods. Describe and discuss what patterns you see in the table.

Triangle number	1	2	3	4	5	6	30
Number of dots	3	6					

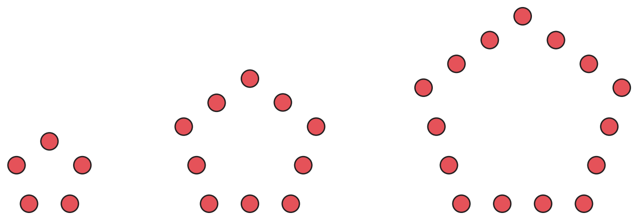
2. On the next page you can see growing patterns of squares, pentagons and hexagons. Investigate each pattern by answering these questions.

   (a) Describe in words how the growing pattern is made.

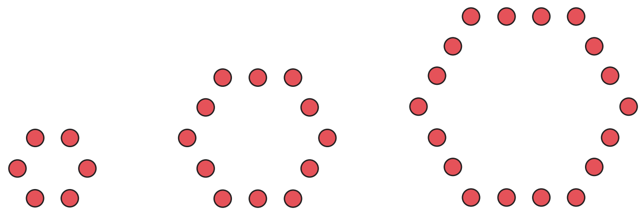
   (b) Describe Figure 6 (that is Square 6, Pentagon 6 and Hexagon 6) and Figure 7 in words. How many dots are there in Figure 6 and how many in Figure 7?



Square 1 Square 2 Square 3 Square 4



Pentagon 1 Pentagon 2 Pentagon 3



Hexagon 1 Hexagon 2 Hexagon 3

(c) Describe Figure 60 and Figure 70 in words. Calculate the number of dots in Figure 60 and in Figure 70.

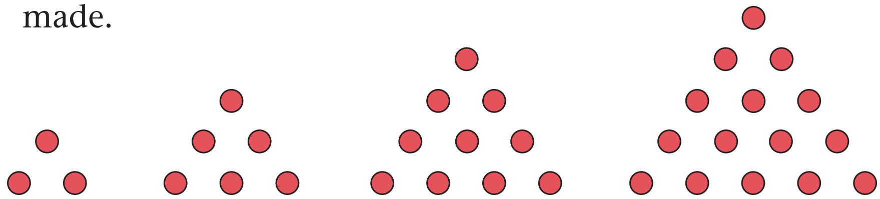
(d) Complete this table. Describe and discuss your methods. Describe and discuss what patterns you see in the table.

Figure number	1	2	3	4	5	6	30
No. of dots in square	4	8					
No. of dots in pentagon	5	10					
No. of dots in hexagon	6						

3. How are the patterns of triangles, squares, pentagons and hexagons the same, and how are they different?

10.2 Investigate and extend more patterns

1. (a) Describe in words how this growing pattern of triangles is made.



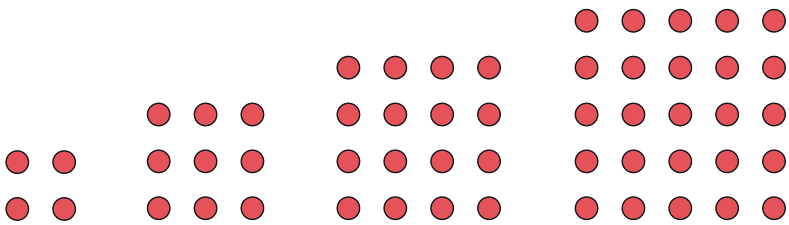
Triangle 1 Triangle 2 Triangle 3 Triangle 4

(b) Describe Triangle 6 and Triangle 7 in words. How many dots are there in Triangle 6 and how many in Triangle 7?

(c) Complete this table. Describe and discuss your methods. Describe and discuss what patterns you see in the table.

Triangle no.	1	2	3	4	5	6	7	8	9	10
No. of dots	3	6								

2. (a) Describe in words how this growing pattern of squares is made.



Square 1 Square 2 Square 3 Square 4

(b) Complete this table. Describe and discuss your methods. Describe and discuss what patterns you see in the table.

Square no.	1	2	3	4	5	6	7	8	30
No. of dots	4	9							

3. How are these patterns different from those in Section 10.1?

10.3 From tables to flow diagrams

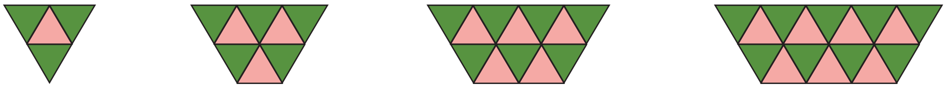
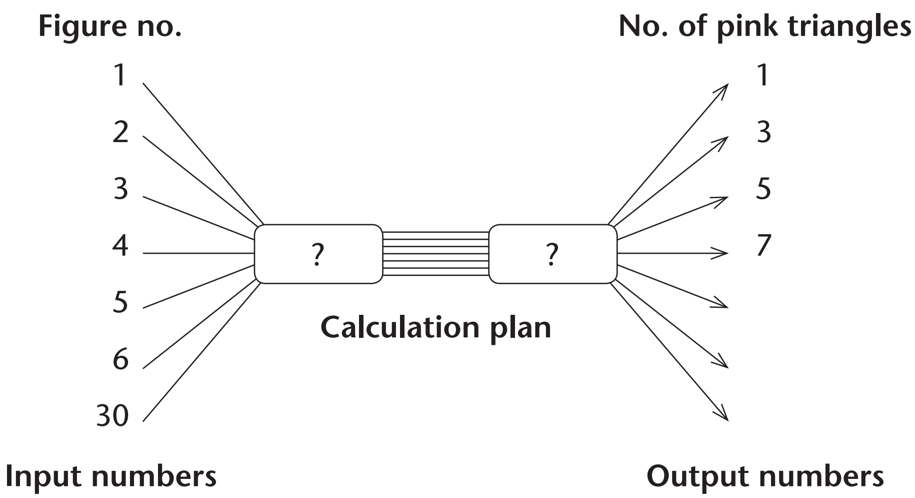


Figure 1 Figure 2 Figure 3 Figure 4

1. Complete this table. Describe and discuss your methods. Describe and discuss what patterns you see in the table.

Figure number	1	2	3	4	5	6	30
Number of pink triangles	1	3	5	7			
Number of green triangles	3	5					
Total number of triangles	4	8					

2. Make a flow diagram to show how the number of pink triangles can be calculated. Use the *Figure numbers* as the *input numbers* and the number of pink triangles as the *output numbers*. Complete all missing parts.



3. Repeat question 2, but this time make a flow diagram to show how the number of *green triangles* can be calculated.

4. Repeat question 2 again but show how the *total number* of triangles can be calculated.

Unit 11 Whole numbers: Addition and subtraction

11.1 Practise addition and subtraction

1. Calculate.

(a) 4 677 + 2 776	(b) 8 677 – 4 999
(c) 3 867 + 3 586	(d) 7 867 – 4 189
(e) 5 586 + 1 867	(f) 5 506 – 1 828
(g) 6 195 + 1 258	(h) 6 135 – 2 457

2. If your answers for questions 1(a), (c), (e) and (g) are not the same, you have made mistakes. If this is the case, check your calculations and correct the mistakes.

3. If your answers for questions 1(b), (d), (f) and (h) are not the same, you have made mistakes. If this is the case, check your calculations and correct the mistakes.

4. Don't do the actual calculations. Just say which of these you *think* will have the same answer.

(a) 5 674 + 3 298	(b) 5 746 + 3 928
(c) 3 674 + 5 298	(d) 5 274 + 3 698
(e) 5 896 + 3 274	(f) 5 278 + 3 694

5. Now do the calculations to check your answer for question 4.

6. Which of these calculations *do you think* will have the same answer, if the calculations inside brackets are done first?
   (a) 3 476 + (2 328 + 2 083)
   (b) (3 476 + 2 328) + 2 083
   (c) 2 328 + (2 083 + 3 476)
   (d) 2 083 + (3 476 + 2 328)

7. Now do the calculations to check your answer for question 6.

8. Which of these calculations *do you think* will have the same answer, if the calculations inside brackets are done first?
   (a) 3 476 + (2 328 – 2 083)
   (b) 3 476 – (2 328 + 2 083)
   (c) (3 476 – 2 083) + 2 328
   (d) (3 476 + 2 328) – 2 083
   (e) 2 328 + (3 476 – 2 083)
   (f) (2 328 – 2 083) + 3 476
9. Now do the calculations to check your answer for question 8.
10. Janice has to add all these numbers together:

976	1 721	881	1 648	546
1 254	447	764	1 034	623

   (a) Round each number off to the nearest 1 000 and use the rounded figures to make an estimate of the total.
   (b) Round each number off to the nearest 100 and use the rounded figures to make a better estimate of the total.
11. Janice decides not to calculate the accurate total of the numbers in question 10 by working in her normal way. She decides to transfer parts between numbers so that she can end up with easy work. For example:
   - Janice transfers the 4 from the 1 034 to the 976 to make 1 030 and 980.
   - Janice also transfers the 20 from the 623 to the 881 to make 603 and 901.

   Rewrite the numbers in question 10 in your book. Transfer parts like Janice did until it is very easy to add up the new numbers.
12. Now find the total of all the new numbers that you made in question 11.

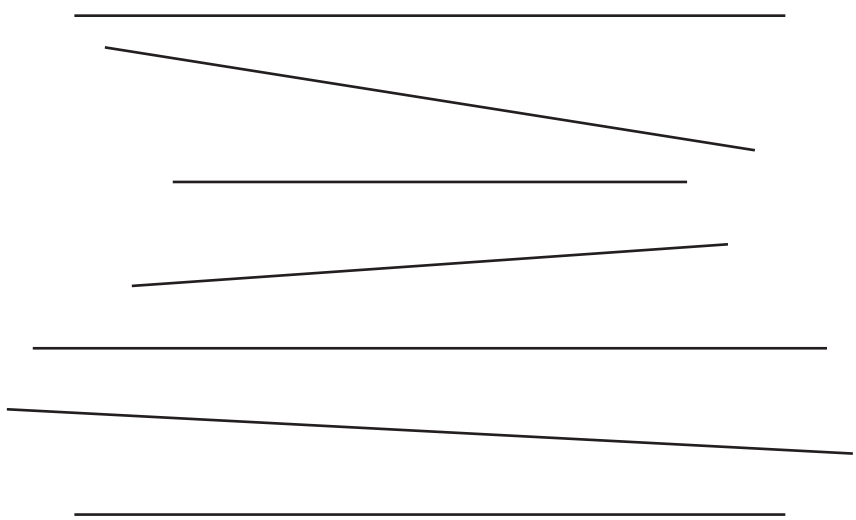
11.2 Find information

1. In December, a hospice shop sold 2 659 of its books at a bargain sale. After the book sale, there were 7 352 books left on its shelves. How many books were there before the sale?
2. Twenty-four new clinics are built in a certain province, each with sixteen beds for patients. How many beds is this in total?
3. Gabieba has R9 800 in her savings account. She withdraws R840, R475, R910 and R635 on different days. How much money is left in her account?
4. Kaliep laid 8 773 bricks and Solly laid 7 884 bricks. How many more bricks did Kaliep lay than Solly?
5. How long are all these line pieces together?

   First make an estimate.

   Then measure and calculate.

   Give your answer in millimetres.



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11.3 One number for many

Bennie has to find the sum of the ten numbers below.

He decides to make an estimate by choosing an easy number that is close to these numbers and multiplying it by 10.

To "find the sum" means you have to add all the numbers together.

887	734	639	729	901
663	781	809	585	672

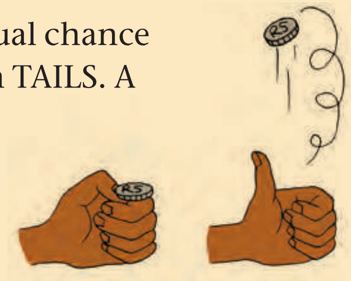
Bennie chooses 500 and multiplies it by 10, so his estimate of the sum is 5 000.

1. Do you think Bennie made a good choice for a single number? If not, explain why you think 500 is not a good choice.
2. Choose a number that you think is better than 500, and use it to make your estimate of the sum of the above numbers.
3. Now add up the ten numbers accurately.
4. Was your estimate of the sum better than Bennie's estimate?
5. Investigate whether the single number 800 would have produced a better estimate than the number you chose.
6. Which of the following numbers would have been the best choice for a single number?

   600 650 700 750 800
7. Which number would have been a "perfect" choice for a single number?
8. (a) Choose a single number and use it to estimate the sum of 1 354, 2 007, 1 785, 1 576 and 1 932.

   (b) Add the numbers up accurately to check how close your estimate was.

UNIT 12 PROBABILITY



When you flip a coin, then there is an equal chance that it lands on HEADS or that it lands on TAILS. A coin can only land on one of these.

If you say "heads" when your teacher flips a coin, and it lands on HEADS, then you win. If it lands on TAILS, you lose.

Flipping a coin helps us make some decisions.

12.1 How does it work to flip a coin?

1. (a) When two teams are playing each other, they agree to flip a coin to make a decision. The person who wins the toss starts the game. Do you think this is fair? Why do you say so?

   (b) What else do people use when they may not agree with each other and they have to make a fair decision? Discuss other ways of helping to make a decision, like drawing straws (the person who draws the short straw is usually the loser). Write down at least one other way.

A coin has two sides called HEADS and TAILS. HEADS is the side with the coat of arms of South Africa, and TAILS is the side with the number that tells the value of the coin. We say a **coin flip** has **two outcomes**: either HEADS or TAILS.

Sometimes people think they can predict which side the coin will land on. People think one side is luckier than the other side, or that one HEAD must be followed by one TAIL. We will do an experiment to better understand how it works to flip a coin.

12.2 An experiment with flipping a coin

Work on your own to flip a coin many times and record what happens each time. You need a sheet of squared paper and a coin.

Make a key on your sheet of paper:

HEADS TAILS

Each time the coin lands HEADS up, shade in a square with your pencil. Each time the coin lands TAILS up, leave the block unshaded.

Below is an example of 20 flips of a coin that were recorded by shading blocks:

T	H								

In the example above, the HEADS are 11 out of 20, and the TAILS are 9 out of 20.

1. Now do your own experiment. Flip a coin at least 20 times and record the results. If you have time, flip the coin 100 times.
2. Work with your own data.
   (a) How many flips did you do?
   (b) How many times did you get HEADS in your experiment?
   (c) What fraction of the flips was HEADS and what fraction of the flips was TAILS?

When you record the way the flipped coin landed, this is your **data**. We can analyse the data to understand coin flipping better.

3. Compare your data with that of other classmates.
   (a) What fraction of HEADS did they get in their experiments?
   (b) Why do you think your data are not all the same?

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Sometimes people think the number of HEADS and the number of TAILS must be the same in any experiment. This is not true. Only when we flip a coin many, many, many times can we expect that the total number of HEADS and TAILS may be the same. We cannot expect that in short experiments. Why is this?

4. Work with the rest of the class.
   (a) Make a tally table with rows from 0 to 20 to show how many HEADS each classmate got out of 20 flips of a coin. (Nobody can get more than 20 HEADS in 20 flips.)
   (b) Make a pictograph. Draw a number line that runs from 0 to 20. Make a cross above the correct number to show how many HEADS each one got.
   (c) Write a short paragraph about the story of the graph.

5. Combine the data of some classmates until you have data of 100 flips.
   (a) Complete the table with the data of 100 flips.

Number of flips	Fraction HEADS	Fraction TAILS
After the first 20 flips		
After 40 flips		
After 60 flips		
After 80 flips		
After 100 flips		

   (b) Compare your table with the results of another group of classmates with 100 combined flips. How much different are your data after 20 flips? And after 100 flips?
   (c) Make a pictograph of the number of HEADS out of 100 flips that different groups of classmates got. Think before you start: Does your number line have to run from 1 to 100?

(d) Write a short paragraph to tell the story of the pictograph.

(e) What do you think will happen after 100 flips? Write why you say so.

6. Think about your experiment.

   (a) Do you think it is possible to get 100 HEADS in 100 flips of a coin? Write why you say so.

   (b) Do you think it is possible to get 0 HEADS in 100 flips of a coin? Write why you say so.

   (c) Will you be surprised to see 15 HEADS in 20 flips?

   (d) Will you be surprised to see 20 HEADS in 100 flips?

   (e) If your class repeated the experiment of flipping a coin, about how many HEADS would you expect to get in 100 flips?

7. (a) If you flipped a coin 20 times and you got 12 HEADS, how many TAILS did you get?

   (b) If you flipped a coin 100 times and you got 56 HEADS, how many TAILS did you get?

   (c) How did you know the answers to (a) and (b) without actually flipping a coin?

12.3 An experiment with rolling a die

Games with dice are very popular, and are played by children and adults. This is because we cannot predict what number on the die we will get for any specific throw. We will gather data about rolling a die to learn how it works.

1. Write down the possible numbers that you can get if you roll a die.

2. Write down what you think. If you roll one die 10 times, what numbers do you think you will get? Why do you say so?

Prepare to gather data about rolling a die.

Work on squared paper. Each time you roll the die write the number on the die in one block.

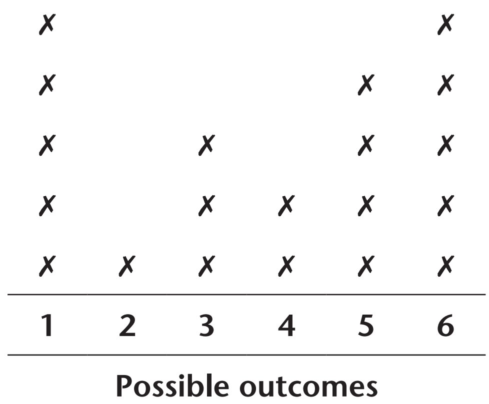
Below is an example of the results of rolling a die 20 times.

1	4	4	1	5	6	5	5	3	6
6	6	3	3	6	2	1	1	5	1

3. Do your own experiment. Roll one die at least 20 times. If you have time, roll the die many times. Record your data in a tally table.

When you roll one die there are six possible outcomes.

Below is a pictograph of the data in the table above.



4. Now make a pictograph to show how many of each number you got in *your* experiment.
   (a) Draw a number line in your book that runs from 1 to 6.
   (b) Make crosses above the correct numbers to show your results.
   (c) Write a short paragraph about the story of your graph.

5. Compare your pictograph with that of a classmate.
   (a) Explain the differences between your graphs.
   (b) Why do you think your results are different?
6. How will your graph change if you record the results of 100 rolls of one die? Why do you say so?
7. If you have not yet done so, roll a die 100 times and record the results on a pictograph.
8. Write a short paragraph to tell the story of your experiment. Say how much your data about the number of each outcome differ.
9. Interpret your pictograph to answer these questions. Give reasons from your data.
   (a) If you do the experiment again, would you be surprised if you throw no 2s?
   (b) Would you be surprised if you roll the same number all the time?
   (c) Would you be surprised if you roll almost the same number of all the possible outcomes?
   (d) Would you be surprised if one number is never repeated?
   (e) Would you be surprised if you roll the same number three times in a row?