education

Department:
Education
PROVINCE OF KWAZULU-NATAL

Mathematics

Grade 9

Workbooks, ANA Exemplars and ANA Papers Alignment to the 2013 Work Schedules

CURRICULUM GET DIRECTORATE, HEAD OFFICE

...dedicated to service and performance
beyond the call of duty

TABLE OF CONTENTS

NOTES FOR THE TEACHER

Purpose of the document

This document aims to enhance the use of the CAPS and workbooks in the teaching, learning and assessment of Grade 9 Mathematics. The document in no way prescribes how teaching should be carried out, but suggests pacing that would ensure curriculum coverage.

Since Workbooks do not have a table of contents, Section 1 provides the table of contents for the workbooks that will make it easy for you to use the alignment of workbooks to the work schedule provided in Section 2.

- Workbook activities may be used for both teaching and assessment.
- Exemplars should be used for revision (NOT FOR TEACHING).
- 2012 Exemplar and 2012 ANA paper are appended to the document as annexures.

Workbooks

A general observation is that teachers encounter challenges with the use of workbooks. The document thus suggests activities in the workbook that could be done for each topic. The teacher should decide whether the activities should be used for teaching or they should be used for consolidation of work done. In some activities, learners may do selected questions. Activities not done during learning and teaching may be used for revision.

It is highly recommended that work done in the workbooks should indicate dates on which it was done. There should also be evidence that the teacher concerned monitors the use of workbooks.

SECTION 1

Table of contents for Grade 9 Workbook 2

SECTION 2
Alignment of Workbook Activities to the Work Schedule

Term 1

Week	Content (Knowledge and Skills)	Suggested workbook activities
1	Number system • Historical development of numbers (Number Theory) • Rational numbers (recognition, use and representation; including writing very big/small rational numbers in the scientific notations)	17; 2; 18; 4 See Grade 8 workbook 30
2	3D Geometry: • Properties of geometric solids (Polyhedra, spheres and cylinders) • Nets (sketches) and models of geometric solids • Perspective drawings of geometric solids (not drawn to scale)	13; 130 – 138
3	2D Geometry and Measurement: • Line geometry (construction and measurement of intersecting lines, parallel lines and angles formed) • Triangle geometry (Types and properties including exterior angle theorem)	11; 51 -53; 59; 60; 65 - 68
4	2D Geometry and Measurement • Types of quadrilaterals and other polygons. • Using measurement, straight line and triangle geometry to justify properties and relationships of polygons	54 – 58; 61; 62
5	Measurement • Units of measurement and conversions from one unit to the other • Calculating perimeter, area and volume (use of formulae)	14; 15; 72 – 76; 116 - 120
6	Measurement • Theorem of Pythagoras and its applications • Solving problems on ratio and rate (time, distance, speed problems)	19 – 21; 70; 71
7	Data Handling • Data collection techniques • Data collection instruments (e.g. questionnaires) • Data sources	16 See Grade 8 workbook 108
8	Data Handling • Organisation of collected data (Tally and frequency tables) • Central tendency (mode, median and mean) • Measures of dispersion (range)	16 See Grade 8 workbook 109 - 110

Term 2

Week	Content (Knowledge and Skills)	Suggested workbook activities
1	Rational numbers • Properties • Calculations	1; 22; 23; 25 - 30
2	Financial mathematics • Profit and loss • Budgets • Loans • Simple and compound interests • Hire purchase	10; 77; 78
3	Financial mathematics • Exchange rates • Commission Solving financial problems on rate, ratio and proportion	79; 80
4	Exponents • Laws of exponents • Calculations involving exponents	3; 24, 31 – 38 Also look at Grade 8 workbook 32 - 37
5	Algebra • Number patterns • Tables • Flow diagrams	7; 39; 40; 81 – 84;
6	Algebra • Formula and substitution • Products of monomials and polynomials • Simplify expressions	41 -46; 8; 86 – 88; 90; 91
7	Algebra • Factorisation of expressions by removing HCF • Solve simple equations	47 – 50; 85; 92

Term 3

Week	Content (Knowledge and Skills)	Suggested workbook activities
1	Position • Ordered grids and Cartesian plane • Compass directions • Angles of elevation and depression	104 See Grade 8 workbook 130 - 135
2	Use transformations to investigate properties of geometric figures: (Symmetry, rotations, reflections, translations, enlargements and reductions)	12; 121 - 129
3	Geometry • Similarity and congruence	63; 64; 69
4	Data Handling Draw and critically interpret: • Bar graphs • Histograms • Pie charts Use the above graphs to make predictions and draw conclusions	Grade 8 workbook 16; 111- 114
5	Data Handling Draw and critically interpret: • Pie charts • Scatter plots • Line graphs Use the above graphs to make predictions and draw conclusions	Grade 8 workbook 9; 115 - 120
6	Algebra • Plot graphs of equations • Determines formula from given graphs	9; 104 – 115;
7	Probability • Do experiments to determine relative frequency • Determines probability for compound events • Draw and interpret Tree Diagrams • Predict probability of outcomes	

Term 4

Week	Content (Knowledge and Skills)	Suggested workbook activities
1	Algebraic products. • Products of binomials • Simplifying expressions	89; 100 - 103
2	Algebra • Equivalent expressions • Deriving equations from Flow Diagrams • Equations	97; 98
3	Algebra • Factorise the difference of two squares • Solve equations that involve factorising difference of two squares	93 – 96; 98; 99

NB

To prepare for Grade 9 ANA, incorporate Term 4 work in Term 3 and Term 4 Algebra. Term 4 will thus be used for revision and consolidation using selected activities in the workbook. Special focus in Term 4 could be on basics required for Grade 10 Mathematics.

SECTION 3
Alignment of Exemplars & Previous ANA Papers to the Work Schedule

Term 1

Week	Content (Knowledge and Skills)	2010		2011	2012	
		Exemplar_1	Exemplar_2	Exemplar	Exemplar	ANAPaper
1	Number system • Historical development of numbers (Number Theory) • Rational numbers (recognition, use and representation; including writing very big/small rational numbers in the scientific notations)	2.1.3; 2.4	1.8; 2.4	1.1; 1.4; 2.1.4; 2.3	1.1; 1.2; 2.1	1.2; 2.1
2	3D Geometry: • Properties of geometric solids (Polyhedra, spheres and cylinders) • Nets (sketches) and models of geometric solids • Perspective drawings of geometric solids (not drawn to scale)	1.7; 1.8	1.7			1.8; 8.1
3	2D Geometry and Measurement: • Line geometry (construction and measurement of intersecting lines, parallel lines and angles formed) • Triangle geometry (Types and properties including exterior angle theorem)	6.2	6.2	1.9	1.10; 6.1; 6.3	6.1
4	2D Geometry and Measurement • Types of quadrilaterals and other polygons. • Using measurement, straight line and triangle geometry to justify properties and relationships of polygons	6.1.1	6.1.1; 6.1.3	1.8; 6.1.1	6.3	
5	Measurement • Units of measurement and conversions from one unit to the other • Calculating perimeter, area and volume (use of formulae)	1.4; 6.1.3; 6.1.5; 6.4.1; 6.4.2; 6.4.4	1.4; 6.1.2; 6.4	6.1.3 – 6.1.5; 8.2	7.2; 7.3.2	1.7; 8.2; 8.3
6	Measurement • Theorem of Pythagoras and its applications • Solving problems on ratio and rate (time, distance, speed problems)	1.3; 3.2; 6.1.2; 6.4.3	1.3; 3.3	1.8; 6.1.2; 8.1	7.1; 7.3.1	3.1; 3.2
7	Data Handling • Data collection techniques • Data collection instruments (e.g. questionnaires) • Data sources					
8	Data Handling • Organisation of collected data (Tally and frequency tables) • Central tendency (mode, median and mean) • Measures of dispersion (range)	8	7	9.2	9.2	9.2

Term 2

Week	Content (Knowledge and Skills)	2010		2011	2012	
		Exemplar_1	Exemplar_2	Exemplar_3	Exemplar	ANAPaper
1	Rational numbers • Properties • Calculations			1.3	3.1	
2	Financial mathematics • Profit and loss • Budgets • Loans • Simple and compound interests • Hire purchase	3.1	3.1; 3.2	3	3.3; 3.4	3.3; 3.4
3	Financial mathematics • Exchange rates • Commission Solving financial problems on rate, ratio and proportion		3.4		1.8; 3.2	
4	Exponents • Laws of exponents • Calculations involving exponents	See algebra	See algebra	See algebra	1.3 – 1.5; 2.4.1	1.4; 2.2.2
5	Algebra • Number patterns • Tables • Flow diagrams	1.9; 4	1.9; 4	1.2; 4	1.9; 4	1.1; 1.3; 4
6	Algebra • Formula and substitution • Products of monomials and polynomials • Simplify expressions	1.2; 2.1.2; 2.1.2; 2.2.1	1.2; 1.6; 2.1.2; 2.1.3; 2.2.1;	2.1.2; 2.1.5	2.2; 2.3; 2.4.2; 2.4.3; 2.4.5	2.2.1; 2.2.2; 2.3.1
7	Algebra • Factorisation of expressions by removing HCF • Solve simple equations	2.3.1*; 2.5.1; 6.2.1	2.3.1; 2.5.1; 2.4.1		1.7; 2.6.1	2.4.1; 2.4.3; 2.5.1

Term 3

Week	Content (Knowledge and Skills)	2010		2011	2012	
		Exemplar_1	Exemplar_2	Exemplar_3	Exemplar	ANAPaper
1	Position • Ordered grids and Cartesian plane • Compass directions • Angles of elevation and depression	1.10	1.10			
2	Use transformations to investigate properties of geometric figures: (Symmetry, rotations, reflections, translations, enlargements and reductions)	1.6		7	8	7
3	Geometry • Similarity and congruence	1.5; 6.1.4; 6.3	1.5; 6.1.4; 6.3	6.2; 6.3	6.2; 6.4	1.9; 6.2 – 6.4
4	Data Handling Draw and critically interpret: • Bar graphs • Histograms • Pie charts Use the above graphs to make predictions and draw conclusions		9.1		9.1	9.1
5	Data Handling Draw and critically interpret: • Pie charts • Scatter plots • Line graphs Use the above graphs to make predictions and draw conclusions	5.1	5.1			
6	Algebra • Plot graphs of equations • Determines formula from given graphs	5.2	5.2	1.5; 5	5	1.5; 5
7	Probability • Do experiments to determine relative frequency • Determines probability for compound events • Draw and interpret Tree Diagrams • Predict probability of outcomes	7	8	1.10		1.10

Term 4

Week	Content (Knowledge and Skills)	2010		2011	2012	
		Exemplar_1	Exemplar_2	Exemplar_3	Exemplar	ANAPaper
1	Algebraic products. • Products of binomials • Simplifying expressions	2.2.2	2.1.1; 2.2.2**;	2.1.1**; 2.1.3	1.6; 2.4.4	2.3.2
2	Algebra • Equivalent expressions • Deriving equations from Flow Diagrams • Equations	2.5.2; 2.5.3	1.1;	1.6; 1.7; 2.4.2; 2.4.3	2.6.2; 2.6.3	2.5.2; 2.5.3; 2.5.4
3	Algebra • Factorise the difference of two squares • Solve equations that involve factorising difference of two squares	1.2; 2.3.2; 2.3.3	2.3.2; 2.3.3; 2.5.2; 2.5.3	2.2.1*; 2.2.2	2.4.6; 2.5.1*; 2.5.2	1.6; 2.4.2

* Factorising quadratic trinomials not done in Grade 9
** Process the same as for binomials.

basic education
Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

2010 ANNUAL NATIONAL ASSESSMENTS

GRADE 9 MATHEMATICS - ENGLISH

EXEMPLAR 1

SURNAME _____ **GENDER (TICK ☑)** | **BOY** | **GIRL** |

NAME(S) _____ **PROVINCE** _____

DATE OF BIRTH _____

SCHOOL NAME _____

EMIS NO. _____ **DISTRICT / REGION** _____

Instructions to learners:

1. Question **1** consists of 10 multiple choice questions. Learners must circle the letter of the correct answer (see example below).
2. Learners must provide answers to questions **2** to **8** in the spaces provided.
3. Approved scientific calculators (non-programmable and non graphical) may be used.
4. The test duration is $2\frac{1}{2}$ hours.

Example

Circle the letter of the correct answer.

Which number comes next in the pattern?

2 ; 4 ; 6 ; 8 ; _____

a. 9

b. 10

c. 12

d. 20

You have done it correctly if you have circled **b** as above.

QUESTION 1

1.1 If $(x - 1)(x + 2) = 0$ then $x =$

A. –1 or 2

B. 1 or –2

C. 1

D. –2

1.2 $\dfrac{(2^3)(3^2)}{(3^3)} =$

A. x

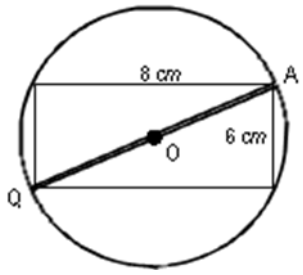
B. x^3

C. x^6

D. x^4

1.3 In the figure below, the rectangle within the circle, with centre O, is 8 centimetres long and 6 centimetres wide.

What is the length of the diameter QA in *cm*?



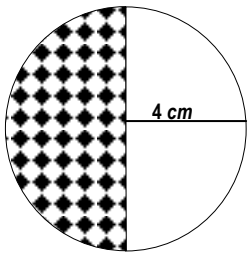
A. 10

B. 5

C. 14

D. 8

1.4 In the sketch the circle has a radius of 4 cm. What is the area in cm^2 of the shaded part of this circle?



A. 16π

B. 8π

C. $\frac{4}{3}\pi$

D. $\frac{8}{3}\pi$

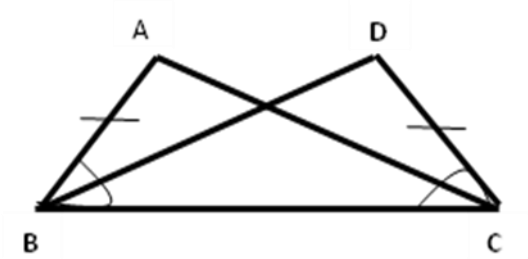
1.5 Why is Δ ABC $\equiv$ Δ DCB?

A. S S S

B. 90º H S

C. S < S

D. < < S



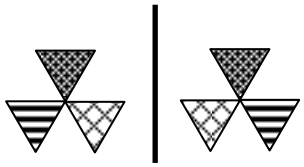
1.6 The geometric shape on the left side of the solid line can be made to fit onto the geometric shape on the right side of the solid line by

A. translation

B. enlargement

C. rotation

D. reflection



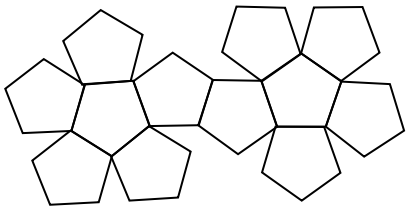
1.7 A net of a polyhedron is given below. This is a net of a/an:

A. tetrahedron

B. octahedron

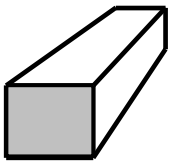
C. dodecahedron

D. icosahedron

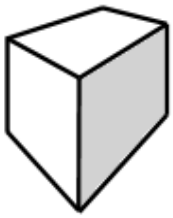


1.8 Which of the drawings below represents a perspective view of a rectangular box with one face viewed straight on?

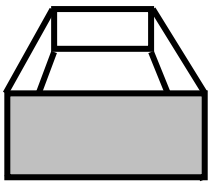
A



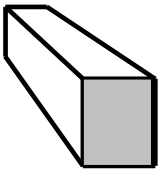
B



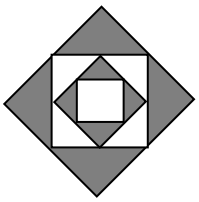
C



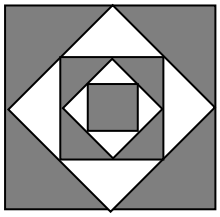
D

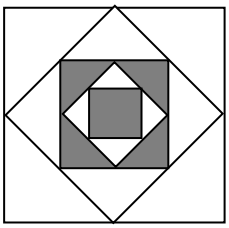


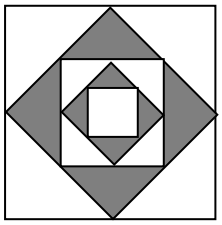
1.9 Study this growing pattern.

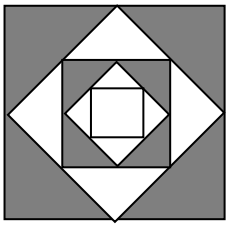


If you grow this pattern further the next diagram will be:

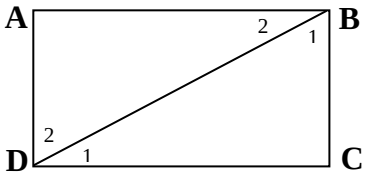
A 

B 

C 

D 

1.10 Which angle in rectangle ABCD is the angle of depression of D from B?



A. $\hat{B}_1$

B. $\hat{B}_2$

C. $\hat{D}_1$

D. $\hat{D}_2$

[10]

QUESTION 2

2.1 Simplify:

2.1.1 $(x^2+3x-4)-(x^2-2x-6)$

(3)

2.1.2 $\dfrac{-4m^3n\times 10mn^2}{5m^4n^3}$

(3)

2.1.3 $\dfrac{1{,}6\times 10^{-3}+4{,}0\times 10^{-4}}{4{,}0\times 10^{-3}-0{,}2\times 10^{-2}}$ (Do **NOT** Use a calculator)

(4)

2.2 Multiply and simplify:

2.2.1 $\frac{2}{3}(2a^2-3a-6)$

(3)

2.2.2 $(a-4b)(a-2b)$

(3)

2.3 Factorise fully:

2.3.1 $6k + 12k^2 - 3k^3$

(2)

2.3.2 $16y^2 - 49$

(2)

2.3.3 $3x^2 - 12$

(3)

2.4 Use prime factors to determine the value of $\sqrt{784}$

(4)

2.5 Solve for x:

2.5.1 $2x - 3 = 17 + x$

(2)

2.5.2 $\frac{3x+4}{2}=2$

(3)

2.5.3 $\frac{2(x+5)}{3}=1-\frac{3(x-5)}{4}$

(5)

[37]

QUESTION 3

3.1 Show by calculation which is the better investment?
R8 000 invested at 3,5% compound interest per annum for 3 years **or**
R8 000 invested at 7,5% simple interest per annum for 3 years.

(5)

3.2 Mark travels between two towns A and B at an average speed of 70 kilometres per hour for $4\frac{1}{2}$ hours. On his return from town B to A, he travelled at an average speed of 90 kilometres per hour. How long did he take on his return trip?

(4)

[9]

QUESTION 4

4.1 Write down the next two terms in the given sequence:

-1; 1; 3; .... ; ....

(2)

4.2 Describe the pattern in **QUESTION 4.1** in your own words.

(1)

4.3 Write down the general term of the given sequence in the form

T_n =_____.

(2)

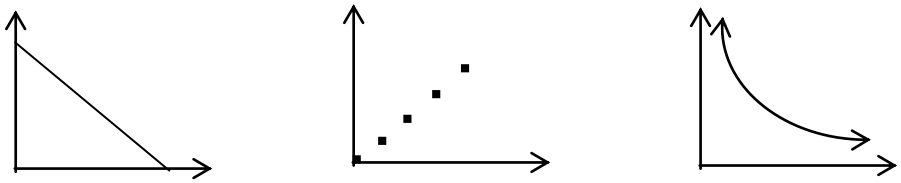
4.4 Which term in the sequence is equal to 37?

(2)

[7]

QUESTION 5

5.1 Use the graphs below to answer the questions that follow.



a b c

Which of the above graphs represents:

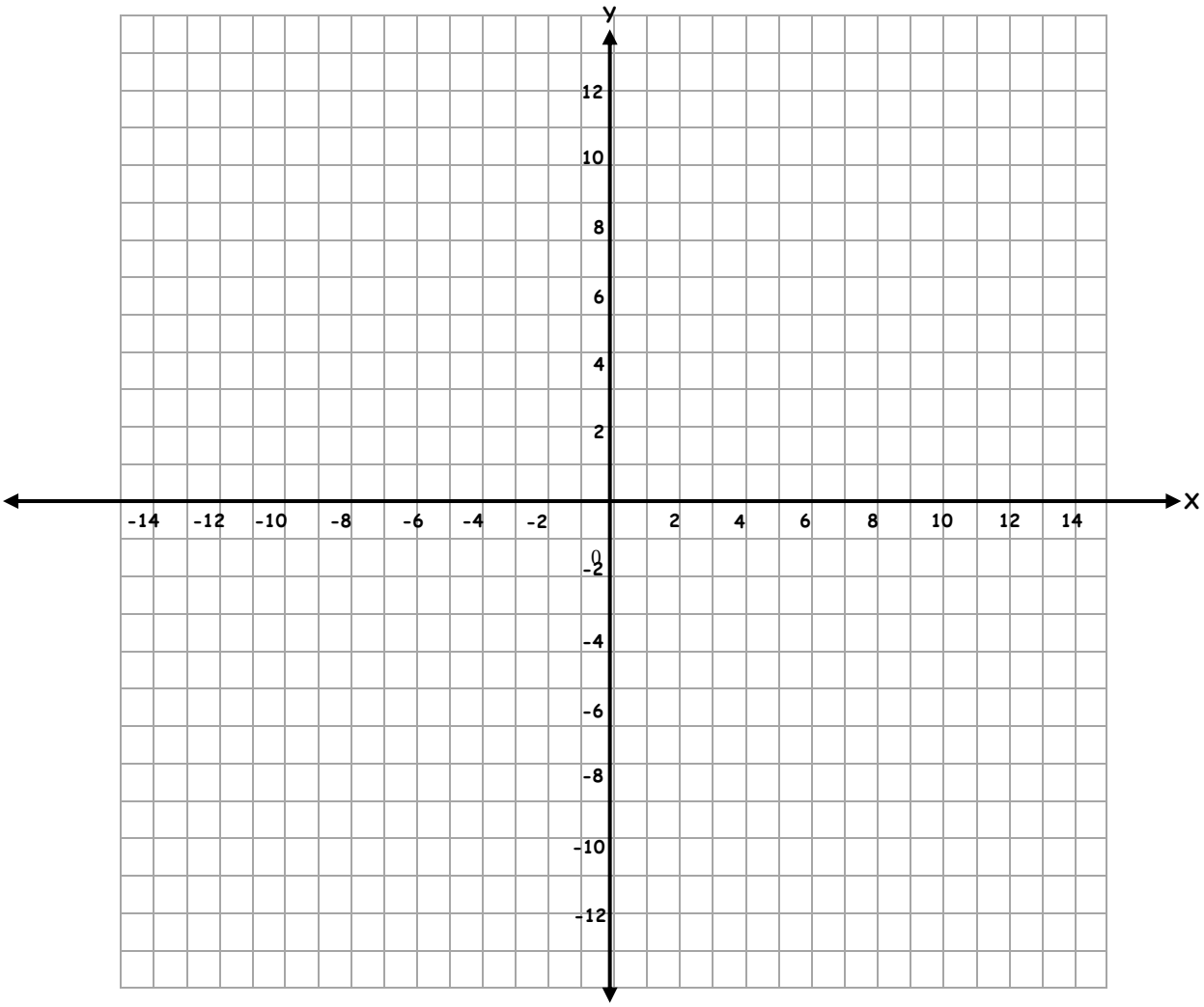
5.1.1 A discrete, increasing, linear function? _____ (1)

5.1.2 A continuous, decreasing, linear function? _____ (1)

5.1.3 An indirect proportion? _____ (1)

5.2 Use the grid below. On the same system of axes draw and label the graphs defined by:

$y = x + 4$, if $x \in$ {-1, 0, 1, 2} and $y = -2x + 4$, if $x \in \mathbb{R}$ (7)

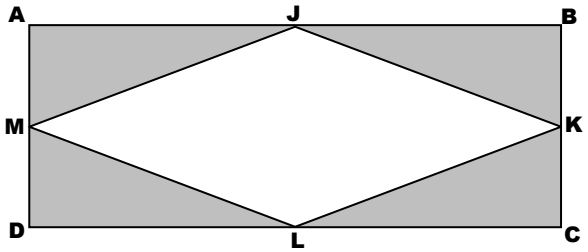


[10]

QUESTION 6

In QUESTION 6 give reasons for each of your statements.

6.1 In rectangle ABCD:
Points J, K, L and M are the mid-points of sides AB, BC, CD and DA respectively;
AB = 24 cm and AD = 10 cm



6.1.1 What kind of quadrilateral is JKLM?

_____

_____

(1)

6.1.2 Calculate the length of line-segment KL.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(5)

6.1.3 Calculate the perimeter of quadrilateral JKLM.

_____

_____

_____

(1)

6.1.4 Prove that Δ JBK $\equiv$ Δ LDM

(7)

6.1.5 Determine the value of t if the area of JKLM = t × (the area of ABCD).

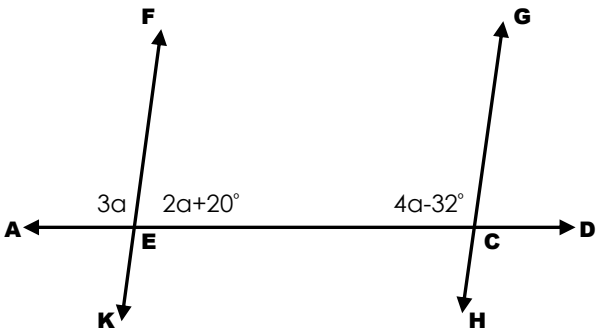
(5)

6.2 In the diagram below, line FK intersects line AD at point E and Line GH intersects line AD at point C.

$F\hat{E}A = 3a$

$F\hat{E}C = 2a+20^\circ$

$G\hat{C}E = 4a-32^\circ$



6.2.1 Calculate the value of a.

(5)

6.2.3 What can you deduce about line FK and line GH? Give **one** reason for your deduction.

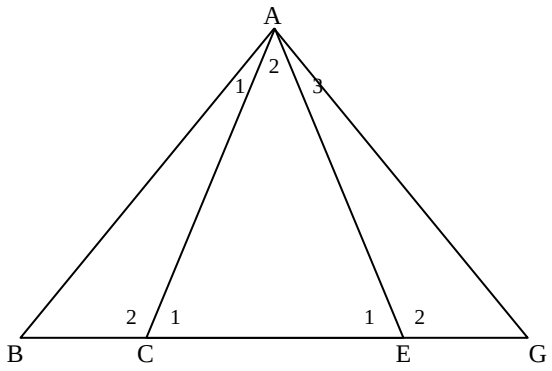
_____

_____

_____

(2)

6.3 In the figure below AC = AE and AB = AG



6.3.1 Show that $\hat{C}_2 = \hat{E}_2$

_____

_____

_____

_____

(2)

6.3.2 Show with reasons that Δ ABC and Δ AGE are similar.

_____

_____

_____

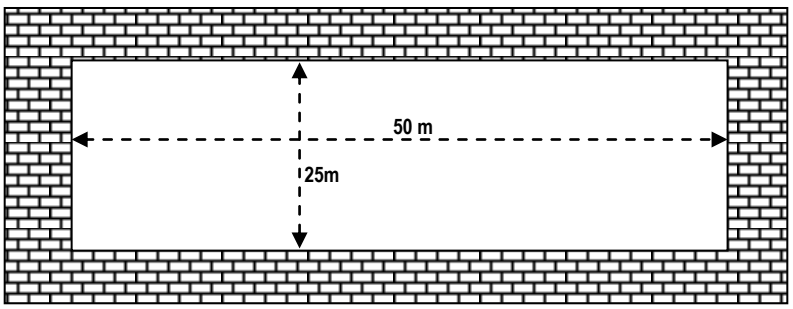
_____

_____

_____

(6)

6.4 The dimensions of the Olympic swimming pool are shown in the following diagram. The pool has a uniform depth.



6.4.1 The total capacity of the Olympic pool is 2 500 000 litres. What is the volume of the pool in cubic metres?

(2)

6.4.2 Calculate the depth of the Olympic pool. Write the answer in metres.

(4)

6.4.3 In 1996, Penny Heyns of South Africa broke the world record by completing the 100 metre breaststroke in 1 minute and 7,02 seconds. Calculate her average swimming speed in metres per second. **(Round off your answer to two decimal places).**

(4)

6.4.4 The space around the pool is paved. The uniform width of the paving is 2,5 metres. Calculate the area of the paving in square metres.

(6)

[53]

QUESTION 7

7.1 Lucy has **two** R50 notes, **one** R20 note, and **three** R10 notes in her pocket.

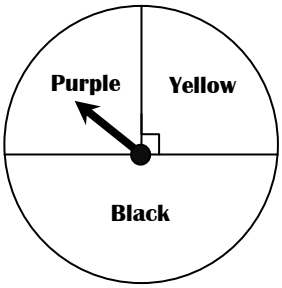
7.1.1 She randomly takes out one of the notes from her pocket to buy sweets. What is the probability of her taking out a R50 note?

(1)

7.1.2 She takes out a note, and then takes out another note. Draw a tree diagram to illustrate the sequence of events.

(3)

7.2 The spinner below is spun twice in succession.



7.2.1 What is the probability that the arrow will point to yellow after the first spin and to black after the second spin?

(2)

7.2.2 Suppose the spinner was spun 50 times and the frequencies of the outcomes are as follows:

Purple	Yellow	Black
15	10	25

Calculate the relative frequency of purple as an outcome?

_____
_____
_____
_____

(2)

[8]

QUESTION 8

8. The following scores are arranged in an ascending order, where y and z are variables.

1; 3; 5; 5; y; 6; 6; z

8.1 If the median of the scores is $5\frac{1}{2}$ calculate the value of y.

_____
_____
_____
_____
_____

(2)

8.2 If the mean of the scores is 5 calculate the value of z.

_____
_____
_____
_____
_____
_____

(3)

8.3 What is the mode of the scores?

_____
_____

(1)

[6]

Total [140]

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ANNUAL NATIONAL ASSESSMENTS 2010

GRADE 9 MATHEMATICS - ENGLISH

EXEMPLAR 2

SURNAME	_____	**GENDER (TICK ☑)**	**BOY**	**GIRL**
NAME(S)	_____	**PROVINCE**	_____	
DATE OF BIRTH	_____			
SCHOOL NAME	_____			
EMIS NO.	_____	**DISTRICT / REGION**	_____	

Instructions to learners:

5. Question **1** consists of 10 multiple choice questions. Learners must circle the letter of the correct answer (see example below).
6. Learners must provide answers to questions **2** to **8** in the spaces provided.
7. Approved scientific calculators (non-programmable and non graphical) may be used.
8. The test duration is $2\frac{1}{2}$ hours.

Example

Circle the letter of the correct answer.

Which number comes next in the pattern?

2 ; 4 ; 6 ; 8 ; _____

e. 9

(f.) 10

g. 12

h. 20

You have done it correctly if you have circled **b** as above.

QUESTION 1

1.1 If $4(x+3)(2x-1)=0$ then $x=$

A. -3 or $\frac{1}{2}$

B. 4 or $\frac{1}{2}$

C. 0 or 3

D. 4 or -3

1.2 $\frac{(x^4)(x^2)^3}{(x^{-3})^2}=$

E. x^3

F. x^4

G. x^8

H. x^{16}

1.3 In rectangle ABCD, DC =12 *cm* and diagonal BD=15 *cm*.

What is the length of BC in *cm*?

E. 3

F. 27

G. $\sqrt{369}$

H. 9

1.4 A circle has a diameter of 6 cm. What is the area in cm^2 of one quarter of the circle?

E. 36π

F. 9π

G. $\frac{9}{4}\pi$

H. $\frac{9}{2}\pi$

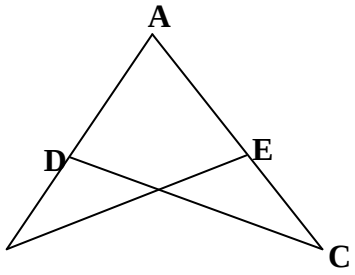
1.5 In the adjacent figure, AB = AC and AE = AD. Why is Δ ABE $\equiv$ Δ ACD?

A. S S S

E. 90º H S

F. S < S

G. < < S



1.6 If $x = -2$ then the value of $-x^2 + 3x - 4 =$

E. -6

F. 6

G. -14

H. -8

1.7 The 3-D figure which has 5 faces, 5 vertices and 8 edges is a:

E. cylinder

F. triangular prism

G. square-based pyramid

H. triangular pyramid

1.8 In scientific notation $4 \times 10^{-12} \times 7 \times 10^{-7} =$

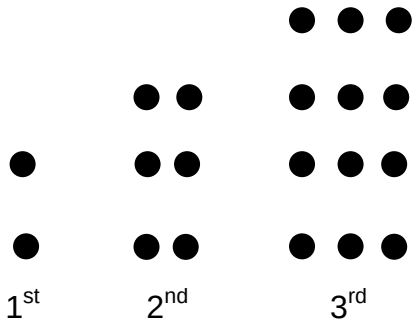
A. 28×10^{-20}

B. $2{,}8 \times 10^{-18}$

C. $2{,}8 \times 10^{-20}$

D. $0{,}28 \times 10^{-18}$

1.9 **Study this growing pattern.**



How many dots will there be in the sixth dot array if this dot array is continued?

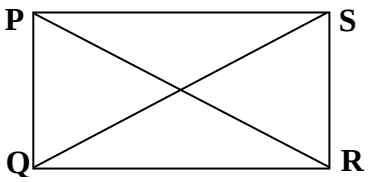
A. 56

B. 36

C. 42

D. 30

1.10 Which angle in rectangle PQRS is the angle of elevation of P from R?



E. $R\hat{Q}S$

F. $P\hat{Q}R$

G. $P\hat{R}Q$

H. $S\hat{P}R$

[10]

QUESTION 2

2.1 Simplify:

2.1.1 $(x+2)^2-(x+1)(x-3)$

(3)

2.1.2 $\dfrac{6x^2y\times 8xy^3}{12x^4y^2}$

(3)

2.1.3 $\dfrac{-16x^3-8x^2+2x}{-2x}-(4x-1)$

(5)

2.2 Multiply and simplify:

2.2.1 $\frac{3}{4}(12a^2 - 8a - 4)$

(3)

2.2.2 $(a + 2)(a^2 - 2a + 4)$

(3)

2.3 Factorise fully:

2.3.1 $2x^2y^2 - 4x^2y + 10xy^2$

(2)

2.3.2 $9x^2 - y^2$

(2)

2.3.3 $2x^3 - 8x$

(3)

24 Use prime factors to determine the value of $\sqrt{1089}$

(4)

2.5 Solve for x:

2.5.1 $3(x-1)-4x=5-2(x+1)$

(3)

2.5.2 $\frac{2}{3}x-1=x$

(3)

2.5.3 $\frac{x-2}{4}-\frac{x+1}{3}=\frac{x-2}{12}$

(5)

[39]

QUESTION 3

3.1 Calculate the simple interest on R5 400 at 6% per annum for 4 years?

(4)

3.2 Mark borrowed R8 000 from the bank at 5% per annum compound interest for 3 years. How much must he repay to the bank at the end of 3 years?

(5)

3.3 The time taken by the different sets of pumps to empty a water tank is given in the table below.

Number of pumps	20	10	5
Time in hours	2	4	8

3.3.1 Is this an example of direct or inverse proportion?

(1)

3.3.2 Calculate how long it will take 16 pumps to empty the water tank.

(2)

3.4 If 4,5 kg of sugar costs R36, what will 2,5 kg of sugar cost?

_____
_____
_____
_____
_____
_____
_____
_____
_____

(3)

[15]

QUESTION 4

4.1 Write down the next two terms in the given sequence:
5; 9; 13; ... ; ...

_____
_____
_____

(2)

4.2 Describe the pattern in QUESTION 4.1 in your own words.

_____
_____
_____

(1)

4.3 Write down the general term of the given sequence in the form

T_n =_____.

(2)

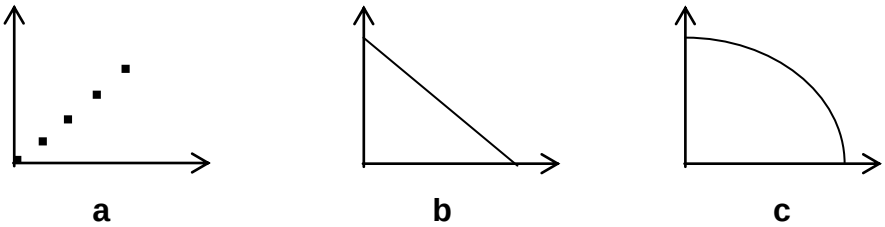
4.4 Which term in the sequence is equal to 101?

_____
_____
_____
_____
_____
_____

(4)
[9]

QUESTION 5

5.1 Use the graphs below to answer the questions that follow.



Which of the above graphs represents:

5.1.1 A decreasing, continuous, non-linear function?

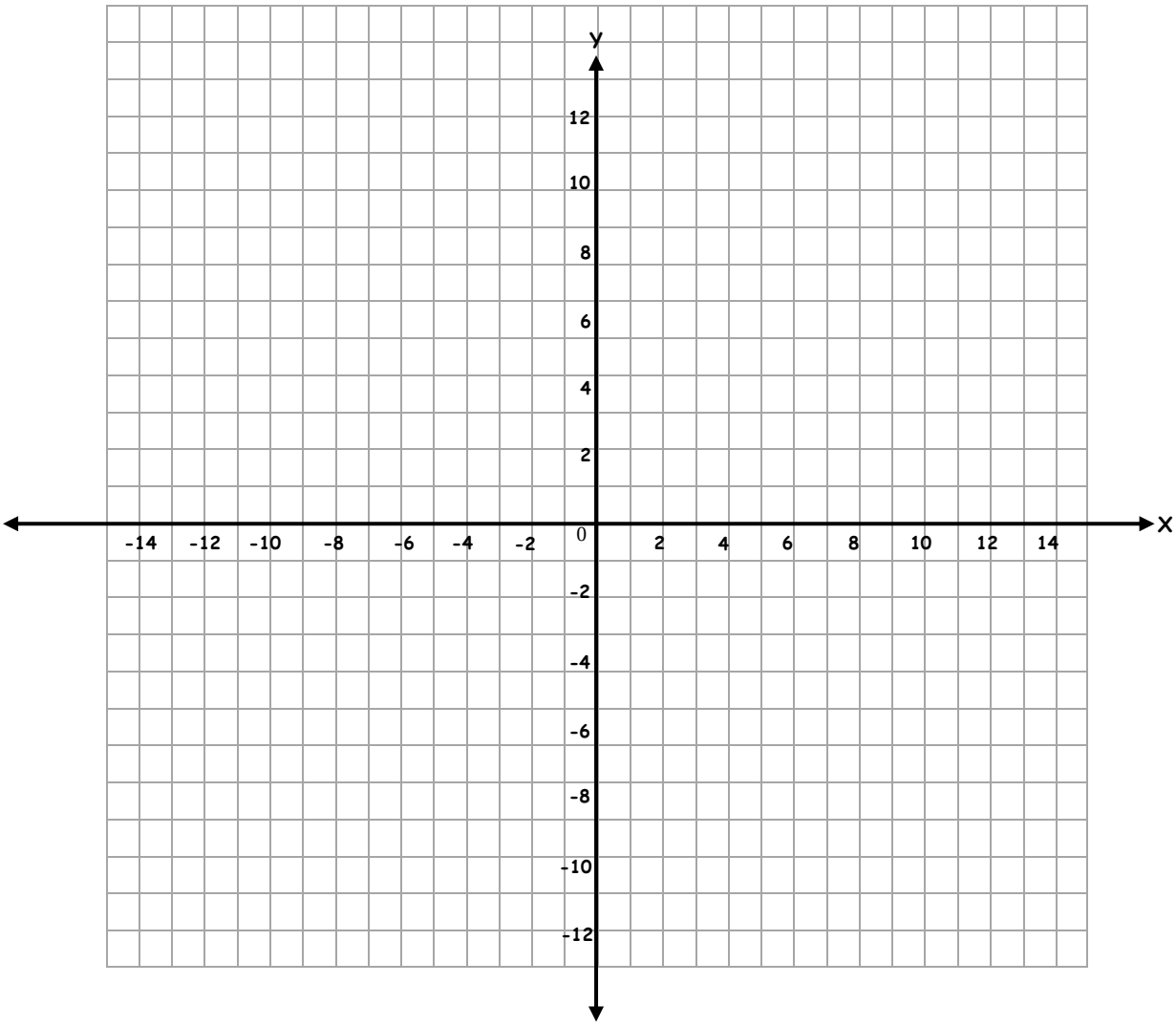
_____ (1)

5.1.2 A discrete, increasing, linear function?

_____ (1)

5.2 Use the grid below. On the same system of axes draw and label the graphs defined by:

$y = 2 - x$, for $x \in \{-2; -1; 0; 1\}$ and
$y = 2x - 3$, for $x \in \mathbb{R}$ (7)

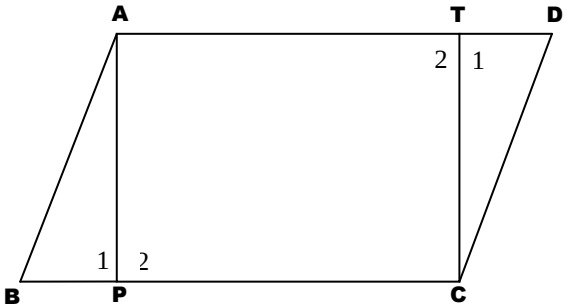


[9]

QUESTION 6

In QUESTION 6 give reasons for each of your statements.

6.1 In the given diagram AD = BC, AB = CD, AP ⊥ BC, AD ⊥ TC, AP ∥ TC, AD = 24 cm, BP = 8 cm and AP = 12 cm.



6.1.1 What kind of quadrilateral is ABCD? Give a reason for your answer.

_____

_____

(2)

6.1.2 Calculate the area of quadrilateral APCD.

_____

_____

_____

_____

_____

_____

_____

(4)

6.1.3 State why is AP = TC?

_____

_____

_____

(1)

6.1.4 Prove that Δ ABP ≡ Δ CDT

_____

_____

_____

_____

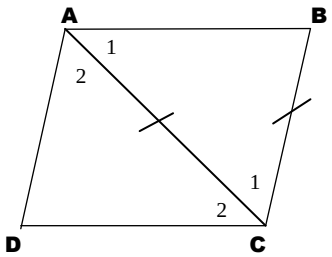
_____

_____

_____

(4)

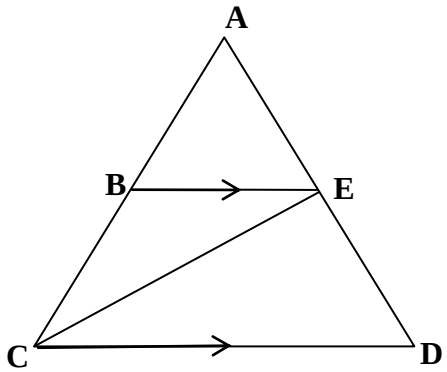
6.2 In the figure below, ABCD is a parallelogram. AC = BC and $\hat{C}_1 = 40^\circ$.



Calculate the size of BÂD

(9)

6.3



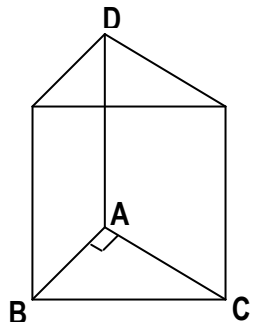
6.3.1 Which triangle is similar to Δ ACD?

(1)

6.3.2 If AE : AD = 3 : 8 and AB = 9cm, determine the length of BC.

(6)

6.4 The base of an given triangular prism is a right-angled triangle with AB = 5 m, AC = 12 m and the height of the prism = 20 m.



6.4.1 Calculate the volume of the prism.

(3)

6.4.2 Calculate the surface area of the prism.

(8)

[38]

QUESTION 6

The following marks were obtained by a group of grade 9 learners in a Mathematics test out of 100.

38	52	68	81	72
31	45	55	74	49
52	47	64	58	84

6.1 Draw a stem-and-leaf plot to display the data.

(4)

6.2 From the data set determine each of the following:

6.2.1 The range.

(2)

6.2.2 The mode.

(2)

6.2.3 The median.

(2)

6.2.4 The mean.

(4)

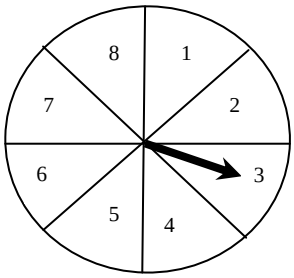
6.3 How many learners obtained more than 55% for the test?

(2)

[16]

QUESTION 8

8. If the spinner below is rotated, determine the probability that the arrow will point to:



8.1 a number greater than (2)

8.2 A prime number.

(2)

8.3 A factor of 8.

(2)

[6]

Total [140]

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LEARNER NUMBER	

ANNUAL NATIONAL ASSESSMENTS 2011
GRADE 9 - MATHEMATICS – ENGLISH
EXEMPLAR

SURNAME:_____ **GENDER (TICK ✓)**

BOY	GIRL

NAME (S):_____

PROVINCE:_____

DATE OF BIRTH: _____

I.D NUMBER:

SCHOOL NAME: _____

EMIS NUMBER:

DISTRICT **/REGION:**
_____

Instructions to learners:

1. Question **1** consists of 10 multiple questions. Learners must circle the letter of the correct answer (see example below)
2. Learners must provide answers to questions **2** and **9** in the spaces provided.
3. Approved scientific calculators (non-programmable and non-graphical) may be used.
4. The test duration is $2\frac{1}{2}$ hours.

Example

Write only the letter of the correct answer.e.g.1A

.

QUESTION 1

1.1 The next number in the sequence 1; 9; 25;.....is

A. 33

B. 36

C. 49

D. 50

1.2 Which of the following numbers is a rational number?

A. $\sqrt{3}$

B. $\sqrt{16}$

C. $\sqrt{-9}$

D. $\sqrt{13}$

1.3 $12 \times \frac{3}{4} - 6 \times 2 - 2 =$

A. -5

B. 9

C. -1

D. 3

1.4 The sum of a square root and the cube root of a certain number is12. The Number is

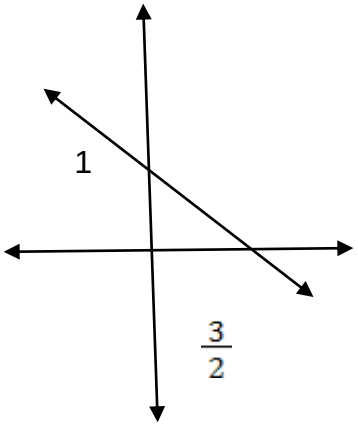
A. 64

B. 144

C. 728

D. 8

1.5 The equation defining the graph is



A. $y = \frac{3}{2}x + 1$

B. $y = -\frac{3}{2}x + 1$

C. $y = -\frac{2}{3}x + 1$

D. $3y = -2x + 1$

1.6 If $x^2 = 36$, then $x =$

A. 6

B. -6

C. 1

D. ± 6

1.7 $\frac{2^{n+1}}{2^{n-2}} =$

A. $\frac{n+1}{n-2}$

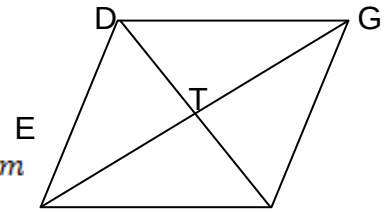
B. $\frac{1}{8}$

C. $-\frac{1}{2}$

D. 8

1.8 DEFG is a rhombus. DG = 17cm and EG= 30cm. Calculate the length of DF.

AAXM



A. $8\ cm$

B. $2\ cm$

C. $16\ cm$

D. $4\ cm$

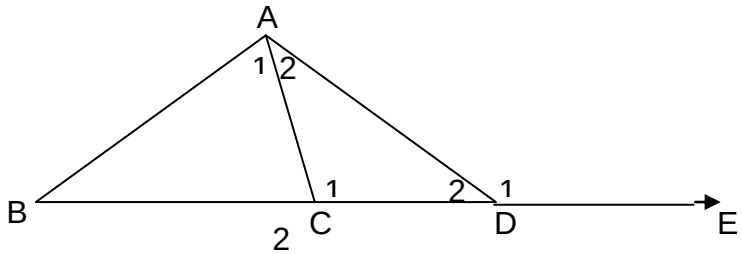
1.9 If $AC = BC$, $\hat{B} = 40°$ and $\hat{A}_2 = 30°$ in the figure, then $\hat{D}_1 =$

A. 70°

B. 140°

C. 110°

D. 120°



1.10 The probability of picking an odd number from numbers 1 to 13 is

A. $\frac{6}{13}$

B. $\frac{7}{13}$

C. $\frac{1}{13}$

D. $\frac{1}{2}$

[10]

QUESTION 2

2.1 Simplify:

2.1.1 $(x+3)^2-(x+1)(x-4)$ (3)

2.1.2 $\frac{-4a^2b\times 6ab^4}{12a^4b^3}$ (2)

2.1.3 $\frac{6x^2a-3bx^2}{bx-2ax}+\frac{3x^2}{x}$ (5)

2.1.4 $\frac{1{,}4\times 10^{-3}+4{,}0\times 10^{-4}}{3{,}0\times 10^{-3}-0{,}2\times 10^{-2}}$ without using a calculator (5)

2.1.5 $2^n.3^{-5}.2^{3-n}.3^3$ (3)

2.2 Factorise completely:

2.2.1 $2a^3-8a^2+4a$ (2)

2.2.2 $3a^3-27a$ (2)

2.2.3 (3)

2.3 Use prime numbers to determine the value of $\sqrt[3]{3375}$. (3)

2.4 Solve for x:

2.4.1 $2(2x-4)=4(4-2x)-36$ (4)

2.4.2 $\frac{3(x+4)}{4}-\frac{(x-4)}{2}=2$ (5)

2.4.3 $5^{2x}.5^x=1$ (3)

[40]

QUESTION 3

3.1 Calculate the simple interest on R3 750 at 11% per annum for 3 years. (4)

3.2 Irma invests R5 500 in a bank at 8,2% per annum compound interest for 4 years.

Calculate the total amount in Irma's account after 4 years. (3)

[07]

QUESTION 4

4.1 Write down the next two terms in the sequence
3; 8; 13; _____; _____; (2)

4.2 Describe the pattern in QUESTION 4.1 in your own words.

_____ (1)

4.3 Write down the general term of the given sequence in the form

$T_n =$

_____ (2)

4.4 Which term in the sequence is equal to 38?

_____ (3)

[8]

QUESTION 5

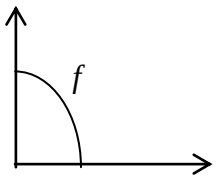
5.1 Underline the word, number or equation in the bracket so that the statement Is correct in each of the following:

5.1.1 The $x = 4$ and $x = -4$ lines are (parallel/ perpendicular) to one another. (1)

5.1.2 The equation of the horizontal line through the point $P(3; -2)$ is ($x = 3$ / $y = -2$) (1)

5.1.3 The gradient of the line defined by $y - 4x + 5 = 0$ is equal to (-4 /4). (1)

5.1.4 This graphs of f represents a (linear/ non-linear) function. (1)



5.2.1 On the same set of axes, draw and label the graphs defined by $y = -2x + 1$and$= x - 2$. Use the given grid and clearly indicate points Where the lines cut the axes and label your graphs. (8)

5.2.2 Show by calculation that $T(1;-1)$is the point of intersection of the drawn graphs.

_____

_____

_____

(2)

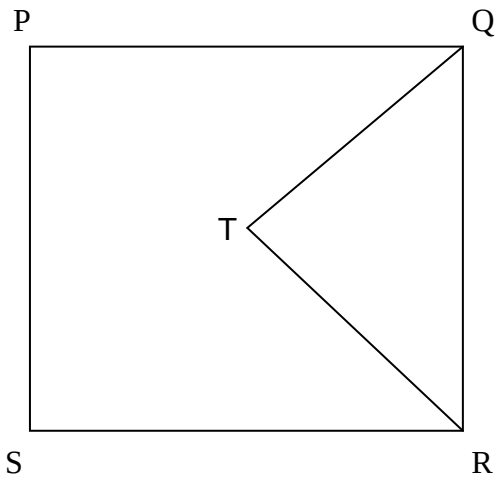
[14]

QUESTION 6

GIVE A REASON for each of your statements in question 6.

6.1 In the given diagram:

PQ =QR=RS= SP, QT⊥RT, $QT = RT = 6\ cm$and$\hat{T} = \hat{S} = 90°$.



6.1.1 What kind of a quadrilateral is PQRS?

(1)

6.1.2 Calculate the length of QR. Leave your in the simplest surd form.

6.1.3 Calculate the area of PQRS.

(1)

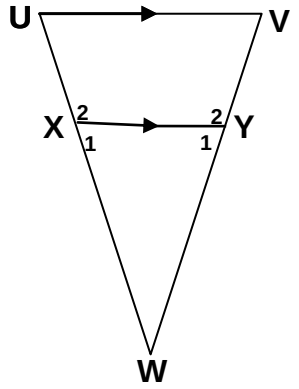
6.1.4 Calculate the area of ΔQRT.

(3)

6.1.5 Hence, determine the area ofPQTRS.

(2)

6.2 In the figure VW = 12cm, XY = 4cm, UV = 8cm and XY // UV.



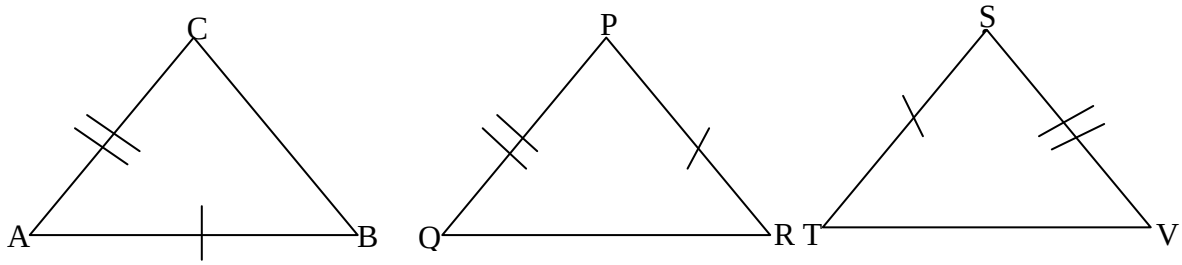
6.2.1 Prove that $\Delta XYW \,|||\, \Delta UVW$.

(4)

6.2.2 Calculate the length of YW.

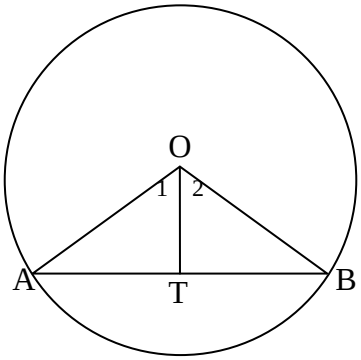
(3)

6.3.1 State which triangle is congruent to ΔABC.



(2)

6.3.2



A and B are points on a circle with centre O. T is the mid-point of chord AB.

6.3.2 a) Prove that $\Delta ATO \equiv \Delta BTO$

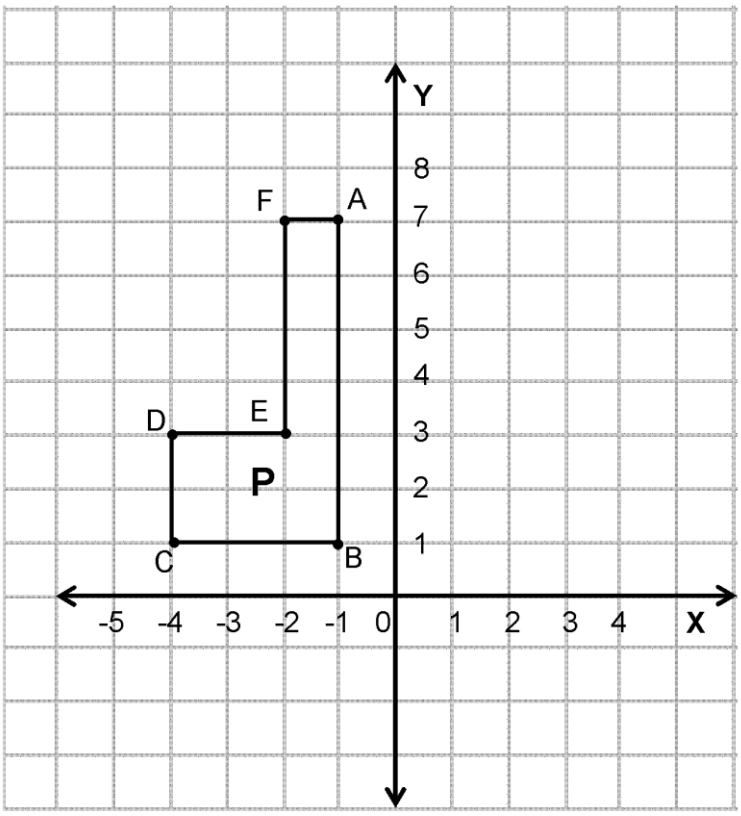
6.3.2 b) Hence, prove that OT is perpendicular to AB.

(3)

[26]

QUESTION 7

7.1 A, B, C, D, E and F are the vertices of figure P.



7.1 Write down the co-ordinates of the image of D and E if figure P is translated 3 units to the right and 2units down.

(2)

7.2 Write down the co-ordinates of the image of A' and B' if figure P is reflected in the Y-axis.

(2)

7.3 Figure P is reduced by a scale factor of 2. Calculate the perimeter of the new figure.

(2)

7.4 Complete: Area of figure P: Area of reduced figure =

(2)

QUESTION 8

8.1 A rectangular volleyball court DEFG is 9m wide and 18m long. Calculate the length of the diagonal FD correct to 2 decimal places.

(3)

8.2 The diameter of a cylinder is 6cm and its height is 20cm.
Calculate:

8.2.1 The volume correct to 2 decimal places.

(3)

8. 2.2 The surface area of the cylinder correct to 2 decimal places.

(3)

[9]

QUESTION 9

9.1 The following marks were obtained by a Grade 9 class for a Mathematics test Out of 50.

14	21	29	32	36	43
41	17	43	31	38	35
32	29	27	23	36	25
22	26	40	28	47	30
24	46	25	44	42	39

9.1.1 Complete the frequency table.

Interval	Tally marks	Frequency
1 – 10		
11 – 20		
21 – 30		
31 – 40		
41 – 50		

(4)

9.1.2 Draw a histogram to illustrate the data. (4)

9.2 Vuvu collected the following data from her class about their shoe sizes.

Girls	5	7	7	5	5	7	5	5	8	6	
Boys	5	6	9	8	7	9	9	10	5	9	8

9.2.1 Write down the range and the median for the boys.

(2)

9.2.2 Write down the mode (modal size) for the girls.

(1)

9.2.3 Calculate the mean for the girls.

(2)

[13]

Total [140]