Mathematics

Year 1

Learner Book

This book was developed with the participation of the Department of Basic Education of South Africa (DBE) using the DBE State-owned (Sasol Inzalo)

YEAR 1

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TERM 1

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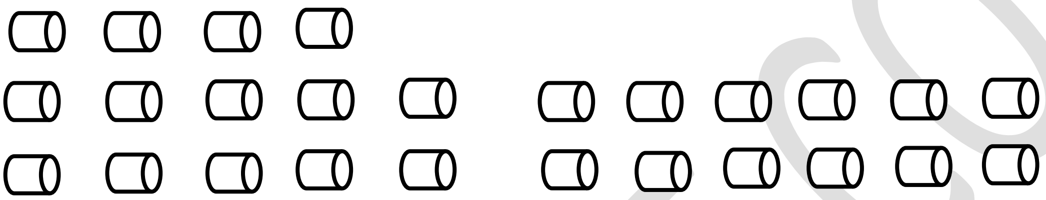
UNIT 1

WHOLE NUMBERS: COUNTING, ORDERING, COMPARING, REPRESENTING AND PLACE VALUE

1.1 Number names and number symbols

1. How many cylinders are shown below? Write your answer in words e.g. *twelve*.



Eighteen is called a **number name**. The number name eighteen means **ten** and **eight**

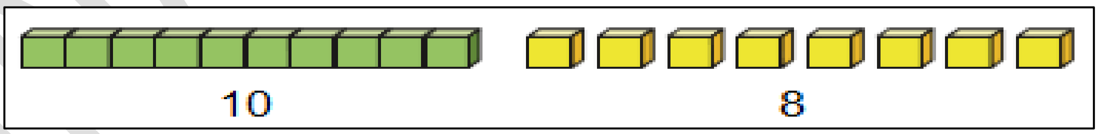
2. What does the number name fifteen mean?
3. What does the number name forty-four mean?

We can also represent eighteen using symbols as illustrated below:

The 8 sits on top of the 0, as shown above.

The number eighteen has two parts: **ten** and **eight**.

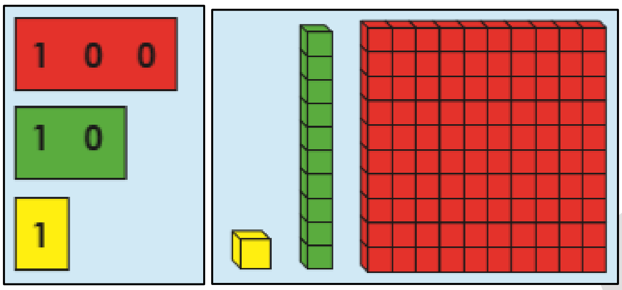
When you write 18 as 10 + 8, you are using **expanded notation**.



4. What are the parts of thirty-six?
5. What is the number symbol for thirty-six?
6. Write thirty-six in expanded notation.

1.2 Count in hundreds, tens and ones

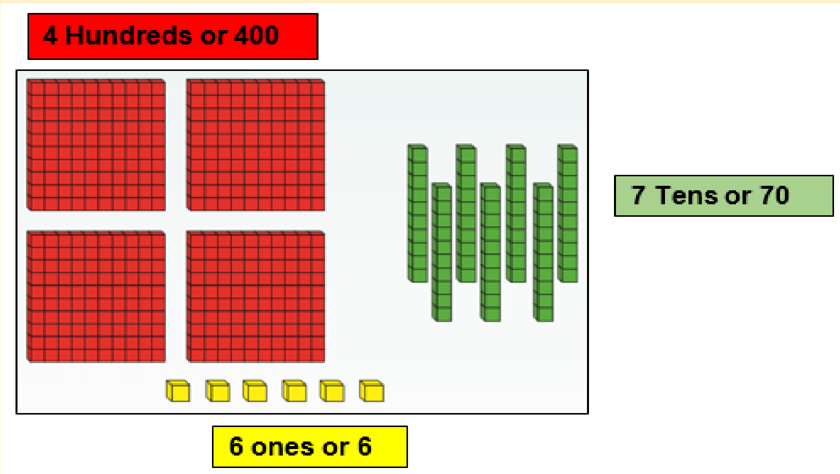
1. How many cubes are there in total? Match the place value cards with the base ten blocks.



Four hundred and seventy-six cubes are shown below.

10 × cubes (ones) piled together (on top of the other) form a Ten, which is like a rod in shape. 10 × Tens piled together (one next to the other) form a Hundred, which is **flat** in shape.

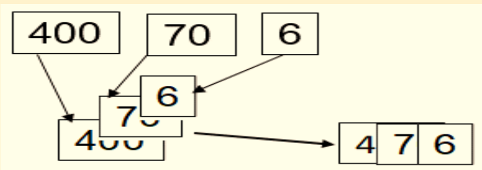
Four hundred and seventy-six cubes are shown below.



The number four hundred and seventy-six has three parts. The three parts are:

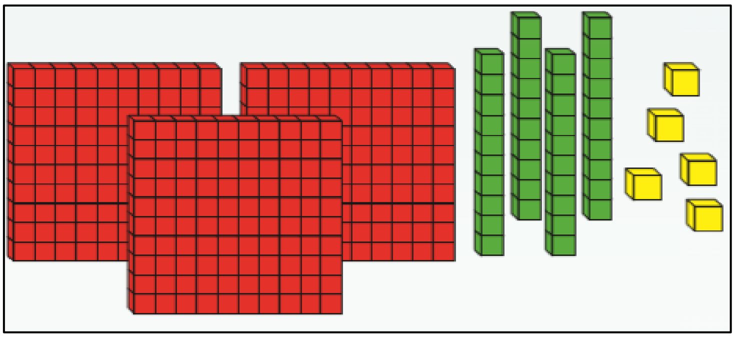
Four hundreds	400	This is the **hundreds** part
Seventy	70	This is the **tens** part
Six	6	This is the **ones** part

The three parts can be combined to form the number symbol 476.



In the number symbol 476, the 00 of the 400 is hidden behind the 76, and the 0 of the 70 is hidden behind the 6.

2. Use the given diagram to complete the table below it.



Number in words	Numerical value	Place value parts
		hundreds
	40	
Five		

3. Which number has the parts that are shown below?

$\boxed{80}$ $\boxed{6}$ $\boxed{500}$

(a) Write the number name.

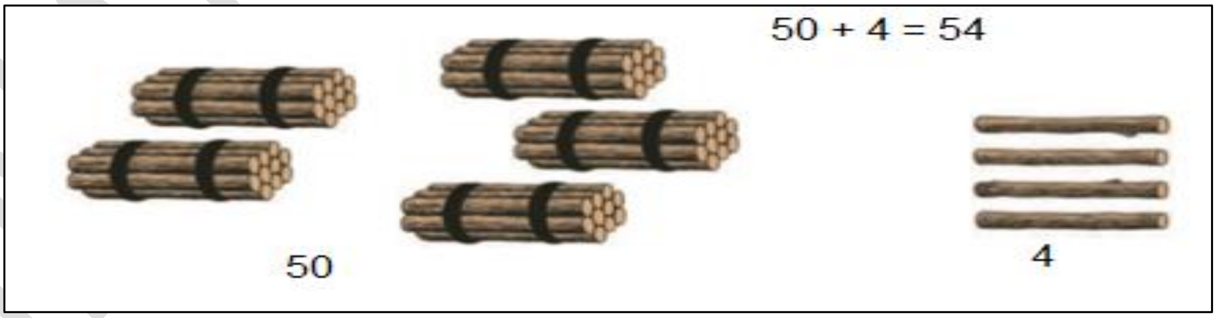
(b) Write the number symbol.

(c) Write the number in expanded notation.

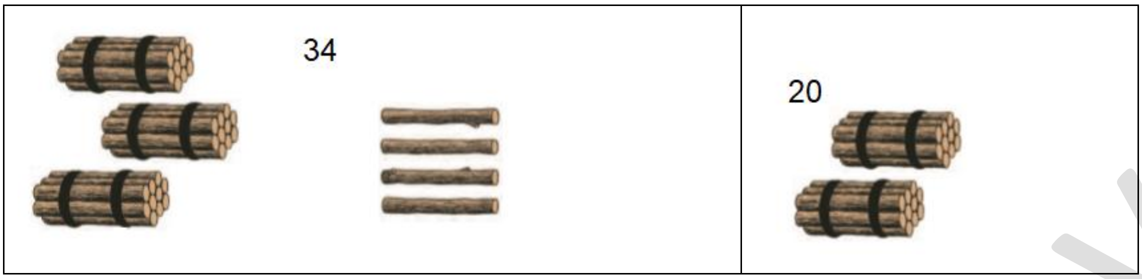
4. Which number has the parts $\boxed{900}$ and $\boxed{8}$

1.3 Building up and breaking down of numbers

The numbers 50 and 4 can be combined to form the single number 54.



The number 54 can also be formed by combining two other numbers, for example 34 and 20.



54 can be formed by combining two other numbers, for example: 35 + 19 = 54

28 + 26 = 54   38 + 16 = 54

1. Write down other three different ways in which 54 can be formed by combining two numbers.

2. Given the digits: 7   2   6

   (a) Use each digit once. Make the smallest 3-digit number.

   (b) Use each digit once. Make the largest 3-digit number.

   (c) You can use a digit twice. Make the smallest 3-digit number.

   (d) You can use a digit twice. Make the largest 3-digit number.

3. Given the number 537

   (a) Which digits do you need to build 537?

   (b) What other numbers can you build with the same digits?

   (c) What is the biggest number from (b) above?

   (d) What is the smallest number from (b) above?

1.4 Expanded notation

The expanded notation for 465 is 400 + 60 + 5. The 4, the 6 and the 5 in the number symbol 465 are called **digits.**

- The digit 4 in the number symbol 465 means 400 or 4 **hundreds** or 40 tens
- The digit 6 in the number symbol 465 means 60 or 6 **tens**
- The digit 5 in the number symbol 465 means 5 **ones**
- 465 = 4 hundreds + 6 tens + 5 ones
- 465 = 400 + 60 + 5

Hundreds	**Tens**	**Ones**
4	6	5

NB: The value or meaning of a digit in a number symbol depends on the position or place of the digit in the number symbol

1. Which digit is in the tens place in the number symbol 384?
2. Which digit in the symbol 384 represents the number 300?
3. The digit in the hundreds place in 243 is 2.
   (a) Which digit is in the tens place in 243?
   (b) Which digit is in the tens place in 283?
4. The expanded notation for some numbers is given below. Write the number symbols for these numbers.
   (a) 20 + 6
   (b) 5 + 40
   (c) 200 + 6
   (d) 70 + 300 + 6
   (e) 700 + 50 + 8
5. Complete this statement for the number two hundred and eighty-three: 2 ________ + ________ tens + 3 ________
6. Write the number symbol for *two hundred and eighty-three*.
7. Write the expanded notation for the number *two hundred and eighty-three*.
8. Write the number name for 836.
9. Write 836 in expanded notation.
10. Write down the place value parts that make up the number 836
11. Answer the following:
    (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?

1.5 Represent, order and compare numbers

1. Count in **thirties** from 450 until you reach 900. Write down the number symbols as you go along.
   450; ____ ; 510 ; ____ ; ____ ; 600 ; ____ ; ____ ; ____ ; 720 ; ____ ; 780 ; ____ ; ____ ; 870

The pictures alongside show which animals are bigger. We can also decide which number(s) is/ are bigger than the other when given two or more numbers with the same digits by looking at the place value of the digits. To compare numbers, we use the symbol “>**”** for greater than, “<**”** for less than and “ =” for equal to.

Example:

653 and 676 have 3 digits. The hundreds digits are the same but the tens digit is different. 70 is bigger than 50, therefore 653 is less than 676 or 676 is bigger than 653. We represent the numbers as 653 < 676

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

2. In each case, compare the numbers using the symbol **>** or < in the place of “and.”

   (a) 498 and 902

   (b) 676 and 687

   (c) 291 and 289

   (d) 653 and 635

3. Arrange these numbers from biggest to smallest.

   (a) 810; 775; 309; 899; 785; 459; 293

   (b) 479; 989; 201; 609; 183; 685; 107

UNIT 2

NUMBER SENTENCES

2.1 Open and closed number sentences

When you add 30 to 50, you get the same answer as when you add 50 to 30. In other words, $50 + 30 = 30 + 50$, we call this a number sentence. We have two types of number sentences, **closed and open** number sentences.

Closed number sentences

A **closed number sentence** gives all the information about the numbers, and it is always true or false.

$5 + 3 = 8$

$78 - 65 = 13$

$9 \div 3 = 3$

$7 \times 12 = 84$

1. Say whether the following number sentences are true or false.

   Example: $5 + 3 = 6 + 4$ is false.

   (a) $8 + 6 = 7 + 7$

   (b) $2 + 9 = 9 + 2$

   (c) $70 + 50 = 80 + 60$

   (d) $13 - 7 = 14 - 9$

   (e) $13 - 7 = 20 - 14$

Open number sentences

An **open number sentence** does not give all the information about the numbers. Missing information has to be determined to make the number sentence true

$\blacksquare + 7 = 15, \quad \therefore \blacksquare = 8$

$16 - 9 = \blacksquare, \quad \therefore \blacksquare = 7$

$36 \div 12 = \blacksquare, \quad \therefore \blacksquare = 3$

$12 \times \blacksquare = 60, \quad \therefore \blacksquare = 5$

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

(a) $7 + 3 = 5 +$ ____

(b) $7 \times 9 = 10 +$ ____

(c) $700 + 300 = 800 +$ ____

(d) $80 + 50 = 80 + 20 +$ ____

(e) $75 +$ ____ $= 100$

(f) ____ $+ 500 = 1\,000$

(g) $120 +$ ____ $= 150 + 50$

(h) ____ $+ 750 = 1\,000$

(i) $487 +$ ____ $= 500$

3. Write number sentences for the following:

(a) The sum of 7 and 5 is equal to the sum of 9 and 3

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

(c) A teacher places 65 books onto the shelves. Each shelf holds 5 books. How many shelves does the teacher fill?

(d) Themba has 4 dogs. He gave each dog 4 dog cakes. How many dog cakes did he give altogether?

2.2 Properties of Whole Numbers

Commutative Property

When you *add or multiply* numbers, the order does not count, as the answer will always remain the same.

$50 + 30 = 30 + 50$

$15 \times 5 = 5 \times 15$

1. Which of these number sentences are false?

(a) $500 + 300 = 300 + 500$

(b) $500 - 200 = 200 - 500$

(c) $20 \div 5 = 5 \div 20$

(d) $11\times 2 = 2 \times 11$

Associative Property

You can add or multiply numbers regardless of how the numbers are grouped; the answer will be the same.

$(12 + 3) + 8 = 12 + (3 + 8)$

$7 \times (5 \times 9) = (7\times 5) \times 9$

2. Which of these number sentences are false?

(a) $(1 + 3) + (5 + 7) + 9 = 1 + (3 + 5) + (7 + 9)$

(b) $(10 + 8) + 6 = (8 + 6) + 10$

(c) $(10 + 8) - 6 = 10 - (8 - 6)$

(d) $(10 + 8) - 6 = (6 + 6) - 8$

(e) $11 \times (2 \times 5) = (11 \times 2) \times 5$

(f) $(60 + 3) + 7 = 60 + (3 + 7)$

Identity Element of Zero

If you add or subtract 0 from any number, the number will always remain the same.

$16 + 0 = 16$

$16 - 0 = 16$

Adding and subtracting the same number to a number, does not change the value of the number.

$14 + 4 - 4 = 14$

3. Complete the following number sentences

(a) $6 + 0 =$

(b) $6 - 0 =$

(c) $27 + 0 =$

(d) $27 - 0 =$

(e) $17 + 2 - 2 =$

(f) $464 + $ __ $- 6 = 464$

(g) $85 -$ ___ $= 0$

(h) ____ $- 862 = 0$

2.3 Inverse operations

Addition and subtraction as inverse operations

The **inverse** of **addition** is **subtraction**. This means subtraction is the opposite of addition. This means we can check an addition calculation by subtraction or a subtraction calculation by addition.

Example:

If $96 + 48 = 144$, then $144 - 48 = 96$

If $144 - 48 = 96$, then $96 + 48 = 144$

1. Fill in the missing number.
   (a) If $345 + 40 =$ _____; then $385 - 40 =$_____
   (b) If $345 + 40 =$ _____; then $385 - 345 =$_____
   (c) If $345 +$ ____ $= 385$; then $385 - 345 =$_____

Multiplication and divisions as inverse operations

It is important to understand that any division statement can be changed into a multiplication statement.

Example:

$48 \div 8 = 6$ can be changed into $6 \times 8 = 48$ or $8 \times 6 = 48$.

$5 \times 7 = 35$ can be changed to $35 \div 5 = 7$ or $37 \div 5 = 7$

1. Use the information given to fill in each box.
   (a) $4 \times 25 = 100$, then $100 \div 25 = \blacksquare$
   (b) $12 \times 11 = 132$, then $132 \div \blacksquare = 12$
   (c) $225 \div 5 = 45$, then $45 \times 5 = \blacksquare$
   (d) $171 \div 9 = 81$, then $81 \times 9 = \blacksquare$
   (e) $28 \times 12 = \blacksquare$, then $336 \div 28 = \blacksquare$

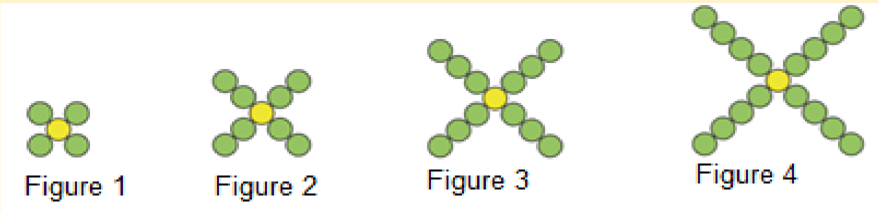
UNIT 3

NUMERIC AND GEOMETRIC PATTERNS

3.1 Investigate and extend geometric patterns

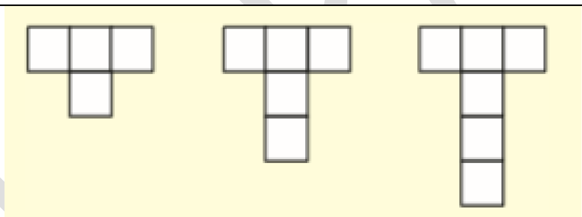
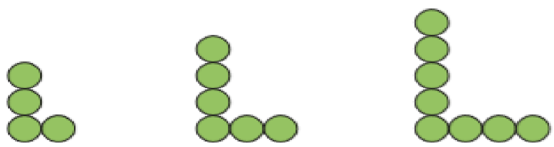
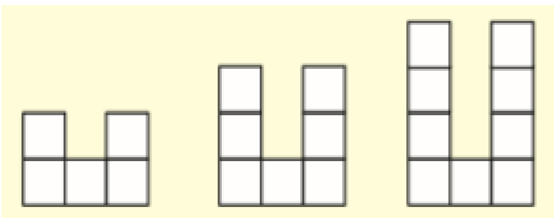
Geometric patterns with a constant difference

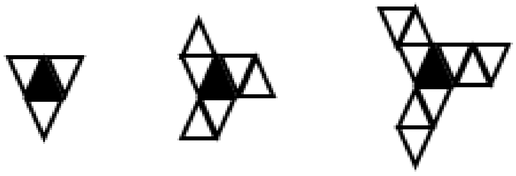
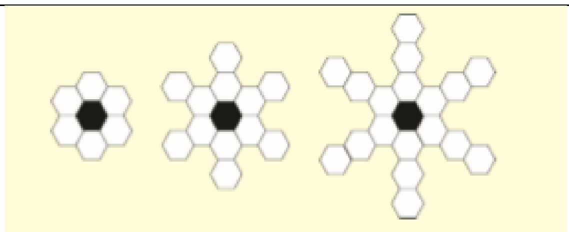
A **geometric pattern** is the arrangement of objects, shapes, drawings, diagrams in the same manner without changing the structure. However, the structure may be enlarged or reduced.



One can **describe the pattern** above by saying two dots are added diagonally on the either side of the yellow circle throughout the pattern.

1. In the following geometric patterns, draw figure 4 and then describe how you would extend the pattern.

(a)		
(b)		
(c)		

(d)		
(e)		

Numeric patterns with a constant difference

A **numeric pattern** is a list of numbers that follow a certain sequence or pattern. This pattern generally establishes a common relationship or rule between all the numbers.

Example: 2; 4; 6; 8; 10; 12; 14; 16; …

We can describe the pattern by saying we always add 2 to the previous number to get the next number.

2. Complete the following patterns by adding the next three numbers and describe how the pattern extends,

(a) 6; 9; 12; 15; 18; 21; ___ ; ___ ; ___

(b) 5; 10; 15; 20; 25; 30; 35; ___ ; ___ ; ___

(c) 7; 11; 15; 19; 23; 27; 31; ___ ; ___ ; ___

(d) 9, 18, 27, 36, 45, 54, 63, ___ ; ___ ; ___

(e) 10; 20; 30; 40; 50; 60 ___ ; ___ ; ___

(f) 1; 4; 7; 10; 13; 16; ___ ; ___ ; ___

(g) 275; 273; 271; ___ ; ___ ; ___

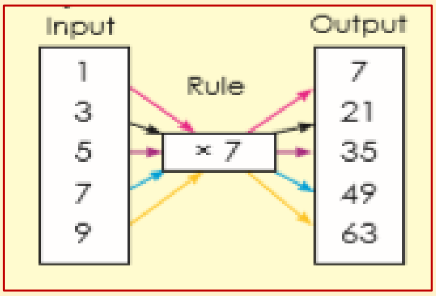
(h) 191; 195; 199; ___ ; ___ ; ___

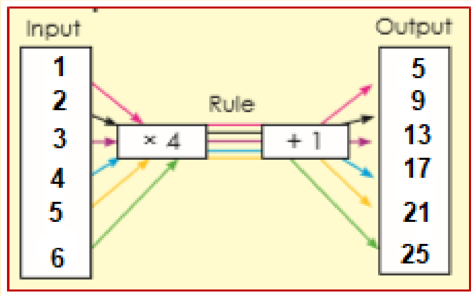
3.2 Input and output values

Flow diagrams

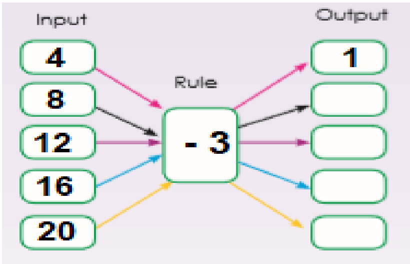
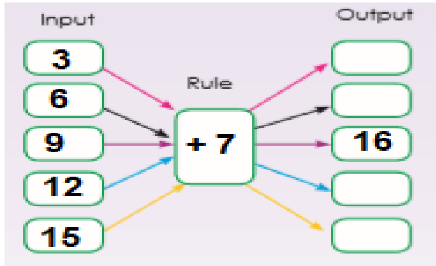
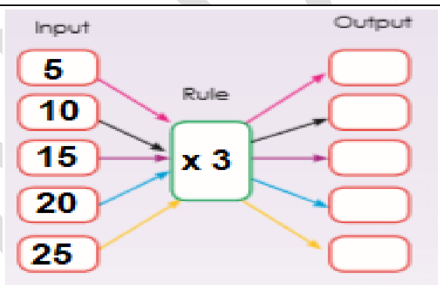
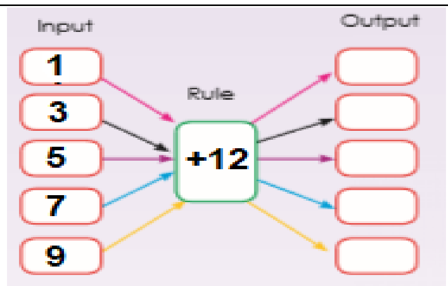
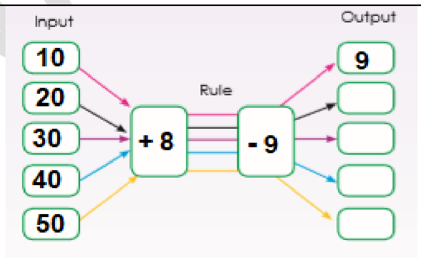
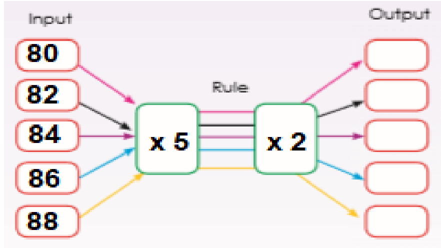
Patterns can be represented using a flow diagram. Flow diagrams are made up of small boxes with inputs and outputs linked with arrows. Between the input and the output is the rule.

Example:





1. Complete the following flow diagrams using the given rule.

(a)		(b)	
(c)		(d)	
(e)		(f)	

Patterns represented in tables

Patterns can also be represented using tables. The first row of a table displays input values and the bottom row(s) display(s) output numbers. The rule is used to generate the output values.

Examples:

Using tables is a useful way to record patterns.

Input

	1	2	3	4	5	6	7	8	9	10
Rule × 6	6	12	18	24	30	36	42	48	54	60

Output

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

Inputs

Outputs

Rule

1. Complete the following tables using the given rules.

(a)

	1	2	3	4	5	6	7	8	9	10
× 5							35			

(b)

	1	2	3	4	5		8	9	10
× 2 +10				29					

2. 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	16	20					
5	5	10	15	20	25		35			
6	6	12	18	24	30			48		
7	7	14	21	28						

(a) Complete the table.

(b) Which method did you use to complete the table?

(c) What patterns do you see in the table?

3. Use the following table to determine answers.

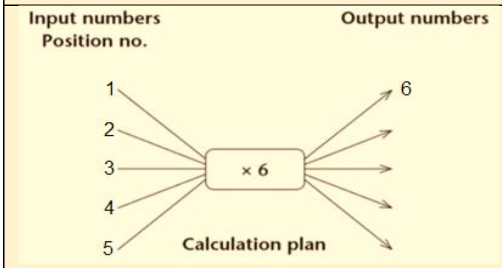
x	**12**	**14**	**16**	**18**	**20**		
12	144	168	192	216	240		(a) 16 × 18
14	168	196	224	252	280		(b) 18 × 18
16	192	224	256	288	320		(c) 16 × 12
18	216	252	288	324	360		(d) 20 × 20
20	240	280	320	360	400		(e) 14 × 16
							(f) 14 × 20

3.3 Equivalent forms and describing patterns

Different representation of a pattern

When patterns of different forms give the same results, we say they are equivalent forms of patterns. Different forms of patterns can be presented in tables, flow diagrams, diagrams and verbally.

Example:

<table>
<tr><th>Flow diagram</th><th>Table</th></tr>
<tr><td>
</td><td>
<table>
<tr><td>Position number</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>9</td></tr>
<tr><td>× 6</td><td>6</td><td>12</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><th>Number sentence</th><th>Verbally</th></tr>
<tr><td>Input x 6 = output</td><td>Multiply the position number by six to get the output number</td></tr>
</table>

Describing a pattern

Patterns can be described in different ways. There is a horizontal and vertical description. A **horizontal** description indicates how one gets the next term from the previous term in the output values. A **vertical** description (**general rule**) indicates the relationship between the input and the output values

The first term in a numeric pattern not represented in table form is always regarded as the output value of the first input value (i.e. input value is 1)

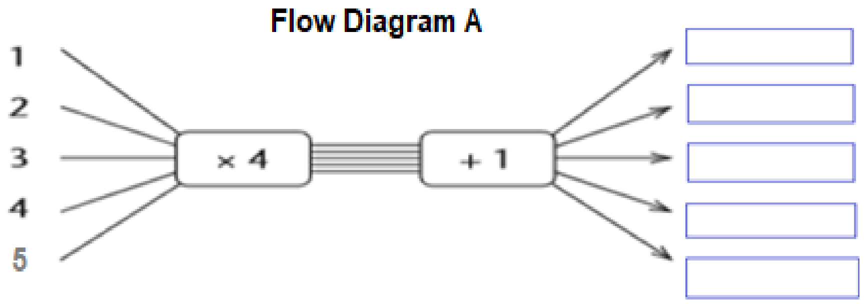
1. Study the following two tables and two flow diagrams.

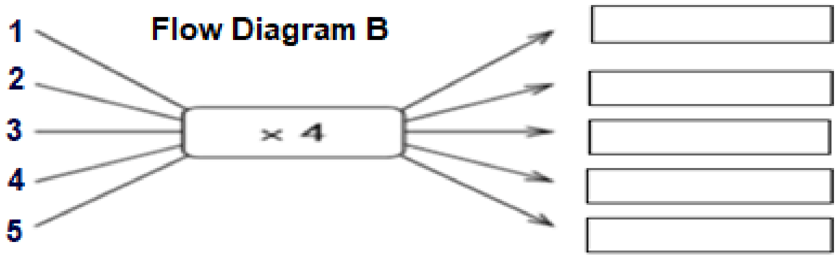
Table A

Input numbers	1	2	3	4	5	6
Output numbers	4	8	12			

Table B

Input numbers	1	2	3	4	5	6
Output numbers	5	9	13			





(a) Which table is equivalent to which flow diagram (i.e. gives the same output numbers for the same input numbers)?

(b) Fill in all the missing numbers in each table.

(c) Write any number sentence to represent each table

(d) Describe how to get the next term in each table and write down the general rule in own words.

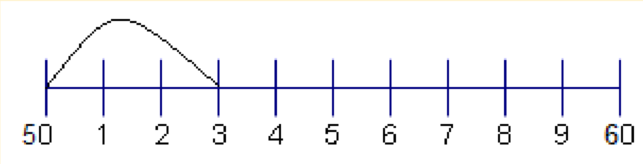
UNIT 4

WHOLE NUMBERS: ADDITION AND SUBTRACTION

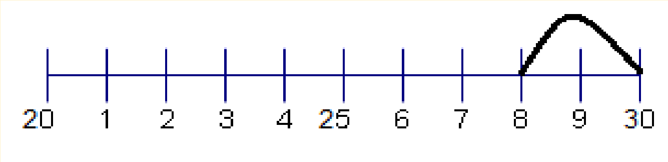
4.1 Rounding off to estimate answers

It is often useful to quickly estimate answers of calculations. Imagine you want to buy items for R28 and R53 and do not have time to accurately add R28 and R53. It can help you to know that you need to pay about (approximately) R30 + R50

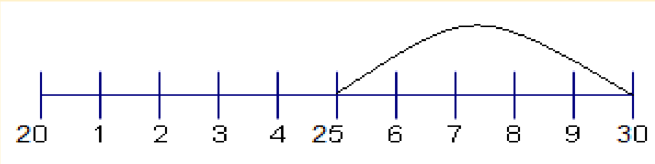
- 53 can be rounded off to the nearest multiple of 10, which is 50.



- 28 can be rounded off to the nearest multiple of ten, which is 30.



- 25 is equally far from 20 and 30. People all over the world have agreed to round off “upwards” in a case like this, so 25 is normally rounded off to 30.



1. In each case, estimate the answers by rounding off to the nearest ten
   (a) 43 + 52
   (b) 46 + 57
   (c) 74 – 35

2. In each case round off to the nearest hundred to calculate the following:
   (a) 267 + 466
   (b) 932 – 437

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, ≈ 600 kilometres.

3. Round off to the nearest hundred before you calculate.
   There are 108 houses in 1 town, 362 houses in another town and 269 houses in a third town. Approximately how many houses are there in the three towns together?

4. Round off to the nearest ten before you calculate the answer in the following.
   A farmer has 734 cows. A veld fire breaks out and 568 of the cows are killed. Approximately how many cows are left?

Rounding off | Compensating

To calculate: $68 + 44 = 68 + 2 + 44 - 2$ (add zero pair +2 and −2)

$= 70 + 42$

$= 112$

Rounding off | Compensating

To calculate: $96 - 41 = 96 + 4 - 41 - 4$ (add zero pair +4 and −4)

$= 100 - 45$

$= 55$

5. Round off and compensate to get an accurate answer.
   (a) 46 + 52
   (b) 76 – 35
   (c) 76 – 34
   (d) 343 + 549
   (e) 886 – 278

4.2 Breaking down and building up of numbers

1. Complete the table:

Number	Add 100	Add 10	Add 1	New number
79				
298				
435				

To add numbers, one can **break** the numbers down into **place value parts**. You can add the hundreds parts, then the tens parts and lastly the ones parts. Finally, you then **build** the number **up** as shown below.

Examples:

▪ 143 + 215 = 100 + 200 + 40 + 10 + 3 + 5 = 300 + 50 + 8 = 358	▪ 524 + 339 = 500 + 300 + 20 + 30 + 4 + 9 = 800 + 50 + 13 = 800 + 50 + 10 + 3 = 800 + 60 + 3 = 863

2. Use the breaking down method to calculate the following.

(a) 134 + 123

(b) 128 + 231

The strategy used above can also be used to do calculations that involve subtraction.

Examples:

▪ 973 – 452 = (900 – 400) + (70 – 50) + (3 – 2) = 500 + 20 + 1 = 521	▪ 947 – 596 = (900 – 500) + (40 – 90) + (7 – 6) = 400 + (40 – 90) + 1 = 300 + (100 + 40 – 90) + 1 = 300 + (100 – 90 + 40) + 1 = 300 + (10 + 50) + 1 = 300 + 60 + 1 = 361

3. Use the breaking down method to calculate the following.

(f) 134 – 123

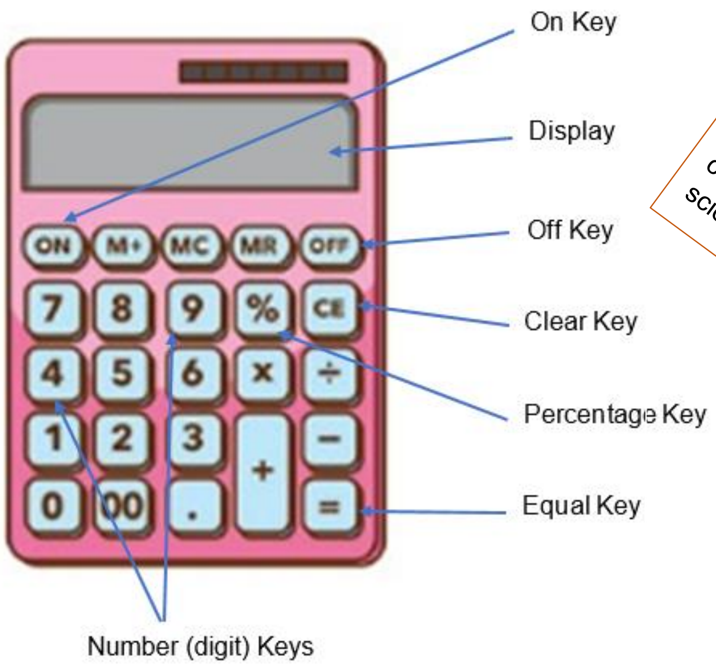
(g) 231 – 128

4.3 Using a calculator

A calculator can help a user to work quickly and get accurate answers if he or she presses the correct keys. It is very important to know when it is appropriate to use a calculator because some calculations are quicker if they are done mentally rather than using a calculator e.g. 3 + 6; 4 × 5; 100 ÷ 2; 300 + 500.

The calculator Language

The calculator does not think but only does what the user tells it to do. It is then important to learn the calculator language so that you can understand how the calculator works. The calculator language is written as a keystroke sequence using different kinds of key in a calculator. An example of a basic calculator is given.



There are many different kinds of calculators. Some are called simple calculators and some scientific calculators.

Let us do simple basic operations on the calculator like this:

Calculation plan	Calculator keystroke sequence
$5 + 4$	5 + 4 =
$5 - 4$	5 – 4 =
5×4	5 × 4 =
$20 \div 4$	20 ÷ 4 =

It is very important to understand that you must always use the " = " key to tell the calculator to now give the answer to what you entered. Note that we are using small numbers here only to explain, and so that we can easily check the calculator mentally. However, we should only use the calculator when doing calculations with large numbers.

1. Estimate the answers and use your calculator to find answers.
   (a) $11 + 21$
   (b) $150 + 6$
   (c) $212 - 103$
   (d) $136 + 48$
   (e) 23×52
   (f) $728 - 619$

UNIT 5

TIME

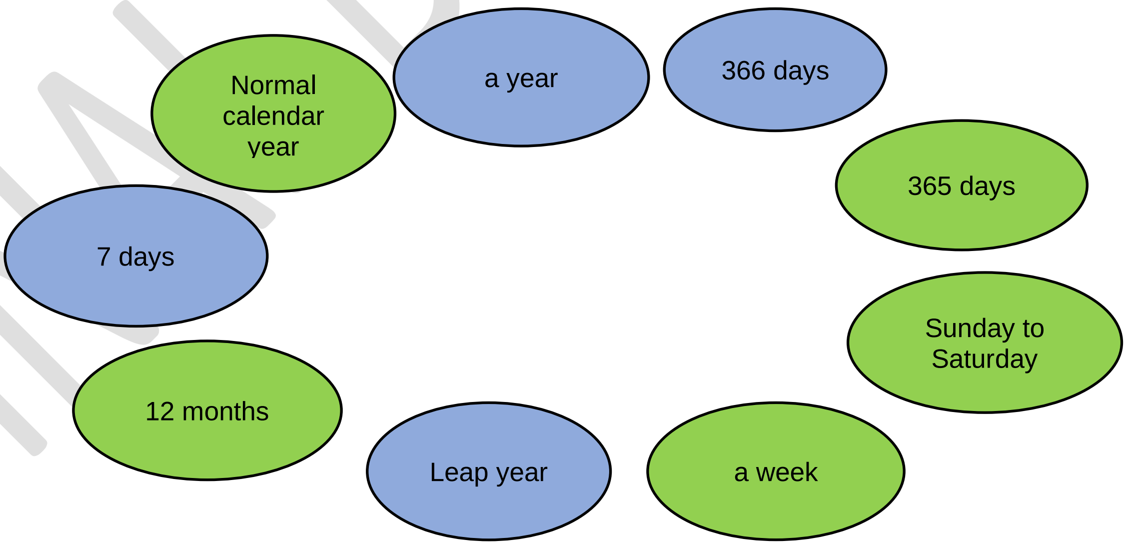
5.1 Days, weeks, months and years

Reading calendars and calculating time intervals

There are **365 days** in a normal calendar year. There are **12 months** in a year. The months do not all have the same number of **days**. Eleven of the months have either 30 or 31 days. February, the second month of the year, has 28 days for 3 consecutive years and 29 days for every fourth year. The fourth year where February has 29 days is called a **leap year**. A period of seven days in a month is called a **week**, usually taken as starting on Sunday and ending on Saturday. Thus, in a year there are 52 weeks.

We use **calendars** to measure time in years, months, weeks and days. Years do not all have the same number of days. Three **normal calendar years** have 365 days each, and then every fourth year, called a **leap year** has 366 days, since February has 29 days. In the year with 365 days, February has 28 days. 2012 was a leap year, so 2013, 2014 and 2015 were normal years.

1. Draw a line to join the words about time that have the same meaning



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

2. Study the month of January and complete the table

JANUARY 2020

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			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	

Dates	No. of days
1 – 15 January	
7 – 11 January	
10 – 13 January	
27 – 30 January	
20 – 25 January	

3. Study the calendar for 2021. The public holidays are marked in yellow. Answer the questions that follow:

2021

January

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					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

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28						

March

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	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

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				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

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						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

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		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

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				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

Sun	Mon	Tue	Wed	Thu	Fri	Sat
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

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			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

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					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

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	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

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			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	

(a) Name the month(s) with 30 days.

(b) Name the month(s) with more than 30 days.

(c) Name the month(s) with fewer than 30 days.

(d) Is there a pattern that you can use to quickly say how many days there are in any month?

(e) Is 2021 a leap year? How do you know that?

(f) How many months, weeks and days have passed since the beginning of the year until 15 October 2021?

(g) Today is 15 October 2021. How many years will you still spend at school if you plan to attend school up to Year 4?

(h) How old are you today in years, months, weeks and days?

4. Look at the December month below and answer the questions that follow:

	December					
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	

(a) On what day is New Year's Day?

(b) What happens in South Africa if a public holiday is on a Sunday?

(c) How many days is it from Christmas to New Year's Day?

5. Consider a table of public holidays for 2021.

January 1	New Year's Day	Day June 16	Youth Day
March 21	Human Rights Day	August 9	Women's Day
April 2	Good Friday	September 24	Heritage Day
April 5	Family Day	December 16	Reconciliation Day
April 27	Freedom day	December 25	Christmas Day
May 1	Worker's day	December 26	Day of Goodwill

(a) On what day of the week is Workers' Day in 2021?

(b) Does September have a public holiday? If so, what is it called and when is it?

5.2 Decades and centuries

Decades

A **decade** is a period of 10 years. Decades may describe any ten-year period, such as those of a person's life, or refer to specific groupings of calendar years.

1. How many years are there in a decade?
2. Complete the following:
   (a) 3 decades = ______________ years
   (b) 7 decades = ______________ years
   (c) 1 decade = ______________ months
3. Answer the questions based on the table above

1990s	2000s	2010s	2020s
Nelson Mandela became the president (1994)	Cell phones became popular and affordable	Soccer World Cup in South Africa (2010)	South Africa was hit by corona virus

   (a) How many decades have passed since the cellphones became popular?
   (b) In which decade were you born?
   (c) Count in decades starting from 1980 to 2020

Centuries

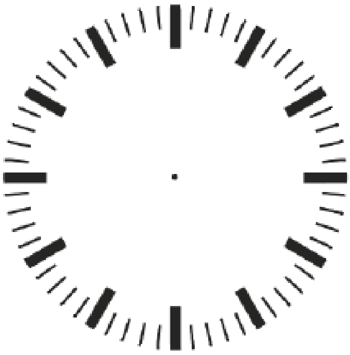
A **century** is a period of 100 years. The word century comes from the Latin word "centum", meaning one hundred.
1800 was the end of the 18^{th} century, 1900 was the end of the 19^{th} century and 2000 was the last year of the 20^{th} century.

1. How many years are there in a century?
2. How many decades are there in a century?
3. Complete the following:
   (a) 4 centuries = ______________ years
   (b) 9 centuries = ______________ decades
4. In which century are we now?

5. In which century were you born?
6. In which century did Nelson Mandela become a president?
7. In which year will this century end?

5.3 Understanding time

There are 24 hours in a day. Time tells us either how much time has passed since midnight or how much time has passed since midday (noon or midnight.



1. In the worksheet provided, draw dotted lines that indicate half of the figure when it is cut vertically
2. Write 12 inside the figure below the bold line where you have drawn dotted lines.
3. From 12, which is regarded as 0, count the number of the bold calibrated lines and complete the worksheet by writing the numbers inside the clock from 1-12.
4. How many total counts did you get?

Note: The numbers inside are called hours and are indicated by a short arm in an analogue clock.

5. Count all calibrated markings (clockwise) from 0 which is 12 in this case and write the number of each big count outside the circle.
6. How many total counts did you get?

Note: The number of counts in 6 above indicates minutes and are shown by the long arm in the clock.

When the minute arm is at 12, the time is read as o'clock. When the minute arm moves from 0 to 30 minutes (12-6) we say minute "past the hour". To read time "past" an hour, minutes and hours are read starting from the Right Hand Side, e.g.10:25 is read as 25 minutes past 10.

When the minute arm moves past the 30 minutes (6-12), we say minute "to the hour". When reading or writing time after the minute hand has passed 30 minutes, always subtract the minutes from 60 and add 1 to an hour, e.g. 10:45 is read as 15 minutes to 11 { (60 −45 =15) minutes and (10+1 =11) hours}.

7. What fraction of the circle are the following intervals
   (a) 0 – 15?
   (b) 0 – 30?
   (c) 30 – 45?
   (d) 0 – 45?
   (e) 45 – 60?

The interval from 0 to15 is $\frac{1}{4}$ of an hour i.e. $\frac{1}{4}$ of 60 minutes hence **quarter past**

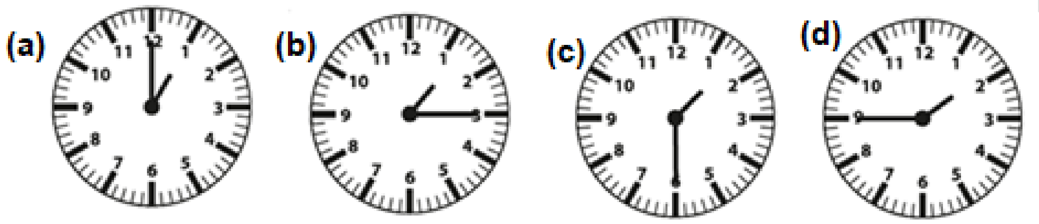
The interval from 0 to 30 is $\frac{1}{2}$ of an hour i.e. $\frac{1}{2}$ of 60 minutes hence half past

The interval from 0 to 45 is $\frac{3}{4}$ of an hour i.e. $\frac{3}{4}$ of 60 minutes hence **quarter to**

One hour is the same length of time as **60 minutes**. Therefore **15 minutes = $\frac{1}{4}$ hour, 30 minutes = $\frac{1}{2}$ hour and 45 minutes = $\frac{3}{4}$ hour,** as follows**:**

8. Complete the following:
   (a) 1 hour = _______minutes = _________ seconds
   (b) Half an hour = ________minutes = _________ seconds
   (c) One quarter of an hour = _______minutes = _________ seconds
   (d) Three quarters of an hour = _________ minutes = _________ seconds

9. What times do the following clocks show? Write the time in numbers and in words, e.g. 6:15 is quarter past 6.



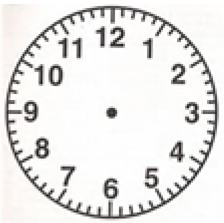
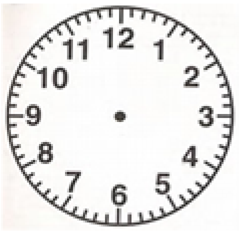
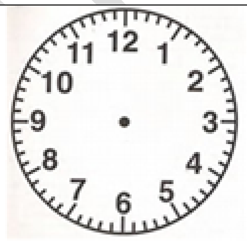
10. Refer to the clocks and your answers in 9 and answer the following questions.
    (a) What do you notice about the position of the hour arm and the minute arm in (a)?
    (b) What do you notice about the position of the hour arm and the minute arm in (c)?
    (c) What do you notice about the position of the hour arm and the minute arm in (b)?
    (d) What do you notice about the position of the hour arm and the minute arm in (d)?

When the minute arm is at **half past**, the hour arm should point **halfway** between the hours. When the minute arm is at o'clock, the hour arm is exactly pointing at the hour. When the minute arm is pointing at any minute past an hour, the hour arm should point shortly after the hour. When the minute arm is pointing at any minute to an hour, the hour arm should point shortly before the hour

11. What time is indicated in the following clocks?

(a)  (b)  (c) 

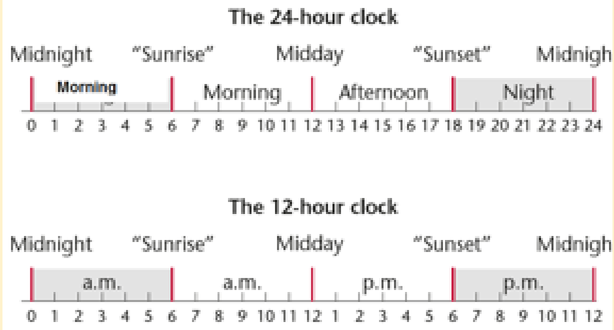
12. In the worksheet provided, draw the arms of the clock to indicate the following times.

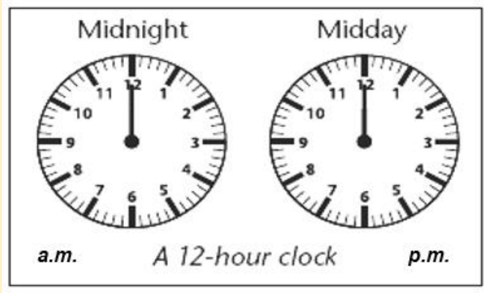
(a) Quarter past 5 or 5:15	(b) 10 minutes past 10 or 10:10
	
(c) Quarter to 7 or 6:45	(d) 5 minutes to 11 or 10:55
	

5.4 Read, tell and write time in 12-hour and 24-hour formats

Analogue and digital clocks and watches

In a digital 12 - hour clock, the midday is 12:00 p.m. and after an hour time will be written as 1:00 p.m. whilst in a 24 - hour clock; the midday is 12:00 and after an hour time will be written as 13:00. Midnight will be written as 00:00. NB. 00 on the digital clock indicates the 24th hour / midnight in a 24-hour clock. In an analogue clock, there is no difference except for stating a.m. or p.m.



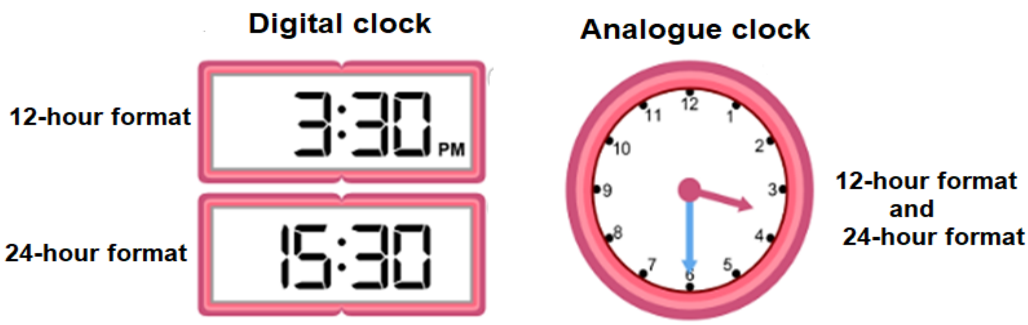


12 midnight is 12 a.m.

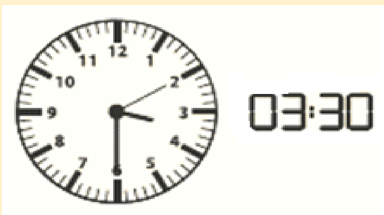
12 noon (midday) is 12 p.m.

1. Refer to the diagram on 12-hour and 24-hour clock above to answer the questions that follow:
   (a) Compare and contrast the 12-hour and 24-hour format by copying and completing the missing words.
   In a 24-hour clock, we count from _______ to _________, whereas in a 12-hour clock we count from _______ to _________, _________ times.
   (b) What symbols do we use to show that the time is read in a 12-hour format?
   (c) What do the symbols in (b) above mean?

Half past three in the afternoon



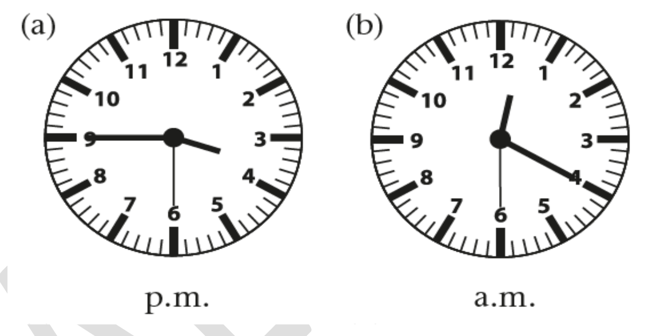
A digital clock below is in 24 – hour format. The time is 03:30; this is 3 hours and 30 minutes after midnight or 3:30 a.m. The leading 0 in 03:30 in this case indicates that the time was read in the morning.



Differences between 12- hour format and 24- hour format

12-hour time	24-hour time
The hour arm goes around the clock twice	The hour arm goes around the clock once
After 12 midday we start counting from 1 up to 12 midnight	After 12 midday, we continue counting from 13 up to 24 hrs. which is denoted by 00
The first 9 hours from 12 midnight and 12 midday are indicated by 1 digit	The first 9 hours after midnight have a leading zero to make two digits, e.g. 02; 05
The morning part from midnight is denoted by a.m. and the afternoon part after midday is denoted by p.m.	There is no indication of a.m. and p.m.

2. Match the 12-hour clocks with the 24-hour time. Notice that a.m. or p.m. is written below the 12-hour clocks. Give your answer by writing the letter of the 24-hour time next to the question number of the 12-hour clock.

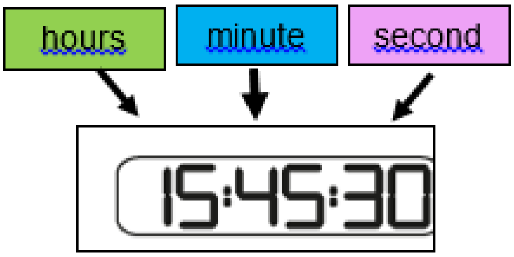


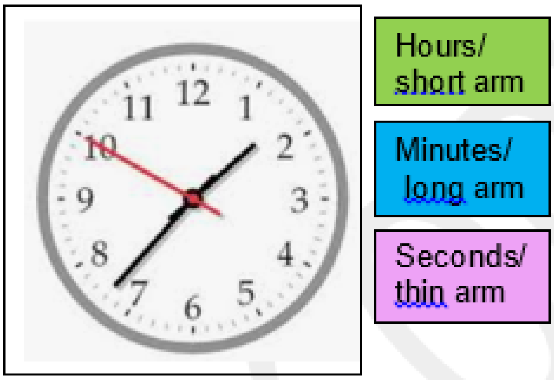
K	00:20:30
L	12:20:30
M	03:45:30
N	15:45:30

3. Complete the following table

12-hour time	24-hour time	Time in words
11:10 a.m.		
		Ten minutes to 9 in the morning
	16:50	
		A quarter to midnight
3:00 p.m.		
	17:32	

Analogue and digital clocks also show time in seconds. In a digital clock the seconds will be on the right, the hours will be on the left whilst the minutes will be at the centre, whilst in the analogue clock the thin arm will indicate the seconds: 60 seconds make one minute: **60 seconds = 1 minute**





4. Complete the following:

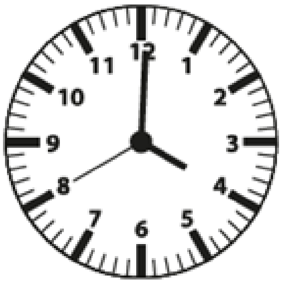
(a) 1 hour = _______minutes = _______ seconds

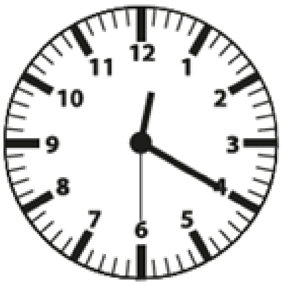
(b) Half an hour = ________minutes =______ seconds

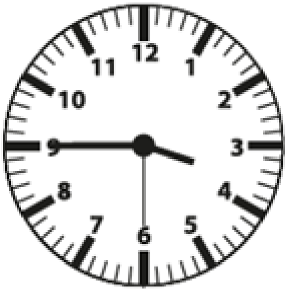
(c) One quarter of an hour = _______minutes =________ seconds

(d) Three quarters of an hour = _______ minutes = _______ seconds

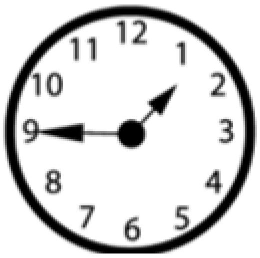
5. Write the digital time, in hours, minutes and seconds if the time was read in the morning from the following clocks.

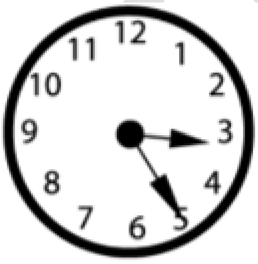

(a)

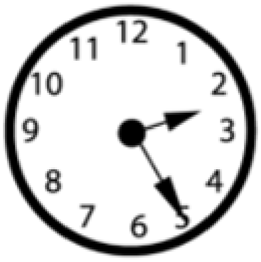

(b)


(c)

6. Write the following times in both word and digital form (in both 12-hour format and 24-hr format)


(a) In the morning


(b) In the afternoon


(c) In the morning

7. Write these 24-hour times in 12-hour notation, in symbols and in words.

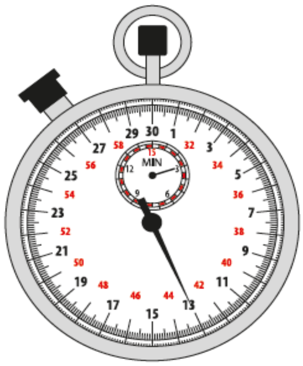
(a)

(b)

Stopwatches

We use stopwatches to measure how long an activity takes. There are **two** types of stopwatches i.e. Analogue and digital. Currently, digital stopwatches are used the most, as they can be available even on cellphones. Stopwatches are normally used to measure the starting time as well as the finishing time i.e. time interval for runners, swimmers, soccer matches, rugby games and debate,

2 TYPES OF STOPWATCHES



Analogue stopwatch

Digital stopwatch

1. Estimate the following:
   (a) The time it takes a full kettle to boil.
   (b) The time it takes to walk around the soccer field.
   (c) The maths period in a day.

2. In 2018, Katleho Mothupi from Free State won the Comrades Marathon (about 90 km) in 5 hours 20 minutes and 34 seconds (05:20:34). Tumelo Kitie came second in a time of 5 hours 25 minutes and 14 seconds (05:25:14).
   The times of the five fastest runners are recorded in the table below.

Runner	Country	Measured time	
1. Katleho Mothupi	Free State, SA	5h 20min 34s	05:20:34
2. Tumelo Kitie	Gauteng, SA	5h 25min 14s	05:25:14
3. Mandla Mbatha	KZN, SA	5h 26min 39s	05:26:39
4. Stephen Muzhingi	Zimbabwe	5h 27min 18s	05:27:18
5. Rufus Photo	Limpopo, SA	5h 27min 30s	05:27:30

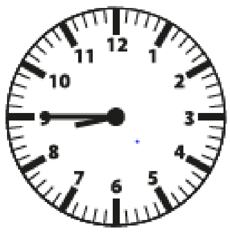
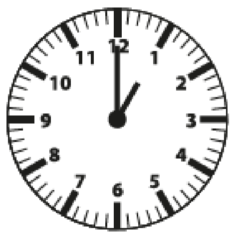
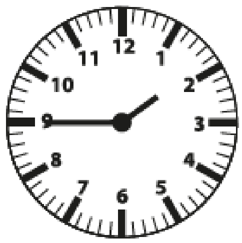
   (a) Mothupi started his race at 6 a.m. At what time did he cross the finishing line? Write the time in 24-hour notation.
   (a) Muzhingi and Photo were very close. How much faster was Muzhingi than Photo?
   (b) How much slower was Mbatha than Kitie?

5.5 Calculating time intervals

Time interval is the space of time between events or countries.

The longer length of time can be divided into many equal parts i.e. time interval. Like in netball game, there are four quarters played with three intervals, which are separating the quarters.

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

(a) Starts	Ends		(b) Starts	Starts
				

Starts	**Ends**	**Interval**
(a) 07:20	12:20	
(b) 13:40	14:30	

2. Lerato left Johannesburg airport by plane at 08:30 a.m. and arrived in Cape Town airport at 10:40 a.m. How long did the journey take?
3. A soccer practice starts at ten past two in the afternoon and it is one-hour long. What time does the soccer practice end?
4. Ngcebo started her homework at quarter to 7 at night and finished it two and half hours later. What time did she finish?

TERM 2

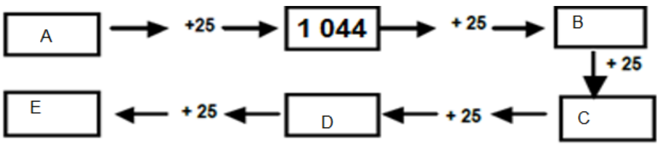
1 Contents

UNIT 1

WHOLE NUMBERS: COUNTING, ORDERING, COMPARING, REPRESENTING AND PLACE VALUE

1.1 Count, represent, order and compare numbers.

1. Complete the pattern:
   (a) 292; 294; 296; ___; ___; ___
   (b) 993; 998; 1 003; ___; ___; ___
   (c) 2 009; 2 007; 2 005; ___; ___; ___
2. Underline odd numbers.
   274; 299; 1 004; 2 775; 2 778; 4 119; 6336; 9 333
3. What is the even number that comes before 555?
4. Complete the following flow diagram.



1.2 Odd and Even numbers

Study the number grid below. Shade the first number, skip one and shade the next. Continue doing that until you have finished shading.

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	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

1. Describe all the numbers that are shaded.
2. What are the shaded numbers called?
3. Describe all the numbers that are not shaded.

4. What are the numbers that are not shaded called?

All the shaded numbers end with 1, 3, 5, 7 or 9. They cannot be divided into 2 equal groups and are called **odd numbers**. All the numbers that are not shaded end with 2, 4, 6, 8 and 0 and can be divided into two equal groups and thus called **even numbers**

1.3 Rounding off

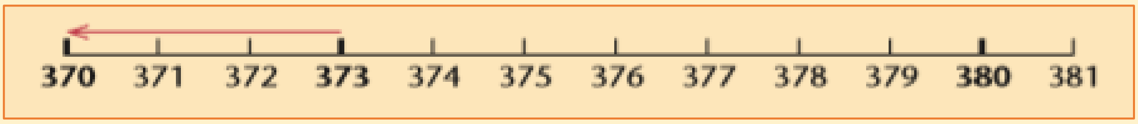
Rounding off numbers is estimation. Estimation is a useful skill that is used in Mathematics when we do calculations. We normally round off number to estimate answers for addition and subtraction. Rounding off means expressing a number as a multiple of 5, 10, 100 or 100 making a number simpler but keeping its value close to what it was. **Rounding off to the nearest 10**.

When rounding off a number to the nearest 10 the ten's value of the number increases to the next upper ten and the unit's digit becomes 0 if the number's unit digit is 5, 6, 7, 8, 8 or 9.

When rounding off a number to the nearest 10 the ten's value of the number decreases to the next lower ten if the number's unit digit is 1, 2, 3, or 4.

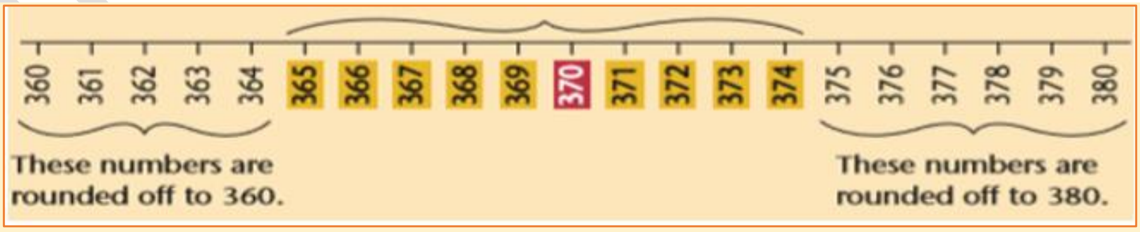
Example:

- 373 rounded off to the nearest 10 is 370, because 373 is closer to 370 than to 380:



- 366 rounded off to the nearest f 10 is also 370 because 366 is closer to 370 than to 360.

NB: All the shaded numbers below from 274 to 365 are rounded off to 370.



1. Round these numbers off to the nearest 10.

(a) 535

(b) 1 249

(c) 5 503

(d) 3 644

(e) 2 537

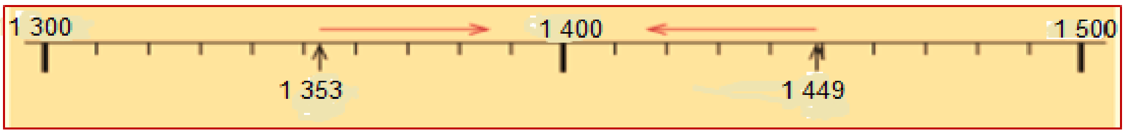
Rounding off to the nearest 100.

When rounding off a number to the nearest 100 the hundred's value of the number increases to the next upper hundred and both the tens and the unit's digits become
0 if the number's ten's digit is 5, 6, 7, 8, or 9.

When rounding off a number to the nearest 100 the hundred's value of the number decreases to the next lower hundred and both the ten's and the unit's digits become 0 if the number's ten's digit is 0, 1, 2, 3, or 4.

Examples:

- 1 353 rounded off to the nearest 100 is 1 400, because 1 353 is closer to 1 400 than to 1 300.
- 1 449 rounded off to the nearest 100 is 1 400, because 1 449 is closer to 1 400 than to 1 300.



If the digit in the **tens** place is 0, 1, 2, 3, or 4, to round off to the nearest multiple of 100, replace the ones digit and the tens digit by 00, then keep the **hundreds** digit the same. i.e. 13**53** ~ 1***400***

If the digit in the **tens** place is 5 ,6, 7, 8 or 9, to round off to the nearest multiple of 100, replace the ones digit and the tens digit by 00, then add 1hundred (100) to the **hundreds** digit. i.e. 13**53** ~ 1***400***

2. Round these numbers off to the nearest 100.

(a) 369

(b) 1 850

(c) 1 845

(d) 2 232

(e) 8 947

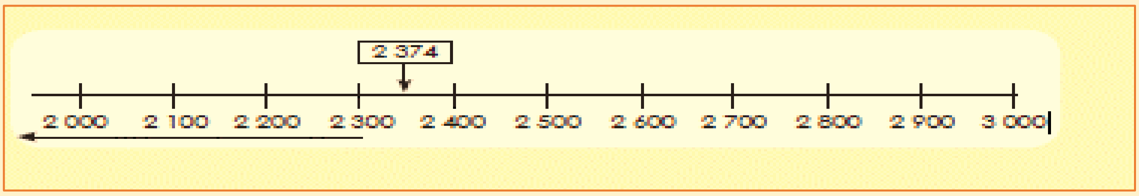
Rounding off to the nearest 1 000.

When rounding off a number to the nearest 1000 the thousand's value of the number increases to the next upper thousand and the hundreds, tens and the unit's digits become 0 if the number's hundred's digit is 5, 6, 7, 8, or 9.

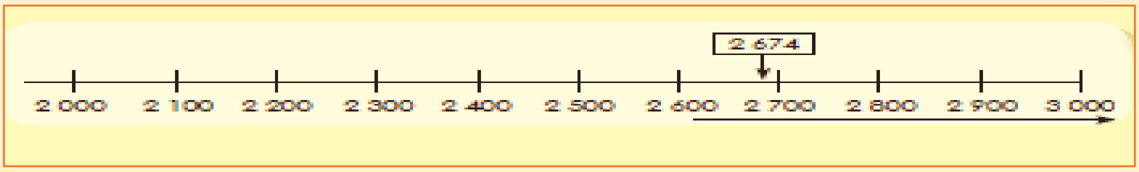
When rounding off a number to the nearest 1000 the thousand's value of the number decreases to the next lower thousand and the hundreds, tens and the unit's digits become 0 if the number's hundred's digit is 0, 1, 2, 3, or 4.

Examples:

- 2 374 rounded off to the nearest thousand is 2 000 because 2 374 is closer to 2 000 than to 3 000 as shown in the number line.



- 2 674 rounded to the nearest thousand is 3000 because it is closer to 3 000 than 2 000.



If the digit in the **hundreds** place is 0, 1, 2, 3, or 4, to round off to the nearest multiple of 1000, replace the ones digit, tens digit and hundreds digit each by 0, then keep the **thousands** digit the same. i.e. 2 **374** ~ 2 ***000***

If the digit in the **hundreds** place is 5, 6, 7, 8 or 9, to round off to the nearest multiple of 1000, replace the ones digit, tens digit and hundreds digit each by 0, then add 1 thousand (1000) to the **thousands** digit. i.e. 2 **674** ~ **3 000**

3. Round these numbers off to the nearest 1 000.

(a) 1 500

(b) 7 499

(c) 8 799

(d) 2 800

4. Complete the table to show how the numbers on the left column should be rounded off to the nearest 10, 100 and 1 000.

Number	ten (10)	Hundred (100)	Thousand (1 000)
763			
282			
4 999			
5 455			

UNIT 2

NUMBER SENTENCES

2.1 Open and Closed number sentence

A number sentence is a mathematical sentence written in numbers and mathematical symbols. The term number sentence may be used in the place of the word equation.

A closed number sentence is when all the terms of the sentence are known

Example: $6 + 7 = 13$

An open number sentence is when one of the terms of the sentence is unknown

Example: $56 - 19 = \Delta$

1. Complete the following number sentence
   (a) $6 \times 7 =$ _____
   (b) $56 -$ ____ $= 37$
   (c) $99 \div 11 =$ _____
   (d) $120 +$ ____ $= 150$
2. State whether the following number sentences are true or false. If false, correct it. $4 \times 7 = 23$
   (a) $32 - 0 = 0$
   (b) $58 \div 11 = 5$
   (c) $100 + 10 = 150$

2.2 Properties of whole numbers

Identity element of 1

Any number multiplied by 1 results in a number itself.

1 is called an identity element for multiplication.

NB: $25 \times 1 = 1 \times 25 = 25$

1. Complete the following:
   (a) $250 \times 1 =$ ____
   (b) ____ $= 1 \times 139$
   (c) $1 \times 3\,135 =$ ____
   (d) $250 \div 250 =$ ____
   (e) $250 \div$ ____ $= 250$

(f) ___ $\div$ 1 139 = 1

(g) 1 139 $\div$ 1 = ____

(h) Any number multiplied or divided by 1 is equal to ______________

Multiplication and division are closely related.t Multiplication is an inverse of division. If you take any number $\boldsymbol{a}$, multiply it by another number $\boldsymbol{b}$ and then divide by the same number $\boldsymbol{b}$, or the other way around, the number you started with $\boldsymbol{a}$ remains the same.

Example:

$5000 \times 5 \div 5$

$= (5\,000 \times 5) \div 5$ (one way of grouping)

$= 5\,000 \times (5 \div 5)$ (an equivalent grouping)

$= 5\,000 \times 1$

$= 5\,000$ (multiplicative property of 1)

1. Complete the following number sentences.

   (a) $67 \times 9 \div 9 =$ ______

   (b) $100 \times 100 \div 100 =$ _____

   (c) $4\,778 \div 4 \times 4 =$ _____

   (d) $125 \div 25 \times 25 =$ _____

2. Complete the following table. You may use a calculator.

Number	Multiply by	Divide by	Answer
150	20	20	150
5 430	39	39	
1 499	50	50	

3. A number is hidden behind the ■ stickers. It is the same number behind each of the ■ stickers. Say whether each number sentence is true or false.

   (a) ■ $\times$ 1 = ■

   (b) ■ $\times$ 30 $\div$ 30 = 1

   (c) (■ + ■) $\times$ 1 = ■

   (d) ■ $\div$ ■ = 1

UNIT 3

WHOLE NUMBERS: ADDITION AND SUBTRACTION

3.1 Rounding off to estimate answers

When estimating answers first round off the numbers and add or subtract the rounded numbers.

Examples

3 437 + 6 798 ≈ 3 000 + 7 000 ≈ 10 000	8 639 – 5 343 ≈ 9 000 – 5 000 ≈ 4 000

1. Estimate the answers to the following:
   (a) 8 524 + 1499
   (b) 2 336 + 3 247
   (c) 5 475 – 2369
   (d) 7 846 – 3500
   (e) 8 464 – 2 352 + 3778

3.2 Expanded column method

To add or subtract numbers, first write that in expanded form

Example:

1 562 + 3 415 =	4 977 – 3 415 =	8 888 – 7 359 =
1 000 + 500 + 60 + 2	4 000 + 900 + 70 + 7	8 000 + 800 + 70 + 18
+ 3 000 + 400 + 10 + 5	– 3 000 – 400 – 10 – 5	– 7 000 – 300 – 50 – 9
4 000 + 900 + 70 + 7	1 000 + 500 + 60 + 2	1 000 + 500 + 20 + 9
∴ 1 562 + 3 415 = **4 977**	∴ 4 977 – 3 415 = **1 562**	∴ 8 888 – 7 359 = **1 529**

Check solution by subtraction or using a calculator

1. Calculate the following and check the answers by addition or substitution.
   (a) 6 425 + 2 374
   (b) 7 542 – 3 440
   (c) 5 793 + 3 324
   (d) 8 651 – 5 692

UNIT 4

WHOLE NUMBERS: MULTIPLICATION AND DIVISION

4.1 Multiples, Factors and Products

Multiples, factors and products

The number 40 can be obtained by calculating 5×8. We can say 40 is the **product** of 5 and 8. We can also say 40 is a **multiple** of 5 or 40 is also a multiple of 8. Therefore 8 is a **factor** of 40 and 5 is also a factor of 40.

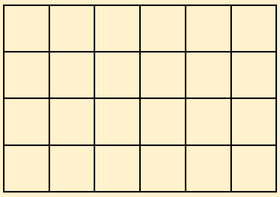
We can also express (write) 40 as the product of two whole numbers in other ways:

$2 \times 20 = 40$ and $4 \times 10 = 40$

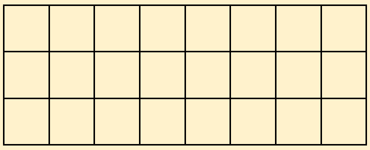
We can also express 40 as the product of 1 and 40 because $1 \times 40 = 40$.

Products and factors

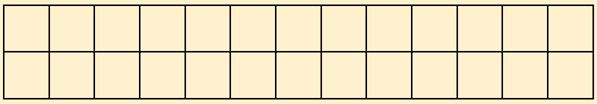
24 squares can be presented in different ways as shown below



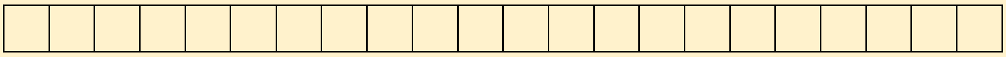
6 squares by 4 squares



8 squares by 3 squares



12 squares by 2 squares



24 squares by 1 square

Thus, 24 can be expressed as a product of 6 and 4 **or** 8 and 3 **or** 12 and 2 **or** 24 and 1. These pairs are called factor pairs. They are all **factors** of 24 which means that if you multiply each pair it gives you 24 as **a product**, e.g. $1 \times 24 = 24$; $2 \times 12 = 24$; $3 \times 8 = 24$ and $4 \times 6 = 24$.

A **factor** is a number that divides another completely without leaving a remainder.

Numbers	Division	Factor pair
1	$18 \div 1 = 18$	1×18
2	$18 \div 2 = 9$	2×9
3	$18 \div 3 = 6$	3×6

The factors of 18 are 1; 2; 3; 6; and 18.

1. Write down all the factors of
   (a) 25
   (b) 36
   (c) 42
   (d) 100
2. A number can be expressed (written) as a product of two equal factors, e.g. 36 is a product of 6×6. List all the different ways in which each of the following numbers can be expressed as a product of two numbers (factors).

(a) 28	(b) 23	(c) 60
(d) 17	(e) 120	(f) 160

3. By what number do you have to multiply 40 to get
   (a) 240?
   (b) 480?
4. Express each of the following numbers as factors such that one factor is 40.

(a) 280	(b) 320	(c) 400
(d) 440	(e) 480	(f) 1 280

Multiples

A multiple is obtained when two numbers are multiplied.
A product is obtained when two or more numbers are multiplied.
A number that divides another number without leaving a remainder is a factor of that number.

Example: Write all the first ten multiples of 8.

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

Multiples	8	16	24	32	40	48	56	64	72	80
Multiples of 8 are 8; 16; 24; 32; 40; 48; 56; 64; 72; 80										

All these are multiples of 8, e.g. 48 is a multiple of 8, because 8 × 6 = 48.

72 is also a multiple of 8, because 8 × 9 = 72, etc.

NB: Multiples are products but you cannot say that products are multiples.

1. Complete the following table.

Write the multiples of 3.								
Multiplication (Multiply 3 by counting numbers from 0 to 10								
Multiples								
Multiples of 3 are ___; ____; ____; ____; ….								

2. Write the first five multiples of the following numbers:
   (a) 6
   (b) 50
   (c) 250
   (d) 1 200

4.2 Multiplication

Multiplying by multiples of 10 and 100

Some calculations can be done mentally, e.g. 30 × 8 = 3 × 10 × 8 = 240

1. Work out the following:

(a) 3 × 8	(b) 30 × 8	(c) 30 × 80	(d) 3 × 800
(e) 4 × 8	(f) 40 × 8	(g) 40 × 80	(h) 4 × 800
(i) 5 × 6	(j) 5 × 60	(k) 50 × 60	(l) 5 × 600

One can also work out calculations quickly by recognizing whether a number is doubled or not.

Example.

$3 \times 8 = 24$, therefore $6 \times 8 = 48$. 6 is double 3, the multiplier 8 is the same, therefore double 24 is 48.

$20 \times 8 = 160$, therefore $40 \times 8 = 320$, because 40 is double 20, therefore doubling 160 we get 320.

2. Copy the table below, and fill in the answers that you did *not* know when you did question 1.

$\times$	2	4	8	3	6	5	10	9
10								
20								
40								
80								
30								
60								
70								

Now look at this: $457 = 400 + 50 + 7$

$$10 \times 457 = 10 \times 400 + 10 \times 50 + 10 \times 7$$
$$= 4\,000 + 500 + 70$$

When 457 is multiplied by 10 the 400 becomes 4 000, the 50 becomes 500 and the 7 becomes 70.

3. Use the method above to show what will 583 be if 100 multiply it.
4. How much is each of the following?
   (a) 128×10 (b) 128×100
   (c) 263×10 (d) 263×100
   (e) 345×10 (f) 345×100

Multiplication of 1-digit-by-1-digit whole number

Multiplication is when you add a number to itself a number of times as indicated by the multiplier. e.g. $9 \times 3 = 9 + 9 + 9 = 27$. It can be done in different ways, for example by breaking down numbers, column method and using a calculator.

Example 1

Write down the answers as quickly as you can.

$9 \times 1 = 9$

$9 \times 2 = 18$

$9 \times 3 = 27$

$9 \times 4 = 36$

$9 \times 5 = 45$

$9 \times 6 = 54$

Having the information above, you can be able to find any multiple of 9.

$$\begin{aligned} 9 \times 6 &= (9 \times 5) + (9 \times 1) = 54 \\ &= (9 \times 4) + (9 \times 2) = 54 \\ &= (9 \times 3) + (9 \times 3) = 54 \end{aligned}$$

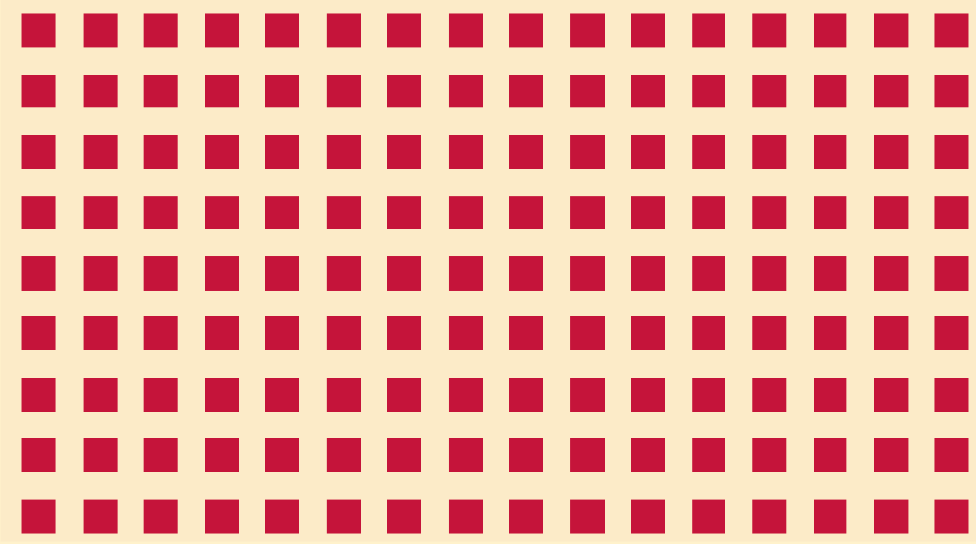
When using this strategy make sure that the multipliers add up to the original multiplier (in this case 6 is our original multiplier).

Example 2

$$\begin{aligned} 7 \times 8 &= (7 \times 3) + (7 \times 5) = 56 \\ &= (7 \times 2) + (7 \times 6) = 56 \\ &= (7 \times 1) + (7 \times 7) = 56 \end{aligned}$$

1. Write down the answers.
   (a) $6 \times 8 =$
   (b) $4 \times 7 =$
   (c) $7 \times 9 =$

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.



- There are sixteen columns of squares and nine rows of squares.
- A quicker way is to add 16 repeatedly: $16 + 16 + 16 + \ldots$
- However, if you can calculate 16×9, it is even quicker!

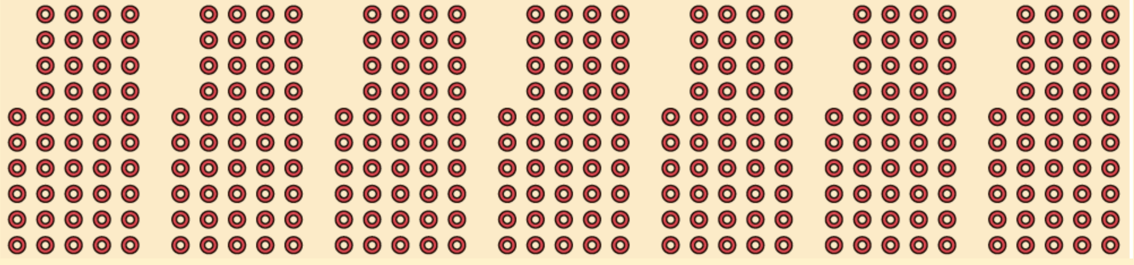
To be able to calculate something like 16×9, you need to know some multiplication facts, such as $10 \times 9 = 90$ and $6 \times 9 = 54$. In this unit, you will learn many facts like these. Multiplication is when you take a number and add it to itself a number of times. It can be done in different ways, for example by repeated addition and breaking down numbers into parts that are easy to multiply. Multiplication can also be done by lattice method (Napier's rods).

Example 3: Multiplication by repeated addition

$$16 \times 9 = 16 + 16 + 16 + 16 + 16 + 16 + 16 + 16 + 16$$
$$= 144$$

You will learn to multiply with bigger numbers, e.g. how to calculate 6×54 or 73×5.

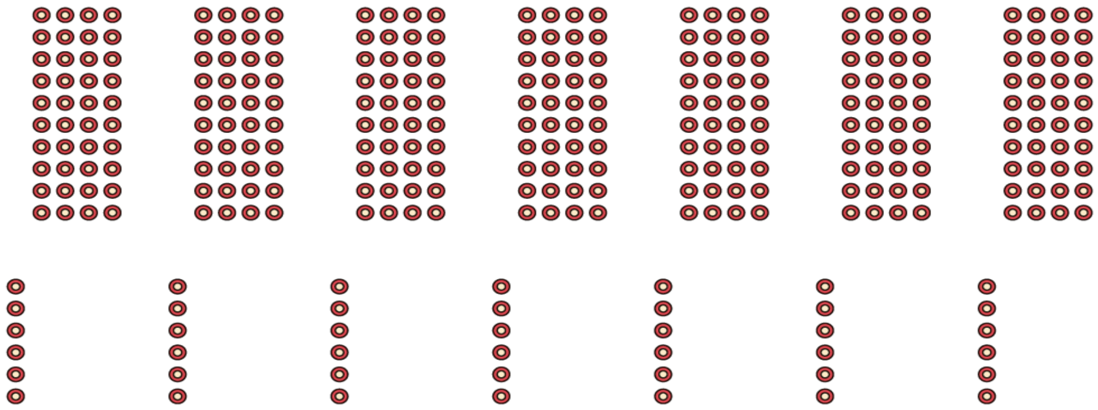
If you can do such calculations, you can easily and quickly find out how many rings are there in the diagram below, without counting all the rings.



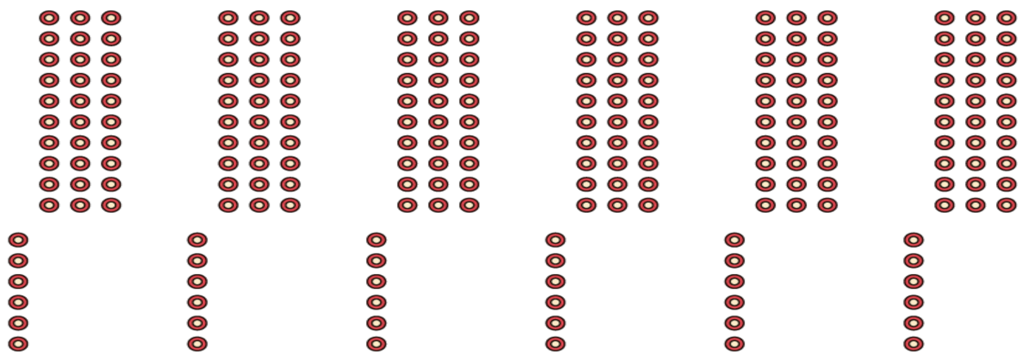
Bonga knows that $7 \times 40 = 280$.He also knows that $7 \times 6 = 42$.

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

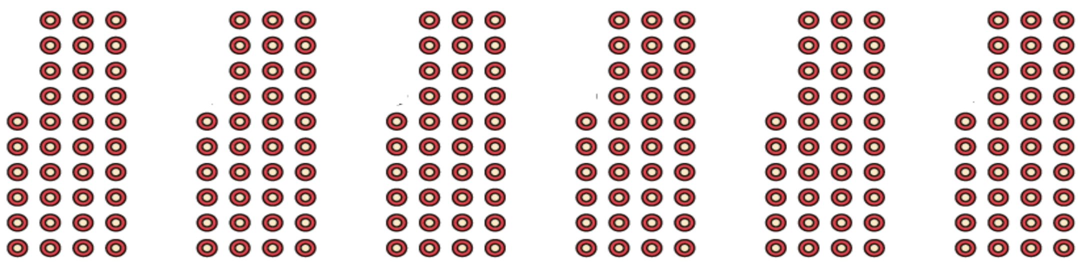
1. Do you think the diagram below has the same number of rings as the diagram above?



2. Do you agree that in the diagram in question 1, there are 7×40 rings and another 7×6 rings?
3. If $7 \times 40 = 280$ and $7 \times 6 = 42$, how many rings are there altogether?
4. Work out how many rings there are in this diagram.



5. Calculate the number of rings in the diagram.



Multiplication strategies

Breaking down and building up

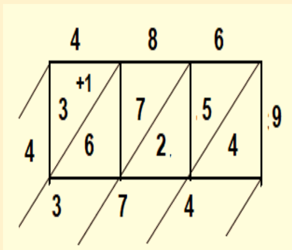
This multiplication method breaks down the number into its place value parts and multiply each part by the multiplier. The products of place value parts and the multiplier are then added together. The sum is presented as a number symbol.

Column Method

In this method, the number parts are multiplied with each product written underneath each other in column and the products are added.

Napier's rods or Lattice and column methods

This multiplication method uses a grid with a size depending on the number of digits of the multiplicand and multiplier. Inside the grid, each square or rectangle is divided with a diagonal line from the top right corner to left bottom corner. The multiplicand is written on the top of the grid with each digit aligned to a column. The multiplier written on the right side of the grid with each digit aligned to the row. In each column, the tens digit is always written above the diagonal and the ones digit is written below. Numbers are then added diagonally to get the sum. N.B. Each number is regarded as a single digit. This short cut can be used when one has grasped the number sense fully

Breaking down and building up	Column	Lattice
223 × 8 can be calculated as follows: 223 = 200 + 20 + 3 So, 223 × 8 = (200 × 8)+ (20 × 8) + (3 × 8) = 1 600 + 160 + 24 = 1 000 + 600 + 100 + 60 + 20 + 4 = 1 784	341 × 7 = ______ 341 × 7 7 (7 × 1) 280 (7 × 40) + 2 100 (7 × 300) 2 387	486 × 9 = ______ 
∴ 223 × 8 = 1 784	∴ 341 × 7 = 2 387	∴ 486 × 9 = 4 374

1. Calculate each of the following.

(a) 28 × 6 =	(b) 4 × 78 =	(c) 62 × 9=	(d) 8 × 53 =
(e) 7 × 47 =	(f) 75 × 5 =	(g) 7 × 84 =	(h) 9 × 93 =
(i) 528 × 6 =	(j) 4 × 378 =	(k) 362 × 9 =	(l) 8 × 523 =
(m) 7 × 407 =	(n) 785 × 5 =	(o) 7 × 284 =	(p) 9 × 493 =

2. 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?
3. At a bakery, 263 loaves of brown bread are baked a day. How many such loaves are baked in 3 days?
4. A bag of onions has a mass of 875 g. Calculate the total mass of eight bags of onions of the same kind. Give your answer in grams.

4.3 Division

Division of 1-digit-by-1-digit whole numbers

Example

Division is the same as repeated subtraction

$8 \div 2 = 4$ this means you can subtract 2 four times from 8.

$8 - 2 - 2 - 2 - 2 = 0$

1. Divide the following
   (a) $6 \div 2$
   (b) $8 \div 4$
   (c) $9 \div 3$

Division of 2-digit by 1-digit whole numbers

Example 1	**Example 2**
Breaking down the one-digit number into its factors $56 \div 4 = 56 \div 2 \div 2$ $= (56 \div 2) \div 2$ $= 28 \div 2$ $= 14$	You can also break down the two-digit whole number into multiples of the one-digit number $56 \div 4 = (28 + 28) \div 4$ $= (28 \div 4) + (28 \div 4)$ $= 7 + 7$ $= 14$

2. Divide the following numbers
   (a) $88 \div 4$
   (b) $54 \div 9$

(c) $42 \div 7$

(d) $65 \div 5$

Division of 3-digit by 1-digit whole numbers

Example 1	**Example 2**
Calculate by breaking down the three-digit number into multiples of the one-digit number $426 \div 6 = (420 + 6) \div 6$ $= (420 \div 6) + (6 \div 6)$ $= 70 + 1$ $= 71$	Calculate by dividing the one-digit number into its factors $426 \div 6 = 426 \div 2 \div 3$ $= (426 \div 2) \div 3$ $= 213 \div 3$ $= 71$

3. Calculate the following:

(a) $399 \div 3$

(b) $525 \div 5$

(c) $896 \div 8$

UNIT 5

COMMON FRACTIONS

5.1 Describing fractions

Fraction can be done practically by paper folding for better understanding**. The fraction** is a part of a whole. If a whole is cut or divided into equal pieces, each piece of that whole is a fraction.

$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$

The strip above is divided into 3 parts. Each part indicated by the different colours is a third. It has two parts, a numerator and a denominator. Thus, a fraction is named according to the fraction part (numerator) and the total number of parts that a whole is divided into (denominator) e.g.

$$\frac{2}{5}$$

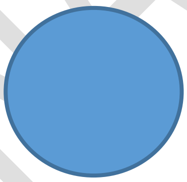
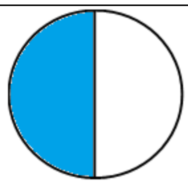
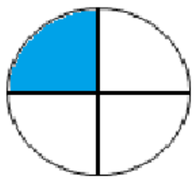
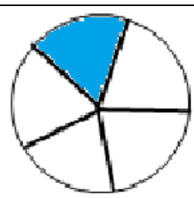
numerator

denominator

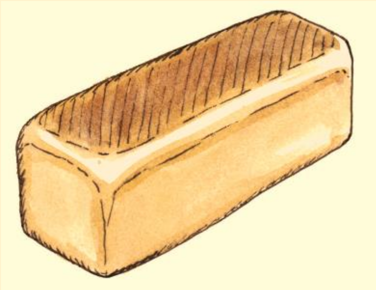
1. Name the fractions that are shaded in the strips

(a)					
(b)					
(c)					
(d)					

2. Identify which fractions are shaded in the circles

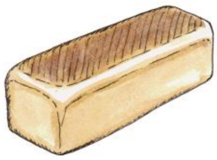
			
(a)	(b)	(c)	(d)

Five children share a loaf of bread equally. “Equally” means that every child gets the same. What fraction of bread does each child get?



The bread is divided into **five equal parts**. Each of these parts is called **one fifth** of the loaf. If a loaf of bread or a group of objects is divided into seven equal parts, each part is called **one seventh** of the whole.

3. Make rough sketches to show how each of the following can be shared equally between six children:
   (a) one slice of bread
   (b) one loaf of bread
   (c) 24 peanuts



5.2 Comparing and ordering fractions with different denominators

Fractions can be compared or ordered by arranging them from smallest to biggest or vice versa. When the fractions are compared, some notations or signs are used i.e.$<, >$ and $=$.

1 Use $<$; $>$ or $=$ to complete the following:

(a) $\frac{1}{1} * \frac{1}{4}$

(b) $\frac{1}{4} * \frac{1}{2}$

(c) $\frac{3}{4} * \frac{2}{5}$

(d) $\frac{3}{4} * \frac{4}{5}$

(e) $\frac{1}{2} * \frac{2}{4}$

(f) $\frac{4}{4} * \frac{5}{5}$

5.3 Adding and subtracting fractions with the same denominator

Adding common fractions

Fractions can be added or subtracted. We only subtract a smaller fraction from a bigger fraction, thus decreasing the quantity. Sometimes, the sum of fractions can lead to a whole e.g. $\frac{3}{5} + \frac{2}{5} = \frac{5}{5} = 1$

1. In the figure below shade $\frac{1}{5}$ and shade another $\frac{2}{5}$ in different colours.

   Complete the table by shading the indicated fractions differently and indicate the total number of shaded parts

	Fractions	Fraction of shaded parts
(a)		$\frac{1}{2} + \frac{1}{2} =$ ______
(b)		$\frac{2}{5} + \frac{1}{5} =$ ______
(c)		$\frac{1}{4} + \frac{2}{4} =$ ______

2. Without shading the fractions, add the following fractions

   (a) $\frac{3}{4} + \frac{1}{4}$

   (b) $\frac{1}{5} + \frac{2}{5}$

   (c) Two fifths + three fifths.

   (d) Two quarters + one quarter.

3. Complete:

   (a) $\frac{2}{4} +$ __ $= \frac{3}{4}$

   (b) $\frac{2}{5} +$ __ $= \frac{5}{5}$

   (c) $\frac{1}{2} +$ __ $= \frac{2}{2} =$ ___

Subtracting common fractions

Fractions can be subtracted by carrying out the following steps:

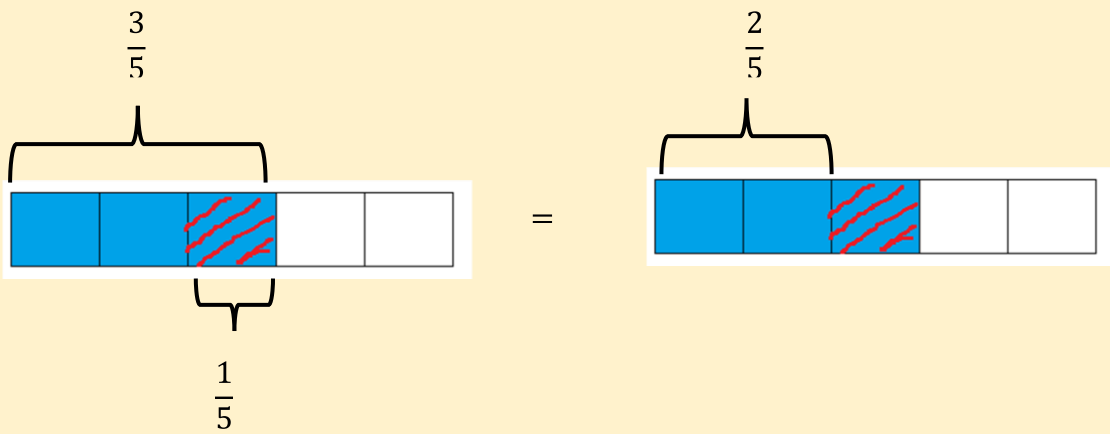
Step 1: First shade the bigger fraction

Step 2: Subtract the smaller fraction by shading on top of the shaded part using different shading.

Step 3: Write the fraction that is shaded once.

N.B the fraction that is shaded once is the difference between the two fractions.

e.g. $\frac{3}{5}$ and $\frac{1}{5}$; thus $\frac{3}{5} - \frac{1}{5} = \frac{2}{5}$



4. Complete the table by shading the indicated fractions below:

	Fractions	Number of parts shaded
(a)		$\frac{2}{2} - \frac{1}{2} =$ ______
(b)		$\frac{4}{5} - \frac{3}{5} =$ ______
(c)		$\frac{3}{4} - \frac{1}{4} =$ ______
(d)		$\frac{5}{5} - \frac{3}{5} =$ ______

5. Without drawing diagrams, work out the following:

(a) $\frac{2}{2} - \frac{1}{2}$

(b) $\frac{4}{5} - \frac{2}{5}$

(c) Three fifths – two fifths.

(d) Two quarters – one quarter.

6. Complete:

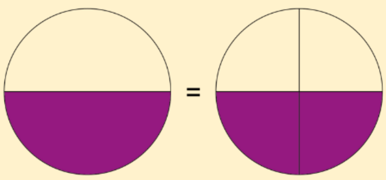
(a) $\frac{3}{4} - \cdots = \frac{1}{4}$

(b) $\frac{5}{5} - \cdots = \frac{1}{5}$

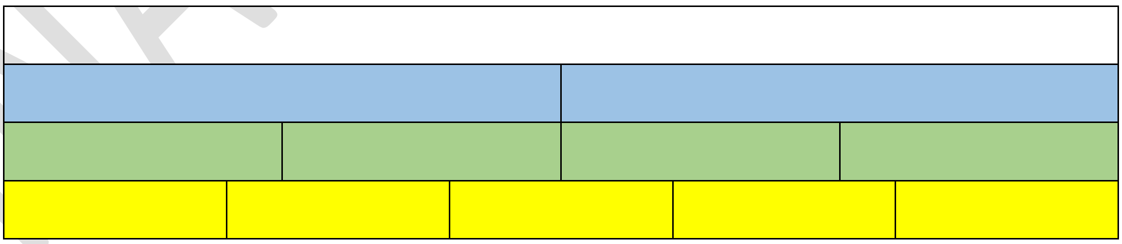
(c) $\frac{1}{2} - \cdots = 0$

5.4 Equivalent fractions

When two or more fractions yield to the same result when simplified, they are, said to be equivalent. Thus, any fraction can be represented in different ways but conserve the same value after simplification. e.g. $\frac{2}{4}$ and $\frac{1}{2}$ are equivalent fractions.



1. Given the fraction wall, write the fraction on each part



2. What fractions are equal to:

(a) $\frac{1}{2}$	(b) $\frac{2}{2}$	**(c)** $\frac{2}{4}$

5.5 Solving problems

Grouping and equal sharing

1. R50 is divided equally between a number of people. Each person gets R10.

   (a) How many people shared the money?

   (b) What fraction of the money did each person get?

2. A teacher shares pens that he bought equally among his four classes. What fraction of all the pens does each of the classes get?

3. During the rugby trials, 72 players are divided equally into three groups. Each group has its own field. What fraction of all the players are in each field?

UNIT 6

LENGTH

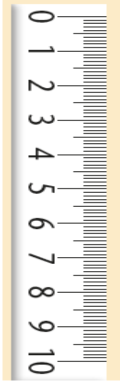
When we measure the length of objects or spaces, we are allocating a number value to how long or wide the object or space is. This allows us to compare and order objects in terms of their length. Today, in many parts of the world, we use the same system of unit to measure length. The standard unit for length is a metre (m). This makes it possible for us to tell other people how long an object is. The other units of length such as millimetres (mm), centimetres (cm), and kilometres (km) are derived from a metre.

6.1 Compare and estimate lengths of objects

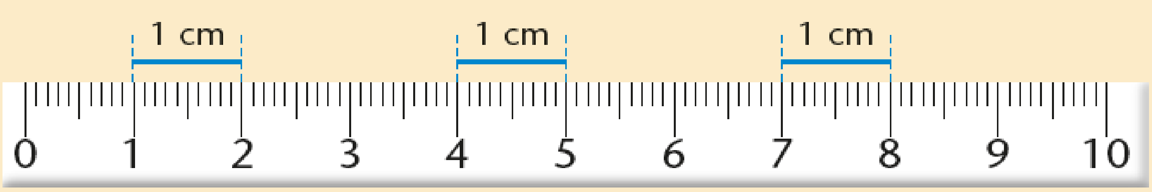
1. Which of the following pairs of objects is longer?
   (a) The height of a classroom door or the length of a desk.
   (b) The width of a classroom door or the width of a chalkboard.
   (c) The length of your hand or the length of your foot.
2. Follow the instructions to answer the questions below: Accept any reasonable response.
   (a) Use the palm of your hand to measure the length of the textbook.
   (b) Use your feet to measure the length of the wall of their classroom.
   (c) Are your answers to the above the same as of other learners? Why?

6.2 Practical measuring objects using measuring instruments

One metre is the standard unit and the other units are named for how they relate to the metre. A **centimetre (cm)** is one of the parts if 1 m is divided into 100 equal parts. There are 100 cm in 1 m. Centi- in centimetre means hundredth. A **millimetre (mm)** is one of the parts that is formed when 1 m is divided into 1 000 equal parts. There are 1 000 mm in 1 m. Milli- in millimetre means thousandth. There are 10 mm in 1 cm. A **kilometre (km)** is 1 000 times as long as 1 m. Kilo- in kilometre means thousand. On **measuring tapes,** you will see millimetres, centimetres and metres (m). We use measuring tapes to measure longer lengths, such as the height of a person or the length of a skirt. For even longer distances, such as the length of a wall in a building, there are builder's tape measures and surveyor's tape measures. For long distances, we use trundle wheel.

			
Measuring tape	Trundle wheel	Ruler	Builders tape

Most **rulers** have centimetres (cm) and millimetres (mm) as their units. We use rulers to measure shorter lengths such as the length of a book or the length in a geometric figure. Now look at the ruler below. There are 1 cm spaces on the ruler.



Each centimetre space is divided into 10 equal smaller spaces called millimetres. Therefore, every centimetre is divided into tenths of a centimetre. This means that the space of 1 cm is the same length as the space that is 10 mm long.

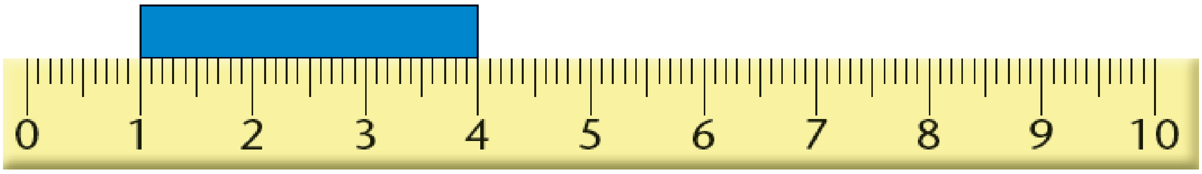
1. Which of the units will you use if you have to measure the length of each of these objects?
   (a) The length of your textbook
   (b) The length of the classroom
   (c) The length of your pencil
   (d) The thickness of your pencil - millimetres
   (e) The distance between two towns - kilometres
   (f) The distance around your school yard - metres
   (g) The distance around a soccer field - metres
   (h) The height of the window in your classroom - centimetres
2. Name three objects that are about the length of a centimetre.

(Hint: look at your hands or look around in the classroom.) Accept any reasonable response.

3. Name three objects that are about 10 cm long or wide. Accept any reasonable response.
4. Name three objects that are about 30 cm long or wide. Accept any reasonable response.
5. Now use some of the objects that you named in questions 2 to 4 to help you estimate the following: Accept any reasonable response.
   (a) Estimate how long your thumb is.
   (b) Estimate how long your desk is.
   (c) Estimate how wide the distance is between two desks in your classroom.

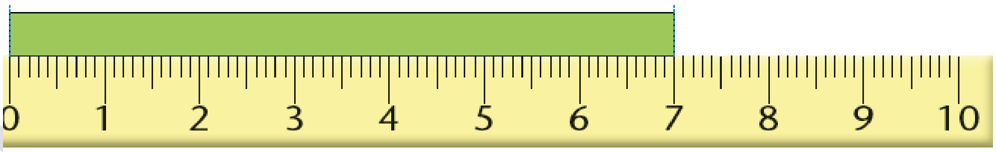
6.3 Accurately measuring short lengths in both cm and mm

To measure accurately, the measuring instrument must be at 0, if not, regard the starting point as 0.
In the example below, the strip starts at 1 to 4, and it measures 3 cm

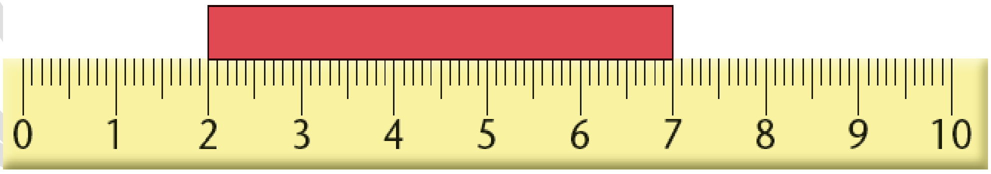


1. Read the lengths of the strips and record the lengths in both cm and in mm

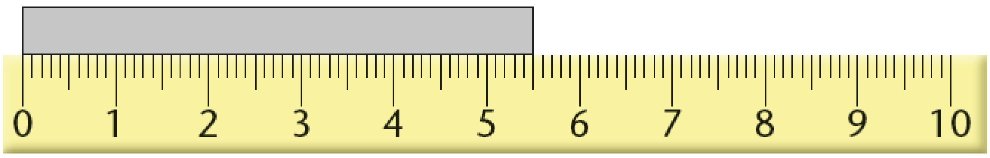
(a)



(b)

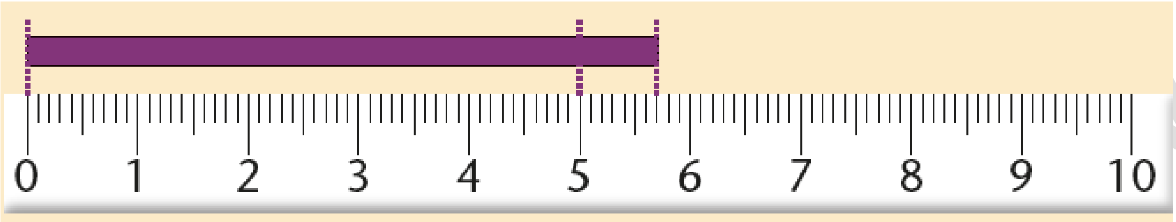


(c)



We can also record the length of an object with a combination of two different units. The bar above is more than 5 cm but less than 6 cm long. It is 7 mm longer than 5 cm. We can therefore say that the bar is 5 cm and 7 mm or we can record it as 57 mm.

1. Study the following ruler and answer questions.



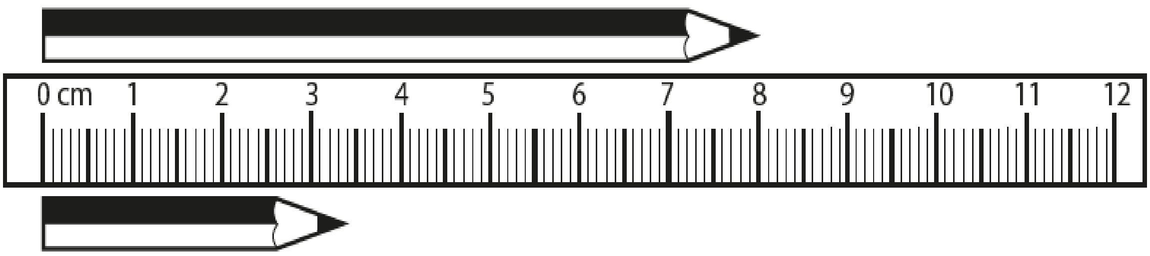
   (a) What is the length of the bar using a combination of cm and mm?

   (b) What is the length of the bar in mm?

2. First estimate the centimetre length of each of the objects indicated in the table that follows. Then measure each object with an appropriate instrument. Complete the table. Accept any reasonable response.

Item	Estimation	Actual Measurement
lead pencil		
DBE text book		
Desk		
Classroom wall,		
Height of the door		
The total distance around the schoolyard.		
The distance around a R5 coin		

3. Estimate the distance between your own town and the nearest town.
4. Record accurate reading from the figures below.



Units	Long pencil	Short pencil
mm	80 mm	35 mm
cm	8 cm	3,5 cm

6.4 Writing lengths in different units

You already know the following:

There are 10 millimetres in 1 centimetre.

There are 100 centimetres in 1 metre.

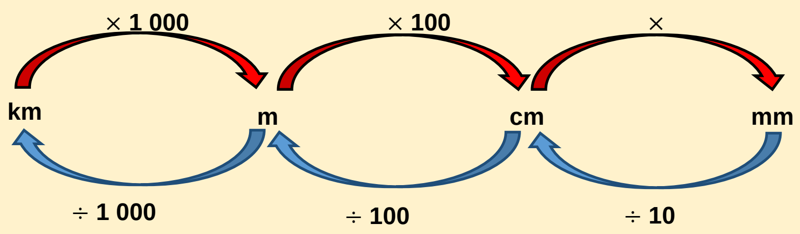
There are 1 000 metres in 1 kilometre.

This makes it easy to convert from one unit to another, because each unit is 10, 100 or 1 000 times as large or as small as another unit in the system.

1 m = 1 000 mm and 1 km = 1 000 m

1 cm = 10 mm and 1 m = 100 cm/ 1 000 mm

The illustration below shows how to convert between SI units, i.e. from bigger unit to smaller unit, use sign and vice versa.



1. How do you convert:
   - (a) centimetres to millimetres?
   - (b) millimetres to centimetres?
   - (c) kilometers to metres?
   - (d) metres to kilometers?
   - (e) 5 cm to millimetres?
   - (f) 6 km to metres?
   - (g) 7 500 m to kilometers?

2. Write the following lengths in millimetres:

(a) 2 cm	(b) 23 cm	(c) one half of a cm	(d) one fifth of a metre

3. Write the following lengths in metres:

(a) 400 cm	(b) 4 000 mm	(c) 1 050 cm	(d) 10 000 cm

4. Write the following lengths in metres:

(a) 25 km	(b) 14 km	(c) 1 km	(d) $\frac{1}{4}$ km

5. Write the following lengths in kilometres:

(a) 7 000 m	(b) 26 000 m	(c) 1 500 m	(d) 10 000 m

6.5 Ordering and comparing lengths

In order to arrange length of shapes or objects in any order, the units must be the same

Example:

Order the following lengths from highest to lowest

643 cm; 2 m; 87 000 mm; 34 m

634 cm	2 m	87 000 mm	34 m
6 430 mm	2 000 mm	87 000 mmm	34 000 mm

Answer: 87 000 mm; 34 m; 634 cm; 2 m

In order to order lengths, convert all lengths to a single unit.

1. Order the following numbers from the smallest to the largest.
   (a) 643 cm; 1212 m; 870 mm; 34 m
   (b) 556 cm; 112 km; 861 490 cm; 0, 5 km
   (c) 20 000 m; 25 km; 150 000 cm

6.6 Rounding off

1. Round off to the nearest 100:

(a) 78 cm	(b) 163 cm	(c) 896 m	(d) 56 083 cm

2. Round off to the nearest 1 000:

(a) 2 740 cm	(b) 4 590 cm	(c) 1 958 m	(d) 890 mm

TERM 3

2 Table of Contents

UNIT 1

WHOLE NUMBERS: COUNTING, ORDERING, COMPARING, REPRESENTING AND PLACE VALUE

1.1 Counting, ordering, comparing, representing and place value

Counting forwards and backwards in 50's and 100's from 0 to 9 000.

1. Fill in the missing numbers by Counting forward in fifties from 2 450 until you reach 3 200.

   2 450; ____; 2 550; ____; ____; 2 700; ____; ____; ____; 2 900; ____; 3 000; ____; ___; ____; 3 200

2. Count backwards in 100's.

   7 250; _____; _____; _____; 6 850; _____; _____; _____; 6450; _____; _____

3. Count forwards in 50s from 2 133 to 2 333.
4. Count backwards in fifties from 3 250 to 2 950.

Representing and place value of numbers up to 5-digits

1. Write the digits of the following numbers in their correct columns:

Number	Ten Thousands	Thousands	Hundreds	Tens	Ones
1 547		1	5	4	7
56 283					
7 291					
63 243					
8 010					

2. What is the place value of the underlined digit?
   (a) 1<u>2</u> 456
   (b) 2 5<u>4</u>8
   (c) 25 63<u>8</u>

(d) 40 052

(e) 35 284

3. What is the value of the digit 6 in these numbers?

   (a) 78 062

   (b) 64 100

   (c) 34 576

   (d) 16 002

   (e) 98 623

Ordering

1. Arrange these numbers from smallest to biggest:

   3 648; 3 684; 3 468; 3 864; 3 486.

2. Arrange these numbers from biggest to smallest.

   98 210; 97 885; 94 010; 99 900; 95 610; 98 589.

Comparing

The < sign for "smaller than" can be used to state that one number is smaller than the other is. For example, we can write 25 < 27 and 2 695 < 8 981. The > sign for "bigger than" can be used to state that one number is bigger than the other is. For example, we can write 27 > 25 and 5 579 > 3 579. Notice that the open part of the sign is always towards the bigger number.

1 Use the < or > sign to compare the following whole numbers.

(a) 53 492 ☐ 19 002

(b) 26 768 ☐ 26 879

(c) 12 901 ☐ 12 899

(d) 75 536 ☐ 75 355

1.2 Odd and even numbers

All the numbers that end with 1, 3, 5, 7 or 9 cannot be divided into two equal groups or cannot be halved or cannot be divisible by 2 and are called **odd numbers**. All the numbers that end with 0, 2, 4, 6, or 8 can be divided into two equal groups or can be halved or can be divisible by 2 and are called **even numbers**.

1 Select all the odd numbers or even numbers in the set of numbers below.

394 201

538

427

635

140

713 989

1.3 Multiples and factors

The number 12 can be obtained by calculating 3×4.

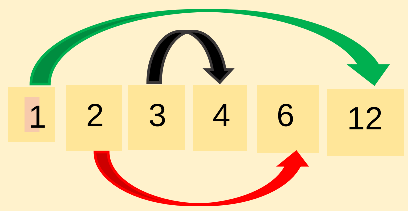
We can say:

- 12 is the product of 3 and 4.

MULTIPLES OF 12

$12 \times 1 = \mathbf{12}$
$12 \times 2 = \mathbf{24}$
$12 \times 3 = \mathbf{36}$
$12 \times 4 = \mathbf{48}$

FACTORS OF 12



- 12 is a **multiple** of 3 and 3 is a **factor** of 12
- 12 is also a **multiple** of 4 and 4 is a **factor** of 12

1. What are the first ten multiples of:

(a) 2 ________________________________

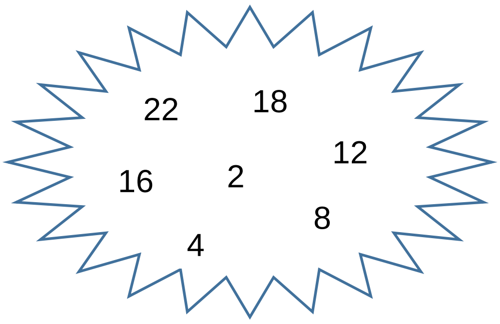
(b) 3 ________________________________

(c) 6 ________________________________

(d) 8 ________________________________

(e) 10 ________________________________

2. Which of the following numbers in the shape are multiples of 4?



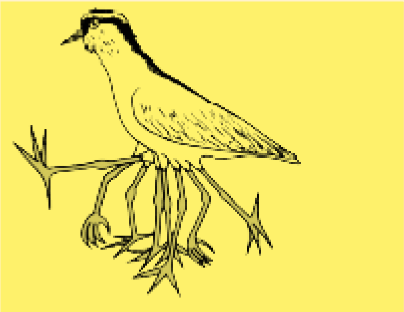
3. Write down all the factors of:
   (a) 36
   (b) 54
   (c) 51
   (d) 98
   (e) 115

UNIT 2

NUMBER SENTENCES

2.1 Open and closed number sentences

If something is not true, we say it is false.



For example, this sentence is **false**: All birds have eight legs.

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

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

9 + 4 = 7 +___?

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

The number 6 will make the above number sentence true: 9 + 4 = 7 + **6**

- The sentence 9 + 4 = 7 + 6 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:

9 + 4 = 7 + . . . or 9 + 4 = 7 + a number or 9 + 4 = 7 + □

1. Complete the following number sentences:
   (a) 6 + 4 = 8 + . . .
   (b) 90 + 10 = 80 + . . .
   (c) 20 + 60 = 10 + 50 + . . .
   (d) . . . + 200 = 1 000
   (e) 130 + . . . = 110 + 35
   (f) . . . + 640 = 1 000
   (g) 487 + . . . = 650

2.2 Properties of whole numbers

When a number is multiplied by 1, the answer is the number itself. This is called the **multiplicative property of 1**.

Example $37 \times 1 = 37$.

When 0 is added to a number, the answer is the number itself. This is called the **additive property of 0**.

Example $37 + 0 = 37$.

When you subtract the same number from itself, the answer is zero. This is called the **Identity element of 0**

Example $15 - 15 = 0$

Commutative property of addition - Numbers can be added in any order.

Example: $12 + 13 = 13 + 12$

Commutative property of multiplication - Numbers can be multiplied in any order.

Example**:** $6 \times 8 = 8 \times 6$

1. Complete the following:
   (a) $25 + 20 = 20 + \ldots$
   (b) $33 - 33 = \ldots$
   (c) $7 \times 11 = \ldots \times 7$
   (d) $18 + \ldots = 18$
   (e) $41 - \ldots = 0$
   (f) $10 \times \ldots = 30 \times 10$
   (g) $\ldots + 0 = 16$
   (h) $52 \times \ldots = 52$
   (i) $\ldots + 2 = 2 + \ldots$
   (j) $\ldots - 8\ldots = 0$

2.3 Inverse operations

Addition and subtraction as inverse operations

This means that subtraction is the opposite of addition.

Addition can be used to check subtraction

Example: $45 + 12 = 57$ therefore $57 - 12 = 45$

Multiplication and division as inverse operations

Division statement can be changed to a multiplication statement.

Example: $36 \div 12 = 3$ can be changed into $3 \times 12 = 36$

1. Complete the following

(a) $15 + 11 = 26$	therefore	$26 - 11 = \ldots$
(b) $10 \div 5 = 2$	therefore	$2 \times \ldots = 10$
(c) $51 \div 17 = 3$	therefore	$3 \times 17 = \ldots$
(d) $26 + 13 = 39$	therefore	$39 - 13 = \ldots$
(e) $9 \times 6 = 54$	therefore	$54 \div \ldots = 6$
(f) $78 - 18 = 60$	therefore	$60 + \ldots = 78$

UNIT 3

WHOLE NUMBERS: ADDITION AND SUBTRACTION

3.1 Rounding off to the nearest 1000 to estimate answers

Example 1

When estimating answers first round off the numbers

2 345 + 4 858 = 2 000 + 5 000

= 7 000

Example 2

6 745 – 3 245 = 8 000 – 3 000

= 5 000

1. Estimate the answers to the following:

   (a) 7 178 – 3 535

   (b) 7 834 + 1 188

   (c) 9 062 – 5 368

   (d) 6 771 + 2 869

   (e) 2 384 + 6 297

   (f) 6 572 – 1 944

   (g) 3 902 + 2 869

   (h) 7 869 – 2 543

   (i) 1 795 + 2 947

3.2 Expanded column method

Examples:

5 632 + 2 476 =

5 362 = 5 000 + 300 + 60 + 2

2 476 = <u>2 000 + 400 + 70 + 6</u>

= 7 000 + 700 + **130** +8

Since 130 is in the place value of tens, it needs to be expanded to have 100 + 30 and transfer the 100 to 700

= 7 000 + **(700** + **100)** + 30 + 8
= 7 000 + **800** + 30 + 8
= **7 838**

(a) 7 445 – 3 274 =

7 445 = 7 000 + 400 + **40** + 5
– 3 274 = <u>3 000 + 200 + **70** + 4</u>

But 40 is less than 70 therefore we need to transfer 100 from 400 to have 140

7 445 = 7 000 + **300** + **140** + 5
– 3 274 = <u>3 000 + 200 + **70** + 4</u>
7 445 – 3 274 = 4 000 + 100 + 70 + 1

= **4 171**

1. Calculate:
   (a) 6 420 + 3 364
   (b) 9 580 – 2 450
   (c) 7 255 + 1 260
   (d) 4 457 – 2 325
   (e) 2 842 – 1 651
   (f) 2 948 + 1 033
   (g) 1 931 + 1 077
   (h) 3 100 – 2 800

3.3 Using a calculator

1. Use the calculator to calculate the following

    (a) 3 812 + 2 163

    (b) 4 523 – 3 439

    (c) 6 605 + 4 251

    (d) 5 032 – 3 810

    (e) 3 653 + 2 435

    (f) 4 528 – 3 452

    (g) 5 437 + 4 472

    (h) 7 205 – 1 363

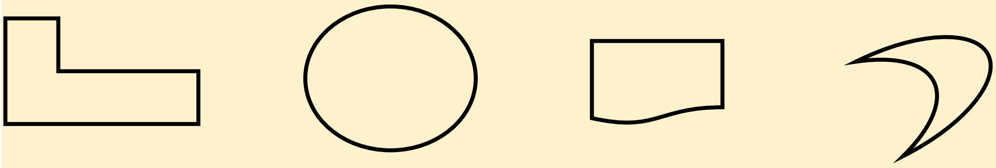
UNIT 4

PROPERTIES OF 2-D SHAPES

4.1 Recognise, classify and name 2-D shapes

A **two dimensional (2-D)** shape is a closed flat plane figure that does not have any thickness. It cannot be physically held. It can have curved straight or a combination of curved and straight sides.

Examples:



1. Identify whether the following shapes are two-dimensional (2-D) or not. Choose the most appropriate answer.

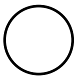
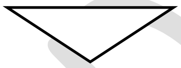
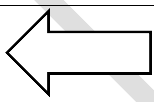
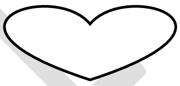
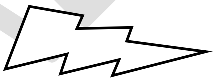
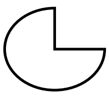
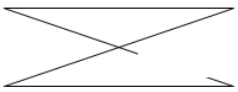
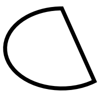
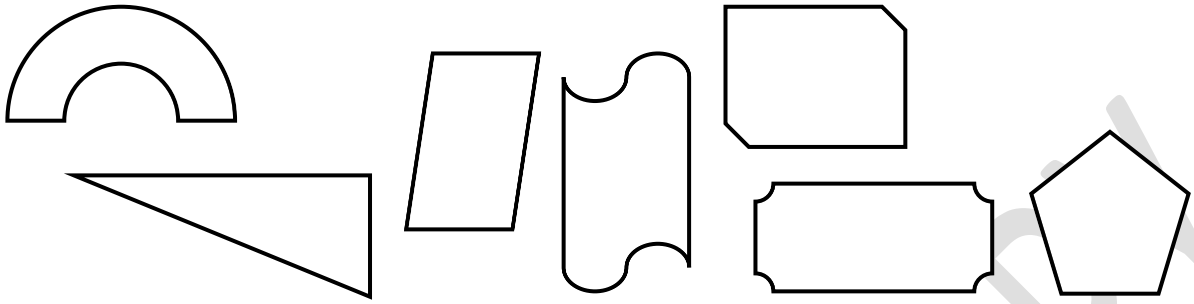
NO	FIGURE	2-D shape?	Straight sides only	Curved sides only	Straight and curved
		Yes or no	Tick the most correct answer.		
(a)					
(b)					
(c)					
(d)					
(e)					
(f)					
(g)					
(h)					

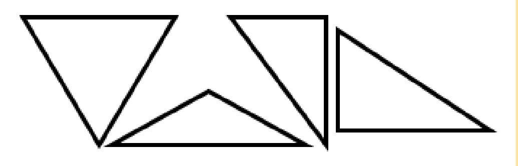
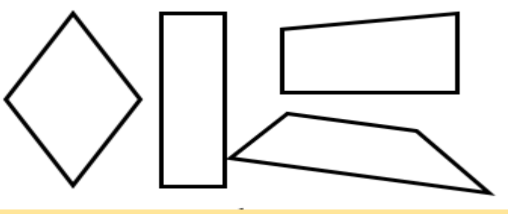
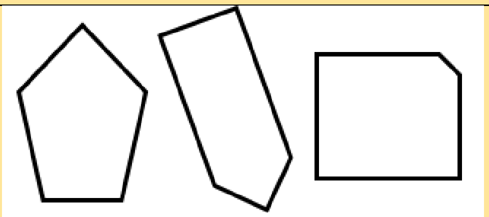
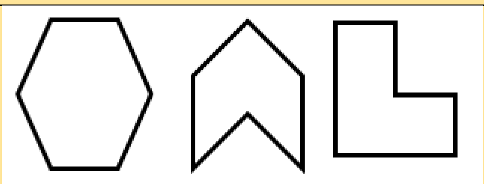
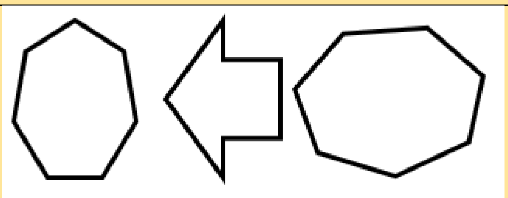
Figure B, C and E are closed shapes bounded by straight lines. They are called **polygons.**

2. Study the following diagrams and colour in those that are polygons.



Naming polygons

We name polygons according to the number of straight sides they have. The shapes below have been named using words derived from Latin or Greek words.

No.	Shape	Number of sides	Derived from	Name
(a)		Three	Latin: tri – three	Triangle
(b)		Four	Latin: quadri – four	Quadrilateral
(c)		Five	Greek: pent – five	Pentagon
(d)		Six	Greek: hexa – six	Hexagon
(e)		Seven	Greek: hepta – seven	Heptagon

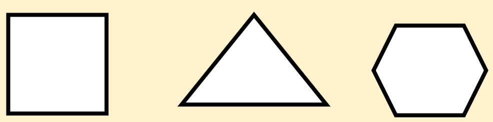
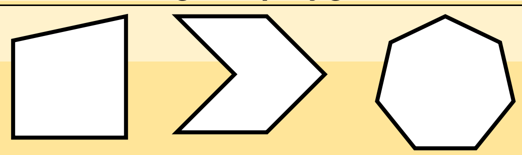
In the following diagram, all the numbered shapes have straight lines.

1. Complete the table using the shapes in the house.

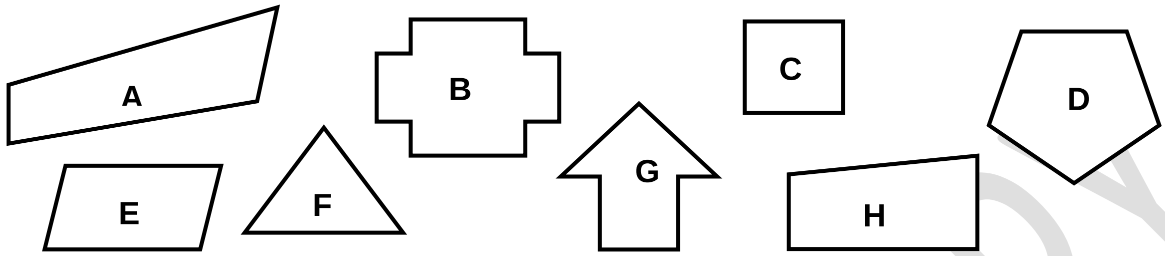
SHAPE	NUMBER OF SIDES	NAME OF THE SHAPE
A		
B		
C		
D		
E		
F		
G		
H		

4.2 Regular and irregular polygons.

Polygons are grouped according to their sides and angles **Regular** polygon are polygons with ALL sides and angles equal. **Irregular** polygons are polygons with sides and angles unequal**. Examples**:

Regular polygons	Irregular polygons
	

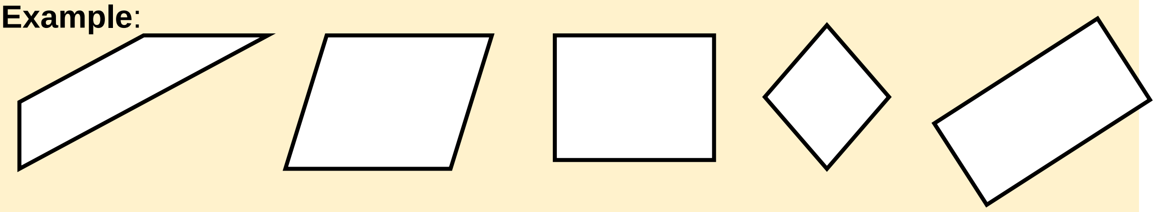
1. Sort the following shapes according to regular and irregular polygons by writing only the letter of the shape.



REGULAR	IRREGULAR

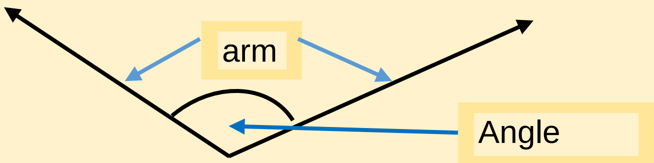
All shapes that are four-sided are called quadrilaterals. Quadri- is a Latin word meaning four and lateral means sides.

Example:

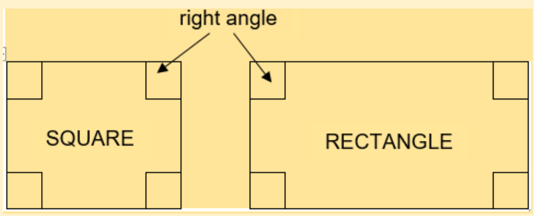


Angles

When two straight lines meet, an **angle** is formed. The two lines that meet to form an angle are called **arms**.

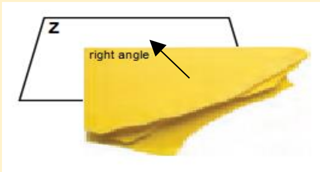


The size of an angle depends on the distance between the two arms. A square and a rectangle are special quadrilaterals because they both have equal angles that are called **right angles**.



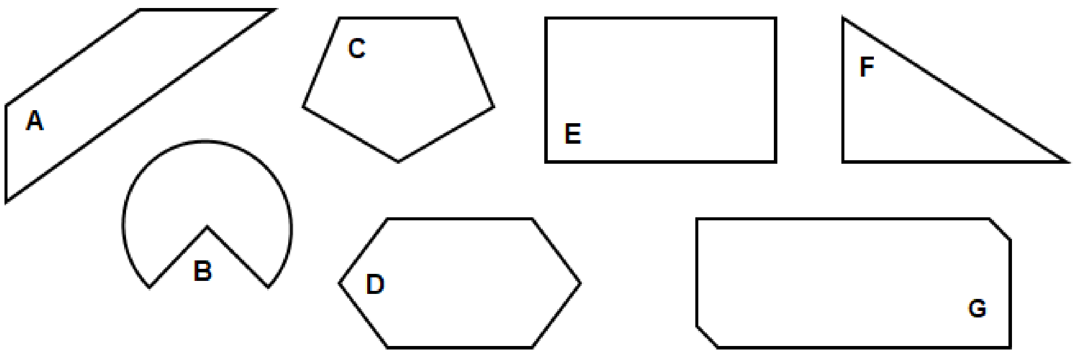
To determine if the angle is a right angle or not one can use corners of a sheet of paper that has been folded two times as shown in the diagrams.

To measure an angle, we place the corner of the folded paper on the angle in a shape and check if it is equal to a right angle, smaller than a right angle or bigger than a right angle. If we want to measure the size of angle z, we can put a folded paper with a right angle on top of the angle as shown in the diagram.



Angle z is greater than a right angle.

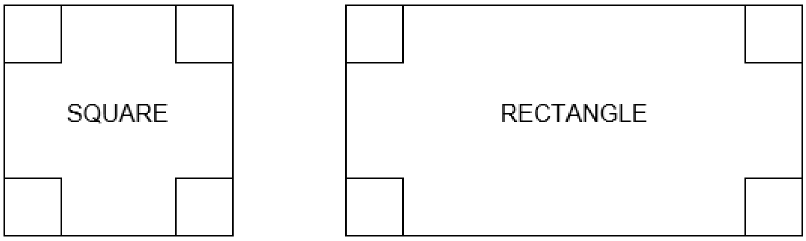
1. Study the identified angles in the following shapes and say whether they are **right angles**, **smaller than a right angle** or **bigger than a right angle**. Use a folded piece of paper to check your answer.



(a) ______________________________ are right angles.
(b) ______________________________ are smaller than a right angle.
(c) ______________________________ are greater than a right angle.

4.3 Similarities and differences between a square and rectangles.

1. Look at these shapes and identify the similarities and differences with special focus on angles and sides.



Complete the table (where possible)

Similarities	Differences
(a)	
(b)	

UNIT 5

SYMMETRY

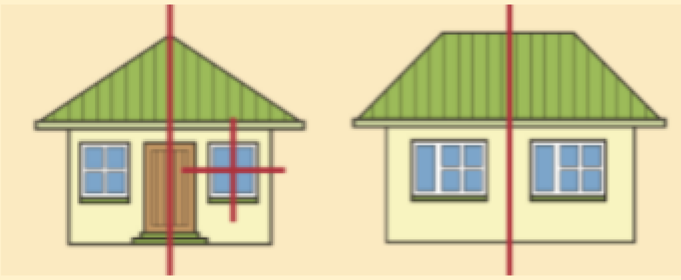
5.1 Recognise and describe lines of symmetry

Symmetry occurs when a shape or design can be imagined as consisting of two "mirror halves". Stated differently, for any symmetrical shape we can imagine a line, called the line of symmetry. It passes through the shape in such a way that if we fold along the line, every single line and point on one side of the line of symmetry lies on top of its twin on the other side of the line of symmetry – without exceptions.

A **line of symmetry** is a line that cuts a shape exactly in the middle. If you fold the shape along the line, both halves would match exactly. If you place a mirror along the line, the shape would remain unchanged.

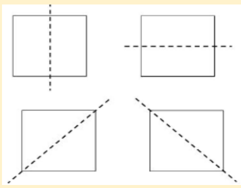
Front view Side view

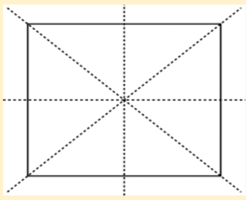
If you fold the picture of the front view of the house on the red line, the part that is on the left of the line will fold exactly onto the part that is on the right of the line.



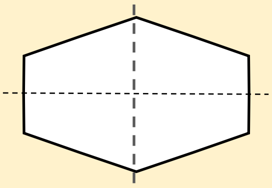
The front view of this house is symmetrical. It has one line of symmetry. The side view is symmetrical. Each front window of the house is also symmetrical, and has two symmetrical lines.

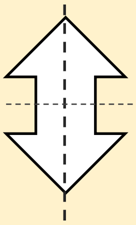
Square:

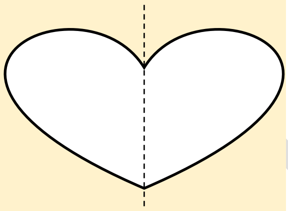




Other shapes:

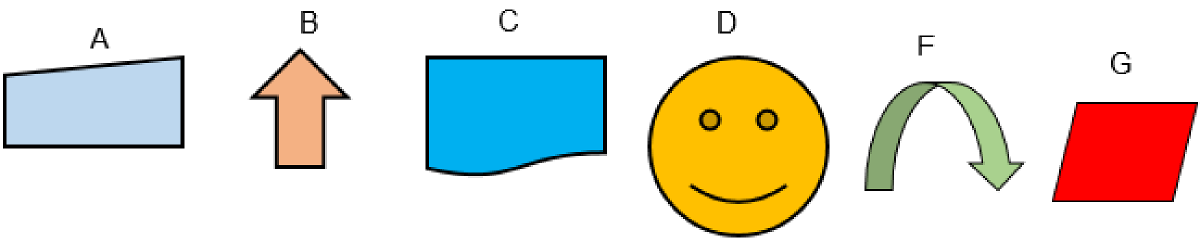






1. Take a paper that was cut to form a square and fold it in the middle. Open it and draw a line on the fold. See how many lines of symmetry you get. Remember the mirror image.

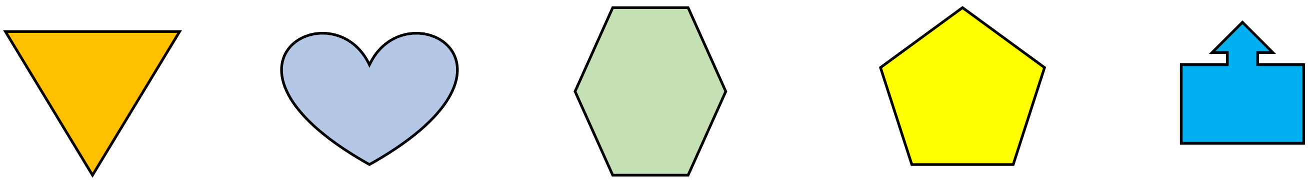
2. Which of the following shapes does not have a line of Symmetry?



Line(s) of Symmetry	No lines of Symmetry

5.2 Draw lines of symmetry

1. Draw the line(s) of symmetry:



UNIT 6

DRAWING OF 2-D SHAPES

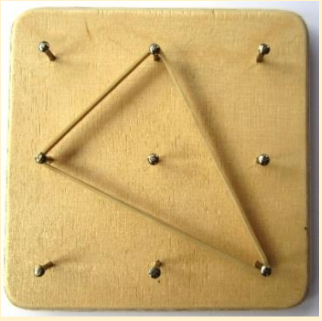
6.1 Draw 2-D shapes

It is easier to draw 2-D shapes on a grid paper. It makes shapes more accurate.

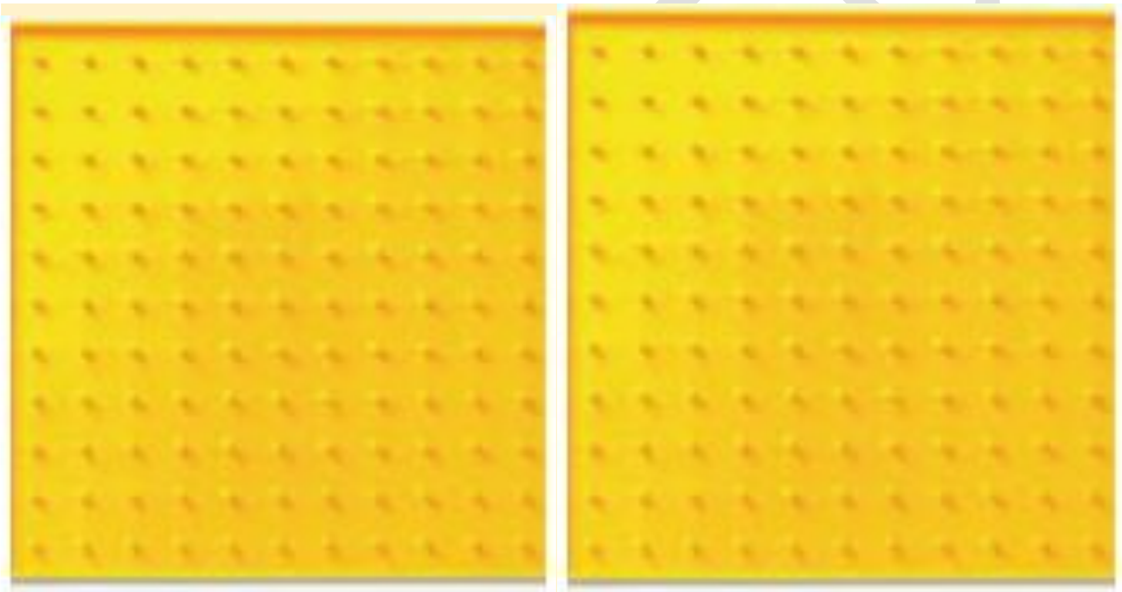
1. Draw an example of each of the following on a square grid:
   a) square
   b) rectangle
   c) triangle
   d) pentagon
   e) heptagon
   f) hexagon

6.2 Create shapes on geoboards

We can create 2-D shapes using a string and a geoboard as shown in the picture.

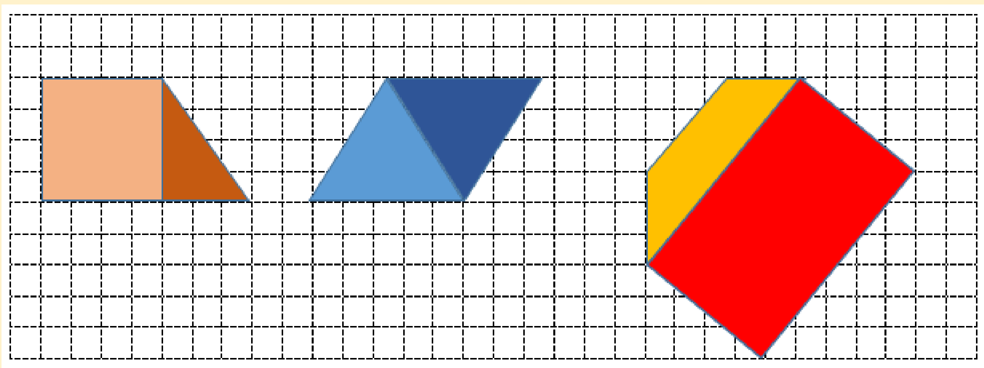


1. Create any 2-D shape using a geoboard like the one below. Ensure that you create at least 5 different shapes.



6.3 Building composite shapes

A composite shape is any shape that is made up of two or more geometric shapes such as triangles, squares, rectangles, etc. It is also called a compound shape.



2. Draw any 4 composite shapes on the grid provided.

UNIT 7

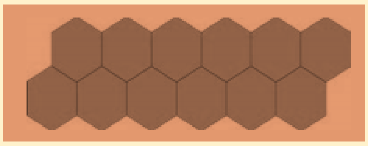
TRANSFORMATIONS

7.1 Composite shapes and tessellations

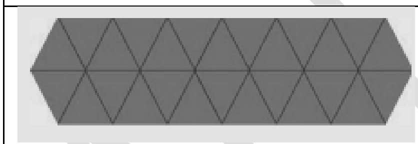
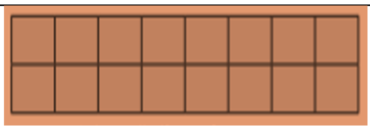
Transformation is a way of moving a shape or an object to another position or changing the size of the shape. During transformation, the position or size of the shape or object changes and not the shape. The Commonly used transformations are those that involve the change of position such as rotations (turn), translation (slide) and reflection (flip). Shapes can be put together to build composite shapes by tessellating them and by packing tangram pieces.

Tessellation

Tessellation is a tiling pattern. We say shapes tessellate when they fit together without using any gaps in between. The example below shows a tessellation of hexagons.



1. Look at the figures below and answer the questions that follow:

Figure A	Figure B
	

(a) Name the smaller shapes that make figure A

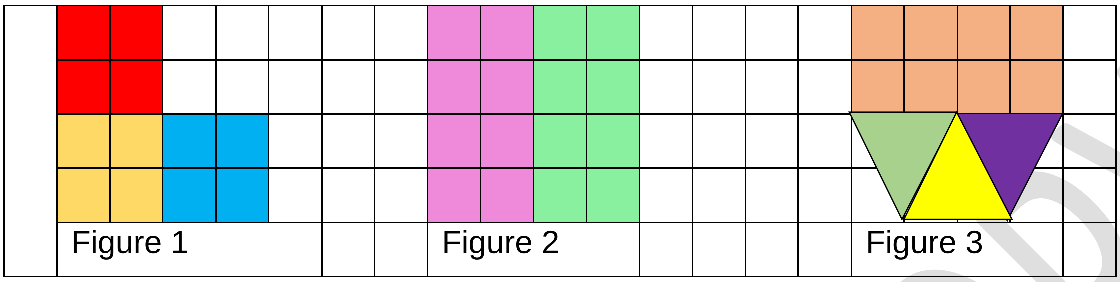
(b) Identify the smaller shapes that make figure B

(c) Have the shapes in figures A and B tessellated or not

(d) What is the name of Figure A?

(e) What is the name of Figure B?

2. Each figure in the square grid below is made of shapes indicated by different colours.



(f) Name each figure

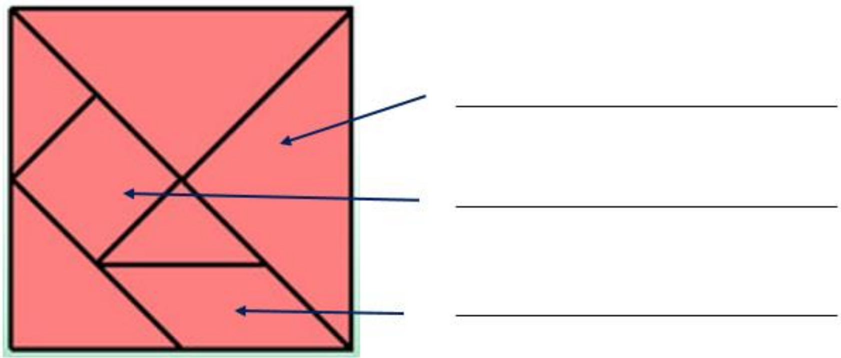
(g) Identify the shapes that made each figure

(h) How many lines of symmetry are there in each figure?

Tangram

We can also use tangram pieces to make new shapes. A tangram is a puzzle made up of triangle, a square and a rhombus cut out of a bigger square. It has seven (7) shapes altogether.

3. Label the shapes in the following tangram.



4. Use ALL your tangram pieces to make the pictures shown below.

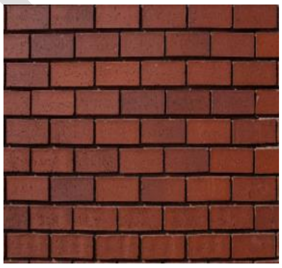
7.2 Describing patterns

Patterns can be described by talking about the shapes or symmetry that is seen on the pattern e.g. the pattern on the tiled floor is a tessellation of rectangles or squares

Example

The pattern on the figure is made of curved lines

1. Identify the objects below and describe how the following patterns were formed.

		
Figure 1	Figure 2	Figure 3

UNIT 8

POSITIONS AND MOVEMENT

8.1 Locate objects using alpha-numeric grid referencing:

Cells in a grid are often labelled with a letter and a number e.g. D4; A3; E7. This is called alpha-numeric referencing.

1. Use the grid below to locate the objects in the given positions. 4C= dog

(a) 1D = square

(b) 7A = circle

(c) 3E = car

(d) 8B = pentagon

(e) 5C = the sun

(f) 2E = hexagon

(g) 1A = triangle

8									
7									
6									
5									
4									
3									
2									
1									
	A	B	C	D	E	F	G	H	I

2. The grid below shows where different learners sit in a classroom.
(a) Describe in words where you sit in the classroom.

(b) Describe where Nathi sits.

(c) Describe where Phil sits.

3. The following grid has 8 rows marked 1 to 8 from the bottom to the top. Study the grid and answer the questions that follow if Jack sits in D6.

8			**BOARD**	**TEACHER'S TABLE**	**CUPBOARD**
7	**SOPHIA**				
6			**MIRRIAM**	**JACK**	
5					**PHIL**
4		**YOU**		**NARE**	**LERATO**
3		**SALLY & GERT**	**NATHI**		
2	**NKOSI & BUSI**	**SIBUSISO**			
1			**JULIUS**		**MPHO**
	A	**B**	**C**	**D**	**E**

(a) In which column, and in which row does Lerato sit?

(b) In which column and in which row do these learners sit?

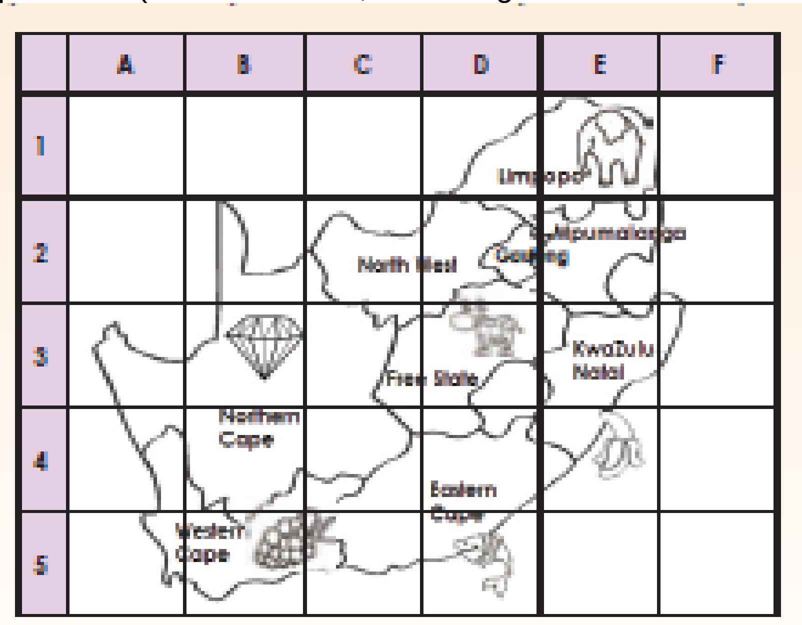
i. Sophia	ii. Busi	iii. Mirriam
iv. Nare	v. Sally	vi. Gert

(c) Who sits in Cell A2?

(d) In which cell is the board?

(e) In which cell is the cupboard?

4. Use the Map below to answer the questions. Give the map references and province. (DBE workbook, Math Eng Gr4 B2 worksheet 134)



(a) Cow ? ______________________________

(b) Grapes? ______________________________

(c) Fish ? ______________________________

(d) Diamond? ______________________________

(e) Elephant ? ______________________________

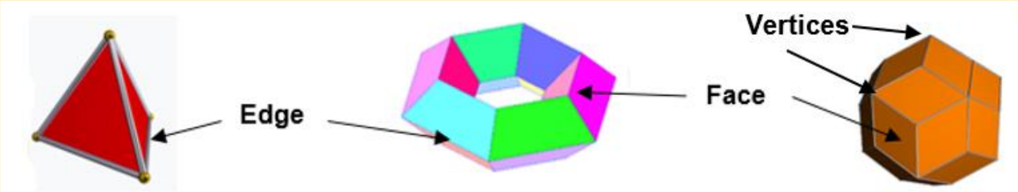
(f) Banana ? ______________________________

UNIT 9

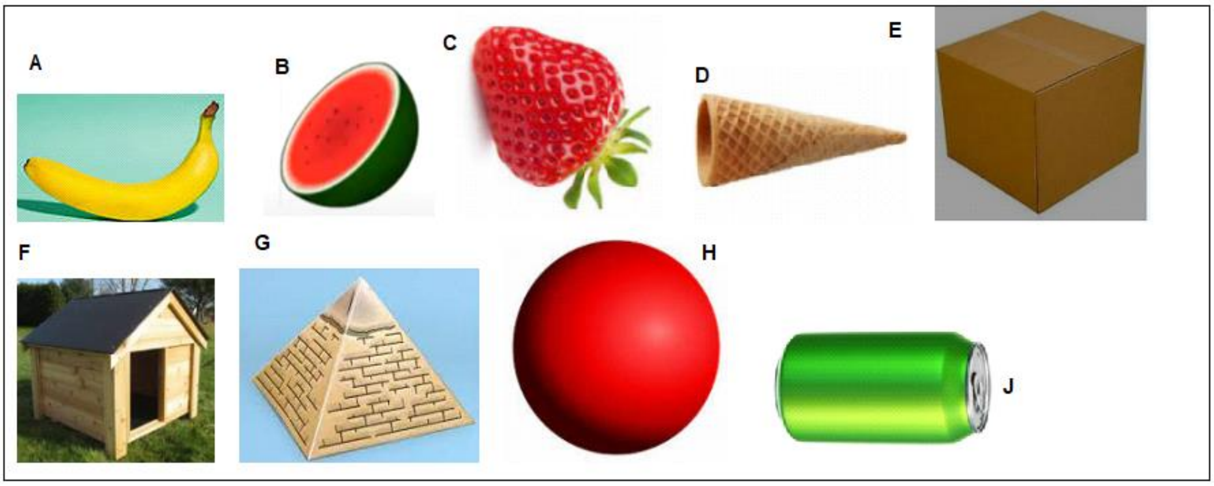
PROPERTIES OF 3-D OBJECTS

9.1 Classifying 3-D objects

A three-dimensional (3-D) object is an object around you that you can pick up, touch and move around. Objects can have curved surfaces only, flat surfaces only and curved and flat surfaces. All objects with flat surfaces are called polyhedra. A polyhedron is a three-dimensional object that consists of a collection of polygons that are joined at the **edges**. A flat surface is called a face. The points where edges meet are called **vertices.**

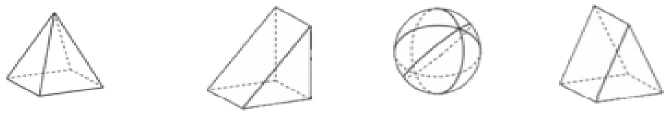


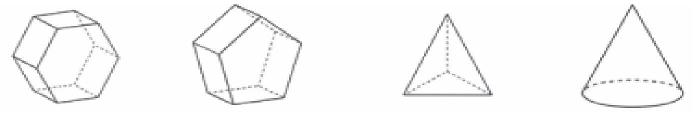
1. Group the following 3-D objects.

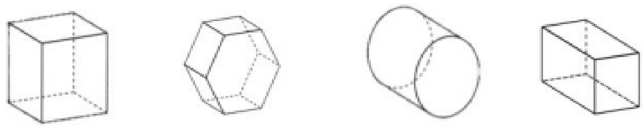


Curved surfaces only	Flat and curved surfaces	Flat surfaces only

2. Circle the 3-D object that does not fit in each row. Name that 3-D object and give reasons why you say it does not fit

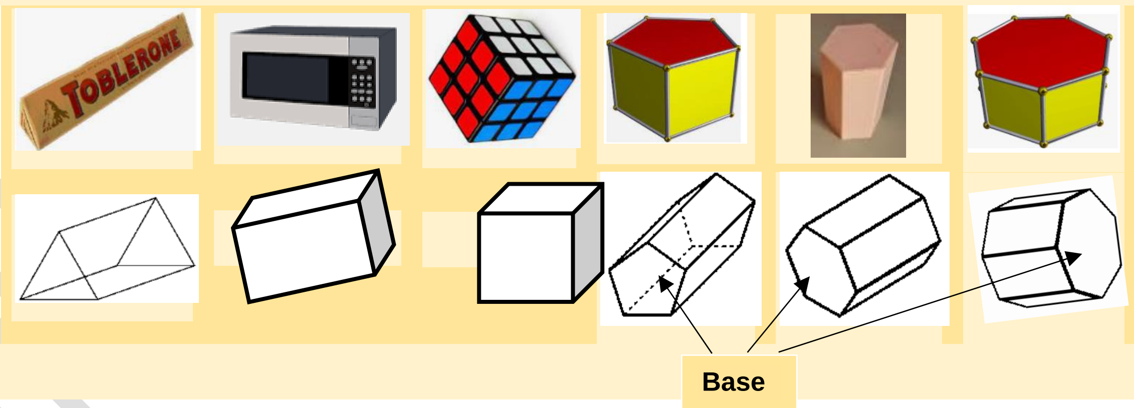
(a) 

(b) 

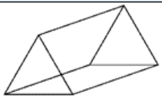
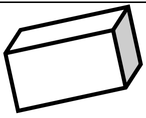
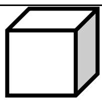
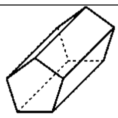
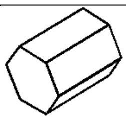
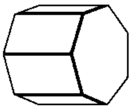
(c) 

Prisms and pyramids

Prisms and pyramids are polyhedrons. A **prism** is a polyhedron with more than three rectangular faces and two identical faces opposite to each other. The identical faces upon which a prism is named are called “**bases**”. A base can be any polygon and it does not refer to the face the object sits on. A prism is named using the two identical faces (bases) that are opposite each other. Other faces of a prism are rectangles or squares. A pyramid is a three-dimensional polyhedron with the base of a polygon along with three or more triangular-shaped faces that meet at a point.



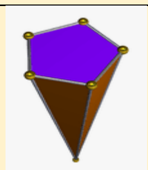
1. Complete the table.

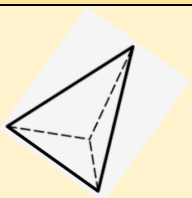
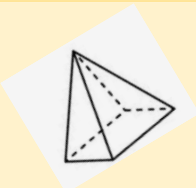
Prism	Name	Number of faces	Shapes that make up faces
	Triangular prism	5	2 triangles 3 rectangles
	Rectangular prism	6	6 rectangles
			
			
			
			

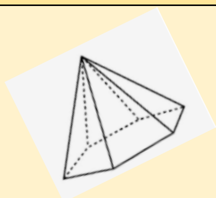
Pyramids

A pyramid is a three-dimensional polyhedron with the base of a polygon along with three or more triangular-shaped faces that meet at a point.

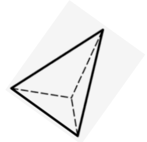
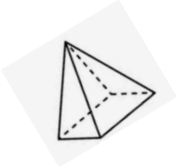
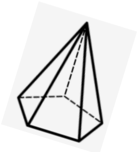
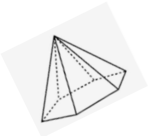
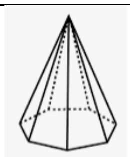


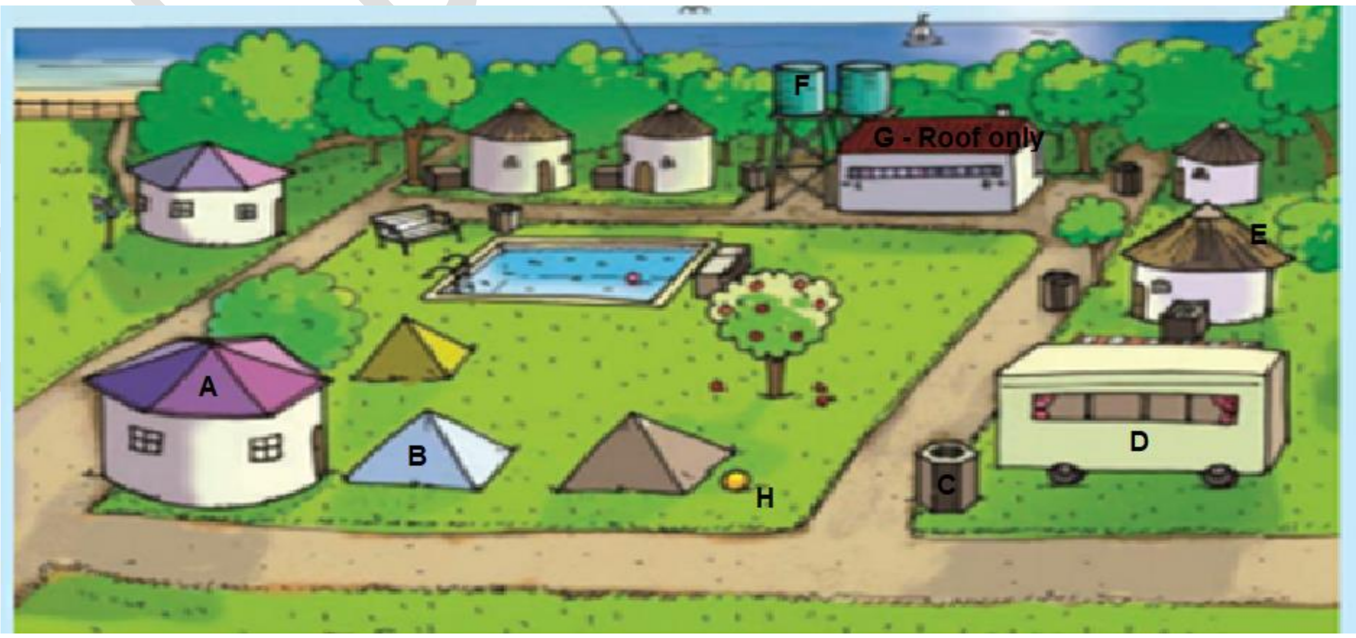






1. Complete the table.

Pyramids	Name	Number of faces	Shapes that make up faces
	Triangular pyramid	4	4 triangles
	Square-based pyramid	5	1 square 4 triangles
			
			
			

2. Identify the labelled three-dimensional objects and name them.



Object	Name
A	
B	
C	
D	
F	
H	

9.2 Make 3-D models using cut-out polygons

1. Bring along any 3-D object to school and complete the following steps.

   Step 1: Cut the object along the edges to get the polygons that make up that object.

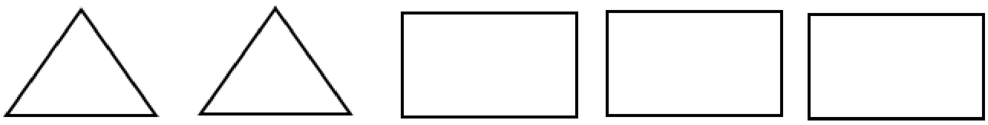
   Step 2: Swap the polygons (pieces) of the object with another classmate.

   Step 3: Make a 3-D model using the polygons that you got from another group

   Step 4: Name the 3-D model you made.

.

2. Make a triangular prism using the pieces you got from your teacher.



   (a) What kind of surfaces does this object have?

   (b) Would it roll the object formed by these faces or slide it?

   (c) What is a face?

   (d) How many faces does it have?

   (e) What shapes make a triangular prism?

UNIT 10

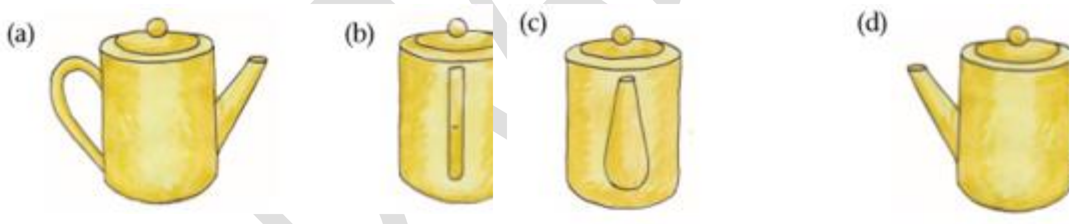
VIEWING OF OBJECTS

Every object can be seen in a different way, depending on the position where you are.

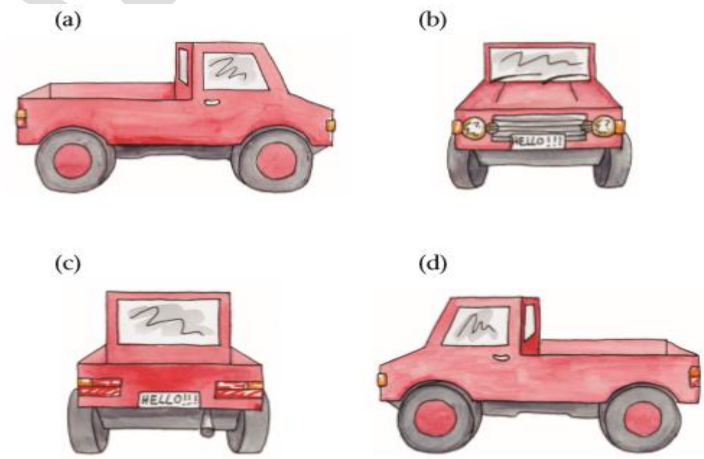
10.1 Match different views of everyday objects

1. Nathi, Lebogang, Peter and Miriam sit around a table.

Each of the four friends makes a drawing of how they see the teapot from where they sit. Who drew which/ picture?



2. Write the position of the view of the car, using: Front, back, left side, right side, top

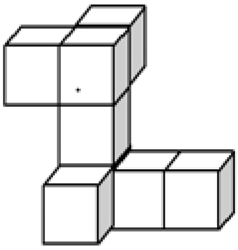


10.2 Identify everyday objects from different views

1. Draw floor plan of your classroom.

   Below is an example of a classroom (top view).

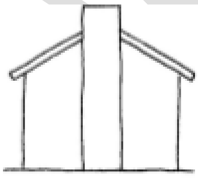
2. Study the diagram of the following object.



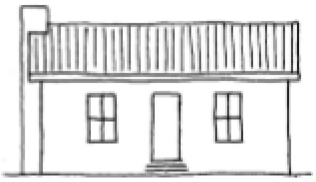
   (a) Use grid paper to draw the i) front, ii) top view iii) left and iv) back of the object.

   (b) After the drawing of the views, discuss and reflect on the transformations that you used to draw the different views

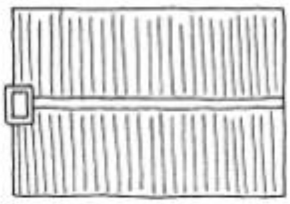
3. Nathi, Lebogang, Peter, Miriam and Bonga all look at the model of the same house. This is what each one sees?



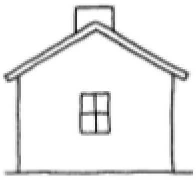
Nathi



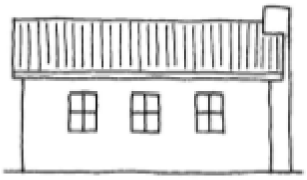
Lebogang



Bonga



Miriam



Peter

Which side view does each see?

(a) Nathi

(b) Lebogang

(c) Bonga

(d) Miriam

(e) Peter

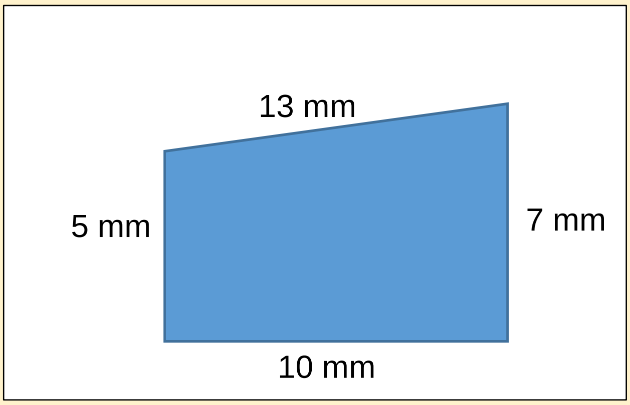
UNIT 11:

PERIMETER, AREA AND VOLUME

11.1 Perimeter:

Perimeter is the total length around the shape. The perimeter can be measured around a shape or object using a measuring tape or a ruler and. In a case where the sides are given, the sum of sides gives the perimeter

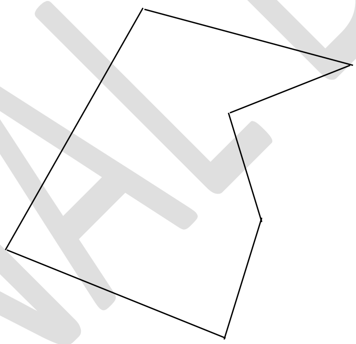
In the figure below, add the lengths of all the sides



10mm + 7mm + 5mm + 13mm = **35mm**

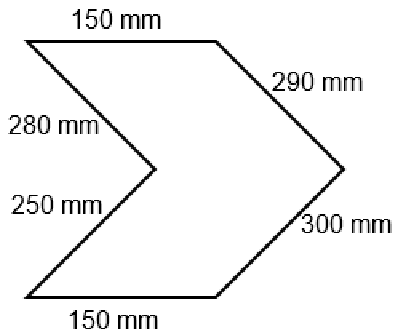
Note: the answer you get is called Perimeter.

1. Measure all the sides using a ruler. Add all the lengths.

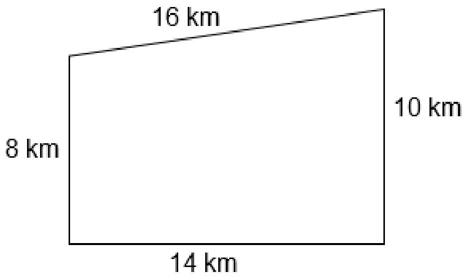


2. The following figures are maps of different plots of land. Calculate the perimeter of each plot and state your answer in the unit used on the map.

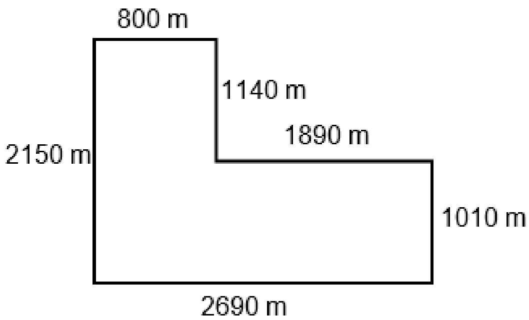
(a)



(b)

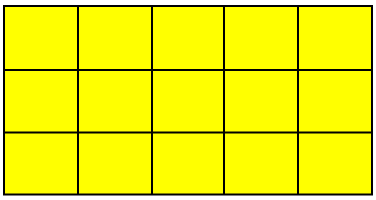


(c)



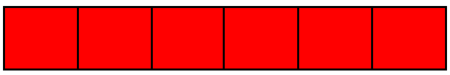
3. What is the total distance around these shapes if the side of each square is 1 unit?

(a)



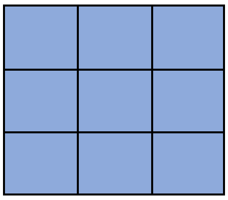
_____________ units

(b)



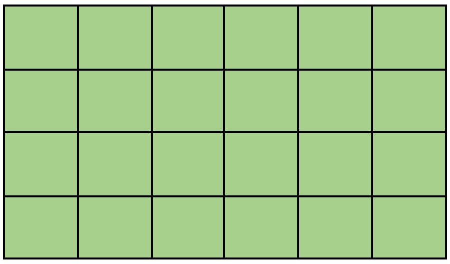
_____________ units

(c)



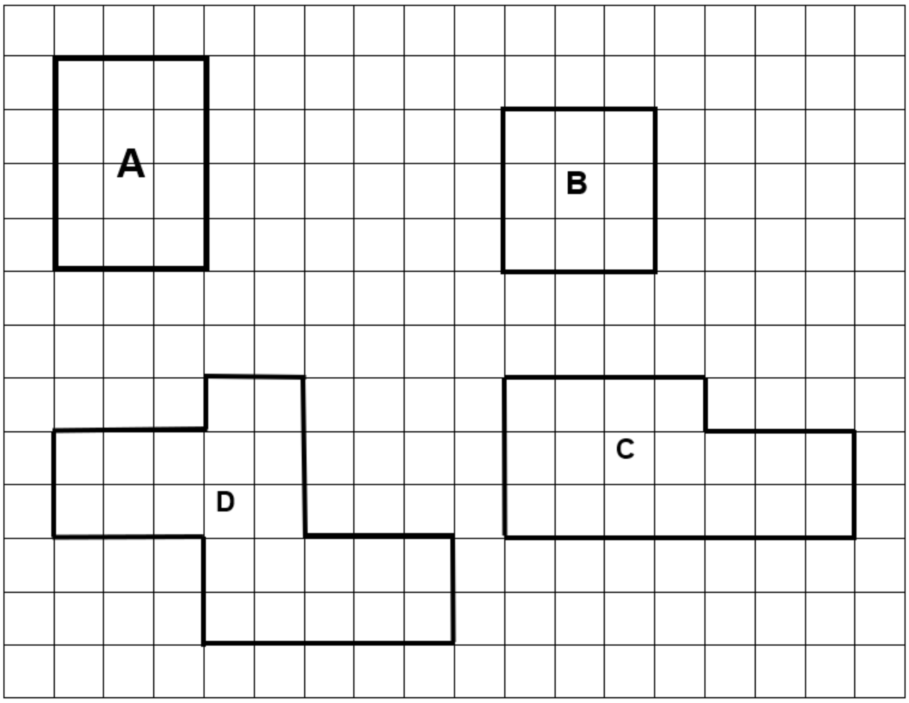
_______________ units

(d)



_______________ units

4. Determine the perimeter of the labelled shapes in the grid if each side of a small square is 1 unit.



11.2 Area

Area is the space enclosed by a boundary in 2-D shape. Area is measured in square units such as square centimetres (cm^2), square metres (m^2) and square kilometres (km^2)

The total number of squares in the figure determine the **area** of the figure.

1. Determine perimeter and area of each figure below:

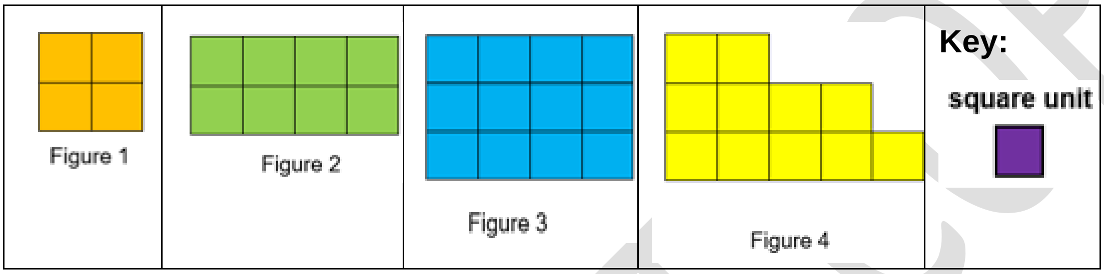
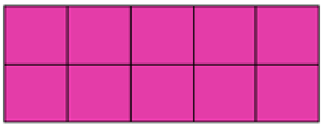


Figure	Perimeter	No of square units
1		
2		
3		
4		

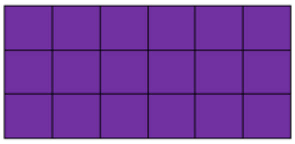
2. How many square units will it take to cover these shapes?

(a)



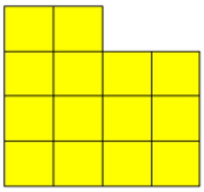
__________square units

(b)



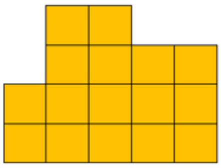
________ square units

(c)



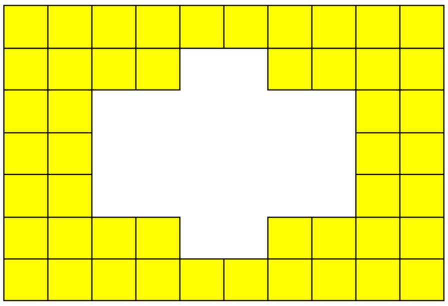
_____________ square units

(d)



________ square units

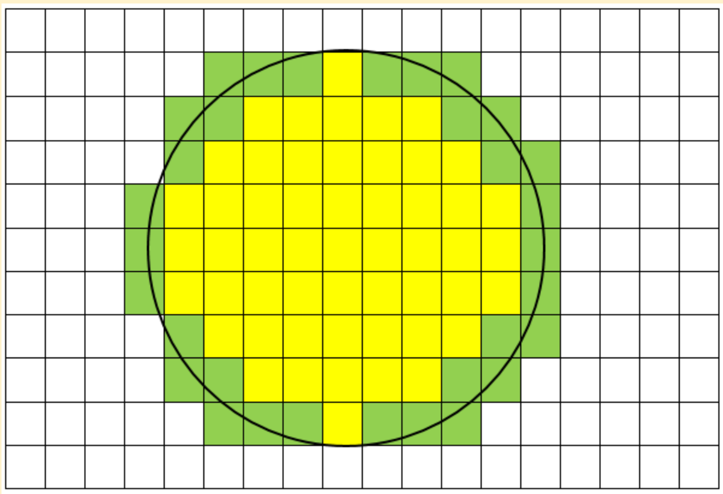
3. How many square units will it take to cover the unshaded shape below?



___________ square units

Shapes with curved sides

When we calculate the area on a given curved shape, we always approximate since it will be in between the two square unit values of the polygonal shapes.

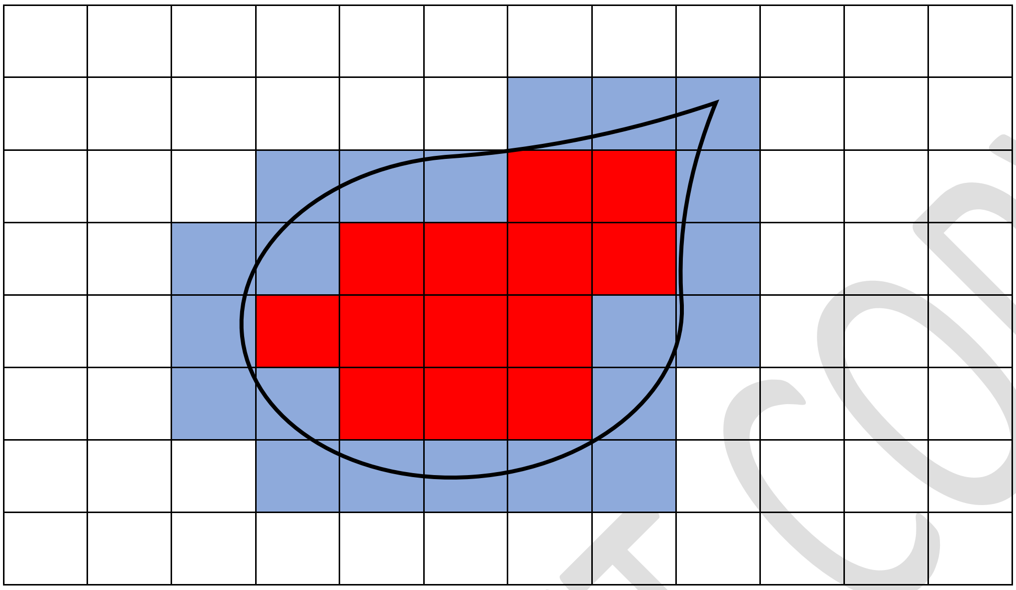


- Count the number of yellow square units = 53
- Count the number of green square units=32
- Add all (yellow and green) square units = 53 + 32 = 85 square units

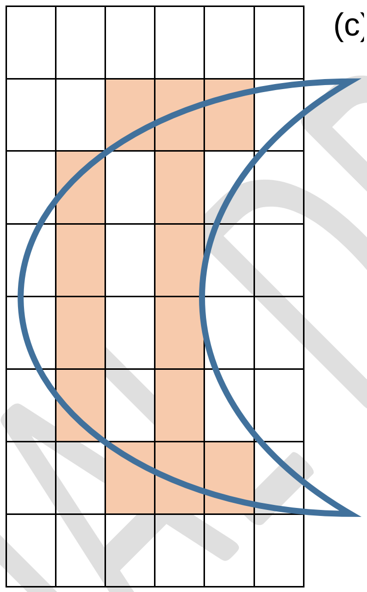
Then we can say the area of the curved shape (circle) will be between 53 and 85 square units

1. Determine the area of the curved shapes

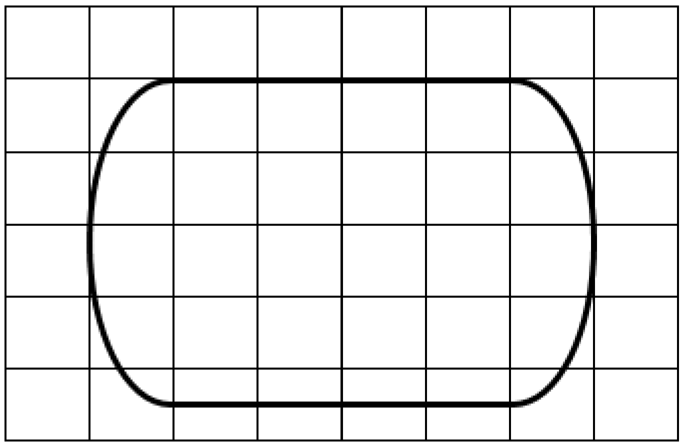
(a)



(b)

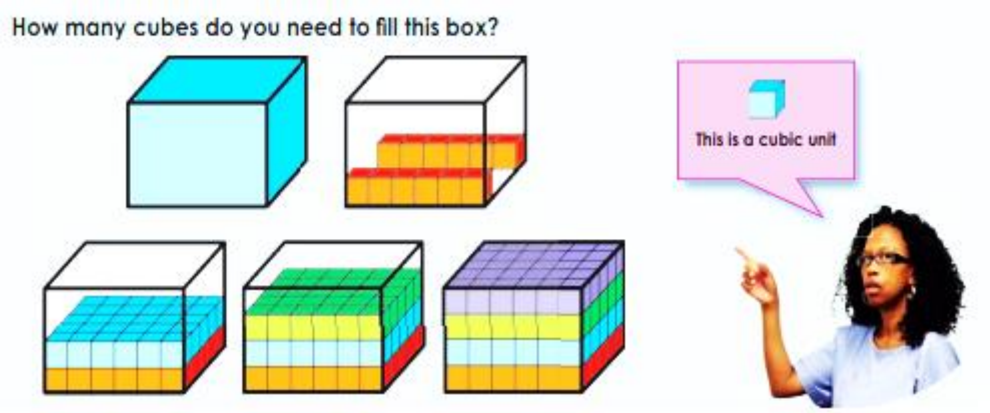


(c)

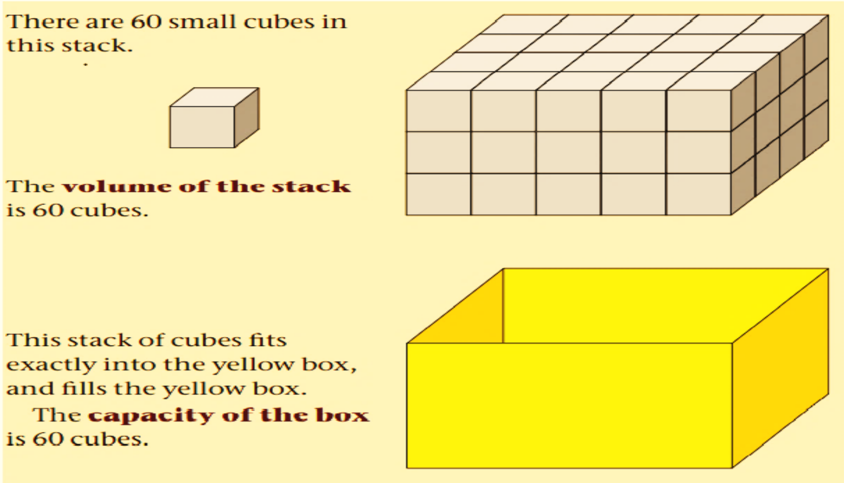


11.3 Volume

- Making stacks with cubes or rectangular prisms

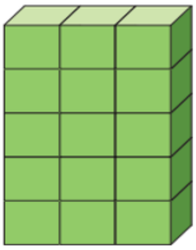


- The **capacity** of a container tells us how much space the container has.
- The **volume** of an object tells us how much space the object takes up.

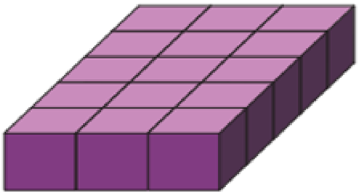


1. How many cubes in each figure?

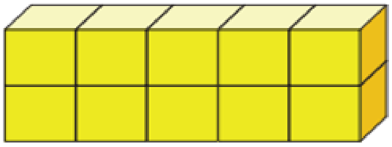
(a)



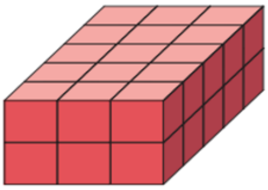
(b)

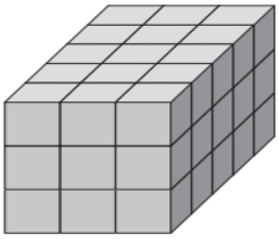


(c)



(d)



(e) 

2. How many cubes do you need to build a stack that is 3 cubes wide and 5 cubes long and 5 cubes high?
3. How many cubes do you need to build a stack that is 4 cubes wide, 6 cubes long and 7 cubes high?

TERM 4

3 Table of Contents

Data Handling

UNIT 1

WHOLE NUMBERS: COUNTING, ORDERING, COMPARING, REPRESENTING AND PLACE VALUE

1.1 Revision

1. Write the number symbols for the following numbers and arrange them from smallest to biggest.
   (a) six thousand three hundred
   (b) five thousand and thirty
   (c) seven thousand and sixty six
   (d) seven thousand and six
   (e) five thousand one hundred
   (f) five thousand two hundred and fifty
2. Answer the following questions
   (a) Consider this number: 85 450
      i. Count forwards in 50s and then in 100s from the given number. NB: Write the next three numbers.
      ii. Count backwards in 50s and then in 100s from the given number. NB: Write the next three numbers.
      iii. Express the number in expanded notation.
   (b) In each case, write $<$ or $>$ between the two numbers.
      i. 2 897 and 2 289

ii. 4 294 and 4 492

iii. 21 890 and 22 089

iv. 35 362 and 35 263

(c) Write down the expanded notation of each number:

i. 2 568

ii. 86 652

iii. 15 504

iv. Three thousand eight hundred and seventy-four

v. Sixty two thousand two hundred and fifty-nine

vi. Ninety eight thousand four hundred and twenty-three

UNIT 2

WHOLE NUMBERS: ADDITION AND SUBTRACTION

2.1 Revision

1. Calculate the following by using a calculator

   (a) 8 867 + 7 968

   (b) 5 886 + 8 657

   (c) 6 783 + 8 894

   (d) 5 378 + 8 257

   (e) 6 756 – 2 354

   (f) 12 785 – 6 432

   (g) 6 896 – 1 635

   (h) 7 657 – 3 434

2. Estimate the answer by first rounding off and then calculate the answer.

   (a) 5 242 – 2 135

   (b) 2 363 – 1 057

   (c) 2 748 + 3 887

   (d) 4 678 + 6 846

   (e) 6 843 – 1 028

   (f) 7 654 + 6 956

3. Solve the following problems.

(a) Thandeka is buying a building material for R6 355. She has already paid the hardware R5 450. How much does she still have to pay?

(b) Vusi borrowed R8 400 to buy a bike of. He has already paid back R5 500 of the R8 400 . How much does he still have to pay?

(c) A car dealer bought a good second-hand 4×4 vehicle for R5 658 and sold it for R1 300 more. What was the selling price of the vehicle?

(d) During the winter, 5 507 people in the city caught flu. In spring the number decreased to 1 794. By how much did the number decrease?

UNIT 3

TEMPERATURE

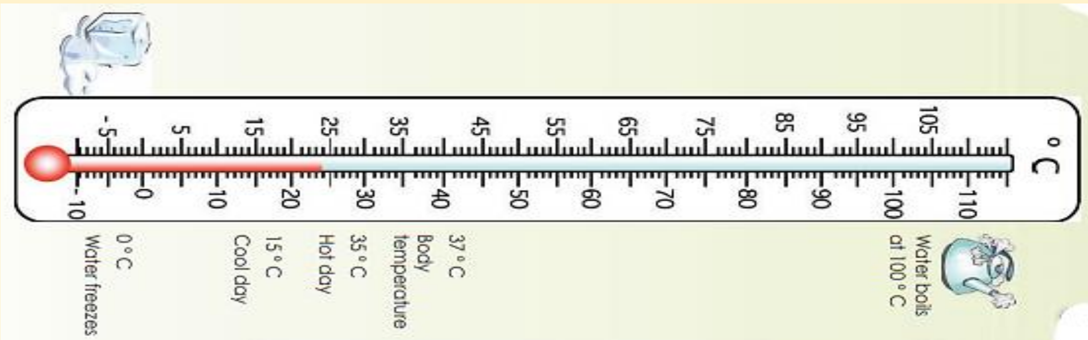
3.1 Reading temperature measurement

When we talk about **hotness** or **coldness,** we are referring to a **temperature**. When we say, “it is cold today”, it is because our bodies are warmer than the environment. When we complain that it is too hot, it is because our bodies are colder than the environment.

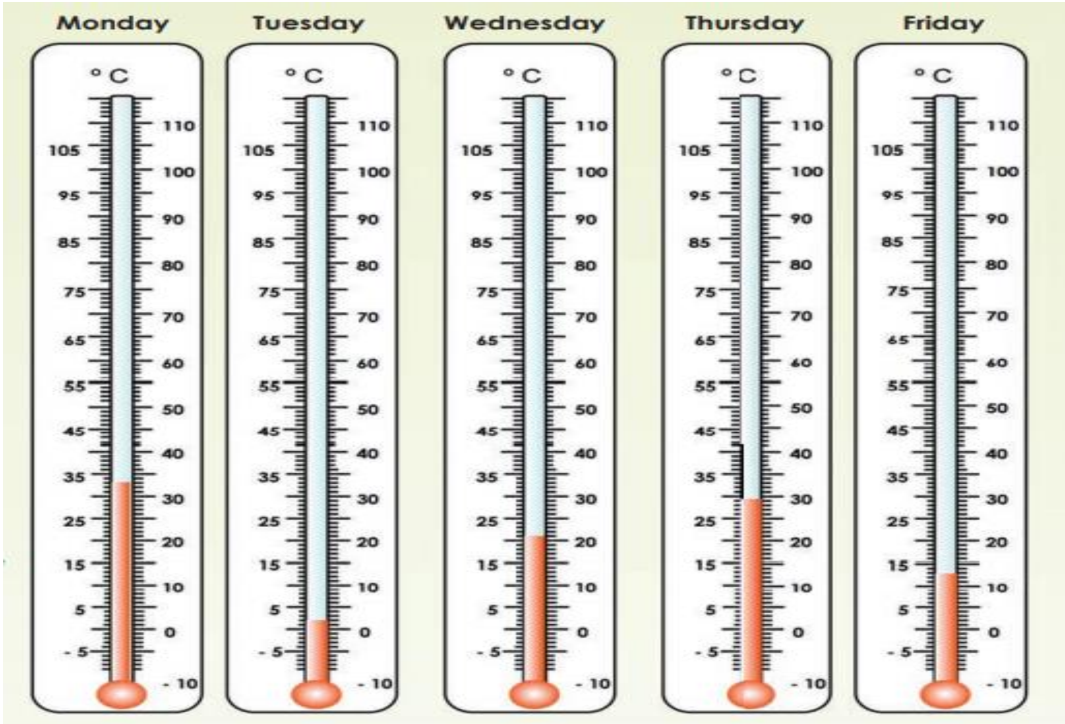
We use an instrument called **thermometer** to **measure temperature,** with units called **degrees Celsius (°C)**.

- The freezing point of pure water is 0 °C.
- The boiling point of pure water is 100°C, depending on the atmospheric pressure
- The average normal human body temperature is 37 °C

Thermometers measure temperature according to well-defined scales of measurement. Thermometer consists of a sealed glass tube that contains a liquid called mercury, that rises (expands) or falls (contracts) when temperature changes.



1. Study the following picture read over a week and then answer questions.



What was the temperature on:

(a) Monday?

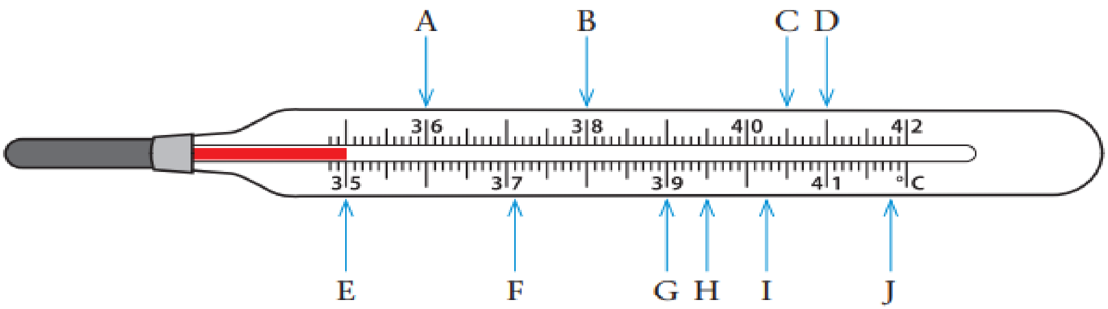
(b) Tuesday?

(c) Wednesday?

(d) Thursday?

(e) Friday?

2. The fluid in the tube (the red line) indicates the temperature reading in the thermometer. Match each temperature reading with one of the letters shown in the drawing below (A to J).



(a) 36 °C (b) 35 °C (c) $39\frac{1}{2}$ °C

(d) $37\frac{1}{10}$ °C (e) $41\frac{8}{10}$ °C (f) $40\frac{1}{2}$ °C

(g)Two degrees below 40 °C

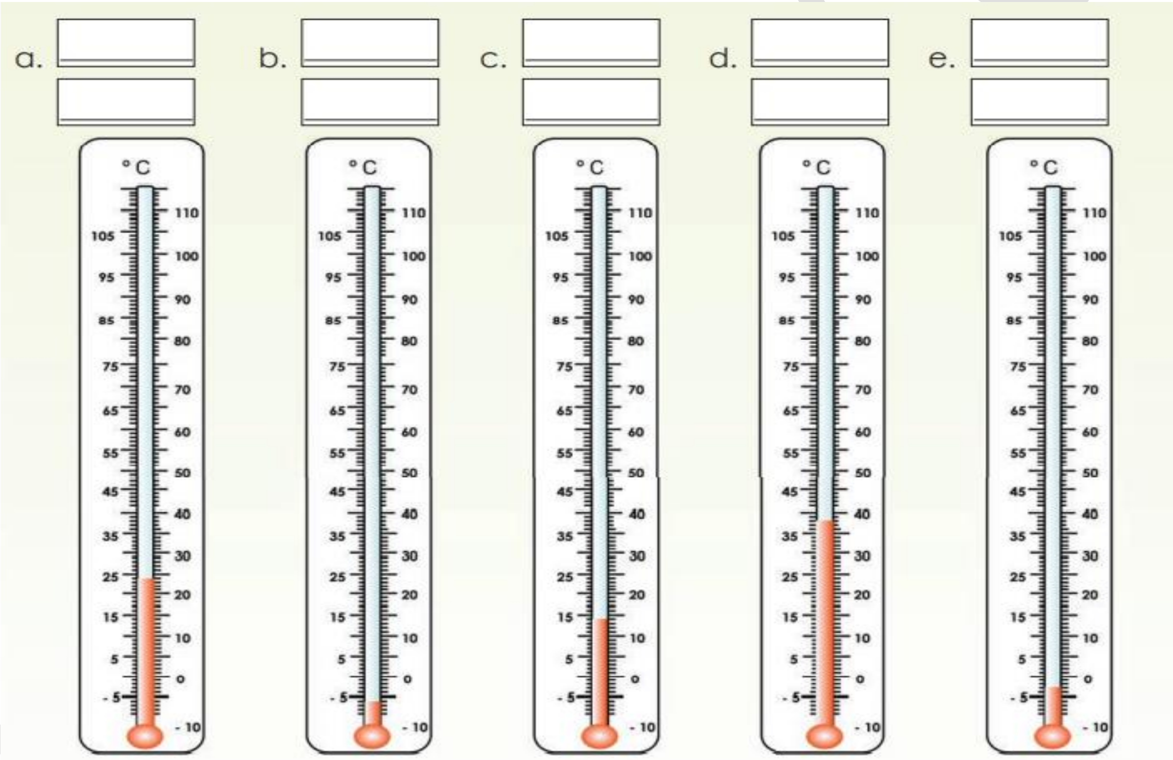
(h) Three and a half degrees higher than $35\frac{1}{2}$ °C

(i) $40\frac{1}{4}$ °C

(j) Half a degree lower than $41\frac{1}{2}$ °C

3.2 Reading calibrated instruments

1. Read these thermometers. Write down the temperature. Say if it is very cold, cold, cool, warm or very warm



3.3 Recording and reporting on temperature measurements

When recording the different temperature readings, one must be accurate and consistent.

When weather temperature is recorded per day, there will be a highest (maximum) temperature and a lowest (minimum) temperature.

1. Record the minimum and maximum temperatures of your own environment/town/city from Monday to Friday. Draw the table in your book and fill in each day's temperatures.

Days	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**
Min temperature					
Max temperature					

   (a) Compare the temperatures of the different days. How did the temperature change over the week?
   (b) Which day had the lowest maximum temperature?
   (c) What is the difference on maximum temperatures on Day 1 and Day 4?
   (d) Calculate the difference in temperature between the minimum and maximum for each day.

3.4 Calculations and solving problems related to temperature

1. The table below shows the actual maximum and minimum temperatures on a day in July for a few towns.

Town	Kuruman	Kimberly	Benoni	Richard's Bay	King William's town
Min temperature	19 °C	20 °C	17 °C	19 °C	16 °C
Max temperature	36 °C	30 °C	27°C	26 °C	24 °C

   (a) Compare the minimum temperatures of Richard's Bay and King William's town. How much colder was it in King William's town than in Richard's Bay on this day?

(b) Compare the maximum temperatures of Richard's Bay and King William's town. How much warmer was it in Richard's Bay than in King William's town on this day?

(c) Calculate the difference in temperature between the minimum and maximum for each town.

(d) In which town was the difference between the minimum and maximum temperatures the smallest?

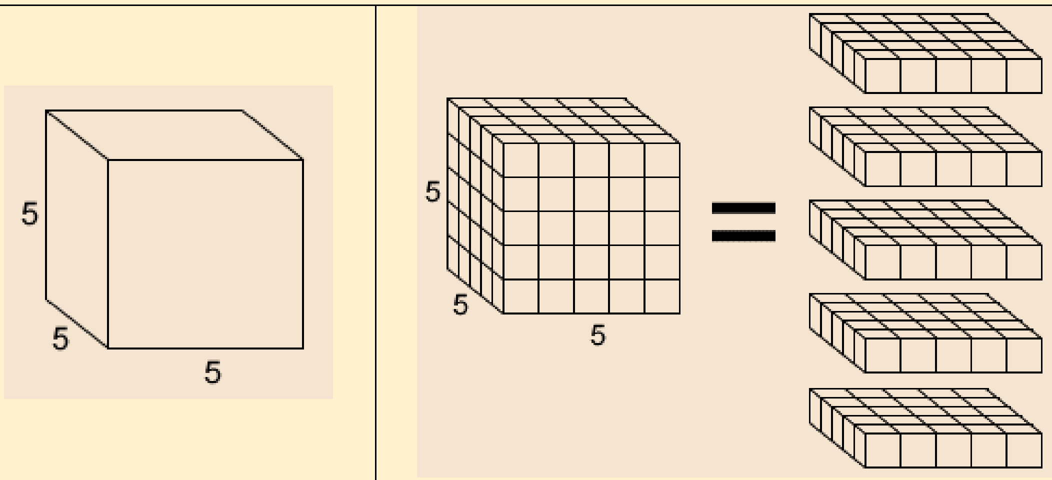
(e) In which town did the temperature change the most between the minimum and maximum temperatures?

UNIT 4

CAPACITY/VOLUME

4.1 What is capacity? What is volume?

The cube below has side lengths of 5. You can evenly stack 5 layers of unit cubes containing a total of 25 cubic units each into the cube as shown below:

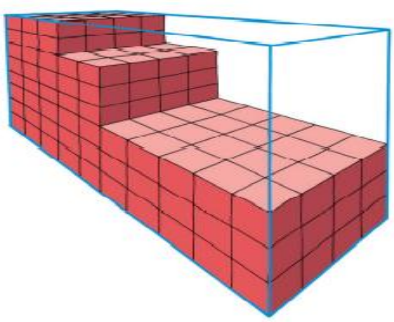


Count how many cubes are used to fill a container. The volume of the container is stated in cubes.

The **capacity** of a container tells us how much space the container has.

The **volume** of an object tells us how much space the object takes up.

1. Answer the following questions based on the diagram below:



(a) What is the volume of the stack inside the blue box?

(b) What is the capacity of the blue box?

(c) How many more cubes must be put into the box to fill it completely?

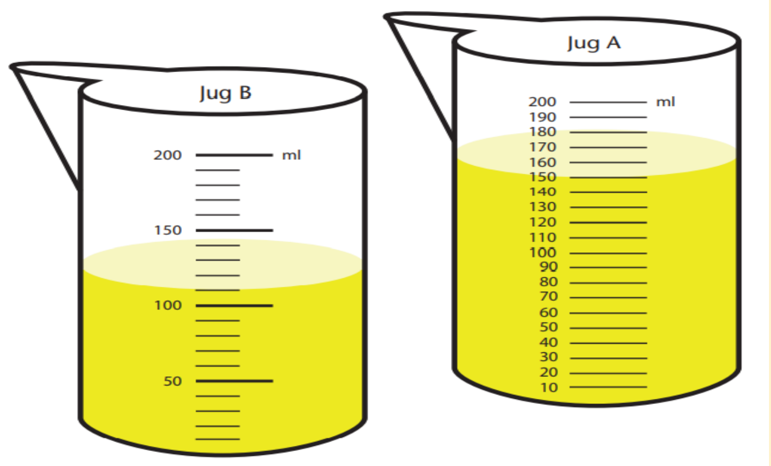
4.2 Measuring capacity / volume and reading capacity/volume measuring instruments

Volume and capacity can be measured with different instruments and in different units such as litres (l) and millilitres (mℓ). **Millilitres** are used to measure **small** amounts of the volume / capacity, whereas **litres** are used to measure **larger** amounts of the volume/ capacity.

Examples of measuring instruments: measuring spoons, measuring cups, measuring jugs and any other appropriate instrument for measuring volume/capacity

Examples:

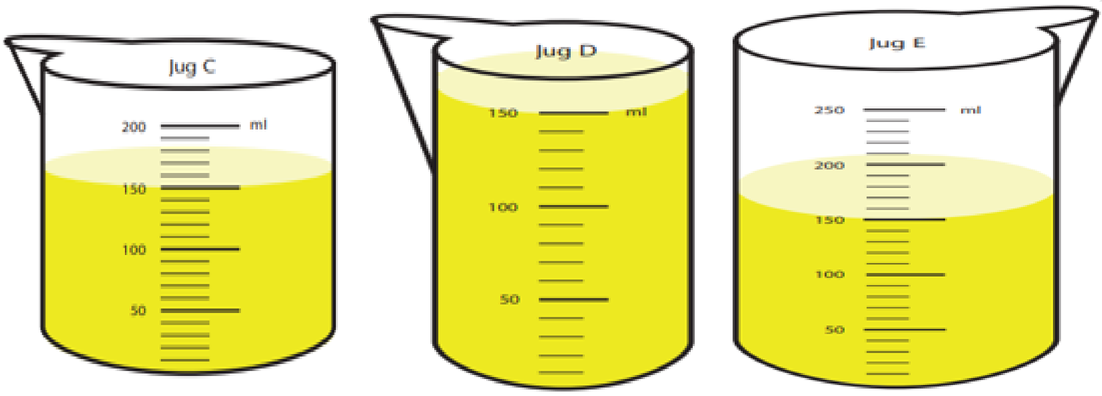
- A bottle can have a 1 litre capacity, but it may not be filled to its full capacity. It could for example, only contain a volume of 250 mℓ.
- Each of these jugs can hold 200 mℓ of liquid (or sand or salt or sugar).
- We say the capacity of each jug is 200 mℓ.
- There is 110 mℓ of juice in Jug B, and 150 mℓ of juice in Jug A.
- We say the volume of the juice in Jug A is 110 mℓ, and the volume of the juice in Jug B is 150 mℓ



1. Answer the following questions:

   (a) What is the volume of juice in each of these jugs?

   (b) What is the capacity of each of these jugs?



2. Will you use millilitres (ml) or litres (ℓ) to measure the capacity of the following?

(a)		(b)		(c)		(d)		(e)	

4.3 Comparing and Recording capacities

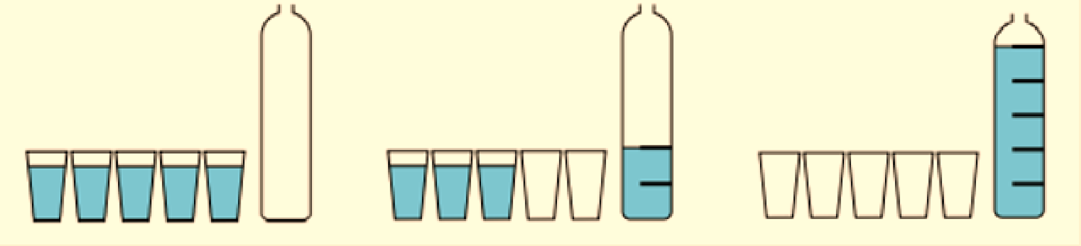
1 litre is 1 000 millilitres. Instead of millilitre you can write $m\ell$. Instead of litre you can write ℓ

In the following picture, each glass is 200mℓ and a bottle is 1 ℓ, meaning we will need 5 glasses to fill up a litre bottle.

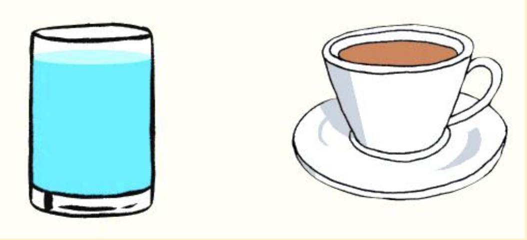
We can say that:

$200\ m\ell + 200\ m\ell + 200\ m\ell + 200\ m\ell + 200\ m\ell = 200\ m\ell \times 5 = 1000\ m\ell$

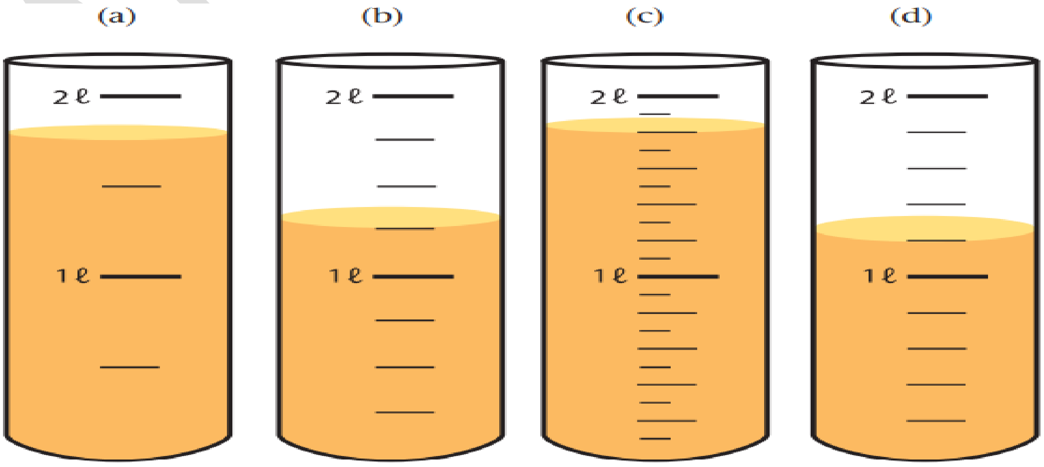
Therefore $1000\ m\ell = 1\ \ell$



An ordinary cup or glass can hold about 250 millilitres of liquid. 250 $m\ell$ is the same as a quarter of a litre.



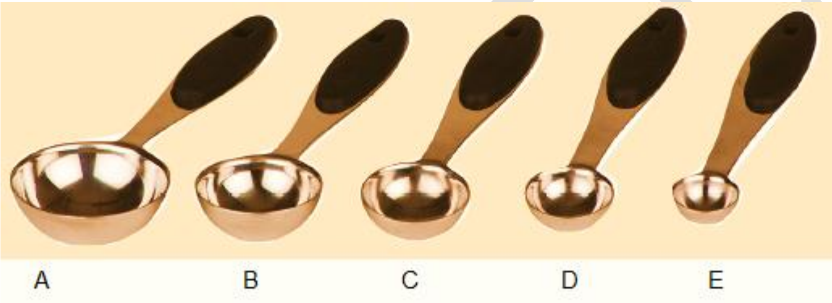
1. Consider the picture below and complete the table the follow.



Container	Volume in mℓ	Volume in ℓ	Capacity
(a)			
(b)			
(c)			
(d)			

Tablespoons have a capacity of about 15 mℓ, while a teaspoon has a capacity of 5 mℓ.

1. The biggest of these measuring spoons has a capacity of 25 mℓ. Estimate the capacity of each of the other spoons.



(a) How many 25 mℓ spoonful of honey will you need to fill a 250 mℓ container?

(b) How many teaspoons of honey will you need to fill a tablespoon?

4.4 Solving problems relating to capacity including ratio and rate problems.

1. Four portions of 125 mℓ each are poured from a full 1-litre container of milk.
   (a) How much milk is left in the container?
   (b) How many more portions of 125 mℓ each can be poured from the container?
   (c) How many millilitres is one eighth of a litre?
   (d) How many millilitres is one quarter of a litre?
   (e) How many millilitres is one-half of three litres?

2. Sipho bought four different bottles of sanitiser. According to the labels, the bottles contain the following volumes of sanitiser: 1,5 ℓ; 800 mℓ; 500mℓ and 450 mℓ. How many litres plus millilitres of sanitiser did Sipho buy in total?

3. Answer the following
   (a) If petrol costs about R23 per litre, how much does 60 ℓ petrol cost?
   (b) If 9 ℓ of petrol cost 207 and you paid R1 518 to fill your tank, how many litres did you buy?

4.5 Converting between units

When converting millilitres to litres we divide millilitres by 1000 and when we convert litres to millilitres, we multiply litres by 1000.

1 litre is 1 000$m\ell$. You can write 1 500 $m\ell$ as 1 ℓ + 500 $m\ell$ or as $1\frac{1}{2}$ ℓ.

Litres and/or millilitres	Fraction in litres
250 $m\ell$	$\frac{250}{1000} = \frac{1}{4}\ \ell$
1 ℓ 500 $m\ell$	$1 + \frac{500}{1000} = 1\frac{1}{2}\ \ell = 1{,}5\ \ell$
750 $m\ell$	$\frac{750}{1000} = \frac{3}{4}\ \ell$

Fraction in litres	Millilitres
$\frac{1}{2}\ \ell$	$\frac{1}{2} \times 1000 = 500\ m\ell$
$\frac{1}{8}\ \ell$	$\frac{1}{8} \times 1000 = 125\ m\ell$
$\frac{1}{5}\ \ell$	$\frac{1}{5} \times 1000 = 200\ m\ell$

4. Write these volumes in descending order (from the largest to the smallest):
   (a) 19 ℓ + 250 $m\ell$; $19\frac{1}{2}$ ℓ; 9 250 $m\ell$
   (b) 650 $m\ell$; 6 ℓ + 5 $m\ell$; $6\frac{1}{5}$ ℓ
   (c) 8 750 $m\ell$; 87 ℓ + 50 $m\ell$; $8\frac{1}{4}$ ℓ; $8\frac{1}{2}$ ℓ

5. Express each of the following in millilitres:
   (a) 2 ℓ + 250 $m\ell$
   (b) 3 ℓ + 500 $m\ell$
   (c) $4\frac{1}{2}$ ℓ
   (d) $4\frac{3}{4}$ ℓ

(e) $5\,\ell + \frac{1}{4}\,\ell$

(f) $6\,\ell$

(g) $7\frac{1}{2}\,\ell$

UNIT 5

MASS

5.1 What is mass?

Mass refer to the weight of an object. It depends on the amount of matter in an object e.g. a horse's mass is more than a dog's mass. If we want to measure how heavy something is, we need a unit.

Mass is measured in grams (g) and kilograms (kg).

Kilogram is heavier than a gram.

Kilo- means thousand: 1 kilogram = 1 000 grams

1 000 g = 1 kilogram

2 000 g = 2 kilogram

1. Sipho is carrying two bags

   (a) Which bag is heavier, the one in the right or left hand?

   (b) Which is easier to carry, 4 tins full of bake beans, or 5 empty tins?

2. Will the following products be weighed in grams or kilograms? Write a) to f) in your book and answer. Indicate with a "yes" where appropriate.

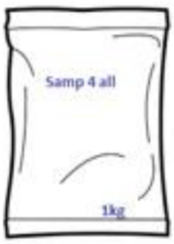
Object	Grams	Kilograms
(a) A matchstick		
(b) Loaf of bread		
(c) Soccer Ball		
(d) 6 books		
(e) 4year old boy		
(f) Car		

Balancing scale:

Example

We often decide which of two objects is heavier just by estimating how difficult it is to lift the objects. We can also compare mass by using a balance. You can make your own balance using a clothes hanger and two shopping bags.

1. Make your own balancing scale: Weigh the following objects to compare their weight in terms of which one weighs more or less.
   (a) eraser or your pencil
   (b) 3 rulers or a sock
   (c) 3 rulers or 20 bottle tops
2. Answer the following questions.

a) 

b) 

c) 

d) 

e) 

f) 

g) 

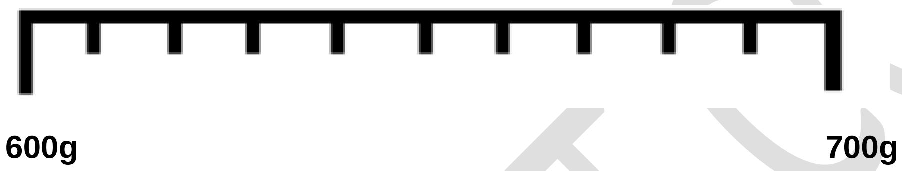
   (a) Arrange the following products from the heaviest to the lightest;
   (b) Which items weigh the same?
   (c) How many kilograms will there be, if you add all the kilograms together.

(d) Add all the grams together. Is the answer more than a kilogram?

5.2 Reading instruments and measuring mass.

If we want to measure how heavy something is, we need a unit. We use **kilogram (kg)** and **gram (g)** to measure weight. Measuring instruments can be numbered or unnumbered.

1. This is an unnumbered line on a scale.
   Draw the line in your book and write down the digits that are missing.



2. The scale drawn are numbered and unnumbered scales

A	B	C
		

(a) What will you weigh on these scales? Write the name of the object.

(b) Which scale is not numbered? **[DBE WB pg 117]**

3. What would you weigh with the following measuring instruments? Would you weigh it in kilograms or grams?

			
Kitchen scale	Bathroom scale	Spring scale	Balance scale

(a) Kitchen scale ______________________________

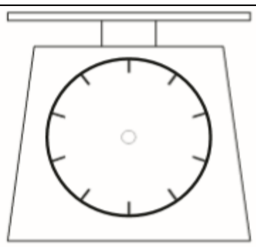
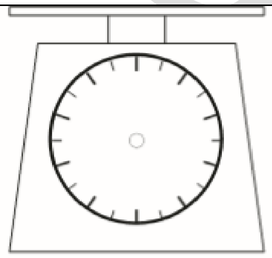
(b) Bathroom scale ______________________________

(c) Spring scale ______________________________

(d) Balance scale ______________________________

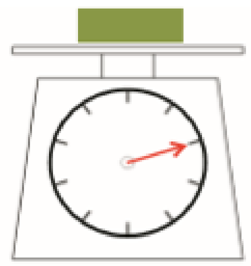
When mass measurements need to be accurate, we have to agree to compare the mass of all objects to the standard unit. The standard unit for mass measurement is one kilogram (kg) and for smaller objects gram (g)

4. These scales are marked in intervals of 10 kg. Draw them in your book and write the numbers in. Fill in the appropriate numbering.

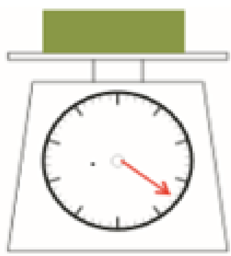
A	B
	

5. Write the weight of each object on the scale down. The maximum reading on the scale is 10 kg

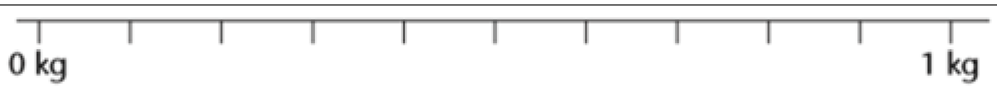
C

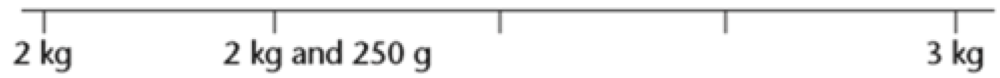


D



6. Copy the number lines in your books and fill in the grams and kilograms on the number lines.

(a)	

(b) 

(c) 

5.3 Calculations including conversions and problem-solving

Kilogram and gram

Many objects weigh less than a kilogram. The lighter objects must be measured in gram.

1 kg = 1 000 g

Cake flour: 2.5 kg = $2\frac{1}{2}$ kg =2 kg and 500 g =2 500 g

1. Convert the mass from kilogram to gram.
   (a) $\frac{1}{2}$ kg
   (b) $\frac{1}{4}$ kg
   (c) 5,5 kg
   (d) 1 kg

2. Write the mass of the following in kilogram or fractions.
   (a) 2 500 g
   (b) 500 g
   (c) 3 250 g
   (d) 6 000 g
   (e) 250 g

3. Write these masses in gram only.
   (a) 3 kg
   (b) $7\frac{1}{4}$ kg
   (c) 2 kg and 500 g
   (d) $\frac{1}{2}$ kg

(e) 1 465 kg

(f) 10 kg

(g) $\frac{1}{4}$ kg

(h) 12 kg and 467 g

(i) 4 kg and 20 g

4. Round off to the nearest 1 000
   (a) 4 321 g
   (b) 1 599 g
   (c) 2 834 g
   (d) 5 997 kg
   (e) 999 kg
   (f) 1 947 kg

5.4 Calculate and estimate using grams and kilograms

The mass of a 1 ℓ bottle
of water is about I kg

1. Complete and answer the following:
   (a) 500 g + 500 g + 1 250g + 250 g =
   (b) How much more do you need to get 3 kg?
   (c) How many grams must be added to 999 g to have 1 kg?
   (d) John weighs 65 kg and his father 96 kg. John, his father and baby brother weigh 171 kg altogether. How much does the baby brother weigh?

2. Calculate the following:
   (a) 54 kg + 350 g + 6 kg = _______ kg
   (b) 4 670 g + 3 254 g = _______ kg
   (c) 2 450 kg + 1 750 kg= _______ kg

(d) 1 200 kg + 500 g = _______

3. Write the correct answer in the open spaces.
   (a) 500 g + 250 g + 250 g = _____ g or _____ kg
   (b) 500 g + 500 g = 1 kg = 250 g + _____ + 250 g + _____
   (c) 200 g + 200 g + 200 g + ____ + _____ = 1 kg

5.5 Solving problems relating to mass

1. Mom buys a 3 kg washing powder. She uses 250 g every time she does washing. How many times will she do the washing, if the amount of the washing is the same?
2. A pole weighs 320 kg. How much will 3 poles of the same kind weigh?
3. How many 200 g of powdered soap will you need to fill up $2\frac{1}{2}$ kg packet of the same soap?
4. The mass of a bar of soap is 325 g. We use 4 bars of soap per week. How many grams will that be?
5. How many 250 g of soap will you add to 250 g of the same soap to make 1 kg.
6. The mass of one egg is 60 grams. How much will 6, 12 and 24 eggs of the same mass weigh respectively?

UNIT 6

DATA HANDLING

6.1 Collect data, organise and summarise data

Data collection is the systematic approach to gathering and measuring information from a variety of sources to get a complete and accurate picture of an area of interest. A group of people chosen to gather specific information from is called the population e.g. all the learners in a school.

- A **frequency table** is a method of organising data in a compact form.
- A **tally** is mark used to record data as it is counted. Tally marks are a quick way of keeping track of numbers in groups of five. We use vertical and diagonal lines to represent a tally mark. One vertical line is made for each of the first four numbers; the fifth number is represented by diagonal line across the previous four. e.g. 𝍸 represents 5, 𝍸 || represents 7,
- **Frequency** is the total number of times each category of data occurs.

Example

The table below shows data collected from learners on the different kind of drinks they like.

The results were used to draw the frequency table.

FREQUENCY TABLE

Drinks	**Tally**	**Frequency**
Fizzy drink	𝍸 |	6
Ice lolly	𝍸	5
Juice	𝍸 ||	7
Milk	𝍸 𝍸	10
Water	𝍸 𝍸 |	11
TOTAL		**38**

1. The teacher collected data in the class to find out what each learners favourite kind of chocolate is. Complete the table

TYPE OF CHOCOLATE	TALLY MARKS	FREQUENCY
Mint Crisps	卌 卌	
Biscuits		5
Whole nuts		16
Dark Chocolate	////	
Peanuts and Raisins	卌 //	
Milk Chocolate		8
TOTAL		

6.2 Representing data

Graphs

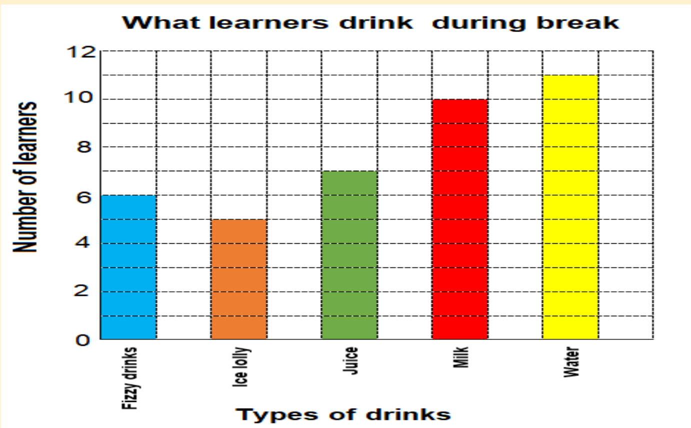
Graphs give a visual picture of data. There are different types of graphs e.g. bar graphs, pictographs and pie charts. Different graphs provide different pictures of data e.g. in pictographs, pictures are used to illustrate data. In bar graphs, vertical or horizontal columns of equal width are used to illustrate data and in pie charts sectors represent a fraction of the whole.

Bar graph

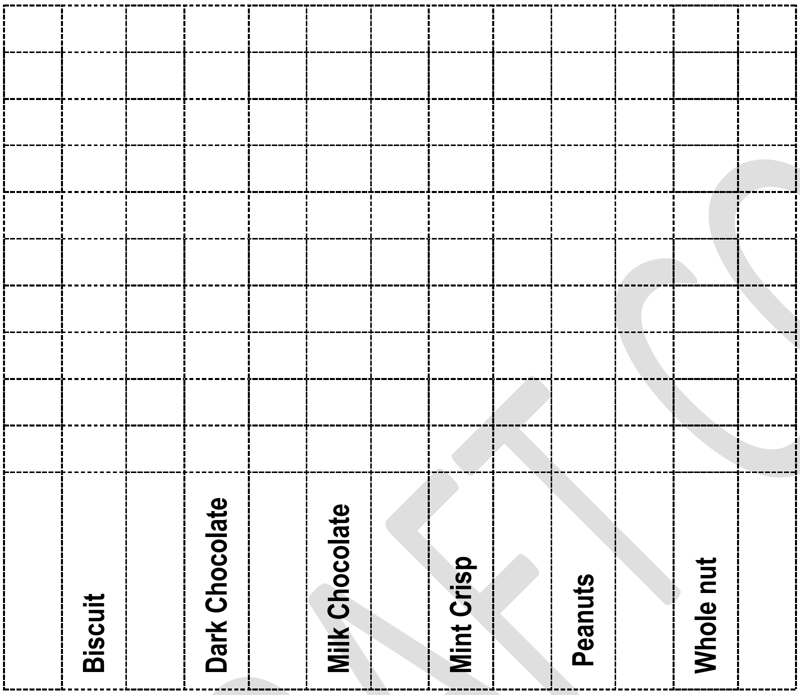
Bar graphs are ideal for comparing two or more values.

When drawing bar graphs you should write the **title** or **heading** and label the **vertical axes** and the **horizontal axes.** The **heading or title** of the bar graph provides an overview of the information it contains and gives the readers an indication of the data collected.

Example



1. Represent the data collected from the learners' favourite types of chocolates in (1) on a bar graph. Remember to label your graph correctly.

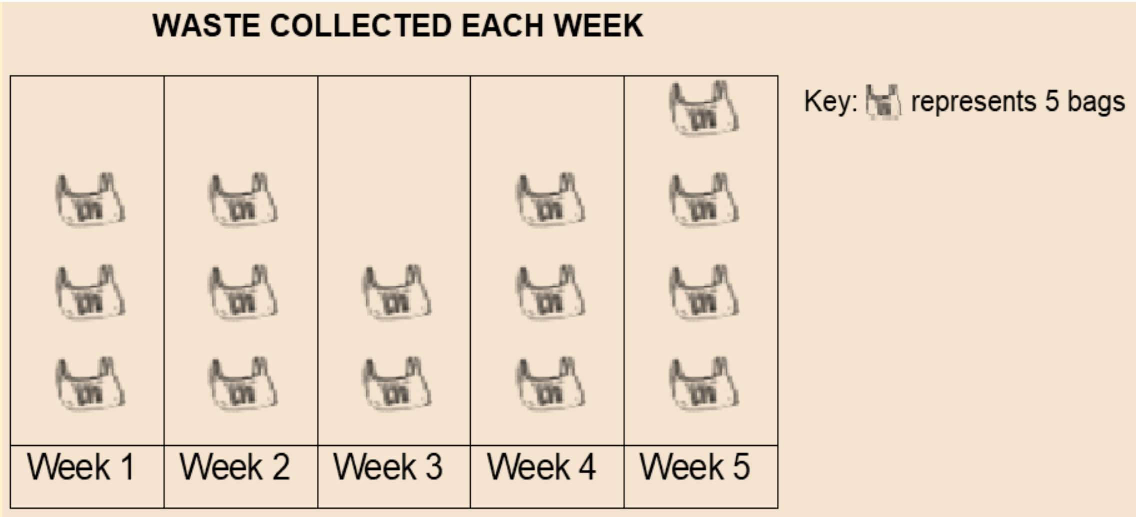


Pictographs

Pictographs **are graphs that show numerical information by using picture symbols or icons to represent data sets**. The advantage of using pictographs is that they are easy to read. They must have a **key** to show what each symbol or picture means. Each picture must be of identical size. They can display pictures in rows or columns. In a pictograph, the symbols must always be the same size, but you can show a part of them to represent a different amount.

Example

This pictograph shows the bags of waste collected in a school in 5 weeks



Thus, 20 bags were collected in week 5.

1. Use the pictograph to answer the questions
   (a) Which week had the most number of bags collected?
   (b) How many bags were collected in week 2?
   (c) How many bags were collected in total?
   (d) Which week had the least number of bags collected?
   (e) What could be the reason for week 5 to have more waste than all the other weeks?
   (f) Write a short paragraph about what is happening in this graph.

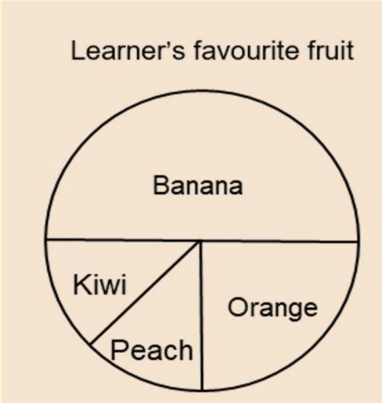
6.3 Interpreting and reporting data

Pie Chart

A pie chart **gives a visual image of data in the form of a circle**. The whole circle represents the total number of people or objects involved in data collection. In a pie chart, the parts (slices) are fractions of the pie or circle. The different-sized parts of the pie chart stand for the quantities. A pie chart has a **heading** and a **key** to give the meaning its meaning.

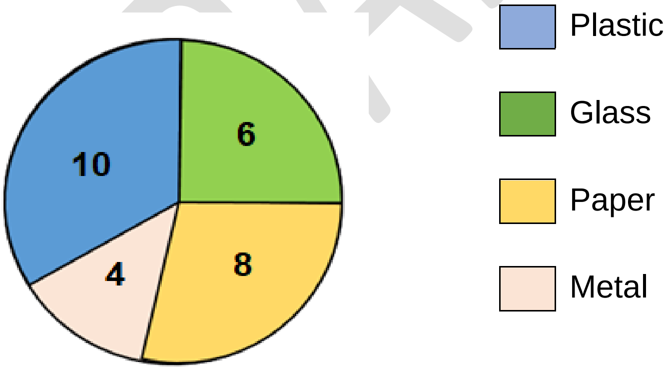
Example

40 Grade 5 learners were given the names of six kinds of fruit from which to choose their favourite. The information was illustrated on a pie chart



Thus, $\frac{1}{2}$ of the learners chose banana (Half of the learners chose banana)

1. A school held a sports day and the playgrounds were full of litter. The graph was drawn to represent the bins of litter collected.
   (a) Write a heading of the pie chart on the space provided.



   (b) How many waste bins of glass did they collect?
   (c) How many waste bins of paper did they collect?
   (d) How many waste bins of plastic did they collect?
   (e) How many waste bins of metal did they collect?
   (f) Why do you think the school collected so much plastic?
   (g) What will you do with all this waste?
   (h) What type of waste did they not collect? What will you do with this type of waste?