South Sudan

Primary Mathematics 7

Primary Mathematics has been written and developed by Ministry of General Education and Instruction, Government of South Sudan in conjunction with Subjects experts. This course book provides a fun and practical approach to the subject of mathematics, and at the same time imparting life long skills to the pupils.

The book comprehensively covers the Primary **7** syllabus as developed by **Ministry of General Education and Instruction.**

Each year comprises of a Pupil's Book and teacher's Guide.

The Pupil's Books provide:

- Full coverage of the national syllabus.
- A strong grounding in the basics of mathematics.
- Clear presentation and explanation of learning points.
- A wide variety of practice exercises, often showing how mathematics can be applied to real-life situations.
- It provides opportunities for collaboration through group work activities.
- Stimulating illustrations.

All the courses in this primary series were developed by the Ministry of General Education and Instruction, Republic of South Sudan. The books have been designed to meet the primary school syllabus, and at the same time equiping the pupils with skills to fit in the modern day global society.

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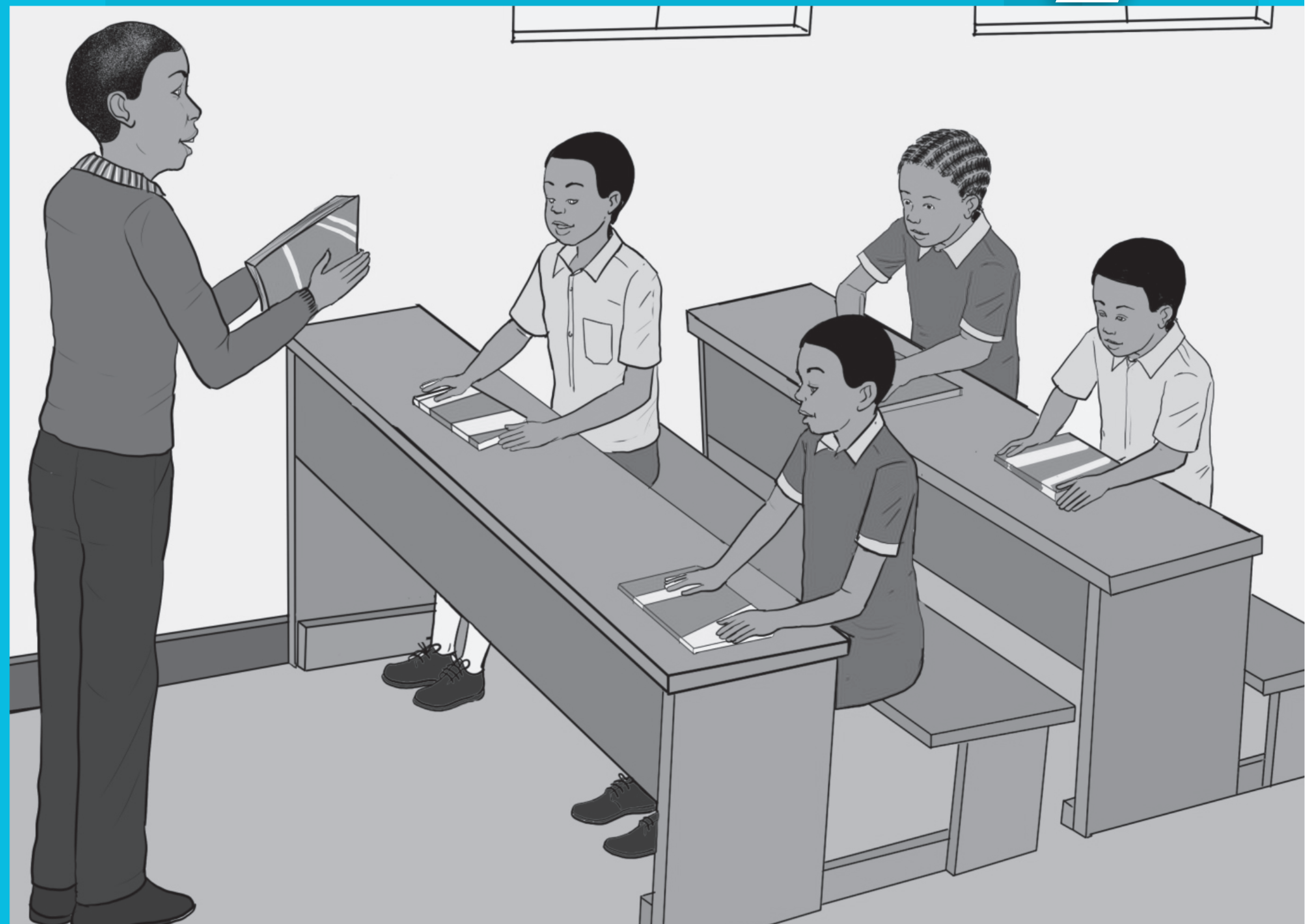
South Sudan

Primary Mathematics 7

Teacher's Guide



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South Sudan

PRIMARY
7

Mathematics

Teacher's Guide 7

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FOREWORD

I am delighted to present to you this Teacher's Guide, which is developed by the Ministry of General Education and Instruction based on the new South Sudan National Curriculum. The National Curriculum is a learner-centered curriculum that aims to meet the needs and aspirations of the new nation. In particular, it aims to develop (a) Good citizens; (b) successful lifelong learners; (c) creative, active and productive individuals; and (d) Environmentally responsible members of our society. This textbook, like many others, has been designed to contribute to achievement of these noble aims. It has been revised thoroughly by our Subject Panels, is deemed to be fit for the purpose and has been recommended to me for approval. Therefore, I hereby grant my approval. This Teacher's Guide shall be used to facilitate learning for learners in all schools of the Republic of South Sudan, except international schools, with effect from 4th February, 2019.

I am deeply grateful to the staff of the Ministry of General Education and Instruction, especially Mr Michael Lopuke Lotyam Longolio, the Undersecretary of the Ministry, the staff of the Curriculum Development Centre, under the supervision of Mr Omot Okony Olok, the Director General for Quality Assurance and Standards, the Subject Panelists, the Curriculum Foundation (UK), under the able leadership of Dr Brian Male, for providing professional guidance throughout the process of the development of National Curriculum, school textbooks and Teachers' Guides for the Republic of South Sudan since 2013. I wish to thank UNICEF South Sudan for managing the project funded by the Global Partnership in Education so well and funding the development of the National Curriculum, the new textbooks and Teachers' Guides. I am equally grateful for the support provided by Mr Tony Calderbank, the former Country Director of the British Council, South Sudan; Sir Richard Arden, Senior Education Advisor of DfID, South Sudan. I thank Longhorn and Mountain Top publishers in Kenya for working closely with the Ministry, the Subject Panels, UNICEF and the Curriculum Foundation UK to write the new textbooks. Finally, I thank the former Ministers of Education, Hon. Joseph Ukel Abango and Hon. Dr John Gai Nyuot Yoh, for supporting me, in my role as the Undersecretary, to lead the Technical Committee to develop and complete the consultations on the new National Curriculum Framework by 29 November 2013.

The Ministry of General Education and Instruction, Republic of South Sudan, is most grateful to all these key stakeholders for their overwhelming support to the design and development of this historic South Sudan National Curriculum. This historic reform in South Sudan's education system is intended to benefit the people of South Sudan, especially the children and youth and the future generations. It shall enhance the quality of education in the country to promote peace, justice, liberty and prosperity for all. I urge all Teachers to put this textbook to good use.

May God bless South Sudan. May He help our Teachers to inspire, educate and transform the lives of all the children and youth of South Sudan.

Deng Deng Hoc Yai, (Hon.)
Minister of General Education and Instruction, Republic of South Sudan

TABLE OF CONTENTS

INTRODUCTION

This is a new P7 Mathematics series book and the teacher's guide is used alongside the learner's book. The course is practical. It places the learner at the center of learning as he or she solves mathematical problems.

The learning activities are based on a variety of situations familiar to the learners. Teaching is an interesting endeavor that requires creativity. Try to relate Mathematics activities and problems to relevant, real-life situations.

Components of the book

This is a primary seven mathematics book, which contains 6 different units which have different sub topics. Each topic is strategically integrated with discussion sessions with activities that will help further the learners understanding.

The units are as outlined below.

Primary 7 Mathematics	
Unit	Title
1	Numbers: percentages and scale
2	Measurement: Surface areas of solids
3	Geometry: Transverse and parallel lines
4	Algebra: algebraic expressions (2)
5	Statistics: Group data and probability (1)
6	Business accounting

This primary mathematics book is based on the new curriculum review. The content of this book is mainly responsive to the needs of learners and aims to change from knowledge-based learning to competency-based learning.

An effort has been made to develop skills and competences of the learner; and this has been achieved through widening and inspiring certain attitudes during teaching and learning processes that would help the learner to think critically through various activities given in the learner's book.

Purpose

This Teacher's Guide must be used in conjunction with the Mathematics pupil's book. Its main purpose is to help you to implement the syllabus in your classroom.

This guide provides you with guidelines to help you plan and develop teaching and learning activities for the achievement of the learning outcomes. It also provides you with information and processes to:

Mathematics teaching and learning strategies

a) Problem-based learning

Using this strategy, you can set a problem or a task for the class to solve.
Steps

- ✍ Brainstorm learners' ideas and record them on the board.
- ✍ Ask related questions such as, "How many different multiplication strategies can you find?"
- ✍ Have learners carry out the investigation in groups and report back to the class.

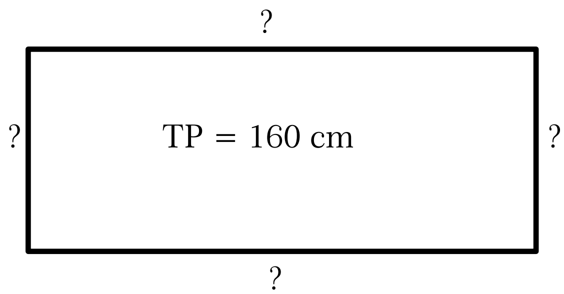
To make the learning explicit, it is important that you create a summary of what has been learnt from solving the problem.

b) Open-ended questions

Closed questions, commonly used in Mathematics lessons, only have one answer.

Open-ended questions can have more than one answer and the variety of possible answers allows learners to make important discoveries.

An example of an open-ended question is:



'The total perimeter of the rectangle above is 160 cm.

Opposite sides are equal in length. What would be the lengths of the sides of the rectangle? How many different answers can you find?'

One answer could be $\mathbf{50\ \mathit{cm} \times 2 + 30\ \mathit{cm}\ \ 2}$.

If a learner comes up with one answer and stops, ask the class if anyone had a different answer. How many different answers are possible?

You may allow the learners to discuss their answers in groups and agree on an answer for presentation and discussion.

One open-ended question can provide many answers for learners to find and provides them with practice basic skills.

c) Group work

The purpose of group work is to give learners opportunities to share ideas and at the same time learn from other group members.

Every group should have a leader to supervise the group's activities. The leader would, for example, delegate tasks and consult you for assistance.

Group activities can take place inside or outside the classroom. A good example of a group activity would be drawing shapes such as squares and rectangles, and making models of common three-dimensional shapes such as cubes or cones.

Groups of learners could also use a soccer field to measure distance and perimeter using traditional methods of measuring such as with strings and sticks.

This will not only ensure participation by all pupils but also gives room for collaborative learning and talk. When grouping, bear in mind their special educational needs, gender balance and their abilities. Groups should never be too large.

d) Peer teaching and learning

This is organised as a partnership activity in which one learner performs a task while the other observes and assist; making corrections and suggesting new ideas and changes. For example, one learner decides to multiply three-digit numbers by two-digit numbers. The learner who is observing should assist and make sure that all the steps are followed before the final answer is given. The teacher's role in this strategy is to observe and encourage positive interaction and effective communication through which the intended outcome can be achieved.

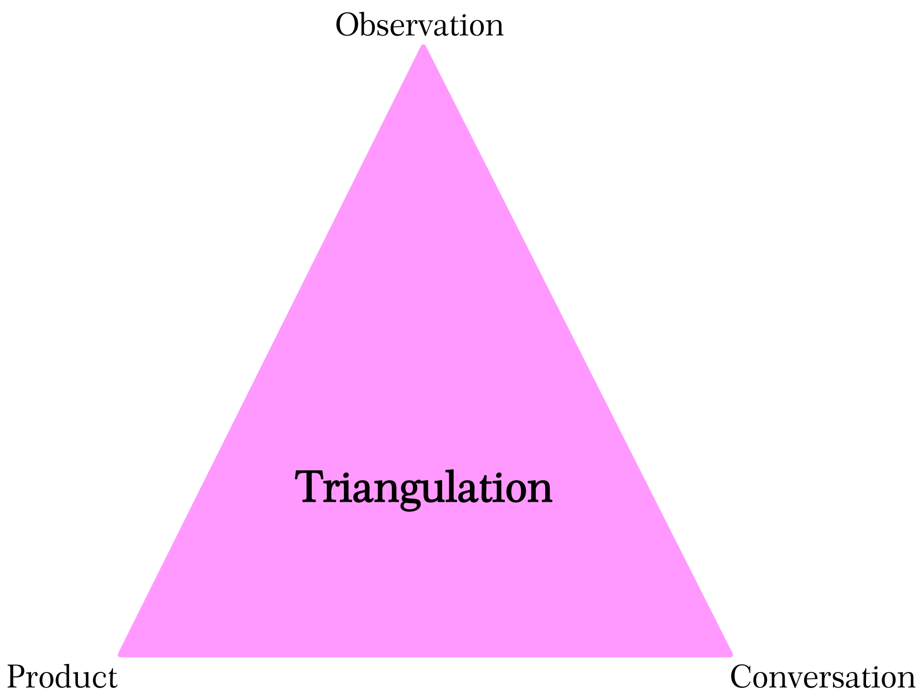
You are advised to set additional exercises depending on the pupil's learning abilities.

MAKING CLASSROOM ASSESSMENT

• Observation – watching learners as they work to assess the skills learners are developing.

• Conversation – asking questions and talking to learners is good for assessing knowledge and understanding of the learner.

• Product – appraising the learner's work (writing report or finding, mathematics calculation, presentation, drawing diagram, etc).



To find these opportunities, look at the "Learn About' sections of the syllabus units. These describe the learning that is expected and in doing so they set out a range of opportunities for the three forms of opportunity.

UNIT 1: NUMBERS

Learn about	Key inquiry questions
✍ Learners should review their prior learning and experiences of the squares and square roots of perfect numbers up to 3 digits and build on this through mathematical investigations to develop their knowledge and understanding of squares and square roots of perfect squares and the conversion of fractions to decimals. ✍ Learners should work in groups to consolidate understanding of cubes numbers and roots and investigate more complex problems. ✍ Learners should build on their prior knowledge of ratio and proportion to solve problems and investigate scale and sharing quantities in a given ratio based on the unitary method, and investigate increases and decreases in percentage. This should involve calculating percentage of a quantity and one quantity as a percentage of another. ✍ They investigate combinations of all the concepts to consolidate the ideas and their practical applications.	• How can we find and demonstrate the squares and square roots of perfect square numbers? • How do we explain the squares and square roots of fractions of perfect squares? • How do we convert the square roots of fraction of perfect squares into simple decimal numbers and vice versa? • How can we apply the concept of cubes of numbers? • How do we guide learners to understand unitary method and use it to solve problems of ratios and proportions? • Why do we have percentage increase and decrease in practice and what are the advantages and disadvantage?

<table>
<tr><td colspan="3">Learning outcomes</td></tr>
<tr><td>Knowledge and understanding</td><td>Skills</td><td>Attitudes</td></tr>
<tr><td>Square and squares roots of perfect numbers as well as squares and square roots of perfect squares.
Find cubes and sequence of positive numbers in their cubic form.
Identify the use of unitary method in solving problems of ratios and proportions.
Percentage increase and decrease.</td><td>Perform problems and exercises involving square and square roots of perfect numbers.
Evaluate squares and squares roots of fractions of perfect squares and write fractions in simple decimals.
Distinguish numbers and their cubes.
Deduce cube of sequence of numbers.
Apply the concepts of percentage increase and decrease.</td><td>Appreciate the notions of squares and square roots of both perfect numbers and fractions as well as simple decimals
Value the applications of proportions, ratios, and percentage increase and decrease
Curious to solve problems of proportions and percentage increase and decrease.</td></tr>
<tr><td colspan="3">Contribution to the competencies:
<u>Critical and creative thinking</u>: working with squares and square roots of perfect numbers and fractions; increasing analytical competencies in their daily activities through solving problems related to ratio, proportions and percentage decrease and increase.
<u>Communication and Co-operation</u>: group engagement.</td></tr>
<tr><td colspan="3">Links to other subjects:
Links to a range of subjects such as science and social studies where numbers are used.</td></tr>
</table>

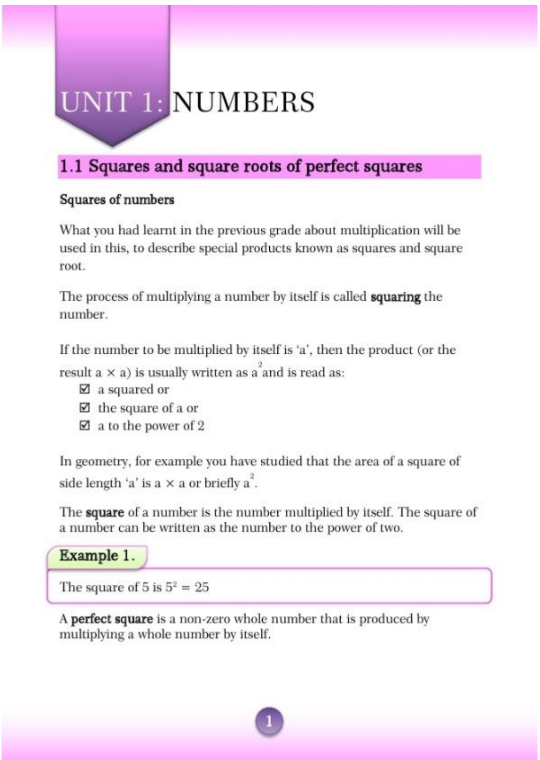
UNIT ONE: NUMBERS

In P6 learners covered the concept of square roots and proportions. At this level, they should be take through a review of the P6 concepts then cover new concepts on cubes, cube roots, percentage increase and decrease and conversion of fractions to decimals.

Activities in groups or pairs

- Allow learners to investigate complex problems involving squares, square roots, cubes and cube roots.
- Group or pair learners to solve problems on ratios.
- Relate fractions to decimals and determine percentages.

1.1 Squares and square roots



UNIT 1: NUMBERS

1.1 Squares and square roots of perfect squares

Squares of numbers

What you had learnt in the previous grade about multiplication will be used in this, to describe special products known as squares and square root.

The process of multiplying a number by itself is called **squaring** the number.

If the number to be multiplied by itself is 'a', then the product (or the result a × a) is usually written as a^2 and is read as:

- ☑ a squared or
- ☑ the square of a or
- ☑ a to the power of 2

In geometry, for example you have studied that the area of a square of side length 'a' is a × a or briefly a^2.

The **square** of a number is the number multiplied by itself. The square of a number can be written as the number to the power of two.

Example 1.

The square of 5 is $5^2 = 25$

A **perfect square** is a non-zero whole number that is produced by multiplying a whole number by itself.

1

Ask learners if they have ever heard of squares and square roots. Let learners try to explain to the rest of the class.

Explain to learners, a square is obtained when a number is multiplied by itself.

$a \times a = a^2$

$2 \times 2 = 2^2 = 4$

$5 \times 5 = 5^2 = 25$

Activity 1

Learners to perform the activity in pairs as you supervise and give assistance to the pairs.

Expected answers

a. 64
b. 100
c. 196
d. 361

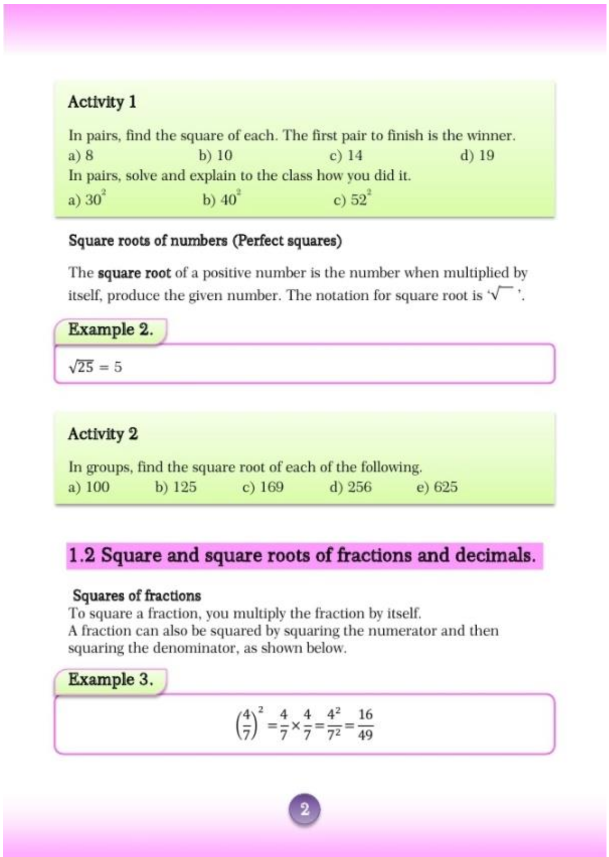
a. 900
b. 1600
c. 2704

Activity 2

Square root – A factor which when multiplied by itself produces a given number.

Expected answers

10
13
16
25



Activity 1

In pairs, find the square of each. The first pair to finish is the winner.
a) 8 b) 10 c) 14 d) 19
In pairs, solve and explain to the class how you did it.
a) 30^2 b) 40^2 c) 52^2

Square roots of numbers (Perfect squares)

The **square root** of a positive number is the number when multiplied by itself, produce the given number. The notation for square root is '$\sqrt{\ }$'.

Example 2.

$\sqrt{25} = 5$

Activity 2

In groups, find the square root of each of the following.
a) 100 b) 125 c) 169 d) 256 e) 625

1.2 Square and square roots of fractions and decimals.

Squares of fractions
To square a fraction, you multiply the fraction by itself.
A fraction can also be squared by squaring the numerator and then squaring the denominator, as shown below.

Example 3.

$$\left(\frac{4}{7}\right)^2 = \frac{4}{7}\times\frac{4}{7} = \frac{4^2}{7^2} = \frac{16}{49}$$

2

1.2 Square and square roots of fractions and decimals

To square a fraction, you multiply it by itself. Numerator by itself and denominator by itself.

Exercise 1

Expected answers

1.

i.	48	iv.	23	vii.	76
ii.	67	v.	57	viii.	89
iii.	59	vi.	37	ix.	24

x. 32	xi. 56	xii. 30

2.

i. 8	ii. 12	iii. 67

3.

i. 1.6	iii. 7.2
ii. 27	iv. 6.5

To square a mixed number, write the mixed number as an improper fraction and then square the fraction.

Write the question. $\left(1\frac{4}{7}\right)^2$

Write the mixed number as an improper fraction. $=\left(\frac{11}{7}\right)^2$

Square the numerator and square the denominator. $=\frac{11^2}{7^2}$

$=\frac{121}{39}$

Write the result as a mixed number. $=2\frac{23}{49}$

Square roots of fractions

The square root of a fraction can be obtained by finding the square root of the numerator and the square root of the denominator separately, as shown below.

Example 4.

$$\sqrt{\frac{81}{169}}=\frac{\sqrt{81}}{\sqrt{169}}=\frac{9}{13}$$

Square Root of Decimal Numbers

The square root will have half the number of decimal places as the number it has. Hence to calculate the square root of a decimal perfect square we should remember this:

Example 5.

Find the square root of: 0.0169

Solution

The square root of 0.0169 will have two decimal places.

The square root of 169 is 13.

Therefore the square root of 0.0169 = 0.13. $\sqrt{0.0168} = 0.13$

Exercise 1:

1. Find the square roots of each of the following numbers.

(i) 2304	(ii) 4489	(iii) 3481	(iv) 529
(v) 3249	(vi) 1369	(vii) 5776	(viii) 7921
(ix) 576	(x) 1024	(xi) 3136	(xii) 900

2. Find the square root of each of the following numbers

(i) 64 (ii) 144 (iii) 4489

3. Find the square root of the following decimal numbers:

(i) 2.56 (ii) 7.29 (iii) 51.84 (iv) 42.25

1.3 Cubes of numbers

The cube of a number is the number raised to the power 3.

How do you find the volume of a cube of side s?

You multiply s by itself three times. Thus Volume of cube = $s \times s \times s = s^3$

When a number is multiplied by itself three times, we get the cube of the number.

1.3 Cubes of numbers

To obtain a cube of a number, the number is multiplied by itself three times.

Cube of a = a × a × a

Cube of p = p × p × p

A cube is indicated as a power:

Cube of a = a^3

Cube of p = p^3

Thus $5^3 = 5 \times 5 \times 5 = 125$

Exercise 2

Guide learners to do the exercise individually for you to assess the learners understanding.

Expected answers

a. 64	c. 4 096	e. 2 7000
b. 729	d. 2 744	f. 8 000

1.4 Ratios and proportions using the unitary method

The cube of 2 = $2^3 = 2 \times 2 \times 2 = 8$. The cube of 5 = $5^3 = 5 \times 5 \times 5 = 125$

8 and 27 are natural numbers which are cubes of natural numbers 2 and 3 respectively. Such numbers are called cubic numbers or perfect cubes.

A cubic number or perfect cube is a natural number which is the cube of some natural number.

The following numbers are perfect cubes.

$8 (=2^3)$	$27 (=3^3)$	$64 (= 4^3)$	$125 (= 5^3)$
$216 (=6^3)$	$343 (=7^3)$		

Exercise 2:

1. In groups, find the cube of each number.

a. 4 b. 9 c. 16 d. 14

e. 30 f. 20

1.4 Ratios and proportions using the unitary method

The Unitary Method sounds like it might be complicated but it's not. It's a very useful way to solve problems involving ratio and proportion.

Example 5.

If 12 tins of paint weigh 30kg, how much will 5 tins weigh?

Solution

The first step in solving this is to find what ONE tin weighs.

This will be $\frac{30}{12}$ so 2.5kg.

Then we scale this back up for 5 tins gives $5 \times 2.5 = 12.5$kg.

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Activity 2

In groups find out the following;

1. If sixteen bricks weigh 192kg. What would nineteen bricks weigh?
2. If thirteen girls can plant 169 trees in a day. How many trees could fourteen girls plant in a day?

Explain your answers

Exercise 3:

For each question show your working out.

1. If twenty two workers can dig 308 holes in an hour. How many holes could twenty seven workers dig in an hour?
2. If thirty four coins weigh 170g. What would fifty one coins weigh?
3. If fifteen buses can seat 420 people. How many people could thirty five buses seat?
4. Thirty three identical pipes laid end to end make a length of 462m. What length would fifty seven pipes make if they are laid end to end?
5. 31 toy building blocks placed one on top of another reach a height of 341cm. How high would 79 blocks be if placed one on top of the other?
6. 960g of flour is needed to make a special cake for 16 people. How much flour would be needed to make a cake for 33 people?
7. A vehicle travels one hundred and ninety eight km on 18 litres of fuel. How far would it travel on twenty eight litres?
8. Another vehicle travels four hundred and sixty eight km on 39 litres of fuel. How far would it travel on seventy nine litres?

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Activity 2

Guide learners to do the activity in pairs as you supervise, learners with disability should be given more time.

Expected answers

1. 228 kg
2. 182 trees

Exercise 3

Expected answers

1. 378 holes
2. 255 g
3. 840 people
4. 798 m
5. 869cm
6. 1980g
7. 308km
8. 948km

1.5 Percentage increase and decrease

To obtain the percentage increase or decrease:

Step 1: First find the difference between the original quantity and the new quantity.

Increase = New value – original value

Decrease = Original value – new value

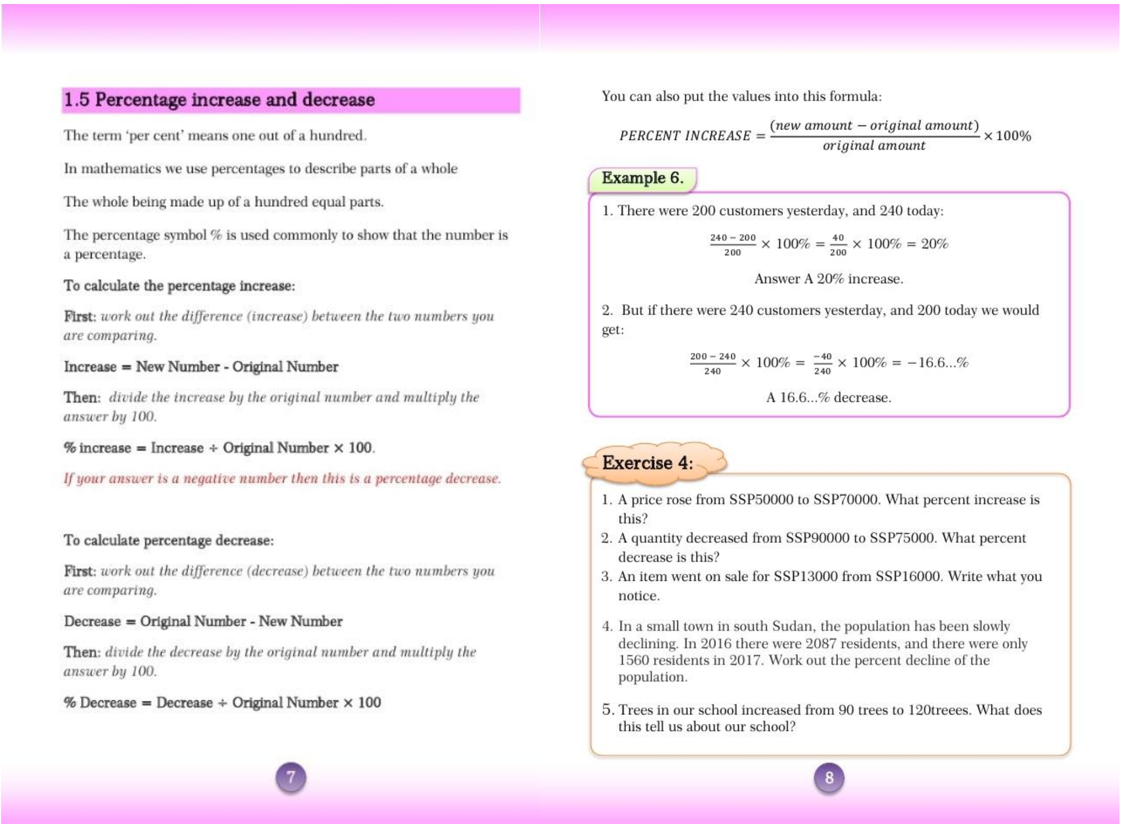
Step 2: divide the difference (increase or decrease) by the original value.

$$\frac{\text{Increase}}{\text{Original value}} \quad \text{OR} \quad \frac{\text{Decrease}}{\text{Original value}}$$

Step 3: Multiply the value obtained in step 2 above by 100%.

$$\text{Percentage increase} = \frac{\text{increase}}{\text{Original value}} \times 100\%$$

Percentage decrease = $\dfrac{\text{decrease}}{\text{Original value}}$ x 100%



1.5 Percentage increase and decrease

The term 'per cent' means one out of a hundred.

In mathematics we use percentages to describe parts of a whole

The whole being made up of a hundred equal parts.

The percentage symbol % is used commonly to show that the number is a percentage.

To calculate the percentage increase:

First: *work out the difference (increase) between the two numbers you are comparing.*

Increase = New Number - Original Number

Then: *divide the increase by the original number and multiply the answer by 100.*

% increase = Increase ÷ Original Number × 100.

If your answer is a negative number then this is a percentage decrease.

To calculate percentage decrease:

First: *work out the difference (decrease) between the two numbers you are comparing.*

Decrease = Original Number - New Number

Then: *divide the decrease by the original number and multiply the answer by 100.*

% Decrease = Decrease ÷ Original Number × 100

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You can also put the values into this formula:

$$PERCENT\ INCREASE = \frac{(new\ amount - original\ amount)}{original\ amount} \times 100\%$$

Example 6.

1. There were 200 customers yesterday, and 240 today:

$$\frac{240-200}{200} \times 100\% = \frac{40}{200} \times 100\% = 20\%$$

Answer A 20% increase.

2. But if there were 240 customers yesterday, and 200 today we would get:

$$\frac{200-240}{240} \times 100\% = \frac{-40}{240} \times 100\% = -16.6...\%$$

A 16.6...% decrease.

Exercise 4:

1. A price rose from SSP50000 to SSP70000. What percent increase is this?
2. A quantity decreased from SSP90000 to SSP75000. What percent decrease is this?
3. An item went on sale for SSP13000 from SSP16000. Write what you notice.
4. In a small town in south Sudan, the population has been slowly declining. In 2016 there were 2087 residents, and there were only 1560 residents in 2017. Work out the percent decline of the population.
5. Trees in our school increased from 90 trees to 120treees. What does this tell us about our school?

8

Exercise 4

Guide learners to attempt the exercise individually. This will help in assessing the learner's ability.

1. 40%
2. 16.67%
3. 18.75%
4. 25.25%

UNIT 2: MEASUREMENT

By the end of the Primary 7 level measurement course, the learners should be able to get the relationship of diameter and radius to circumference, convert m/s to km/h and solve problems on weight, mass and temperature.

Learn about	Key inquiry questions
✍ Learners should review their understanding of circumference and diameter of a circle, and investigate how to calculate the area of a circle and the areas of parallelograms, rhombuses, trapeziums, and surface area of common solids such as cubes, squares, cones, and the applications.	• How can you estimate, measure and calculate the circumference and area of a circle? • How are parallelograms rhombuses and trapeziums related to squares and rectangles?
✍ Learners should review their knowledge of time and apply it to solve problems concerned with speed, distance and time taken, and explain conversion of m/s to km/h and vice versa.	• How can we devise a method of finding of these figures? • Why do we write the units of speed in terms of the units of length and time?
✍ They should draw on prior learning to investigate increasingly complex problems associated with weight, mass and temperature.	• How can we relate the units of speed (km/h to m/s and vice versa)?

<table>
<tr><td colspan="3">Learning outcomes</td></tr>
<tr><td>Knowledge and understanding</td><td>Skills</td><td>Attitudes</td></tr>
<tr><td>• Calculate circumferences and areas of circle, parallelogram, rhombus, trapezium, and surface area of common solids.
• Calculations involving discount, percentages, simple interest, commission and hire purchase.
• Problems involving units of time, converting km/h into m/s and average speed.
• Problems involving units of weight and temperature.</td><td>• Solve problems involving circumference and area of a circle, parallelogram, rhombus and trapezium.
• Investigate the relationship between speed, distance and time, and between km/h and m/s.</td><td>• Enjoy working with areas of common solids.</td></tr>
<tr><td colspan="3">Contribution to the competencies:
<u>Critical thinking</u>: apply the knowledge related to measurement and develops strategies and solutions to various problems.
<u>Communication</u>: relating their findings.
<u>Co-operation</u>: discussions and team work.</td></tr>
<tr><td colspan="3">Links to other subjects:
Links to a range of subjects such as science and social studies where measurement is used.</td></tr>
</table>

In Primary 6, the learners covered units of length, circumference and diameter.

Activities in groups or pairs

- Review of knowledge concerning time such as conversion of hours to seconds, minutes to seconds etc.
- Guide learners to form groups or pairs and solve problems involving weight, mass, temperature by using the examples given in the sub units.
- Guide learners on solving problems on circumference, perimeter, and speed by using examples given.

UNIT 2: MEASUREMENT

2.1 Circumference of circles

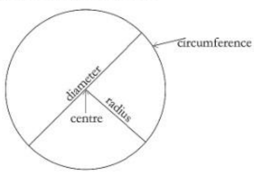
Circumference of a circle is the distance all round a circular shape. Such as coins, circular tins etc.

The **circumference (c)** of a circle is the distance all the way round the circle.

The distance from the circumference through the centre is its **diameter (d)**

The distance from the centre to the circumference is its **radius**.

2 radii (plural for radius) = diameter.



Activity 1

- Using a pair of compass draw a suitable circle on a manilla paper.
- Use a razor blade to cut it carefully around its circumference.
- Using a string measure the circumference.
- Use the circumference to find out how many times it can fit on the diameter.

- It will fit approximately $3\frac{1}{7}$ or 3.14 times on the diameter.
- Circumference of a circle divided by its diameter is $3\frac{1}{7}$ or 3.14 is a mixed fraction of $\frac{22}{7}$
- $3\frac{1}{7}$ or $\frac{22}{7}$ or 3.14 are used as estimation for π read as pi.

$C \div d = \frac{C}{d} = \pi$

$C = \pi d$

Or $C = 2\pi r$

In groups, peg a string on the ground to form center of a circle and draw a circle. Measure the line you have drawn.

Example 1.

Find the circumference of a circle where radius is 7m

Method: 1	**Method: 2**
$C = 2\pi r$	$C = 2\pi r$
$C = 2\times \frac{22}{\cancel{7}} \times \cancel{7}m$	$C = 2\times 3.14\times 7m$
$C = 44m$	$C = 6.28\times 7$
	$C = 43.96$

The circumference is about 44m

Formula of finding the circumference.

1) $C = \pi \times D$ or πD
2) $C = 2\times \pi \times r$ or $2\pi r$

2.1 Circumference of circles

Circumference is distance around a circle. Symbol is C.

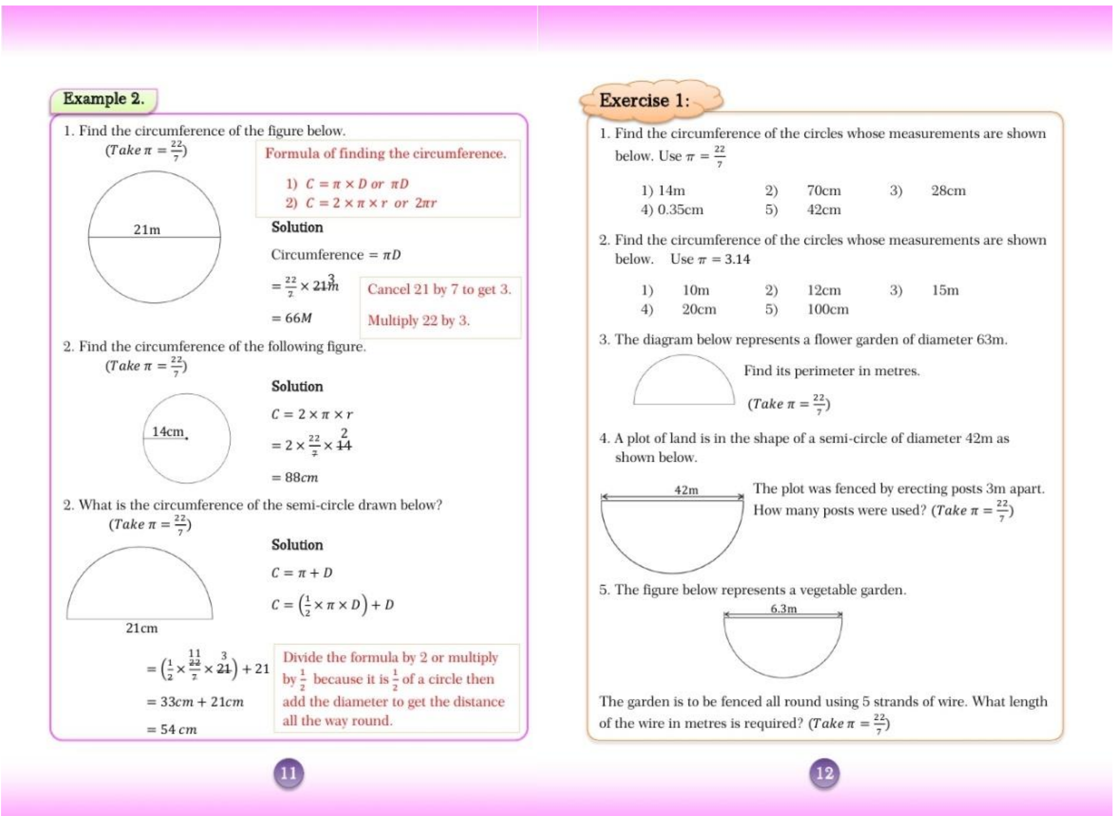
C $= \pi$d; Where π is approximately $\frac{22}{7}$ or 3.142

When the diameter is 7 or its multiple, then π is $\frac{22}{7}$ while when the diameter is not 7 or its multiple then π 3.142.

Activity 1

Guide learners by providing them with the required materials and ensure that they follow step by step as stated in the learner's book.

This will help learners understand what pi (π) means.



Example 2.

1. Find the circumference of the figure below.
   $(Take\ \pi = \frac{22}{7})$

Formula of finding the circumference.

1) $C = \pi \times D$ or πD
2) $C = 2 \times \pi \times r$ or $2\pi r$

21m

Solution

Circumference $= \pi D$

$= \frac{22}{7} \times \overset{3}{\cancel{21}}m$

$= 66M$

Cancel 21 by 7 to get 3.

Multiply 22 by 3.

2. Find the circumference of the following figure.
   $(Take\ \pi = \frac{22}{7})$

14cm

Solution

$C = 2 \times \pi \times r$

$= 2 \times \frac{22}{7} \times \overset{2}{\cancel{14}}$

$= 88cm$

2. What is the circumference of the semi-circle drawn below?
   $(Take\ \pi = \frac{22}{7})$

21cm

Solution

$C = \pi + D$

$C = \left(\frac{1}{2} \times \pi \times D\right) + D$

$= \left(\frac{1}{2} \times \frac{\overset{11}{\cancel{22}}}{7} \times \overset{3}{\cancel{21}}\right) + 21$

$= 33cm + 21cm$

$= 54\ cm$

Divide the formula by 2 or multiply by $\frac{1}{2}$ because it is $\frac{1}{2}$ of a circle then add the diameter to get the distance all the way round.

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Exercise 1:

1. Find the circumference of the circles whose measurements are shown below. Use $\pi = \frac{22}{7}$

   1) 14m 2) 70cm 3) 28cm
   4) 0.35cm 5) 42cm

2. Find the circumference of the circles whose measurements are shown below. Use $\pi = 3.14$

   1) 10m 2) 12cm 3) 15m
   4) 20cm 5) 100cm

3. The diagram below represents a flower garden of diameter 63m.
   Find its perimeter in metres.
   $(Take\ \pi = \frac{22}{7})$

4. A plot of land is in the shape of a semi-circle of diameter 42m as shown below.
   42m
   The plot was fenced by erecting posts 3m apart. How many posts were used? $(Take\ \pi = \frac{22}{7})$

5. The figure below represents a vegetable garden.
   6.3m
   The garden is to be fenced all round using 5 strands of wire. What length of the wire in metres is required? $(Take\ \pi = \frac{22}{7})$

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Exercise 1

Guide learners to work individually for your assessment and evaluation.

Expected answers

Question 1 (all measurements are radii)

i. 88m   iii. 176cm   v. 264cm

ii. 440cm   iv. 2.2cm

Question 2 (all measurements are diameters)

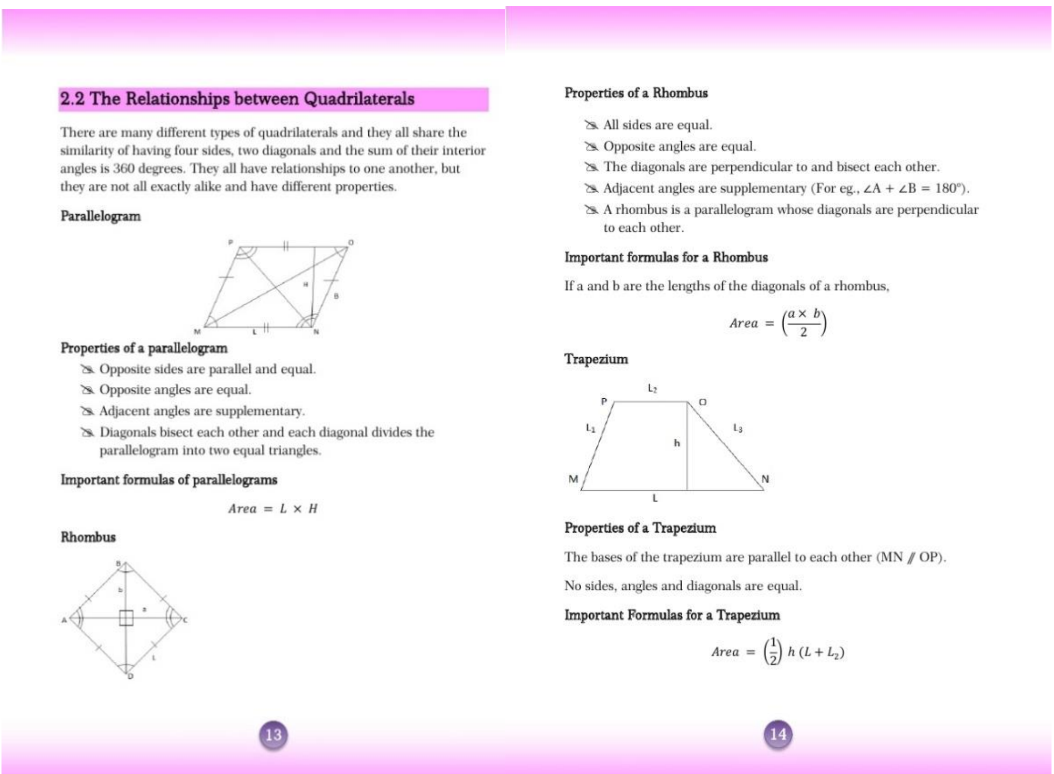
i. 31.4m   iv. 62.8cm

ii. 37.68cm   v. 314cm

iii. 47.1m

3. 99m
4. 65 posts
5. 81m

2.2 The relationships between quadrilaterals



2.2 The Relationships between Quadrilaterals

There are many different types of quadrilaterals and they all share the similarity of having four sides, two diagonals and the sum of their interior angles is 360 degrees. They all have relationships to one another, but they are not all exactly alike and have different properties.

Parallelogram

Properties of a parallelogram

- Opposite sides are parallel and equal.
- Opposite angles are equal.
- Adjacent angles are supplementary.
- Diagonals bisect each other and each diagonal divides the parallelogram into two equal triangles.

Important formulas of parallelograms

$$Area = L \times H$$

Rhombus

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Properties of a Rhombus

- All sides are equal.
- Opposite angles are equal.
- The diagonals are perpendicular to and bisect each other.
- Adjacent angles are supplementary (For eg., $\angle A + \angle B = 180°$).
- A rhombus is a parallelogram whose diagonals are perpendicular to each other.

Important formulas for a Rhombus

If a and b are the lengths of the diagonals of a rhombus,

$$Area = \left(\frac{a \times b}{2}\right)$$

Trapezium

Properties of a Trapezium

The bases of the trapezium are parallel to each other (MN // OP).

No sides, angles and diagonals are equal.

Important Formulas for a Trapezium

$$Area = \left(\frac{1}{2}\right) h \,(L + L_2)$$

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Parallelograms:

Opposite sides are parallel and equal in length.

Opposite angles are equal.

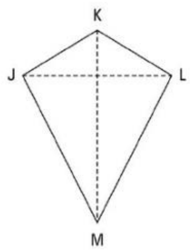
Sum of interior angles is 360°.

Adjacent angles add up to 180°.

$$Area = l \; x \; h$$

Kite

A kite is a quadrilateral in which two disjoint pairs of consecutive sides are congruent ("disjoint pairs" means that one side can't be used in both pairs). Check out the kite in the below figure.



The properties of the kite are as follows:

- ☑ Two disjoint pairs of consecutive sides are congruent by definition ($\overline{JK} \cong \overline{LK}$ and $\overline{JM} \cong \overline{LM}$).

  Note: *Disjoint* means that the two pairs are totally separate.
- ☑ The diagonals are perpendicular.
- ☑ One diagonal (segment *KM*, the ***main diagonal***) is the perpendicular bisector of the other diagonal (segment *JL*, the ***cross diagonal***). (The terms "main diagonal" and "cross diagonal" are made up for this example.)
- ☑ The main diagonal bisects a pair of opposite angles (angle *K* and angle *M*).
- ☑ The opposite angles at the endpoints of the cross diagonal are congruent (angle *J* and angle *L*).

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Rhombus:

All four sides are equal.

Opposite sides are parallel.

Sum of interior angles is 360°.

Adjacent angles add up to 180°

$$\text{Area} = \frac{(a \times b)}{2}$$

A and B are the diagonals of the rhombus. They are perpendicular to each other.

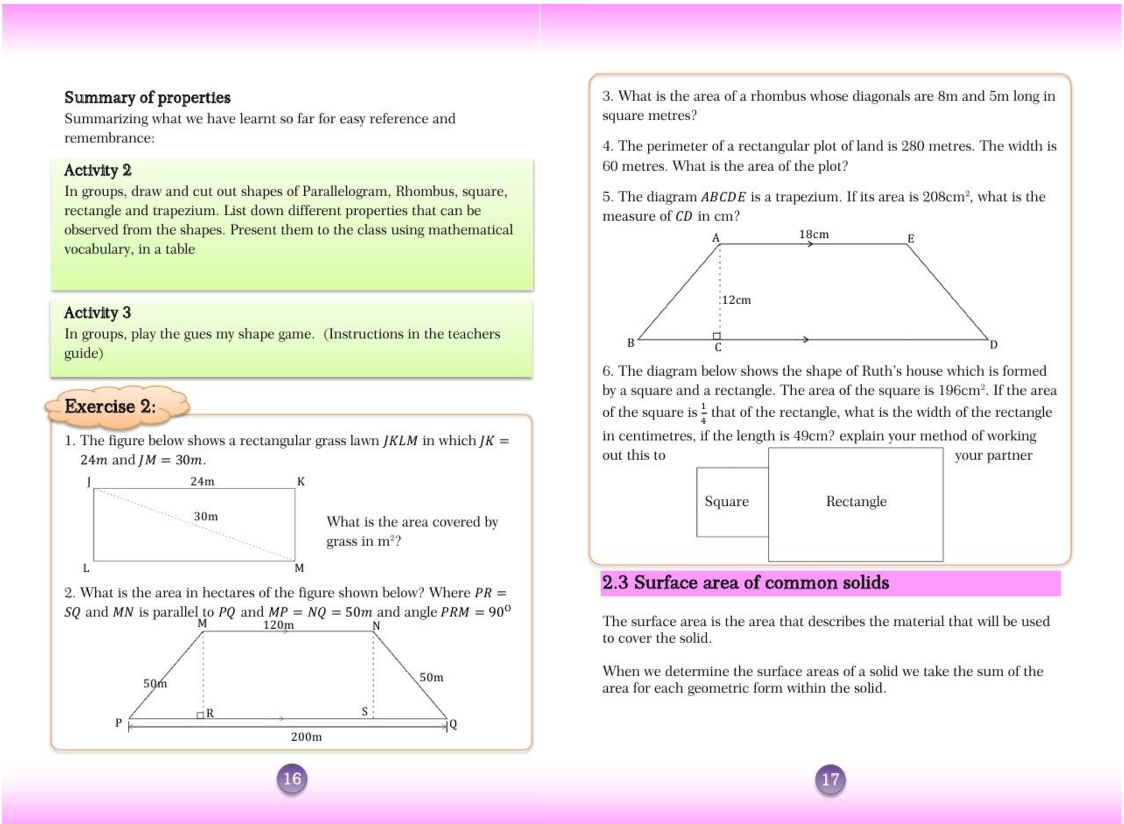
Trapezium:

A four sided polygon made of two opposite parallel sides (called the bases) and two opposite sides which are not parallel.

The sum of the interior angles of the trapezium is 360°.

$$\text{Area} = \frac{\text{(sum of length of parallel sides) x height}}{2}$$

$$\text{Area} = \frac{(a + b) \times h}{2}$$



Summary of properties

Summarizing what we have learnt so far for easy reference and remembrance:

Activity 2

In groups, draw and cut out shapes of Parallelogram, Rhombus, square, rectangle and trapezium. List different properties that can be observed from the shapes. Present them to the class using mathematical vocabulary, in a table

Activity 3

In groups, play the gues my shape game. (Instructions in the teachers guide)

Exercise 2:

1. The figure below shows a rectangular grass lawn $JKLM$ in which $JK = 24m$ and $JM = 30m$.

What is the area covered by grass in m^2?

2. What is the area in hectares of the figure shown below? Where $PR = SQ$ and MN is parallel to PQ and $MP = NQ = 50m$ and angle $PRM = 90^0$

3. What is the area of a rhombus whose diagonals are 8m and 5m long in square metres?

4. The perimeter of a rectangular plot of land is 280 metres. The width is 60 metres. What is the area of the plot?

5. The diagram $ABCDE$ is a trapezium. If its area is $208cm^2$, what is the measure of CD in cm?

6. The diagram below shows the shape of Ruth's house which is formed by a square and a rectangle. The area of the square is $196cm^2$. If the area of the square is $\frac{1}{4}$ that of the rectangle, what is the width of the rectangle in centimeters, if the length is 49cm? explain your method of working out this to your partner

2.3 Surface area of common solids

The surface area is the area that describes the material that will be used to cover the solid.

When we determine the surface areas of a solid we take the sum of the area for each geometric form within the solid.

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Property	Parallelogram	Rectangle	Rhombus	Square
All sides are equal	✗	✗	✓	✓
Opposite sides are parallel and equal	✓	✓	✓	✓
All angles are congruent	✗	✓	✗	✓
Opposite angles are equal	✓	✓	✓	✓
Diagonals are congruent	✗	✓	✗	✓
Diagonals are perpendicular	✗	✗	✓	✓
Diagonals bisect each other	✓	✓	✓	✓
Adjacent angles are supplementary	✓	✓	✓	✓

Activity 3

Choose a learner, let the learner describe a shape then choose another learner to say what shape it is.

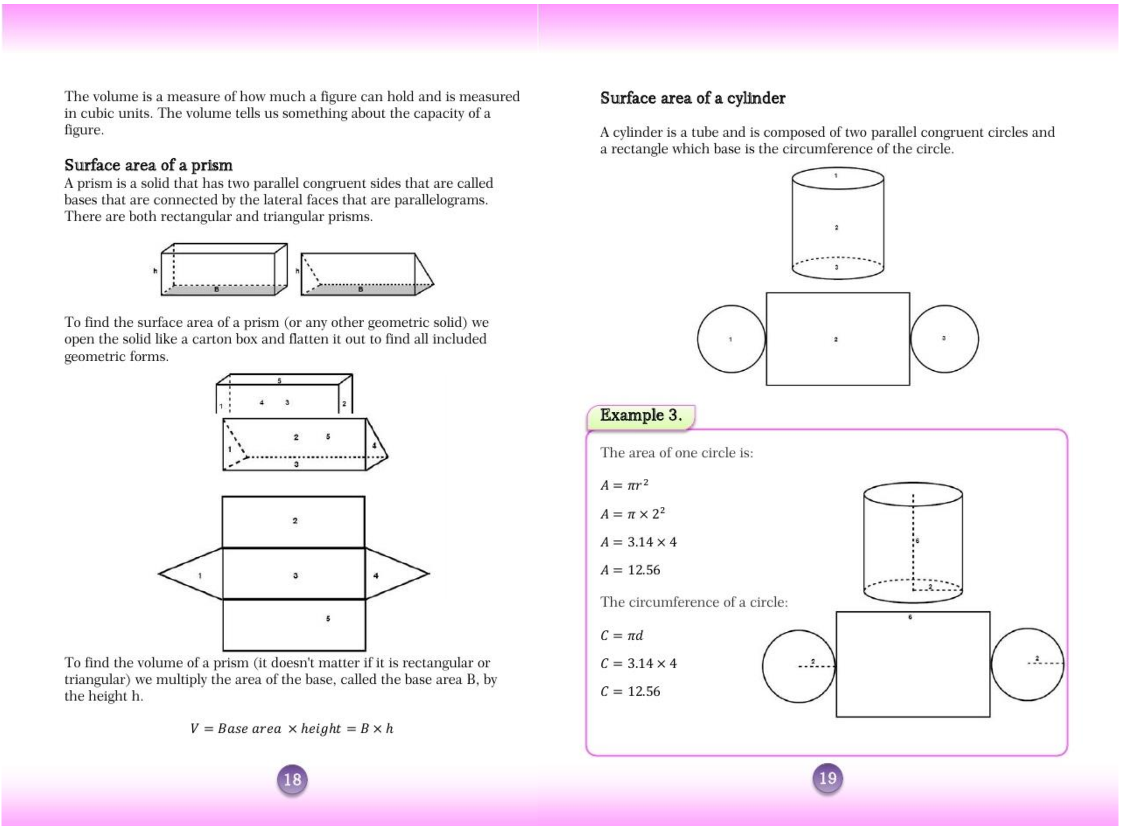
Repeat this with the rest of the class.

Exercise 2

Guide learners to work individually as this will help in assessing learners individually.

1. $432m^2$
2. $0.48m^2$
3. $20m^2$
4. $4800m^2$
5. (Question 5 change ae to 8cm) = 17.33cm
6. 16cm

2.3 Surface area of common solids



The volume is a measure of how much a figure can hold and is measured in cubic units. The volume tells us something about the capacity of a figure.

Surface area of a prism

A prism is a solid that has two parallel congruent sides that are called bases that are connected by the lateral faces that are parallelograms. There are both rectangular and triangular prisms.

To find the surface area of a prism (or any other geometric solid) we open the solid like a carton box and flatten it out to find all included geometric forms.

To find the volume of a prism (it doesn't matter if it is rectangular or triangular) we multiply the area of the base, called the base area B, by the height h.

$$V = Base\ area\ \times height = B \times h$$

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Surface area of a cylinder

A cylinder is a tube and is composed of two parallel congruent circles and a rectangle which base is the circumference of the circle.

Example 3.

The area of one circle is:

$A = \pi r^2$

$A = \pi \times 2^2$

$A = 3.14 \times 4$

$A = 12.56$

The circumference of a circle:

$C = \pi d$

$C = 3.14 \times 4$

$C = 12.56$

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Surface area: amount of material making up a given solid.

$$Surface\ area\ of\ rectangular\ prisms\ (or\ cuboid) = 2(L \times w) + 2(L \times h) + 2(w \times h)$$

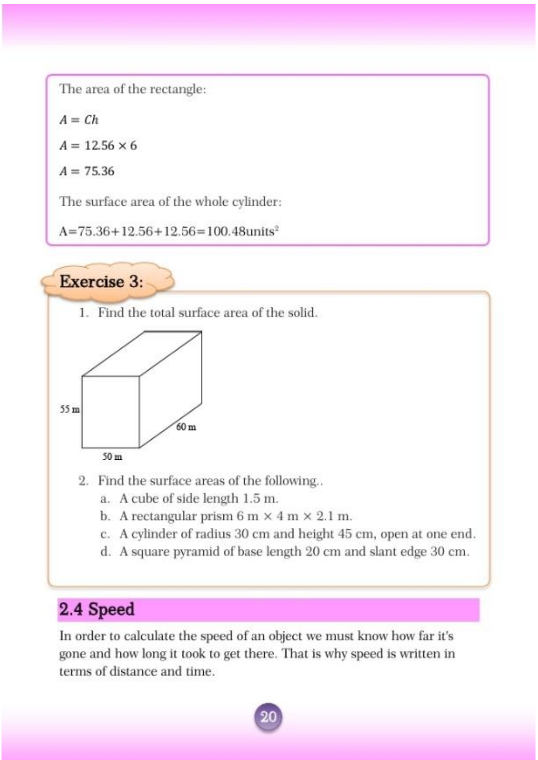
Surface area of cubes = $6(S \times S)$

Surface area of prism = sum of area of sides

Surface area of closed cylinder = 2(area of circular part) + area of curved surface

$$= 2(\pi r^2) + 2\pi r l$$

$$= 2\pi r(r + l)$$



The area of the rectangle:

$A = Ch$

$A = 12.56 \times 6$

$A = 75.36$

The surface area of the whole cylinder:

A=75.36+12.56+12.56=100.48units^2

Exercise 3:

1. Find the total surface area of the solid.

2. Find the surface areas of the following..
   a. A cube of side length 1.5 m.
   b. A rectangular prism 6 m × 4 m × 2.1 m.
   c. A cylinder of radius 30 cm and height 45 cm, open at one end.
   d. A square pyramid of base length 20 cm and slant edge 30 cm.

2.4 Speed

In order to calculate the speed of an object we must know how far it's gone and how long it took to get there. That is why speed is written in terms of distance and time.

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Surface area of open cylinder

= area of circular part + area of curved surface

$$= (\pi r^2) + 2\pi rl$$

Exercise 3

To be performed by learners individually.

i. $18100m^2$
ii. $13.5m^2$
iii. $90m^2$
iv. $3110.58cm^2$
v. $125.68cm^2$
vi. $1531.2cm^2$

2.4 Speed

Speed: Rate of change in distance.
Rate refers to anything divided by time.

Speed = $^{\text{distance}}/_{\text{time}}$.

Unit: $^{m}/s$ or $^{km}/_{h}$

Conversion of $^{m}/_{s}$ to $^{km}/_{h}$: Multiply the speed in $^{m}/_{s}$ by $^{36}/_{10}$.

Conversion of $^{km}/_{h}$ to $^{m}/_{s}$: Multiply the speed in $^{m}/_{s}$ by $^{10}/_{36}$.

Activity 2

a. 20m/s	e. 15m/s	i. 5m/s
b. 70m/s	f. 40m/s	j. 50m/s
c. 65m/s	g. 60m/s	k. 35m/s
d. 45m/s	h. 30m/s	l. 55m/s

Converting m/s to km/h

$$1\ m = \frac{1}{1000}\ km;\ 1\ sec = \frac{1}{3600}\ hr$$

$$1\ m/sec\ = \frac{\frac{1}{1000}}{\frac{1}{3600}}\ km/hr\ = \frac{3600}{1000}\ km/hr\ = \frac{18}{5}\ km/hr$$

To convert m/sec into km/hr, multiply the number by 18 and then divide it by 5.

Example 6.

Convert 20 m/sec into km/hr.

Solution:
20 m/sec
Step 1:
Multiply 20 by 18
We have 20 * 18 = 360
Step 2:
Divide 360 by 5
360/5 = **72**
Final Answer:
20 m/sec = **72 km/hr**

Activity 2

Work in groups to convert the following to km/hr.

i) 45 m/sec	v) 120 m/sec
ii) 4 m/sec	vi) 840 m/sec
iii) 1.5 m/sec	vii) 6.25 m/sec
iv) 2.8 m/sec	viii) 22.5 m/sec

Exercise 4

1. 20m/s
2. 5m/s
3. 2m/s
4. 43.88m/s

Activity 4

1. 133.33s
2. 10.69m

Exercise 4:

1. If a car travels 400m in 20 seconds how fast is it going?
2. If you move 50 meters in 10 seconds, what is your speed?
3. You arrive in my class 45 seconds after leaving math which is 90 meters away. How fast did you travel?
4. A plane travels 395,000 meters in 9000 seconds. What was its speed?

Activity 3

Work in groups to solve the activities

1. You need to get to class, 200 meters away, and you can only walk in the hallways at about 1.5 m/s. (if you run any faster, you'll be caught for running). How much time will it take to get to your class?
2. In a competition, an athlete threw a flying disk 139 meters through the air. While in flight, the disk traveled at an average speed of 13.0 m/s. How long did the disk remain in the air?

2.5 Weight

The charts below will help you to convert between different metric units of weight.

METRICWEIGHTCONVERSIONS					
1 gram	=	1000 milligrams	1g	=	1000 mg
1 decagram	=	10 grams	1dag	=	10g
1 kilogram	=	1000 grams	1 kg	=	1000 g
1 tonne (1 megagram)	=	1000 kilograms	1 tonne (1 Mg)	=	1000 kg
1 gigagram	=	1000 megagrams	1 Gg	=	1000 Mg

Exercise 4:

1. A tin of baked beans weighs 485g. How many grams less than 1.55kg will 2 tins of beans weigh?
2. The combined weight of 6 TV's is 138kg. How much does each TV weigh?
3. DVD players weigh 3kg and I buy 4 TV's and 4 DVD players. How much does my purchase weigh?
4. The limit of the baggage that each person can bring on an airplane is 20 kilograms. Achol's suitcase weighs 24000 grams, and his brother Garang's weighs 23500g. How much over the limit are their suitcases together?
5. To bake a 250g cake, you need to use 70 grams of butter.
   a) How much butter do you need to make a 2kg cake?
   b) If you use 280 grams of butter, how much does the cake weigh?
   c) If you use 560 grams of butter, what does the cake weigh?
6. Tim put a 0.975kg weight on one side of a set of balancing scales. William then put a 255g and a 300g weight on the other side.
   a) How much more does the William need to add to his side to make the scales balance?
   b) What does Tim need to add to his side of the scale to make it weigh 1560g?

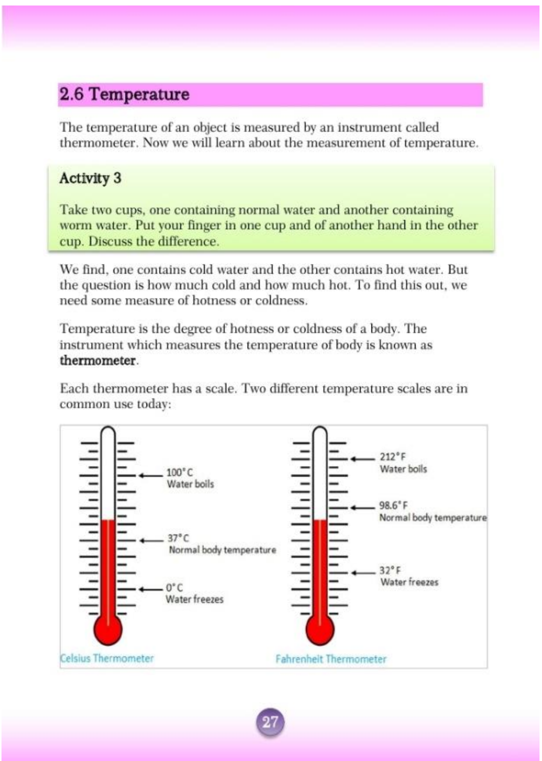
2.5 Weight

Mass/ weight - Amount of matter in a substance.

Mass is measured using a balance. Beam balance, lever arm balance, top pan balance and electronic balance.

Exercise 5

1. 580g
2. 23kg
3. (include a TV weighs 23kg) = 104kg
4. 27.5kg
5. 560g
6. (Question g to be 5b since it's a continuation) =1kg; 2kg
7. (delete 8 and 9, they are continuation of 7 number 10 as 7b) -= 420g; 585g.



2.6 Temperature

The temperature of an object is measured by an instrument called thermometer. Now we will learn about the measurement of temperature.

Activity 3

Take two cups, one containing normal water and another containing worm water. Put your finger in one cup and of another hand in the other cup. Discuss the difference.

We find, one contains cold water and the other contains hot water. But the question is how much cold and how much hot. To find this out, we need some measure of hotness or coldness.

Temperature is the degree of hotness or coldness of a body. The instrument which measures the temperature of body is known as **thermometer**.

Each thermometer has a scale. Two different temperature scales are in common use today:

2.6 Temperature

Temperature - The degree of hotness or coldness of a substance.

Units for temperature: degree celcius (°C); degree centigrades (°C), degree Farenheit (°F), Kelvin (K).

Temperature in °C to °F = Temperature in °C x ${}^{9}/_{5}$

Temperature in °F in °C = Temperature in °F x ${}^{5}/_{9}$

Thermometer has scale in degree Fahrenheit (°F) and in degree Celsius (°C). The Fahrenheit scale has the melting point of ice at 32° F and the boiling point of water at 212° F.

Thus, the Fahrenheit scale is marked from 32° to 212° where 32° F shows the freezing point of water and 212° F shows the boiling point of water. At present most of the countries use the degrees Celsius thermometers.

The Celsius scale (is also called centigrade scale) thermometer has 0° C as freezing point of water and 100° C as the boiling point of water.

Activity 4

In pairs, ask your partner the following questions.

1. The instrument used to measure body temperature is called?
2. The normal body temperature is?
3. The liquid inside the thermometer is called?
4. The units of measure of temperature are?
5. 0°C is cooler than 0°F?

Conversion of Temperature

In conversion of temperature from one scale into another the given temperature in °C we can convert it into °F and also the temperature in °F we can convert it into °C.

The rules which are used in this conversion are given below:

1. When the temperature is given in degree Celsius:

Step I: Multiply the given temperature in degree by 9

Step II: The product we obtained from step I divide it by 5.

Step III: Add 32 with the quotient we obtained from step II to get the temperature in degree Fahrenheit.

Temperature in degree Celsius $\xrightarrow[\text{by 9}]{\text{Multiply}}$ $\xrightarrow[\text{by 5}]{\text{Divide}}$ $\xrightarrow[\text{32}]{\text{Add}}$ Temperature in °F

2. When the temperature is given in degree Fahrenheit:

Step I: Subtract 32 from the given temperature in degree

Step II: The difference we obtained from step I multiply it by 5.

Step III: The product we obtained from step II divide it by 9 to get the temperature in degree Celsius.

Temperature in degree Fahrenheit $\xrightarrow[\text{32}]{\text{Subtract}}$ $\xrightarrow[\text{by 5}]{\text{Multiply}}$ $\xrightarrow[\text{by 9}]{\text{Divide}}$ Temperature in °C

Example 7.

1. Convert into degree Fahrenheit:

50° C

$50 \xrightarrow[\text{by 9}]{\text{Multiply}} 450 \xrightarrow[\text{by 5}]{\text{Divide}} 90 \xrightarrow[\text{32}]{\text{Add}} 122$

Therefore, 50° C = 122° F

2. Convert into degree Celsius:

212° F

$212 \xrightarrow[\text{32}]{\text{Subtract}} 180 \xrightarrow[\text{by 5}]{\text{Multiply}} 900 \xrightarrow[\text{by 9}]{\text{Divide}} 100$

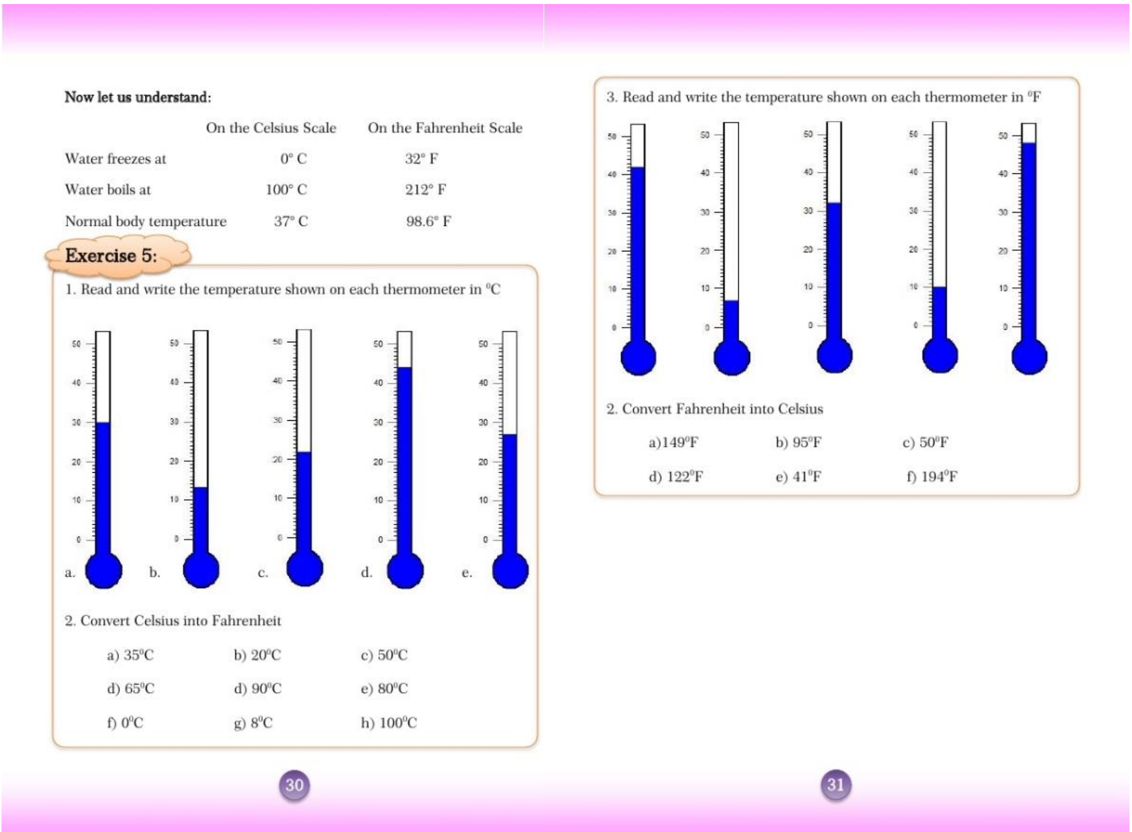
Therefore, 212° F = 100° C

Activity 4

Guide learners to ask each other the questions on the learner's book.

Expected answers

1. Thermometer
2. 37.5°c
3. Mercury
4. Degrees Celsius (°C) or degrees Fahrenheit (°F)
5. No.0°F is cooler



Now let us understand:

	On the Celsius Scale	On the Fahrenheit Scale
Water freezes at	0° C	32° F
Water boils at	100° C	212° F
Normal body temperature	37° C	98.6° F

Exercise 5:

1. Read and write the temperature shown on each thermometer in °C

a. b. c. d. e.

2. Convert Celsius into Fahrenheit

a) 35°C b) 20°C c) 50°C
d) 65°C d) 90°C e) 80°C
f) 0°C g) 8°C h) 100°C

3. Read and write the temperature shown on each thermometer in °F

2. Convert Fahrenheit into Celsius

a)149°F b) 95°F c) 50°F
d) 122°F e) 41°F f) 194°F

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Exercise 5

Guide learners to attempt individually for you to assess the learners understanding of temperature.

Expected Answers

1. a. 30°C	b. 13°C	c. 22°C	d. 44°C	e. 27°C
2. a. 95°F	b. 68°F	c. 122°F	d. 194°F	e. 176°F
3. a. 42°F	b. 7°F	c. 32°F	d. 10°F	e. 48°F
4. a. 65°C	b. 35°C	c. 10°C	d. 50°C	e. 5°C
f. 90°C				

UNIT 3: GEOMETRY

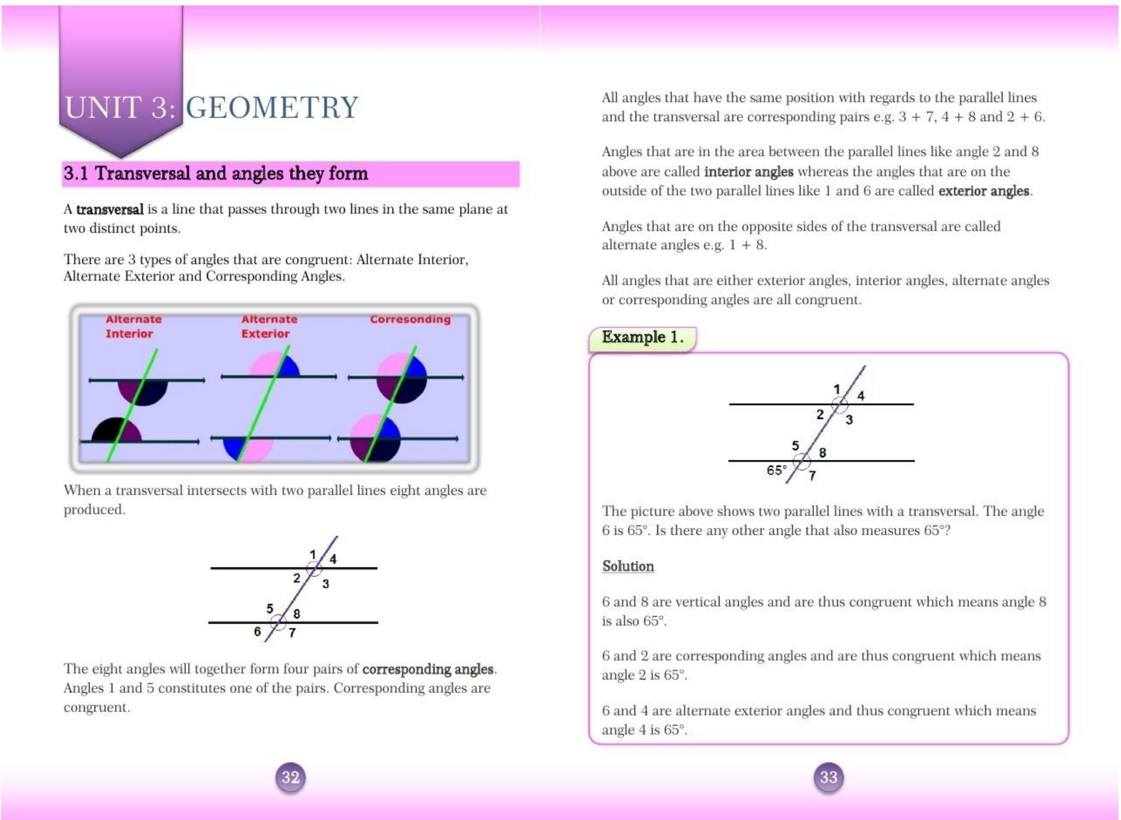
Learn about	Key inquiry questions
✍ Learners should define transversal lines and angles between these lines and parallel lines. ✍ Learners should use their understanding of triangles to distinguish between equilateral, isosceles and right–angled triangles and know how to construct them and investigate inscribing and circumscribing of triangles and circles and apply this learning to solving complex problems. ✍ Learners should differentiate between parallelograms, rhombuses and trapeziums and use Pythagoras Theorem to solving problems related to triangles, parallelograms, rhombuses and trapeziums. ✍ Learners should investigate different forms of symmetry using mirrors and tracing paper, and understand that the distance of any point from the rotation point always stays the same. ✍ Learners should investigate transformation including translation and enlargement, combine transformations and make scale drawings. They should know about faces, edges and vertices and investigate nets for cubes, prisms, cuboids and pyramids.	• How can we describe transversal lines and the angles they make with parallel lines? • How would we judge the difference between equilateral, isosceles and right–angled triangles? • How can we inscribe and circumscribe triangles and circles? • Why do we use Pythagoras theorem? • How can we demonstrate the construction of parallelogram, rhombus and trapezium and find their respective altitudes? • Why should we draw and interpret linear scale?

<table>
<tr><td colspan="3">Learning outcomes</td></tr>
<tr><td>Knowledge and understanding</td><td>Skills</td><td>Attitudes</td></tr>
<tr><td>Identifying transversal lines and angles of parallel lines.
Constructing equilateral, isosceles and right-angled triangles.
Inscribing and circumscribing triangles.
Pythagoras theorem (2D).
Construction of parallelogram, rhombus and trapezium.
Drawing, interpreting and using a range of linear scales.</td><td>Construct transversal and parallel lines and investigate angles between them.
Solve problems of construction involving equilateral, isosceles and right-angled triangles.
Inscribe and circumscribe triangles and circles.
Construct parallelogram, rhombus and trapezium.
Apply Pythagoras Theorem to solve mathematical problems.
Draw and read objects to scale.</td><td>Show curiosity to construct and work with geometrical objects.
Appreciate the use of Pythagoras theorem and linear scales.
Confidence to investigate and to take responsibility for their own learning.</td></tr>
<tr><td colspan="3">Contribution to the competencies:
<u>Critical and Creative thinking</u>: analyzing geometrical objects.
<u>Communication</u>: compare their work in pairs or in groups.
<u>Co-operation</u>: group work.</td></tr>
<tr><td colspan="3">Links to other subjects:
Links to a range of subjects such as science and social studies where geometry is used.</td></tr>
</table>

In previous levels, learners covered geometric constructions where they studied bisection of lines, vertically opposite angles and supplementary angles. At this level, you shall focus on transversal and parallel lines and constructions where you shall dwell on construction of triangles, rhombuses and parallelograms.

Activities in groups or pairs

- In groups or pairs Discuss on triangles and their properties.
- In groups or pairs construct triangles
- Solve problems using Pythagoras theorem.
- In groups solve problems on transformations, translation, enlargement and scale drawing.


UNIT 3: GEOMETRY

3.1 Transversal and angles they form

A **transversal** is a line that passes through two lines in the same plane at two distinct points.

There are 3 types of angles that are congruent: Alternate Interior, Alternate Exterior and Corresponding Angles.

When a transversal intersects with two parallel lines eight angles are produced.

The eight angles will together form four pairs of **corresponding angles**. Angles 1 and 5 constitutes one of the pairs. Corresponding angles are congruent.

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All angles that have the same position with regards to the parallel lines and the transversal are corresponding pairs e.g. 3 + 7, 4 + 8 and 2 + 6.

Angles that are in the area between the parallel lines like angle 2 and 8 above are called **interior angles** whereas the angles that are on the outside of the two parallel lines like 1 and 6 are called **exterior angles**.

Angles that are on the opposite sides of the transversal are called alternate angles e.g. 1 + 8.

All angles that are either exterior angles, interior angles, alternate angles or corresponding angles are all congruent.

Example 1.

The picture above shows two parallel lines with a transversal. The angle 6 is 65°. Is there any other angle that also measures 65°?

Solution

6 and 8 are vertical angles and are thus congruent which means angle 8 is also 65°.

6 and 2 are corresponding angles and are thus congruent which means angle 2 is 65°.

6 and 4 are alternate exterior angles and thus congruent which means angle 4 is 65°.

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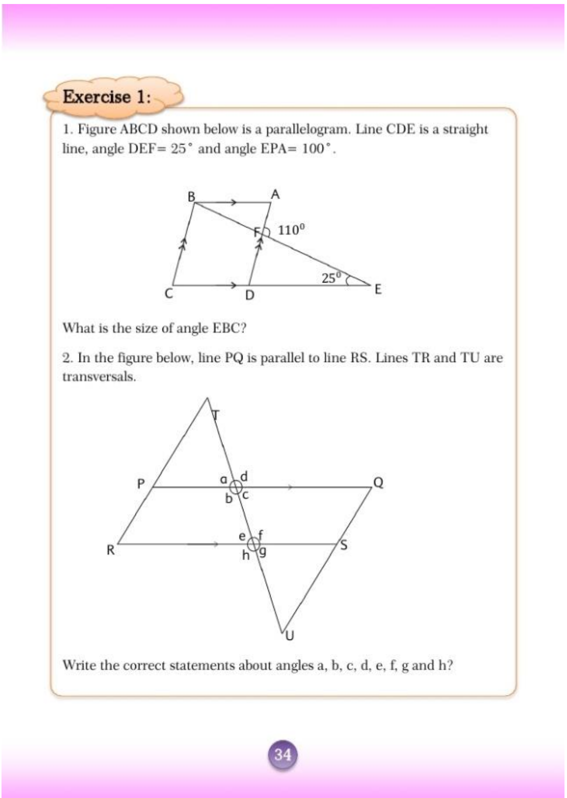
3.1 Transversals and angles they form.

A transversal is a straight line which cuts two parallel lines.



Exercise 1:

1. Figure ABCD shown below is a parallelogram. Line CDE is a straight line, angle DEF= 25° and angle EPA= 100°.

What is the size of angle EBC?

2. In the figure below, line PQ is parallel to line RS. Lines TR and TU are transversals.

Write the correct statements about angles a, b, c, d, e, f, g and h?

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The angles formed by transversals include: alternate angles, vertically opposite angles, corresponding angles.

Alternate angles: found on alternate sides of a transversal. Alternate angles are equal.

Vertically opposite angles: Found on vertically opposite sides of a parallel line at the point of intersection of the transversal, they are equal.

Corresponding angles: found on similar points on each of the parallel lines at the point of intersection of the transversal. They are equal

Exercise 1

Guide learners to attempt individually for you to assess the learners understanding of temperature.

Expected Answers

1. 85°
2. Angles a, c, e and g are equal (alternate angles); angles d, b, f, h are equal

3. y = 48^0

4. 76°

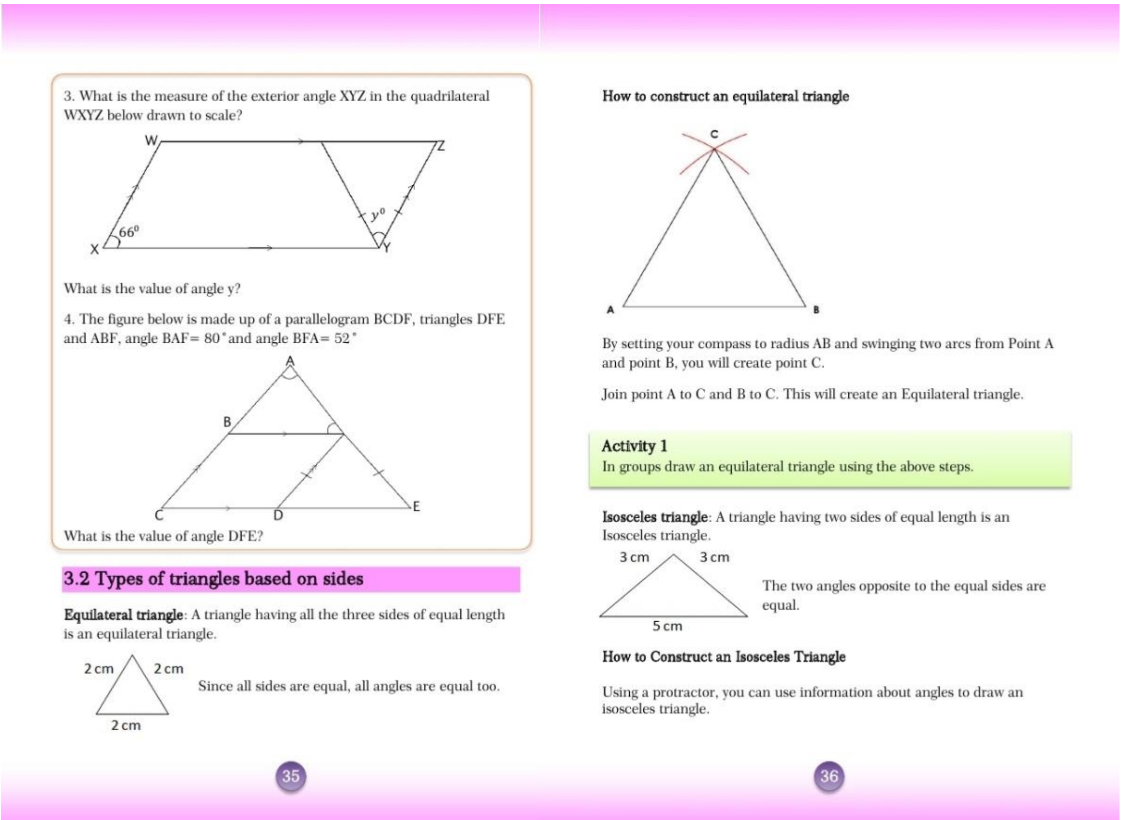
3.2 Types of triangles

Triangles are divided into three main categories.

Equilateral triangle: A triangle with all sides equal and all angles equal.

Isosceles triangle: A triangle with two sides equal and two angles equal.

Right angled triangle: A triangle with one of the angles equal to 90^{o}.



3. What is the measure of the exterior angle XYZ in the quadrilateral WXYZ below drawn to scale?

What is the value of angle y?

4. The figure below is made up of a parallelogram BCDF, triangles DFE and ABF, angle BAF= 80° and angle BFA= 52°

What is the value of angle DFE?

3.2 Types of triangles based on sides

Equilateral triangle: A triangle having all the three sides of equal length is an equilateral triangle.

Since all sides are equal, all angles are equal too.

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How to construct an equilateral triangle

By setting your compass to radius AB and swinging two arcs from Point A and point B, you will create point C.

Join point A to C and B to C. This will create an Equilateral triangle.

Activity 1
In groups draw an equilateral triangle using the above steps.

Isosceles triangle: A triangle having two sides of equal length is an Isosceles triangle.

The two angles opposite to the equal sides are equal.

How to Construct an Isosceles Triangle

Using a protractor, you can use information about angles to draw an isosceles triangle.

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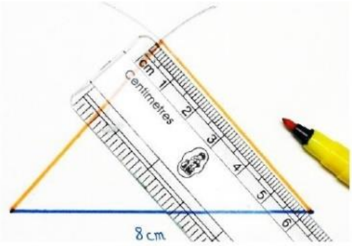
Activity 1

Guide learners to follow the steps on page 34 of the pupil's book to draw an equilateral triangle.

You should come up with more ways of drawing an equilateral triangle.

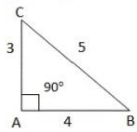
Draw an intersecting arc above the base. Without changing the width of the compass, place the tip on the other endpoint of the base. Draw an arc that intersects the first one.



Draw the sides of the triangle. Use a ruler to draw lines connecting the point where the arcs intersect to either endpoint of the base. The resulting figure is an isosceles triangle.

Activity 2
In groups draw an isosceles triangle using the above steps.

Right-angled triangle: A triangle whose one angle is a right-angle is a Right-angled triangle or Right triangle.



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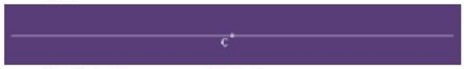
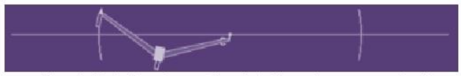
Constructing a Right Angled Triangle

The requirements for the construction are a ruler and a compass. Let us construct a right-angled triangle ABC, right angled at C. Consider the length of the hypotenuse AB = 5 cm and side CA = 3 cm. The steps for construction are:

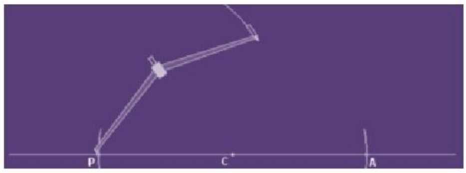
- **Step 1:** Draw a horizontal line of any length and mark a point C on it.



- **Step 2:** Set the compass width to 3 cm.
- **Step 3:** Place the pointer head of the compass on the point C and mark an arc on both the sides of C.



- **Step 4:** Mark the points as P and A where the arcs cross the line.
- **Step 5:** Set the compass width to the length of the hypotenuse, that is, 5 cm.
- **Step 6:** Place the pointer head of the compass on the point P and mark an arc above C.



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Activity 2

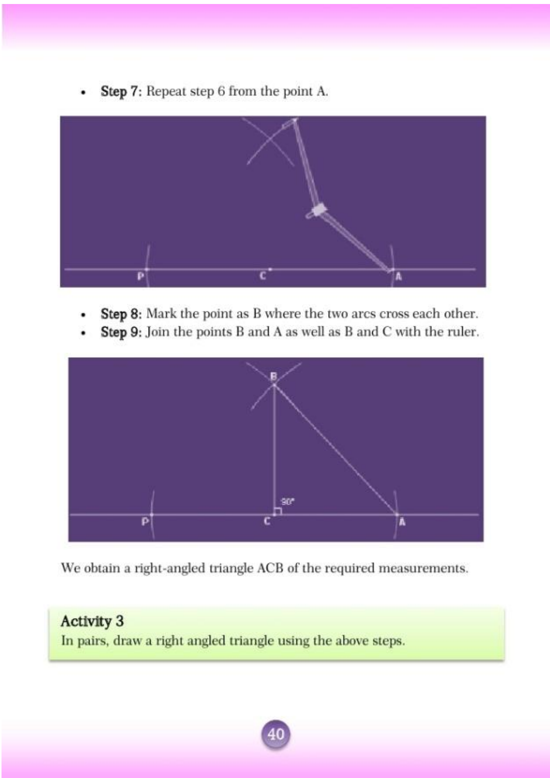
Guide learners to form groups and follow the steps of drawing an isosceles triangle.

You should come up with more ways of drawing an isosceles triangle.

Activity 3

Guide learners to form groups and follow the steps of drawing a right angles triangle. (Page 40-41)

You should come up with more ways of drawing a right angled triangle.



- **Step 7:** Repeat step 6 from the point A.
- **Step 8:** Mark the point as B where the two arcs cross each other.
- **Step 9:** Join the points B and A as well as B and C with the ruler.

We obtain a right-angled triangle ACB of the required measurements.

Activity 3
In pairs, draw a right angled triangle using the above steps.

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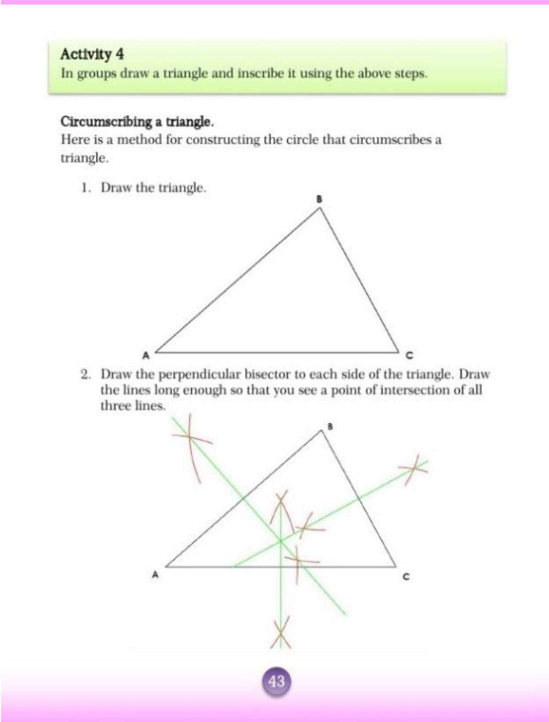
Activity 4

Guide learners to form groups and follow the steps on how to inscribe a triangle. (Page 42 of the pupil's book).

Activity 5

Guide learners to form groups and follow the steps on how to circumscribe and also inscribe a triangle. (Page 43 - 44 of the pupil's book).



Activity 4
In groups draw a triangle and inscribe it using the above steps.

Circumscribing a triangle.
Here is a method for constructing the circle that circumscribes a triangle.

1. Draw the triangle.
2. Draw the perpendicular bisector to each side of the triangle. Draw the lines long enough so that you see a point of intersection of all three lines.

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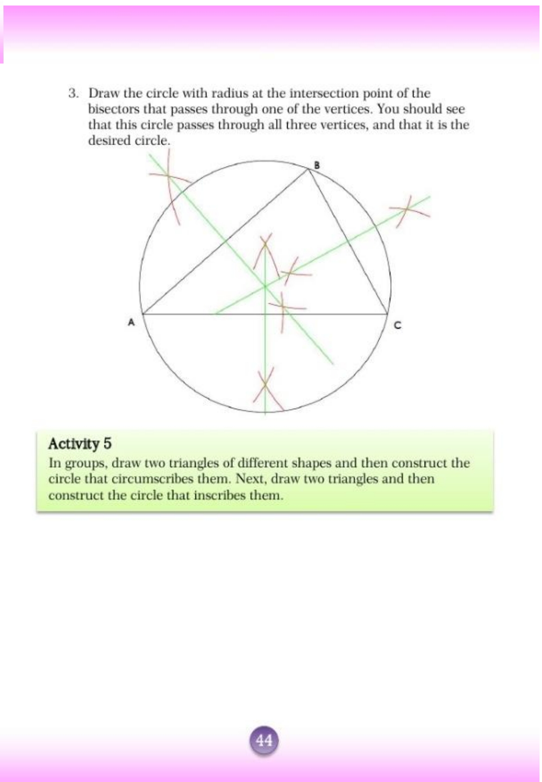

3. Draw the circle with radius at the intersection point of the bisectors that passes through one of the vertices. You should see that this circle passes through all three vertices, and that it is the desired circle.

Activity 5
In groups, draw two triangles of different shapes and then construct the circle that circumscribes them. Next, draw two triangles and then construct the circle that inscribes them.

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UNIT 4: ALGEBRA

Learn about	Key inquiry questions
✍ Learners should review their prior learning of algebraic expressions and consolidate it by understanding the relationship between mathematical statements and algebraic expressions. ✍ Learners should use this learning to describe the substitution method in evaluating algebraic expressions. ✍ Learners should consolidate this experience by solving problems about the relationship between mathematical statements and algebraic expressions. ✍ Learners should may use of more complex expressions involving the use of brackets. ✍ Learners should collect different types of sets of objects and become familiar with sets, set notations and set members. They should investigate the relationships between sets and solve problems to broaden their knowledge and understanding of set concepts.	• How would we apply the substitution method to evaluate algebraic expression? • Why are algebraic expressions formed from simple statements, and what are the advantages and disadvantages of this formation? • How can sets be used in studying practical problems? • Why do we represent sets using special notations and what do we mean by equal and equivalent sets?

<table>
<tr><td colspan="3">Learning outcomes</td></tr>
<tr><td>Knowledge and understanding</td><td>Skills</td><td>Attitudes</td></tr>
<tr><td>Finding values of algebraic expression by substitution
Formation of algebraic expression from mathematica l statements
Sets, members of a set, set notation and equal and equivalent sets</td><td>Evaluate algebraic expressions in numerical form
Transform mathematical statements algebraic phrases
Be able to organize sets and set members and write equal and equivalent sets
Be able to relate the links between sets and their members</td><td>Appreciate knowledge of sets, use of algebraic expressions in daily life
Curious to represent real life situations using algebraic expressions and sets
Confidence to investigate and to take responsibility for their own learning</td></tr>
<tr><td colspan="3">Contribution to the competencies:
<u>Critical thinking</u>: analysis of algebraic expressions; develops creativity as they comprehend several notions of sets and algebraic expressions
<u>Communication</u>: through engagement
<u>Co-operation</u>: group work</td></tr>
<tr><td colspan="3">Links to other subjects:
Links to a range of subjects such as science and social studies where algebra is used</td></tr>
</table>

In P6 the learners covered use of algebraic notations and substitutions. They were able to solve simple equations with one unknown.

In this level, the learners should be taken through the relationship between mathematical statements and algebraic expressions.

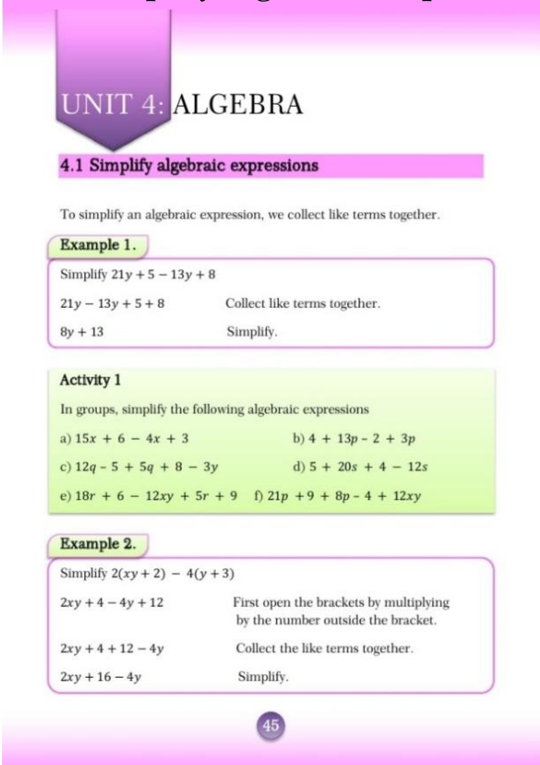
Learners should understand sets, members of a set, set notations and equal and equivalent sets.

Activities in groups or pairs

- Review prior learning of algebraic expressions.
- Solve algebraic problems by substitution method.
- Collect different types of sets of objects for familiarization.

Guide learners on every sub unit using the examples given in the pupil's book.

4.1: Simplify algebraic expressions.



UNIT 4: ALGEBRA

4.1 Simplify algebraic expressions

To simplify an algebraic expression, we collect like terms together.

Example 1.

Simplify $21y + 5 - 13y + 8$

$21y - 13y + 5 + 8$ Collect like terms together.

$8y + 13$ Simplify.

Activity 1

In groups, simplify the following algebraic expressions

a) $15x + 6 - 4x + 3$ b) $4 + 13p - 2 + 3p$

c) $12q - 5 + 5q + 8 - 3y$ d) $5 + 20s + 4 - 12s$

e) $18r + 6 - 12xy + 5r + 9$ f) $21p + 9 + 8p - 4 + 12xy$

Example 2.

Simplify $2(xy + 2) - 4(y + 3)$

$2xy + 4 - 4y + 12$ First open the brackets by multiplying by the number outside the bracket.

$2xy + 4 + 12 - 4y$ Collect the like terms together.

$2xy + 16 - 4y$ Simplify.

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This is done by:
Putting like terms together
Use of BODMAS

B - Bracket

O - Order

D - Division

M - Multiplication

A - Addition

S – Subtraction

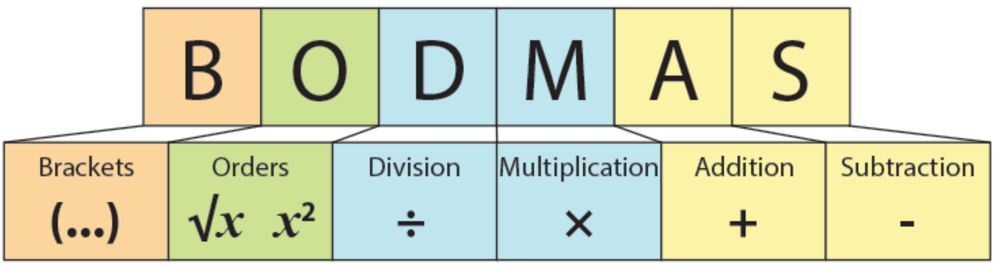
How to guide learners to remember it all.

B	**B**rackets first
O	**O**rders (i.e. Powers and Square Roots, etc.)
DM	**D**ivision and **M**ultiplication (left-to-right)
AS	**A**ddition and **S**ubtraction (left-to-right)

Divide and multiply rank equally (and go left to right).

Add and Subtract rank equally (and go left to right)

Ordering Mathematical Operations



Activity 1

Guide learners to work in groups as you supervise.

a. 11x + 9
b. 2 + 15p
c. 17q + 3 – 3y
d. 9 + 8s
e. 13r + 15 – 12xy
f. 29p + 5 +12xy

Activity 2

Guide learners to work in groups as you supervise.

a. 11p + 8
b. 6q -20 – 8p
c. 6r + 4
d. 11s + 15
e. 16q + 2
f. 26z – 27

4.2 Evaluating expression by substitution

Substitution is done by replacing letters with numbers.

Use the examples in the learner's book to emphasis and explain to learners about substitution.

Activity 2

In groups, simplify the following equations

a) $3(p + 2) + 2(4p + 1)$

b) $q(2 + 4) - 4(5 + 2p)$

c) $4(r + 2) + 2(r - 2)$

d) $5(s + 6) + 3(2s - 5)$

e) $4(5q + 2) - 2(3 + 2q)$

f) $3(6z - 5) + 4(2z - 3)$

4.2 Evaluating expression by substitution

To solve the expression we replace letters with numbers.

Example 3.

1. What is the value of 4p+5q?

When the value of p=3 and q= 2

$(4 \times 3) + (5 \times 2)$ Replace the letters with their number representation.

$= 12 + 10$

$\underline{= 22}$

2. What is the value of? $(2p + 3y) - (2y + 3p)$

When the value of $p = 4$ and $y = 6$

$(2 \times p)+) (3 \times y) - (2 \times y) + (3 \times p)$

$(2 \times 4) + (3 \times 6) - (2 \times 6) + (3 \times 4)$

$= (8 + 18) - (12 + 12)$

$= 26 - 24$

$\underline{= 2}$

Activity 3

In pairs what is the value of the expressions below:

When $p = 3, q = 5, r = 2, s = 7, c = 6, g = 4$

a) $s + c - q$

b) $q \times g$

c) $q \times s \times p$

d) $p + c - r$

e) $q + s - g$

f) $c \times r$

g) $s + q - p$

h) $s \times c$

Example 4.

What is the value of?

$\frac{1}{3}(3x + 5y) + 2y^2 + 7p - 6$

When

$x = 4,\ p = 2x$ and $y = \frac{1}{2}x + 5$

Therefore $x = 4,\ p = 2 \times 4 = 8$ and y= $\frac{1}{2} \times \overset{2}{4} \times 6 = 12$

Solution

$\frac{1}{3}(3 \times 4 + 5 \times 12) + (2 \times 12 \times 12) + (7 \times 8) - 6$

$\frac{1}{3} \times \overset{4}{\cancel{12}} + \frac{1}{3} \times \overset{20}{\cancel{60}} + 288 + 50$

$4 + 20 + 288 + 50$

$= 24 + 338$

$\underline{= 362}$

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Activity 3

Guide learners to work in groups as you supervise.

a. 10
b. 12
c. 20
d. 5
e. 105
f. 42
g. 7
h. 8

Exercise 1:

1. Solve for p in the equation

   $2p + q + r = 10$ If $q = 4, r = 1$

2. Solve for w in the equation

   $x + w - z = 12$ If $x = 4, z = 2$

3. Given that $x = -2, y = 4$, determine the value of z in the equation

   $x + 2y - z = 0$

4. Given that $p = -3, q = -4$, determine the value ofr in the equation

   $3p - q = r$

5. If $x = -3, z = 10$, determine the value of y if the equation is

   $x + y = z$

6. When $c = 3, a = 4, b = 5$ what is the value of:

   a) $(c + a) - (b - a)$
   b) $(b + a) + (b - c)$
   c) $(b - c) + (a - c)$
   d) $(c \times a) - (b + a)$
   e) $(b \times a) + (c + b)$
   f) $(b - a) + (a - c)$

7. If h=8, g=7, f=5 what is the value of:

   a) $2(h - f)$
   b) $(h + h) - (g + f)$
   c) $3g + 5f - h$
   d) $(g - f) + (h - g)$

8. When $d = 4, e = 6, q = 2$ what is the value of:

   a) $(d \times q) + (e \times d)$
   b) $e + d - q$
   c) $3d + 2e - q$
   d) $(e + d) - (e - q)$
   e) $2(q + d)$
   f) $4q + 3d - 2e$

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Exercise 1

Guide learners to work individually for you to assess their level of understanding.

1. 2.5
2. 10
3. 2
4. 3
5. 13
6.

a) 6
b) 3
c) 11
d) 20
e) 3
f) 2

7.

a) 6
b) 38
c) 4
d) 4

8.

a) 32
b) 6
c) 8
d) 12
e) 22
f) 8

Activity 4

a. q + 3q
b. 2p + m + 4
c. (2a+6) - (b+8)
d. 3p-p
e. ½ s + s
f. 2r + q + r

Activity 5

a. 6 + q

b. (24 – y) boys

c. SSP. 9y

d. SSP. 180y

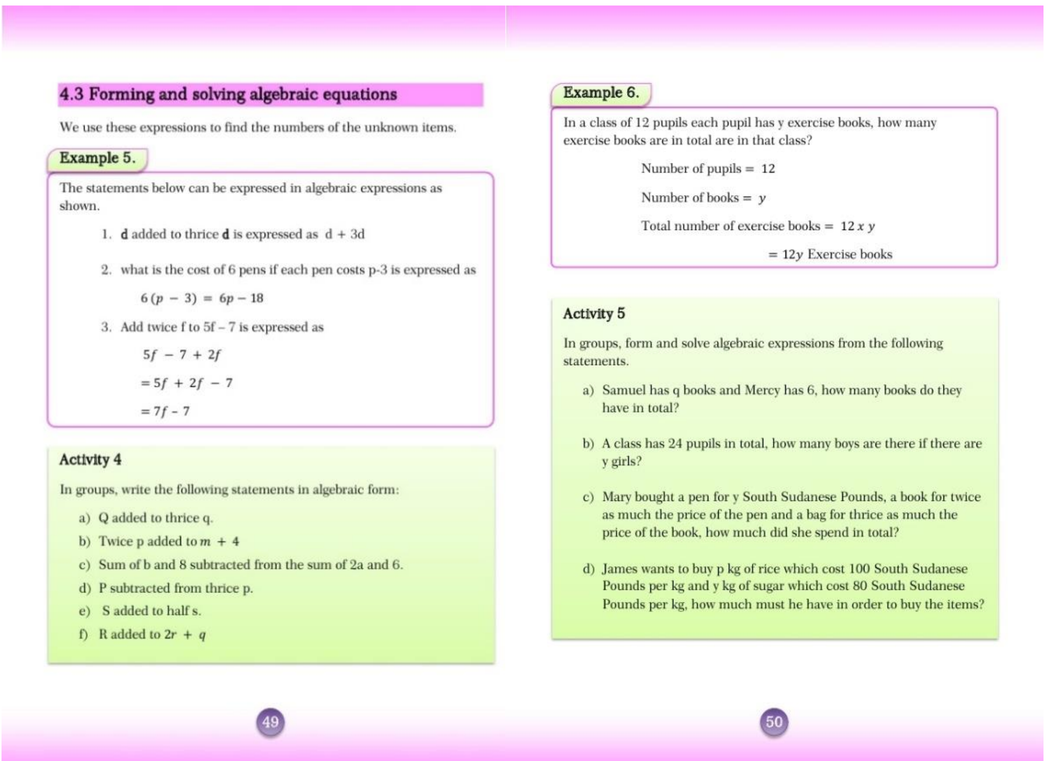
4.3 Forming and solving algebraic equations

Exercise 2

1. 162
2. 78
3. 10.25
4. 7
5. 0.056
6. 4.6875
7. 10.667
8. 5.7
9. 3.5
10. 7
11. 42
12. 124
13. 3.2

4.4 Different notations in sets

To learn about sets we shall use some accepted notations for the familiar sets of numbers.



4.3 Forming and solving algebraic equations

We use these expressions to find the numbers of the unknown items.

Example 5.

The statements below can be expressed in algebraic expressions as shown.

1. **d** added to thrice **d** is expressed as $d + 3d$
2. what is the cost of 6 pens if each pen costs p-3 is expressed as

   $6(p - 3) = 6p - 18$

3. Add twice f to 5f – 7 is expressed as

   $5f - 7 + 2f$

   $= 5f + 2f - 7$

   $= 7f - 7$

Activity 4

In groups, write the following statements in algebraic form:

a) Q added to thrice q.

b) Twice p added to $m + 4$

c) Sum of b and 8 subtracted from the sum of 2a and 6.

d) P subtracted from thrice p.

e) S added to half s.

f) R added to $2r + q$

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Example 6.

In a class of 12 pupils each pupil has y exercise books, how many exercise books are in total are in that class?

Number of pupils = 12

Number of books = y

Total number of exercise books = $12 x y$

= $12y$ Exercise books

Activity 5

In groups, form and solve algebraic expressions from the following statements.

a) Samuel has q books and Mercy has 6, how many books do they have in total?

b) A class has 24 pupils in total, how many boys are there if there are y girls?

c) Mary bought a pen for y South Sudanese Pounds, a book for twice as much the price of the pen and a bag for thrice as much the price of the book, how much did she spend in total?

d) James wants to buy p kg of rice which cost 100 South Sudanese Pounds per kg and y kg of sugar which cost 80 South Sudanese Pounds per kg, how much must he have in order to buy the items?

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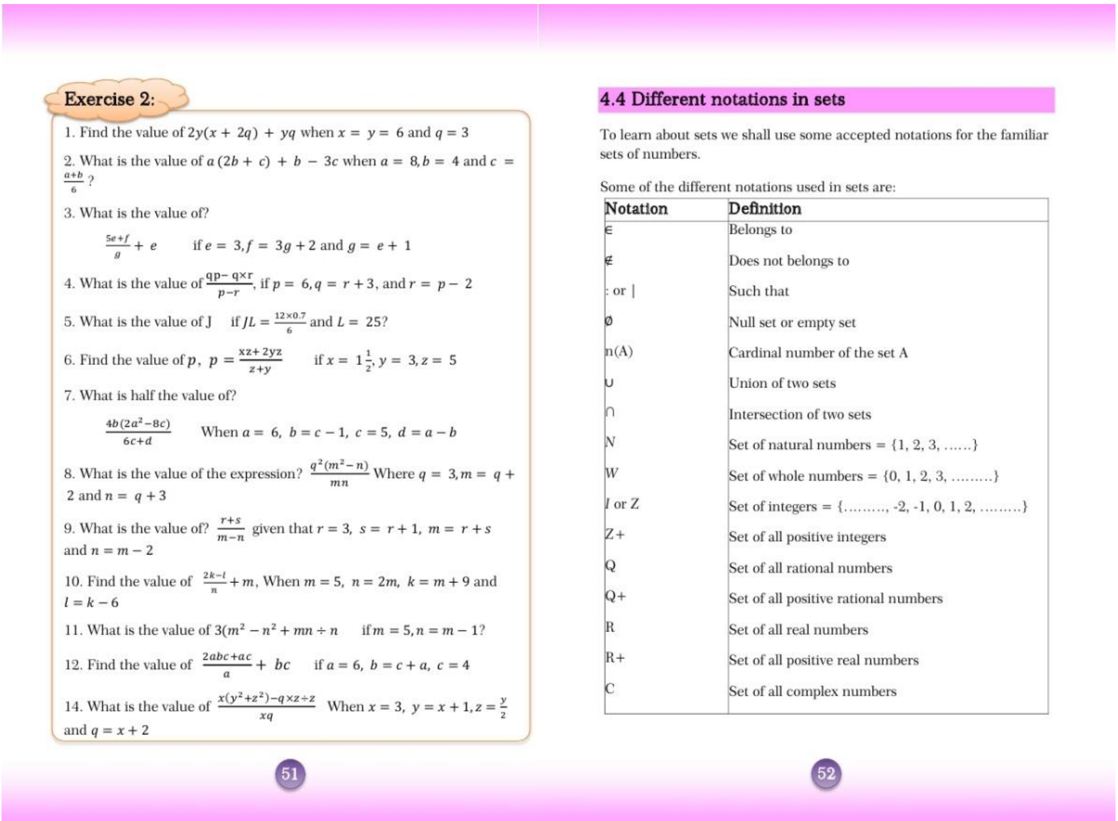

Exercise 2:

1. Find the value of $2y(x + 2q) + yq$ when $x = y = 6$ and $q = 3$

2. What is the value of $a(2b + c) + b - 3c$ when $a = 8, b = 4$ and $c = \frac{a+b}{6}$?

3. What is the value of?

$\frac{5e+f}{g} + e$ if $e = 3, f = 3g + 2$ and $g = e + 1$

4. What is the value of $\frac{qp - q \times r}{p-r}$, if $p = 6, q = r + 3$, and $r = p - 2$

5. What is the value of J if $JL = \frac{12 \times 0.7}{6}$ and $L = 25$?

6. Find the value of p, $p = \frac{xz + 2yz}{z+y}$ if $x = 1\frac{1}{2}, y = 3, z = 5$

7. What is half the value of?

$\frac{4b(2a^2-8c)}{6c+d}$ When $a = 6,\ b = c - 1,\ c = 5,\ d = a - b$

8. What is the value of the expression? $\frac{q^2(m^2-n)}{mn}$ Where $q = 3, m = q + 2$ and $n = q + 3$

9. What is the value of? $\frac{r+s}{m-n}$ given that $r = 3,\ s = r + 1,\ m = r + s$ and $n = m - 2$

10. Find the value of $\frac{2k-l}{n} + m$, When $m = 5,\ n = 2m,\ k = m + 9$ and $l = k - 6$

11. What is the value of $3(m^2 - n^2 + mn \div n$ if $m = 5, n = m - 1$?

12. Find the value of $\frac{2abc+ac}{a} + bc$ if $a = 6,\ b = c + a,\ c = 4$

14. What is the value of $\frac{x(y^2+z^2) - q \times z \div z}{xq}$ When $x = 3,\ y = x + 1, z = \frac{y}{2}$ and $q = x + 2$

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4.4 Different notations in sets

To learn about sets we shall use some accepted notations for the familiar sets of numbers.

Some of the different notations used in sets are:

Notation	Definition
∈	Belongs to
∉	Does not belongs to
: or |	Such that
∅	Null set or empty set
n(A)	Cardinal number of the set A
∪	Union of two sets
∩	Intersection of two sets
N	Set of natural numbers = {1, 2, 3, ……}
W	Set of whole numbers = {0, 1, 2, 3, ………}
I or Z	Set of integers = {………, -2, -1, 0, 1, 2, ………}
Z+	Set of all positive integers
Q	Set of all rational numbers
Q+	Set of all positive rational numbers
R	Set of all real numbers
R+	Set of all positive real numbers
C	Set of all complex numbers

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Some of the different notations used in sets are:

Notation	Definition
∈	Belongs to
∉	Does not belongs to
: or |	Such that
∅	Null set or empty set
n(A)	Number of elements in set A
∪	Union of two sets
∩	Intersection of two sets
ℕ	Set of natural numbers = {1, 2, 3, ……}

$\mathbb{Z}_0^+$	Set of whole numbers = {0, 1, 2, 3, ...}
$\mathbb{Z}$	Set of integers = {........., -2, -1, 0, 1, 2, ...}
$\mathbb{Z}^+$	Set of all positive integers=$\mathbb{N}$
$\mathbb{Q}$	Set of all rational numbers
$\mathbb{Q}^+$	Set of all positive rational numbers
$\mathbb{R}$	Set of all real numbers
$\mathbb{R}^+$	Set of all positive real numbers
$\mathbb{C}$	Set of all complex numbers

These are the different notations in sets generally required while solving various types of problems on sets.

Note:

i. The pair of curly braces { } denotes a set. The elements of set are written inside a pair of curly braces separated by commas.

ii. The set is always represented by a capital letter such as; A, B, C....

iii. If the elements of the sets are alphabets then these elements are written in small letters.

iv. The elements of a set may be written in any order.

v. The elements of a set must not be repeated.

vi. The Greek letter Epsilon '$\in$' is used for the words 'belongs to', 'is an element of', etc.

vii. Therefore, $x \in A$ will be read as 'x belongs to set A' or 'x is an element of the set A'.

viii. The symbol '$\notin$' stands for 'does not belongs to' also for 'is not an element of'.

Therefore, $x \notin A$ will read as 'x does not belongs to set A' or 'x is not an element of the set A'.

4.5 Equivalent Sets:

Two sets A and B are said to be equivalent if their cardinal number is same, i.e., n(A) = n(B). The symbol for denoting an equivalent set is '$\leftrightarrow$'.

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Example 7.

A = {1, 2, 3} Here n(A) = 3

B = {p, q, r} Here n(B) = 3

Therefore, $A \leftrightarrow B$

4.6 Equal sets

Two sets A and B are said to be equal if they contain the same elements. Every element of A is an element of B and every element of B is an element of A.

Example 8.

A = {p, q, r, s}

B = {p, s, r, q}

Therefore, A = B

Exercise 3:

Working in pairs, discuss which of the following pairs of sets are equivalent or equal.

(a) $A = \{x : x \in N, x \leq 6\}$

$B = \{x : x \in W, 1 \leq x \leq 6\}$

(b) P = {The set of letters in the word 'plane'}

Q = {The set of letters in the word 'plain'}

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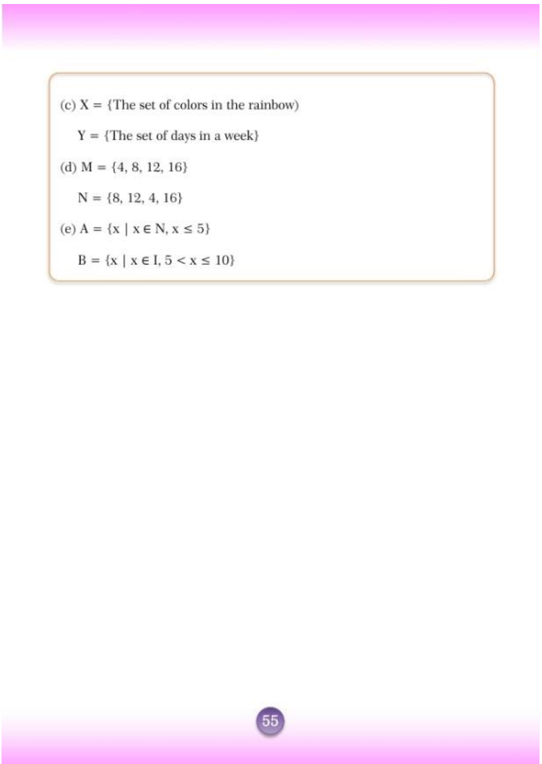
4.6 Equal sets


(c) X = {The set of colors in the rainbow}

Y = {The set of days in a week}

(d) M = {4, 8, 12, 16}

N = {8, 12, 4, 16}

(e) A = $\{x \mid x \in N, x \leq 5\}$

B = $\{x \mid x \in I, 5 < x \leq 10\}$

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Exercise 3

Guide learners to work individually for your assessment and evaluation.

Expected Answers

Equal sets (a), (d)

Equivalent sets (b), (c), (e)

4.7 Solving set problems using venn diagrams

One Venn diagram can help solve the problem faster and save time. This is especially true when more than two categories are involved in the problem.

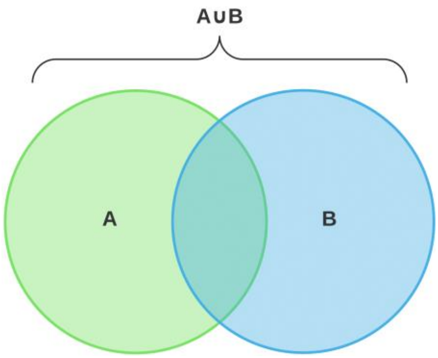
Use Example 9 to explain.

Venn diagrams and set theory

There are more than 30 symbols used in the set theory, but only a few learners need to know to understand the basics. Once they master these, feel free to move on to the more complicated stuff.

Union of two sets: ∪

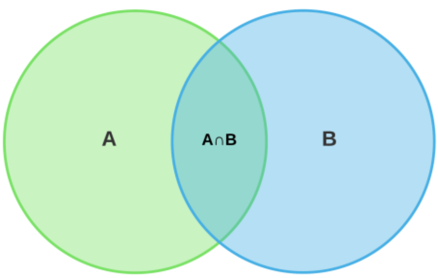
Each circle or ellipse represents a category. The union of two sets is represented by ∪. (Don't confuse this symbol with the letter “u.”) This is a two-circle Venn diagram. The green circle is A, and the blue circle is B. The complete Venn diagram represents the union of A and B, or A ∪ B. Feel free to click on the image to try this diagram as a template.



What would the union of two sets look like in the real world? Set A could represent a group of people who play the piano. Set B could represent guitar players. A ∪ B represents those who play piano, guitar, or both.

Intersection of two sets: ∩

In making a Venn diagram, we are often interested in the intersection of two sets—that is, what items are shared between categories. In this diagram, the teal area (where blue and green overlap) represents the intersection of A and B, or A ∩ B.



To continue the example, the intersection of piano and guitar players includes those who have mastered both instruments.

UNIT 5: STATISTICS

Learn about	Key inquiry questions
✍ Learners should revisit their understanding of data analysis, draw and comprehend frequency tables of grouped data, and learns how to compute the mean, mode and median of grouped data and investigate their use in daily life. ✍ Learners should know how to represent and draw conclusion of this data from grouped frequency tables using appropriate scales, and graphically represent the grouped frequency data in the form of bar graphs, pie charts and travel graphs. ✍ Learners should then be able to interpret information from these graphs and solve more problems involving arithmetic mean, mode and median and connect this with their knowledge and interpretation of statistical graphs. ✍ They should investigate the concept of probability (chance) and solve simple problems involving the simple events of success or failure concepts.	• Why do we represent data in a grouped frequency distribution table? • How would you investigate the idea of grouped data and their representation in a frequency distribution table? • How would you use arithmetic mean, mode and median? • How would we recognize mean, mode and median on statistical graphs? • Why do we need to represent scale statistical data in graphical form? • How would we explain simple probability and how do we use probabilities in our daily life?

<table>
<tr><th colspan="3">Learning outcomes</th></tr>
<tr><th>Knowledge and understanding</th><th>Skills</th><th>Attitudes</th></tr>
<tr><td>• Drawing frequency tables of grouped data.
• Mean, mode and median and the information they display.
• Drawing of statistical graphs to scale.
• Introduction to simple probability (chance).</td><td>• Construct frequency tables of grouped data.
• Make analysis of measures of central tendency.
• Be able to deduce conclusions on statistical tables.
• Perform simple statistical experiments on the chance of success or failure.
• Analyze and solve simple statistical problems.</td><td>• Enjoy drawing statistical graphs and interpreting data in a scientific way.
• Value the application of probability in daily life situations.
• Appreciate the uses of arithmetic mean, mode and median and the information they display.
• Confidence to investigate and to take responsibility for their own learning.</td></tr>
<tr><td colspan="3">Contribution to the competencies:
<u>Critical thinking</u>: solve statistical and probability problems and relate these problems to their daily life.
<u>Communication</u>: sharing their findings.
<u>Co-operation</u>: work in groups to analyze statistical information and graphs to draw conclusions.</td></tr>
<tr><td colspan="3">Links to other subjects:
Links to a range of subjects such as science and social studies where statistics is used.</td></tr>
</table>

In Primary 6, learners covered content on reading statistical graphs.

In the topic, learners were taken through recognizing and interpreting picture, line and circle graphs.

The learners were expected to read and interpret data from the given table and draw, recognize and interpret data inform of pictures, lines, bars and pie charts.

In this level the learners are supposed to be taken through group data and simple probability. The learners are supposed to understand mean, median and mode and the information they display.

They should also be able to represent and draw conclusions from grouped frequency tables.

UNIT 5: STATISTICS

5.1 Frequency Distribution

A frequency distribution is defined as an orderly arrangement of data classified according to the magnitude of the observations.

Frequency distribution helps us

1. To analyze the data.
2. To estimate the frequencies of the data.
3. To facilitate the preparation of various statistical measures.

Frequency and Frequency Tables

The **frequency** of a particular data value is the number of times the data value occurs.
A **frequency table** is constructed by arranging collected data values in ascending order of magnitude with their corresponding frequencies.

When the set of data values are spread out, it is difficult to set up a frequency table for every data value as there will be too many rows in the table. So we group the data into **class intervals** (or groups) to help us organize, interpret and analyze the data.

Each group starts at a data value that is a multiple of that group. For example, if the size of the group is 5, then the groups should start at 5, 10, 15, 20 etc.

Likewise, if the size of the group is 10, then the groups should start at 10, 20, 30, 40 etc.

The **frequency of a group** (or class interval) is the number of data values that fall in the range specified by that group (or class interval).

Example 1.

The number of calls from motorists per day for roadside service was recorded for the month of December 2016. The results were as follows:

28	122	217	130	120	86	80	90	120	140
70	40	145	187	113	90	68	174	194	170
100	75	104	97	75	123	100	82	109	120
81									

Set up a frequency table for this set of data values.

Solution:

To construct a frequency table, we proceed as follows:

Smallest data value = 28
Highest data value = 217
Difference = Highest value − Smallest value
= 217 − 28
= 189
Let the width of the class interval be 40.

$\therefore$ Number of class intervals $= \frac{189}{40} = 4.7 = 5$ (Round up to the next integer)

There are at least 5 class intervals. This is reasonable for the given data.

Step 1: Construct a table with three columns, and then write the data groups or class intervals in the first column.

The size of each group is 40. So, the groups will start at 0, 40, 80, 120, 160 and 200 to include all of the data.

Note that in fact we need 6 groups (1 more than we first thought).

Activities in groups or pairs

Guide learners to form groups or pairs to find answers to the following key inquiry questions:

- Review of data analysis
- How do you collect data?
- Why is it important to represent collected data in frequency table?
- How do we predict simple probability outcome in given events?

5.1 Frequency distribution

This is an orderly arrangement of data classified according to the magnitude of the observations.

Frequency: Number of times a data value occurs.

Class interval: A range between the lowest value and the highest value in a group.

Class interval	Tally	Frequency
0 - 39		
40 - 79		
80 - 119		
120 - 159		
160 - 199		
200 - 239		

Step 2: Go through the list of data values. For the first data value in the list, 28, place a tally mark against the group 0-39 in the second column.

For the second data value in the list, 122, place a tally mark against the group 120-159 in the second column. For the third data value in the list, 217, place a tally mark against the group 200-239 in the second column.

Class interval	Tally	Frequency
0 - 39	I	
40 - 79		
80 - 119		
120 - 159	I	
160 - 199		
200 - 239	I	

We continue this process until all of the data values in the set are tallied.

Step 3: Count the number of tally marks for each group and write it in the third column. The finished frequency table is as follows:

Class interval	Tally	Frequency
0 - 39	I	1
40 - 79	𝍸	5
80 - 119	𝍸 𝍸 II	12
120 - 159	𝍸 III	8
160 - 199	IIII	4
200 - 239	I	1
	Sum =	31

Exercise 1:

1. Construct the frequency distribution table for the data on heights (cm) of primary 7 pupils using the class intervals 130 - 135, 135 - 140 and so on.
   The heights in cm are: 140, 138, 133, 148, 160, 153, 131, 146, 134, 136, 149, 141, 155, 149, 165, 142, 144, 147, 138, 139.
2. Construct a frequency distribution table for the following weights (in gm) of 30 oranges using the equal class intervals, one of them is 40-45 (45 not included). The weights are: 31, 41, 46, 33, 44, 51, 56, 63, 71, 71, 62, 63, 54, 53, 51, 43, 36, 38, 54, 56, 66, 71, 74, 75, 46, 47, 59, 60, 61, 63.

Activity 1

Measure the heights of all the learners in the class and record the heights. Construct a frequency distribution table.

5.2 The mean

To calculate the mean, simply add all of your numbers together.

Next, divide the sum by however many numbers you added. The result is your *mean* or average score.

Example 2.

Let's say you have four test scores: 15, 18, 22, and 20.

To find the average, you would first add all four scores together, then divide the sum by four. The resulting mean is 18.75. Written out, it looks something like this:

$(15 + 18 + 22 + 20) / 4 = 75 / 4 = 18.75$

Exercise 1

1. Heights

GROUP	TALLY	FREQUENCY
130 - 134	III	3
135 – 139	IIII	4
140 – 144	IIII	4
145 – 149	~~IIII~~	5
150 – 154	I	1
155 – 159	I	1
160 - 164	I	1
165 - 169	I	1
	SUM	20

2. Weights

GROUP	TALLY	FREQUENCY
30 – 34	II	2
35 – 39	II	2
40 – 44	III	3
45 – 49	III	3
50 – 54	~~IIII~~	5
55 – 59	III	3

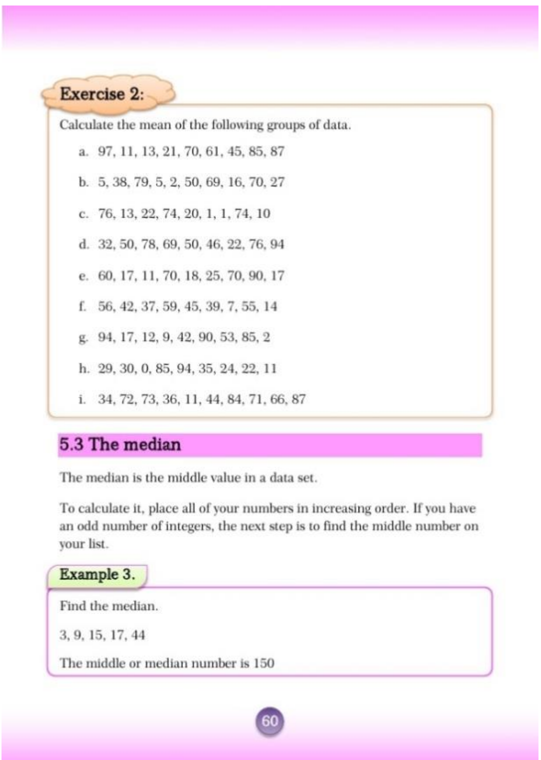
60 – 64	~~IIII~~ I	6
65 – 69	I	1
70 – 74	IIII	4
75 – 79	I	1
	SUM	30

Activity 1

Provide an instrument to measure the height of learners. Organize learners to measure each other's heights and record them down.

Guide learners on the steps of constructing a frequency distribution table.

5.2 The mean



Exercise 2:

Calculate the mean of the following groups of data.

a. 97, 11, 13, 21, 70, 61, 45, 85, 87

b. 5, 38, 79, 5, 2, 50, 69, 16, 70, 27

c. 76, 13, 22, 74, 20, 1, 1, 74, 10

d. 32, 50, 78, 69, 50, 46, 22, 76, 94

e. 60, 17, 11, 70, 18, 25, 70, 90, 17

f. 56, 42, 37, 59, 45, 39, 7, 55, 14

g. 94, 17, 12, 9, 42, 90, 53, 85, 2

h. 29, 30, 0, 85, 94, 35, 24, 22, 11

i. 34, 72, 73, 36, 11, 44, 84, 71, 66, 87

5.3 The median

The median is the middle value in a data set.

To calculate it, place all of your numbers in increasing order. If you have an odd number of integers, the next step is to find the middle number on your list.

Example 3.

Find the median.

3, 9, 15, 17, 44

The middle or median number is 150

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Mean refers to the average.

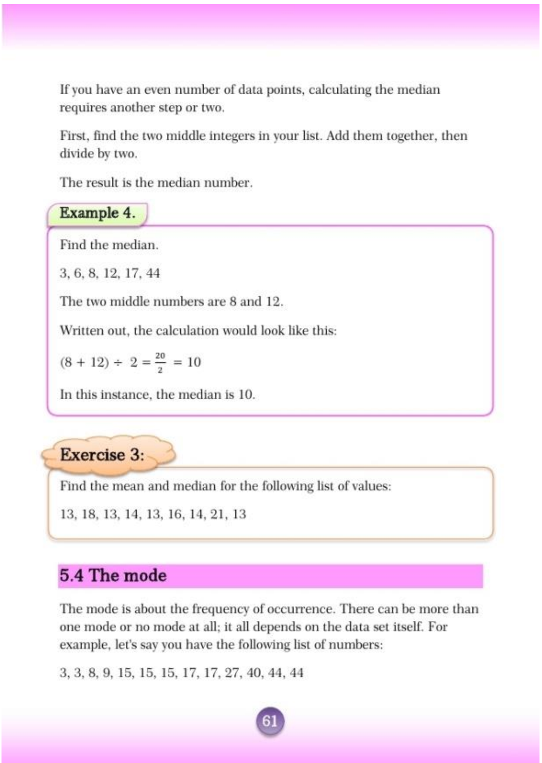
Mean = sum of all numbers/cumulative frequency

Exercise 2 Guide learners to work individually for your assessment.

Expected Answers

a. 54.44
b. 36.1
c. 32.33
d. 57.44
e. 42
f. 39.33
g. 44.67
h. 36.67
i. 57.8

5.3 The median


If you have an even number of data points, calculating the median requires another step or two.

First, find the two middle integers in your list. Add them together, then divide by two.

The result is the median number.

Example 4.

Find the median.

3, 6, 8, 12, 17, 44

The two middle numbers are 8 and 12.

Written out, the calculation would look like this:

$(8 + 12) \div 2 = \frac{20}{2} = 10$

In this instance, the median is 10.

Exercise 3:

Find the mean and median for the following list of values:

13, 18, 13, 14, 13, 16, 14, 21, 13

5.4 The mode

The mode is about the frequency of occurrence. There can be more than one mode or no mode at all; it all depends on the data set itself. For example, let's say you have the following list of numbers:

3, 3, 8, 9, 15, 15, 15, 17, 17, 27, 40, 44, 44

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This is the midmost value when a given data is arranged in ascending or descending order.

For a data with an even number of values, the median is the average of the two midmost values.

Exercise 3

Guide learners to work individually for your assessment and evaluation.

Expected Answers

Mean = 15

Median = 14

5.4 The mode

This is the most repeated figure in a given data distribution.

Exercise 4

Guide learners to work individually for your assessment and evaluation.

Expected Answers

1. 18
2. 6
3. 39
4. 28
5. 30
6. 24
7. 14
8. 30
9. 30
10. 18

In this case, the mode is 15 because it is the integer that appears most often. However, if there were one fewer 15 in your list, then you would have four modes: 3, 15, 17, and 44.

Exercise 4:

Calculate the Median for Each of the Sets of Numbers:

1.18, 38, 46, 7, 12, 43, 11

2. 23, 48, 6, 1, 3, 8, 1

3. 34, 50, 20, 44, 30, 49

4. 34, 26, 30, 18, 7, 30

5. 30, 7, 9, 36, 32, 44, 29

6. 1, 20, 27, 1, 24, 43, 33

7. 10, 3, 14, 14, 34, 19, 43

8. 38, 14, 37, 6, 26, 34

9. 36, 28, 43, 22, 26, 35, 30

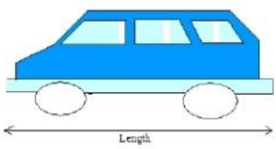
10. 25, 19, 17, 20, 7, 7

Activity 2

Using the data collected in activity 1, calculate the mean, median and mode.

5.5 Scale Drawings

Since it is not always possible to draw on paper the actual size of real-life objects such as the real size of a car, an airplane, we need scale drawings to represent the size like the one you see below of a van.



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Activity 2

Guide learners, to refer to the data they collected about height in activity 1 and use it to find mean, mode and median.

Expected Answers

The answers can be different from one school to another because of the population and difference in heights.

5.5 Scale drawing

Explain to learners the concept behind scale drawing by using example 5 on page 63 of the learner's book.

Exercise 5

1. 21 miles
2. Accurate reading × 100m
3. 13 cm
4. 360m
5. 750cm

In real-life, the length of this van may measure 240 inches. However, the length of a copy or print paper that you could use to draw this van is a little bit less than 12 inches

Since $\frac{240}{12} = 20$, you will need about 20 sheets of copy paper to draw the length of the actual size of the van

In order to use just one sheet, you could then use 1 inch on your drawing to represent 20 inches on the real-life object

You can write this situation as 1:20 or $\frac{1}{20}$ or 1 to 20

Example 5.

The length of a vehicle is drawn to scale. The scale of the drawing is 1:20

If the length of the drawing of the vehicle on paper is 12 inches, how long is the vehicle in real life?

Set up a proportion that will look like this:

$$\frac{\text{Length of drawing}}{\text{Real Length}} = \frac{1}{20}$$

Do a cross product by multiplying the numerator of one fraction by the denominator of the other fraction

Length of drawing × 20 = Real length × 1

Since length of drawing = 12, we get:

$$12 \times 20 = \textit{Real length} \times 1$$
$$240 \textit{ inches} = \textit{Real length}$$

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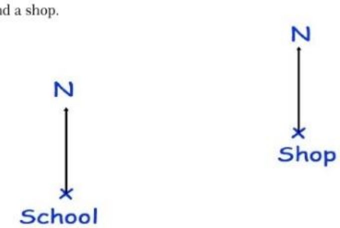
Exercise 5:

1. A map has a scale of 1cm: 3 miles. On the map, the distance between two towns is 7cm. What is the actual distance between the two towns
2. The diagram shows part of a map. It shows the position of a school and a shop.



The scale of the map is 1cm = 100 metres.

Work out the real distance between the school and the shop. Give your answer in metres.

3. A map has a scale of 1cm: 4 kilometres. The actual distance between two cities is 52 kilometres. What is the distance between the cities on the map?
4. A map has a scale of 1:4000. On the map, the distance between two houses is 9cm. What is the actual distance between the houses? Give your answer in metres.
5. A scale drawing has a scale of 1:20. In real life the length of a boat is 150m. What is the length of the boat on the scale drawing? Give your answer in centimetres.

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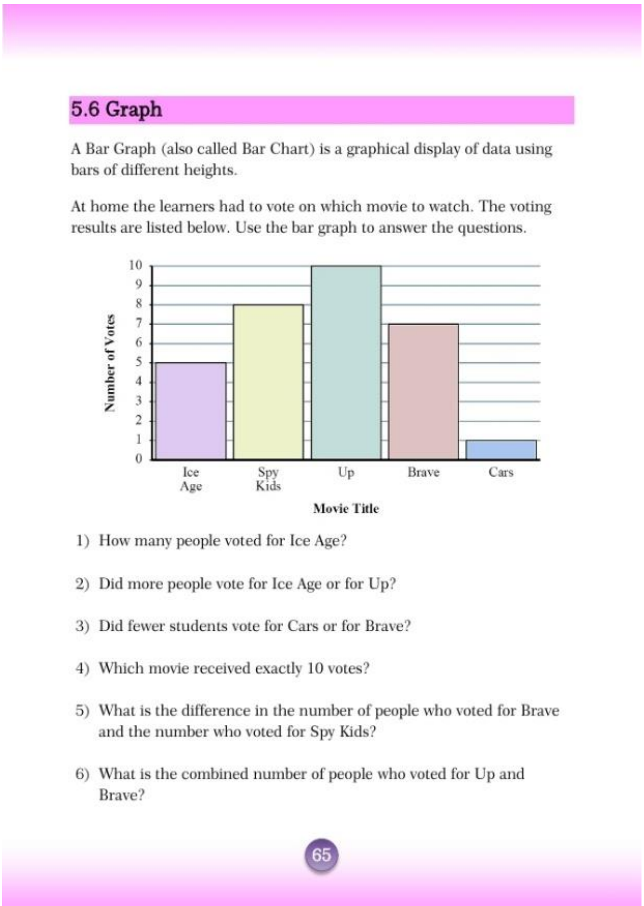
5.6 Graph

Explain to learners on how graphs help us interprate data and help us make decisions.

Give examples like when the government is planning for the country, hospitals and many more.

Guide learners to use data in the graph to answer the questions on page 62 of the pupil's book.



5.6 Graph

A Bar Graph (also called Bar Chart) is a graphical display of data using bars of different heights.

At home the learners had to vote on which movie to watch. The voting results are listed below. Use the bar graph to answer the questions.

1) How many people voted for Ice Age?
2) Did more people vote for Ice Age or for Up?
3) Did fewer students vote for Cars or for Brave?
4) Which movie received exactly 10 votes?
5) What is the difference in the number of people who voted for Brave and the number who voted for Spy Kids?
6) What is the combined number of people who voted for Up and Brave?

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Expected answers

1. 5

2. More learners voted for up than ice age.

3. Fewer voted for cars.

5. $8 - 7 = 1$

6. $10 + 7 = 17$

5.7 Probability

Probability refers to the chance of an event occurring.

Probability = <u>chance</u>
Number of possible outcomes

On probability, provide coins and dies for learners to use in telling probability.

5.7 Probability

The probability of an event is a number describing the chance that the event will happen.

An event that is certain to happen has a probability of 1.

An event that cannot possibly happen has a probability of zero.

If there is a chance that an event will happen, then its probability is between zero and 1.

Examples of Events:

- Tossing a coin and it landing on *heads*.
- Tossing a coin and it landing on *tails*.
- Rolling a '3' on a die.
- Rolling a number > 4 on a die.
- It rains two days in a row.
- Drawing a card from the suit of clubs.
- Guessing a certain number between 000 and 999 (lottery).

Events that are certain:

- If it is Thursday, the probability that tomorrow is Friday is certain, therefore the probability is 1.
- If you are sixteen, the probability of you turning seventeen on your next birthday is 1. This is a certain event.

Events that are uncertain:

- The probability that tomorrow is Friday if today is Monday is 0.
- The probability that you will be seventeen on your next birthday, if you were just born is 0.

Let's take a closer look at tossing the coin. When you toss a coin, there are two possible outcomes, "heads" or "tails."

Examples of outcomes:

- When rolling a die for a board game, the outcomes possible are 1, 2, 3, 4, 5, and 6.
- The outcomes when choosing the days of a week are Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, and Saturday.

Activity 2

In groups, collect different marbles or any available safe materials to do the activity.

Materials: Sack; marbles of two different colors - 100 of one color (blue), 25 of another color (green).

Procedure:

Put all the marbles in the sack.

We will try to find out - without looking in the sack and counting whether there are more blue marbles or more green marbles in the sack.

Have four students draw five marbles each from the sack. (Make sure that the marbles are put back into the sack after each draw.)

Have every student record the numbers and colors of marbles for each of the four draws.

Questions

1. On the basis of the first four draws how many marbles of each color are there in the sack?

   Let each student in the rest of the class draw five marbles each from the sack. (Be sure to put the marbles back in the sack after each drawing.)

2. What are the totals for each color of marble?

3. Do you think there were more marbles of one color than the other? Why?

4. If so, what do you think the ratio of one color to the other might be? G. Open the sack and count the number of marbles of each color.

5. What is the ratio of one color to the other color?

UNIT 6: BUSINESS ACCOUNTING

Learn about	Key inquiry questions
✍ Learners should use their prior knowledge and understanding of business transactions to develop business terminologies in transactions and demonstrate how to estimate, measure and calculate. ✍ Learners should work in groups to plan an enterprise in their own locality and list the operations that they will need to carry out. ✍ Learners should draw up a business plan and calculate probable profits and losses.	• How do we explain the various terms such as discount, simple interest, commission, hire purchase and bills in business transactions? • How would we estimate, measure and calculate discount, simple interest, commission, hire-purchase and carry out the process of writing a bill?

Learning outcomes

Knowledge and understanding	Skills	Attitudes
• How to calculate profit, loss and percentage interest.	• Solve problems about discount, simple interest, commission, hire purchase and writing bills.	• Develop curiosity in business activities.

Contribution to the competencies:

<u>Critical thinking</u>: about a business plan.
<u>Communication</u>: explaining their plan to others.
<u>Co-operation</u>: discussions and team work.

Links to other subjects:

Life Skills: Enterprise.

Activities in groups or pairs

Guide learners to form groups or pairs visit a business enterprise and list the operations that take place there.

Plan and visit an enterprise or shop in the locality and list the operations that they will carry out.

Guide learners to solve problems involving profit and loss by explaining to learners using examples provided in the pupils book.

6.1 Profit and loss

Buying price: The amount at which a business person gets goods.

Selling price: The amount at which a business person sells goods.

UNIT 6: BUSINESS ACCOUNTING

6.1 profit and loss

When a trader sells an item at a higher cost than the initial buying price, the difference between the **buying price** and **selling price**, is termed as a **profit**.

At times a trader may sell an item at a lower price as compared to the initial buying price, the difference between the **selling price** and the **buying price** is termed as a **loss**.

Example 1.

1.A seller bought a bag of rice at 7000 South Sudanese Pounds and later sold it at 100000 South Sudanese Pounds. What profit did he make?

Buying price = 7000 South Sudanese Pounds.

Selling price = 100000 South Sudanese Pounds.

Profit = selling price – buying price.

= 100000 – 70000

= 30000 South Sudanese Pounds.

2. A seller bought a bag of maize at 10000 South Sudanese Pounds and later sold it at 8000 South Sudanese Pounds. What loss did he make?

Buying price =10000 South Sudanese Pounds.
Selling price = 8000 South Sudanese Pounds.
Loss = buying price – selling price.
= 10000 – 8000

= 2000 South Sudanese Pounds.

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Activity 1.

Work in groups.

a) A seller bought a bag of potatoes at 1500 South Sudanese Pounds and later sold it at 800 South Sudanese Pounds. What loss did he make?

b) A boy bought a shirt at 600 South Sudanese Pounds and later sold it to his friend at 900 South Sudanese Pounds. What profit did he make?

c) A seller bought a bag of potatoes at 20000 South Sudanese Pounds and later sold it and made a profit of 5000 South Sudanese Pounds, how much did he sell the bag?

d) A seller bought a bag of maize at 3000 South Sudanese Pounds and made a loss of 600 South Sudanese Pounds, what was the selling price?

Exercise 1:

1. Copy the table and find the missing values in the table below.

Buying price in SSP	Selling price in SSP	Profit in SSP	Loss in SSP
500		30	
	300		20
600	400		
	200	50	
300			70
100	150		
	500	80	

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Profit: The money obtained when the selling price of an item is higher than its buying price.

$$Profit = Selling\ price - Buying\ price$$

Loss: The money lost when the selling price of an item is lower than the buying price.

$$Loss = Buying\ price - Selling\ price$$

Activity 1

Guide learners to form groups and allow them to discuss and work out the questions under your supervision

a. SSP. 700
b. SSP. 300
c. SSP. 25000
d. SSP 240

Exercise 1

Guide learners to work individually for your assessment and evaluation.
Expected Answers

1.

BP (SSP)	SP (SSP)	PROFIT (SSP)	LOSS (SSP)
500	530	30	-
320	300	-	20
600	400	-	200
150	200	50	-
300	230	-	70
100	150	50	-
420	500	80	-

2. SSP. 200
3. SSP. 20

4. SSP. 70

6.2 Discounts

Discount is the amount of money reduced from the market (marked) price of a commodity so as to attract customers to buy it.

Discount = marked price – selling price.

2. Kuol bought a bike at 500 South Sudanese Pounds and later sold it at 300 South Sudanese Pounds, how much loss did he make?

3. A seller bought vegetables at 50 South Sudanese Pounds and later sold them at 70 South Sudanese Pounds, did he get a profit or a loss and of how much?

4. A girl bought a dress at 120 South Sudanese Pounds and on getting home it was not her size so she sold it to her friend at a loss of 50 South Sudanese Pounds, how much did she sell the dress?

6.2 Discount

At times traders reduce prices of their goods in order to attract more customers. This reduction is what is referred to as **discount.**

Example 2.

The marked price of a trouser is 1000 South Sudanese Pounds. After bargaining David bought it at 800 South Sudanese Pounds. What discount was he allowed for the trouser?

Marked price = 1000 South Sudanese Pounds

Selling price = 800 South Sudanese Pounds

Discount = marked price – selling price

= 1000 - 800

= 200 South Sudanese Pounds

Note: The difference between **marked price** and **selling price** is the **discount**.

Activity 2.

Work in groups or pairs.

a) Faheem bought a pair of shoe at 250 South Sudanese Pounds after a discount of 20 South Sudanese Pounds, what was the marked price of the shoe?

b) The marked price of a bicycle is 500 South Sudanese Pounds, David bought the bicycle for 350 South Sudanese Pounds, and how much was the discount?

c) Samuel bought 14 sweets at 60 South Sudanese Pounds, if the marked price of each sweet is 5 South Sudanese Pounds, how much discount was he given?

d) The marked price of a bag of maize is 300 South Sudanese Pounds, Faith bought 20 bags at 5800 South Sudanese Pounds. how much discount was she given per bag?

Exercise 2:

1. Copy the table and fill in the missing amounts.

Marked price in SSP	Selling price in SSP	Discount in SSP
a. 200		50
b.	500	20
c. 400	300	
d. 600		100
e.	300	30
f. 250		25

Activity 2

Guide learners to form groups and attempt the activity.

Expected Answers

a. SSP 270

b. SSP. 150

c. SSP. 10

d. SSP. 10

Exercise 2

Guide learners to work individually for your assessment and evaluation.

Expected Answers

1.

Marked price	**Selling price**	**Discount**
200	150	50
520	500	20
400	300	100
600	500	100
330	300	30
250	175	25

2. SSP. 1300
3. SSP. 200
4. SSP. 650

6.3 Simple interest

Money earned by loans calculated as a one off.

$$\text{Simple interest} = \frac{\text{principal x rate x time}}{100}$$

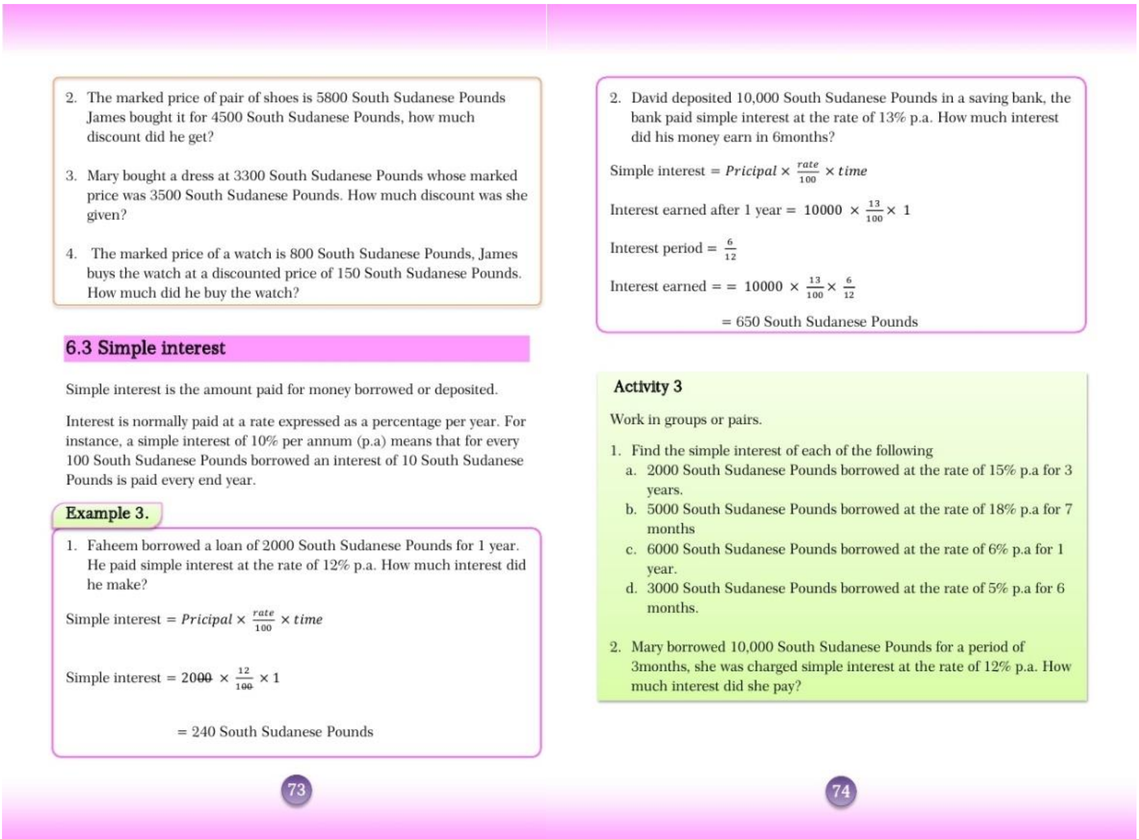
$$S.I = \frac{PRT}{100}$$

Amount = Principal + Simple Interest

Activity 3

1. SSP. 900
2. SSP. 6300
3. SSP. 360
4. SSP. 900

5. SSP. 300



2. The marked price of pair of shoes is 5800 South Sudanese Pounds James bought it for 4500 South Sudanese Pounds, how much discount did he get?

3. Mary bought a dress at 3300 South Sudanese Pounds whose marked price was 3500 South Sudanese Pounds. How much discount was she given?

4. The marked price of a watch is 800 South Sudanese Pounds, James buys the watch at a discounted price of 150 South Sudanese Pounds. How much did he buy the watch?

6.3 Simple interest

Simple interest is the amount paid for money borrowed or deposited.

Interest is normally paid at a rate expressed as a percentage per year. For instance, a simple interest of 10% per annum (p.a) means that for every 100 South Sudanese Pounds borrowed an interest of 10 South Sudanese Pounds is paid every end year.

Example 3.

1. Faheem borrowed a loan of 2000 South Sudanese Pounds for 1 year. He paid simple interest at the rate of 12% p.a. How much interest did he make?

Simple interest $= Pricipal \times \frac{rate}{100} \times time$

Simple interest $= 20\cancel{00} \times \frac{12}{1\cancel{00}} \times 1$

$= 240$ South Sudanese Pounds

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2. David deposited 10,000 South Sudanese Pounds in a saving bank, the bank paid simple interest at the rate of 13% p.a. How much interest did his money earn in 6months?

Simple interest $= Pricipal \times \frac{rate}{100} \times time$

Interest earned after 1 year $= 10000 \times \frac{13}{100} \times 1$

Interest period $= \frac{6}{12}$

Interest earned $= = 10000 \times \frac{13}{100} \times \frac{6}{12}$

$= 650$ South Sudanese Pounds

Activity 3

Work in groups or pairs.

1. Find the simple interest of each of the following
   a. 2000 South Sudanese Pounds borrowed at the rate of 15% p.a for 3 years.
   b. 5000 South Sudanese Pounds borrowed at the rate of 18% p.a for 7 months
   c. 6000 South Sudanese Pounds borrowed at the rate of 6% p.a for 1 year.
   d. 3000 South Sudanese Pounds borrowed at the rate of 5% p.a for 6 months.

2. Mary borrowed 10,000 South Sudanese Pounds for a period of 3months, she was charged simple interest at the rate of 12% p.a. How much interest did she pay?

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Activity 4

1. SSP 27200
2. SSP. 32250
3. SSP. 57000

Exercise 3

Guide learners to work individually for your assessment and evaluation.

Expected Answers

1. Table

S.I	AMOUNT
1250	21250
14000	64000
720	12720
8000	168000
5250	40250
6760	58760
1050	16050

2. SSP28800; 148800.
3. SSP280000; SSP 780000.
4. SSP54000; SSP 204000.

Example 4.

David borrowed 2000 South Sudanese Pounds in a financial institution that charged 18% p.a. He repaid the loan in 4 months, how much did he pay in total?

Simple interest = principal x rate x time

Simple interest $= Pricipal \times \frac{rate}{100} \times time$

$= 2000\ X\ 18/100\ X\ 4/12$

= 120 South Sudanese Pounds

Amount paid = 2000 + 120

= 2120 South Sudanese Pounds

Activity 4

Work in groups;

1. Leyla deposited 20000 South Sudanese Pounds in a savings account that acquired 12% interest per annum. Calculate the amount of money Leyla had at the end of 3years
2. David borrowed 30000 South Sudanese Pounds from a financial institution whose simple interest rate is 15%. He repaid the loan at the end of 6 months, how much did he pay in total?
3. Mary borrowed 50000 South Sudanese Pounds in a financial institution, whose simple interest is 14% p.a. She repaid the loan at the end of a year, how much did she pay in total?

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Exercise 3:

1. Copy and fill in the missing amounts:

Principal in South Sudanese Pounds	Rate p.a	Time	Simple Interest	Amount
20000	15%	5 months		
50000	14%	2 years		
12000	12%	6 months		
160000	15%	4 months		
35000	5%	3 years		
52000	13%	1 year		
15000	12%	7 months		

2. Samantha borrowed a loan of 120000 South Sudanese Pounds and paid in a period of 2 years at a simple interest rate of 12%.
   a. How much interest did she pay?
   b. How much money did she pay in total?
3. Sam deposited 500000 South Sudanese Pounds in a savings account that acquired simple interest at the rate of 14%, how much did he have in his account at the end of 4years?
4. Mary borrowed 150000South Sudanese Pounds from bank whose simple interest rate is 12%. She paid the loan in a period of 3years.
   a. How much interest did she pay?
   b. How much did she pay in total?

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6.4 Commissions

Commission: Money given to a sales person by an employer after sale of goods.

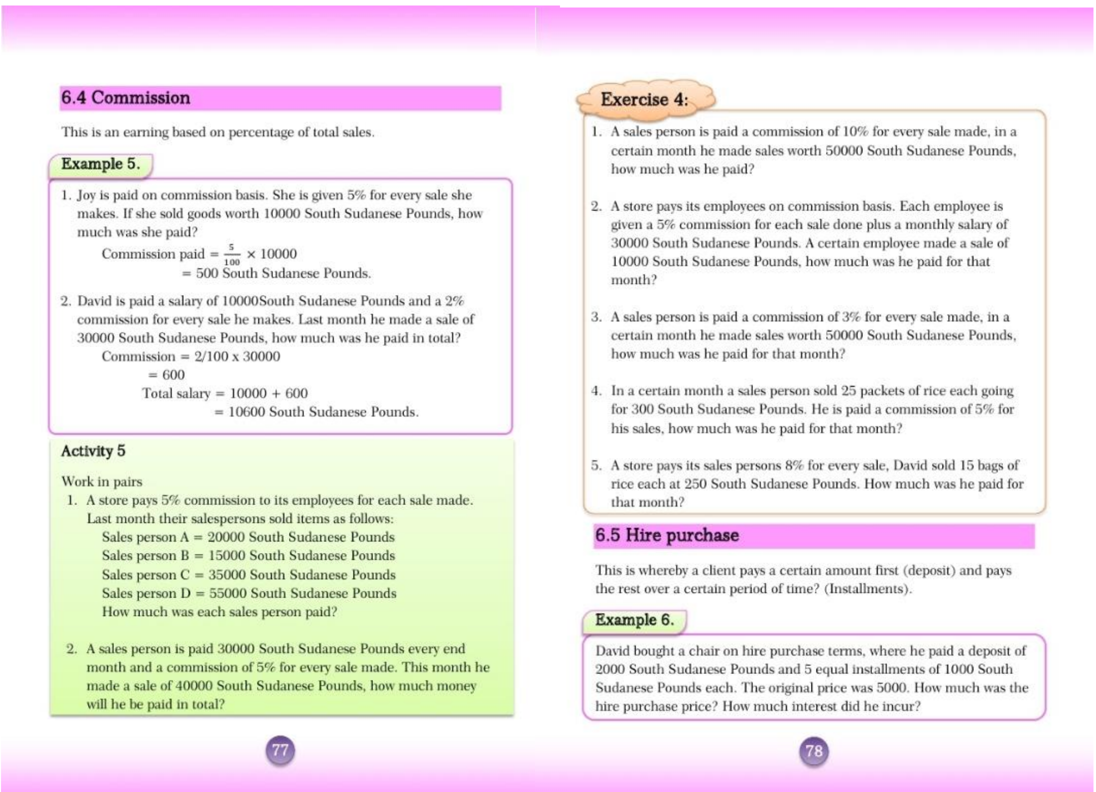
Commission is meant to encourage the sales person to work harder in sales of goods or services.

Commission is always calculated as a percentage of the gross sales.

$$Commission\ amount\ = percentage\ commission \times gross\ sales$$

Activity 5

1. Sales Person A = SSP. 1000; Sales Person B = SSP. 750;
   Sales Person C = SSP. 1750; Sales Person D = SSP. 2750
2. SSP. 32000.



6.4 Commission

This is an earning based on percentage of total sales.

Example 5.

1. Joy is paid on commission basis. She is given 5% for every sale she makes. If she sold goods worth 10000 South Sudanese Pounds, how much was she paid?
   Commission paid = $\frac{5}{100} \times 10000$
   = 500 South Sudanese Pounds.

2. David is paid a salary of 10000South Sudanese Pounds and a 2% commission for every sale he makes. Last month he made a sale of 30000 South Sudanese Pounds, how much was he paid in total?
   Commission = 2/100 x 30000
   = 600
   Total salary = 10000 + 600
   = 10600 South Sudanese Pounds.

Activity 5

Work in pairs

1. A store pays 5% commission to its employees for each sale made. Last month their salespersons sold items as follows:
   Sales person A = 20000 South Sudanese Pounds
   Sales person B = 15000 South Sudanese Pounds
   Sales person C = 35000 South Sudanese Pounds
   Sales person D = 55000 South Sudanese Pounds
   How much was each sales person paid?

2. A sales person is paid 30000 South Sudanese Pounds every end month and a commission of 5% for every sale made. This month he made a sale of 40000 South Sudanese Pounds, how much money will he be paid in total?

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Exercise 4:

1. A sales person is paid a commission of 10% for every sale made, in a certain month he made sales worth 50000 South Sudanese Pounds, how much was he paid?
2. A store pays its employees on commission basis. Each employee is given a 5% commission for each sale done plus a monthly salary of 30000 South Sudanese Pounds. A certain employee made a sale of 10000 South Sudanese Pounds, how much was he paid for that month?
3. A sales person is paid a commission of 3% for every sale made, in a certain month he made sales worth 50000 South Sudanese Pounds, how much was he paid for that month?
4. In a certain month a sales person sold 25 packets of rice each going for 300 South Sudanese Pounds. He is paid a commission of 5% for his sales, how much was he paid for that month?
5. A store pays its sales persons 8% for every sale, David sold 15 bags of rice each at 250 South Sudanese Pounds. How much was he paid for that month?

6.5 Hire purchase

This is whereby a client pays a certain amount first (deposit) and pays the rest over a certain period of time? (Installments).

Example 6.

David bought a chair on hire purchase terms, where he paid a deposit of 2000 South Sudanese Pounds and 5 equal installments of 1000 South Sudanese Pounds each. The original price was 5000. How much was the hire purchase price? How much interest did he incur?

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Exercise 4

Guide learners to work individually for your assessment and evaluation.

Expected Answers

1. SSP. 5000
2. SSP. 30500
3. SSP. 1500
4. SSP. 375
5. SSP. 300

6.5 Hire purchase

Hire purchase: this is buying an item by paying for it for longer and in bits. (deposit and instalments)

$$Hire\ purchase\ price = Deposit + Instalments$$

Solution

Hire purchase price = deposit + installments

= 2000 + (5 × 1000)

= 2000 + 5000

= 7000 South Sudanese Pounds

Interest = total amount paid – original price

= 7000 – 2000

= 5000 South Sudanese Pounds.

Activity 6

Work in groups

1. Mary bought a bed at a hire purchase price, the price of the bed was 2000 South Sudanese Pounds or a deposit of 800 South Sudanese Pounds and 4 equal installments of 400 South Sudanese Pounds.
   a) What is the hire purchase price of the bed?
   b) How much interest did she pay?

2. The cash price of a dining set is 5000 South Sudanese Pounds or a deposit of 1500 South Sudanese Pounds and 4 equal monthly installments of 1000 South Sudanese Pounds. Amin opted to buy with the hire purchase price. How much more did he pay?

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Exercise 5:

1. David bought a phone on hire purchase basis, where he paid a deposit of 20000 South Sudanese Pounds and 5 equal installments of 5000 South Sudanese Pounds each. The cash price of the phone was 30000 South Sudanese Pounds.
   a) What was the hire purchase price?
   b) How much more did he pay?

2. Malusi bought a radio at a hire purchase price, where he paid a deposit of 30000 South Sudanese Pounds and 4 equal monthly installments of 5000 South Sudanese Pounds. The cash price of the radio was 80000 South Sudanese Pounds.
   a) How much Interest did he pay?
   b) What was the hire purchase price?

3. The marked price of a TV set is 120000 South Sudanese Pounds. Asim bought at a hire purchase price, which had no deposit, he paid 7 equal monthly installments of 20000 South Sudanese Pounds. How much more did he pay for it?

4. Rita bought a microwave whose marked price was 15000 South Sudanese Pounds, she paid a 10% deposit and 6 equal monthly installments of 4000 South Sudanese Pounds.
   a) How much did she pay for the microwave?
   b) How much would she have saved if she bought cash?

6.5 Bills

This is a printed or written statement of the money owed for goods to be bought or services offered.

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Activity 6

1. SSP. 2400; SSP. 400
2. SSP. 5500

Exercise 5

Guide learners to work individually for your assessment and evaluation.

Expected Answers

1. SSP. 45000; SSP. 15000
2. (change cash price to 30000) Interest = SSP 20000; SSP. 50000
3. SSP. 20000;
4. SSP. 25500; SSP. 10500

6.6 Bills

Example 5.

Grace bought the following items from a supermarket: 2 packets of rice @ 200 South Sudanese Pounds, 2 packets of flour at 500 South Sudanese Pounds, a loaf of bread @ 50 South Sudanese Pounds and a liter of oil @ 300 South Sudanese Pounds. Prepare a bill for the items.

	ITEM	SOUTH SUDANESE POUNDS
1.	2 packets of rice	2000
2.	2 packets of flour	5000
3.	A loaf of bread	500
4.	A liter of cooking oil	3000
	Total	**10500**

Total to be paid is SSP10,500

Activity 7

Work in groups and present your calculations.

1. David bought the following items: A radio @ 50000 South Sudanese Pounds, a TV set @ 80000 South Sudanese Pounds, a fridge @ 120000 South Sudanese Pounds, a phone @ 30000 South Sudanese Pounds and a sofa set @ 150000 South Sudanese Pounds. Prepare a bill for the items.
2. Mary bought the following items from the market: tomatoes @ 70 South Sudanese Pounds, onions @ 50 South Sudanese Pounds, carrots @ 100 South Sudanese Pounds and potatoes @ 200 South Sudanese Pounds. She paid 500 South Sudanese Pounds.
   a) Prepare a bill for the items
   b) How much change was she given?

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Exercise 6:

1. A student bought the following items: A pencil @ 30 South Sudanese Pounds, a text book @ 200 South Sudanese Pounds, an exercise book @ 50 South Sudanese Pounds, a rubber @ 10 South Sudanese Pounds and a ruler @ 15 South Sudanese Pounds.
   a) Prepare a bill for the student.
   b) If the student paid with 500 South Sudanese Pounds, how much change was she given?
2. Grace bought the following items: a pair of shoes @ 350South Sudanese Pounds, a dress @ 150 South Sudanese Pounds, sunglasses @ 200 South Sudanese Pounds and a bracelet @ 60 South Sudanese Pounds. Prepare a bill for her.
3. Amin bought the following items: a set of plates @ 300 South Sudanese Pounds, a set of cups @ 250 South Sudanese Pounds, a set of spoons @ 150 South Sudanese Pounds and 5 table mats @ 100 South Sudanese Pounds.
   a) Prepare a bill for Amin
   b) If he paid 1000 South Sudanese Pounds how much was he to add to clear the bill?

Activity 8

With the guidance of the teacher, visit a nearby shop or hotel and request the shop or hotel owner to explain how they prepare bills.

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Activity 7

Question. 1

	ITEM	COST (SSP)
1	Radio	50000
2	TV Set	80000
3	Fridge	30000
4	Sofa Set	150000
TOTAL TO BE PAID IS SSP. 310000		

Question. 2

	ITEM	COST (SSP)
1	Tomatoes	70
2	Onions	50
3	Carrots	100
4	Potatoes	200
TOTAL TO BE PAID IS SSP. 420		

Change given = SSP80

Exercise 6

Guide learners to work individually for your assessment and evaluation.

Expected Answers

Question 1

	ITEM	COST (SSP)
	Pencil	30
	Text book	200
	Exercise book	50
	Rubber	10
	Ruler	15
	TOTAL	305
TOTAL TO BE PAID IS 305		

CHANGE ISSUED = SSP. 195

Question 2

	ITEM	COST (SSP)
1	Pair of shoes	350
2	Dress	150
3	Sun glasses	200
4	Bracelets	60
	TOTAL	760
		TOTAL TO BE PAID IS SSP. 760

Question 3

	ITEM	COST (SSP)
	Set of plates	300
	Set of cups	250
	Set of spoons	150
	5 table mats	500
	TOTAL	1200
		TOTAL TO BE PAID IS 1200

BALANCE TO PAY = SSP. 200

Activity 8

Do a pre-visit to the shop or hotel and request for permission for the learners to visit and inquire. Brief the owner on the inquiry question that they may expect from learners.