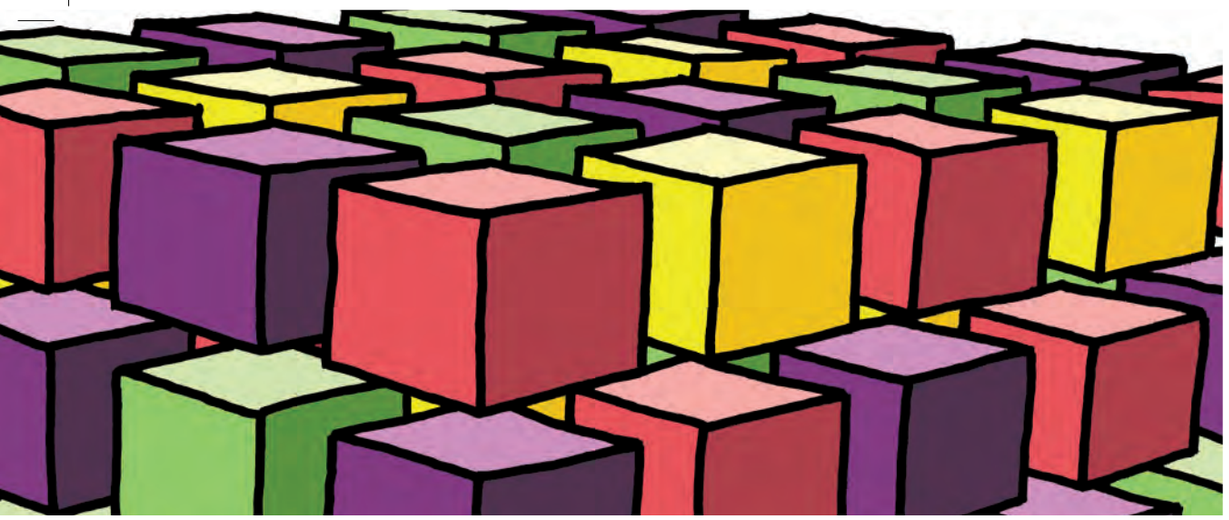

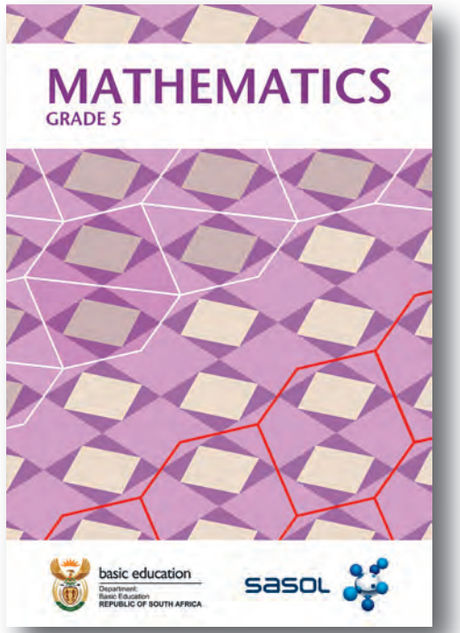

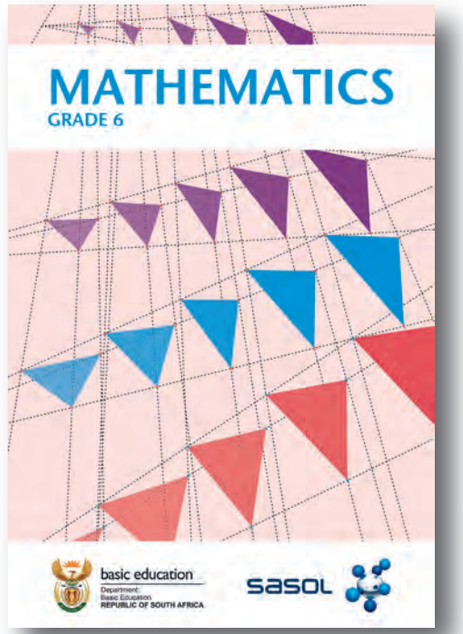

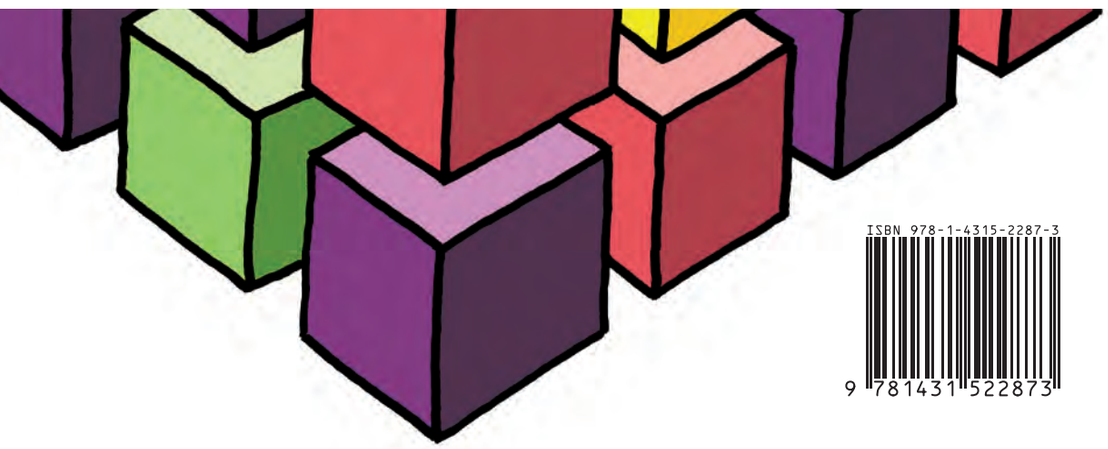

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MATHEMATICS GRADE 4

MATHEMATICS

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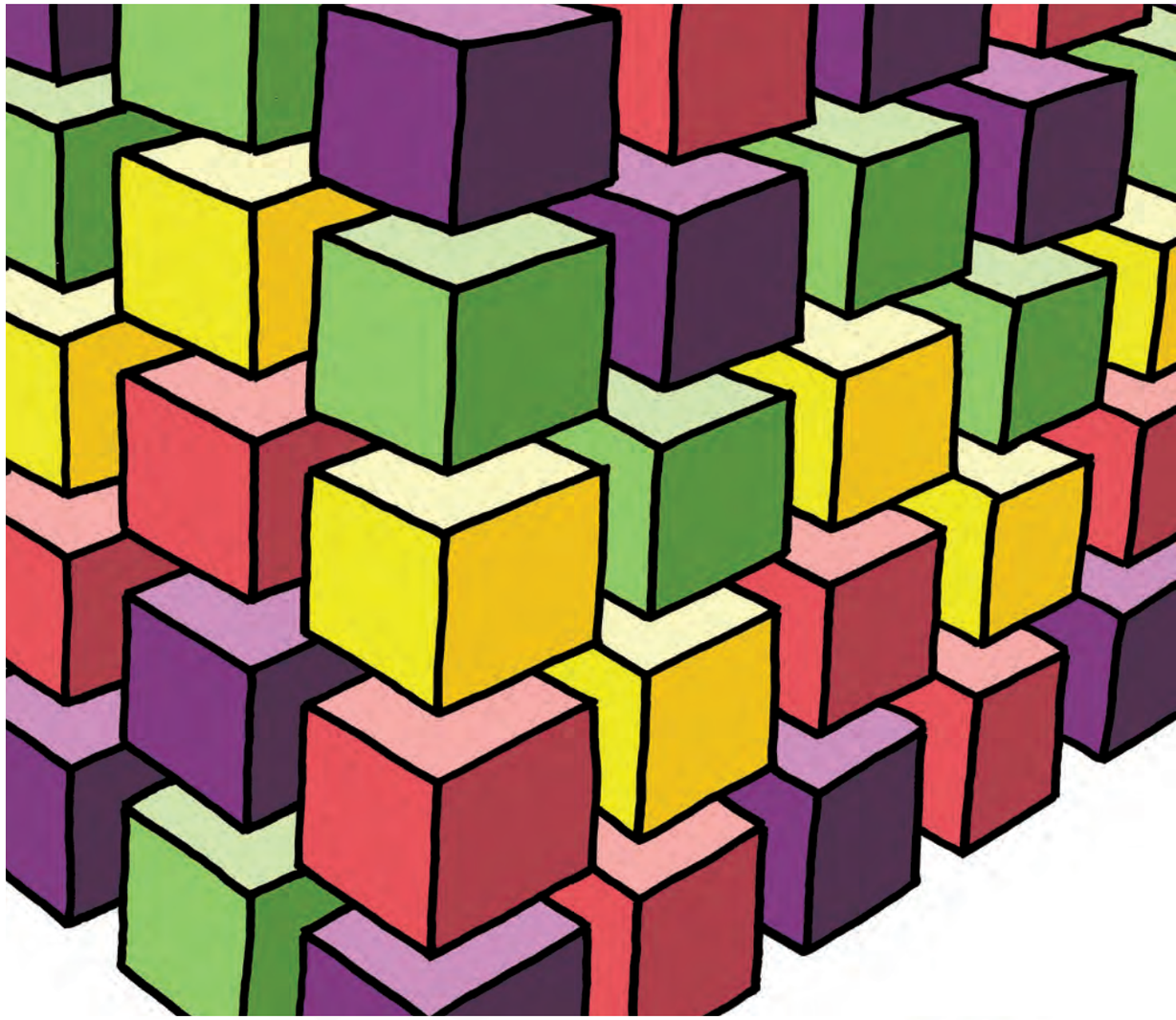

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Grade 4

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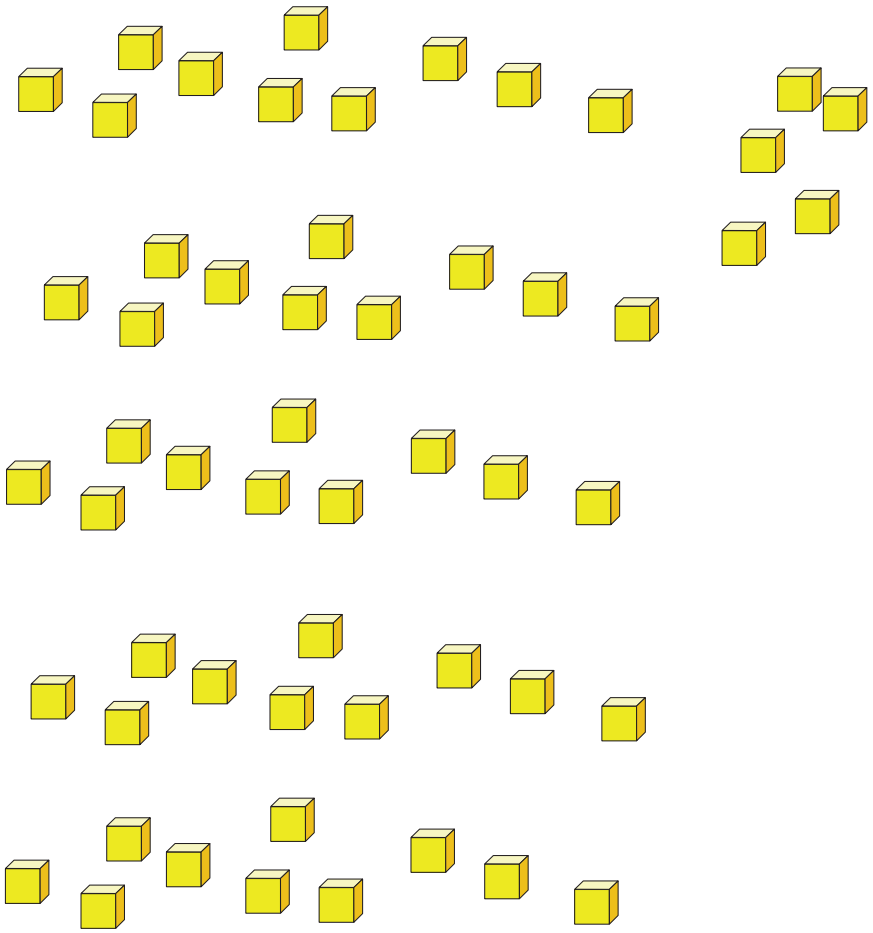
UNIT 1

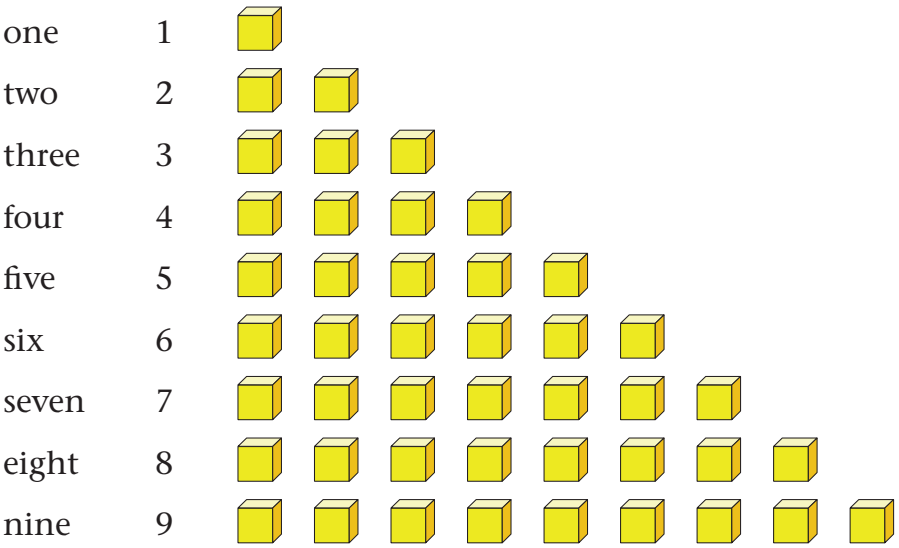
WHOLE NUMBERS

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*.

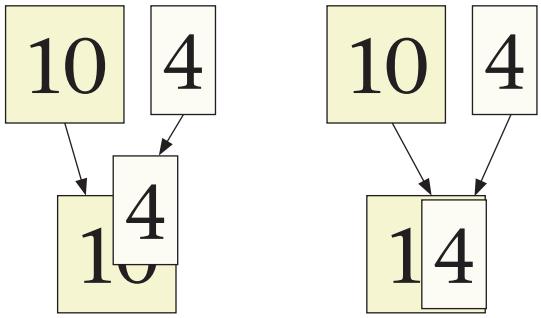


You already know that we have *single* symbols for the numbers one to nine, as shown below.



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*.

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

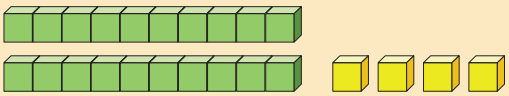
eighteen

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

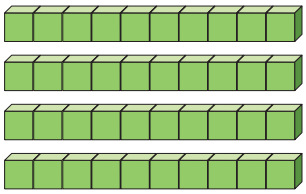
$24 = 20 + 4$

The number symbol is 24.

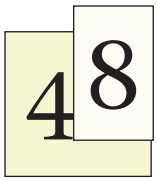
When you write this number as 20 + 4, you are using the **expanded notation**.

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

5. Look at number 48:

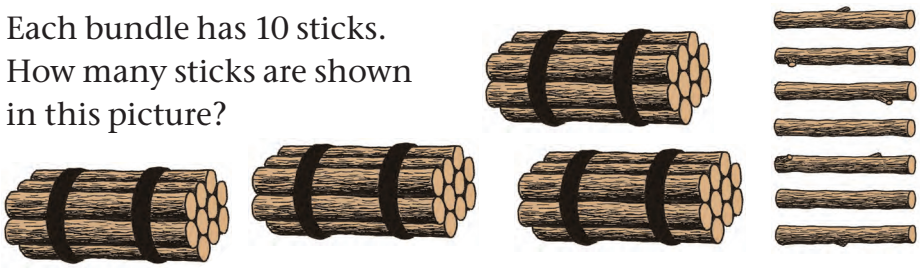


forty-eight



   (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?



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.

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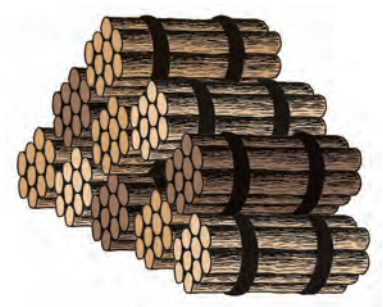
1.2 Count in hundreds, tens and units

Look at what this picture shows you:

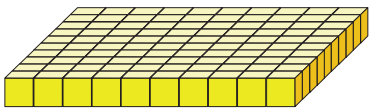


*A heap of **hundred** sticks*
(10 bundles of 10 sticks each)

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.

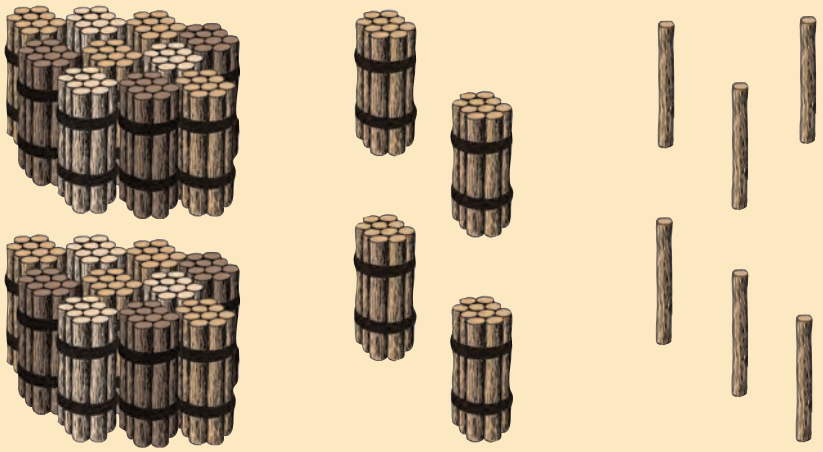
2. (a) How many sticks are there in 2 heaps of 10 bundles each?
   (b) How many sticks are there in 5 heaps of 10 bundles each?
   (c) How many sticks are there in 7 heaps of 10 bundles each?
   (d) How many sticks are there in 10 heaps of 10 bundles each?

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?

Two hundred and forty-six sticks are shown below.

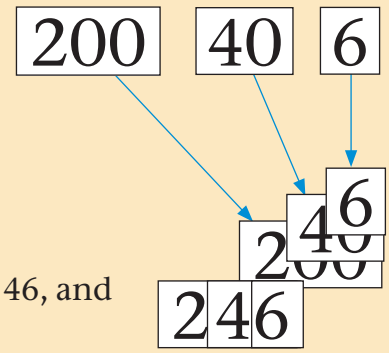


200 sticks *40 sticks* *6 sticks*

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

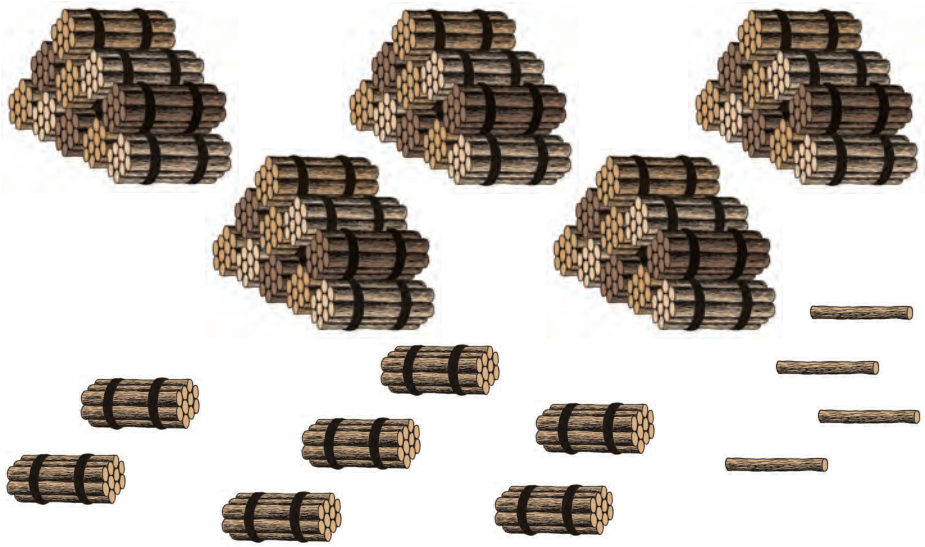
- two hundred 200 This is the **hundreds part**.
- forty 40 This is the **tens part**.
- six 6 This is the **units part**.

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?



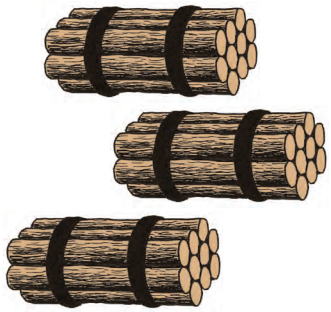
5. Which is more?
   (a) 501 sticks or 389 sticks (b) 699 sticks or 822 sticks
6. How many sticks is 4 heaps, 7 bundles and 5 loose sticks?
7. (a) How many heaps of hundred can be made up from 384 sticks, and how many sticks will remain?
   (b) How many bundles of ten can be made from the sticks that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

1.3 Building up and breaking down numbers

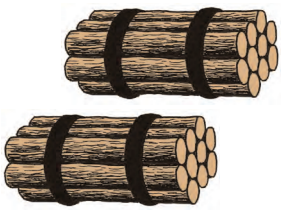
The numbers 30 and 4 can be combined to form the single number 34.



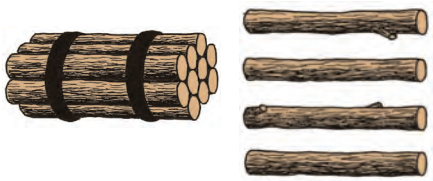
30 + 4 = 34

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

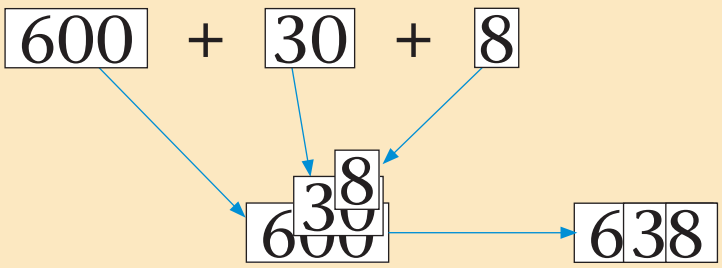
The parts that are mentioned in the name of a number are called the **place value parts**. For example, the place value parts of thirty-seven are 30 and 7.

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?

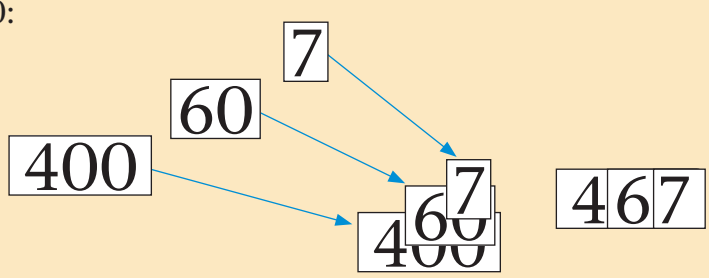
1.4 Number names, expanded notation and number symbols

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?

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

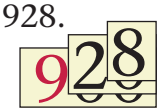
298 = 2 hundreds + 9 tens + 8 units

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

Place values

hundreds	tens	units
2	9	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
9	2	8

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.

hundreds	tens	units
8	2	9

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

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?

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?

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)

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.

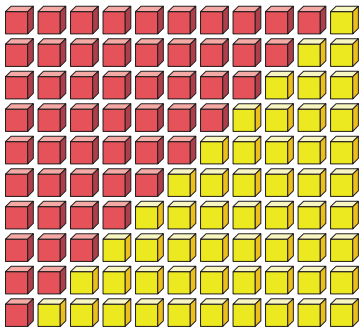


Diagram A

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.

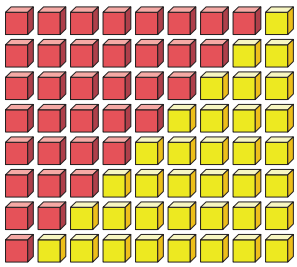


Diagram B

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

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

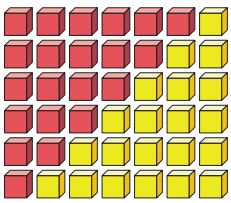


Diagram C

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.

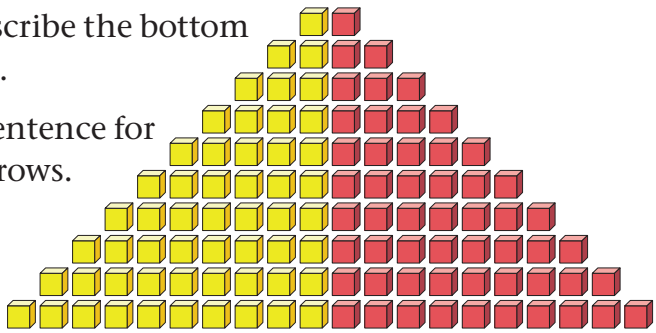


Diagram D

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

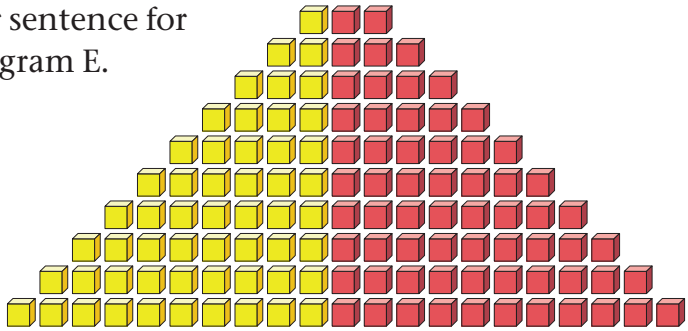


Diagram E

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

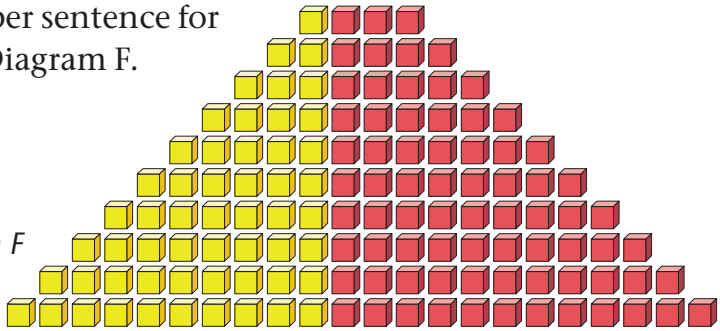


Diagram F

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?

2.4 Solve and complete number sentences

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

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

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 □ 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.

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

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:

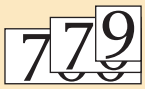
500 40 3 200 30 6

You can add the hundreds parts 500 + 200 = 700 700

and the tens parts 40 + 30 = 70 70

and the units parts. 3 + 6 = 9 9

You can then build the answer up: 700 + 70 + 9 = 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

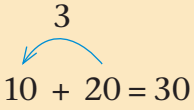
If you always have to count to find facts like 7 + 5 = 12, it will always take you very long to do calculations. *You have to learn to make addition and subtraction facts without counting!*

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:



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.

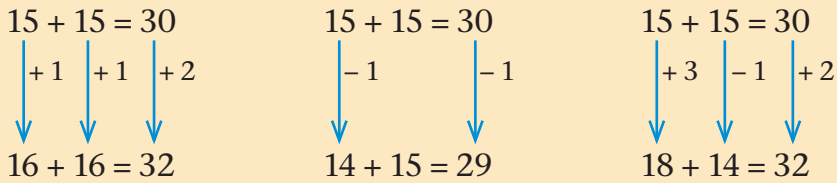
   (b) Shift 3 to make another fact from 20 + 20 = 40.

   (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.

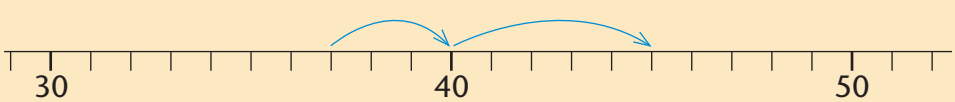


4. Start with 20 + 10 = 30 and make ten other addition facts, all with answers different than 30.

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:

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

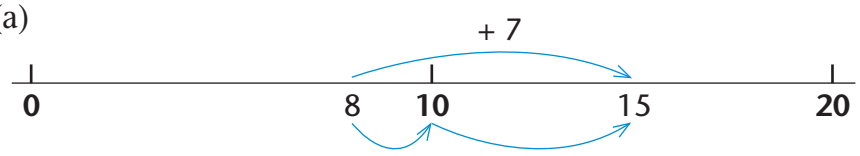
By first adding 3 and then adding 5 you have added 8 in total.

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

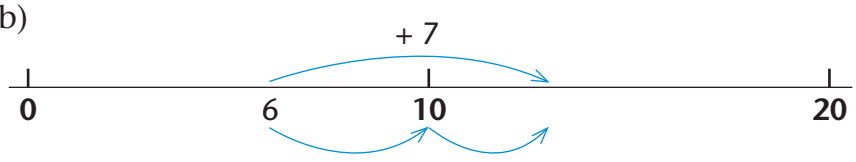
7. Show how 15 + 8, 35 + 8, 17 + 7 and 46 + 9 can be calculated by filling up to tens.

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.

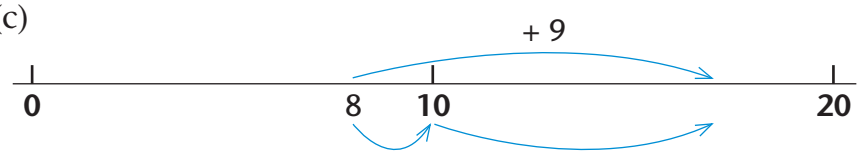
(a)



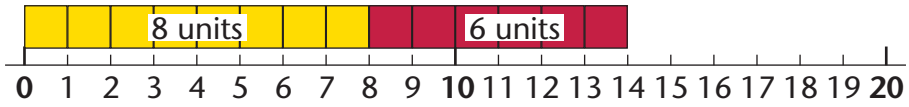
(b)



(c)



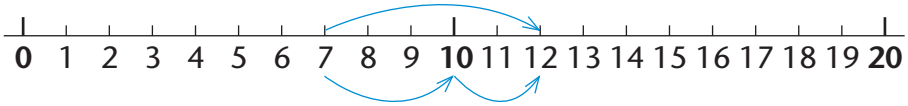
You can see on this number line that 8 + 6 = 14.



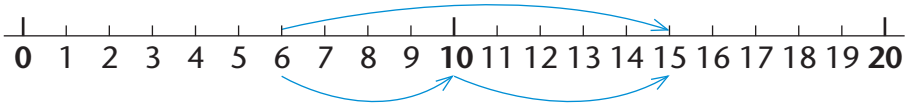
You can also see that 14 – 8 = 6, and 14 – 6 = 8.

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

(a)



(b)



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 = . . .

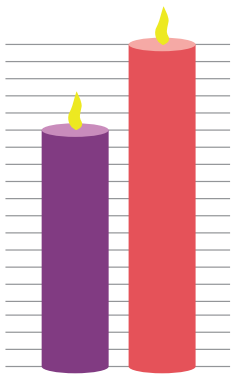
11. Now complete the sentences you have copied in question 10. You may work from the facts that you know, or fill up to 10, or work in any other way you prefer.

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:

    $14 + 6 \rightarrow \ldots + 10 \rightarrow \ldots + 2 = \ldots$

    (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.

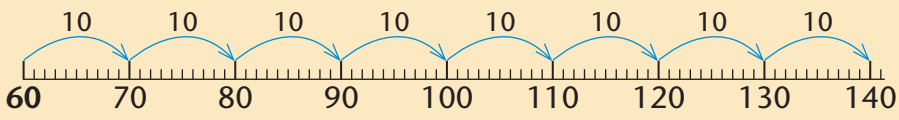
So, if you know that 3 + 5 = 8,
you can also know that 30 + 50 = 80 and 300 + 500 = 800.

1. How much is each of the following?

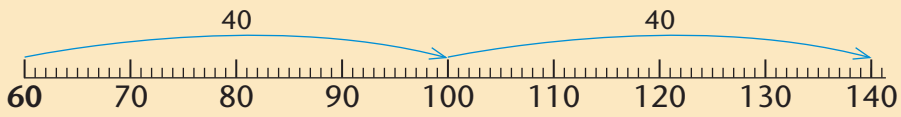
   If you don't know the answers immediately, read the text below and on the next page first. Then try again.

(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:

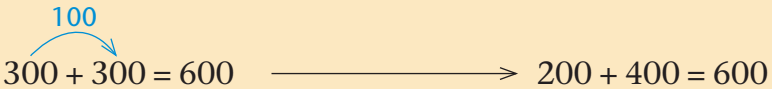


You do not have to draw a number line to think like this. You can just think of a number line and write as follows:
60 + 40 → 100 + 40 = 140

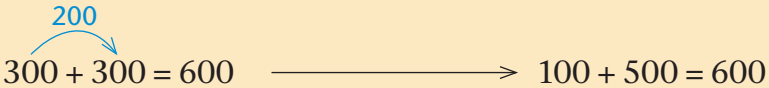
You can also use **doubling** to calculate 60 + 80:
Start with 60 + 60 = 120; then add 20 to make 60 + 80 = 140.

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:



You can make a different fact by transferring 200:



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:

$$30 + 50 = 80 \quad (+10,\ +10)$$
$$40 + 50 = 90$$

$$300 + 300 = 600 \quad (+200,\ +200)$$
$$300 + 500 = 800$$

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

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

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.

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

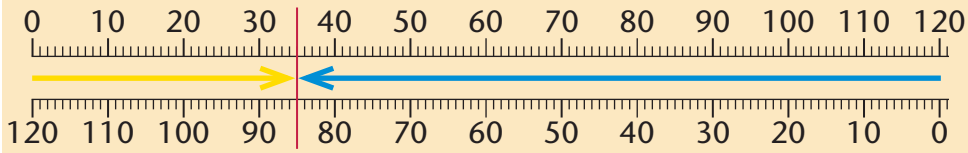
3.5 Subtraction facts for multiples of 10 and 100

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?
   □ – 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

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.

Hence $720 - 450 = \underbrace{600 - 400}_{200} + \underbrace{120 - 50}_{70}$

$= 270$

Instead of the curly signs ⏟ we may use brackets to indicate the plan to calculate 600 – 400 and 120 – 50 separately:

$720 - 450 = (600 - 400) + (120 - 50)$

$= 200 + 70$

$= 270$

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

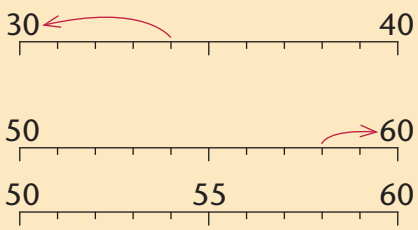
It is often useful to quickly make approximate answers for calculations. Imagine you buy items for R34 and R58 and do not have time to accurately calculate R34 + R58.

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?

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.

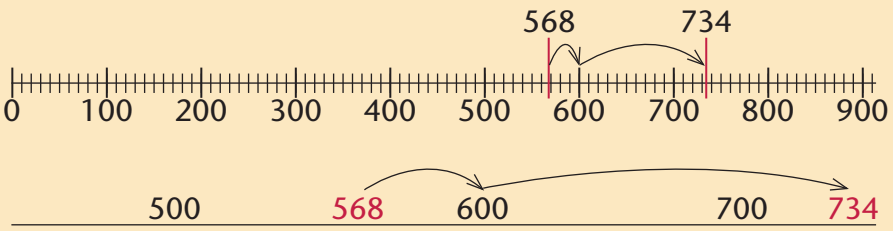
You may then do this in steps as shown below.

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 + □
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 + □ = 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?

UNIT 4

NUMERIC PATTERNS

4.1 Seeing patterns

The more patterns you can see in mathematics, the better you are at mathematics!

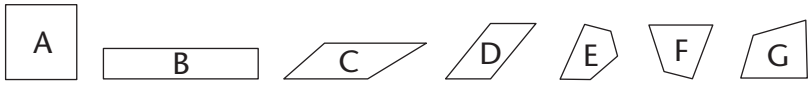
How good are you at seeing patterns?

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.

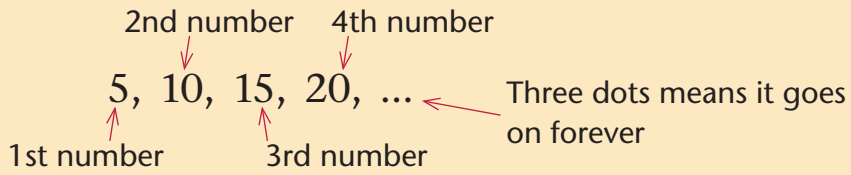
4.2 Making patterns

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:



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			

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.

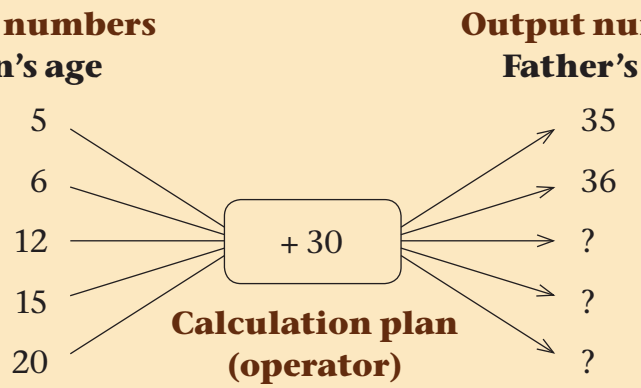
We can describe the father and son's ages in different ways:

- 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:

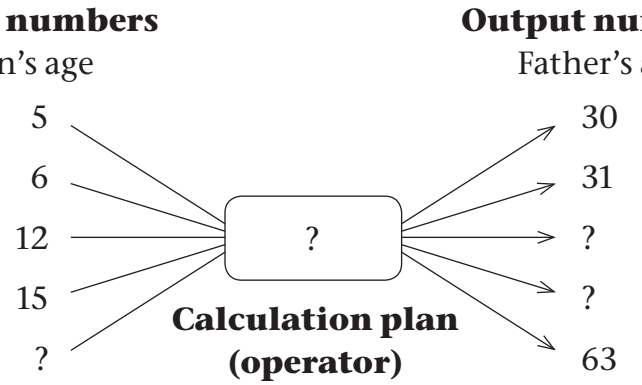
Son's age	1	2	3	4	...	10	11
	↓ +30	↓ +30	↓ +30	↓ +30		↓ +30	↓ +30
Father's age	31	32	33	34	...	40	41

- 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?

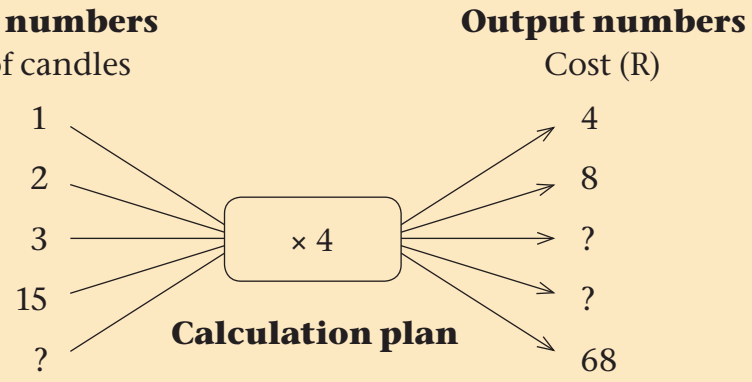
   (b) Describe her method in words.

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

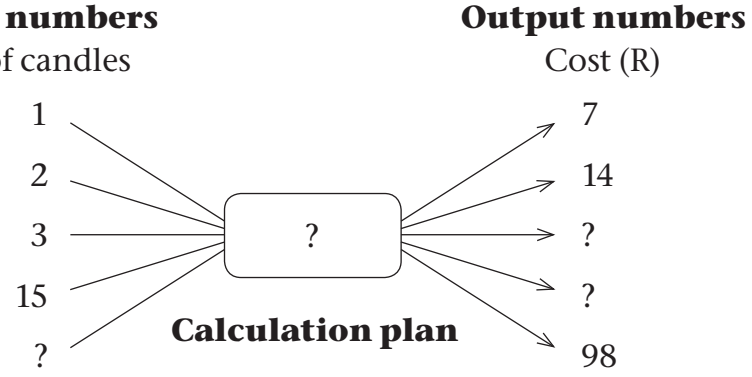
4. Which method do you prefer, Theo's method or Nadia's method? Why? Discuss.

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							

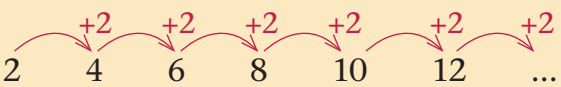
1. Complete the table.
2. Which methods did you use to complete the table? Discuss.
3. Discuss what patterns you see in the table, and how that helps you to "remember" the tables.

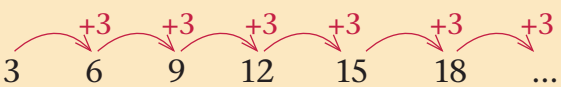
The multiplication table consists of sequences of **multiples**. For example:

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:





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, ...

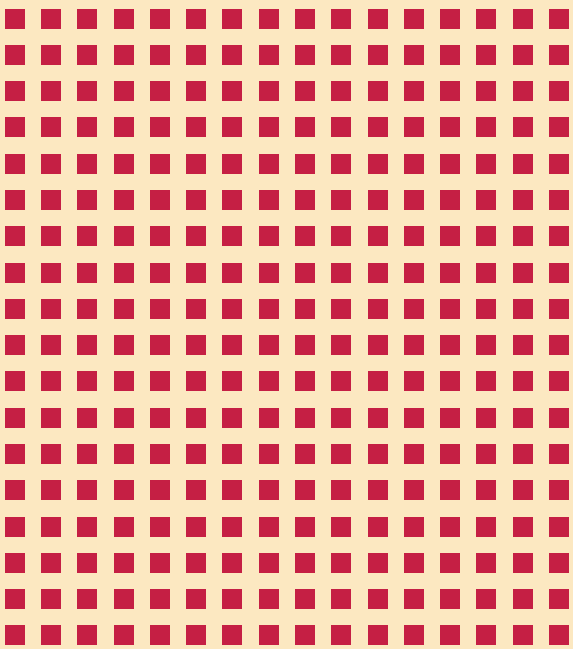
   Sequence F: 10, 20, 30, 40, 50, 60, 70, ...

   (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 + ...

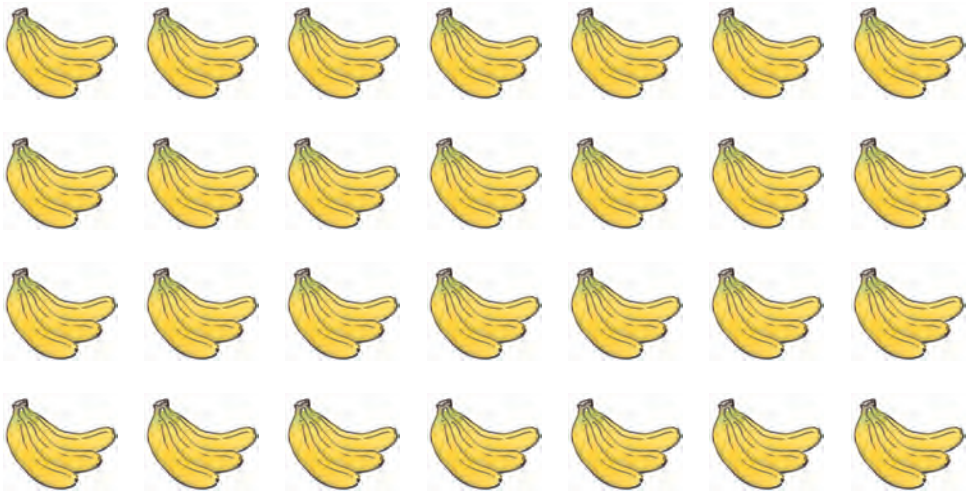
But if you can calculate 18 × 16, it is even quicker!

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?

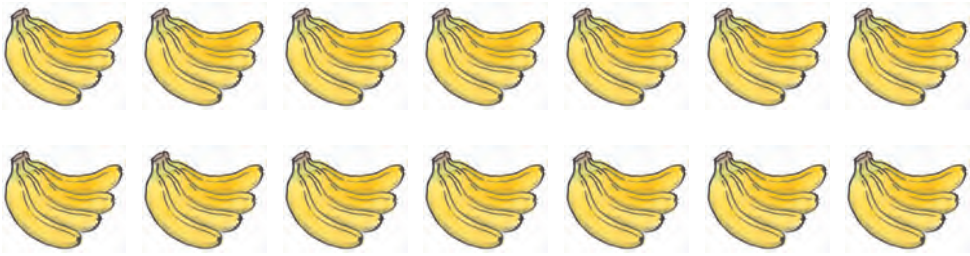
11. What do you notice about 3 × 5 and 5 × 3?

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

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

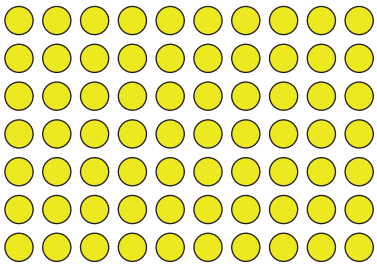
   Use your answers to answer question 3.

   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.



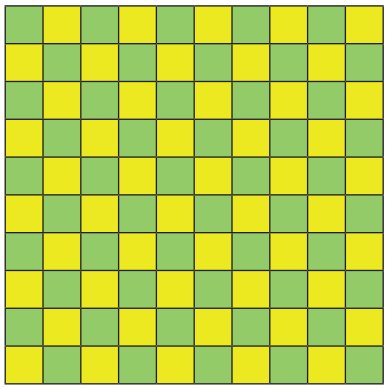
   Which of the following multiplication facts can you use to know how many dots there are in the diagram, altogether?

   (a) 7 × 7 = 49 (b) 7 × 8 = 56

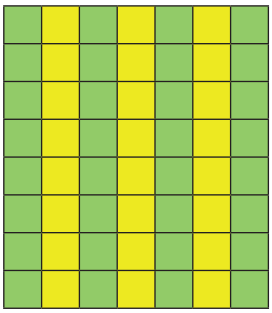
   (c) 7 × 9 = 63 (d) 7 × 10 = 70

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

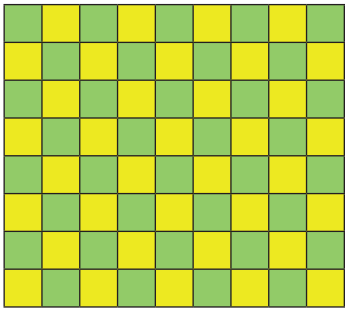
(a)



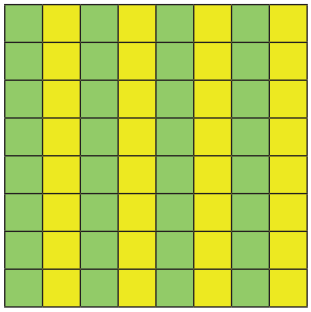
(b)



(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?

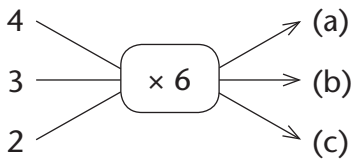
5.6 Multiplying in steps

A flow diagram consists of three parts:

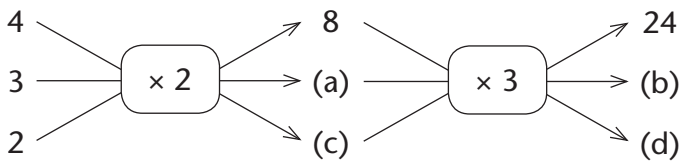
- the **input numbers**, for example 4, 3 and 2 in the flow diagrams below
- the **operator(s)**, for example × 6 in question 1, and × 2 and × 3 in question 2
- the **output numbers**, for example the number 24 in question 2.

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.

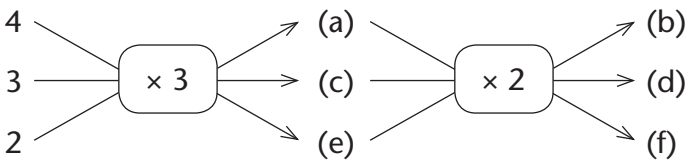
1. What are the output numbers at (a), (b) and (c)?



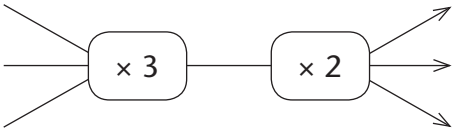
2. What are the numbers at (a), (b), (c) and (d)?



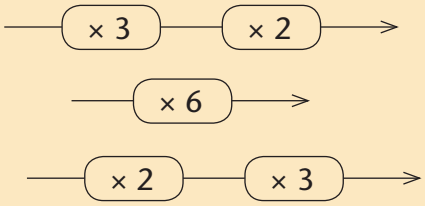
3. Write the numbers that are missing below.

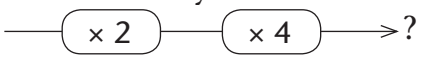


Each flow diagram in question 3 has one operator. Two flow diagrams with one operator each can be combined into one flow diagram with two operators:

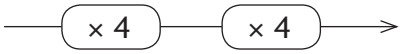


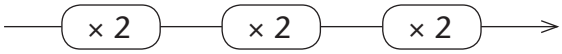
The three flow diagrams below are different. However, they produce the same results, so we say they are **equivalent**.

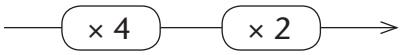


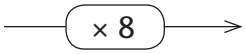
4. (a) Which of Flow diagrams A to D below do you think will produce the same results as 

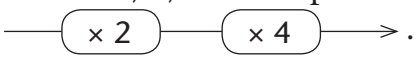
?

A 

B 

C 

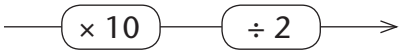
D 

(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?



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

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?

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

My school calendar

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

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

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

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**.

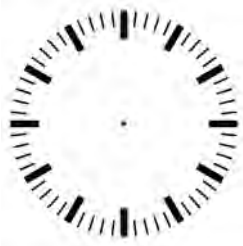
The minute hand moves around the clock face once every 60 minutes. While the minute hand moves around the clock once, the hour hand moves to the next hour.

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

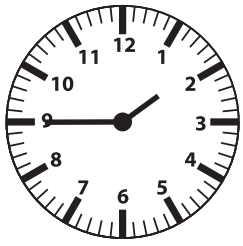
2. What times do these clocks show? Write the time in numbers and in words, for example: *6:15 quarter past 6*.

(a)

(b)

(c)

(d)



Minutes past the hour

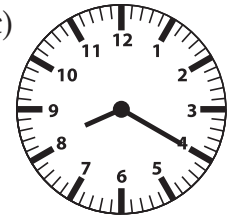
As the minute hand moves from 12, at the top of the clock, we talk about minutes *past* the hour. We say: 1 minute past ..., 2 minutes past ..., 3 minutes past ... until we get to 30 minutes past, or half past the hour.

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) 

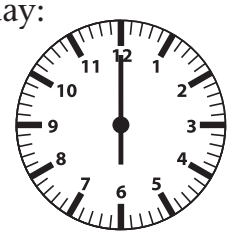
(c) 

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

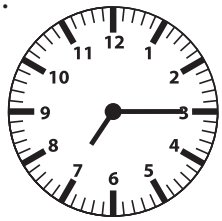
Before midday and after midday

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?

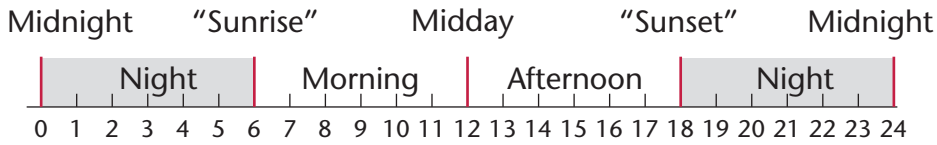
10. Soccer practice starts at ten past two in the afternoon and it is one hour long. What time does soccer practice end?

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

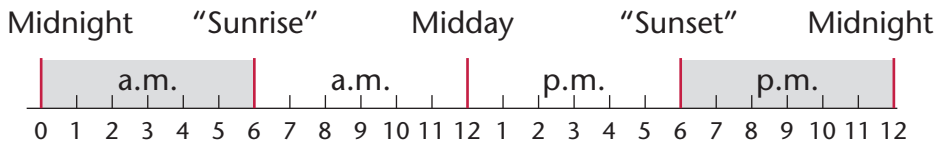
12. Which is longer: two and a quarter hours or 124 minutes? Explain your answer.

6.4 Understanding the 24-hour clock

The 24-hour clock



The 12-hour clock

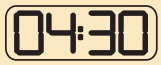


Two kinds of clocks

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

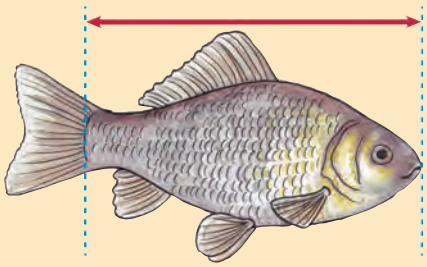
Syubunkin goldfish

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!

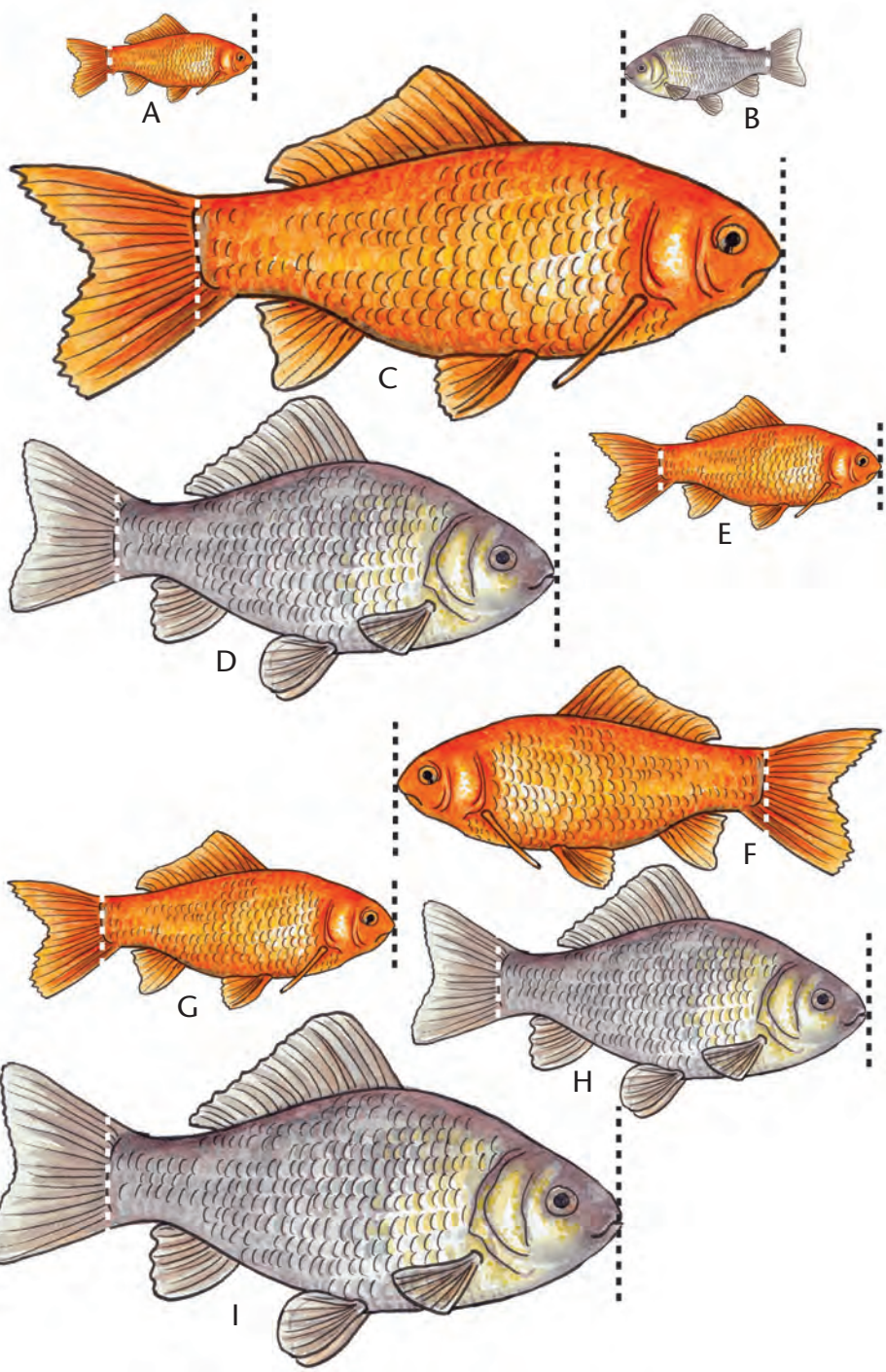


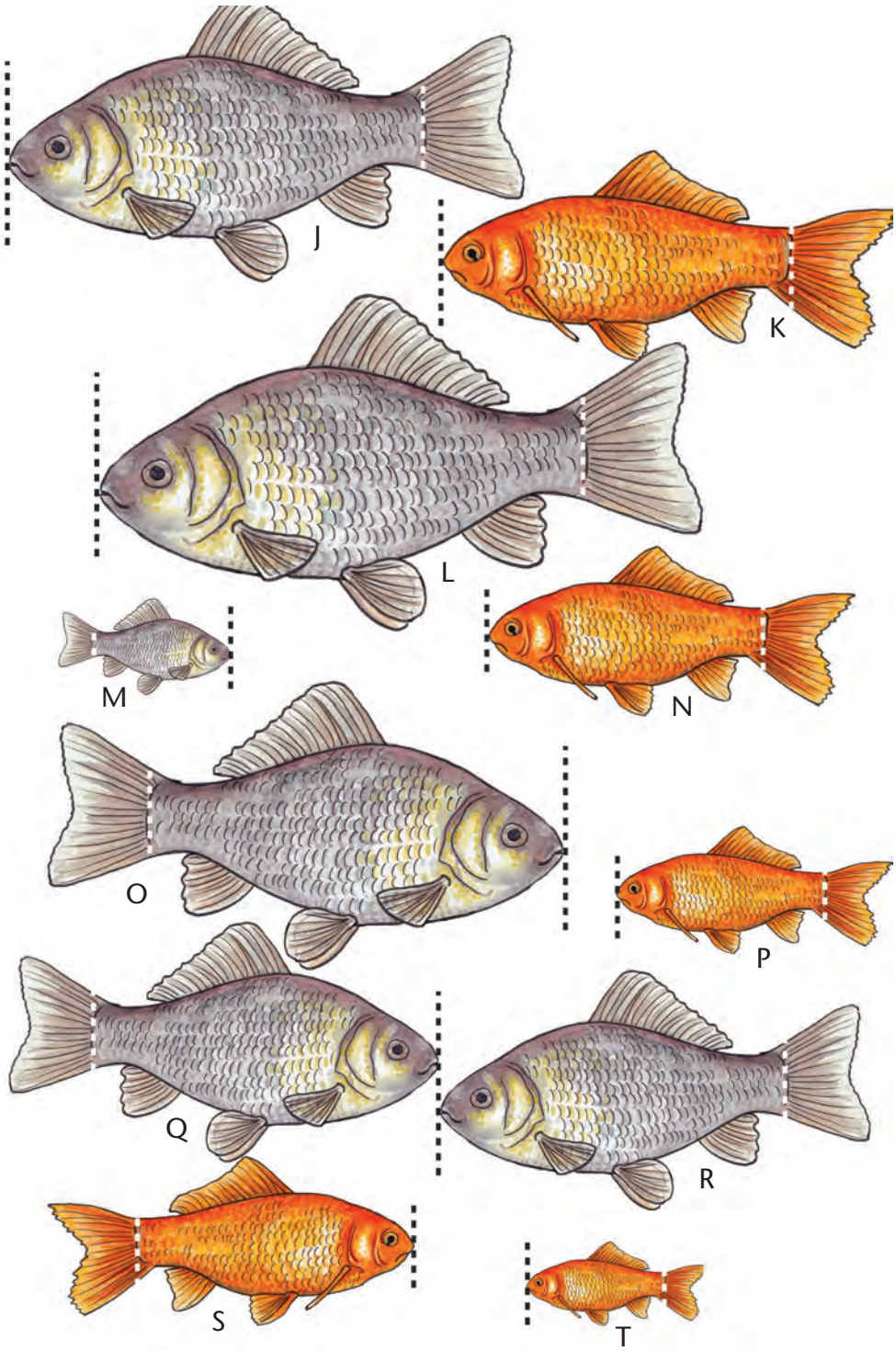
1. Work with a classmate.
   (a) Decide how you will share the work and make sure that you do not leave out fish or measure them twice. Write down what you decided.
   (b) Now measure the fish and write down your measurements in your book.
   (c) Compare your measurements with another pair of classmates. 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.





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	𝍸 //	7
4 cm	𝍸 𝍸 𝍸	15
5 cm	𝍸 𝍸 /	11
6 cm	𝍸 //	7
7 cm	///	3
8 cm	////	4

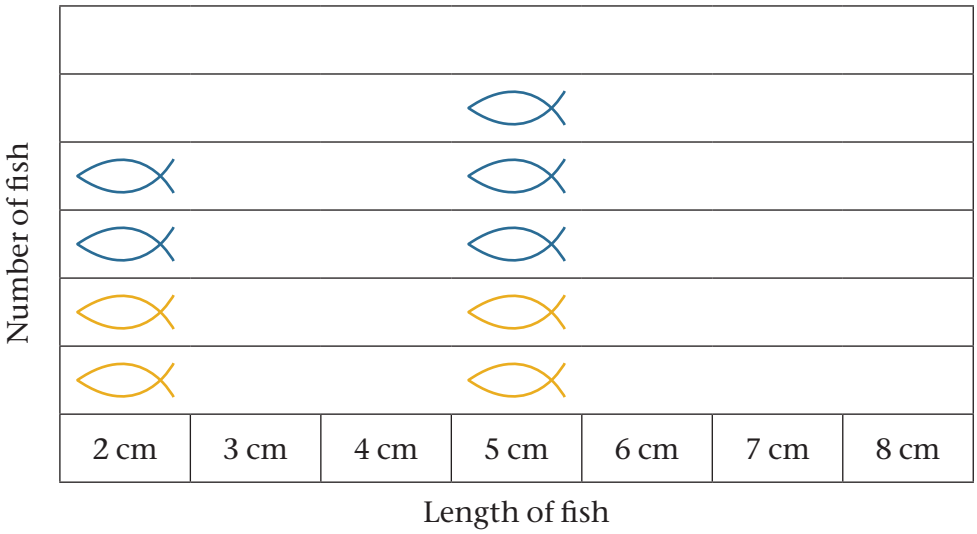
1. What can you tell about the length of the fish from Jabu's tally table? Write down your story and compare it with that of a classmate.
2. Do you agree or disagree with the following statements? Explain why.
   (a) Most Syubunkins are between 5 cm and 8 cm long.
   (b) Most Syubunkins are 4 cm long.
   (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



Key: One Huna One Hibuna

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.

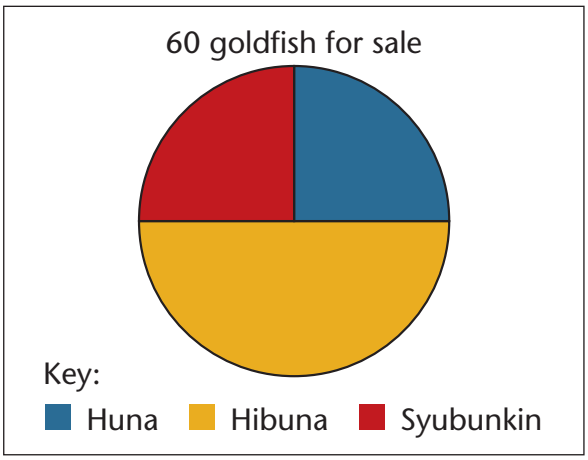
Number of Huna of different lengths in Tank A

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.

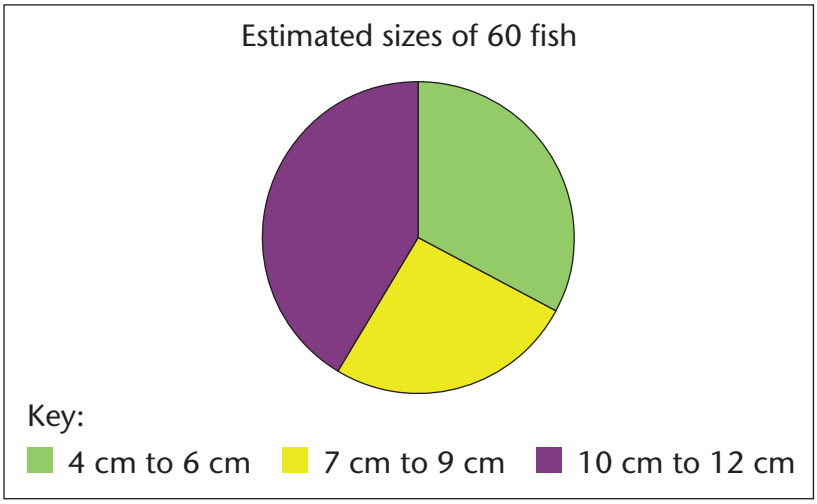
In a pie chart the parts are **fractions** of the pie (circle). For example, we work out *what fraction* of the fish are Huna and then we colour *the same fraction* of the pie.

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!"

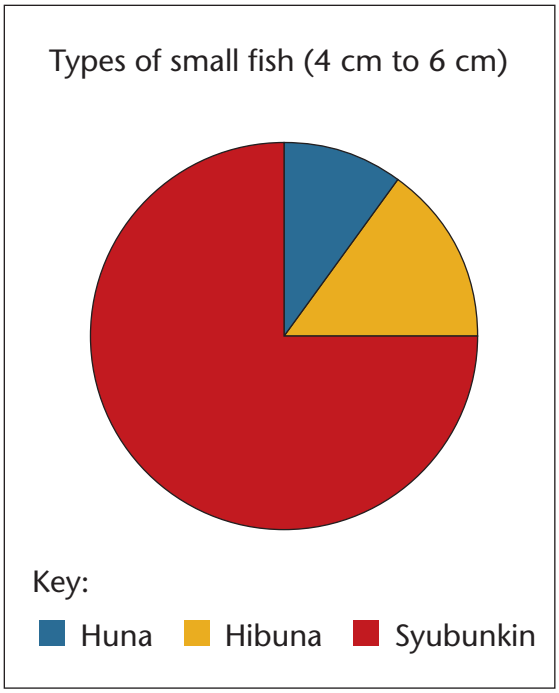
2. Check if Jabu is correct about the price.

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.



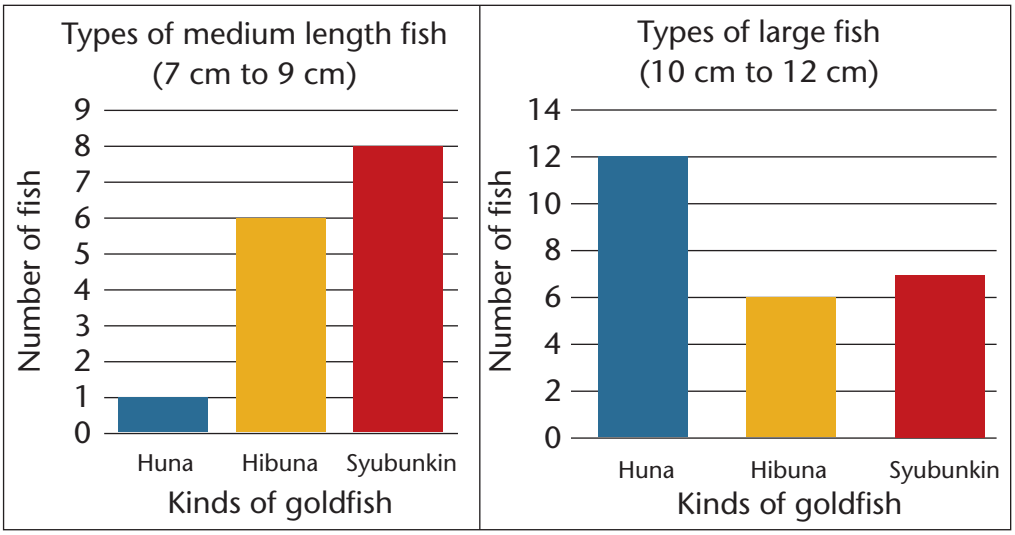
5. What story does the pie chart tell about the kinds of small fish? Write the information in your book.
6. Read each statement and say whether you agree or disagree. Explain why.
   (a) About three quarters of the small fish are Syubunkins.
   (b) About one third of the small fish are not Syubunkins.
   (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.

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.

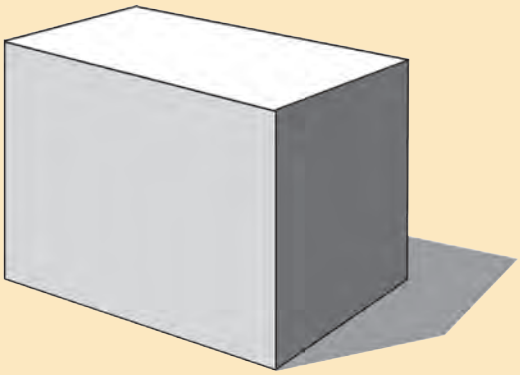
1. How many Hibunas are medium length fish?
2. How many Hunas are large fish?
3. Compare the number of Hibunas that are medium and large.
4. Compare the number of Syubunkins that are medium and large.
5. Work out how many Hunas and Hibunas are small. Use the information in all the previous bar graphs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

UNIT 8

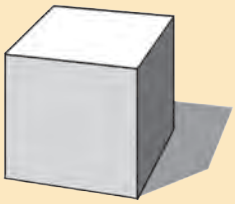
PROPERTIES OF TWO-DIMENSIONAL SHAPES

8.1 Surfaces with different shapes

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

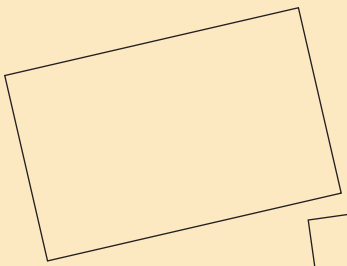


Block A

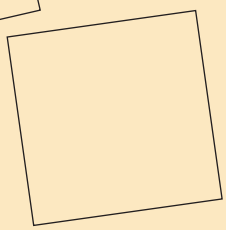


Block B

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.



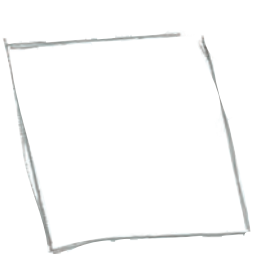
1. Use your pencil only and try to draw a square. Do not use a ruler or some other straight object.

   Your drawing must be bigger than the square shown here.

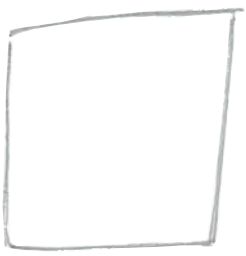
   Use about half of a page.

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

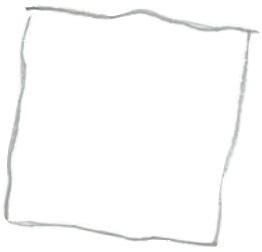
   Which of these drawings is the best attempt to draw a square?



Drawing A

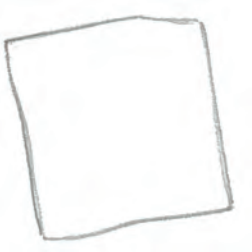


Drawing B



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*.

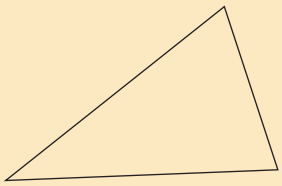
You have made yourself a tool that you can use to draw straight lines. A tool like this is called a **straight edge**.

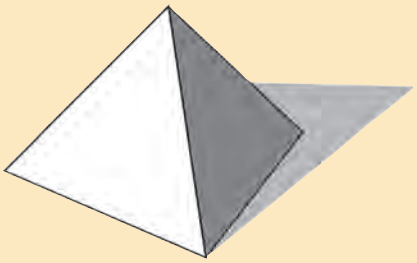
5. Use your straight edge to draw a square as well as you can.
6. Also draw a rectangle that is not a square, as well as you can.

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**.

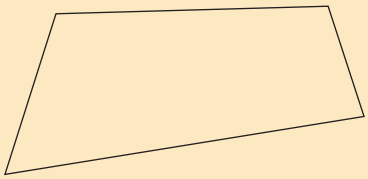


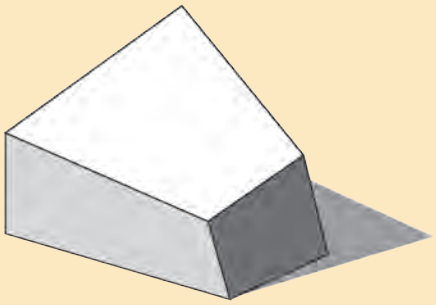


Block C

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?

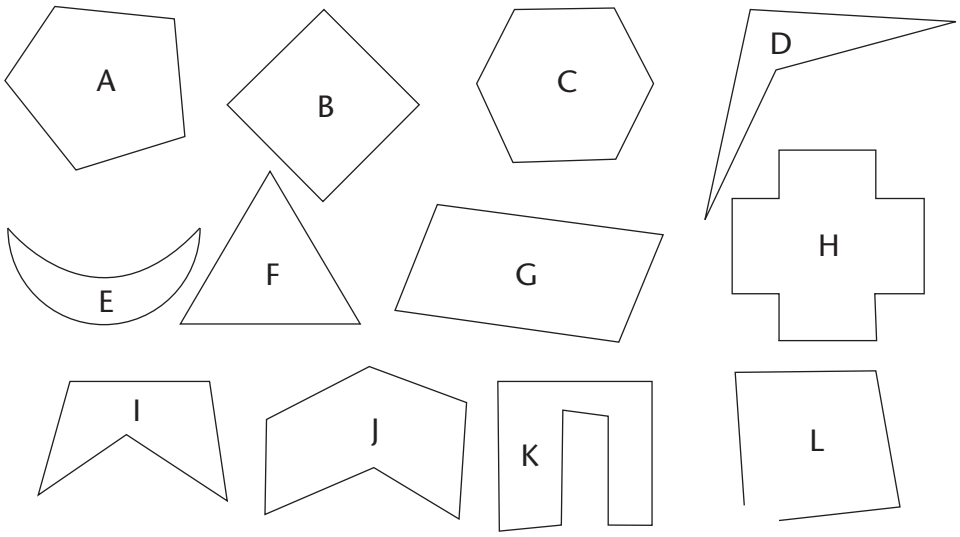
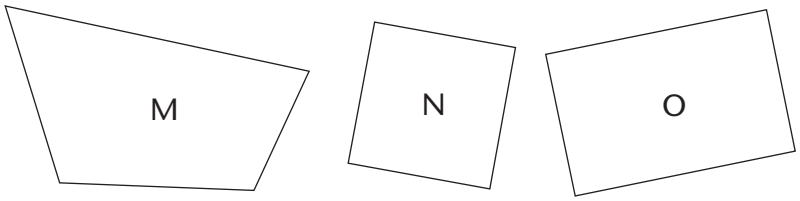


Figure L is not called a quadrilateral because it is **open** at one place. Only **closed** figures, such as those below, are called quadrilaterals.



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**.

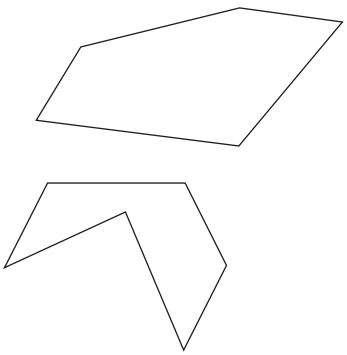
A quadrilateral of which all four corners look the same is called a **rectangle**.

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**.



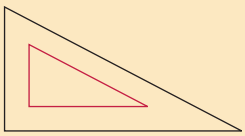
4. (a) Which figures in question 1 are not polygons?

   (b) Name all the pentagons in question 1.

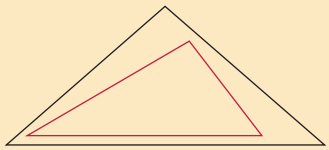
   (c) Name all the hexagons in question 1.

   (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.

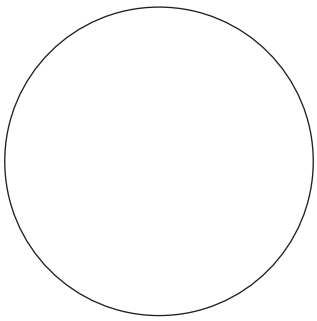
10. Now use your straight edge to again draw three triangles with the same shape. Draw your triangles inside each other.

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.



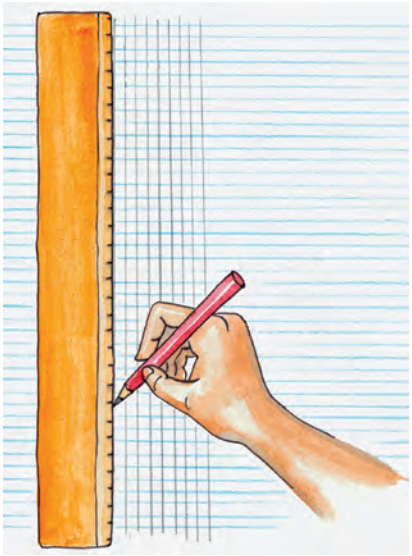
8.3 Make drawings on grid paper

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

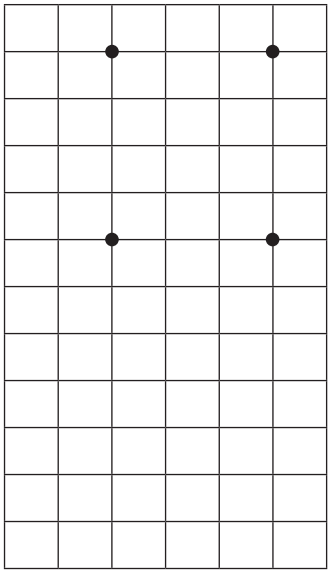
   Use your ruler and a sharp pencil as shown here, to make a grid on a whole clean page of ruled paper.

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

   You will need at least three sheets of grid paper.



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.

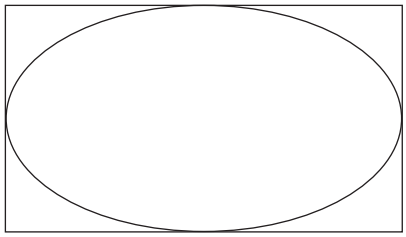
   (b) Draw another triangle, of exactly the same shape and size, on the other half of the grid sheet.

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.

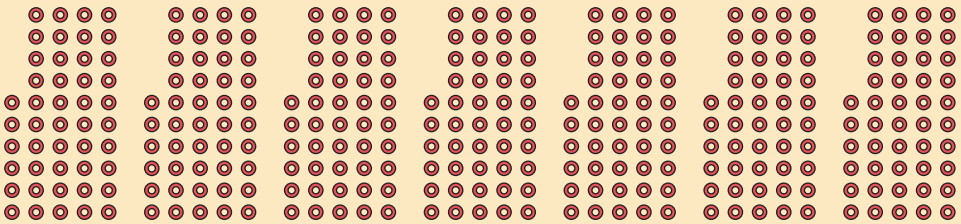


Unit 9 Whole numbers: Multiplication and division

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.

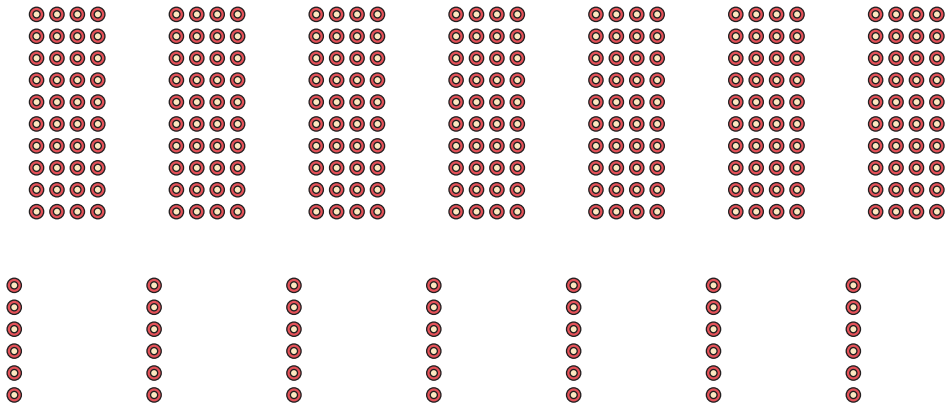


Zweli knows that 7 × 40 = 280.

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?



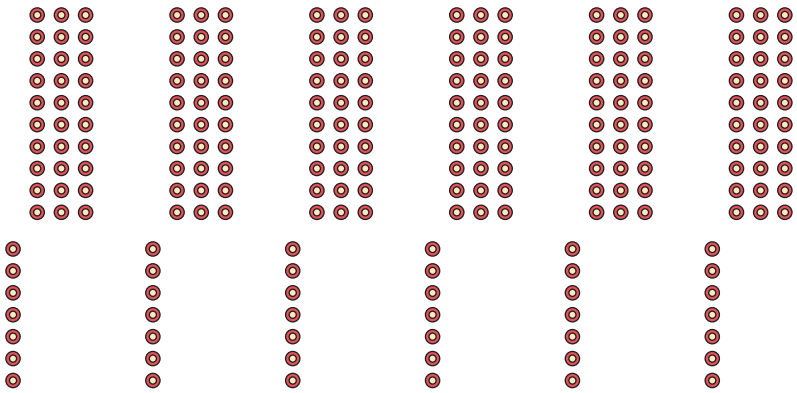
2. (a) Do you agree that in the diagram in question 1, there are 7 × 40 rings and another 7 × 6 rings?

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

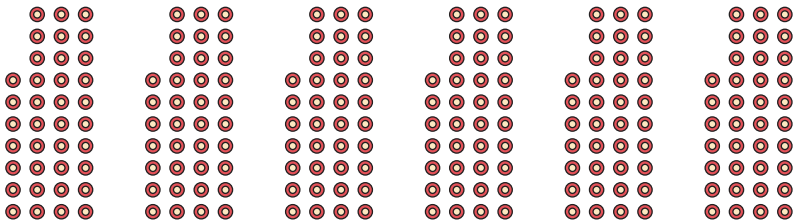
3. Copy the four numbers below. Then add 30 each time to write the next six numbers in the pattern.

   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?

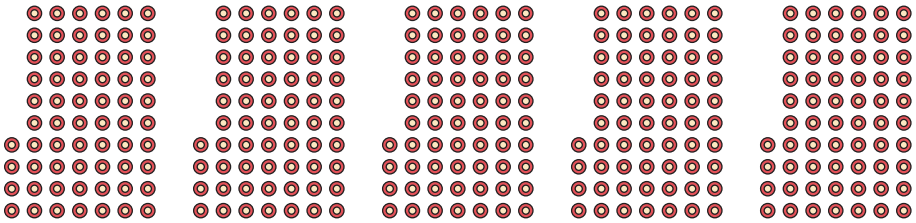


6. What is 6 × 67? How did you work that out?

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) $4 \times 20 + 4 \times 6$	(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) $5 \times 30 + 5 \times 8$	(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 × . . . = 270	(b) 450 = 50 × . . .
(c) 120 = . . . × 20	(d) . . . × 40 = 120
(e) 30 × . . . = 5 × 30	(f) 4 × . . . = 8 × 20
(g) 50 × . . . = 600	(h) 400 = 40 × . . .
(i) 800 = 40 × . . .	(j) 30 × . . . = 210
(k) 40 × . . . = 360	(l) 280 = 40 × . . .

2. Calculate.

(a) 3 × 20 + 5 × 20	(b) 5 × 30 + 4 × 30
(c) 40 × 4 + 50 × 6	(d) 9 × 40 – 5 × 40
(e) 10 × 30 – 4 × 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

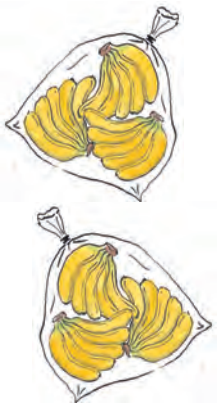
Mia calculates the cost of 27 pancakes like this:
I look at the cost of 20 pancakes and add that to the cost of 7 pancakes.

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 $320 \div 4$.

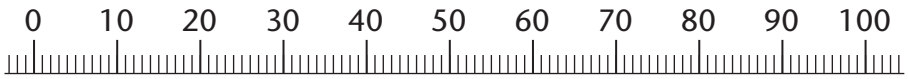
What you will do in question 5 is also called division.

$320 \div 4 = 80$
$4 \times 80 = 320$
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

Answer the questions below.

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

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?

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 × 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 × 8) + 4	(f) (7 × 7) + 4
(g) (7 × 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 ÷ 8 = 7 **remainder** 4.

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

5. How much is each of the following?
   (a) 48 ÷ 6 (b) 48 ÷ 8 (c) 50 ÷ 6
   (d) 81 ÷ 9 (e) 100 ÷ 10 (f) 60 ÷ 10
   (g) 58 ÷ 10 (h) 58 ÷ 5 (i) 63 ÷ 7
   (j) 63 ÷ 9 (k) 80 ÷ 4 (l) 80 ÷ 20
   (m) 60 ÷ 4 (n) 60 ÷ 15 (o) 80 ÷ 3
   (p) 75 ÷ 25 (q) 90 ÷ 3 (r) 90 ÷ 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 ÷ 8 (b) 65 ÷ 4 (c) 36 ÷ 9
   (d) 54 ÷ 9 (e) 27 ÷ 3 (f) 42 ÷ 6
   (g) 60 ÷ 5 (h) 45 ÷ 7 (i) 20 ÷ 6
   (j) 24 ÷ 3 (k) 98 ÷ 7 (l) 58 ÷ 3