South Sudan

PRIMARY
8

Mathematics

Teacher's Guide 8

Funded by:

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THIS BOOK IS NOT FOR SALE

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

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INTRODUCTION

This Teacher Guide must be used in conjunction with the Primary eight learner's book

The guide provides you with guidelines and directions to help you plan and develop teaching and learning activities for the achievement of the learning outcomes.

Components of the book

This is a primary eight 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 8 Mathematics	
Unit	Title
1	Numbers: complex problems
2	Measurement: Volumes of solids
3	Geometry: co-ordinate geometry
4	Algebra: Algebraic expressions and sets
5	Statistics: Group data and probability (2)
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.

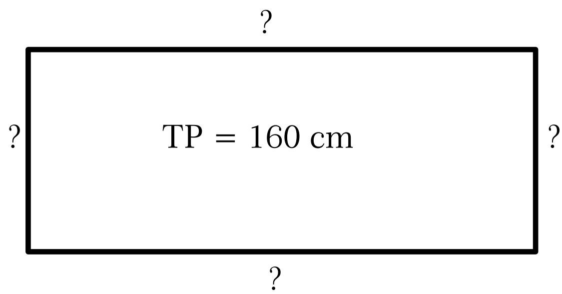
To make the learning explicit, it is important that you create a summary of what has been learnt from solving the problem.

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 $\boldsymbol{50\,cm \times 2 + 30\,cm\ \ 2}$.

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.

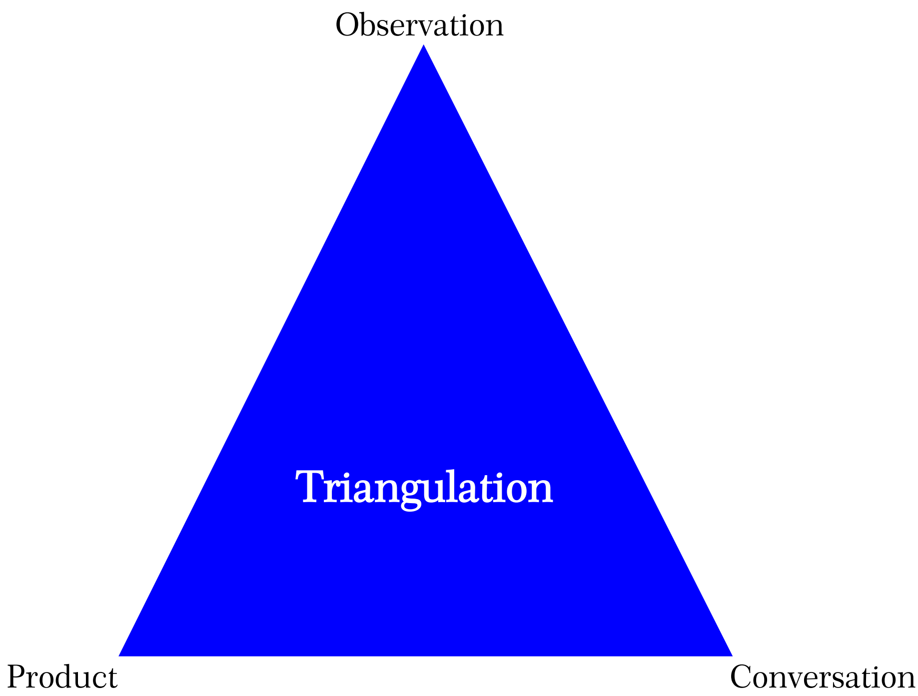
You are advised to set additional exercises depending on the pupil's learning abilities.

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 revisit learning about numbers and investigate through calculations using multiples and factors of numbers, and fractions and decimals; and apply these to solve increasingly complex problems. ✍ They should determine the square roots of mixed numbers that involve perfect numbers and use this knowledge and understanding to compute the square roots of decimals and distinguish between terminal and recurring decimals, and solve more complex problems. ✍ By revisiting their previous knowledge and understanding of fractions, decimals and percentages in groups or pairs, learners should investigate complex problems involving expressions of fractions and decimals into percentages and vice versa.	• How can we determine multiples and factors of fractions and decimals? • How would we extract the square roots of mixed numbers that incorporate perfect numbers? • How would you determine the square roots of perfect decimals and recurring decimals? • Why do we express fractions and decimals into percentages and vice versa? • How can we relate the conversion of fractions and decimals into percentages in our real life situation?

<table>
<tr><td colspan="3">Learning outcomes</td></tr>
<tr><td>Knowledge and understanding</td><td>Skills</td><td>Attitudes</td></tr>
<tr><td>• Multiples and factors of higher numbers as well as multiples and factors of numbers expressed in fraction and decimal forms
• Finding square roots of mixed numbers, and perfect squares
• Differences between terminal and recurring decimals
• Square roots of decimals
• Relationships between fractions, decimals and percentage</td><td>• Explain the concepts of multiple and factors of numbers including fractions and decimals
• Compute the square roots of mixed numbers involving perfect squares
• Distinguish terminal and recurring decimals
• Evaluate the square roots of fractions and decimals
• Apply fractions and decimals as percentages and vice versa</td><td>• Appreciate working out multiples and factors of numbers including fractions and decimals
• Enjoy the extraction of the square roots of mixed numbers
• Appreciate the beauty and strength in the interrelationships between percentages, fractions and decimals
• Challenge learners to explore and investigate and to take responsibility for their own learning.</td></tr>
<tr><td colspan="3">Contribution to the competencies:
<u>Creative thinking</u>: through concrete computations
<u>Communication and Co-operation</u>: work in pairs and groups in concrete computations in the subject</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>

Activities in groups or pairs

- Investigate complex problems involving expressions of fractions and decimals
- Solving problems on determining multiples and factors
- Extract the square roots of mixed numbers that incorporate perfect numbers.
- Determine the square roots of perfect decimals and recurring decimals.
- Relate conversion of fractions and decimals into percentages into real life situations.

1.1 Factors and multiples

Use example 1 and 2 to explain multiples to learners.

UNIT 1: NUMBERS

1.1 Factors and Multiples

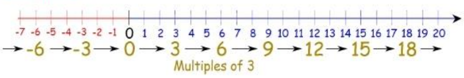
Factors and multiples are different things but they both involve multiplication:

Multiples

A multiple is the result of multiplying a number by an integer (not a fraction).

Example 1.

Multiples of 3:

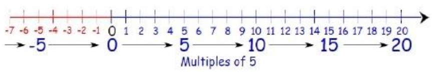


..., −9, −6, −3, 0, 3, 6, 9, ...

15 **is** a multiple of 3, as $3 \times 5 = 15$
16 is **not** a multiple of 3

Example 2.

Multiples of 5:



..., −15, −10, −5, 0, 5, 10, 15, ...

10 **is** a multiple of 5, as $5 \times 2 = 10$
11 is **not** a multiple of 5

1

Factors are what we can multiply to get the number.

Multiples are what we get after multiplying the number by an integer (not a fraction).

Example: the positive factors, and some multiples, of 6:

Factors:

$1 \times 6 = 6$, so **1** and **6** are factors of 6

$2 \times 3 = 6$, so **2** and **3** are factors of 6

Multiples:

$0 \times 6 = 0$, so **0** is a multiple of 6

$1 \times 6 = 6$, so **6** is a multiple of 6

$2 \times 6 = 12$, so **12** is a multiple of 6 and so on

(Note: there are negative factors and multiples as well)

Here are the details:

Factors

"Factors" are the numbers we can **multiply together** to get another number:

$$\underset{\text{Factor}}{2} \times \underset{\text{Factor}}{3} = 6$$

2 and 3 are factors of 6

A number can have **many** factors.

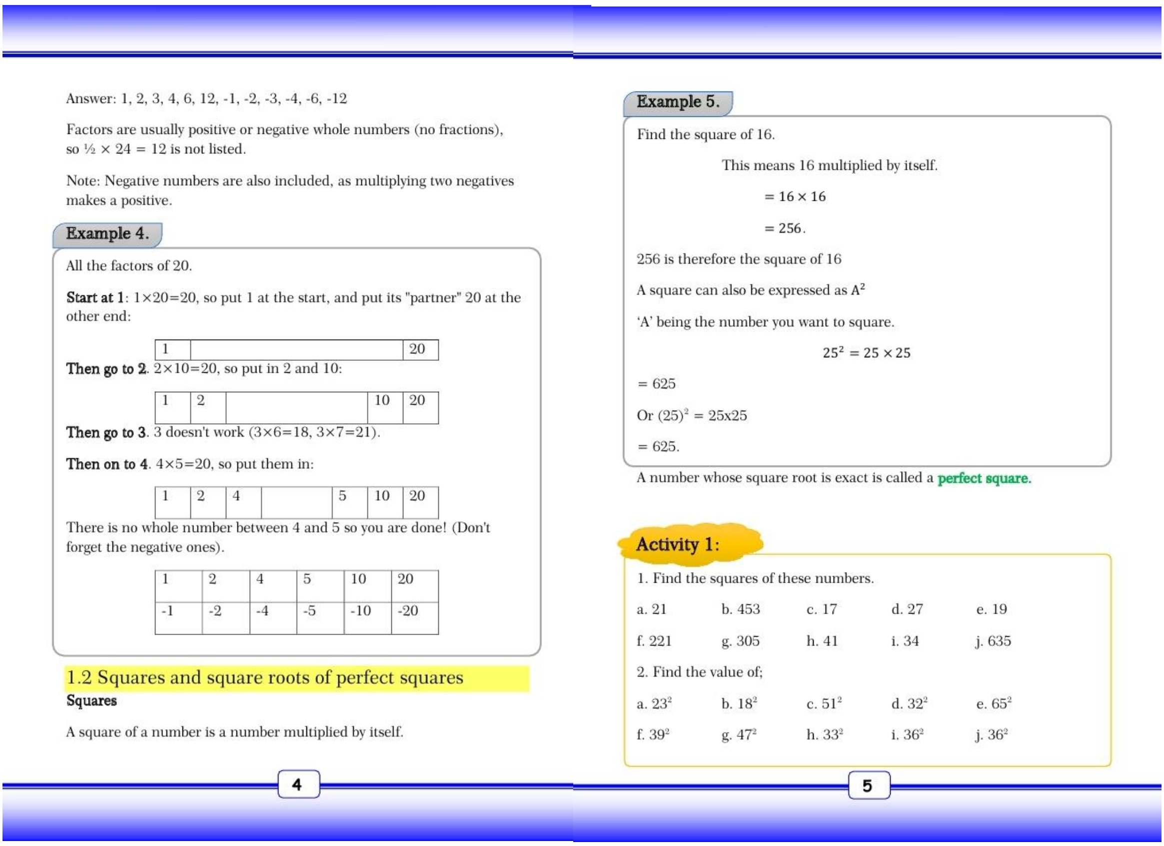
2

Use the number line to show learners on how to find multiples.

Explain to learners the difference between multiples and factors using notes on page 2 of the learners book.

1.2 Squares and square roots of numbers

The learner should be able to determine squares and square roots of perfect squares based on primary 7 knowledge.



Answer: 1, 2, 3, 4, 6, 12, -1, -2, -3, -4, -6, -12

Factors are usually positive or negative whole numbers (no fractions), so ½ × 24 = 12 is not listed.

Note: Negative numbers are also included, as multiplying two negatives makes a positive.

Example 4.

All the factors of 20.

Start at 1: 1×20=20, so put 1 at the start, and put its "partner" 20 at the other end:

1		20

Then go to 2. 2×10=20, so put in 2 and 10:

1	2		10	20

Then go to 3. 3 doesn't work (3×6=18, 3×7=21).

Then on to 4. 4×5=20, so put them in:

1	2	4		5	10	20

There is no whole number between 4 and 5 so you are done! (Don't forget the negative ones).

1	2	4	5	10	20
-1	-2	-4	-5	-10	-20

1.2 Squares and square roots of perfect squares

Squares

A square of a number is a number multiplied by itself.

4

Example 5.

Find the square of 16.

This means 16 multiplied by itself.

$= 16 \times 16$

$= 256.$

256 is therefore the square of 16

A square can also be expressed as A^2

'A' being the number you want to square.

$25^2 = 25 \times 25$

$= 625$

Or $(25)^2 = 25x25$

$= 625.$

A number whose square root is exact is called a **perfect square.**

Activity 1:

1. Find the squares of these numbers.

a. 21 b. 453 c. 17 d. 27 e. 19

f. 221 g. 305 h. 41 i. 34 j. 635

2. Find the value of;

a. 23^2 b. 18^2 c. 51^2 d. 32^2 e. 65^2

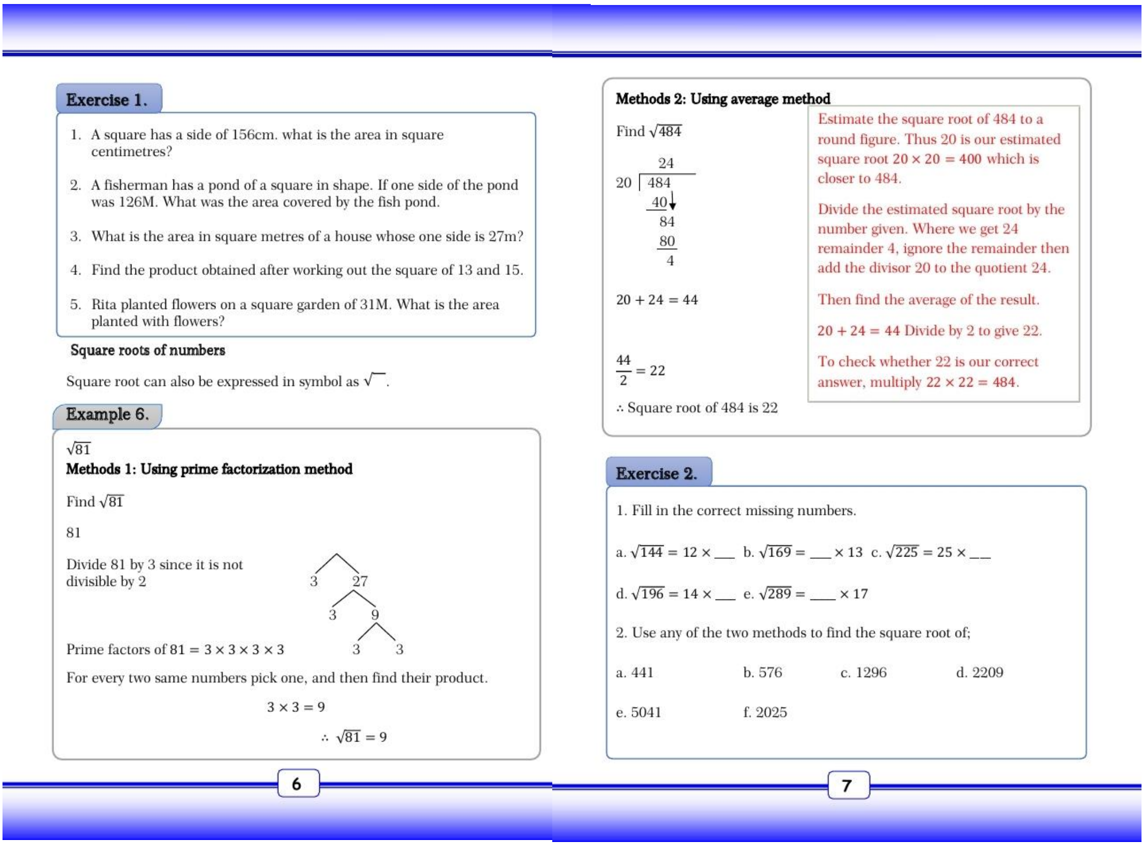
f. 39^2 g. 47^2 h. 33^2 i. 36^2 j. 36^2

5

Squares of numbers

Square of a number refers to multiplying a number by itself while square root refers to a number that can be multiplied by itself to obtain a given number.

Use example 5 to show learners the difference between squares and square roots.



Exercise 1.

1. A square has a side of 156cm. what is the area in square centimetres?
2. A fisherman has a pond of a square in shape. If one side of the pond was 126M. What was the area covered by the fish pond.
3. What is the area in square metres of a house whose one side is 27m?
4. Find the product obtained after working out the square of 13 and 15.
5. Rita planted flowers on a square garden of 31M. What is the area planted with flowers?

Square roots of numbers

Square root can also be expressed in symbol as $\sqrt{}$.

Example 6.

$\sqrt{81}$

Methods 1: Using prime factorization method

Find $\sqrt{81}$

81

Divide 81 by 3 since it is not divisible by 2

Prime factors of 81 = $3 \times 3 \times 3 \times 3$

For every two same numbers pick one, and then find their product.

$3 \times 3 = 9$

$\therefore \sqrt{81} = 9$

6

Methods 2: Using average method

Find $\sqrt{484}$

$$\begin{array}{r|l} & 24 \\ \hline 20 & 484 \\ & 40 \\ \hline & 84 \\ & 80 \\ \hline & 4 \end{array}$$

Estimate the square root of 484 to a round figure. Thus 20 is our estimated square root $20 \times 20 = 400$ which is closer to 484.

Divide the estimated square root by the number given. Where we get 24 remainder 4, ignore the remainder then add the divisor 20 to the quotient 24.

$20 + 24 = 44$

Then find the average of the result.

$20 + 24 = 44$ Divide by 2 to give 22.

$\frac{44}{2} = 22$

To check whether 22 is our correct answer, multiply $22 \times 22 = 484$.

$\therefore$ Square root of 484 is 22

Exercise 2.

1. Fill in the correct missing numbers.

a. $\sqrt{144} = 12 \times$ ___ b. $\sqrt{169} =$ ___ $\times 13$ c. $\sqrt{225} = 25 \times$ ___

d. $\sqrt{196} = 14 \times$ ___ e. $\sqrt{289} =$ ___ $\times 17$

2. Use any of the two methods to find the square root of;

a. 441 b. 576 c. 1296 d. 2209

e. 5041 f. 2025

7

Activity 1

Allow learners to work in pairs and supervise them as they discuss and work out the activity.

Expected answers

1.

a. 441	e. 361	i. 1156
b. 205209	f. 48841	j. 403225
c. 289	g. 93025	
d. 729	h. 1681	

2.

a. 529	d. 1024	g. 2209
b. 324	e. 4225	h. 1089
c. 2601	f. 1521	i. 1296

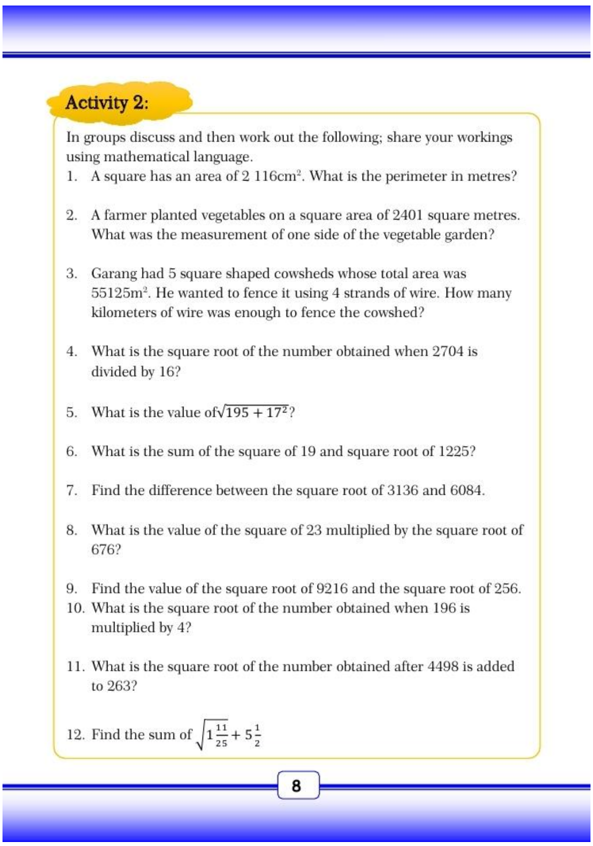
Exercise 1

The learners to do this individually to enable the teacher evaluate individual mastery of content.

Expected answers

1. 24336cm^2	3. 729m^2	5. 961m^2
2. 15876m^2	4. 38025	

This will improve their confidence and leadership skills.



Activity 2:

In groups discuss and then work out the following; share your workings using mathematical language.

1. A square has an area of 2 116cm^2. What is the perimeter in metres?
2. A farmer planted vegetables on a square area of 2401 square metres. What was the measurement of one side of the vegetable garden?
3. Garang had 5 square shaped cowsheds whose total area was 55125m^2. He wanted to fence it using 4 strands of wire. How many kilometers of wire was enough to fence the cowshed?
4. What is the square root of the number obtained when 2704 is divided by 16?
5. What is the value of$\sqrt{195 + 17^2}$?
6. What is the sum of the square of 19 and square root of 1225?
7. Find the difference between the square root of 3136 and 6084.
8. What is the value of the square of 23 multiplied by the square root of 676?
9. Find the value of the square root of 9216 and the square root of 256.
10. What is the square root of the number obtained when 196 is multiplied by 4?
11. What is the square root of the number obtained after 4498 is added to 263?
12. Find the sum of $\sqrt{1\frac{11}{25}} + 5\frac{1}{2}$

8

Square roots of numbers

The learners should be able to solve square roots of numbers. A square root is a number which when multiplied by itself yields to a given multiple.

Square root can also be expressed in symbol as $\sqrt{}$.

Use example 6 to explain to learners about square roots.

After doing the explanation let the learners chose their partner. And attempt exercise 2

Exercise 2

Learners to take the exercise individually to help the teacher evaluate individual mastery of content.

Expected answers

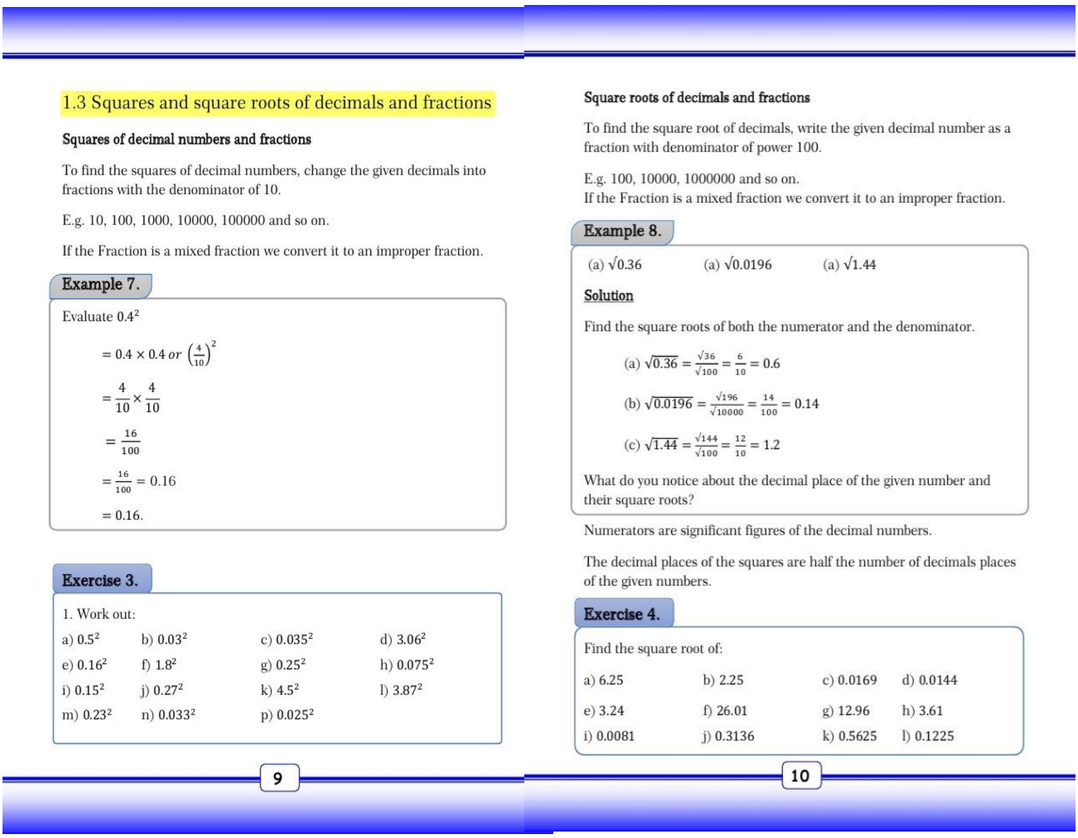
1.

a. 12	c. 25	e. 17
b. 13	d. 14	

2.

a. 21	c. 36	e. 71
b. 24	d. 47	f. 45

1.3 Squares and square roots of decimals and fractions



1.3 Squares and square roots of decimals and fractions

Squares of decimal numbers and fractions

To find the squares of decimal numbers, change the given decimals into fractions with the denominator of 10.

E.g. 10, 100, 1000, 10000, 100000 and so on.

If the Fraction is a mixed fraction we convert it to an improper fraction.

Example 7.

Evaluate 0.4^2

$= 0.4 \times 0.4 \; or \; \left(\frac{4}{10}\right)^2$

$= \frac{4}{10} \times \frac{4}{10}$

$= \frac{16}{100}$

$= \frac{16}{100} = 0.16$

$= 0.16.$

Exercise 3.

1. Work out:

a) 0.5^2	b) 0.03^2	c) 0.035^2	d) 3.06^2
e) 0.16^2	f) 1.8^2	g) 0.25^2	h) 0.075^2
i) 0.15^2	j) 0.27^2	k) 4.5^2	l) 3.87^2
m) 0.23^2	n) 0.033^2	p) 0.025^2	

9

Square roots of decimals and fractions

To find the square root of decimals, write the given decimal number as a fraction with denominator of power 100.

E.g. 100, 10000, 1000000 and so on.
If the Fraction is a mixed fraction we convert it to an improper fraction.

Example 8.

(a) $\sqrt{0.36}$ (a) $\sqrt{0.0196}$ (a) $\sqrt{1.44}$

Solution

Find the square roots of both the numerator and the denominator.

(a) $\sqrt{0.36} = \frac{\sqrt{36}}{\sqrt{100}} = \frac{6}{10} = 0.6$

(b) $\sqrt{0.0196} = \frac{\sqrt{196}}{\sqrt{10000}} = \frac{14}{100} = 0.14$

(c) $\sqrt{1.44} = \frac{\sqrt{144}}{\sqrt{100}} = \frac{12}{10} = 1.2$

What do you notice about the decimal place of the given number and their square roots?

Numerators are significant figures of the decimal numbers.

The decimal places of the squares are half the number of decimals places of the given numbers.

Exercise 4.

Find the square root of:

a) 6.25	b) 2.25	c) 0.0169	d) 0.0144
e) 3.24	f) 26.01	g) 12.96	h) 3.61
i) 0.0081	j) 0.3136	k) 0.5625	l) 0.1225

10

Based on the knowledge on squares and square roots from perfect squares of whole numbers, the learners to take activities helping them solve squares and square roots of decimals and fractions.

Activity 2.

Learners to take the activity in groups of four. The teacher to assess their work in groups.

Expected answers

1. 46cm
2. 49m
3. 3.756594km
4. 13
5. 22
6. 396
7. 22
8. 13754
9. 96 and 16
10. 28
11. 69
12. $6^7/_{10}$

Exercise 3

Learners to do the task individually for you to assess and evaluation individual ability.

Expected answers

a. 0.25
b. 0.0009
c. 0.001225
d. 9.3636
e. 0.0256
f. 3.24
g. 0.0625
h. 0.005625
i. 0.0225
j. 0.0729
k. 20.25
l. 14.9769
m. 0.0529
n. 0.001089
o. 0.000625

Exercise 4

Learners to do the task individually for you to assess and evaluation individual ability by asking how they arrived at the answers.

Expected answers

a. 2.5
b. 1.5
c. 0.13
d. 0.12
e. 1.8
f. 5.1
g. 3.6
h. 1.9
i. 0.09
j. 0.56
k. 0.75
l. 0.35

1.4 Conversion of fractions to percentage and percentage to fractions

1.4 Conversion of fractions to percentage and percentage to fractions

Conversion of fractions to percentage

Percentage means out of hundred $\left(\frac{x}{100}\right)\%$

Example 9.

Express $\frac{3}{8}$ as a percentage.

$\frac{3}{8}$ Out of hundred

$= \frac{3}{\cancel{8}_{2}} \times \cancel{100}^{25}\% = \frac{75}{2}$

$= 35\frac{1}{2}\%$

Exercise 5.

1. Convert these fractions to percentages. Show your working out.

a) $\frac{3}{3}$ b) $\frac{1}{3}$ c) $\frac{5}{6}$ d) $\frac{13}{20}$ e) $\frac{5}{8}$

2. Johana scored 13 out of 18 in Kiswahili test. What were his marks as percentage? Show your working out.

3. In a class of 45 pupils there are 18 girls. What percentage of the total number of pupils were boys? Show your working out.

4. Pamela had 60 hens. She sold 15 hens. What percentages of hens were unsold? Show your working out.

5. A basket had 36 fruits, 27 of them were ripe. What percentage of fruits was raw? Show your working out.

6. Abdi had 600 cattle. If he had 180 dairy cattle. What percentage were beef cattle?

7. In a tray there were 30 eggs. 11 eggs were rotten. What percentages of eggs were good?

Activity 3:

In groups discuss, where do we apply converting fractions to percentages.

Conversion of percentage to fractions

Example 10.

Write 35% as a fraction and write in simplest form.

35% is 35 out of 100

Change to a fraction $= \frac{35}{100}$

Simplify by cancelling the numerator and the denominator by a common divisor. $\frac{\cancel{35}}{\cancel{100}} = \frac{7}{20}$

$= \frac{7}{20}$

11 12

Learners to be able to convert fractions to percentages and vice versa. To convert a fraction to a percentage, multiply it by 100%. While to convert a percentage to a fraction, just divide the figure in percentage by 100 and simplify.

Exercise 5

Guide learners to do the task individually.

Expected answers

a. 100%
b. 33.33%
c. 83.33%
d. 65%
e. 62.5%
f. 72%
g. 60%
h. 75%
i. 25%
j. 70%
k. 63.33%

Exercise 6

Guide learners to do the task individually.

Expected answers

a. $\frac{3}{5}$
b. $\frac{3}{4}$
c. $\frac{9}{10}$
d. $\frac{13}{40}$
e. $\frac{11}{40}$
f. $\frac{9}{400}$
g. $\frac{3}{8}$
h. $\frac{2}{3}$

1.5 Conversion of decimals to percentage and percentage to decimals

To convert of decimals to percentages, write the figure in decimal without the decimal point and divide it by 100.

To convert percentages to decimals, write the percentage as a fraction with the denominator being 100 or it's multiple the cancel the zeros while moving the position of the decimal point from right to left.

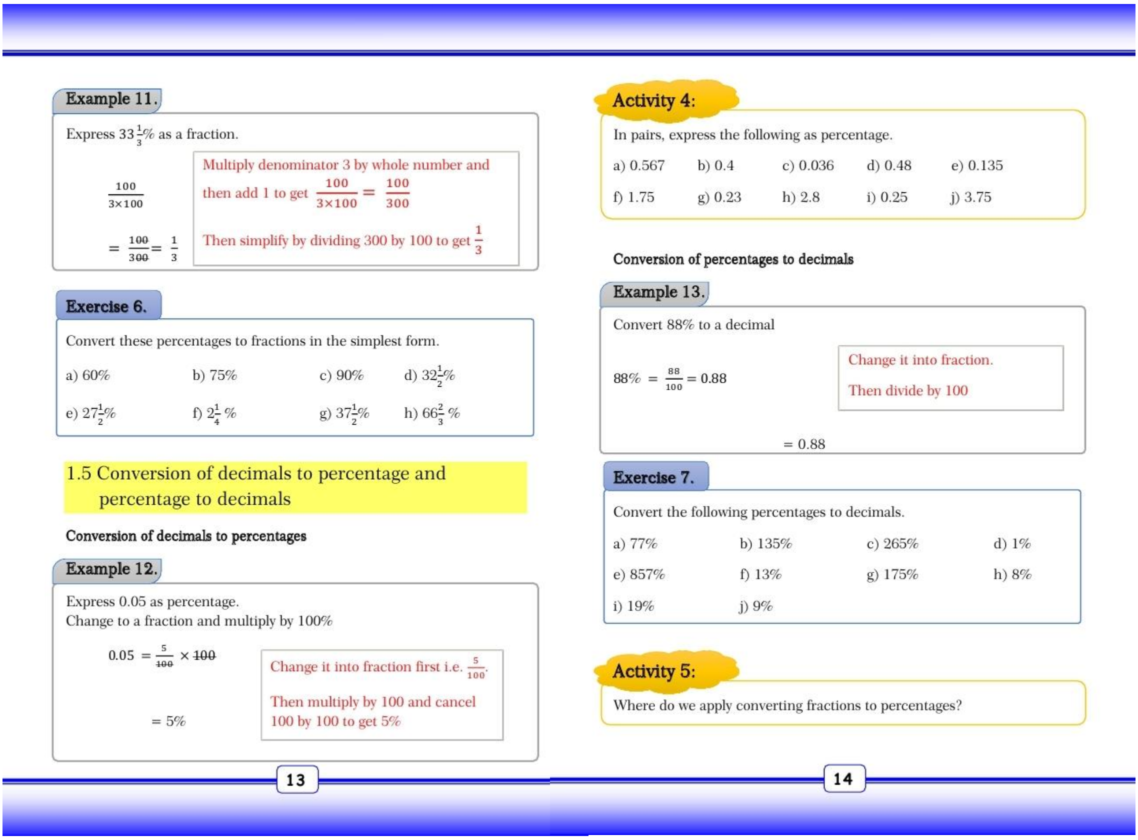
The original position of the decimal point should always be to the right of the number occupying the ones place value.

Activity 3

Guide learners to perform the activity in groups while you supervise and assess the work.

Expected answers

a. 56.7%
b. 40%
c. 3.6%
d. 48%
e. 13.5%
f. 175%
g. 23%
h. 280%
i. 25%
j. 375%



Example 11.

Express $33\frac{1}{3}\%$ as a fraction.

$\frac{100}{3\times100}$

$= \frac{100}{300} = \frac{1}{3}$

Multiply denominator 3 by whole number and then add 1 to get $\frac{100}{3\times100} = \frac{100}{300}$

Then simplify by dividing 300 by 100 to get $\frac{1}{3}$

Exercise 6.

Convert these percentages to fractions in the simplest form.

a) 60% b) 75% c) 90% d) $32\frac{1}{2}\%$

e) $27\frac{1}{2}\%$ f) $2\frac{1}{4}\%$ g) $37\frac{1}{2}\%$ h) $66\frac{2}{3}\%$

1.5 Conversion of decimals to percentage and percentage to decimals

Conversion of decimals to percentages

Example 12.

Express 0.05 as percentage.
Change to a fraction and multiply by 100%

$0.05 = \frac{5}{\cancel{100}} \times \cancel{100}$

$= 5\%$

Change it into fraction first i.e. $\frac{5}{100}$.

Then multiply by 100 and cancel 100 by 100 to get 5%

13

Activity 4:

In pairs, express the following as percentage.

a) 0.567 b) 0.4 c) 0.036 d) 0.48 e) 0.135

f) 1.75 g) 0.23 h) 2.8 i) 0.25 j) 3.75

Conversion of percentages to decimals

Example 13.

Convert 88% to a decimal

$88\% = \frac{88}{100} = 0.88$

Change it into fraction.

Then divide by 100

$= 0.88$

Exercise 7.

Convert the following percentages to decimals.

a) 77% b) 135% c) 265% d) 1%

e) 857% f) 13% g) 175% h) 8%

i) 19% j) 9%

Activity 5:

Where do we apply converting fractions to percentages?

14

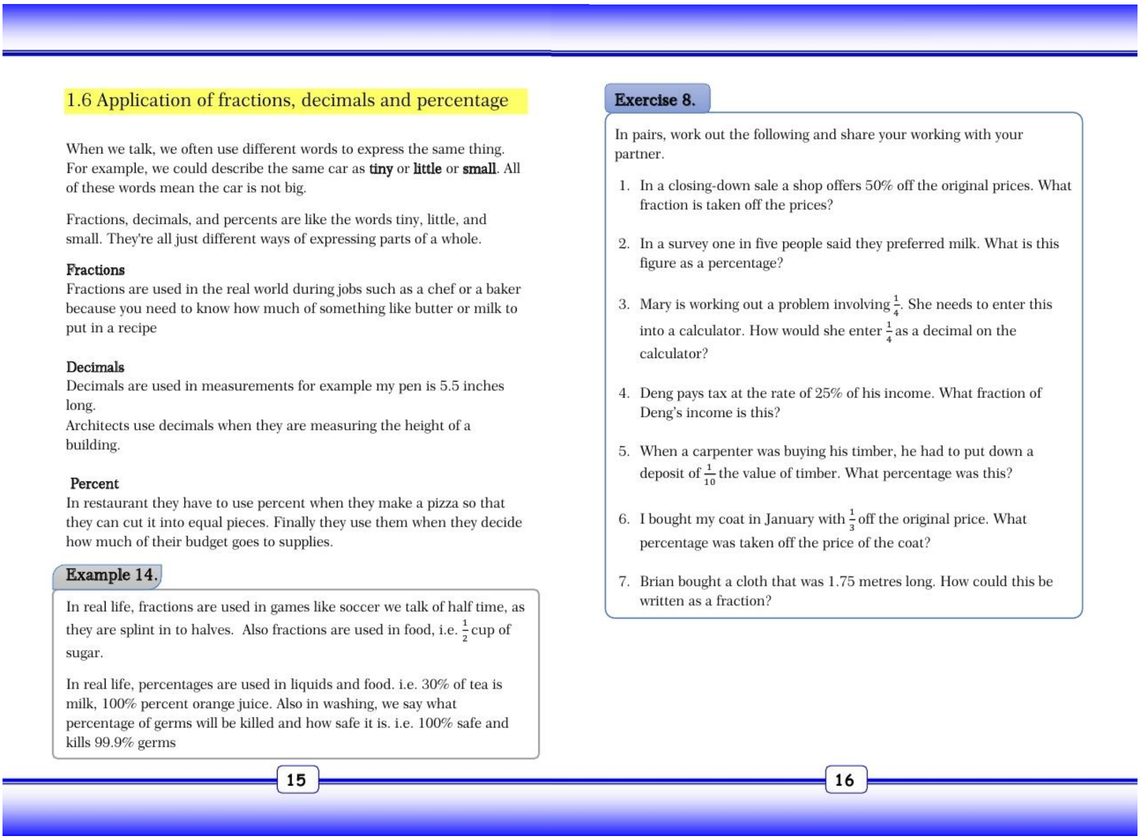
Exercise 7

Guide learners to do the task individually.

Expected answers

a. 0.77
b. 1.35
c. 2.65
d. 0.01
e. 8.57
f. 0.13
g. 1.75
h. 0.08
i. 0.19
j. 0.09

1.6 Application of fractions, decimals and percentage



1.6 Application of fractions, decimals and percentage

When we talk, we often use different words to express the same thing. For example, we could describe the same car as **tiny** or **little** or **small**. All of these words mean the car is not big.

Fractions, decimals, and percents are like the words tiny, little, and small. They're all just different ways of expressing parts of a whole.

Fractions
Fractions are used in the real world during jobs such as a chef or a baker because you need to know how much of something like butter or milk to put in a recipe

Decimals
Decimals are used in measurements for example my pen is 5.5 inches long.
Architects use decimals when they are measuring the height of a building.

Percent
In restaurant they have to use percent when they make a pizza so that they can cut it into equal pieces. Finally they use them when they decide how much of their budget goes to supplies.

Example 14.

In real life, fractions are used in games like soccer we talk of half time, as they are splint in to halves. Also fractions are used in food, i.e. $\frac{1}{2}$ cup of sugar.

In real life, percentages are used in liquids and food. i.e. 30% of tea is milk, 100% percent orange juice. Also in washing, we say what percentage of germs will be killed and how safe it is. i.e. 100% safe and kills 99.9% germs

15

Exercise 8.

In pairs, work out the following and share your working with your partner.

1. In a closing-down sale a shop offers 50% off the original prices. What fraction is taken off the prices?
2. In a survey one in five people said they preferred milk. What is this figure as a percentage?
3. Mary is working out a problem involving $\frac{1}{4}$. She needs to enter this into a calculator. How would she enter $\frac{1}{4}$ as a decimal on the calculator?
4. Deng pays tax at the rate of 25% of his income. What fraction of Deng's income is this?
5. When a carpenter was buying his timber, he had to put down a deposit of $\frac{1}{10}$ the value of timber. What percentage was this?
6. I bought my coat in January with $\frac{1}{3}$ off the original price. What percentage was taken off the price of the coat?
7. Brian bought a cloth that was 1.75 metres long. How could this be written as a fraction?

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Exercise 8

Guide learners to do the task individually.

Expected answers

1. $\frac{1}{2}$
2. 20%
3. 0.25
4. $\frac{1}{4}$
5. 10%
6. 33.33%
7. $1\frac{75}{100}$

UNIT 2: MEASUREMENT

In P7 you studied about circumference and area of common shapes. In this level we shall review the P7 content and delve further into determining surface area and volumes of common geometrical solids.

Learn about	Key inquiry questions
✍ Learners should investigate length, perimeter and circumference of a circle and explore the properties of isosceles, equilateral, scalene and right angled triangles, parallelograms, rhombuses, kites and trapezium quadrilaterals, and circles, and work out their areas. ✍ Learners should investigate the surface area of cubes, cuboids, spheres, cylinders, cones, triangular prism and square based pyramid and their volume. They should explore and explain the conversion of m^3 to cm^3 and vice versa. ✍ Learners should investigate the movement of objects, distance they cover and their average speed over a given time taken and investigate and express speed as distant covered per unit time for example (m/s, cm/s and km/h), and consolidate their understanding.	• How do we investigate length, perimeter and circumference of a circle? • How do we differentiate between perimeter and circumference? • Why is it important to solve problems involving areas? • How can we calculate the surface area of cuboids, cones and cylinders and apply the knowledge and skills in daily situation? • How do we use volume and capacity to solve practical problems? • How can we explain the relationship between speed, time and distance moved?

Learning outcomes		
Knowledge and understanding	**Skills**	**Attitudes**
• Solving problems involving length, perimeter and circumference • Solving problems involving areas of given shapes; triangles, quadrilaterals, circles and combined shapes • Solving problems involving surface area and volumes of cuboids • Converting m^3 to cm^3 and vice-versa • Solving problems involving capacity • Solving problems involving; commissions and discounts, hire purchase, profit and loss, simple interest and compound interest • Solving problems involving speed, time and distance • Speed as a distance covered in unit time $(m/s$ and $km/h)$	• Solve problems using shape • Calculate the areas of shapes and the surface area of cuboids, cones and cylinders • Manage problems involving volumes and capacities, cuboids, cones and cylinders • Change the units of volume and capacity in $m^3 and\ cm^3$ and apply the knowledge • Estimate speed, distance and time taken and be able to convert speed units	• Develop interest to in the computation and benefit in mathematical measurements • Appreciate the uses of measurement in daily activities.

Contribution to the competencies: Critical thinking: how to carry out measurements and construction of shapes of common solids as well as develop effective skills of computation. Communication: presentation of their work. Co-operation: through discussion.
Links to other subjects: Links to a range of subjects such as Science and Social Studies where measurement is used.

Activities in groups or pairs

Guide learners to do the activities, in groups or pairs to solve problems involving perimeter, circumference, area, volume and conversion of units.

Guide learners, using the examples given in the learner's book to help learners understand the unit.

2.1 Perimeter of rectangle, square, triangle, circle and trapezium

The learner should be able to determine perimeter of common geometric shapes.

Perimeter of Rectangle = 2(L+W)

Perimeter of Triangle = sum of length of sides

Circumference of circle = $2\pi R$ or πD

Perimeter of trapezium = sum of length of sides

Units = metre (m), centimeter (cm), kilometer (km), millimeter (mm)

UNIT 2: MEASUREMENT

2.1 Perimeter of rectangle, square, triangle, circle and trapezium

Perimeter is the distance around a shape. Its symbol is **P**. In order to calculate the perimeter of a shape, you must add up the lengths of all its sides.

Example 1.

A rectangle has a width of 5cm and a length of 3cm, its perimeter would be:

3cm

5cm

PERIMETER = SUM OF LENGTH OF ALL FOUR SIDES

= 5 + 3 + 5 + 3

= 16cm

There are different types of geometric shapes.

They include:

Rectangle, Square, Triangle, Circle, Trapezium

There is a formula for calculating the perimeter of each shape.

Perimeter of a rectangle

A Rectangle is a four sided with two opposite sides equal to each other. The longer side is called the **Length** while the shorter side is called the **Width**.

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Perimeter of a rectangle = 2 (Length + Width)

P = 2(L+W)

P = 2(10+6)

P = 2 X 16

P = 32 cm

6cm

10cm

Exercise 1.

1. Find the perimeter of the following:

1. 25cm, 15cm
2. 12cm, 18cm
3. 14cm, 36cm

18

2. A rugby makes seven runs around a rugby field of length 90m and width 75m. Calculate the distance she covered.
3. A farmer wants to fence a field of length 800m and width 650m by surrounding it with a barbed wire, calculate the length of the barbed wire used.
4. To fence a rectangular plot of length 150m and width 100m, a landlord erects poles which are 50m apart. How many poles are required?

Activity 1:

Work in groups;

1. The perimeter of a rectangular playground is 46 m. If the length of the park is 7 m, what is the width of the park? Explain your working.
2. The perimeter of a rectangular field is 60 M and its width is 20 M. Find the perimeter of this field. Show your workings.
3. Before soccer practice, Laura warms up by jogging around the soccer field that is 80 M by 120 M. How many yards does she jog if she goes around the field two times?

Perimeter of a square

A Square is a four sided with all sides equal to each other.

Perimeter of a Square = 4 × Length

19

Exercise 1

This should be done by individual learners for you to evaluate the level of understanding of each learner.

Expected answers

1.
   a. 80cm
   b. 60cm
   c. 100cm
2. 2310
3. 2900m
4. 10 poles

Activity 2:

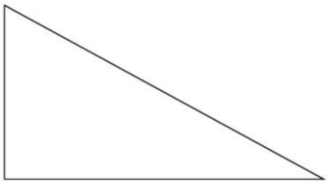
Work in groups;

1. A cricket player makes four runs around a pitch of length 90m. Calculate the distance he covered. Explain how you arrived at your answer.

2. A farmer wants to fence a square field of length 800m by surrounding it with a barbed wire, calculate the length of the barbed wire used. Present your working.

Perimeter of a triangle

A triangle is a three sided figure.



Perimeter of triangle is the sum of the lengths of all the sides.

Like any polygon, the perimeter is the total distance around the outside, which can be found by adding together the length of each side.

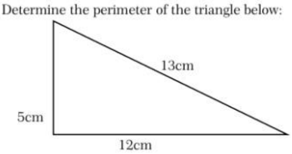
Or as a formula:

$$Perimeter = a + b + c$$

Where: a, b and c are the lengths of each side of the triangle.

Example 3.

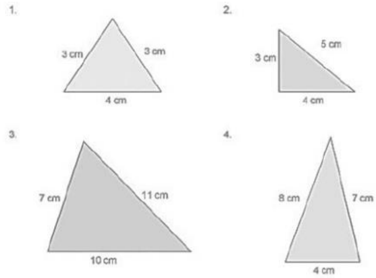
Determine the perimeter of the triangle below:



Perimeter = Sum of length of sides
= 12 + 13 + 5
= 30cm

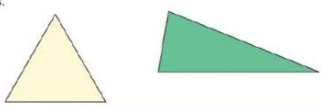
Exercise 3.

In pairs, work out the perimeters of the triangles below. (Not drawn to scale)



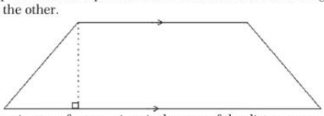
Activity 3:

Measure the lengths of the sides of this triangles and calculate their perimeters.



Perimeter of a trapezium

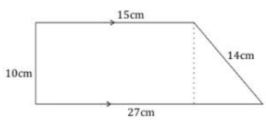
A trapezium has two parallel sides with one of the sides being shorter than the other.



The perimeter of a trapezium is the sum of the distances round the figure.

Example 7.

Calculate the perimeter of the figure below:



P = 15 + 27 + 14 + 10
= 66 cm

Exercise 2

Guide learners to solve the activity in groups as you supervise and assess them.

Expected answers

i. 72cm ii. 100cm

iii. 144cm

Activity 2

1. 360m
2. 3200m

Exercise 5

This should be done by individual learners for you to evaluate the level of understanding of each learner.

Expected answers

1.
    a. 169.668cm
    b. 94.26m
    c. 125.68m
2. 1540m
3. 46.278m
4. D = 24.507cm ; R = 12.25cm
5. 11 poles

Activity 4

Guide learners to do the activity in groups as you supervise.

Expected answer

1. 63cm

Exercise 6

This is an assessment opportunity. Learners to work in groups, they first choose two shapes remind the class that they have learnt about the five shapes; square and trapezium

Encourage the groups to work on different shapes as a class decide which fact book provides the relevant information using mathematical language.

2.2 Area of rectangle, square, triangle, circle and trapezium

2.2 Area of rectangle, square, triangle, circle and trapezium

The area is the amount of a surface covered by a boundary. The symbol for area is **A**.
The units for area are square units such as square metres (m^2), square centimeters (cm^2), square kilometers (km^2), Ares, hectares (Ha).

$1m^2 = 1m \times 1m$ $1m^2 = 10000cm^2$

$1 \text{ Are} = 100m^2$ $1\text{Hectare} = 10000\ m^2$

Example 8.

To convert m^2 to cm^2, multiply the value given by 10000.

1. Convert $1.8m^2$ to cm^2

   Solution

   $1m^2 = 10000cm^2$
   $1.8m^2 = 1.8 \times 10000$
   $= 18000cm^2$

2. Convert $0.075m^2$ to cm^2

   Solution

   $1m^2 = 10000cm^2$
   $0.075m^2 = 0.075 \times 10000$
   $= 750cm^2$

To convert cm^2 to m^2, divide the value given by 10000.

1. Convert $1500cm^2$ to m^2

   Solution

   $10000cm^2 = 1m^2$
   $1500cm^2 = \frac{1500}{10000}$
   $= 0.15m^2$

2. Convert $28450cm^2$ to m^2

   Solution

   $10000cm^2 = 1m^2$
   $28450cm^2 = \frac{28450}{100000}$
   $= 2.845m^2$

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Area of a rectangle

A Rectangle is a four sided with two opposite sides equal to each other. The longer side is called the **Length** while the shorter side is called the **Width**.

Area of a rectangle = Length x Width)

$A = L \times W)$
$A = 15 \times 6$

$A = 90cm^2$

Activity 7:

In groups, solve the questions

1. The floor of a classroom has a length of 12m and a width of 9m. Calculate its area.
2. A farmer has a rectangular garden of length 800m and width 650m. Calculate the area of the garden on hectares.
3. A football field has length of 90m and a width of 75m. What is the area of its playing surface?

Area of a square

A Square is a four sided with all sides equal to each other.

Area of a Square = Length × Length

$A = L^2$

$A = 8^2$

$A = 64cm^2$

29

The learner should be able to
determine the areas of common geometrical shapes such as rectangle, triangle, square, trapezium and circle. Allow learners to display what they have drawn.

Area of rectangle; $A = L \times W$

Area of a square; $A = L^2$

Area of circle; $A = \pi R^2$

Area of trapezium; $A = \frac{(a + b)}{2} \times h$

Area of triangle; $A = \frac{1}{2} bh$

Units for are: square metres (m^2), square centimeter (cm^2), ares, hectares (ha).

Area of a rectangle

A Rectangle is a four sided with two opposite sides equal to each other. The longer side is called the **Length** while the shorter side is called the **Width**.

Area of a rectangle = Length x Width)

A = L × W)
A = 15 × 6

A = $90cm^2$

Activity 7:

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1. The floor of a classroom has a length of 12m and a width of 9m. Calculate its area.
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Area of a square

A Square is a four sided with all sides equal to each other.

Area of a Square = Length × Length

A = L^2

A = 8^2

A = $64cm^2$

Activity 8:

1. Find the area of the following:

(i) A square of sides 25cm.

(ii) A square of sides 18cm.

(iii) A square of sides 36cm.

2. A designer is using carpet to cover the floor of a room of area $169m^2$. Determine the dimensions of the carpet used.

Area of a right angled triangle

A triangle is a three sided figure.

Area of triangle = $\frac{1}{2} \times base \times height$

$A = \frac{1}{2}bh$

The height and the base are the two sides which form a rich angle. The longest side of the triangle is called the hypotenuse. It is not used in calculation of the area.

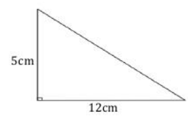
Example 9.

Determine the area of the triangle below:

Area $= \frac{1}{2}bh$

$= \frac{1}{2} \times 12 \times 5$

$= 30cm^2$



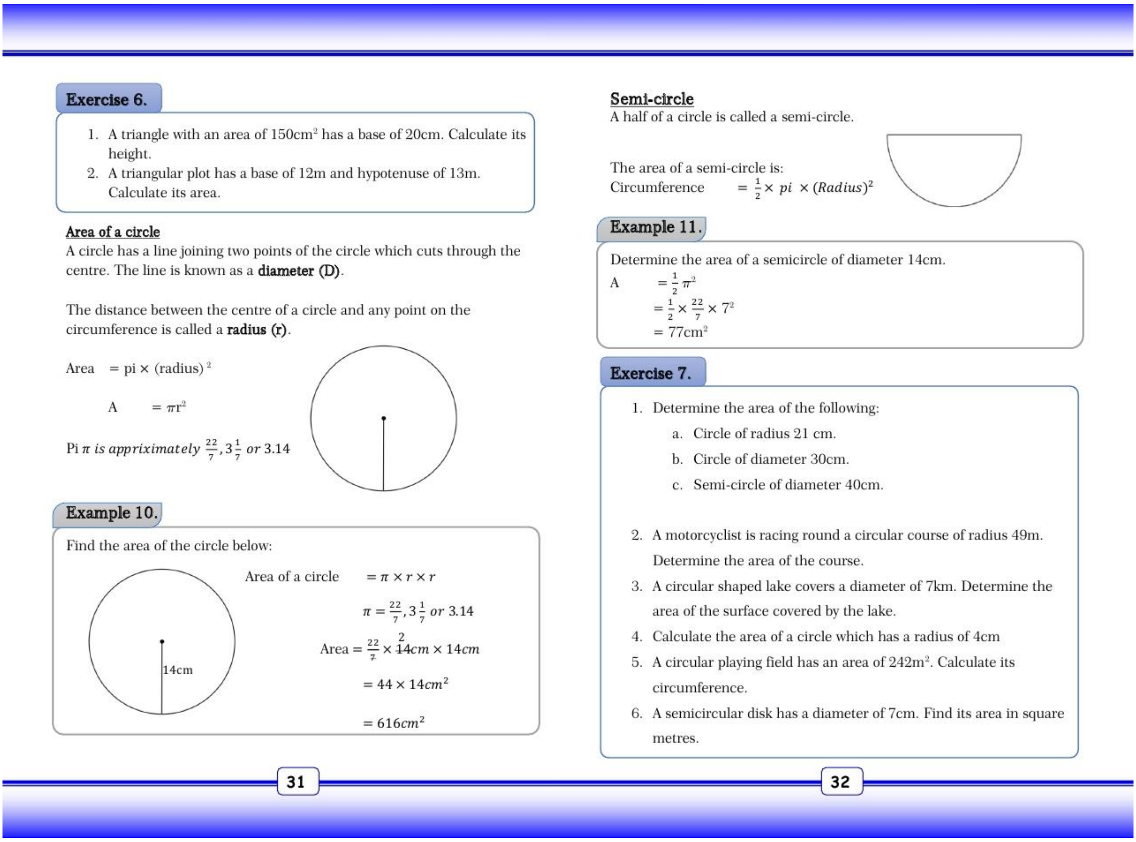
Activity 7

Learners to perform the activity in groups as you evaluates and assesses .

1. $108m^2$
2. $520000m^2$
3. $6750m^2$

Activity 8

1. $625cm^2$
2. $324cm^2$
3. $1296cm^2$
4. 13m



Exercise 6.

1. A triangle with an area of $150cm^2$ has a base of 20cm. Calculate its height.
2. A triangular plot has a base of 12m and hypotenuse of 13m. Calculate its area.

Area of a circle

A circle has a line joining two points of the circle which cuts through the centre. The line is known as a **diameter (D)**.

The distance between the centre of a circle and any point on the circumference is called a **radius (r)**.

Area = pi × (radius) ^{2}

A = πr^2

Pi π *is appriximately* $\frac{22}{7}, 3\frac{1}{7}$ *or* 3.14

Example 10.

Find the area of the circle below:

14cm

Area of a circle $= \pi \times r \times r$

$\pi = \frac{22}{7}, 3\frac{1}{7}$ *or* 3.14

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

$= 44 \times 14cm^2$

$= 616cm^2$

Semi-circle

A half of a circle is called a semi-circle.

The area of a semi-circle is:

Circumference $= \frac{1}{2} \times pi \times (Radius)^2$

Example 11.

Determine the area of a semicircle of diameter 14cm.

A $= \frac{1}{2}\pi^2$

$= \frac{1}{2} \times \frac{22}{7} \times 7^2$

$= 77cm^2$

Exercise 7.

1. Determine the area of the following:
   a. Circle of radius 21 cm.
   b. Circle of diameter 30cm.
   c. Semi-circle of diameter 40cm.
2. A motorcyclist is racing round a circular course of radius 49m. Determine the area of the course.
3. A circular shaped lake covers a diameter of 7km. Determine the area of the surface covered by the lake.
4. Calculate the area of a circle which has a radius of 4cm
5. A circular playing field has an area of $242m^2$. Calculate its circumference.
6. A semicircular disk has a diameter of 7cm. Find its area in square metres.

31 32

Exercise 6

This should be done by individual learners for you to evaluate the level of understanding of each learner.

Expected answers

1. 15cm
2. $30m^2$

Exercise 7

This should be done by individual learners for you to evaluate the level of understanding of each learner.

Expected answers

1.

a. $1386cm^2$

b. $707.143cm^2$

c. $628.57cm^2$

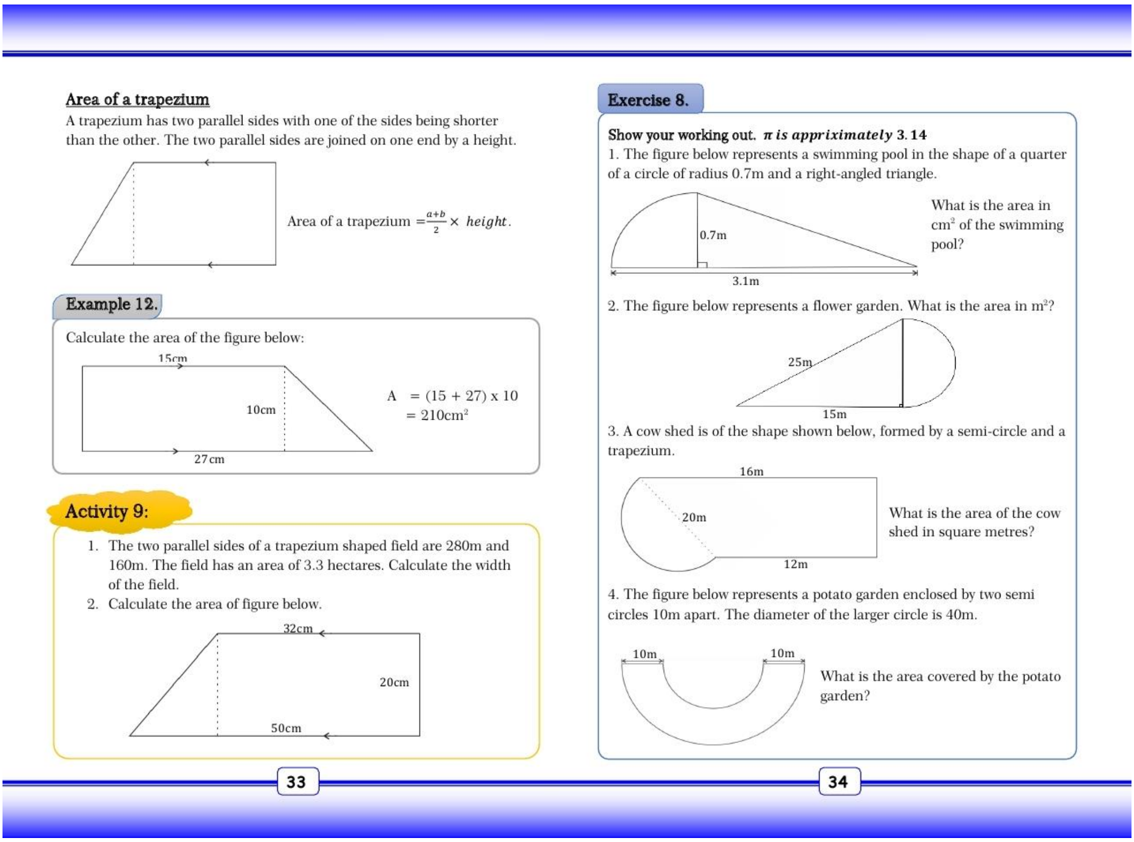
2. $7546m^2$

3. $38.5km^2$

4. $50.286cm^2$

5. $55.15m$

6. $19.25cm^2$



Area of a trapezium

A trapezium has two parallel sides with one of the sides being shorter than the other. The two parallel sides are joined on one end by a height.

Area of a trapezium $= \frac{a+b}{2} \times height$.

Example 12.

Calculate the area of the figure below:

15cm

10cm

27cm

A $= (15 + 27) \times 10$
$= 210cm^2$

Activity 9:

1. The two parallel sides of a trapezium shaped field are 280m and 160m. The field has an area of 3.3 hectares. Calculate the width of the field.
2. Calculate the area of figure below.

32cm

20cm

50cm

Exercise 8.

Show your working out. π *is apprixmately* 3.14

1. The figure below represents a swimming pool in the shape of a quarter of a circle of radius 0.7m and a right-angled triangle.

0.7m

3.1m

What is the area in cm^2 of the swimming pool?

2. The figure below represents a flower garden. What is the area in m^2?

25m

15m

3. A cow shed is of the shape shown below, formed by a semi-circle and a trapezium.

16m

20m

12m

What is the area of the cow shed in square metres?

4. The figure below represents a potato garden enclosed by two semi circles 10m apart. The diameter of the larger circle is 40m.

10m

10m

What is the area covered by the potato garden?

33

34

Activity 9

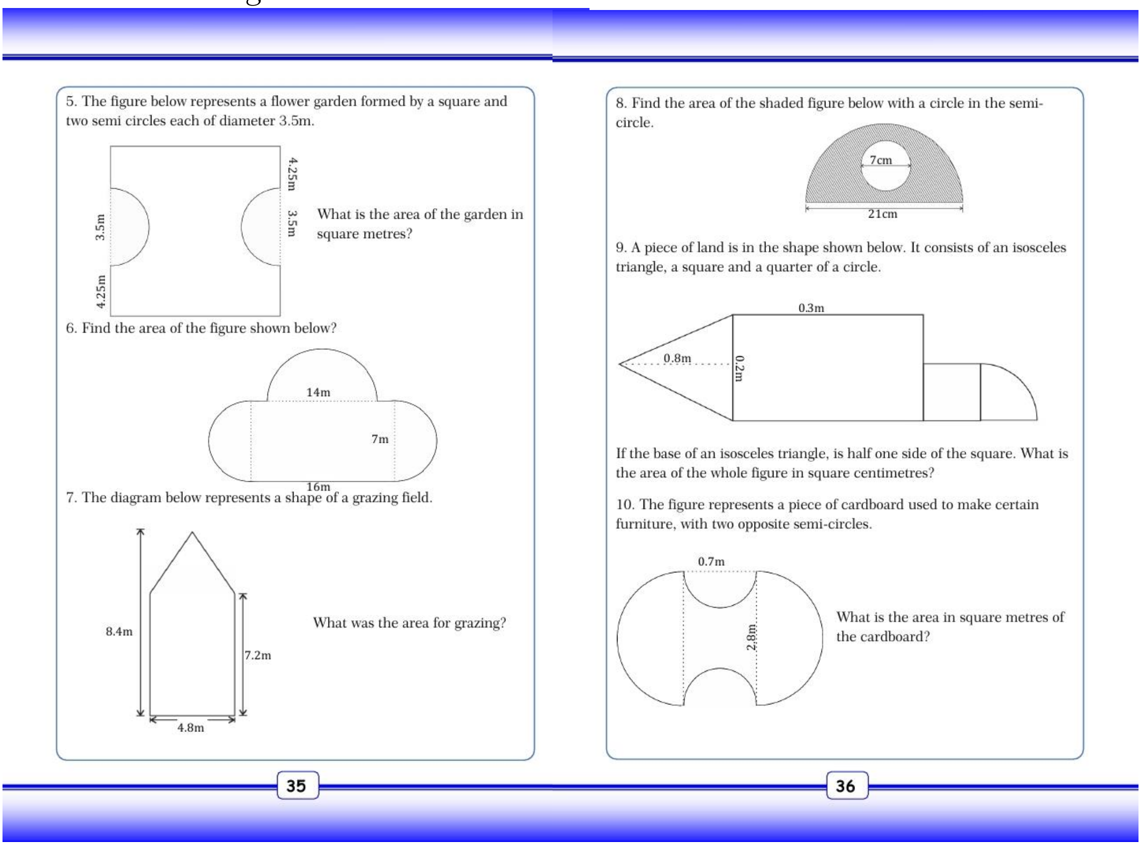
The learners to solve the activity in pairs as you supervise.

Expected answer

1. $150m^2$
2. $820cm^2$

Exercise 8

This should be done individually for you to evaluate the level of understanding of each learner.



5. The figure below represents a flower garden formed by a square and two semi circles each of diameter 3.5m.

What is the area of the garden in square metres?

6. Find the area of the figure shown below?

7. The diagram below represents a shape of a grazing field.

What was the area for grazing?

8. Find the area of the shaded figure below with a circle in the semi-circle.

9. A piece of land is in the shape shown below. It consists of an isosceles triangle, a square and a quarter of a circle.

If the base of an isosceles triangle, is half one side of the square. What is the area of the whole figure in square centimetres?

10. The figure represents a piece of cardboard used to make certain furniture, with two opposite semi-circles.

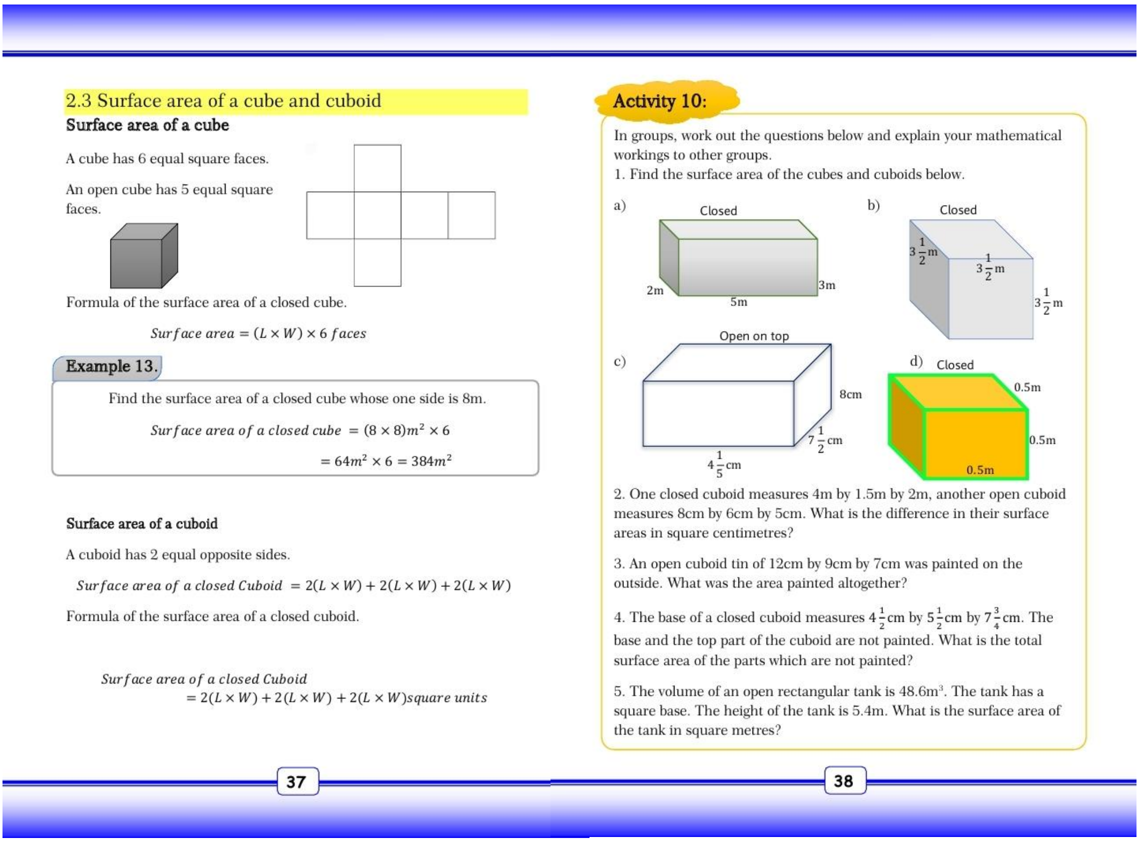
What is the area in square metres of the cardboard?

35 36

Expected answers

1. $1.225m^2$; $12250cm^2$
2. $307.1m^2$
3. $431.44m^2$
4. $471m^2$
5. $134.375m^2$
6. $227.5m^2$
7. $37.44m^2$
8. $19.25cm^2$
9. $4256cm^2$
10. 7.735m

2.3 Surface area of a cube and cuboid



2.3 Surface area of a cube and cuboid

Surface area of a cube

A cube has 6 equal square faces.

An open cube has 5 equal square faces.

Formula of the surface area of a closed cube.

$$Surface\ area = (L \times W) \times 6\ faces$$

Example 13.

Find the surface area of a closed cube whose one side is 8m.

$$Surface\ area\ of\ a\ closed\ cube = (8 \times 8)m^2 \times 6$$
$$= 64m^2 \times 6 = 384m^2$$

Surface area of a cuboid

A cuboid has 2 equal opposite sides.

$$Surface\ area\ of\ a\ closed\ Cuboid = 2(L \times W) + 2(L \times W) + 2(L \times W)$$

Formula of the surface area of a closed cuboid.

$$Surface\ area\ of\ a\ closed\ Cuboid = 2(L \times W) + 2(L \times W) + 2(L \times W) square\ units$$

37

Activity 10:

In groups, work out the questions below and explain your mathematical workings to other groups.

1. Find the surface area of the cubes and cuboids below.

2. One closed cuboid measures 4m by 1.5m by 2m, another open cuboid measures 8cm by 6cm by 5cm. What is the difference in their surface areas in square centimetres?

3. An open cuboid tin of 12cm by 9cm by 7cm was painted on the outside. What was the area painted altogether?

4. The base of a closed cuboid measures $4\frac{1}{2}$cm by $5\frac{1}{2}$cm by $7\frac{3}{4}$cm. The base and the top part of the cuboid are not painted. What is the total surface area of the parts which are not painted?

5. The volume of an open rectangular tank is $48.6m^3$. The tank has a square base. The height of the tank is 5.4m. What is the surface area of the tank in square metres?

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By the end of the sub unit the learner should be able to determine the surface area of cubes and cuboids. 1

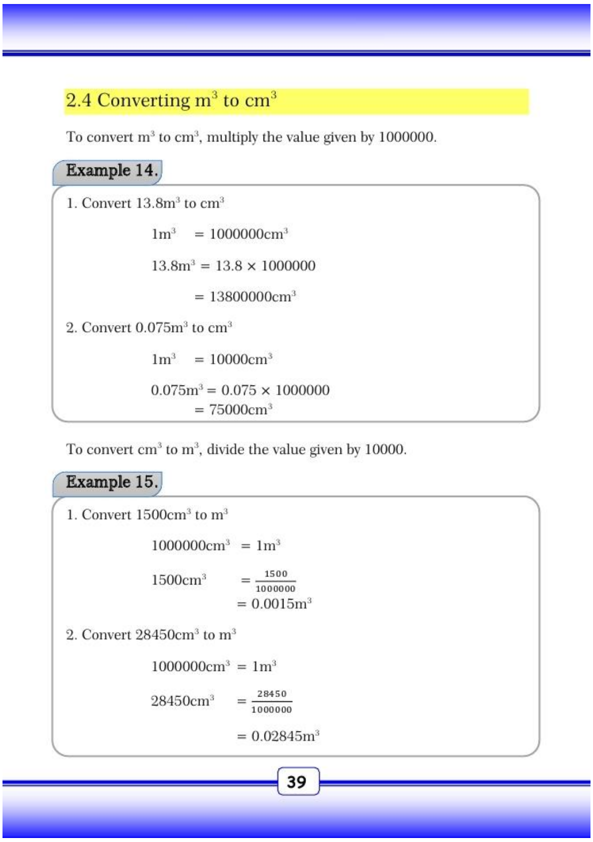
Activity 10

Guide learners to perform the activity in groups.

1. .

a) $62m^2$	2. $339812cm^2$
b) $73,5m^2$	3. $402cm^2$
c) $225.75cm^2$	4. $155\ cm^2$
d) $1.5m^2$	5. $45m^2$

2.4 Converting m^3 to cm^3



2.4 Converting m^3 to cm^3

To convert m^3 to cm^3, multiply the value given by 1000000.

Example 14.

1. Convert $13.8m^3$ to cm^3

$1m^3 = 1000000cm^3$

$13.8m^3 = 13.8 \times 1000000$

$= 13800000cm^3$

2. Convert $0.075m^3$ to cm^3

$1m^3 = 10000cm^3$

$0.075m^3 = 0.075 \times 1000000$

$= 75000cm^3$

To convert cm^3 to m^3, divide the value given by 10000.

Example 15.

1. Convert $1500cm^3$ to m^3

$1000000cm^3 = 1m^3$

$1500cm^3 = \frac{1500}{1000000}$

$= 0.0015m^3$

2. Convert $28450cm^3$ to m^3

$1000000cm^3 = 1m^3$

$28450cm^3 = \frac{28450}{1000000}$

$= 0.02845m^3$

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To convert m^3 to cm^3, multiply the value given by 1000000.

Example 14.

1. Convert $13.8m^3$ to cm^3

$1m^3 = 1000000cm^3$

$13.8m^3 = 13.8 \times 1000000$

$= 13800000cm^3$

2. Convert 0.075^3 to cm^3

$1m^3 = 10000cm^3$

$0.075m^3 = 0.075 \times 1000000$

$= 75000cm^3$

To convert cm^3 to m^3, divide the value given by 10000.

Example 15.

1. Convert $1500cm^3$ to m^3

$1000000cm^3 = 1m^3$

$1500cm^3 = 1500/1000000$

$= 0.0015m^3$

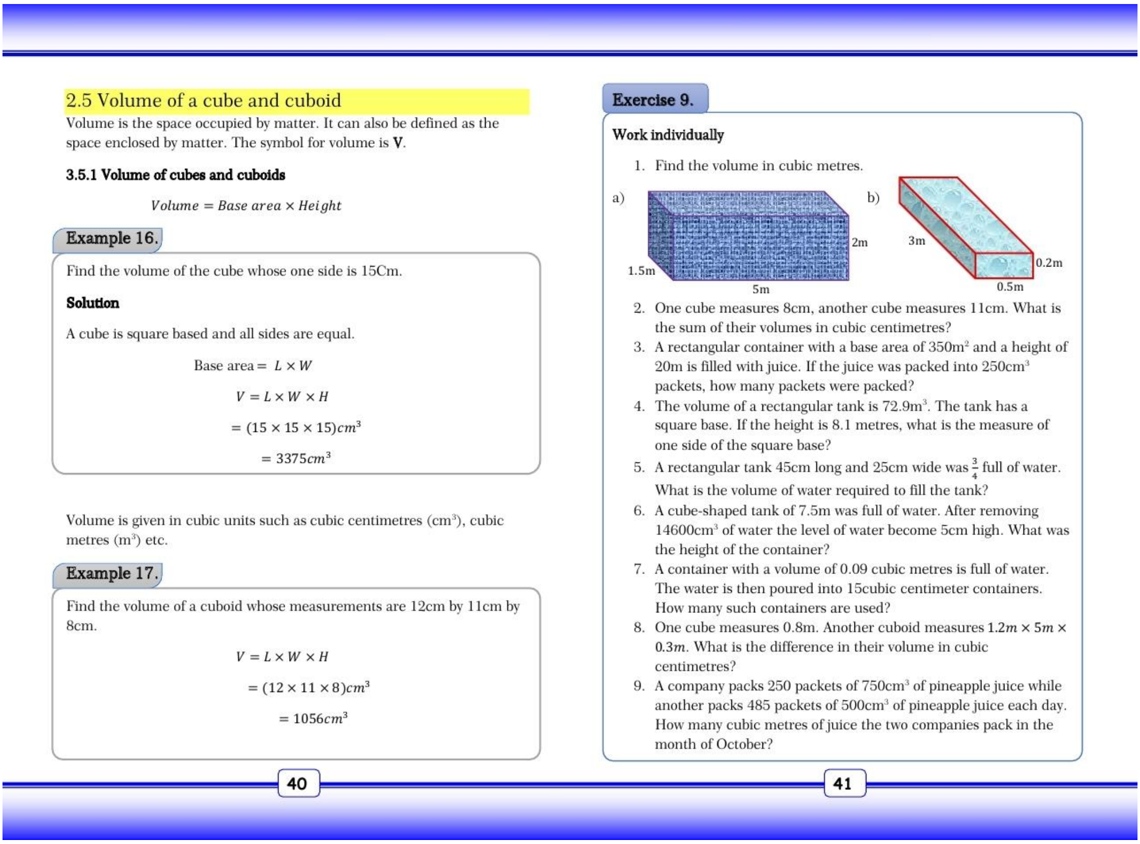
2. Convert $28450cm^3$ to m^3

$1000000cm^3 = 1m^3$

$28450cm^3 = 28450/1000000$

$= 0.02845m^3$

2.5 Volume of a cube and cuboid



2.5 Volume of a cube and cuboid

Volume is the space occupied by matter. It can also be defined as the space enclosed by matter. The symbol for volume is **V**.

3.5.1 Volume of cubes and cuboids

$$Volume = Base\ area \times Height$$

Example 16.

Find the volume of the cube whose one side is 15Cm.

Solution

A cube is square based and all sides are equal.

$$\text{Base area} = L \times W$$

$$V = L \times W \times H$$

$$= (15 \times 15 \times 15)cm^3$$

$$= 3375cm^3$$

Volume is given in cubic units such as cubic centimetres (cm^3), cubic metres (m^3) etc.

Example 17.

Find the volume of a cuboid whose measurements are 12cm by 11cm by 8cm.

$$V = L \times W \times H$$

$$= (12 \times 11 \times 8)cm^3$$

$$= 1056cm^3$$

Exercise 9.

Work individually

1. Find the volume in cubic metres.

a) b)

2. One cube measures 8cm, another cube measures 11cm. What is the sum of their volumes in cubic centimetres?
3. A rectangular container with a base area of $350m^2$ and a height of 20m is filled with juice. If the juice was packed into $250cm^3$ packets, how many packets were packed?
4. The volume of a rectangular tank is $72.9m^3$. The tank has a square base. If the height is 8.1 metres, what is the measure of one side of the square base?
5. A rectangular tank 45cm long and 25cm wide was $\frac{3}{4}$ full of water. What is the volume of water required to fill the tank?
6. A cube-shaped tank of 7.5m was full of water. After removing $14600cm^3$ of water the level of water become 5cm high. What was the height of the container?
7. A container with a volume of 0.09 cubic metres is full of water. The water is then poured into 15cubic centimeter containers. How many such containers are used?
8. One cube measures 0.8m. Another cuboid measures $1.2m \times 5m \times 0.3m$. What is the difference in their volume in cubic centimetres?
9. A company packs 250 packets of $750cm^3$ of pineapple juice while another packs 485 packets of $500cm^3$ of pineapple juice each day. How many cubic metres of juice the two companies pack in the month of October?

40 41

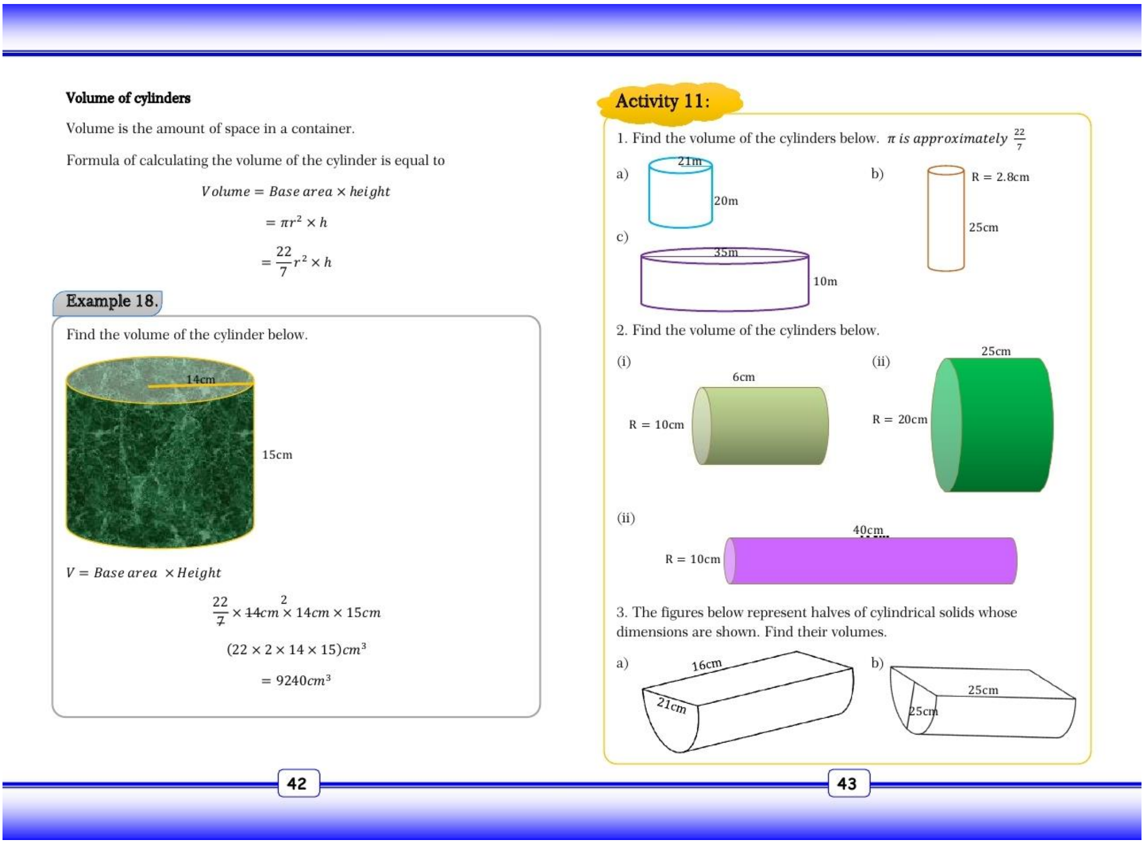
Exercise 9

This should be done by individual learners for you to evaluate the level of understanding of each learner.

Expected answers

1.
   a. $15m^3$
   b. $0.3m^3$
2. $1843cm^3$
3. 28 000 000 packets
4. 3m
5. ¼ xh (45 x 25) cm^3
6. 7.5m
7. 6 000 containers
8. $1.288cm^3$;$1288000m^3$

9. 13 330



Volume of cylinders

Volume is the amount of space in a container.

Formula of calculating the volume of the cylinder is equal to

$$Volume = Base\ area \times height$$
$$= \pi r^2 \times h$$
$$= \frac{22}{7} r^2 \times h$$

Example 18.

Find the volume of the cylinder below.

$V = Base\ area\ \times Height$

$\frac{22}{\cancel{7}} \times \cancel{14cm}^{2} \times 14cm \times 15cm$

$(22 \times 2 \times 14 \times 15)cm^3$

$= 9240cm^3$

Activity 11:

1. Find the volume of the cylinders below. π *is approximately* $\frac{22}{7}$

a) b) c)

2. Find the volume of the cylinders below.

(i) (ii) (ii)

3. The figures below represent halves of cylindrical solids whose dimensions are shown. Find their volumes.

a) b)

42 43

Activity 11

Guide learners to do the activity in pairs as you supervise them.

Expected answers

1.

a. $27720m^3$

b. $616\ cm^3$

c. $9625m^3$

2.

i. $1884\ cm^3$

ii. $31400\ cm^3$

iii. $12560cm^3$

3. a) $2772\ cm^3$

b) $24553.57\ cm^3$

2.6 Time, speed and distance

By the end of the sub unit, the learner should be able to solve problems involving speed.

2.6 Problems involving Time, speed and distance

Formula

$Time\ taken = Distance \div Speed.$ $T = D \div S$

$Speed = Distance \div Time\ taken.$ $S = D \div T$

$Distance = Speed \times Time\ taken$ $D = S \times T$

Conversion of M/s to Km/h

Example 19.

Convert 15m/s to km/h

1000m = 1Km 15m = 15÷1000km

3600sec = 1Hour 1Sec = 1÷3600 hour

Formula

$Speed = Distance \div (Time\ taken)$

$15 min\ in\ 1 sec = 15 \times 60 sec$

$15 \times 60 \times 60m$ in 1 hour

$$\frac{15 \times 60 \times 60}{1000} km\ in\ 1\ hour$$

$$= 54 Km/h$$

NB 1: m/s ⟶ Km/h

Take speed in $m/s \times \frac{3600}{1000}$

NB 2: Km/h ⟶ m/s

Take speed in $km/h \times \frac{1000}{3600}$

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Exercise 10.

Show how you got your answer

1. A cyclist took 18 minutes to travel from his home to school at a speed of 36Km/h. He took 20 minutes to travel back from school to his home. What was his average speed in M/s from school to his home?
2. A motorist left town C at 7.15a.m for town B a distance of 510km. He travelled the first 150km in $1\frac{1}{5}$ hours and stopped for 15 minutes to take a cup of tea. He went on with the journey arriving in town D at 12.55p.m. What was his average speed for the whole journey?
3. A driver started on a journey of 450km at 7.30a.m travelling at an average speed of 90km/h. After travelling for 120km, he rested for 25minutes. He then continued with the rest of the journey at an average speed of 60km/h. At what time did he complete the journey?
4. In a relay race Faiza ran 100m which is $\frac{1}{3}$ of the race in 3 minutes. Mukami ran another 100m in 5 minutes while Cheromo ran the remaining part in 2 minutes. What was the average speed for the whole race in m/s?
5. Ayesha left home and walked for $1\frac{1}{3}$ hours at an average speed of 9km/h. She rested for 20 minutes and continued with the journey for 3hours at an average speed of $4\frac{2}{15}$km/h. What was the average speed for the whole journey?
6. Imran left town R at 7.15a.m for town S travelling at a speed of 75km/h, Saima left town S at 8.00a.m for town R at a speed of 9 km/h. The two met at a place 225km away from town R. What was the distance between town R and S?

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Exercise 10

This should be done by individual learners for you to evaluate the level of understanding of each learner.

Expected answers

1. 32.4km/h
2. 94.44km/h
3. 2.45pm
4. 0.667m/s
5. 4.207km/h
6. 22.5km
7. 96km/h
8. 16km/h
9. 72km/h
10. 77.922km/h

UNIT 3: GEOMETRY

Learn about	Key inquiry questions
✍ Learners should review their prior experiences in constructing triangles and circles, and of inscribing and circumscribing them. ✍ Learners should apply this to construct, inscribe and circumscribe triangles of given sides and angles. For instance, they should construct an equilateral triangle and either inscribe it in a circle or circumscribe a circle in it. To encourage co-learning learners, in pairs or groups, should then apply the Pythagoras relationship to determine the lengths and areas of triangles and individually solve problems. ✍ By using their prior experiences of construction of straight lines, learners should understand how to make curved patterns from straight lines and nets, and use this knowledge and understanding to make envelopes, pyramids and prisms (shapes of two or three dimensions). ✍ Learners should know about plotting points and understand how to plot co-ordinates and solve problems involving linear scale and the use of coordinates in creating pyramids and prisms.	• How do we inscribe and circumscribe circles and triangles? • Why do we have to apply Pythagoras relationship? • How do we make curved patterns and what are their uses? • Why do we use linear scale in representing geometrical shapes? • Why do we use coordinates in forming geometrical shapes?

Learning outcomes		
Knowledge and understanding	**Skills**	**Attitudes**
• Constructing, inscribing and circumscribing triangles of given sides and angles • Applying Pythagoras relationships to length and areas of triangles. • Making curved patterns from straight lines and nets for envelopes, pyramids and prisms. • Solving problems involving scale. • Use of co-ordinates.	• Construct inscribe and circumscribe triangles. • Use of Pythagorean relationship. • Be able to manipulate straight lines and nets into curved patterns. • Apply curved patterns to make envelopes, pyramids and prisms. • Use coordinates and linear scales to determine size and position of objects.	• Appreciate geometrical constructions, calculations and the use of geometry in their daily life. • Enjoy the use of linear scales and coordinates in geometry. • Challenge learners to explore and investigate and to take responsibility for their own learning.

Contribution to the competencies:

Critical thinking: management of constructions, computations and uses of geometry

Communication and Co-operation: group work

Links to other subjects:

Links to a range of subjects such as Science and Social Studies where shapes are used.

UNIT 3: GEOMETRY

In Primary 7 learners studied about transversal lines, angles between transversals and parallel lines.
Learners also constructed equilateral, isosceles, right angled triangles and distinguish between them.
Learners were also taken through distinguishing between rhombuses, parallelograms and trapeziums.
They also studied the use of Pythagoras theorem. In this level they shall review the Primary 7 content and delve further into determining surface area and volumes of common geometrical solids.

3.1 Inscribing and circumscribing circles of triangles

UNIT 3: GEOMETRY

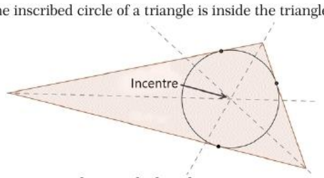
3.1 Inscribing and circumscribing circles of triangles

Given a triangle, what's the difference between the **inscribed circle** of the triangle and the **circumscribed circle** of the triangle?

Inscribing a circle

Given a triangle, an **inscribed circle** is the largest circle contained within the triangle. The inscribed circle will touch each of the three sides of the triangle in exactly one point. The center of the circle inscribed in a triangle is the **incentre** of the triangle, the point where the angle bisectors of the triangle meet.

NB: The inscribed circle of a triangle is inside the triangle.



Steps to construct the inscribed circle:

Bisect the angles of the triangle and produce them such that they intersect somewhere within the circle. The point of intersection is known as the incentre.

Draw a triangle. Construct the angle bisectors of two of its angles. Why is the point of intersection of the two angle bisectors the incentre of the circle?

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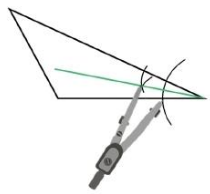
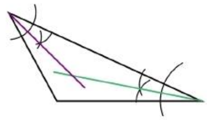
Use your Pair of compasses and straightedge to construct the angle bisector of one of the angles.



Repeat with a second angle.



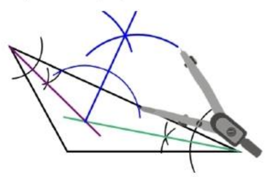
The point of intersection of the angle bisectors is the incentre.

It is not necessary to construct all three angle bisectors because they all meet in the same point. The third angle bisector does not provide any new information.

The segment connecting the incentre with the point of intersection of the triangle and the bisector is the radius of the circle.

Construct a circle centered at the incentre that passes through the point of intersection of the side of the triangle and the perpendicular line from the problem above.

Construct a line perpendicular to one side of the triangle that passes through the incentre of the triangle.



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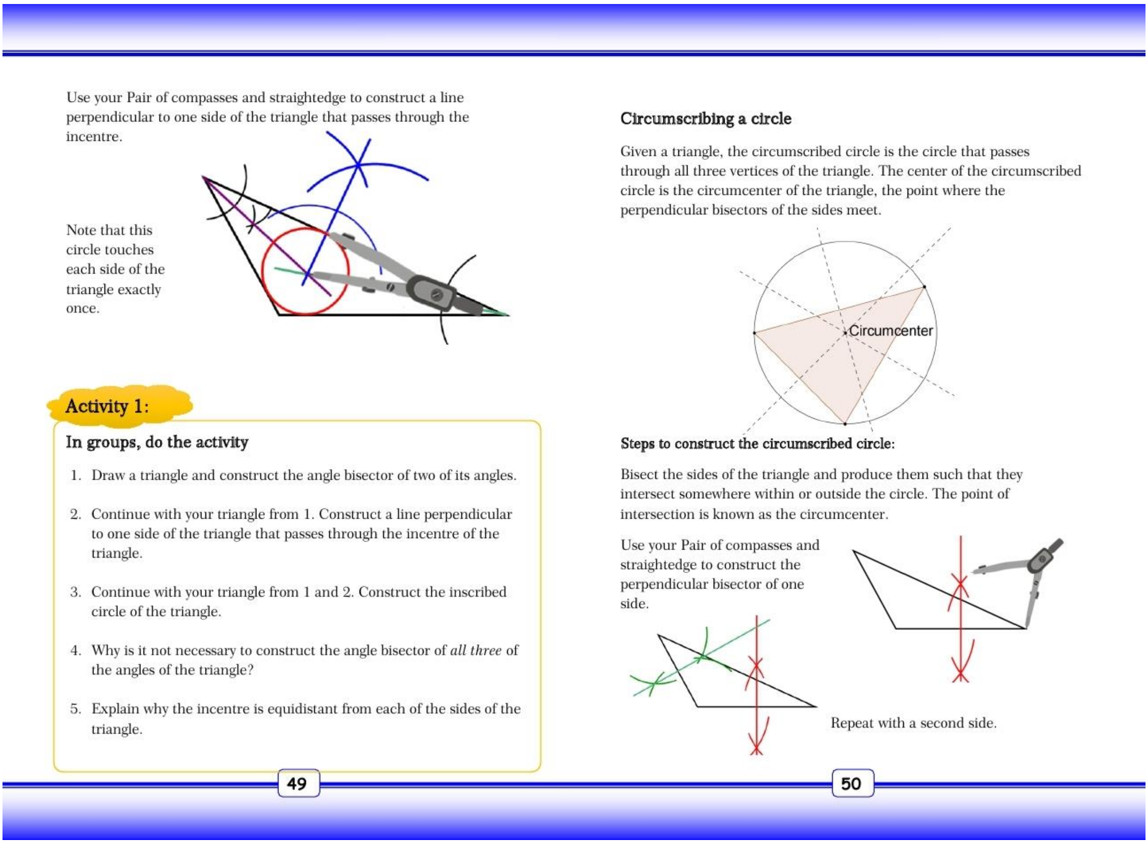
Learners should be able to inscribe and circumscribe circles on triangles. To inscribe, learners be guided on bisection of the angles. The point of intersection of the bisectors is the centre of the circle.

To circumscribe, learners to be guided on bisection of the lines or the edges. The point of intersection of the bisectors is the centre of the circle.



Use your Pair of compasses and straightedge to construct a line perpendicular to one side of the triangle that passes through the incentre.

Note that this circle touches each side of the triangle exactly once.

Activity 1:

In groups, do the activity

1. Draw a triangle and construct the angle bisector of two of its angles.
2. Continue with your triangle from 1. Construct a line perpendicular to one side of the triangle that passes through the incentre of the triangle.
3. Continue with your triangle from 1 and 2. Construct the inscribed circle of the triangle.
4. Why is it not necessary to construct the angle bisector of *all three* of the angles of the triangle?
5. Explain why the incentre is equidistant from each of the sides of the triangle.

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Circumscribing a circle

Given a triangle, the circumscribed circle is the circle that passes through all three vertices of the triangle. The center of the circumscribed circle is the circumcenter of the triangle, the point where the perpendicular bisectors of the sides meet.

Steps to construct the circumscribed circle:

Bisect the sides of the triangle and produce them such that they intersect somewhere within or outside the circle. The point of intersection is known as the circumcenter.

Use your Pair of compasses and straightedge to construct the perpendicular bisector of one side.

Repeat with a second side.

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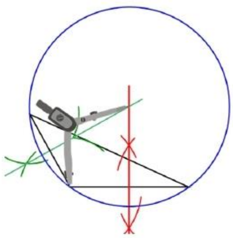
Activity 1

Divide learners into groups.
Guide learners to draw a triangle and bisect angles.
Guide leaners to follow the steps provided in the learners book.
Allow them to express themselves by explaining point 4 & 5.
This will help learners to inscribe a triangle.

The point of intersection of the perpendicular bisectors is the circumcenter.

It is not necessary to construct all three perpendicular bisectors because they all meet in the same point. The third perpendicular bisector does not provide any new information.

Construct a circle centered at the circumcenter that passes through one of the vertices of the triangle. This circle should pass through *all three* vertices.



Activity 2:

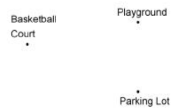
In groups, do the activity

1. Draw a triangle and construct the perpendicular bisector of two of its sides.
2. Continue with your triangle from #1. Construct the circumscribed circle of the triangle.
3. Explain why the circumcenter is equidistant from each of the vertices of the triangle.

Exercise 1.

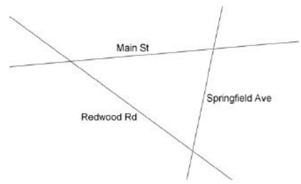
Work in groups;

1. You work selling food from a food truck at a local park. You want to position your truck so that it is the same distance away from each of the three locations shown on the map below.



   a. Is the point of interest the incentre or the circumcenter? How do you know, explain your thinking to the group.
   b. Find the point on the map that is equidistant from each of the three locations.

2. A new elementary school is to be constructed in your town. The plan is to build the school so that it is the same distance away from each of the three major roads shown in the map below.



   a. Is the point of interest the incentre or the circumcenter?
   b. Find the point on the map that is equidistant from each of the three roads.

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Activity 2

Divide learners into groups.

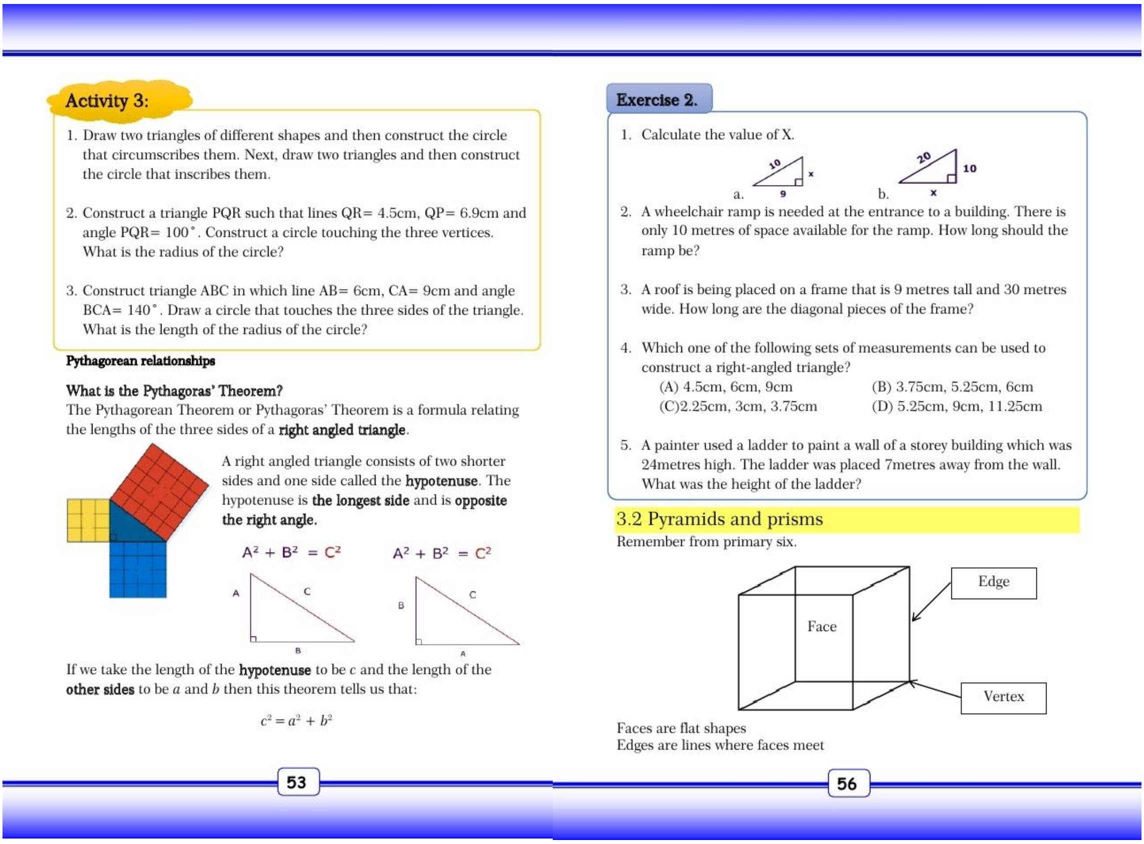
Guide learners to draw a triangle and bisect sides.

Guide leaners to follow the steps provided in the learners book.

Exercise 1

Guide learners to copy the questions in their exercise books and let them attempt.

Answers may differ because the distance may differ from one learner to the other.



Activity 3:

1. 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.
2. Construct a triangle PQR such that lines QR= 4.5cm, QP= 6.9cm and angle PQR= 100°. Construct a circle touching the three vertices. What is the radius of the circle?
3. Construct triangle ABC in which line AB= 6cm, CA= 9cm and angle BCA= 140°. Draw a circle that touches the three sides of the triangle. What is the length of the radius of the circle?

Pythagorean relationships

What is the Pythagoras' Theorem?
The Pythagorean Theorem or Pythagoras' Theorem is a formula relating the lengths of the three sides of a **right angled triangle**.

A right angled triangle consists of two shorter sides and one side called the **hypotenuse**. The hypotenuse is **the longest side** and is **opposite the right angle.**

$A^2 + B^2 = C^2$ $\quad$ $A^2 + B^2 = C^2$

If we take the length of the **hypotenuse** to be *c* and the length of the **other sides** to be *a* and *b* then this theorem tells us that:

$$c^2 = a^2 + b^2$$

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Exercise 2.

1. Calculate the value of X.
   a. b.
2. A wheelchair ramp is needed at the entrance to a building. There is only 10 metres of space available for the ramp. How long should the ramp be?
3. A roof is being placed on a frame that is 9 metres tall and 30 metres wide. How long are the diagonal pieces of the frame?
4. Which one of the following sets of measurements can be used to construct a right-angled triangle?
   (A) 4.5cm, 6cm, 9cm (B) 3.75cm, 5.25cm, 6cm
   (C)2.25cm, 3cm, 3.75cm (D) 5.25cm, 9cm, 11.25cm
5. A painter used a ladder to paint a wall of a storey building which was 24metres high. The ladder was placed 7metres away from the wall. What was the height of the ladder?

3.2 Pyramids and prisms
Remember from primary six.

Faces are flat shapes
Edges are lines where faces meet

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Activity 3

Guide learners to choose their partners, let the learners carry out the activities.

This activity will help learners understand inscribing and circumscribing of triangles.

Exercise 2

1.

a. 3

b. 17.32

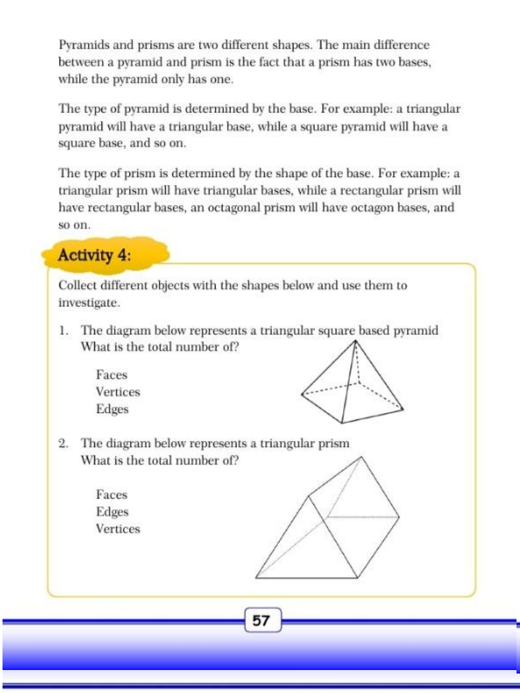
2. $(\text{Hypotenuse})^2 = 10^2 + (\text{height})^2$

3. 31.32m

4. C

5. 22m

3.2 Pyramids and prisms.



Pyramids and prisms are two different shapes. The main difference between a pyramid and prism is the fact that a prism has two bases, while the pyramid only has one.

The type of pyramid is determined by the base. For example: a triangular pyramid will have a triangular base, while a square pyramid will have a square base, and so on.

The type of prism is determined by the shape of the base. For example: a triangular prism will have triangular bases, while a rectangular prism will have rectangular bases, an octagonal prism will have octagon bases, and so on.

Activity 4:

Collect different objects with the shapes below and use them to investigate.

1. The diagram below represents a triangular square based pyramid
   What is the total number of?

   Faces
   Vertices
   Edges

2. The diagram below represents a triangular prism
   What is the total number of?

   Faces
   Edges
   Vertices

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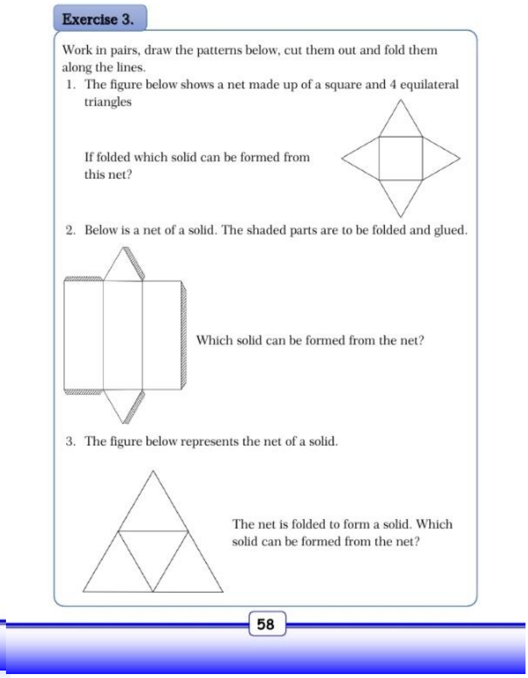

Exercise 3.

Work in pairs, draw the patterns below, cut them out and fold them along the lines.

1. The figure below shows a net made up of a square and 4 equilateral triangles

   If folded which solid can be formed from this net?

2. Below is a net of a solid. The shaded parts are to be folded and glued.

   Which solid can be formed from the net?

3. The figure below represents the net of a solid.

   The net is folded to form a solid. Which solid can be formed from the net?

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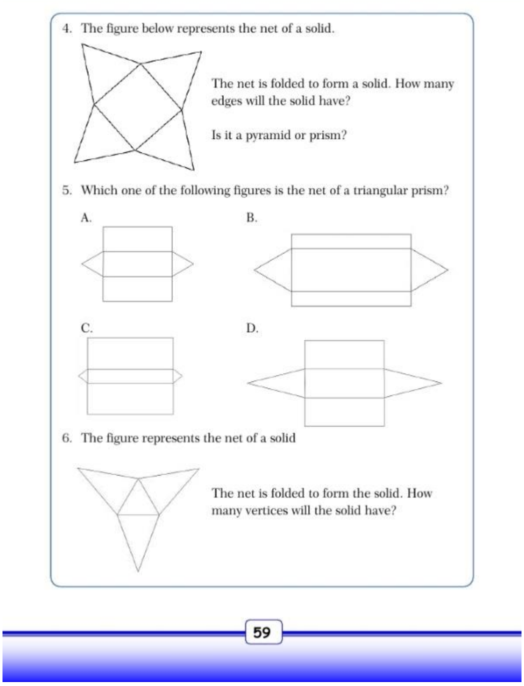

4. The figure below represents the net of a solid.

   The net is folded to form a solid. How many edges will the solid have?

   Is it a pyramid or prism?

5. Which one of the following figures is the net of a triangular prism?

   A.
   B.
   C.
   D.

6. The figure represents the net of a solid

   The net is folded to form the solid. How many vertices will the solid have?

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Learners to be taken through the differences between pyramids and prisms. Also to differentiate between, faces, vertices and edges.

Activity 4

1. 5 faces; 5 vertices, 8 edges

2. 5 faces; 6 vertices; 6 edges

Exercise 3

1. Pyramid
2. Prism
3. Triangular prism
4. 5 edges; pyramid
5. None
6. 6 vertices

3.3 Scale

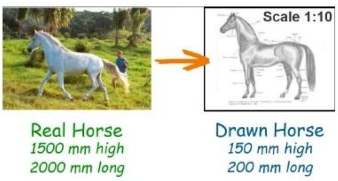
Learners to be taken through the relationship between actual distances and representative distances on diagrams and maps.

The relationship is called scale. Scale is commonly given in relationships of centimeters.

That is, distance on the map or diagram is equivalent to a given distance on the ground.

3.3 Scale

Scale is the ratio of the length in a drawing (or model) to the length of the real things.



In the drawing anything with the size of "1" would have a size of "10" in the real world, so a measurement of 150mm on the drawing would be 1500mm on real life.

Example 3.

A road 3km is represented by a line 8cm long. What is the length of a road 12cm long?

$$8cm = 3km$$
$$8cm = 3000m$$
$$\therefore 1cm = ?$$

Cross multiply $\frac{1 \times 3000}{8}$

$\therefore 1cm$ is $375m$

1cm rep 0.375km

$\therefore 12cm$ Will be 0.375×12

$\underline{= 4.4km}$

Activity 5:

In groups measure the following and use the scale 1:100 to draw them on a paper.

a. School Compound.
b. Class room.
c. Playing ground.

Exercise 4.

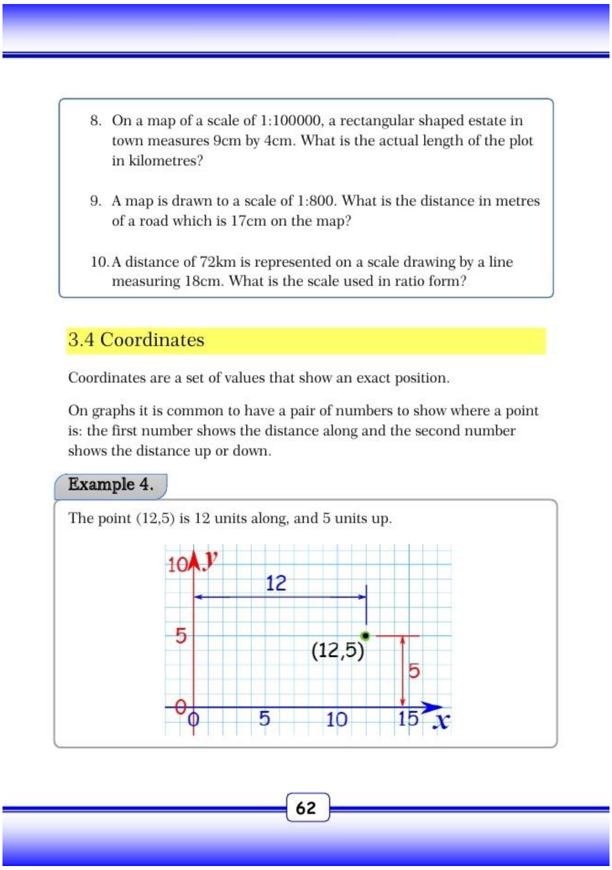
In groups, work out problems involving scale drawings.

1. A section of a tarmac road measures 8.5km, if it is drawn on a map it measures 17cm. What was the scale used?
2. A river measuring 5cm on a map has a length of 75km. What is the scale used on the map?
3. A map whose scale was 1:100000, an actual length of a right-angled plot of land measures 70m by 50m. What was the area of the triangular plot on the map?
4. On a map, 7.5cm represents 90km of the border of a certain county. What is the scale used?
5. A map is drawn to a scale of 1:15000. What is the distance in kilometres of a road which is 13.5cm on a map?
6. In scale drawing 1cm on a map represents an actual length of 25m. What area in the drawing will represent an actual area of 1 hectare?
7. A road is represented on a map by 3cm. What is the actual length of the road in kilometres if the scale used is 1:125000?

60 61

Exercise 4

This should be done by individual learners for you to evaluate the level of understanding of each learner.



8. On a map of a scale of 1:100000, a rectangular shaped estate in town measures 9cm by 4cm. What is the actual length of the plot in kilometres?

9. A map is drawn to a scale of 1:800. What is the distance in metres of a road which is 17cm on the map?

10. A distance of 72km is represented on a scale drawing by a line measuring 18cm. What is the scale used in ratio form?

3.4 Coordinates

Coordinates are a set of values that show an exact position.

On graphs it is common to have a pair of numbers to show where a point is: the first number shows the distance along and the second number shows the distance up or down.

Example 4.

The point (12,5) is 12 units along, and 5 units up.

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Expected answers

1. 1:50 000
2. 1:1 500 000
3. 0.0035m^2
4. 1:1 200 000
5. 2.025km
6. 16cm^2
7. 3.75km
8. 9km by 4km
9. 136m
10. 1:400 000

3.4 Coordinates

Coordinates are a set of values that show an exact position.

On graphs it is common to have a pair of numbers to show where a point is: the first number shows the distance along and the second number shows the distance up or down.

On maps the two coordinates often mean how far North/South and East/West.

There are other types of coordinates, too, such as polar coordinates and 3 dimensional coordinates.

Plotting points on a Cartesian plane

Just like with the Number Line, we can also have negative values.

Negative: start at zero and head in the opposite direction:

Negative x goes to the left, negative y goes down

For example (-6,4) means:
go back along the x axis 6 then go up 4.

And (-6,-4) means:
go back along the x axis 6 then go down 4.

Four Quadrants

When we include negative values, the x and y axes divide the space up into 4 pieces: Quadrants I, II, III and IV

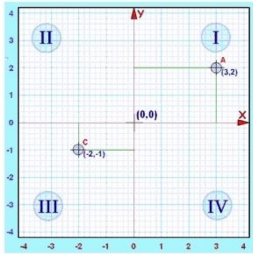
In Quadrant I both x and y are positive, but in Quadrant II x is negative (y is still positive), in Quadrant III both x and y are negative, and in Quadrant IV x is positive again, while y is negative.

Like this:

Quadrant	X (horizontal)	Y (vertical)	Example
I	Positive	Positive	(3,2)
II	Negative	Positive	
III	Negative	Negative	(-2,-1)
IV	Positive	Negative	

(They are numbered in a counterclockwise direction)

Example 5.



The point "A" (3,2) is 3 units along, and 2 units up.

Both x and y are positive, so that point is in "Quadrant I"

Example: The point "C" (-2,-1) is 2 units along in the negative direction, and 1 unit down (i.e. negative direction).

Both x and y are negative, so that point is in "Quadrant III"

Note: The word Quadrant comes from ***quad*** meaning four. For example, four babies born at one birth are called ***quadruplets*** and a ***quadrilateral*** is a four-sided ***polygon***.

UNIT 4: ALGEBRA

Learn about	Key inquiry questions
✍ Learners should revisit prior learning to find numerical values of algebraic expressions by substitution as well as forming algebraic expression from mathematical statements. They work in groups and individually investigate more complex algebraic expression in terms of their formations, simplifications and evaluations. ✍ Learners should solve problems involving quantities and variables of high order and write out mathematical expressions into equations and formulae. As they compute algebraic equations, they should begin to think critically for themselves and apply the investigative skills on algebraic equations in daily life. ✍ Learners should build their understanding and skills about sets and the notions of union, intersection, empty sets and equal sets. They should work in groups and individually to solve more complex problems involving set operations such finding intersection and difference of two sets **Q**= $[A, 3, x]$; and set **R**= $[A, y, 13, z, 3]$.	• How do we form algebraic statements? • How and why do we simplify algebraic statements? • Why do we represent sets, set elements in Venn diagrams? • How do we describe set of given elements?

<table>
<tr><td colspan="2">✍ Learners should be introduced to Venn diagrams and represent mathematical information in pictorial forms. As they work in teams their analytical abilities and critical thinking processes should broaden in dealing with concepts involving sets.</td><td></td></tr>
<tr><td colspan="3">Learning outcomes</td></tr>
<tr><td>Knowledge and understanding</td><td>Skills</td><td>Attitudes</td></tr>
<tr><td>• Formation, simplification and evaluation of algebraic expressions
• Sets, union of sets, empty, unequal and intersection of sets
• Understand and produce Venn diagrams (up to 2 sets).</td><td>• Be able to formulate and simplify algebraic expressions
• Be able combine and evaluate algebraic statements
• Work out sets operations
• Be able to draw and interpret Venn diagrams.</td><td>• Enjoy and value the formation, simplification and evaluation of algebraic expressions and sets operations
• Appreciate the use of Venn diagram to represent sets
• Challenge learners to explore and 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>: formation of algebraic expression from mathematical statements.
<u>Communication</u>: interpretation of 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 algebra is used.</td></tr>
</table>

4.1 Simplifying algebraic expressions

Guide the learners through understanding what algebra is as a branch of Mathematics that uses letters in place of some unknown numbers.

Let learners know that all Mathematical formulae are algebraic expressions or equations.

Take the learners through the rules applied in simplifying algebraic expressions, that is the use of BODMAS and putting like terms together.

UNIT 4: ALGEBRA

In algebra, we use letters to represent to represent unknown numbers.

4.1 Simplifying algebraic expressions

Put like terms together. A letter or a number with a letter in algebra is known as a term.

Example 1.

i. $y + y + y + y + y$ is put together as $5 \times y = 5y$.
ii. $m + m + m + m + m + m = 6 \times m = 6m$

When simplifying algebraic expressions, similar letters should be put together.

1. The operation sign (+ or –) placed before a term is for that term and determines the operation to be performed.
   i. + 7n means add 7n; - 9a means subtract 9a.
   ii. 12a – 7a means subtract 7a from 12a which results to 5a.
   $= 13y - 4y = 9y$
   iii. $p + 2p + 3p - 4p = 2p$
   iv. $3n + 7m + 15n - 4m - 11n$
   Putting like terms together we get;
   $$= (3n + 15n - 11n) + (7m - 4m) = 7n + 3m$$
   $$= 2\frac{1}{2}p + 4\frac{1}{4}q - \frac{3}{4}p - 2\frac{1}{2}q$$
   Putting like terms together
   $$= (2\frac{1}{2}p - \frac{3}{4}p) + (4\frac{1}{4}q - 2\frac{1}{2}q)$$
   $$= 1\frac{3}{4}p + 2q$$
   v. $\frac{1}{2}(5x + 7y) + \frac{1}{4}(3x - 6y)$

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Multiply every term in the brackets by the value outside the bracket.
$$= \frac{5}{2}x + \frac{7}{2}y + 3/4x - 6/4y$$
Putting like terms together
$$= \frac{5}{2}x + \frac{3}{4}x + \frac{7}{2}y - \frac{3}{2}y = \frac{13}{4}x + \frac{4}{2}y$$
$$= \frac{13}{4}x + 2y$$
vi. $\frac{15a + 12b - 6a + 8b}{4(3a - 2b) + 13b}$
$$= \frac{15a - 6a + 12b + 8b}{12a - 8b + 13b}$$
$$= \frac{9a + 20b}{12a + 13b - 8b}$$
$$= \frac{9a + 20b}{12a + 5b}$$

Activity 1:

Simplify the algebraic expressions below:
i. $d + 3d - 5d + 7d$
ii. $\frac{1}{2}(18x + 24y) - \frac{1}{4}(20x + 16y)$
iii. $\frac{\frac{3}{5}(15a + 20b) - \frac{2}{3}(9a - 6b)}{\frac{3}{4}(8a - 12b) + 16b}$
iv. $2.5m + 7 - 1.45m + 13$
v. $\frac{5}{8}(32p - 16q) + \frac{3}{7}(14 + 21q)$
vi. $36(\frac{3}{4}x + \frac{5}{6}y - \frac{3}{8}x) - \frac{4}{5}(10x + 20y)$
vii. $(6 + 3)w + 11w - 6$

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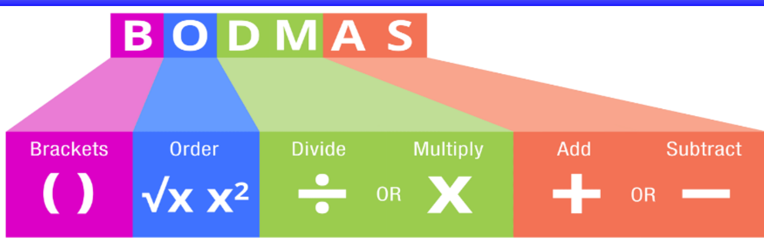
Display this to learners for them to remember.



Activity 1

Learners to take the activity in groups, as you supervise.

Expected answers

i. $6d$

ii. $4x + 8y$

iii. $\frac{3a + 8b}{6a + 7b}$

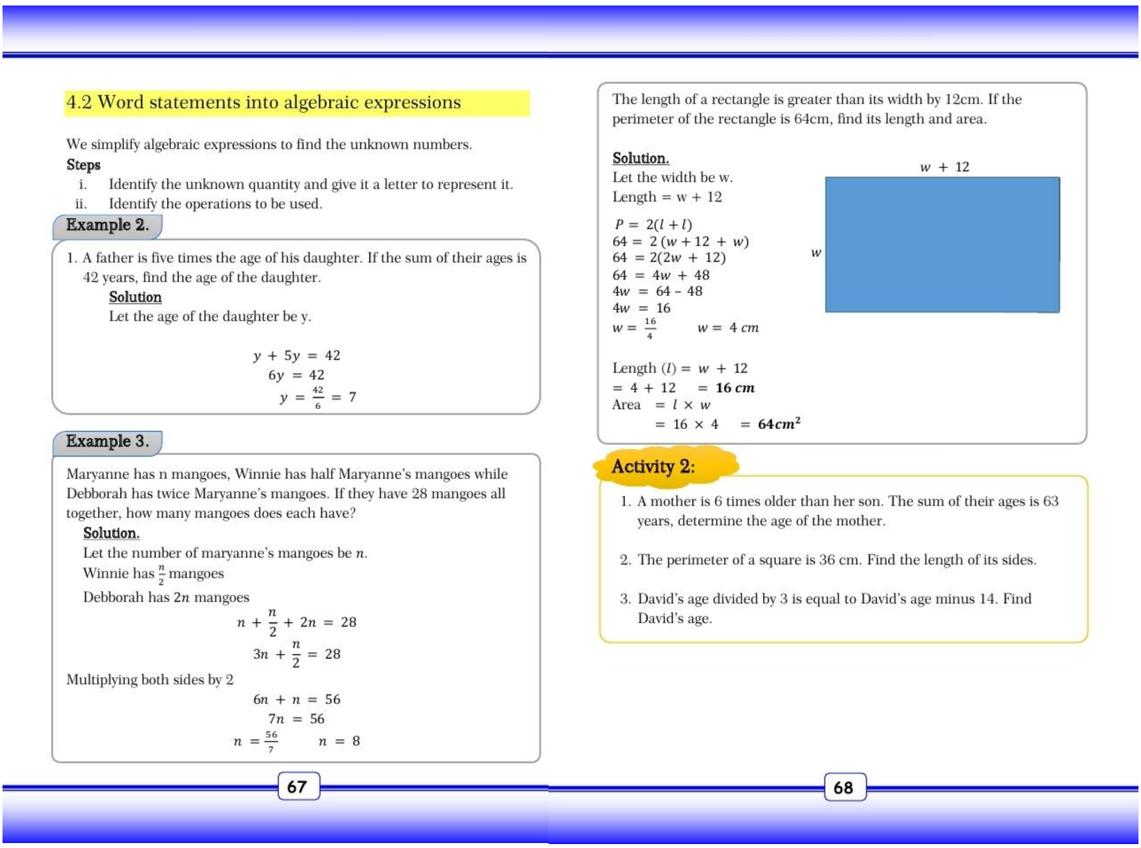
iv. $1.05m + 20$

v. $20p - q + 6$

vi. $5.5x + 14y$

vii. $20w – 6$

4.2 Word statement into algebraic expressions



4.2 Word statements into algebraic expressions

We simplify algebraic expressions to find the unknown numbers.

Steps

i. Identify the unknown quantity and give it a letter to represent it.
ii. Identify the operations to be used.

Example 2.

1. A father is five times the age of his daughter. If the sum of their ages is 42 years, find the age of the daughter.

Solution

Let the age of the daughter be y.

$$y + 5y = 42$$
$$6y = 42$$
$$y = \frac{42}{6} = 7$$

Example 3.

Maryanne has n mangoes, Winnie has half Maryanne's mangoes while Debborah has twice Maryanne's mangoes. If they have 28 mangoes all together, how many mangoes does each have?

Solution.

Let the number of maryanne's mangoes be n.

Winnie has $\frac{n}{2}$ mangoes

Debborah has $2n$ mangoes

$$n + \frac{n}{2} + 2n = 28$$
$$3n + \frac{n}{2} = 28$$

Multiplying both sides by 2

$$6n + n = 56$$
$$7n = 56$$
$$n = \frac{56}{7} \qquad n = 8$$

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The length of a rectangle is greater than its width by 12cm. If the perimeter of the rectangle is 64cm, find its length and area.

Solution.

Let the width be w.

Length = w + 12

$P = 2(l + l)$
$64 = 2(w + 12 + w)$
$64 = 2(2w + 12)$
$64 = 4w + 48$
$4w = 64 - 48$
$4w = 16$
$w = \frac{16}{4} \qquad w = 4\ cm$

Length $(l) = w + 12$
$= 4 + 12 \quad = \mathbf{16\ cm}$
Area $= l \times w$
$= 16 \times 4 \quad = \mathbf{64 cm^2}$

Activity 2:

1. A mother is 6 times older than her son. The sum of their ages is 63 years, determine the age of the mother.
2. The perimeter of a square is 36 cm. Find the length of its sides.
3. David's age divided by 3 is equal to David's age minus 14. Find David's age.

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Activity 2

Learners to take the activity in pairs as you supervise.

Expected answers.

54 years
9cm
21 years

4.3 Sets

Guide learners on sets by using the notes provided in the learners book.

Using examples in the learner's book, it will help learners to understand the concept of sets.

4.3 Sets

What is a Set?

A set is a well-defined collection of distinct objects.

Example 4.

A = {1, 2, 3, 4, 5}

What is an element of a Set?

The objects in a set are called its elements.

So in case of the above Set A, the elements would be 1, 2, 3, 4, and 5. We can say, $1 \in A$, $2 \in A$

Usually we denote Sets by CAPITAL LETTERs like A, B, C, etc. while their elements are denoted in small letters like x, y, z

If x is an element of A, then we say x belongs to A and we represent it as $x \in A$

If x is not an element of A, then we say that x does not belong to A and we represent it as $x \notin A$

How to describe a Set?

Sets of Numbers

Natural Numbers ($\mathbb{N}$)

$\mathbb{N}$ = {1, 2, 3,4 ,5 6, 7, ...}

Integers (Z)

$\mathbb{Z}$ = {..., -3, -2, -1, 0, 1, 2, 3, 4, ...}

Whole Numbers ($\mathbb{Z}_0^+$)

$\mathbb{Z}_0^+$ = {0, 1, 2, 3 4, 5, 6...}

Rational Numbers ($\mathbb{Q}$)

$\{\frac{p}{q}: p \in \mathbb{Z}, q \in \mathbb{Z}, q \neq 0\}$

Exercise 1.

List the elements of the following sets.

(a) A = The set of all even numbers less than 12
(b) B = The set of all prime numbers greater than 1 but less than 29
(c) C = The set of integers lying between -2 and 2
(d) D = The set of letters in the word LOYAL
(e) E = The set of vowels in the word CHOICE
(f) F = The set of all factors of 36
(g) G = {x : x ∈ N, 5 < x < 12}
(h) H = {x : x is a multiple of 3 and x < 21}
(i) I = {x : x is perfect cube 27 < x < 216}
(j) J = {x : x = 5n - 3,n ∈ W, and n < 3}
(k) M = {x : x is a positive integer and x2 < 40}
(l) N = {x : x is a positive integer and is a divisor of 18}
(m) P = {x : x is an integer and x + 1 = 1}
(n) Q = {x : x is a color in the rainbow}

4. Write each of the following sets.

(a) A = {5, 10, 15, 20}	(b) B = {l, 2, 3, 6, 9, 18}
(c) C = {P, R, I, N, C, A, L}	(d) D = {0}
(e) E = { }	(f) F = {0, 1, 2, 3, ..., 19}
(g) G = {—8, —6, —4, —2}	(h) H = {Jan, June, July}
(i) I = {a, e, i, 0, u}	(j) J = {a, b, c, d, ..., z}
(k) K = {1/1, 1/2, 1/3, 1/4, 1/5, 1/6}	(l) L = {1, 3, 5, 7, 9}

Exercise 1

Expected Answers

(a) {2, 4, 6, 8, 10}

(b) {2, 3, 5, 7, 11, 13, 17, 19, 23}

(c) {-1, 0, 2}

(d) {L, O, Y, A}

(e) {O, I, E}

(f) {1, 2, 3, 4, 6, 9, 12, 18, 36}

(g) {6, 7, 8, 9, 10, 11}

(h) {3, 6, 9, 12, 15, 18}

(i) {64, 125}

(j) {-3, 2, 7}

(k) {1, 2, 3, 4, 5, 6}

(l) {1, 2, 3, 6, 9, 18}

(m) {O}

(n) {red, orange, yellow, green, blue, indigo, violet}

(a) $\{x : x$ is a multiple of 5 and $5 \leq x \leq 20\}$

(b) $\{x : x$ is a factor of $18\}$

(c) $\{x : x$ is a letter of the word 'Principal'$\}$

(d) $\{x : x \in W$ and $x < 1\}$

(e) $\{x : x \in N$ and $x < 1)$

(f) $\{x : x \in W$ and $0 \leq x \leq 19\}$

(g) $\{x : x = -2n$ and $n \in N$ and $1 \leq n \leq 4\}$

(h) $\{x : x$ is a month of the year beginning with J$\}$

(i) $\{x : x$ is a vowel of the English alphabet$\}$

(j) $\{x : x$ is a letter of the English alphabet$\}$

(k) $\{x : x = 1/x, n \in N$ and $1 \leq n \leq 6\}$

(l) $\{x : x$ is odd, $x \leq 9\}$

4.4 Finite Sets & Infinite Sets

Finite Set: A set where the process of counting the elements of the set would surely come to an end is called finite set.

Example: All natural numbers less than 50

All factors of the number 36

4.4 Finite Sets & Infinite Sets

Finite Set: A set where the process of counting the elements of the set would surely come to an end is called finite set.

Example 7.

All natural numbers less than 50
All factors of the number 36

Infinite Set: A set that consists of uncountable number of distinct elements is called infinite set.

Example 8.

Set containing all natural numbers $\{x : x \in \mathbb{N}, x > 100\}$

Cardinal number of Finite Set

The number of distinct elements contained in a finite set A is called the cardinal number of A and is denoted by n(A)

Example 9.

$A = \{1, 2, 3, 4\}$ then $n(A) = 4$

$A = \{x : x$ is a letter in the word 'APPLE'$\}$. Therefore $A = \{A, P, L, E\}$ and $n(A) = 4$

$A = \{x : x$ is the factor of $36\}$, Therefore $A = \{1, 2, 3, 4, 6, 9, 12, 18, 36\}$ and $n(A) = 9$

Empty Set

A set containing no elements at all is called an empty set or a null set or a void set.

It is denoted by ϕ

Also $n(\phi) = 0$

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Example 10.

$\{x : x \in N, 3 < x < 4\} = \phi$

$\{x : x$ is an even prime number, $x > 5\} = \phi$

Non Empty Set

A set which has at least one element is called a non-empty set

Example 11.

$A = \{1, 2, 3\}$ or $B = \{1\}$

Equal Sets

Two set A and B are said to be equal sets and written as $A = B$ if every element of A is in B and every element of B is in A

Example 12.

$A = \{1, 2, 3, 4\}$ and $B = \{4, 2, 3, 1\}$

It is not about the number of elements. It is the elements themselves.

If the sets are not equal, then we write as $A \neq B$

Universal Set

If there are some sets in consideration, then there happens to be a set which is a super set of each one of the given sets. Such a set is known as universal set, to be denoted by U.

i.e. if $A = \{1, 2\}$, $B = \{3, 4\}$, and $C = \{1, 5\}$, then $U = \{1, 2, 3, 4, 5\}$

What is a Venn diagram?

A Venn diagram uses overlapping circles to illustrate the relationships between two or more sets of items. Often, they serve to graphically organize things, highlighting how the items are similar and different.

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Infinite Set: A set that consists of uncountable number of distinct elements is called infinite set.

Example: Set containing all natural numbers $\{x \mid x \in N, x > 100\}$

Cardinal number of Finite Set

The number of distinct elements contained in a finite set A is called the cardinal number of A and is denoted by n(A)

Exercise 3

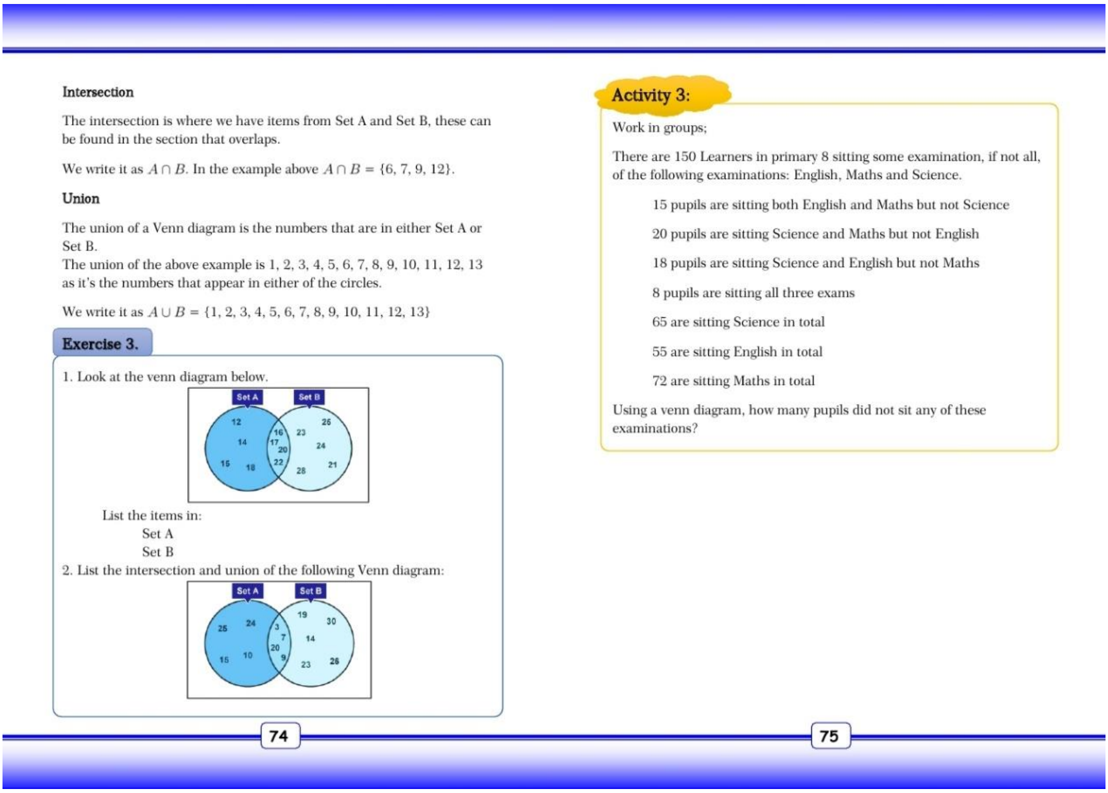
Expected Answers

1. Set A = {12, 14, 15, 16, 17, 18, 20, 22}

   Set B = {16, 17, 20, 21, 22, 23, 24, 25, 28}

2. Intersection – $A \cap B$ = {3, 7, 9, 20}

   Union – $A \cup B$ = {3, 7, 9, 10, 14, 15, 19, 20, 23, 24, 25, 26, 30}



Intersection

The intersection is where we have items from Set A and Set B, these can be found in the section that overlaps.

We write it as $A \cap B$. In the example above $A \cap B$ = {6, 7, 9, 12}.

Union

The union of a Venn diagram is the numbers that are in either Set A or Set B.
The union of the above example is 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 as it's the numbers that appear in either of the circles.

We write it as $A \cup B$ = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13}

Exercise 3.

1. Look at the venn diagram below.

List the items in:
Set A
Set B

2. List the intersection and union of the following Venn diagram:

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Activity 3:

Work in groups;

There are 150 Learners in primary 8 sitting some examination, if not all, of the following examinations: English, Maths and Science.

15 pupils are sitting both English and Maths but not Science

20 pupils are sitting Science and Maths but not English

18 pupils are sitting Science and English but not Maths

8 pupils are sitting all three exams

65 are sitting Science in total

55 are sitting English in total

72 are sitting Maths in total

Using a venn diagram, how many pupils did not sit any of these examinations?

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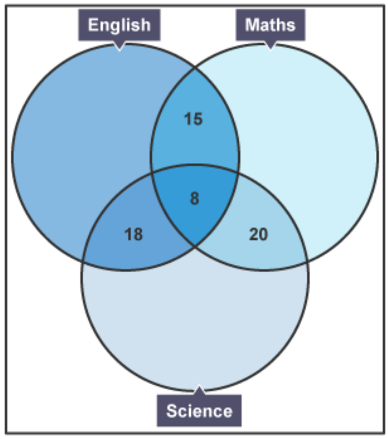
Activity 3

Expected answers and how to get it right

Guide learners to form groups and they should start by filling in as much information as possible on the Venn diagram:

You can see each circle only has one section missing. Since we know the total number that took each subject, we can work out those missing sections.

Science

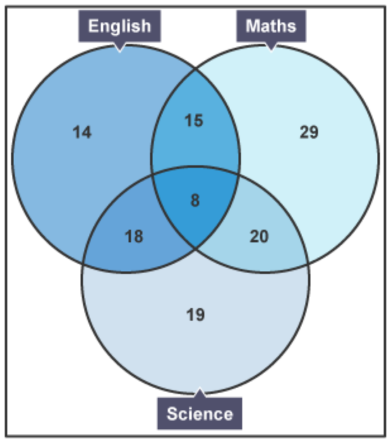


20 + 18 + 8 = 46
65 are sitting Science altogether
65 – 46 = 19
19 pupils are sitting Science only

Maths

20 + 15 + 8 = 43
72 are sitting Maths
72 – 43 = 29
29 pupils sitting Maths only

English



18 + 15 + 8 = 41
55 of the pupils are sitting English
55 – 41 = 14
14 pupils are sitting English only

We can now fill in this information on our diagram.

Let's add the values we have so far:

14 + 15 + 18 + 19 + 20 + 8 + 29 = 123

Now subtract this from the total number of pupils in Primary 8.

150 – 123 = 27

So we know 123 pupils will sit exams and since there are 150 pupils in the year group, there must be 27 pupils who did not sit any of these examinations.

UNIT 5: STATISTICS

Learn about	Key inquiry questions
✍ Learners should review their prior learning on drawing statistical graphs and determining the values of central tendencies through revision exercise demanding high level critical thinking. ✍ Learners should gather information through varieties of means such as conducting survey (e.g. observing colours of people's dress; types of vehicle passing by etc.) and record and interpret their findings. ✍ Learners should confidently present, describe and interpret their data from different sources and engage with more complex tasks involving collection, tabulation and analysis of the data. Based on the introduction to probability they should now be challenged to think critically and predict outcomes of probability events through, for instance throwing a coin or a die. ✍ Learners should carry out more practical and analytical exercise involving probability trials to determine possible outcomes of simple events and illustrate these outcomes.	• How do you collect and interpret data? • Why is it important to represent collected data in frequency table? • How do we predict simple probability out comes in a given experiments/or events? • How do we interpret probability outcomes of simple events?

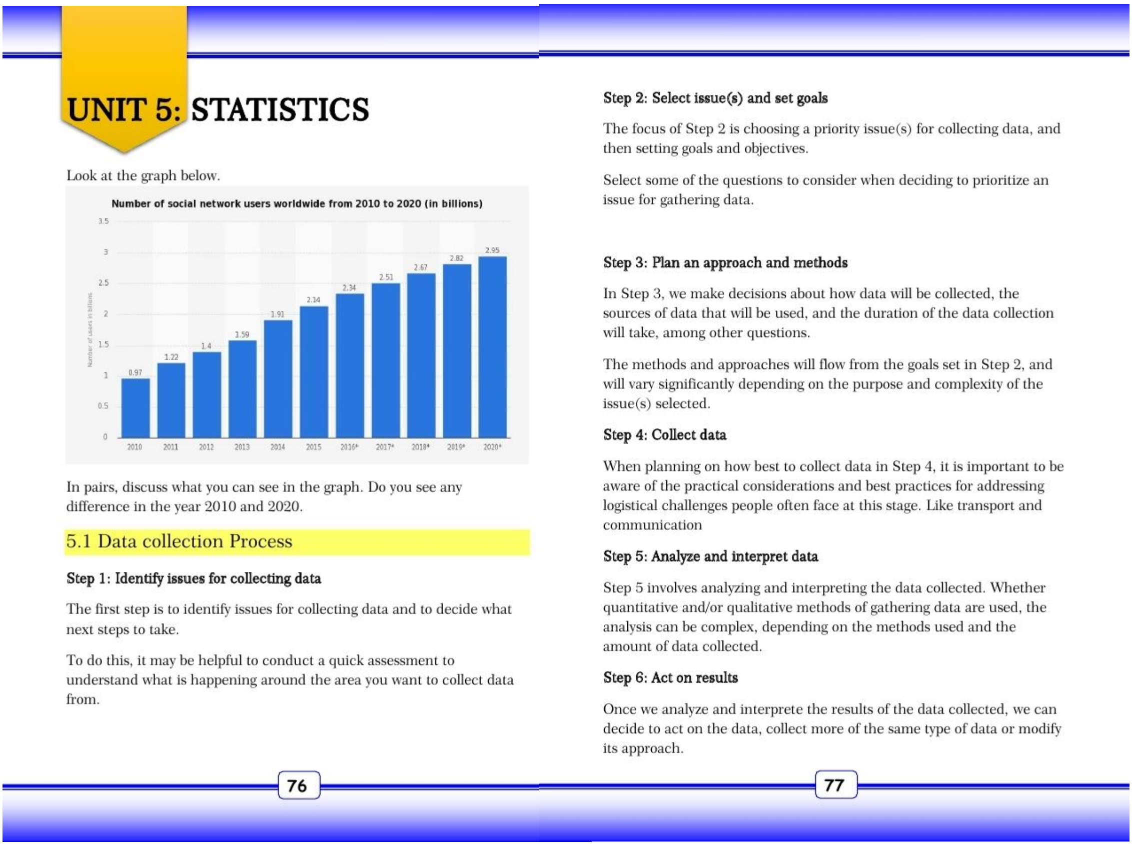
<table>
<tr><th colspan="3">Learning outcomes</th></tr>
<tr><th>Knowledge and understanding</th><th>Skills</th><th>Attitudes</th></tr>
<tr><td>Collecting and recording of data: representation and interpretation
Probability: Calculating possible outcomes of simple events</td><td>Compile and manage data collected
Analyze and interpret collected data
Carry out probability experiments and analysis of events
Compute exercise involving statistics and probability</td><td>Appreciate data collection and use of simple probability in explaining events mathematically
Challenge learners to explore and investigate and to take responsibility for their own learning</td></tr>
<tr><td colspan="3">Contribution to the competencies:
<u>Critical thinking</u>: data collection and its manipulation and interpretations
<u>Communication and Co-operation</u>: group work</td></tr>
<tr><td colspan="3">Links to other subjects:
Links to all subjects in research work</td></tr>
</table>

In P7, the learners were taken through the mean, mode and median and how to draw grouped frequency tables as they covered group data and simple probability 1. At this level, the learners are to be taken through statistical graphs, the values of central tendencies and how to calculate possible outcomes of events.

5.1 Data collection process

The teacher to take the learners through the data collection processes:

Identification of a research issue (identification of research problem): This is the issue that one needs to research on. Examples: poor performance of learners in Mathematics and sciences, rampant corruption in the public sector, high cases of road accidents etc.



UNIT 5: STATISTICS

Look at the graph below.

In pairs, discuss what you can see in the graph. Do you see any difference in the year 2010 and 2020.

5.1 Data collection Process

Step 1: Identify issues for collecting data

The first step is to identify issues for collecting data and to decide what next steps to take.

To do this, it may be helpful to conduct a quick assessment to understand what is happening around the area you want to collect data from.

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Step 2: Select issue(s) and set goals

The focus of Step 2 is choosing a priority issue(s) for collecting data, and then setting goals and objectives.

Select some of the questions to consider when deciding to prioritize an issue for gathering data.

Step 3: Plan an approach and methods

In Step 3, we make decisions about how data will be collected, the sources of data that will be used, and the duration of the data collection will take, among other questions.

The methods and approaches will flow from the goals set in Step 2, and will vary significantly depending on the purpose and complexity of the issue(s) selected.

Step 4: Collect data

When planning on how best to collect data in Step 4, it is important to be aware of the practical considerations and best practices for addressing logistical challenges people often face at this stage. Like transport and communication

Step 5: Analyze and interpret data

Step 5 involves analyzing and interpreting the data collected. Whether quantitative and/or qualitative methods of gathering data are used, the analysis can be complex, depending on the methods used and the amount of data collected.

Step 6: Act on results

Once we analyze and interprete the results of the data collected, we can decide to act on the data, collect more of the same type of data or modify its approach.

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Setting the goals (formulation of a hypothesis): Come up with a statement or postulate that you will verify through the research. This helps the researcher to be focused and to come up with guiding questions for the research.

Identification of the research methodology: Identify the research methods to employ. These includes simple random sampling, stratified sampling, etc.

Collection of data: Identify the data collection tools such as questionnaires etc.

Data analysis: Graphs, tables

5.2 Reading and interpreting tables and graphs

5.2 Reading and interpreting tables and graphs

This is the fifth step where we already have the data collected.

Example 1.

The table below shows the class attendance in a school. All pupils were present on Friday. Which day had the highest number of absentees?

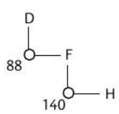
DAYS	PRESENT
Monday	48
Tuesday	49
Wednesday	47
Thursday	48
Friday	50

∴ The highest number of absentees was on Wednesday

Example 2.

Mercy and Juma travelled from D to H via F. How many kilometres did they travel if they used the table below?

D				
80	E			
88	70	F		
100	90	60	G	
200	160	140	70	H



$88 + 140 = 228km$

Activity 1:

1. The table below shows the fare in South Sudanese Pounds for a bus travelling to different towns.

A					
50	B				
80	60	C			
100	80	40	D		
150	100	120	50	E	
200	150	130	90	60	F

A teacher and 3 pupils left town A for town F. They stopped at town C and then continued with the journey to town F in another bus. If the bus fare for children is half that of adults, how much did they pay altogether?

Exercise 1.

1. The table below shows the number of times football teams Team A, Team B and Team C won, drew or lost in a competition. Three points were awarded for each game won, one point for each game drawn and no point for a game lost.

	Team A	Team B	Team C
WON	2	3	4
DRAWN	2	4	3
LOST	5	2	5

Arrange in order the 1st, 2nd and 3rd team in the score. Which two teams tied?

78 79

Learners to understand that reading and interpreting of graphs is part of data analysis and presentation. Guide them through Bar graphs, pie charts, histograms, frequency polygons.

2. The table below shows the number of tonnes of sugar produced and sold by a factory in 7 days.

Days	MON	TUE	WED	THUR	FRI	SAT	SUN
Tonnes produced	500	700	800	400	900	250	250
Tonnes sold	300	400	200	700	500	150	180

On which day was the number of tonnes of sugar sold one and three quarter times the number of tonnes produced?

3. A trader sold loaves of bread for all the days of the week. The table below shows the number of loaves the trader sold in 6 days of the week.

DAYS	MON	TUE	WED	THUR	FRI	SAT	SUN
No. of loaves of bread	150	95	105	80	40	91	70

One loaf of bread was sold at SSP100. How much did the trader get on Monday than on Saturday?

4. The table below shows the number of people who attended an agricultural show.

Female Adults	Male Adults	Children
1909	3918	3449

How many more adults than children attended the show?

5. The table below represents arrival and departure times of buses from a company serving towns J, K, L, M, N, P, Q and R.

Towns	Arrival Time	Departure Time
J		6.00 am
K	8.30 am	9.30 am
L	10.20 am	10.30 am
M	11.45 am	12.00 noon
N	12.45 pm	1.00 pm
P	2.05 pm	2.20 pm
Q	3.15 pm	3.30 pm
R	4.45 pm	

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How long does it take the bus to travel from town K to town Q?

6. The table below shows the number of pupils who were present from Monday to Friday.

DAYS	MON	TUE	WED	THUR	FRI
No. of pupils	63	57	65	67	69

If the class has a total of 70 pupils. How many pupils were absent on Tuesday?

7. The table below represents the sales of milk in litres by a milkman in five days. The sale for Friday is not shown.

DAYS	Monday	Tuesday	Wednesday	Thursday	Friday
NUMBER OF LITRES	24	20	20	25	___

One litre of milk was sold at SSP 50. The milkman got a total of SSP 5,850 for the sale of milk during the five days. How many more litres of milk did the milkman sell on Friday than on Tuesday?

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Activity 1

525 South Sudanese pounds

Exercise 1

1.

TEAM	WON	DRAWN	LOST	POINTS
TEAM C	4	2	4	14
TEAM B	3	4	3	13
TEAM A	2	2	5	8

2. Thursday
3. SSP15000 and 9100
4. 2368
5. 5hours 45 minutes
6. 13 pupils
7. 8 litres
8. 8 pupils

8. The table below shows the number of pupils who were in standard 5–8 in a certain school from 2011- 2014.

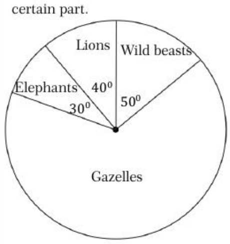
	Primary 5	Primary 6	Primary 7	Primary 8
2011	81	75	61	57
2012	85	79	73	59
2013	88	82	76	70
2014	91	85	79	73

How many pupils of the class which was in Primary 5 in 2011 had dropped out of that class by 2014?

Working out problems involving pie charts

Example 3.

The pie chart below shows the population of 10800 wild animals in a certain part.



How many more Gazelles than wild beasts are there in the park?

Solution

A circle has 360° which represent 10800 animals

$1^\circ = \frac{10800}{360^\circ}$

Angle representing gazelles is $360 - (30^\circ + 40^\circ + 50^\circ)$

$= 360^\circ - 120^\circ$

$= 240^\circ$

$1^\circ = \frac{10800}{360^\circ}$

$240^\circ = \frac{\cancel{10800}^{30}}{\cancel{360^\circ}} \times 240^0 \quad = 7200$ Gazelles

$1^\circ = \frac{\cancel{10800}^{30}}{\cancel{360^\circ}} \times 50^0 \quad = 1500$ Wild beasts

How many more gazelles than wild beasts?

7200 - 1500= 5700

There are 5700 more gazelles than wild beasts in the park.

Activity 2:

In groups, work out the activities and present to the class.

1. The table below represents different colours and the number of pupils who like each colour.

Colours	Red	Blue	White	Yellow	Green
Number of pupils	14	16	12	26	22

Draw a pie chart to represent the information given above, what will be the difference in angles of pupils who liked blue colour compared to those who like colour green?

Activity 2

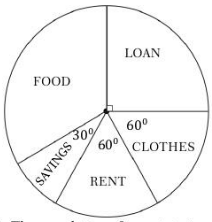
Guide learners to do the activity in pairs as you supervise.

Expected answers

1. Draw pie char with angles (red 56^o, blue 64^o,47^o, 104^o,88^o) ;24^o
2. SSP 2000

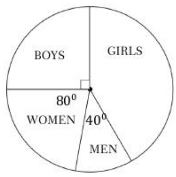
3. 200

2. The pie-chart below shows how Taban spent his salary.



How much more did he spend on loan than on rent, if he spent SSP8000 on food?

3. The population of an estate in a town is represented by the pie chart below.



If there were 600 girls, how many more boys than men were there?

Exercise 2.

1. The table below shows the number of exercise books each pupil was given

Exercise books	Nene	Maundu	Ann	Mustafa	Asha
Number of pupils	16	14	15	18	27

Draw a pie chart to represent this information.

2. There were 210 girls, 168 boys, 336 men and 126 women in a meeting. If a pie chart was drawn to represent this information. What angle would represent the boys?

3. The table below shows Kenyi's score in topical tests in mathematics. The tests were marked out of 20 marks.

Tests	1^{st}	2^{nd}	3^{rd}	4^{th}	5^{th}	6^{th}	7^{th}
Score	18	17	20	16	15	19	15

If a pie chart is to be drawn to represent the information given in the table above, what would be the sum of angles representing 2^{nd} and 5^{th} tests?

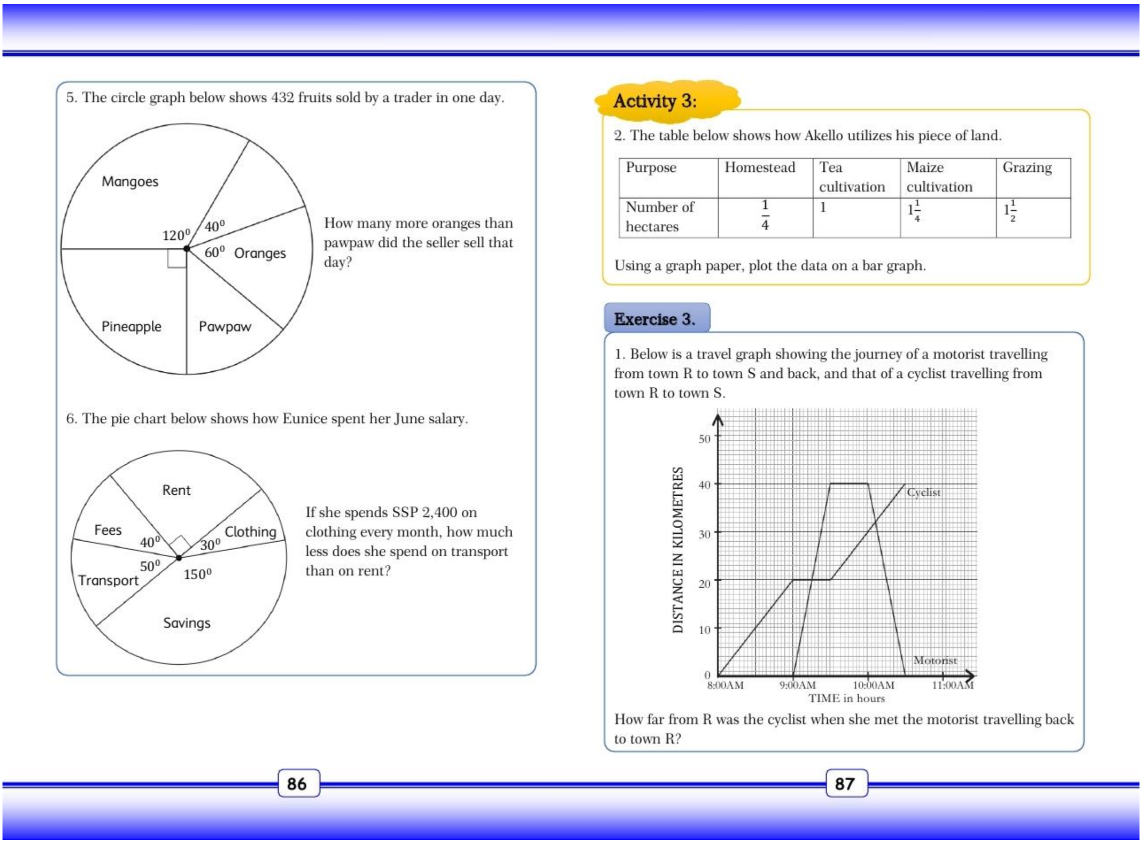
4. The table below shows Nyandeng's income from the sale of farm produce during a certain year. The information on the income of vegetables is not given.

Produce	**Cabbages**	**Coffee**	**Maize**	**Wheat**
Income	________	SSP 72 000	SSP 42 000	SSP 90 000

In groups, draw pie chart was drawn to represent the information above. If the angle representing the income from maize was 72˚, what was the income from cabbages?

Exercise 2

1. Draw Pie chart (Nene = 64^o, Maundu = 56^o, Ann = 60^o, 72^o, 108^o)
2. 72^o
3. 82.3^o
4. 10.3^o
5. 12 oranges
6. SSP. 3200



5. The circle graph below shows 432 fruits sold by a trader in one day.

How many more oranges than pawpaw did the seller sell that day?

6. The pie chart below shows how Eunice spent her June salary.

If she spends SSP 2,400 on clothing every month, how much less does she spend on transport than on rent?

Activity 3:

2. The table below shows how Akello utilizes his piece of land.

Purpose	Homestead	Tea cultivation	Maize cultivation	Grazing
Number of hectares	$\frac{1}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$

Using a graph paper, plot the data on a bar graph.

Exercise 3.

1. Below is a travel graph showing the journey of a motorist travelling from town R to town S and back, and that of a cyclist travelling from town R to town S.

How far from R was the cyclist when she met the motorist travelling back to town R?

Activity 3

Guide learners to do the activity in groups as you supervise.

Expected answers

1. 114.29km/h
2. Bar graph

Exercise 3

Expected answers

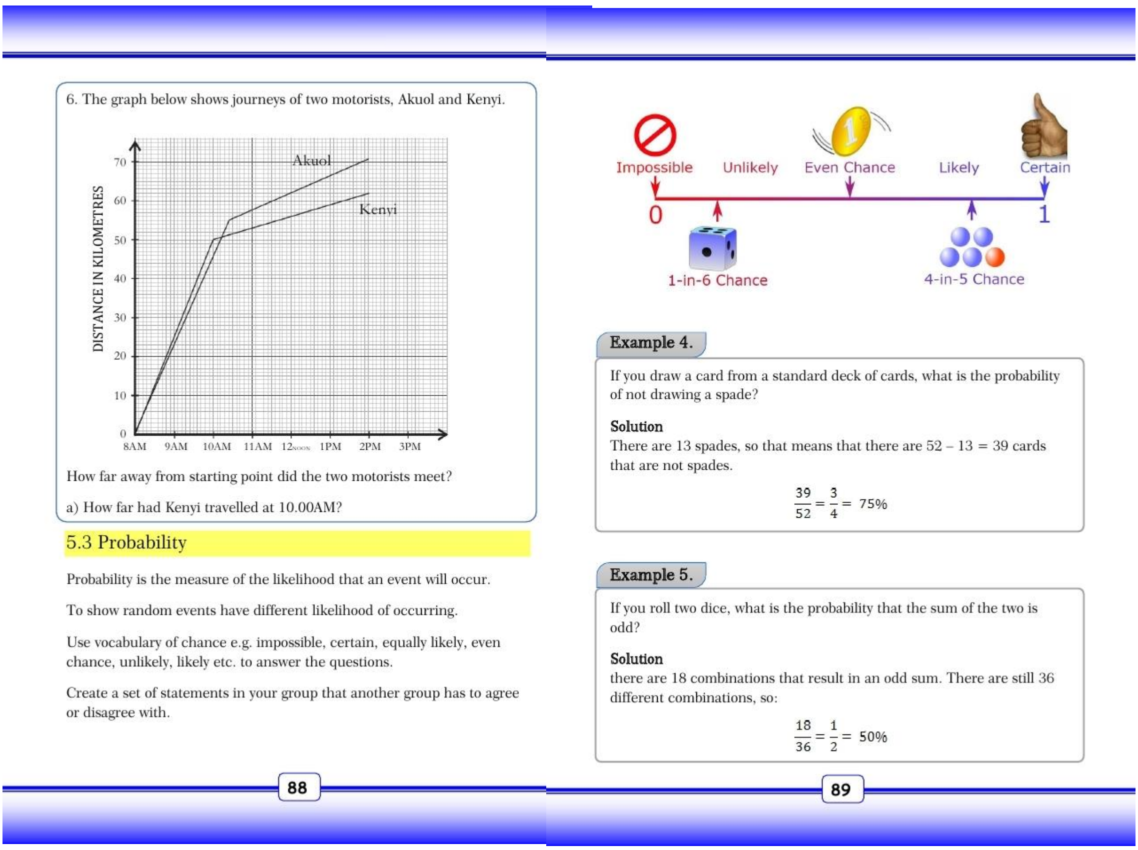
1. 32km
2. (a) 51km (b) 50km

5.3 Probability

Challenge the learners to predict probability outcomes. By using the locally available materials.

A coin (has two sides each with equal chances thus probability is 1 divided by the two possible outcomes = ½).

A dice (Has six equal sides with equal chances thus probability is 1 divided by 6 $=\frac{1}{6}$).



6. The graph below shows journeys of two motorists, Akuol and Kenyi.

How far away from starting point did the two motorists meet?

a) How far had Kenyi travelled at 10.00AM?

5.3 Probability

Probability is the measure of the likelihood that an event will occur.

To show random events have different likelihood of occurring.

Use vocabulary of chance e.g. impossible, certain, equally likely, even chance, unlikely, likely etc. to answer the questions.

Create a set of statements in your group that another group has to agree or disagree with.

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Example 4.

If you draw a card from a standard deck of cards, what is the probability of not drawing a spade?

Solution

There are 13 spades, so that means that there are 52 – 13 = 39 cards that are not spades.

$$\frac{39}{52}=\frac{3}{4}= 75\%$$

Example 5.

If you roll two dice, what is the probability that the sum of the two is odd?

Solution

there are 18 combinations that result in an odd sum. There are still 36 different combinations, so:

$$\frac{18}{36}=\frac{1}{2}= 50\%$$

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Pack of playing cards (Has 52 cards, probability of choosing any card is $\frac{1}{52}$).

The probability that one of the footballers in a soccer match has a ball at any one time is (There's a total of 22 soccer players in the field thus probability is $\frac{1}{22}$).

Example 4.

Jermain and Tremain both calculate the predicted probability of getting heads if they flip a coin 10 times. Then they each flip a coin 10 times.

a. Will they get the same number when they calculate the predicted probability?

b. When they actually flip the coin 10 times, will they get as many as the probability predicted, for sure, no matter what?

c. When they actually flip the coin 10 times, will Jermain absolutely, positively get the same number of heads as the Tremain?

Solution

a. Since they're using the same formula to find the predicted probability, they will get the same number:

b. The number of heads they flip is all up to chance. They should flip about 5 heads out of their 10 flips, but there's no promise, no absolute way of knowing. The answer is no, there is no guarantee that they'll flip 5 heads.

c. Because what they actually flip is up to chance, there is also no guarantee that Jermain will flip the same number of heads and the same number of tails as Tremain. It's just flippin' up to chance.

Activity 4:

In pairs toss a coin 20times and record the outcome in a table.

Heads	
Tails	

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Record the class result

1. What are the chances of getting a head?
2. What are the chances of getting a tail?
3. Does the coin know what had happened on the last throw?
4. Is it more or less likely to get a head or a tail?
5. Is getting an even score on a head as likely as getting a tail an odd score?

Activity 5:

In pairs roll a die 48 times and record the outcome e.g. 5, 4, 3, 3etc. Count the total number of each score and make a table and a bar chart.

Create a table of the class results and make a bar chart. Using a bar graph answer these questions

a. What are the chances of getting a particular score?
b. Is it possible to have a draw in this game?
c. Is getting an even score on a dice as likely as getting an odd score?
d. Is each outcome equally likely?
e. Is this game fair or unfair? Explain to the rest of your classmates.

Activity 6:

In pairs toss a bottle top 20times and record the outcome in a table. Fill in the data in a table.

a. Does the bottle top behave in the same way as the coin? If not, why?
b. Is it possible to have a draw in the outcome?
c. What are the chances of getting a particular score?
d. Make a list of possible outcomes?

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Activity 4

Guide learners to fill table after tossing a coin.

Side	Head (H)	Tail(T)
frequency		

1. ½
2. ½
3. No
4. No
5. Yes

Activity 5

Guide learners to fill table after tossing a die 48 times.

side	1	2	3	4	5	6
frequency						

Activity 6

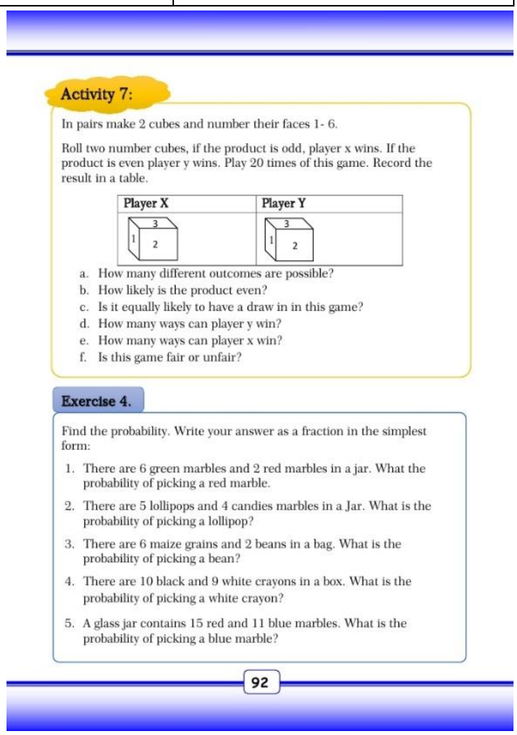
Guide learners to fill table after tossing a bottle top 20 times.

Player wining	x	y
No. of times		

Activity 6

Guide learners to make two cubes, number the faces 1-6 and roll them. Fill table after rolling the cubes 20 times.

Player wining	x	y
No. of times		



Activity 7:

In pairs make 2 cubes and number their faces 1- 6.

Roll two number cubes, if the product is odd, player x wins. If the product is even player y wins. Play 20 times of this game. Record the result in a table.

Player X	Player Y

a. How many different outcomes are possible?
b. How likely is the product even?
c. Is it equally likely to have a draw in in this game?
d. How many ways can player y win?
e. How many ways can player x win?
f. Is this game fair or unfair?

Exercise 4.

Find the probability. Write your answer as a fraction in the simplest form:

1. There are 6 green marbles and 2 red marbles in a jar. What the probability of picking a red marble.
2. There are 5 lollipops and 4 candies marbles in a Jar. What is the probability of picking a lollipop?
3. There are 6 maize grains and 2 beans in a bag. What is the probability of picking a bean?
4. There are 10 black and 9 white crayons in a box. What is the probability of picking a white crayon?
5. A glass jar contains 15 red and 11 blue marbles. What is the probability of picking a blue marble?

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Exercise 4

Expected Answers

1. $\frac{1}{4}$

2. $\frac{5}{9}$

3. $\frac{1}{4}$

4. $\frac{9}{19}$

5. $\frac{11}{26}$

UNIT 6: BUSINESS ACCOUNTING

In Primary 7 the learners were taken through calculation of profit, loss and percentage interest.

They were also taken through terminologies in transactions. At this level, the learners will be taken through hire purchase, profit and loss, discounts, simple interest and compound interest.

They will also be required to prepare their own business plans and compile spreadsheets.

Learn about	Key inquiry questions
✍ Learners should learn how to calculate the impact of commission and discounts, hire purchase, profit and loss, simple interest, and compound interest. They should learn to calculate both simple and compound interest. ✍ Learners should listen to a local businessperson explain how they run their business and what sort of accounts they keep. ✍ They should work in groups to develop their own business plan for and enterprise and compile a spreadsheet showing the impact of changes in the process of raw materials, or the giving of commission, on their profit margins, and be able to calculate the break even point. They should present their plans to the class.	• Why do we estimate and evaluate commissions and discount, hire purchase, simple interest and compound interest? • How do we differentiate simple interest from compound interest?

<table>
<tr><td colspan="3">Learning outcomes</td></tr>
<tr><td>Knowledge and understanding</td><td>Skills</td><td>Attitudes</td></tr>
<tr><td>Calculation of simple and compound interest
Impact of percentage changes in profits
Break-even points</td><td>Solving problems involving; commissions and discounts, hire purchase, profit and loss, simple interest and compound interest</td><td>Appreciate the importance of a business plan to an enterprise.</td></tr>
<tr><td colspan="3">Contribution to the competencies:

<u>Critical thinking</u>: in setting up the spreadsheet and business plan

<u>Communication</u>: presentation of their work

<u>Co-operation</u>: in groups</td></tr>
<tr><td colspan="3">Links to other subjects:

Social Studies: Economic geography</td></tr>
</table>

Activities in groups or pairs

Guide learners to form groups or pairs and develop business plans, compile a spreadsheet showing the impact of changes in the processing of raw materials or the giving of commission on profit margins.

Allow learners to present the impacts of commission and the business plans to the class.

6.1 Commissions

UNIT 6: BUSINESS ACCOUNTING

Look at the picture. In pairs, discuss what you can see.

6.1 Commissions in South Sudanese Pounds

Commission is the money given to a sales person after the sale of goods on behalf of the employer.

To calculate the commission in South Sudanese Pounds we multiply R% by value of goods sold.

Example 1.

Deng sold goods worth SSP 25,000 for a certain company. He was given a commission of 15% of the value of the goods sold. How much was his commission?

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Solution

$$\text{Value of goods sold} = Sh\,25{,}000$$

$$\text{Percentage commission rate} = 15\%$$

$$\text{Commission in South Sudanese Pounds} = R\% \times \text{Value of goods sold}$$

$$= \frac{15}{1\cancel{00}} \times 25{,}0\cancel{00}$$

$$= SSP\ 3{,}750$$

Exercise 1.

1. Nadia was paid a salary of SSP 25,200 per month. She is also paid a commission of 9% on the value of goods sold. In one month she sold goods worth SSP150,000. What was the total money she got at the end of that month?
2. Michael was paid a salary of SSP 27,000 per month and commission at $6\frac{1}{2}\%$ for the value of the goods sold. Above SSP10,000. In June he sold goods worth SSP140,000, what was his total money he received at the end of the month?
3. George is paid a commission of 12.5% on the value of goods sold above SSP 25,000. In one month she sold goods valued at SSP175,000. What was her commission that month?
4. A salesperson is paid a commission on the value of goods sold. In one month she sold 600 items each at SSP1,500. If she was paid a commission at the rate of 5%, how much commission in South Sudanese Pounds did she earn?
5. Khamis is paid a monthly salary of SSP 30,000 and a 3% commission on goods he sold above SSP150,000. In December he sold goods worth SSP125,000, how much was his total earnings at the end of that month?

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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.

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

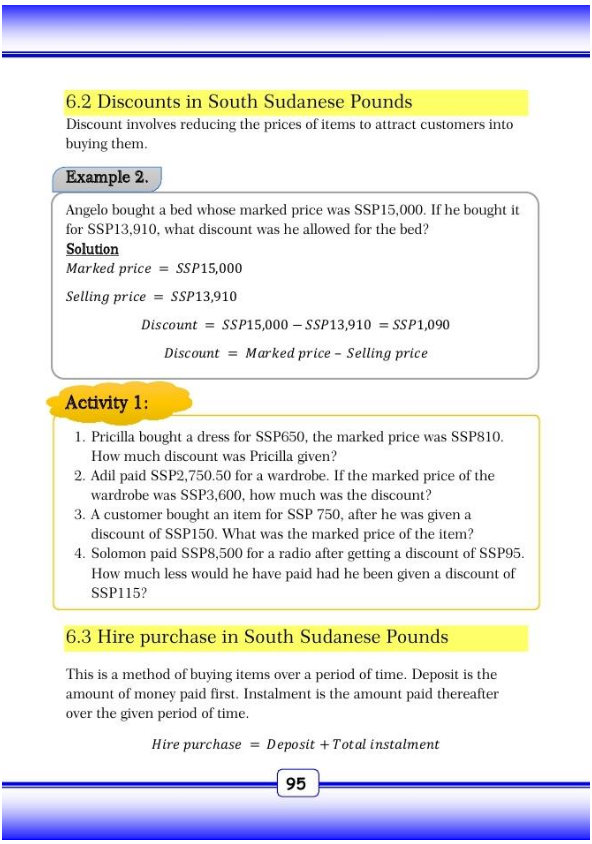
Exercise 1

Guide learners to carry out the exercise as a whole class.

Expected answers

1. SSP 38700
2. SSP 35450
3. SSP 18750
4. SSP 45000
5. SSP 30000

6.2 Discounts



6.2 Discounts in South Sudanese Pounds

Discount involves reducing the prices of items to attract customers into buying them.

Example 2.

Angelo bought a bed whose marked price was SSP15,000. If he bought it for SSP13,910, what discount was he allowed for the bed?

Solution

$Marked\ price\ = SSP15{,}000$

$Selling\ price\ = SSP13{,}910$

$$Discount\ = SSP15{,}000 - SSP13{,}910\ = SSP1{,}090$$

$$Discount\ = Marked\ price - Selling\ price$$

Activity 1:

1. Pricilla bought a dress for SSP650, the marked price was SSP810. How much discount was Pricilla given?
2. Adil paid SSP2,750.50 for a wardrobe. If the marked price of the wardrobe was SSP3,600, how much was the discount?
3. A customer bought an item for SSP 750, after he was given a discount of SSP150. What was the marked price of the item?
4. Solomon paid SSP8,500 for a radio after getting a discount of SSP95. How much less would he have paid had he been given a discount of SSP115?

6.3 Hire purchase in South Sudanese Pounds

This is a method of buying items over a period of time. Deposit is the amount of money paid first. Instalment is the amount paid thereafter over the given period of time.

$$Hire\ purchase\ = Deposit + Total\ instalment$$

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

$$Discount\ = marked\ price - selling\ price$$

Activity 1

Guide learners to work in groups.

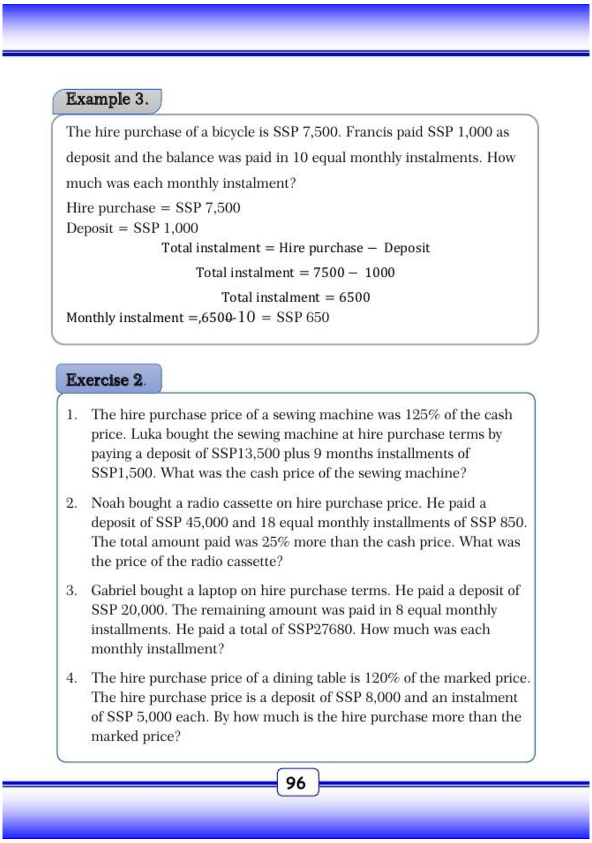
Expected answers

1. SSP 160
2. SSP 849.50
3. SSP 900
4. SSP 20

6.3 Hire purchase

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

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



Example 3.

The hire purchase of a bicycle is SSP 7,500. Francis paid SSP 1,000 as deposit and the balance was paid in 10 equal monthly instalments. How much was each monthly instalment?

Hire purchase = SSP 7,500
Deposit = SSP 1,000

$$\text{Total instalment} = \text{Hire purchase} - \text{Deposit}$$
$$\text{Total instalment} = 7500 - 1000$$
$$\text{Total instalment} = 6500$$

Monthly instalment $= 6500 \div 10$ = SSP 650

Exercise 2.

1. The hire purchase price of a sewing machine was 125% of the cash price. Luka bought the sewing machine at hire purchase terms by paying a deposit of SSP13,500 plus 9 months installments of SSP1,500. What was the cash price of the sewing machine?
2. Noah bought a radio cassette on hire purchase price. He paid a deposit of SSP 45,000 and 18 equal monthly installments of SSP 850. The total amount paid was 25% more than the cash price. What was the price of the radio cassette?
3. Gabriel bought a laptop on hire purchase terms. He paid a deposit of SSP 20,000. The remaining amount was paid in 8 equal monthly installments. He paid a total of SSP27680. How much was each monthly installment?
4. The hire purchase price of a dining table is 120% of the marked price. The hire purchase price is a deposit of SSP 8,000 and an instalment of SSP 5,000 each. By how much is the hire purchase more than the marked price?

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Exercise 2

Expected answers

1. SSP 21600
2. SSP 48240
3. SSP 960
4. SSP 2166.67
5. SSP 4508.33
6. SSP 4166.67
7. SSP 60000

6.4 Profit and loss

Profit: Amount of money gained in business when selling price is higher than buying price.

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

Loss: Amount of money lost in business when the selling price is lower than buying price.

$$Loss\ =\ buying\ price - selling\ price$$

5. Philip bought a TV set on hire purchase items. She paid a deposit of SSP120,000 and 12 equal monthly installments of SSP 850 each. The hire purchase price was 20% more than the cash price. Sylvia bought the same TV set on cash. How much more did Alai pay for the TV set?
6. The hire purchase price of an electric cooker was10% more than the cash price. The cash was SSP150,000. Antony paid SSP 90,000 as deposit and the rest in equal monthly instalments for 18 months. How much was his monthly instalment?
7. The marked price of a motorcycle was SSP 300,000 but a discount of 8% was allowed for cash payment. Ryan bought the motorcycle on hire purchase by paying a deposit of SSP12,000 followed by 8 equal monthly instalment of SSP18,000 each. How much money would Ryan have saved had he bought it for cash?

6.4 Profit and loss in South Sudanese Pounds

Profit is realized when the selling price is higher than the buying price.

Example 4.

Lopir bought a basin for SSP175. He later sold it for SSP208. What profit did Lopir make?

Solution

Selling price = SSP208

Buying price = SSP172

Profit = SSP (208-172)

= SSP36

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

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Loss is realized when the buying price is higher than the selling price.

Example 5.

Worija bought a radio for SSP 720. He later sold it at SSP 630. What loss did Worija make?

Solution

Buying price = SSP720

Selling price = SSP630

Loss = SSP(720-630)

= SSP90

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

Exercise 3.

1. A trader bought 8 trays of eggs at SSP 240 per tray, eight eggs broke and he sold the rest at SSP8 per egg. If a tray holds 30 eggs, how much loss did he get?
2. Jacob bought 250 chicken whose average mass was $1\frac{1}{2}$kg. The buying price per kilogram was SSP150. He then sold each chicken for SSP 215, what profit did Jacob make?
3. Jacinta bought 15 bags of fruits at SSP 450 per bag. She spent SSP 500 on transport, $1\frac{1}{2}$ bags of the fruits got spoilt and she sold the rest at SSP 400 per bag. What was her loss?
4. Saida bought 9 trays of eggs @ SSP 200. All eggs in one of the trays broke and he sold the remaining trays @ SSP 205. What loss did he make?

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Exercise 3

1. Loss of SSP 64
2. SSP 6250
3. SSP 1850
4. SSP 160

6.5 Simple interest

Money earned by loans calculated as a one off.

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

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

Amount = Principal + Simple Interest

6.5 Simple interest in South Sudanese Pounds

This type of interest usually applies to automobile loans or short-term loans, although some mortgages use this calculation method.

Terms used in Simple Interest and Compound Interest:

Principal: This is the money borrowed or lent out for a certain period of time is called the principal or sum.

Interest: Interest is payment from a borrower to a lender of an amount above repayment of the principal sum.

Amount: The total money paid back by the borrower to the lender is called the amount.

Amount = Principal + Interest

Rate: The interest on SSP100 for a unit time is called the rate of interest. It is expressed in percentage (%). The interest on SSP100 for 1 year is called rate per annum (abbreviated as rate % p. a.)

Simple interest is calculated only on the principal amount, or on that portion of the principal amount that remains. It excludes the effect of compounding. It is denoted by **S.I.**

The simple interest is calculated uniformly only on the original principal throughout the loan period.

$$\text{SIMPLE INTEREST} = \frac{Principal \times Rate \ \times Time}{100}$$

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

Where P = Principal, R = Rate and T = Time in years.

While calculating the time period between two given dates, the day on which the money is borrowed is not counted for interest calculations while the day on which the money is returned, is counted for interest calculations.

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Activity 2:

1. Find Rate, when Principal = SSP 3000; Interest = SSP 400; Time = 3 years.
2. Find Principal when Time = 4 years, Interest = SSP 400; Rate = 5% p.a.
3. Richard deposits 5400 and got back an amount of 6000 after 2 years. Find Richard's interest rate.
4. A farmer borrowed SSP 45,000 from a bank for buying a water pump. If she was charged a simple interest rate of 9%P.a. How much;
   a) Interest did she pay at the end of 18 months?
   b) Amount did she pay at the end of 18 months
5. Martin deposited SSP 90,000 in a bank account, which paid a simple interest rate at 10%. How much interest did he earn after 3 years?
6. Jemma borrowed SSP120,000 from a bank that charged simple interest at the rate of 15%. How much should she pay back the bank at the end of two years?
7. Shahin deposited SSP10,000 for a period of two years. She was charged simple interest at the rate of 15% per year. How much interest did she get?
8. Hussein deposited SSP100,000 in a financial institution that offered simple interest at the rate of 5% per annum. How much interest had Hussein's money earned after $1\frac{1}{2}$ years?

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Exercise 4

1. SSP 625,625
2. 4 years

Activity 2

1. SSP. 6,075; SSP. 51,075
2. SSP. 27,000
3. SSP 156,000
4. SSP 3,000
5. SSP. 7,500

6.6 Compound interest

6.6 Compound interest in South Sudanese Pounds

Compound interest is the interest paid on the original principal and on the accumulated past interest.

When you borrow money from a bank, you pay interest. Interest is a fee charged for borrowing the money, it is a percentage charged on the principal amount for a period of a year.

Compound Interest (C.I.) = Final Amount – Original Principal

When calculating compound interest, the amount for the first year is used as principal for the second year. The time (T) is always 1.

Example 8.

Calculate the amount and the compound interest on SSP 12000 for 2 years at 5% per annum compounded annually.

Solution

For 1st year: P = SSP 12000; R=5% and T=1 year

$$\text{Therefore; Interest} = \frac{PRT}{100}$$

$$= \frac{12000 \times 5 \times 1}{100}$$

$$= 600$$

Amount = 12000 + 600 = SSP 12600

For 2nd year: P = SSP12600; R=5% and T=1year

$$\text{Therefore; Interest} = \frac{PRT}{100}$$

$$= \frac{12600 \times 5 \times 1}{100}$$

$$= 630$$

Amount = 12600 + 630 = SSP 13230

Exercise 5.

1. Susan borrowed SSP 200,000 from a money lender for a period of two years at a compound interest rate of 8% per year. How much did she pay all together?
2. Stephen borrowed SSP 250,000 from a bank for a duration of that charged a compound interest rate of $12\frac{1}{2}\%$ P.a. How much money should he pay the bank at the end of two years?
3. A trader deposited SSP18,000 for 2 years in a bank paying compound interest at the rate of 8% P.a. How much did she save in her account at the end of 3 years?
4. John borrowed SSP 40,000 from a bank which he paid a compound interest at the rate of $7\frac{1}{2}\%$ P.a. What was the total interest at the end of the second year?
5. Abdi deposited SSP 480,000 in a bank that paid a compound interest at the rate of 12% P.a. How much money did he pay back after $1\frac{1}{2}$ years?
6. Isaac deposited SSP100,000 in a financial institution that paid compound interest at the rate of 20%P.a. How much did he get at the end of the third year?
7. Stella deposited SSP 200,000 in a bank that paid a compound interest rate of 12% P.a. How much money was in her account at the end of two years?
8. Samuel borrowed SSP150,000 for a period of two years. He was charged compound interest at the rate of 12% per year. How much interest did he pay altogether?
9. Zachariah deposited his savings in a bank which paid a simple interest at a rate of 15% P.a. for a period of 3 years, while Oliver deposited the same amount of SSP 45,000 in saving account which pays a compound interest of 10%P.a. at the end of three years both withdrew the deposits with the interest, who was paid more than the other and by how much?

Exercise 5

1. SSP 233280
2. SSP 316406.25
3. SSP 22674.816
4. SSP 46225
5. SSP 569856
6. SSP 172800
7. SSP 250880
8. SSP 38160
9. ZACHARIA, BY SSP 5355

Activity 3:

With the guidance of a teacher, visit a local businessperson and listen to him/her to explain how they run their business and what sort of accounts they keep.

Example 10.

Calculate the amount and the compound interest on SSP 8000 for years at 10% per annum compounded yearly for 1 ½ years.

Solution

Interest $= \frac{PRT}{100}$

$= \frac{8000 \times 10 \times 1}{100}$

$= 800$

Amount = 8000 + 800 = SSP 8800

For 2nd year: P = SSP 8800; R=10% and T=0.5 year

Interest $= \frac{PRT}{100}$

$= \frac{8800 \times 10 \times 0.5}{100}$

= SSP 440

Amount = 8800 + 440 = SSP 9240

Compound interest = Amount – principal

= 9240 – 8000

= SSP1240

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Exercise 6.

1. Racheal borrows SSP 12,000 at 10% per annum interest compounded half-yearly. Calculate the total amount she has to pay at the end of 30 months in order to clear the entire loan.
2. On a certain sum of money, invested at the rate of 10% per annum compounded annually, the interest for the first year plus the interest for the second year is SSP 2652. Find the sum.
3. A sum of money is lent at 8% per annum compound interest. If the interest for the second year exceeds that for the first year by SSP 96, find the sum of money.
4. A person invested SSP 8000 every year at the beginning of the year, at 10% per annum compounded interest. Calculate his total savings at the beginning of the third year.
5. A sum of SSP13500 is invested at 16% per annum compound interest for 5 years.
   Calculate:
   i. interest for the first year
   ii. the amount at the end of the first year
   iii. Interest for the second year.
6. Jackline borrowed SSP 7500 from Risper at 8% per annum compound interest. After 2 years she gave SSP 6248 back and a TV set to clear the debt. Find the value of the TV set.
7. It is estimated that every year, the value of the asset depreciates at 20% of its value at the beginning of the year. Calculate the original value of the asset if its value after two years is SSP 10240.
8. Find the sum that will amount to SSP 4928 in 2 years at compound interest, if the rates for the successive year are at 10% and 12% respectively.
9. Joan opens up a bank account on 1st Jan 2010 with SSP 24000. If the bank pays 10% per annum and the person deposits SSP 4000 at the end of each year, find the sum in the account on 1st Jan 2012.

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Activity 3

Do a pre-visit to a local business person and brief him/her about the learners visiting his business. Brief him/her on the questions that learners may ask so that he/she can allocate time for the learners to learn from him/her.

Exercise 6

1. SSP 15315.30
2. SSP 24109
3. SSP 1500
4. SSP 26480
5. SSP 2160; SSP 15660; SSP 2505
6. SSP 2500
7. SSP 14745.60
8. SSP 21241.40
9. SSP 37440

6.7 Cash accounts

Guide leaners on cash accounts by using example 10. This can be done best when leaners visit a business.

6.7 Cash accounts

Example 10.

On 1st January 2017, Mark had a capital of SSP17000. On 5th January he bought pawpaws for SSP2400. On 7th January, he bought oranges for SSP 1000 and mangoes for SSP 2000.

By 10th January, he had sold pawpaws for SSP 5000, oranges for SSP 2400 and mangoes for SSP 4000.

On the same day (10th January) he paid SSP 700 for transport and SSP500 a market fee.

- Prepare mark's market cash account as at 11th January and balance it.
- What was his balance on 11th January 2017?
- What was his profit?

Solution

MARK'S MARKET CASH ACCOUNT

DATE	CASH IN		Date	CASH OUT	
	Particulars	SSP		Particulars	SSP
2017	Capital	17000	2017	Purchase	
Jan.1	Pawpaws sale	5000	Jan.5	Pawpaws	2400
Jan.10	Oranges sale	2400	Jan.7	Oranges	1000
Jan.10	Mangoes sale	4000	Jan.7	Mangoes	2000
Jan.10			Jan.10	Transport	700
			Jan.10	Market fee	500
				Balance (cash in hand)	21800
		28400			28400
Jan.11	Balance	21800			

Profit = *Balance (cash in hand) - capital (or balance at the start of business)*
SSP21800 - SSP17000
=SSP4800

WORKING PROCEDURE

1. The layout is divided into two sides:
   - Left hand side (cash in) for all the money received.
   - Right hand side (cash out) for all money spent
2. Each of the sides has 3 columns:
   - Date
   - particulars
   - money (SSP)

a. **Date:** The year is written at the top of the date column .Each of the particulars goes with its date.
b. **Particulars:** These are written in short phrases e.g. orange sale.
c. **Money:** Do all calculations on a separate piece of paper.

How to balance a cash account.

Step 1: Find the sum in the left hand column.

(SSP17000+SSP5000+SSP2400+SSP4000) = SSP28400
Enter this sum in the left hand side as shown.

Step 2: Find the sum of the expenditure, on a separate piece of paper.

(SSP2400+SSP1000+SSP2000+SSP700+SSP500)=SSP6600.
Do not enter this sum.

Step3: Subtract the total expenditure.

(SSP6600) from the total cash in (SSP28400) to get the balance (cash in hand) SSP 21800.

Step 4: Enter the balance (cash in hand) SSP21800 in the right hand side as shown.

Step 5: Find the sum in the right hand side by adding the total expenditure (SSP6600) and the balance or cash in hand SSP21800.
i.e. SSP6600+SSP21800=SSP28400.

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Exercise 7

SHOPKEEPER'S CASH ACCOUNT

DATE	CASH IN		DATE	CASH OUT	
	PARTICULARS	SSP		PARTICULARS	SSP
APRIL 01	CASH AT HAND	49500	APRIL 05	FLOUR MILLS LTD	5990
	SALES	20000	APRIL 22	BREAD COMPANY	45600

APRIL 17	SALES	35850	APRIL 22	SEED COMPANY	12350
APRIL 14	SALES	62300	APRIL 30	RENT	10000
APRIL 22	SALES	53400	APRIL 30	LIGHTING	850
APRIL 29			APRIL 30	WAGES	4500
			APRIL 30	BANK DEPOSIT	20000
				BALANCE (CASH IN HAND)	121760
		221050			221050
MAY 01		121760			

BALANCE AS AT MAY 1^{ST} = SSP 121760

NOTE: the sum in the right hand side should be equal to the sum in the left hand side. If the sum in the left hand side and the right hand side are equal, you have balanced the account. If they are not equal, then you have not succeeded in balancing the account

Exercise 7.

In groups, prepare and balance cash account for the different accounts:

1. Shopkeepers account.
   On first April 2017, a shopkeeper had a cash balance of SSP 49500 in hand. On fifth April, a bill of SSP 5990 was paid to flour mills limited. He received SSP20000 for goods sold in week ending 17^{th} April and SSP35850 in a week ending 14^{th} April. On 22^{nd} April he paid SSP45600 to a bread company and SSP12350 to seed company he received SSP62300 for goods sold in the week ending 22^{nd} April and SSP53400 for goods sold in the week ending 29^{th} April. On 30^{th} April he paid SSP10000 rent, SSP850 for lighting and SSP4500 wages and deposited SSP 20000 in his bank account.

   a. Prepare this shopkeepers cash account and balance it.
   b. What was his balance in his cash account as at 1^{st} may 2017?

2. Carpenters account:
   A carpenter had a balance in his hand of SSP17800. On 1^{st} jan.2016, on 15^{th} Jan, he spent SSP5900 on wood, SSP680 on nails and SSP8990 on tools. On 21^{st} Jan. he sold 10 chairs at SSP2400 each and 6 tables at each SSP4000 .on 27^{th} Jan. he spent SSP 11900 on nails. He transferred SSP9990 to his bank account and paid his labourers a total of SSP 7900 on 31^{st} Jan.
   a. Prepare the carpenters cash account.
   b. What was the balance in his cash account as at 1^{st} Feb 2016?

3. Poultry account.
   A poultry farmer had a flock of 600 layers and a cash balance of SSP26000 on 1^{st} June 2015. On 2^{nd} June, he bought 3 sacks of layers marsh at SSP 2500 each on 5^{th} June, he sold 90 trays of eggs at SSP 300 each and bought 6 sacks layers mash at SSP 2500 each.
   On 21^{st} June he sold 178 trays of eggs at SSP 300 a tray and bought 10 sacks of layers marsh at SSP 1500 a sack.
   On 28^{th} June he sold 100 trays of eggs at SSP 300 a tray.
   On 29^{th} June, he bought 80 egg trays at SSP50 each and paid his worker SSP 4600 on 30^{th} June
   a. Prepare and balance the poultry cash account.
   b. If the farmer banked the balance, how much money did he bank?
   c. How much money did he earn from his poultry farming during the month of June 2015?

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CARPENTER'S CASH ACCOUNT

DATE	CASH IN		DATE	CASH OUT	
	PARTICULARS	SSP		PARTICULARS	SSP
1ST JAN	CASH AT HAND	17800	15TH JAN	WOOD	5900
21ST JAN	CHAIR SALES	24000	15TH JAN	NAILS	680
21ST JAN	TABLES SALES	24000	15TH JAN	TOOLS	8990
			27TH JAN	NAILS	11900
			27TH JAN	BANK DEPOSIT	9900
			31ST JAN	LABOUR	7900
			31ST JAN	BALANCE (CASH AT HAND)	20530
		65800			65800

BALANCE (CASH AT HAND) AS AT 1ST FEB = 20530

POULTRY CASH ACCOUNT

DATE	CASH IN		DATE	CASH OUT	
	PARTICULARS	SSP		PARTICULARS	SSP
1ST OF JUNE	CASH AT HAND	26000	2ND JUNE	LAYERS MASH (63SACKS)	7500
5TH JUNE	SALES (90 TRAYS)	27000	5TH JUNE	LAYERS MASH (6 SACKS)	15000
21ST JUNE	SALES (178 TRAYS)	53400	21ST JUNE	LAYERS MASH PURCHASE (10 SACKS)	15000
28TH JUNE	SALES(100 TRAYS)	30000		PURCHASE (EGG TRAYS)	4000
			29TH JUNE	WORKERS SALARIES	4600
			30TH JUNE	BALANCE (CASH AT HAND)	90300
			30TH JUNE		
		136400			136400

B. SSP 90300

C. SSP 64300