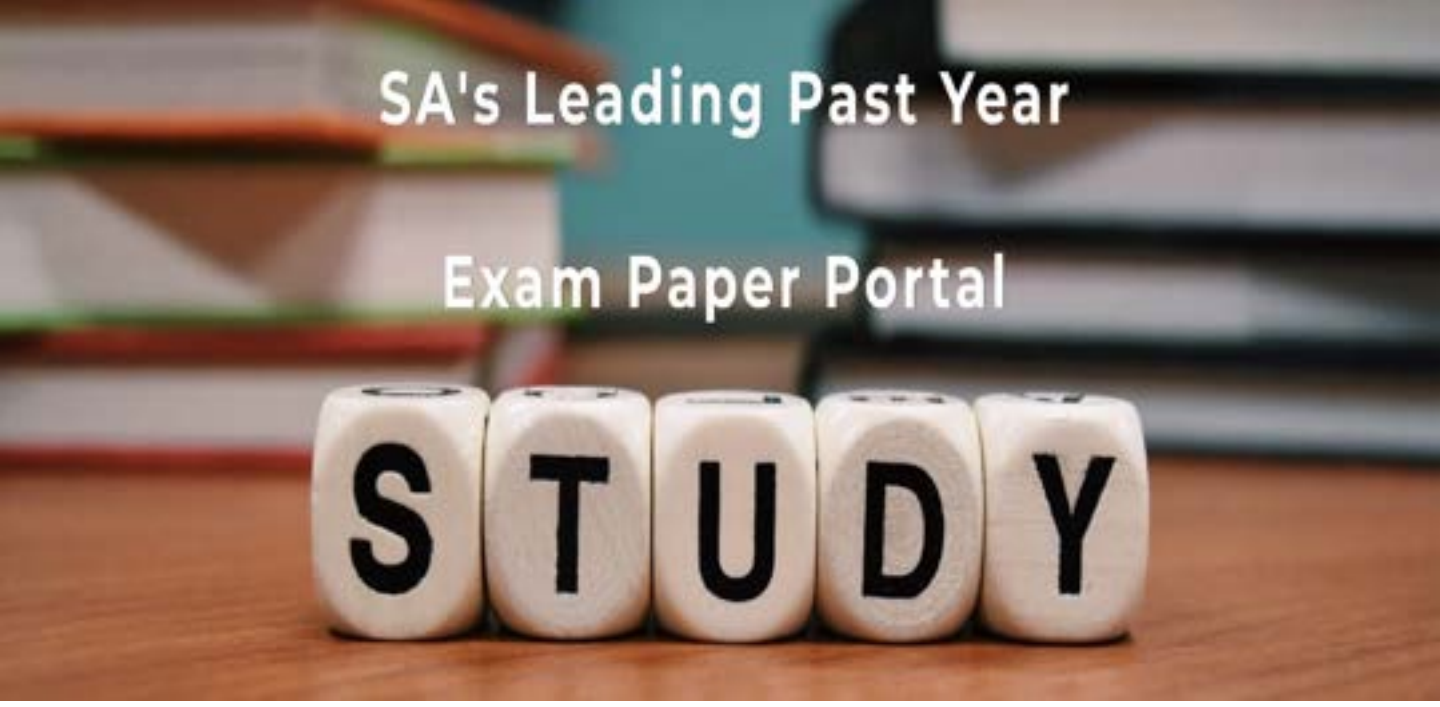

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TABLE OF CONTENTS

1. Introduction

The declaration of COVID-19 as a global pandemic by the World Health Organisation led to the disruption of effective teaching and learning in many schools in South Africa. The majority of learners in various grades spent less time in class due to the phased-in approach and rotational/ alternate attendance system that was implemented by various provinces. Consequently, the majority of schools were not able to complete all the relevant content designed for specific grades in accordance with the Curriculum and Assessment Policy Statements in most subjects.

As part of mitigating against the impact of COVID-19 on the current Grade 12, the Department of Basic Education (DBE) worked in collaboration with subject specialists from various Provincial Education Departments (PEDs) developed this Self-Study Guide. The Study Guide covers those topics, skills and concepts that are located in Grade 12, that are critical to lay the foundation for Grade 12. The main aim is to close the pre-existing content gaps in order to strengthen the mastery of subject knowledge in Grade 12. More importantly, the Study Guide will engender the attitudes in the learners to learning independently while mastering the core cross-cutting concepts.

2. How to use this Self Study Guide?

- This study guide covers selected sections of Measurement which form part of paper 2.
- The topic is drawn from the CAPS Grade 10 – 12 curriculum. Selected sections are presented in the following way:
    - What you should know at the end of the section.
    - Explanation of key concepts.
    - Summary/Notes.
    - Worked examples.
    - Practice questions.
    - Solutions to practice questions.
- Mathematical Literacy is a highly contextualised subject. Whilst every effort has been taken to ensure that skills and concepts you will be examined on are covered in this study guide, it is in fact the context used in the examination that will determine how these skills and concepts are assessed.
- This study guide covers all the cognitive levels.
- Go through the worked examples on your own.
- Do practice examples on your own. Then check your answers.
- Read symbols and explanation table below to understand how marks are allocated.

Symbol	Explanation
M	Method
M/A	Method with accuracy
MCA	Method with consistent accuracy
CA	Consistent accuracy
A	Accuracy
C	Conversion
S	Simplification
RT/RG/RD	Reading from a table/graph/diagram
SF	Correct substitution in a formula
O	Opinion/Example/Definition/Explanation
P	Penalty, e.g. for no units, incorrect rounding off, etc
R	Rounding off
NPR	No penalty for rounding
NPU	No penalty for the units
AO	Answer only, if correct, full marks

- Reward yourself for things you get right.
- If any of your answers are incorrect, make sure that you understand where you went wrong, before moving on to the next section.
- The study guide covers both generic and subject specific examination tips. You are expected to read and understand the tips, so that you are able to study more effectively.

3. Measurement

3.1.1 Key Concepts

TERMINOLOGY	
TERM	**MEANING**
Area	The amount of two-dimensional space occupied by a2-D shape. The area of a shape is the size of its surface.
BODMAS	Brackets, of/orders (powers, squares, etc.), division, multiplication, addition, subtraction. A mnemonic (reminder) of the correct order in which to do mathematical operations.
Body mass index (BMI)	A number calculated from an adult's weight and height, expressed in units of kg/m^2
Breadth	How wide something is. From the word "broad".
Capacity	The amount of space available to hold something. **OR** A measure of the volume a hollow object can hold – usually measured in litres.
Circle	A closed cure that is everywhere the same distance from the middle point.
Circumference	Distance around a circle / the perimeter of a circle.
Conversion	A change from one system / unit to another.
Cubed	The power of three; multiplied by itself three times.
Cubic	Shaped like a cube; having been multiplied by itself three times.
Cylinder	A 3-dimensional object with congruent parallel sides and bases are circles. A tall shape with parallel sides and a circular cross-section – think of a log of wood, for example, or a tube.
Degrees Celsius	Unit used to measure temperature in most countries.
Diameter	A straight line passing through the centre of a circle and touching the circle at both ends, thus dividing the circle into two equal halves.
Dimension	A measurable extent, e.g. length, breadth, height, depth, time. Physics, technical: the base units that make up a quantity, e.g. mass (kg), distance (m), time (s).
Distance	How far it is from one place to another, e.g. from one town to another or from one point to another point.
Growth Charts	Graphs consisting of a series of percentile cures that show the distribution of the growth measurements of children.
Imperial System	A system of measurement using inches, pounds, feet, gallons and miles.
Length	The measurement between two points, in a straight line, e.g. the length of a room.
Measure	Using an instrument to determine size, weight etc.
Measuring	Determine the value of a quantity directly, e.g. reading the length of an object from a ruler or the mass of an object from a scale.
Metric System	A system of measurement that uses metres, litres, kilograms, etc. A measurement system, using a base of 10 (i.e. all the units are divisible by 10).
Perimeter	The total distance around the boundary or edge that outlines a specific shape.
Pi	π, the Greek letter p, the ratio of the circumference of a circle to its diameter. A constant without units, value approximately 3,142.
Radius	The distance from the centre of the circle to any point on the circumference of the circle.
Scale	An instrument that is used to measure the weight of an object.
Surface Area	The area of all the faces / surfaces of an object added together.
Volume	The amount of 3-D space occupied by an object. It is measured in cubic units.
Weight	An indication of how heavy an object is.

3.1.2 Conversion

Objectives

By the end of this section, leaners must be able to: :

- Express measurement values and quantities in units appropriate to the context
- Estimate lengths and or measure lengths of objects accurately to complete tasks
- Estimates distance and or measure distance accurately between objects/position in space using appropriate maps and scale.
- Measure out quantities to complete tasks
- Calculate the cost of a certain amount of product
- Calculate the values using a formulae involving mass

Summary

Metric conversions

You need to memorise the conversions between metric units.

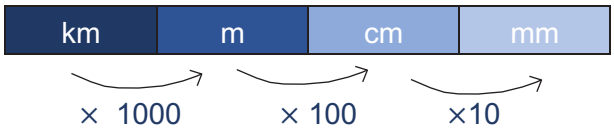
Length

Conversion factors for length
10 millimetres (mm) = 1 centimetre (cm)
1 000 millimetres (mm) = 1 metre (m)
100 centimetres (cm) = 1 metre (m)
1 000 metres (m) = 1 kilometre (km)

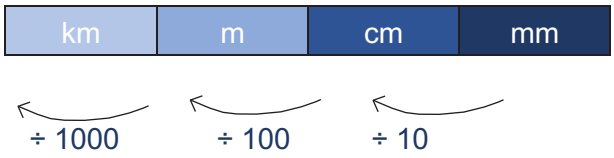
General method:

- **BIG** unit down to a **SMALLER** unit → **MULTIPLY** by the conversion factor
- **SMALL** unit up to a **BIGGER** unit → **DIVIDE** by the conversion factor

Conversion diagram



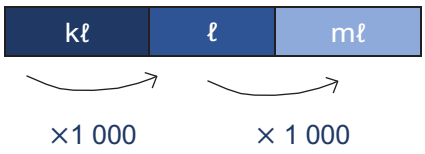
We can also reverse it to find lengths in larger units:



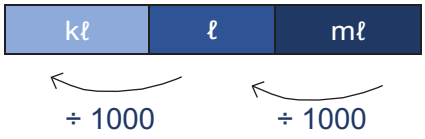
Volume

Conversion factors for volume
1 000 millilitres (mℓ) = 1 litre (ℓ)
1 000 litres (ℓ) = 1 kilolitre (kℓ)

Here is a visual representation of converting between units of volume:



And you can also reverse it:



Weight

Conversion factors for weight
1 000 mg (mg) = 1 gram (g)
1 000 grams (g) = 1 kilogram(kg)
1 000 kilograms (kg) = 1 tonne (t)

Here is a visual representation of converting between units of weight:

And one can also reverse it:

Conversion involving imperial Units of Length and Distance

From METRIC to IMPERIAL
1 cm = 0,3937 inches (in)
1 m = 1,0936 yards (yd.)
1 km = 0,6214 miles (mi)
1 m = 3,2808 feet (ft.)

From IMPERIAL to METRIC
1 inch (in) = 2,54 cm
1 yard (yd.) = 0,9144 m
1 mile (mi) = 1,6093 km
1 foot (ft.) = 0,3048 m

Cooking conversion

Conversions for cooking and baking
1 cup = 250 mℓ
1 tablespoon (tbsp.) = 15 mℓ
1 teaspoon (tsp) = 5 mℓ

Temperature conversion

$$°C = (°F - 32) \times \frac{5}{9}$$

$$ºF = (\frac{9}{5} \times ºC) + 32$$

Worked example 1

Mary needs to measure the length of a sliding door, to find out how much material she must buy to make a curtain. The curtain material cost R89.99 per metre on sale, sold only in half metres.

1.1 Mary estimates the length of a sliding door to be 1, 5 metres long (using her arm). If Mary goes to the shop with this estimate

1.1.1 How many metres of material should she buy?

1.1.2 How much would the material cost?

1.2 Mary decides to double-check her estimated measurement before she buys the material and so she uses her tape measure to accurately measure the length of a sliding door. She determines that the sliding door is actually 4, 2 m long.

1.2.1 Calculate the total length of the material in metre that she needs to buy.

1.2.2 Calculate the cost of the material.

1.2.3 If she pays with R405, how much change will she get and why that amount?

Solutions

1.1.1 1.5 m

1.1.2 Cost = R 89,99 + ½ (R89,99)
= R89,99 + R44,995
= R134,99

OR

Cost = R89.99 x 1.5 = R 134.99

1.2.1 4,5 m

1.2.2 Cost = 4 × R89,99 + (R89,99)
= R359,96 + R44,995
= R404,96

OR

Cost = R 89.99 x 4.5 = R 404.96

1.2.3 She will get R0, 10 change since we don't have R0, 05 and R0, 01 circulating in our economy anymore.

Worked example 2

Francis Mohapanele Primary school has two classrooms. The two classrooms need to be sanitised. A 25 litre container of sanitizer costs R575, 00. The school needs to buy 75 containers.

1.1 Calculate the total cost of the sanitizers?
1.2 How many millilitres of sanitizers will they buy in total?

Solutions

1.1 R575,00 × 75
= R43 125

1.2 $= 75 \times 25$
$= 1\ 875\ \ell$
$1\ l = 1000\ m\ell$
$= 1\ 875 \times 1000\ m\ell$
$= 1\ 875\ 000\ m\ell$

Worked example 3

It is recorded that Javier Sotomayor of Cuba is the current men's record holder in long jump with a jump of 245 cm whereas Stefka Kostadinova of Bulgaria is the women 's record holder with a jump of 2090 mm.

3.1 Determine with calculations who is the longest jumper between the two.
3.2 Calculate how many feet (ft) did Javier Sotomayor jump if **1m = 3, 2808 feet.**
3.3 Calculate how many inches(in) did Stefka Kostadinova jump if **1 inch = 2,54 cm.**

Solutions

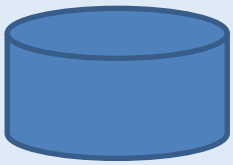
3.1 Javier Sotomayor: 245 cm
To convert cm to mm : we multiply by 10 (Bigger unit to smaller unit)
245 cm × 10 = 2450 mm
Javier Sotomayor is the longest jumper.

3.2 Stefka Kostadinova jumped 2090 mm
We need to convert mm to m
To convert from mm to m : we divide by 1000 (Smaller unit to bigger unit)
2090 mm ÷ 1000 = 2.09 m
2,09 m = 2,09 × 3,2808 = 6,86 *ft* (Bigger unit to smaller unit)

3.3 Javier Sotomayor jumped 245 cm.
To convert from cm to inches : we divide cm by 2,54 (Smaller unit to bigger unit)
245 cm ÷ 2,54 = 96,46 in

Worked example 4

Three friends bought sugar tins with different prices shown below.

A :125 000 mg	B: 500 g	C :0,75 kg
		
R 9,50	R 32,40	R 39,50

[adapted from answer series grade 12]

Which sugar tin is the most economical?

Solutions

125 000 mg = 125 000 ÷ 1000 = 125 g

A : Cost per gram = R 9,50 ÷ 125 g = R 0 ,076/g

Cost per gram = R 32, 40 ÷ 500 g = R 0,0648/g

B : Convert kg to g = 0,75 kg × 1000 = 750 g

C : Cost per gram = R 39,50 ÷ 750 g = R 0,052/g

Therefore C – 0, 75 kg of sugar cost less than the other two bottles.

Practice Questions

Question 1

John is preparing for a union meeting that he will host on Friday afternoon. Including himself, the union consist of 8 members. He decided to make the Vetkoek with curried mince.

TABLE 1: RECIPE OF VETKOEK WITH CURRIED MINCE

Vetkoek	Curried mince
2 cups plain flour 7g instead yeast 1 cup lukewarm water 1 teaspoon salt 1 teaspoon sugar Sunflower oil	250 g beef mince 2 large potatoes 1 large onion 1 large carrot 2 large tomatoes 2 tablespoon chutney 1 tablespoon olive oil 1 cube beef stock

Frying temperature for vetkoek (Fat Cakes) is 350°C for 30 minutes.

[adapted from foodleclub.com/vetkoek-and-curried-mince]

1.1 John bought $\frac{1}{2}$ kg of plain flour. Will the flour be enough for the vetkoek with curried mince?
(Hint: 1 cup = 120 g) (4)

1.2 Convert the frying temperature of 350ºC to ºF.
The following formula may be used: **ºF = ($\frac{9}{5}$ × ºC) + 32** (2)

1.3 John fries the vetkoeks for 30 minutes. If he puts the pan in the oven at 08:43, at what time must he take them out of the oven? (2)

Question 2

Jabu owns a supermarket in Barkly west. He buys his stock from a wholesaler in Kimberley. Below is some of the stock he buys monthly.

10 kg Tastic rice
Cost Price: R174,99
Selling price : R192,49

5 kg Iwisa Samp
Cost Price: R53,49
Selling Price : R58,84

155 g of Lucky Star pilchards
Cost Price: R12,99
Selling Price R 14,30

[adapted from Northern Cape June Paper 1 Nov 2019]

Use information above to answer the questions that follow:

2.1 Convert 155 g to kg. (2)
2.2 Determine the profit he will make if he sells a tin of Luck Star pilchards. (3)
2.3 He buys a 5 kg Iwisa samp and repacks the samp into 125 g packets. Determine how many packets will be able to get from one pack of 5kg samp. (3)
2.4 If the 10 kg Tastic rice is divided into 8 smaller packets. Calculate the selling price of ONE small packet. (2)

Question 3

Nkgono sews dresses for children. The material costs R120, 50 per metre and she needs 3 metres of material to make a dress for a 6-year old, 4, 5 metres to make a dress for a 7-year old and 5 metres to make a dress for 10-year old. The embroidery cotton costs R15, 25 for a roll of 4 metres. She uses 3 rolls of cotton per dress.

Use above information to answer the questions that follows

3.1 How many metres of material will she need to make the above 3 dresses? (2)
3.2 What will the material cost for the three dresses? (2)
3.3 Calculate in centimetre the length of the embroidery cotton that Nkgono is going to use when sewing one dress. (3)
3.4 Calculate the total amount that she will pay for the embroidery cotton? (2)
3.5 What is the total cost of a dress for a 10 year old? (3)

Question 4

Jappie will win a club cycling cup if he is able to log at least 600 km of cycling distance in eight months period. He cycles the Vineyard Race in January (70 miles); the Ocean-to-Ocean Race in March (130 000 yards); the Karoo Fun Race in April (888 500 feet); and the Charity Fun Sprint in June (5 832 154 inches).

NOTE:

1 km = 0,6214 miles **1m = 3,281 feet**
1 yard = 0,9144 metres **1 inch = 2,54 cm**

Use the information above to answer the questions that follow

4.1 Calculate in km the distance cycled in Vineyard Race. (2)
4.2 Calculate in km the distance cycled in Ocean to Ocean Race. (2)
4.3 Calculate in km the distance cycled in Karoo Fun Race. (3)
4.4 Calculate in km the distance cycled Charity Fun Sprint. (3)
4.5 Verify with calculations whether Jappie will be able to win the club cycling cup. (3)

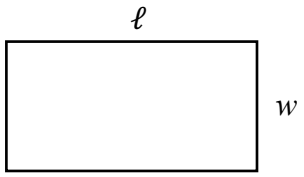
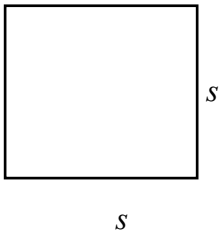
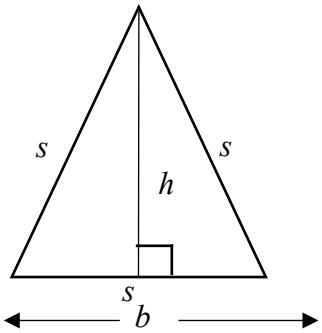
3.1.3 CALCULATING PERIMETER, AREA AND VOLUME

Objectives

In this topic learners need to :

- Solve problems and complete tasks/project
- Determining and/or calculating appropriate quantities of materials needed to complete a task.
- Calculate the cost of materials needed to complete a task.
- Determine the required budget for a given project.
- Make a choice regarding costs and/or quantities and/or materials used in order to complete the task within a given budget.

Summary

Formula	Shape
Rectangle Perimeter =2 × length + 2 × width Area = Length × width	
Square Perimeter = 4 × length or 4 × side side × side = side^2	
Triangle Perimeter = Length 1 + length 2 + length 3 Area = ½ base × perpendicular height	

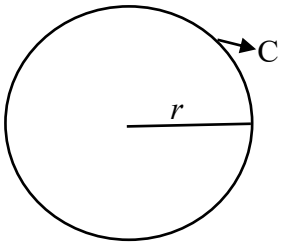
Circle

Circumference = π × (2 × radius)

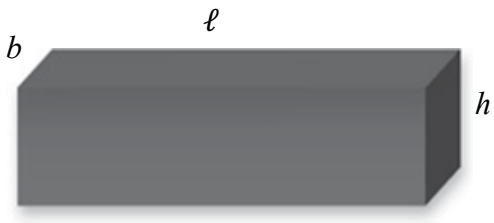
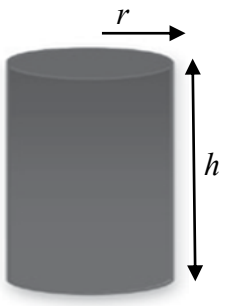
OR

Circumference = π ×diameter

Area = π × $r$adius^2



Volume

Shape	Volume	Diagram
Rectangular box	$V = \ell \times b \times h$	
Cylinder	$V = \pi \times r^2 \times h$	

WORKED EXAMPLES

Worked example 1

Uncle Joe bought a house and decided to do renovations in the lounge area. He plans to change the wall panels on one of the walls in this room.

Below is the plan of the lounge

Diagram	Plan of the wall
	 Measurements of the wall (8 m × 4, 5 m)

Use the above information to answer the questions that follow

1.1 Calculate the perimeter of the part of the wall that needs to be decorate

The following formula may be used:

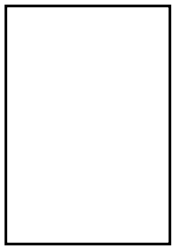
Perimeter = 2 x (Length × Width)

1.2 Calculate the area of the wall that is going to be decorated with wall panels.

The following formula may be used**:**

Area = Length × Breadth

1.3 Uncle Joe is decorating the wall with the ceiling panels

 Ceiling panel is 1 m^2	 Part of the ceiling (8 m × 9,5 m)

1.3.1 How many wall panels will be needed for the wall? Give your answer to the nearest whole number.
The following formula may be used:

$$\text{Wall panels needed} = \frac{\text{Area of the wall to be decorated}}{1{,}5\ \text{m}^2}$$

1.3.2 The area of the part of the ceiling that is going to be decorated is 45 m^2. Determine how many packs of ceiling panels must uncle Joe buy if there are FOUR pieces in a pack

1.3.3 The colour of the wall panels is white and uncle Joe's lounge is orange. He bought the same colour paint to paint the wall panels. The paint that he wants to use can cover approximately 9 m^2 per litre. How many litres of paint must he buy?

Solutions

1.1 $P = 2 \times (8 + 4{,}5)$
$= 25$ m

1.2 $A = 8 \times 4.5$
$= 36\ m^2$

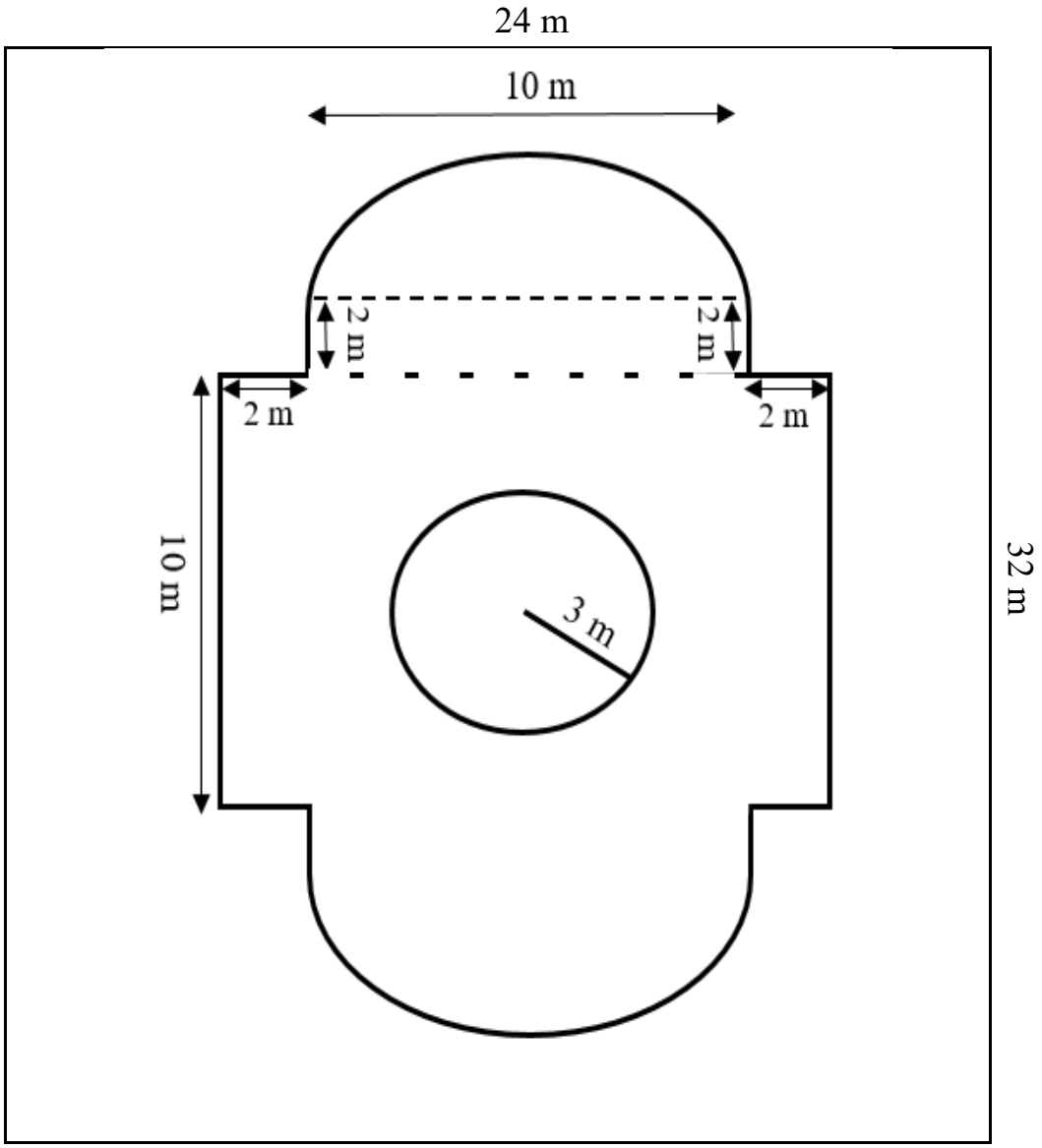
1.3.1 $36 \div 1.5$
$= 24$ panels

1.3.2 $45 \div 1 = 45$ pieces
$45 \div 4 = 11{,}25$ packs
$= 12$ packs

1.3.3 $36 \div 9 = 2{,}72222$
$= 4$ litres of paint

Worked example 2

The following pond is made of rectangular shape at the center and two semi-circular shapes on the either side as shown below. The centre circle (**has a radius of 3 m)** in the middle indicates where the statue will be erected. The area around the pond is paved by bricks



Use information above to answer questions that follow.

2.1 A protective fence must be erected around the pond. Determine the perimeter to be covered by the fence.

This formula may be used: **Perimeter of rectangle = 2(l + *b*)**

2.2 Currently, the quantity and cost of paint is as follows

Quantity	Cost
5 litre	R 475,00
10 litres	R580,00
20 litres	R998,00

[source:builders.co.za]

2.2.1 One litre of paint covers one coat of paint on $3m^2$ of the wall. Determine the number of litres of paint to cover all the inside walls of the pond.

2.2.2 Determine the tin size (tin of paint) that is the cheapest per litre

2.2.3 Provide an advice on the size of the tin that will be most economical

Solutions

2.1 Perimeter = 2 (l + b)

= 2 (32 + 24)

= 2 (56)

= 112 m

2.2.1 1litre = $3m^2$
Litres = 38,78 m^2
= 12,94litres
= 12,94litres
= 13 litres

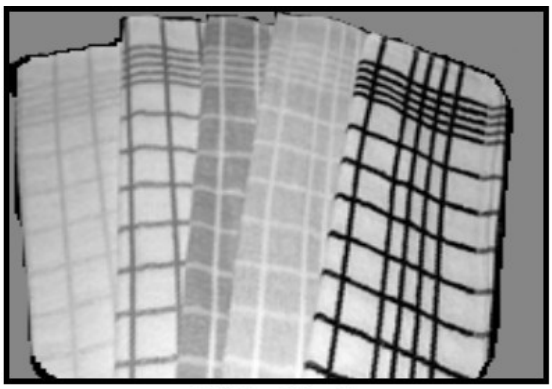
2.2.2 5 litres = R475.00 : 1L = 475 ÷5 = R95
10 litres = R580 : 1L=580÷10 = R58
20 litres = R998 : 1L= 998 ÷20 = R49,99
Therefore 20 litres tin is cheaper

2.2.3 13 litres required
1 x 10 litres and 1 x 5 litres
10 litre x 1 = R580
1 x 5 litres = R475
Total = R1055
20 litres = R998.00

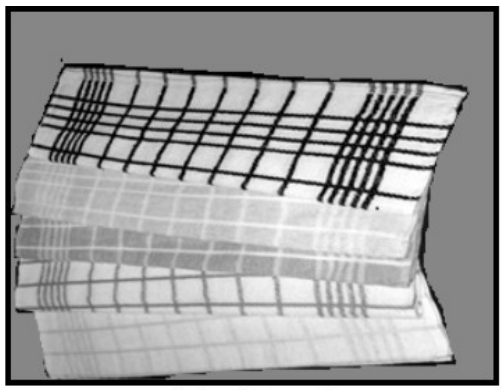
Therefore it is economical to purchase the 20L tin

Worked example 3

Julia buys some material to make dish cloths and tea towels which she uses at her catering project. The material she buys has a fixed width of 120 cm and is cut into any required length. She cuts the material into rectangular pieces of 30 cm × 45 cm to make the tea towels and 30 cm × 30 cm to make the dish cloths, as shown in the photographs below.



Dish Cloth



Tea Towel

Use information above to answer the questions that follow.

3.1 Calculate the area of the material needed to make ONE tea towel.
You may use the formula:

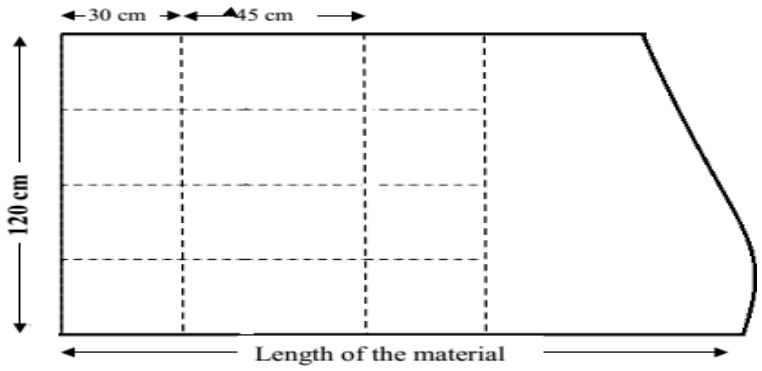
Area of a rectangle = length × breadth

3.2 Julia wants to make a decorative border on some of the tea towels
Calculate the perimeter of a tea towel.
You may use the formula:

Perimeter of a rectangle = 2(length + breadth)

3.3 To make the dish cloths and tea towels she uses the cutting layout as shown in the sketch

Cutting layout for dish cloths and tea towels using dotted lines:

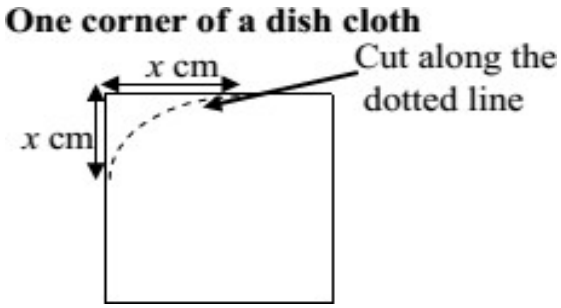


Use the layout above to answer the questions that follow.

3.3.1 Determine the minimum length of material that Julia will need if she wants to make exactly 4 dish cloths and 4tea towels.

3.3.2 Determine the maximum number of dish cloths and tea towels she can make if she has a piece of material that is exactly 180 cm long. You need to make sure that no material is wasted.

3.3.3 Determine the maximum number of dish cloths and tea towels she can make if she has a piece of material that is exactly 180 cm long. You need to make sure that no material is wasted. The edges of the dish cloths are stitched, making the corners round as shown in the diagram



To calculate the area of the finished dish cloth, she uses the following formula: **Area (in cm^2) = 900 – x^2 (4 – π)**	(*x is the distance from the side of the square where she starts to make the corners round.)* Calculate the Area of ONE finished dish cloth if x = 3 and using π = 3, 142.

3.4 Julia buys the material at R45, 00 per metre. She uses the table below to help her calculate the cost of thematerial required.

Length of material (in metres)	0	2	4	5	7	**B**	10
Cost (in rand)	0	90	180	**A**	315	360	450

Use information above to answer the questions that follow.

3.4.1 Complete the following formula:

Cost of material = R 45, 00 × ……..

3.4.2 Calculate the missing values **A** and **B**.

3.4.3 Draw a line graph that represents the relationship between the length and the cost of the material.

Solutions

3.1 Area of a rectangle (Tea towel) = length × breadth
= 30cm × 45 cm
= 1350 cm^2

3.2 Perimeter of a rectangle = 2(length + breadth)
= 2 (30 cm + 45 cm)
= 2 (75 cm)
= 150 cm

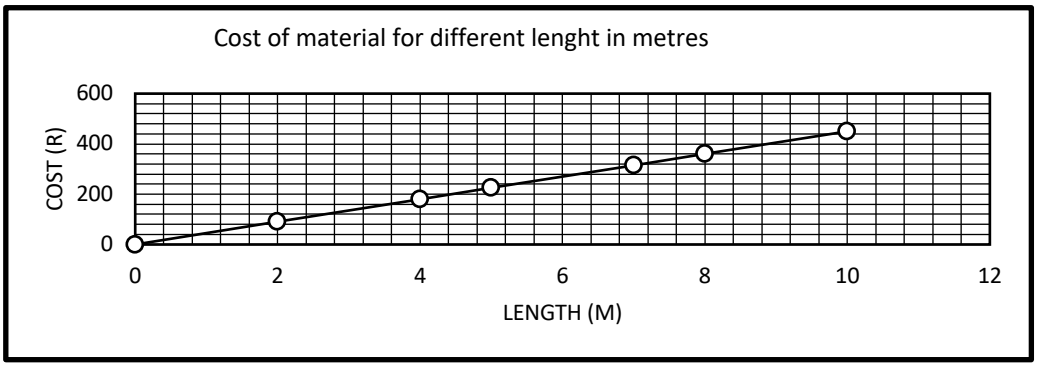
3.3.1 30 cm + 45 cm = 75 cm

3.3.2 180 cm = 2 × 75 cm + 30 cm
She can make 8 tea towels and 12 dish cloths

3.3.3 Area (in cm^2) = 900 – $(3)^2$ (4 - 3,142)
= 900 – 7,74
= 892,26

3.4.1 Cost of the material = R45,00 × length of material (in meters)

3.4.2 A = R 45,00 × 5
=R 225
For calculating B:
Cost of material =R 360
Length of material = B
According to the formula: Substitute what you have
i.e. R 360 =R 45,00 × Length of the material (B)
Therefore B = 360 ÷ R 45,00
= 8 meters



Worked example 4

Rachel sells hair products. One of the product that is in high demand is aqueous cream used for cleansing and moisturising, as shown in the picture alongside. The aqueous cream is sold in 100 ml jars. The cylindrical jars are filled with cream to a height of 4, 5 ml.	**Picture of cylindrical jar of aqueous cream** 

4.1 Calculate in cm the diameter of the jar.
You may use the formula:

Volume of a cylinder $= \pi \times$ (radius)^2 × height, where π = 3,142

NOTE:1 $m\ell$ = 1 cm^3

Solution

Volume of a cylinder = $\pi \times$ (radius)$^2 \times$ height

100 ml = 3,142 × (radius)^2 × 4,5

100 cm^3 =14,139 (radius)^2

100 cm^3 ÷ 14,139 = 14,139 (radius)^2 ÷ 14,139

7,072635971 = (radius)^2

$\sqrt{7,072635971}$ = r

2,659442793 = radius

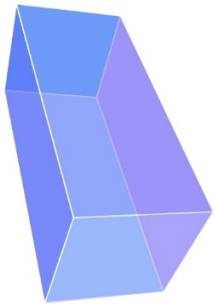
Diameter= 2,659442793 × 2

= 5, 32 cm

Practice questions

Question 1

Mr Masigo is working as an intern at Bata shoe company in Durban. The company designs boxes and other containers for shoes. He is required to work on a design for a shoe box, as shown in the diagram

	
Picture of the Bata shoe box	Dimensions of the Bata shoe box: length = 320 mm; width = 205 mm; height =111 mm

Note: The dimensions of the base are the same as the dimensions of the top (lid).
Area = Length × width

[source:www.boxesonline.co.za]

Use the above information to answer the question that follow.

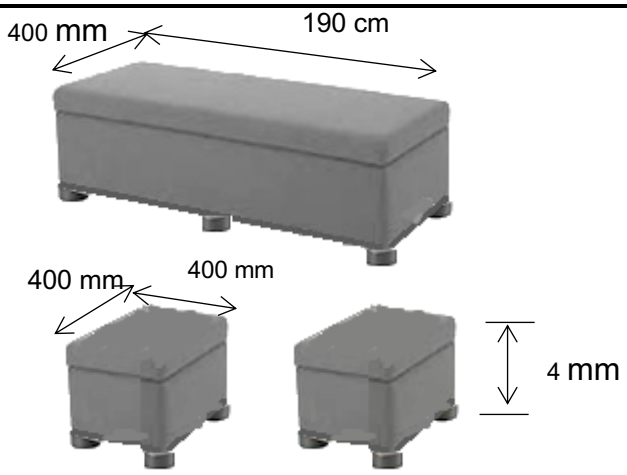
Determine how much cardboard (the surface area) is needed to make one Bata shoe box in cm^2.

NB: The Shoe box has six faces.
The overlap Is not taken into account when forming a box.

(5)

Question 2

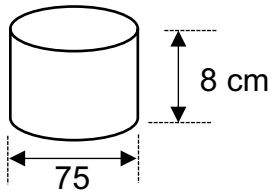
Ten years ago, John bought a rectangular prism-shaped ottoman and two matching cubic-shaped ottomans[1]. He wants to refurbish each of them by having the side surfaces (excluding the top and bottom) repainted. He will also employ an upholsterer[2] to re-cover the top of each ottoman and to attach cylindrical-shaped legs to the base of each ottoman. Each cubic-shaped ottoman will have 4 legs, while the rectangular prism-shaped ottoman will have 6 legs.



DIMENSIONS:

Rectangular ottoman
Length = 190 cm
Width = 400 mm
Height = 400 mm

Cubic-shaped ottomans
Side = 400 mm

PICTURE OF A LEG	DIAGRAM OF A LEG	DIMENSIONS OF A LEG
		Diameter = 75 mm Total height = 8 cm

[1]Ottoman: a piece of furniture like a large box with a soft top, used as a seat
[2]Upholsterer: someone whose job it is to cover furniture with material

Use information above to answer the question that follow

2.1 Determine the total number of legs for the ottomans John has to purchase (3)

2.2 Calculate the radius of the ottoman's leg. (2)

2.3 Calculate, in centimetres, the total height (including the legs) of ONE cubic-shaped ottoman (2)

2.4 Calculate, in cm^2, the total surface area of the side surfaces of all three Ottomans that need to be painted. You may use the following formulae:

$$\text{Area of a rectangle} = \text{length} \times \text{width}$$

$$\text{Area of a square} = \text{side} \times \text{side}$$

(5)

2.5 John bought a one-litre tin of luxurious silk paint to paint the side surfaces. The paint has a spread rate of 9 m^2 per litre.

1-litre tin of pain
[Source: www.farmcity.co.za].

Calculate, in millilitres, the amount of paint needed to paint ALL the ottomans with TWO coats of paint (4)

2.6 The tin has an inner radius of 3.3 cm.

Calculate the height (in cm) of the paint in the tin, if 1 litre = 1 000 cm^3.

You may use the following formula:

$$\textbf{Height} = \frac{\textbf{Volume}}{3{,}142 \times (\textbf{radius})^2} \quad (3)$$

Question 3

Dr Seroto the head of Maths, Science and Technology has to produce rectangular display boards when organising a science fair. The external dimensions of each board are 52 inches by 40 inches. The front surfaces of the boards must be spray – painted with one layer of non- reflective white paint.
NOTE:
1 $m\ell$ of the paint covers a surface area of 50 cm^2
1 inch = 25 mm

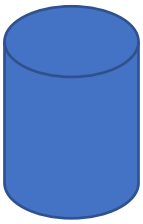
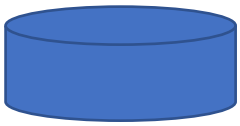
Use information above to answer the questions

3.1 Determine, showing ALL calculations, whether 8 litres of the paint would be enough to spray paint 30 display boards. The following formula may be used:

Area = length × width

(10)

3.2 Dr Seroto has a choice of two cylindrical containers (as shown below) for display purposes. A decorative label with a 1 cm overlap will be placed right around the container completely covering the curved surface only.

CYLINDER - A	CYLINDER - B
 Diameter = 30 cm Height = 30 cm	 Diameter = 40 cm Height = 20 cm

Verify, showing ALL calculations, whether cylinder B would require less material to make the decorative labels.
The following formula may be used:

Curved surface area of cylinder = π × diameter × height, π = 3,142 (7)

3.3 Dr Seroto travelled from his office directly to the school 45 km away. He travelled at an average speed of 100 km per hour and arrived at the school at 11:20.
Verify, showing ALL calculations, whether Dr Seroto left his office at exactly 10:50.
The following formula may be used:

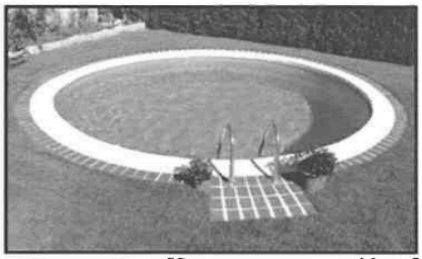
Distance = average speed × time (5)

Question 4

4.1

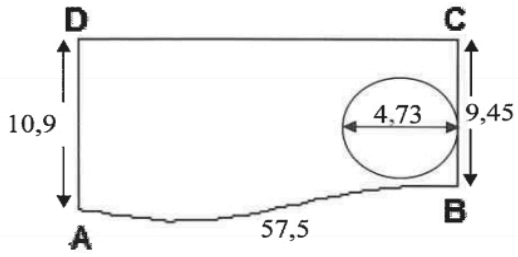
The photograph and sketch below show a circular swimming pool in a portion of Annette's garden.

CIRCULAR SWIMMING POOL



[Source: www.megaide.se]

SKETCH OF THE SWIMMING POOL IN THE GARDEN WITH DIMENSIONS (in metres)



NOTE: The curved distance for AB is 57,5 m.

Use the above information to answer the questions that follow.

4.1.1 Give, in simplified form, the ratio of distance **AD** to distance **CB**. (2)

4.1.2 The perimeter of **ABCD** is 125, 92 m. Calculate the distance **CD** (2)

4.1.3 Write down the length of the radius of the pool. (2)

4.1.4 A fence will be erected along the curved side **AB** at a cost of R97, 56 per running metre. Calculate the total cost of erecting the fence (2)

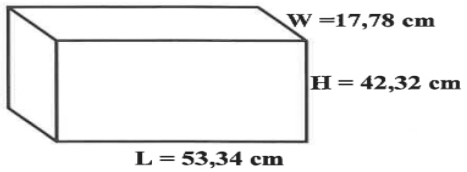
4.2 Anju uses a sedan vehicle to travel. The fuel consumption of her vehicle is 8, 4 litres per 80 km travelling at an average speed.
Use the above information to answer the questions that follow

4.2.1 Calculate (to the nearest km) the distance her vehicle can travel using 60 litres of petrol. (3)

4.2.2 Anju spends 1 hour 45 minutes on a particular day driving between two workstations that are 196 km apart. Determine the average speed of the vehicle.
You may use the following formula:

Average Speed = distance ÷ time (3)

4.3 The dimensions (in centimetres) of Anju's rectangular bag are given below.

Rectangular Bag	Dimension of the bag without the handle
	 **L** = length **W** = width **H** = height **NOTE:** 1 litre = 1 000 cm^3

[Source : Amazon .com]

Use the above information to answer the questions that follow.

4.3.1 Calculate the volume (to the nearest litre) of ONE bag excluding the handle.

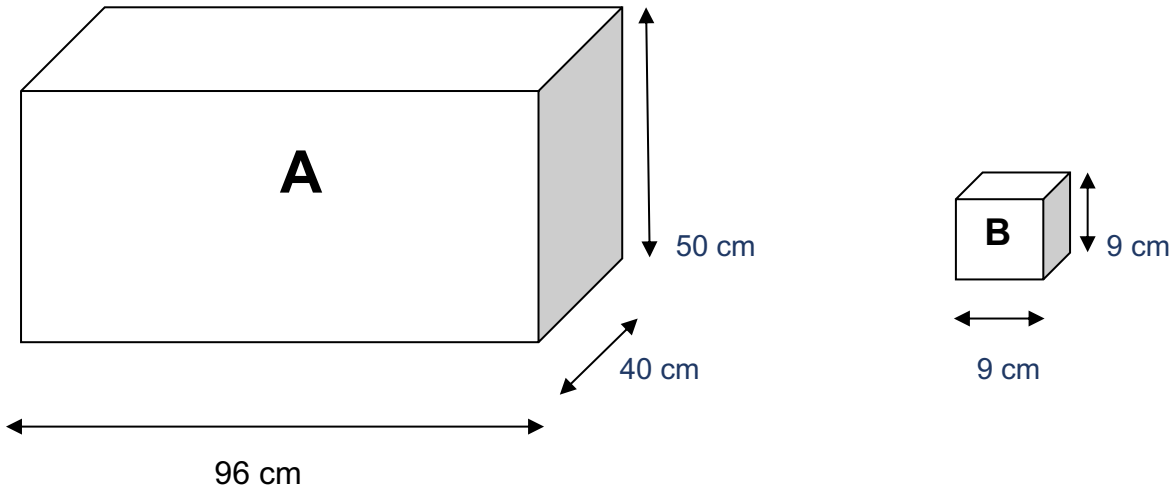
You may use the following formula:

Volume = length × width × height

(4)

QUESTION 5

Below is a drawing of a big cardboard box, **A**. Smaller boxes of chalk are packed into this cardboard box. The smaller box, **B**, are in the shape of a cube (all the sides are equal in length). The sketches are not drawn to scale.



Use information above to answer the questions that follow.

5.1 Calculate the area of the shaded rectangular side of the cardboard box **A**.
Use the following formula

Area = length × breadth (2)

5.2 Calculate the volume of cardboard box (B).
Use the following formula

Volume = length × breadth × height

(3)

5.3 Determine how many boxes of chalk (**B**) can be packed into the larger cardboard box (**A)**. (5)

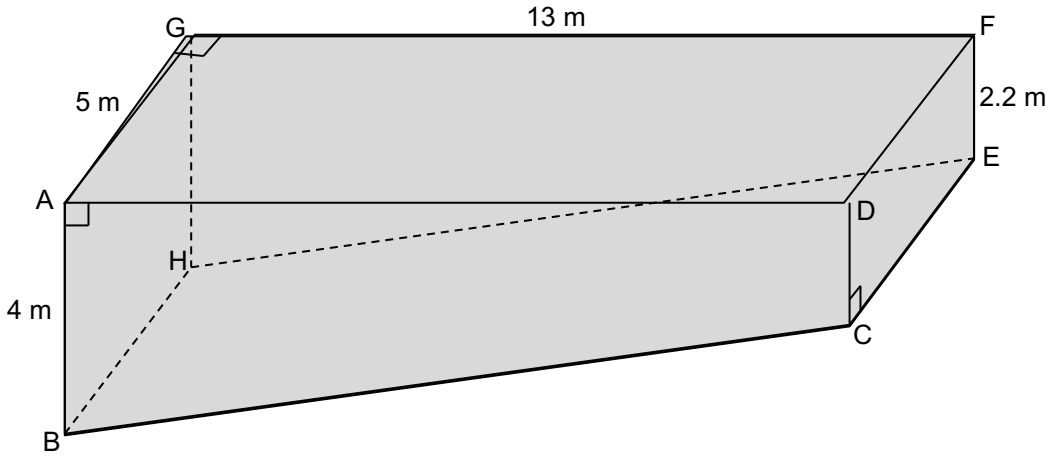
5.4 If one small chalk box (**B**) contains 100 pieces of chalk, determine how many pieces of chalk one big cardboard box (**A)** holds. (2)

Question 6

Paul is residing in Kimberley under Sol Plaatje municipality. He is planning to build himself a swimming-pools in such a manner that one part is deeper than the other part. A sketch drawing of a similar swimming- pool is given below.
The dimensions are clearly marked on the figure. ABHG, DCEF and BCEH are rectangles.

Picture of the swimming pool

Diagram of the swimming pool



Use information above to answer the questions that follow.

6.1 Calculate the area of ABCD
Use the Formula : (4)

Area of ABCD = ½ (AD)(AB + DC)

6.2 Name another side of the pool with the same shape and size as that of ABCD (2)

6.3 Calculate the area of the following sides of the pool.
Use the Formula:

Area = length x breadth

6.3.1 ABHG (2)

6.3.2 CEFD (2)

6.4 All 4 side walls of the swimming-pool are to be tiled. The length and width of each tile is 1600 mm and 1200 mm respectively.

6.4.1 Calculate the total area (m) of all 4 side walls of the swimming-pool (3)

6.4.2 Calculate the area of on one tile in square metres (m^2). (4)

6.4.3 Calculate the number of tiles Paul will need to finish the tiling of the 4 side walls? (***Ignore the waste in cutting.***) (2)

6.4.4 CTM sells tiles in boxes of 24. How many boxes of tiles Paul has to buy?
Give your answer to nearest **whole number**. (3)

6.4.5 A box of tiles cost R159, 90/m^2. What is the total cost of the tiles for the above job? (2)

6.5 The swimming-pool is to be filled with water.
The formula to determine the volume is:

Volume = Area of ABCD x AG

Calculate the capacity (volume) of the swimming-pool

6.5.1 In cubic metres (m^3) (2)

6.5.2 In kilolitres (*kℓ*)
(Hint :1 m^3 = 1 kℓ) (2)

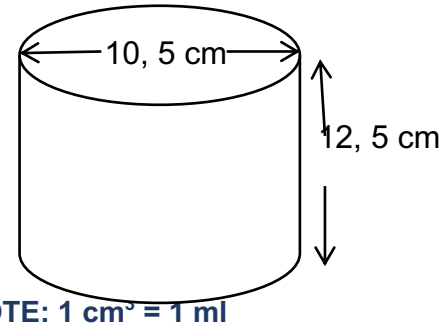
6.6 The Sol Plaatje municipality charges R6, 65 per kilolitre (***kℓ***). Calculate the cost of water needed to fill the pool. (2)

6.7 What is the depth at the centre of the pool? (2)
You may use the following formula:

Depth = ½ (AB + DC*)*

Question 7

Kwazi bought a 750 ml can of motor oil. He is aware that the can of oil is not filled to its fullest capacity. Below is a photograph of the can of motor oil and a diagram showing the external dimensions of the cylindrical can.

Photograph of the can of motor oil	Diagram of the cylindrical can of motor oil
	 **NOTE: 1 cm³ = 1 ml**

Calculate:

7.1.1 The actual capacity (volume) of the can
You may use the following formula:
Volume of a cylinder = π × (radius)^2 × height ,where π = 3,142 (4)

7.1.2 The volume of the empty space in the can when it is filled with 750 ml of motor oil. (2)

7.1.3 The height of the motor oil in the can
You may use the following formula:
Height of motor oil in can = $\frac{\text{volume of motor oil}}{\pi \times (radius)^2}$ **where π = 3,142** (3)

7.2 Mr Koba owns a refuse removal company that removes refuse from building sites. His refuse containers are rusted and Mr Koba wants to repaint the exterior sides of the containers. Each container is an open – top right prism with two sides that are trapezium- shaped and two slanted sides that are rectangular.

The photograph below is of one of his refuse containers that he delivers to building sites. The dimensions of a container are shown on the diagram below.

Photograph of the side view of the container

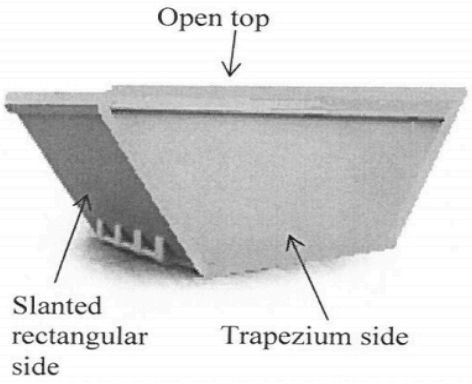
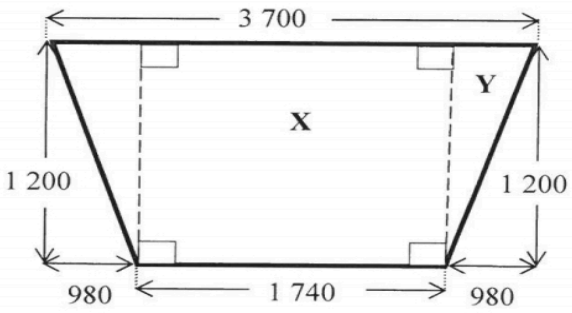


Diagram of the side view of the trapezium-shaped container (all dimensions are in mm)



Use the above diagram to answer the following questions

7.2.1 Calculate the area (in mm^2) of the triangular part marked Y on the diagram. You may use the following formula:

$$\textbf{Area of a triangle} = \frac{1}{2} \times base \times height$$ (2)

7.2.2 Use the formula below to calculate the total exterior area (in m^2) of the trapezium side of the container if the area of the rectangular part X is equal to 2 088 000 mm^2.
You may use the following formula:
Area of trapezium side of the container = 2 × (area of Y) + (area of part X)
NOTE: 1 m^2 = 1 000 000 mm^2

(5)

7.2.3 The total exterior surface area of the container, excluding the top and the bottom base, is 11,676 m^2.
Hence, calculate the area of ONE of the slanted rectangular sides of the container if they are identical in size. (3)

7.3 To paint the exterior sides of the container it must first be rustproofed with a coat of Optirustbusta. It is then painted with Optimetalcoat. The technical consultant recommends that two layers of Optimetalcoat must be applied. Mr Koba has 25 identical containers, each having an exterior area of 11,676 m^2 that need to be repainted as described above. Optimetalcoat is sold in 5 litre tins. One tin of Optimentalcoat will cover 25 m^2.

7.3.1 Calculate the total area of all the containers that will be coated with Optirustbusta. (2)

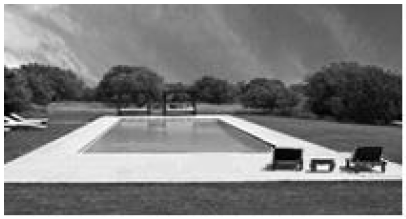
7.3.2 Determine the total number of coats of Optimetalcoat that will be needed for all the containers. (2)

7.3.3 Mr Koba estimates that he needs to paint a total area of 585 m^2.Calculate the minimum number of tins of Optimetalcoat that he will need to order, based on his estimation. (3)

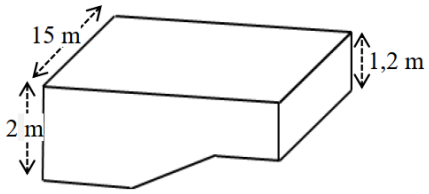
Question 8

8.1 Simone uses the local swimming pool to give swimming lessons. The rectangular pool has a shallow section, **C**, a deep end, **A**, and a sloping section, **B** as shown in the various views below.

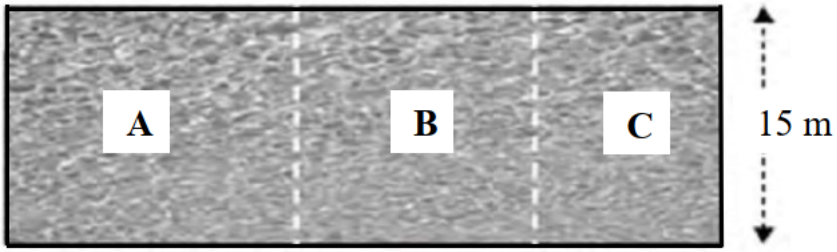
Picture of the swimming pool



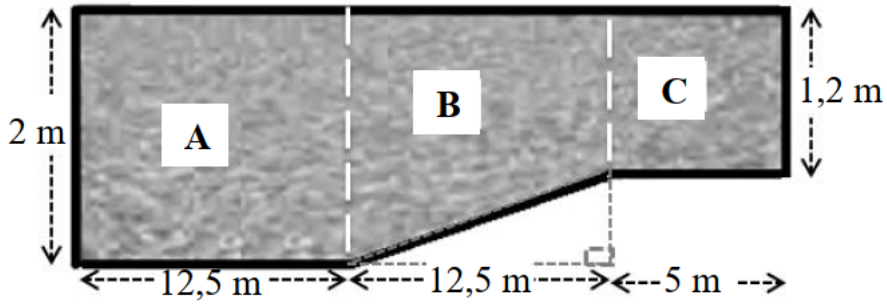
3D view



Top view of the swimming pool



Below ground-level side view of the swimming pool



The capacity of section of B of the swimming pool is 300 m^3.
You may use the following formula:

Volume of a rectangular prism = length × width × height
NOTE:

- **1 gallon = 3,785 litres**
- **1 m^3 = 1 000 litres**

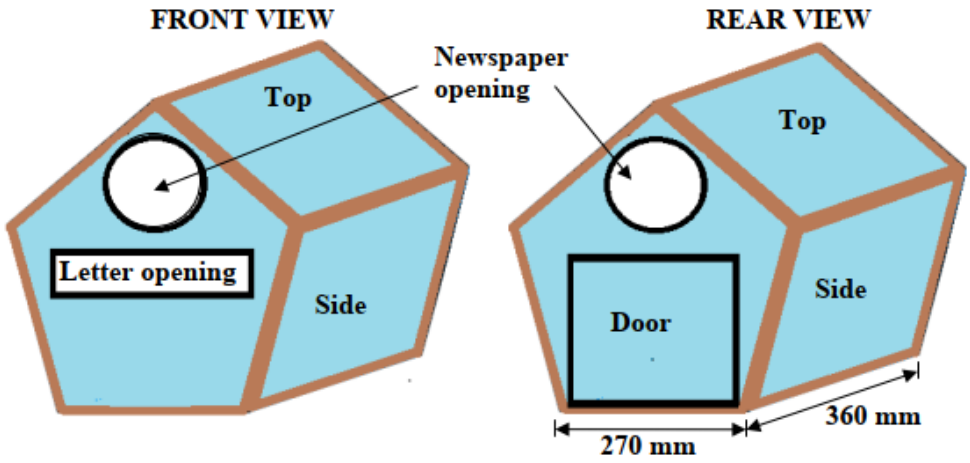
8.1.1 Show, with calculations, that the maximum capacity of the swimming pool is 765 m^3. (5)

8.1.2 Calculate the volume of water (in gallons) required to fill the swimming. Calculate the volume of water (in gallons) required to fill the swimming pool to 94% of its capacity. (4)

8.1.3 The pool must be topped up with 135 000 ℓ of water due to water loss. The pool is filled with water at a constant rate of 2 350 litres per hour. Simone says it will take exactly $2\frac{1}{2}$ days to top up the pool. Verify, showing ALL calculations, if her statement is valid. (5)

Question 9

9.1 Koos lives in Pelican Road in Port Elizabeth. He is making a pentagonal post box for a house as shown in the diagrams below:



The front and rear ends of the post box are regular pentagons with side lengths equal 270mm. The bottom, the top and sides of the post box are rectangles with a length 360mm and a breadth of 270mm.

[source: Free state June Paper 2 June 2021]

Use the information above to answer the questions that follow:

9.1.1 Calculate the perimeter of ONE of the pentagonal ends of the post box. (2)

9.1.2 Calculate the total surface area (in m^2) of the post box (excluding the openings for the newspaper and letter), if the following are given:

SHAPE	AREA
Pentagon	$0,13m^2$
Letter opening	$0,017m^2$
Newspaper opening	$0,013m^2$

The following formulae may be used:

Area of a rectangle = length × breadth

Total surface area of post box = 5 × areas of rectangles (side) + area of front + area of back (5)

9.1.3 A newspaper folded into a cylindrical shape has a diameter of 12 cm. The area of the newspaper opening of the post box is 0,013 m^2. Show, with calculation, whether the folded newspaper will fit in the newspaper opening of the post box.

The following formula may be used:

Area of a circle = π × radius^2 and **π = 3,142.** (5)

3.2 SOLUTIONS TO PRACTICE QUESTIONS

3.2.1 Conversion

Quest	Solution	Explanation	L
1.1	2 cups = 120 g × 2 ✓✓MA = 240 g $\frac{1}{2}$ kg = 500 g✓A John bough more than enough flour ✓A	2MA multiplying by 2 1A simplification 1A conclusion (4)	L2
1.2	ºF = ($\frac{9}{5}$ × 350) + 32 ✓SF = 662 ºF✓A	1 SF substituting 1 A simplification (2)	L2
1.3	Time = 8:43 + 0:30 ✓MA = 9:13✓A	1MA adding 1A simplification (2)	L2

Quest	Solution	Explanation	L
2.1	1 kg = 1 000 g ? = 155 g Quantity in kg = 155 ÷ 1000✓MA = 0,155 kg ✓A **OR** 155 g = 155 g × 0,001 kg✓MA = 0.155 kg✓A **OR** 155 g = 155 ÷ 1000✓MA = 0,155 kg✓A	 1MA dividing by 1 000 1A amount in kg **OR** 1MA dividing by 1 000 1A amount in kg **OR** 1MA multiply by 0,001 1A amount in kg (2)	L1
2.2	Profit = R14,30 – R12,99✓RT ✓M = R1,31✓CA	1RT correct values 1M subtracting values 1CA simplification (3)	L1
2.3	Number of packet: = 5 kg ×(1000 ÷ 125 g) ✓MA✓M = 5× 8 =40 packets ✓CA **OR** 5 ×1000 = 5000 g ÷125)✓MA✓M = 40 packets ✓CA	 1MA multiply by 1 000 1M dividing by 125g 1CA simplification **OR** 1MA multiply by 1 000 1M dividing by 125g 1CA simplification. (3)	L1
2.4	Selling price = R192,49 ÷ 8✓MA = R24,06✓CA	1MA dividing correct value by 8 1CA simplification (2)	L1

Quest	Solutions	Explanation	L
3.2	Material needed = 3m + 4,5 m + 5 m ✓M = 12,5 m ✓A	1M addition 1 A answer (2)	L1
3.2	The cost for the 3 dresses= Length of material ×price = 12,5× R120,50✓M = R 1506,25✓CA	(2)	L1
3.3	The length of embroidery = Length of one roll × 3✓MA = 4m × 3 = 12m × 100✓C = 1200 cm✓A	1M multiplication 1C conversion 1A answer (3)	L2
3.4	Total amount = No. of dresses × 3 cotton rolls × price = 3 × 3 × R 15,25✓MA = R 137,25 ✓A	1 MA 1A answer (2)	L2
3.5	Total cost for 10 yrs. old dress = (Length of material × price) + (3 rolls of cotton ×price) = (5 ×R 120,50) + (3 ×R 15,25) ✓SF =R 602,25 + R 45,75 ✓M = R 648, 25✓A	1SF substitution 1M adding 1A answer (3)	L2

Quest	Solution	Explanation	L
4.1.1	Distance cycled in Vineyard Race = 70 ÷ 0,6214✓ MA =112,65 km ✓A	1MA conversion 1A simplification (2)	L2
4.1.2	Distance cycled in Ocean to Ocean Race = 130 000 yards × 0,9144 = 118 872 m ✓MA = 118 872 ÷ 1 000 = 118,87 km ✓A	1MA conversion m 1M simplification (2)	L2
4.1.3	Distance cycled in Karoo Fun Race: 888 500 feet = 888 500 ÷ 3,2808✓MA = 270 818,09 m ✓ A = 270 818 ÷ 1000 = 270,82 km ✓ C	1MA division 3,2808 1A 270 818,09 m 1C Simplification (3)	L2
4.1.4	Distance cycled Charity Fun Sprint: 5 832 154 inches = 5 832 154 × 2,54 ✓MA = 14 813 671,16 cm ✓A = 14 813 671,16 ÷ 100 000 ✓M = 148,14 km	1MA conversion cm 1A simplification 1M diving by 100 000 (3)	L2
4.1.5	Total distance covered = 112,65 + 118,87 + 270,82 + 148,14 ✓MA = 650,43 km ✓A Therefore, Jappie will be able to win the club cycling cup ✓O	1MA addition 1A simplification 1O explanation (3)	L2

Calculating Perimeter, Area and Volume

Quest	Solution	Explanation	L
1.	l = 320 ÷ 10 = 32 cm w = 205 ÷ 10 = 20,5 cm ✓C h = 111 ÷ 10 = 11,1 cm $2 \times (l \times w) + 2 \times (w \times h) + 2(l \times h)$ $=2 \times (32 \times 20{,}5) + 2 \times (20{,}5 \times 11{,}1) + 2 \times (32 \times 11{,}1) = 1\,312 + 455{,}1 + 710{,}4$ $= 2\,477{,}5\ cm^2$ ✓A	2C converting to cm 2MA calculating surface area 1A simplification (5)	

Quest	Solution	Explanation	L
2.1	<u>Legs of ottomans</u> 2 cubic ottomans × 4 legs = 8 legs/*pote* ✓A 1 retangular ottoman × 6 legs = 6 legs = 8 + 6 ✓MA = 14 legs ✓CA	 1A number of legs 1MA adding 6 legs 1CA total number of legs (3)	L1
2.2	$\text{Radius} = \frac{75\ mm}{2}$ ✓MA = 37,5 mm ✓A	1MA concept of radius 1A simplification (2)	L1
2.3	Total height (400 ÷ 10) + 8✓C = 40 + 8 ✓M = 48 cm	 1C converting to cm 1MA finding the height (2)	L1

2.4	8 square sides × (40 × 40) = 12 800 cm^2 ✓A 2 rectangular side × (40 × 190) = 15 200 cm^2 ✓A 2 square × (40 × 40) = 3 200 cm^2 ✓A Total area to be painted = 12 800 cm^2 + 15 200 cm^2 + 3 200 cm^2 ✓M = 31 200 cm^2 ✓MA	1A simplification 1A simplification 1A simplification 1M adding all values 1MA finding total area (5)	L2
2.5	31 200 ÷ 10 000 = 3,1 m^2 ✓M 3,1 × 2 = 6,2 m^2 ✓M 6,2 m^2 ÷ 9 = 0,69 ✓M = 690 millilitres ✓A	1C converting from cm^2 to m^2 1M area for 2 coats 1M divide by spread rate 1A answer in millilitres (4)	L2
2.6	Height = $\frac{\textbf{Volume}}{\pi \times (\textbf{radius})^2}$ $= \frac{1000\ cm^3}{3,142 \times (3,3)^2}$ ✓C ✓SF = 29,22576848…. cm ✓CA	1C conversion from ml to cm^3 1SF substitution 1CA simplification (3)	L2

Quest	Solutions	Explanation	L
3.1	Area of display = length × width = 52 inches × 40 inches ✓SF = 52 × 25 mm ÷ 10 × 40 × 25 mm ÷ 10 ✓C = 130 cm × 100 cm = 13 000 cm^2 ✓CA Total area of 30 displays =13 000 cm^2 × 30 ✓M = 390 000 cm^2✓CA Amount of whiteboard paint needed = 390 000 cm^2 ÷ 50 cm^2✓M ✓CA = 7 800 ml ÷ 1 000 = 7,8 litres ✓C Therefore 8 ℓ will be enough. ✓O **OR** 8 liters of paint can cover 8 ℓ × 1 000 ✓C = 8 000 m ℓ × 50 ✓M = 400 000 cm^2 ✓CA Area of display = length × width = 52 inches × 40 inches ✓SF = 52 × 25 mm ÷ 10 × 40 × 25 mm ÷ 10✓C = 130 cm × 100 cm ✓C = 13 000 cm^2 ✓ Total area of 30 displays = 13 000 cm^2 × 30 ✓M = 390 000 cm^2 ✓CA 8 ℓ is enough. ✓	1SF substituting correctvalues 1C converting inches to mm 1C converting mm to cm 1CA area of one display 1M multiplying by 30 1CA calculating total area 1M working with ratio 1CA calculating paint used 1C converting to liters 1O conclusion **OR** 1C converting to mℓ 1M multiplying by 50 1CA area 1SF substitution 1C conversion to mm 1C conversion to cm 1CA one display board area 1M multiplying by 30 1CA total area 1O conclusion (10)	4

3.2	Total Surface Area of cylinder A = π × diameter × height = 3,142 × 30 × 30 ✓ SF = 2 827,80 cm^2 ✓ CA Total Surface Area of decorative sticker for cylinder A = 2 827,80 cm^2 + (1 × 30) cm^2 ✓ M = 2 857,80 cm^2 ✓ CA Total Surface Area of cylinder B = π × diameter × height = 3,142 × 40 × 20 = 2 513,60 cm^2 ✓ CA Total Surface Area of decorative sticker for cylinder B = 2 513,60 cm^2 + (1 × 20) cm^2 = 2 533,60 cm^2 ✓ CA Correct, B will require less ✓ O **OR** Total Surface Area of sticker for cylinder A = [(π × diameter) + 1] × height ✓ M ✓ M = [(3,142 × 30) + 1] × 30 ✓ SF = 2 857,8 cm^2 ✓ CA Total Surface Area of sticker for cylinder B = [(π × diameter) + 1] × height = [(3,142 × 40) + 1] × 20 ✓ SF = 2 533,6 cm^2 ✓ CA Correct, B will require less ✓ O	1SF correct values 1CA calculating area 1M adding area of overlap 1CA calculating area of sticker 1CA area of cylinder B 1CA area of sticker B 1O conclusion **OR** 1M formula 1M for adding 1 to circumference 1SF substitution 1CA calculating area 1SF correct values 1CA calculating area 1O conclusion (7)	4

3.3	Distance = average speed × time 45 km = 100 km× time ✓SF Time = 0,45 hours✓A = 27 minutes ✓A Dr Seroto left home at 27 minutes before 11:20 = 10:53 ✓CA He did NOT leave at 10:50 ✓O **OR** Time diff. = 11:20 – 10:50 = 30 min = 0,5 hours ✓A Distance =100 km/h × 0,5 h ✓SF ✓CA = 50 km more than 45 km ✓O Dr Seroto did NOT leave at 10:50 but a bit later✓O	1SF substitution 1A time in hours 1Atime in minutes 1CA simplification 1O conclusion **OR** 1A time in hours 1SFsubstitution1CA distance 1O comparing 1O conclusion (5)	4

Question 4

Quest	Solutions	Explanation	L
4.1.1	AD: CB = 10,9 : 9,45 ✓M = 218 : 189 ✓CA	1M ratio form 1CA (2)	L1
4.1.2	CD = 125,92m – (57,5 + 10,9 + 9,45) ✓ MA = 48,07m ✓CA	1MA subtracting all lengths 1CA length (2)	L1
4.1.3	Radius = 4,73 m ÷ 2 ✓M = 2,365 m ✓A	1M dividing by 2 1A simplification (2)	L1
4.1.4	Total Cost = R 97,56/m × 57,5 m ✓ MA = R 5 609,70 ✓CA	1MA multiply cost by correct distance 1CA simplification (2)	L1
4.2.1	Distance = 60 litres ÷ 8,4 litres × 80 km ✓✓MA = 571,43 = 571 km ✓ R	1MA multiply by 80 1MA divide by 8,4 1R distance (3)	L2

4.2.2	Average speed = 196 ÷ 01h45 ✓SF = 196 ÷ 1,75 ✓C = 112 km ✓CA	1SF to hours 1C correct values 1CA Average speed (3)	L2
4.3.1	Volume = 53,34 cm × 17,78 cm × 42,32 cm ✓SF = 40 135,66 cm^3 ✓CA = 40 135,66 litres ÷ 1000✓ MA = 40 litres ✓ R	1SF correct substitution 1CA volume 1MA dividing by 1 000 1R volume in litres (4)	L3
			[18]

Quest	Solution	Explanation	L
5.1	Area = 50 cm × 40 cm ✓SF = 2 000 cm^2 ✓CA	1SF substitution 1CA area (2)	L2
5.2	Volume B = 9 cm × 9 cm × 9 cm ✓SF = 729 ✓ cm^3 ✓CA	1SF substitution 1CA volume of B 1A unit (3)	L2
5.3	Length = 96 cm ÷ 9 cm = 10 ✓A Width = 40 cm ÷ 9 cm = 4 ✓A Height = 50 cm ÷ 9 cm = 5 ✓A Nr of chalk boxes = 10 × 4 × 5 ✓M = 200 chalk boxes ✓CA	1A length 1A width 1A height 1M 1CA number of boxes (5)	L3
5.4	Pieces of chalk: 100 × 200 ✓M = 20 000 pieces of chalk ✓CA	1M multiplying 1CA number of pieces (2)	L1

Quest	Solution	Explanation	L
6.1	½ (13 m)(4 m + 2,2 m) ✓ ✓SF = 6,5 m x 6,2 m ✓S = 40,3 m^2 ✓A	1SF for 13 m 1SF for 4 m and 2,2 m 1S simplification 1A answer (4)	L2
6.2	GHEF ✓✓	2A answer (2)	L1
6.3.1	Area of ABHG = 4 m x 5 m ✓SF = 20 m^2 ✓CA	1SF substitution 1CA simplification (2)	L2
6.3.2	Area of CEFD = 5m x 2.2m ✓SF = 11 m^2 ✓CA	1SF substitution 1CA simplification (2)	L2
6.4.1	(40,3 m^2 x 2) + 20 m^2 + 11 m^2 ✓MA✓MA = 111,6 m^2 ✓CA **OR** (40,3 m^2 + 40,3 m^2) + 20 m^2 + 11 m^2 ✓✓MA = 111,6 m^2 ✓CA	1MA multiply by 2 1MA adding 1CA: simplification **OR** 2MA adding 40,3m^2 1CA: simplification (3)	L2
6.4.2	L = 1 600 ÷ 1000 = 1,6 m✓R W = 1 200 ÷ 1000 = 1,2 m ✓R Area = 1,6 X 1,2 = 1,92 m^2✓CA	1R converting length to m 1R Converting w to m 1CA simplification (3)	L2
6.4.3	111,6 m^2 ÷ 1,92 m^2 ✓MA = 59 tiles ✓CA	1MA: dividing by 1,92 1CA simplification (2)	
6.4.4	59 ÷ 24 ✓MA = 2,45 boxes ✓A ≈ 3 boxes ✓R	1MA dividing by 24 1A answer 1R rounding	
6.4.5	Cost = 3 × R159,90 ✓MA = R479,70 ✓A	1MA multiplying 1A simplification (2)	L1
6.5.1	Volume = 40,3 × 5 ✓MA = 201,5 m^3✓A	1MA multiplying 1A simplification (2)	L1
6.5.2	1 m^3 = 1 kl = 201,5 kl✓✓A	2A answer (2)	L1
6.6	Cost= R6,65 × 201,5✓MA = R 1 339,98✓A	1MA multiplying 1A simplification (2)	
6.7	½ (4 m + 2,2 m) ✓MA = ½ (6,2) = 3,1 m ✓A	1MA adding 1A simplification (2)	L1

Quest	Solutions	Explanation	L
7.1.1	Radius =10,5 cm ÷ 2 = 5,25 cm ✓ M✓ SF Volume of cylinder = 3,142 × $5,25^2$ × 12,5 cm^3 = 1082,517 cm^3 = 1082,5 cm^3✓ CA	1M radius 1SF substitution 1CA volume (3)	L2
7.1.2	Volume of empty space = 1082,5 – 750 cm^3✓ A = 332,5 cm^3 ✓ CA	1M subtracting 750 1CA volume (2)	L3
7.1.3	Height of motor oil in can = $\frac{750\ cm^3}{3,142 \times (5,25\ cm)^2}$ ✓ SF = $\frac{750\ cm^3}{86,601375}$ ✓ A = 8,7 cm ✓ CA	1SF substitution 1A simplification 1CA height (3)	L2
7.2.1	Area of a triangle = $\frac{1}{2}$ × 980 mm × 1 200 mm✓SF = 588 000 mm^2 ✓ CA	1SF substitution 1CA area of triangle (2)	L2
7.2.2	Area of trapezium side✓ SF = (2 × 588 000) + 2 088 000 mm^2✓ S = 1 176 000 + 2 088 000 mm^2 ✓ A = 3 264 000 mm^2 ✓ C Total area in m^2 = 3 264 000 ÷ 1 000 000 = 3 ,264 ✓ CA	1SF substitution 1S simplification 1A area 1C conversion 1CA total area (5)	L2
7.2.3	Area of slanted side = $\frac{11,676 - 2 \times 3,264}{2}$ m^2 ✓ M✓ = 2,574 m^2 ✓ CA	1M subtraction 1M division by 2 1CA area (3)	L3
7.3.1	Total area = 11,676 × 25 m^2 ✓ M = 291,9 m^2 ✓ CA	1M multiply by 25 1CA total area (2)	L1
7.3.2	Total number of coats = 25 × 2 ✓ M = 50 ✓ A	1M multiply by 2 1A answer (2)	L1
7.3.3	Minimum number of tins = 585 ÷ 25 tins ✓ M = 23,352 tins ✓ CA = 24 tins ✓ R	1M division by 25 1CA simplification 1R rounding up (3)	L1

Quest	Solution	Explanation	L
8.1.1	Capacity of section C = 5m × 1,2m × 15m ✓SF = 90 m^3 ✓CA Capacity of section A = 2m × 12,5m × 15m ✓SF = 375 m^3 ✓CA Maximum Capacity = 90 m^3 + 375 m^3 + 300m^3 = 765 m^3 ✓MA **OR** Maximum Capacity = Capacity of (A +B +C) ✓SF = 2m × 1 2,5m × 15m + 90 m^3 + ✓SF 5m × 1 2m × 15m ✓CA ✓CA = 375m^3+ 300m^3 + 90m^3 = 765 m^3✓MA **OR** Volume = 30m × 15m × 2m ✓SF = 900 m^3 ✓CA ✓SF Volume of beneath B = $\frac{1}{2}$ × 1 2,5m × 15m × 0,8m = 75 m^3 ✓CA Volume of beneath C = 5m × 15m × 0,8m = 60 m^3 Maximum Capacity = 900 m^3 - 75 m^3 - 60 m^3 = 765 m^3 ✓MA	1 SF correct values 1 CA capacity section C 1 SF correct values 1 CA capacity section A 1 MA adding capacities in m^3 **OR** 1 SF Correct values for A 1 SF correct values for C 1 CA capacity section A 1 CA capacity section C 1 MA adding capacities in m^3 **OR** 1 SF volume 1 CA volume section A 1 SF volume beneath B 1 CA volume beneath B 1 MA subtracting volume in m^3 (5)	M L3
8.1.2	✓M Volume of water = 94% × 765 m^3 = 719,1 m^3 = 719 100 litres ✓C = $\frac{719\,100}{3,785}$ gallons ✓C = 189 986,79 gallons ✓CA	1M calculating % 1C convert to litres 1C convert to gal. 1CA simplification (4)	M L3

8.1.3	In 1 hour 2 350 litres of water will flow. In 1 day: 24 350 litres ✓MA = 56 400 litres ✓CA ✓M In days amount of water flowing= $2\frac{1}{2}$ x 56 400 litres = 141 000 litres ✓CA Statement is NOT VALID ✓O **OR** ✓MA Time to fill swimming pool = $\frac{135000\ litres}{2350\ litres/h}$ =57,440 hours✓CA 57,4468 hrs = 2 days and 9 h 27 min✓M Two and a half days = 2 days 12 hours ✓C Statement is NOT VALID ✓O	1MA using flow rate 1CA water in 1 day M multiplying 1CA simplification 1 O conclusion **OR** 1MA finding time taken 1CA time 1M splitting calc. hrs 1 C converting two and a half days 1 O conclusion (5)	M L3
Quest	Solution	Explanation	L
9.1.1	Perimeter = 5 × 270 mm ✓MA = 1 350 mm ✓A **OR** ✓MA Perimeter = (270 + 270 + 270 + 270 + 270) mm = 1 350 mm ✓A	1M/A multiplying side by 5 only 1A simplification **OR** 1MA adding 5 sides 1A simplification (2)	M L2

9.1.2	Area of rectangle = length × breadth = 360 mm × 270 mm ✓SF = 0,36 m × 0,27 m ✓C = 0,0972 m^2 Surface area of front pentagon (in m^2) = 0,13 – 0,017 – 0,013 = 0,1 m^2 ✓M Surface area of rear pentagon (in m^2) = 0,13 – 0,013 = 0,117 m^2 ✓M Total surface area (in m^2) = 5 × 0,0972 + 0,1 + 0,117 = 0,703 m^2 ✓CA **OR** Total surface area = 2×pentagons + 5× rectangles – (letter opening + 2 × newspaper openings) ✓M SF = 2 × 0,13 m^2 + 5 × 360 mm × 270 mm – (0,017 m^2 + 2 × 0,013 m^2) ✓C = 0,26 m^2 + 5 × 0,36 m × 0,27 m – 0,043 m^2 = 0,26 m^2 + 0,486 m^2 – 0,043 m^2 = 0,703 m^2 ✓CA	1SF substituting into area formula 1C converting 1M subtracting the openings 1M five rectangles 1CA simplification using all faces **OR** 1M five rectangles 1SF substituting area 1M subtracting the openings 1C converting 1CA simplification using all the faces (5)	M L3
9.1.3	Area of a newspaper opening = π × r^2 0,013 m^2 = 3,14 × r^2 ✓SF 0,00414... m^2 = r^2 41,401... cm^2 = r^2 ✓C r ≈ 6,434... cm ✓CA The radius of the newspaper is 6 cm ✓A ∴ The newspaper **will fit**. ✓CA **OR** Newspaper radius (in cm) = $\frac{12}{2}$ = 6 ✓A Area of a circle = π × r^2 = 3,14 ×(6 cm)^2 ✓SF = 3,14 × (0,06 m)^2 ✓C ≈ 0,0113 m^2 ✓CA ∴ The newspaper **will fit**. ✓CA	1SF substitution 1C conversion 1CA value of r 1A radius of newspaper 1CA conclusion **OR** 1A radius 1SF substitution 1C converting 1CA simplification 1CA conclusion (5)	M L4

4. EXAMINATION GUIDANCE

	PAPER 2
Weighting of topics	Maps, plans and other representation of the physical world 40% ((±5) Measurement 55% (±5) Probability 5% Including ±5% (Income, Expenditure, Profit/loss, Income-and-Expenditure statements and Budgets, Cost price and Selling price) where there is direct link to Measurement and Maps and Plans.
Structure and scope of content and/or skills	**Question** 1:30 marks ± 5 marks Level 1 questions from Measurement and Maps, plans **Question 2** 'Maps and plans **Question 3** Measurement **Question 4** Integrated context on 'Measurement and Maps and plans Including (Income, Expenditure, Profit/loss, Income-and-Expenditure statements and Budgets, Cost price and Selling price) where there is direct link to Measurement and Maps and Plans. **Question 5** **Measurement, maps and plans or integration** **Data handling** will be examined in the context of one or more of the other questions. Each question can contain more than one context.
NOTE : The paper may have 4 or 5 questions	

WEIGHTING

Topics		%	150 mark paper
Measurement	PAPER 2	55 %	83**
Maps & plans		40%	60**
Probability		5%	7
Finance		±5%	8-15**
TOTAL		**100%**	**150 marks**

****NOTE:**

- Section in Finance: (Income, Expenditure, Profit/loss, Income-and-Expenditure statements and Budgets, Cost price and selling price) can be included in Paper 2 where there is direct link to Measurement and Maps and Plans.

Time and mark allocation
Paper 2

Duration	Marks
3 hours	150 Marks

Time management for Examination preparation:
If you have 100 hours to prepare for the examination, the following can be used as a guide on how to use your hours:

Application Topics	Number of hours
Measurement	55
Maps, Plans and Other…	40
Probability	5

Order of the questions in the question paper

Each paper may have 4 or 5 questions.

Paper 2:

QUESTION 1 (30 marks ± 5 marks ONLY taxonomy Level 1.) Short context – mixed questions (Maps and Plans and Measurement.)
QUESTION 2 – Maps and Plans
QUESTION 3 – Measurement
QUESTION 4 – Maps and Plans and Measurement
QUESTION 5 – Maps and Plans, Measurement or integrated
Probability will be integrated in all five questions, where it is appropriate
Question 4 and 5 may include financial calculations as pertains to problem solving in Maps and Plans and Measurement.

GUIDANCE
Set a goal (marks you would like to see on your Matric Certificate) at the beginning of the term
If for example your aim is to achieve 60% for Mathematical Literacy.
One way of getting it is as follows:
Paper 1: 90 marks out of a possible 150
Paper 2: 90 out of a possible 150
A total of 180 out of 300 = 60%

5. GENERAL EXAMINATION TIPS

1. Study the matric timetable. Know when you are going to write the papers you have registered for. There are sometimes two exams on one day so you will have to be super sharp and alert. **Be sure to check the final timetable in case there are any changes.**

2. There are less than 123 days to the start of the final exams. This includes all weekends and holidays. Start today and work every day. Set targets for achievement.

3. Do not miss **one day of studying** between now and your exams. Work at least two to three hours per day. Keep healthy and alert.

4. **Reading** is a hot skill. Reading will change your life. Read at least 1000 words every day. Read everything you can get your hands on. Read accurately and quickly.

5. **Writing** is power**,** but it requires practice. We are all judged, every day, on our writing. We can inspire, impress, persuade, congratulate and express love in writing. Write at least 400 words every day carefully, accurately and beautifully.

6. **Resources** are an essential student companion. Work systematically through your question papers and Self-Study Guide. Don't wait for your face-to-face classes or broadcasts to explain it all. Look at what you have to cover for the subject and plan accordingly.

7. Your **BMI** can help you in matric. Your Body mass Index (BMI) is an indication of how healthy you are. Calculate your BMI and then exercise and eat healthy throughout the year to keep an optimum BMI.

8. Academic work requires **concentration and focus**. Every day you should be engaged in intensive, focused, individual academic work. Turn off iPods, music centres, the TV, the cell phone and have an intensive and rewarding academic work out every day. Except of course if you are using it to access the resources. Be diligent and don't be tempted to watch or access non – academic material. Technology is a fabulous platform to learn and prepare for the examinations but it can also be a deterrent if you are not focused and dedicated. Build your brain cells and be the envy of all your friends.

9. Good vibes are good for success. Surround yourself with positive people who want you to succeed. Your family and friends will be important ibn supporting you in the next 123 days. Be grateful for their support.

10. Matric success requires **Planning and hard work.** Start planning and working today. Read every day. Write and calculate every day. Stick to your year plan

6. Reference

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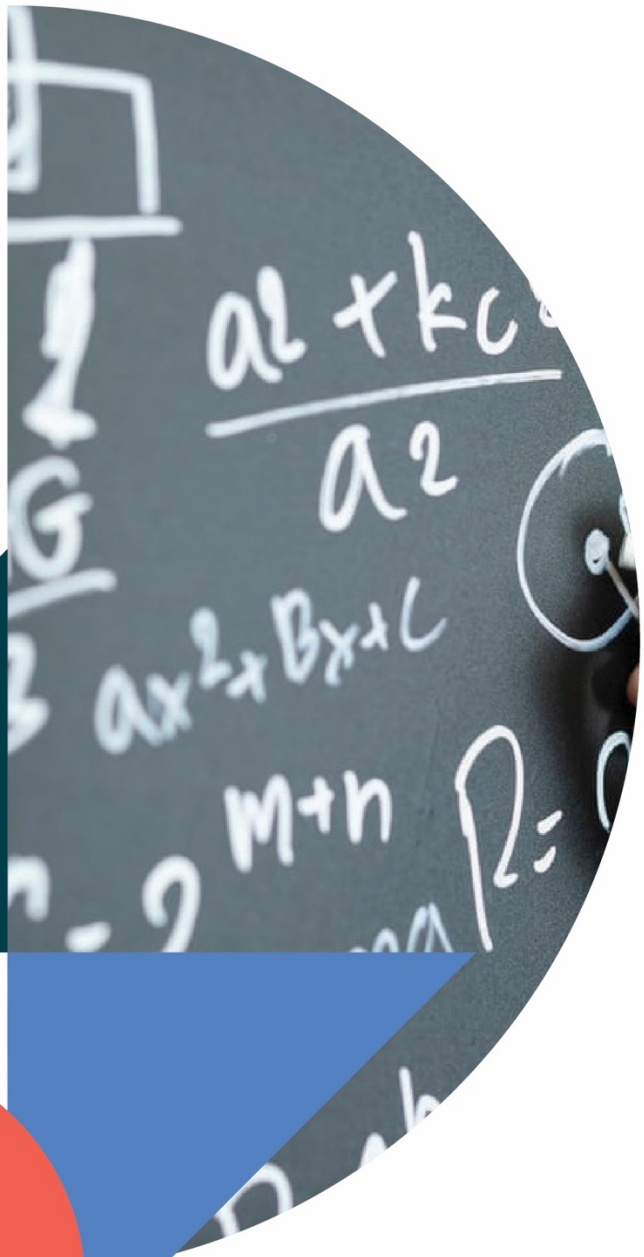

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