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Province of the
EASTERN CAPE
EDUCATION

SENIOR PHASE

GRADE 9

NOVEMBER 2014

MATHEMATICS

MARKS: **100**

TIME: **2 hours**

9MATHS

This question paper consists of 10 pages including an annexure.

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INSTRUCTIONS AND INFORMATION

1. Read the instructions carefully.
2. Answer ALL the questions.
3. Write neatly and legibly.
4. Number your answers exactly as questions are numbered.
5. Give reasons for each statement in QUESTION 8.
6. Show ALL working.
7. You may use an approved scientific calculator (non-programmable and non-graphical).

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QUESTION 1

In this question, write only the correct letter (A–D) next to the corresponding number (1.1–1.10, for example 1.11 A.

1.1 Which ONE of the following numbers is rational?

A π
B $\sqrt{-1}$
C $1,2\dot{3}$
D $\sqrt{10}$ (1)

1.2 $\sqrt[3]{27x^3}$ =

A $3x^2$
B $9x^2$
C $9x^9$
D $3x$ (1)

1.3 Christian installed an electric pump to pump water from a borehole into a 30 000 litre cement dam. If the water is pumped at a rate of 75 litres per minute. How long does it take to fill the dam?

A 4 h
B 6 h 40 min
C 6 h 20 min
D 3 h 40 min (1)

1.4 The next term in the sequence $1; 4; 9; \ldots$; is:

A 10
B 12
C 16
D 14 (1)

1.5 How many terms are there in the expression: $\frac{-x^2 - x + 2}{x - 1} \times \frac{3}{x - 2}$?

A 4
B 1
C 8
D 2 (1)

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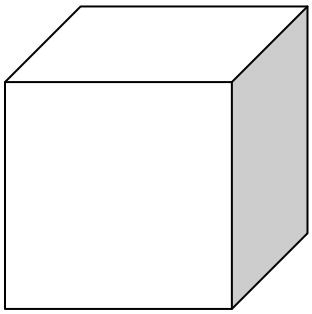
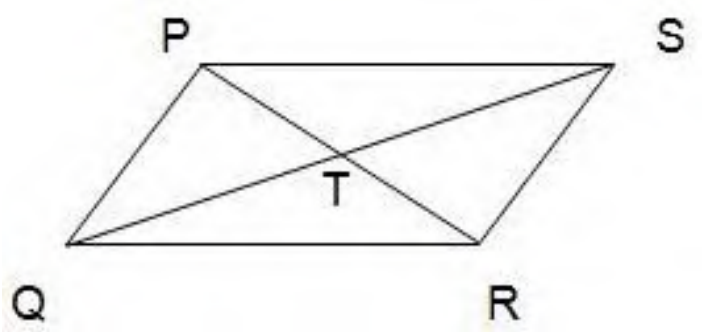
1.6 The volume of a cube below whose height is 4 cm is …



A $8\ cm^3$
B $16\ cm^3$
C $32\ cm^3$
D $64\ cm^3$ (1)

1.7 In $PQRS$ below, PR intersects with QS at T, such that $PT = TR$ and $QT\ TS$, then $PQRS$ is a …



A rectangle
B parallelogram
C kite
D rhombus (1)

1.8 In ΔABC, $\hat{B} = 50°$ and $\hat{C} = 80°$. What is the size of $\hat{A}$?

A $130°$
B $50°$
C $100°$
D $150°$ (1)

1.9 The 3-D object with 5 faces, 5 vertices and 8 edges is a …

A cylinder.
B triangular prism.
C square based pyramid.
D triangular based pyramid. (1)

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1.10 The following set of test scores are out of 150 marks.

124 130 123 130 112 124 125 136 125.

The median is …

A 123.
B 122.
C 125.
D 112. (1)

[10]

QUESTION 2

2.1 Write the next term in the number pattern: 4; 7; 10; … (1)

2.2 Write down the general term, T_n, of the pattern in QUESTION 2.1. (2)

2.3 Calculate the 20^{th} term. (1)

[4]

QUESTION 3

Simplify each of the following expressions:

3.1 $(5^x)^0$ (1)

3.2 $\frac{x}{2} - \frac{y}{3} + 1$ (2)

3.3 $-(3x - 2)^2 + 4x$ (3)

[6]

QUESTION 4

Factorise fully:

4.1 $x^2 - 8x + 15$ (2)

4.2 $\frac{1}{2}x^2 - 8$ (2)

4.3 $x^2 + 3x + tx + 3t$ (3)

[7]

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QUESTION 5

Solve for x:

5.1 $3x + 4 = 10$ (2)

5.2 $\frac{x}{3} + \frac{x+5}{2} = 0$ (3)

5.3 $x^3 = 125$ (2)

[7]

QUESTION 6

6.1 Write 17 trillion in scientific notation. (1)

6.2 Mr T. can travel a certain distance in 3 h 30 min at an average speed of 90 km/h. At what average speed must he travel to complete the trip in 3 hours? (3)

6.3 Calculate the simple interest on R4 400 at 4 % per annum for 7 years. (3)

6.4 Use the formula A = $P(1 + \frac{r}{100})^n$ or A = $P(1 + i)^n$ to calculate the compound interest at 7% per annum on a loan of R 5 600 for 4 years. Round your answer to the nearest cents. (2)

6.5 A father is three times as old as his son. Six years ago he was five times as old as his son. How old are they now? (4)

[13]

QUESTION 7

7.1 X(-1;4) , Y(0;5) , Z(1;6) are points on a straight line XYZ. Determine the equation of the line. (3)

7.2 Using THE ANNEXURE attached, draw the graph of the function defined by $y = 2x - 1$ and $y = -1$.
Label each graph and clearly mark the points where the graphs cut the axes. (5)

[8]

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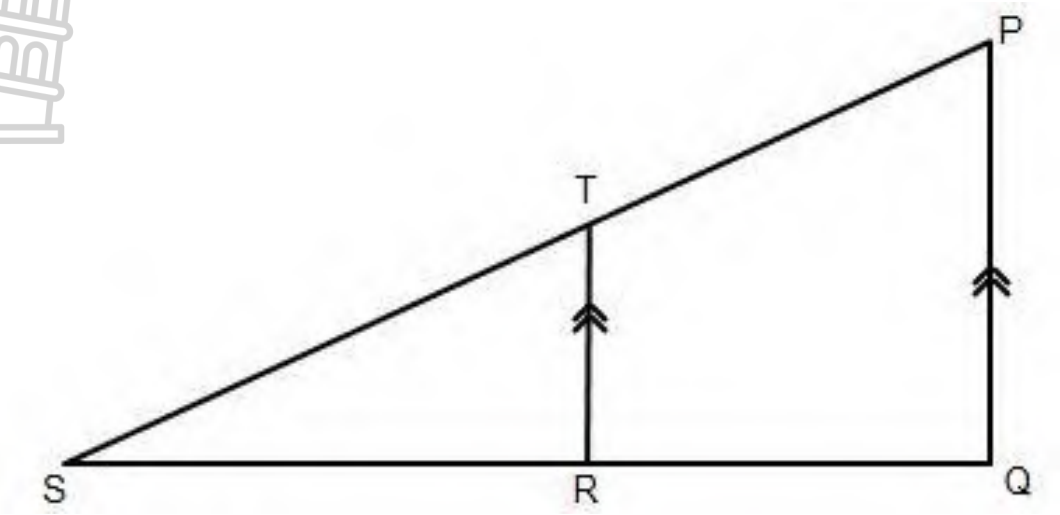
QUESTION 8

NB: GIVE REASONS FOR ALL YOUR STATEMENTS IN THIS QUESTION.

8.1 In the diagram below, *TR//PQ* , $\hat{S}$ = 28°, T$\hat{R}$S = $x + 70°$ and $\hat{P} = x + 10°$

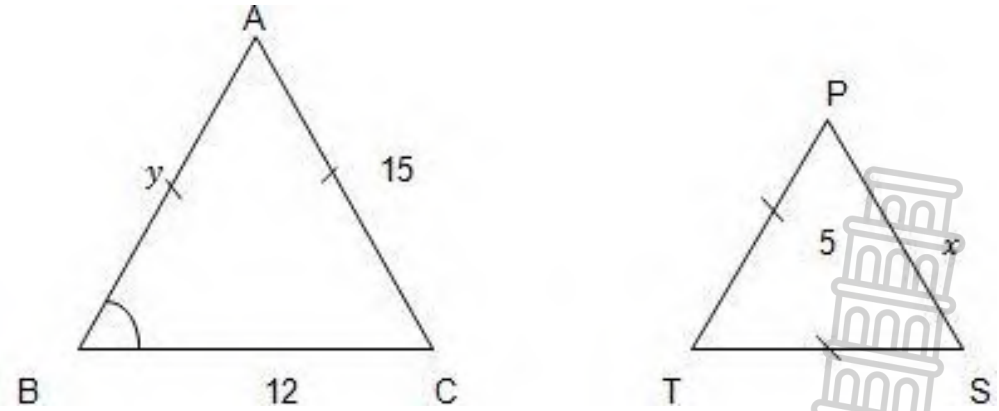


8.1.1 Calculate the value of x, giving reasons. (4)

8.1.2 Calculate the value of $S\hat{T}R$, giving reasons. (3)

8.1.3 Is ΔPQS a right angled triangle? Justify your answer by means of calculations. (3)

8.2 In ΔABC and ΔPTS $\hat{B} = 70°$ *and* $\hat{P} = 70°$



8.2.1 Prove with reasons that $\Delta ABC /// \Delta TSP$ (4)

8.2.2 Determine y and x. (3)

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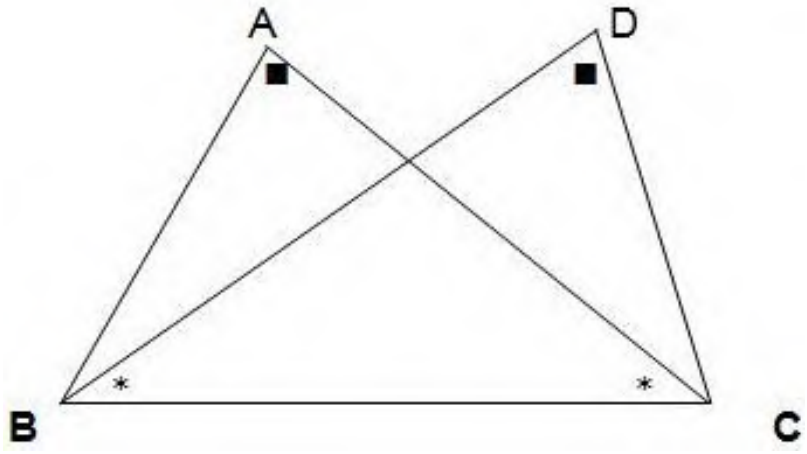
8.3 Study the figure below and answer the questions that follow.



8.3.1 Prove with reasons that $\Delta ABC \equiv \Delta DCB$ (4)

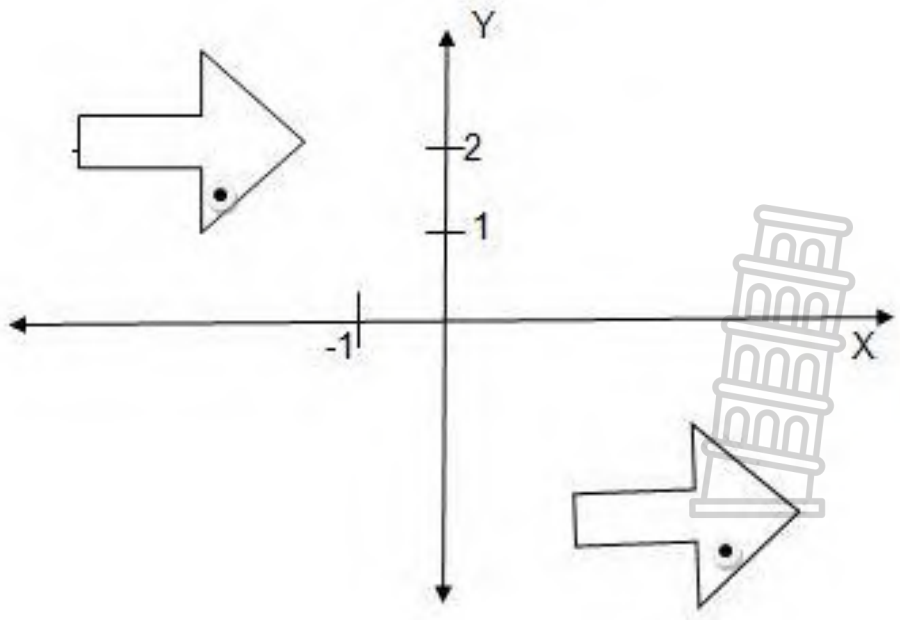
8.3.2 If AB = 4 units, what is the length of BC? (2)

[23]

QUESTION 9

9.1 P(-4 ; 1) , Q(-1 ; -3) , and R(4 ; -1) are the vertices of ΔPQR. Write the co-ordinates of P′; Q′ and R′ after reflection in the X-axis. (3)

9.2 What kind of transformation is defined by the shapes below?



(1)

[4]

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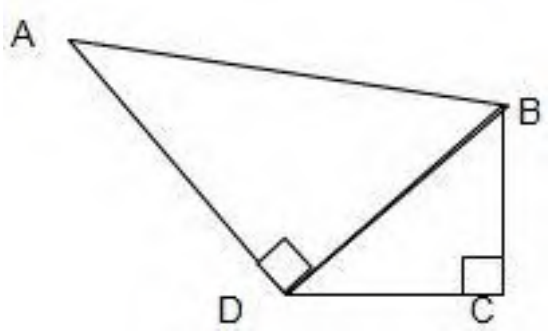
QUESTION 10

10.1 Determine the volume of a cylinder if $r = 7\ cm$ and $h = 20\ cm$.
NB: Use $\pi = 3{,}14$. Correct your answer to one decimal place. (3)

10.2 In the figure below $BC = 8\ cm,\ CD = 6\ cm$ and $AB = 26\ cm$. Find the length of AD.



(4)

10.3 The volume of a rectangular prism with length = 5 cm, breadth = 3 cm and height = 2 cm is 30 cm^3. What will be its volume if all the dimensions are doubled? (2)
[9]

QUESTION 11

11.1 The table below shows the number of pupils who participate in different extra-mural activities. Draw a pie chart to illustrate the data.

Activity	Tennis	Rugby	Cricket	Swimming
Number of learners	12	18	6	12

(4)

11.2 Calculate the range of the following set of test scores.

143 128 132 128 116 145 128 136 141 (1)

11.3 A coin is tossed twice:

11.3.1 Find the sample space by drawing a two way table (2)

11.3.2 Determine the number of outcomes: n(S) (1)

11.3.3 Determine the probability of getting at least 1 tail (1)
[9]

TOTAL: 100

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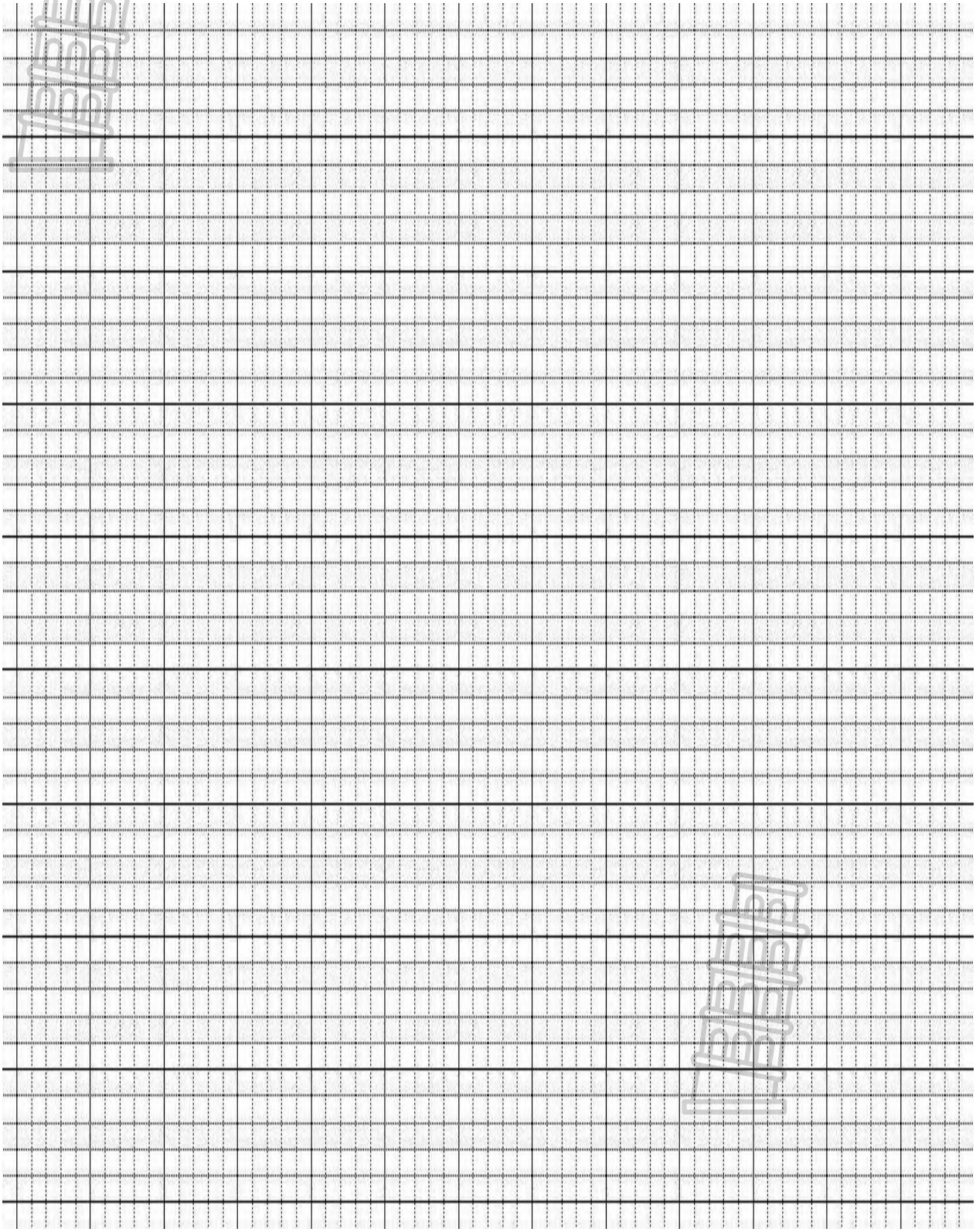
ANNEXURE

NAME: …….. GRADE: ….



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SENIOR PHASE

GRADE 9

NOVEMBER 2014

MATHEMATICS MEMORANDUM

MARKS: **100**

Important information.

- This is marking guideline. In instances where learners have used different Mathematically sound strategies to solve the problems, they (learners) should be credited.
- Underline errors committed by learners and apply Consistent Accuracy (CA) marking.

Symbol	Explanation
M	Method mark
CA	Consistent Accuracy mark
A	Accuracy mark

This memorandum consist of 9 pages.

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Ques.	Solution	Mark Allocation	Total
QUESTION 1			
1.1	C	Give 1 mark for each correct answer.	
1.2	D		
1.3	B		
1.4	C		
1.5	B		
1.6	D		
1.7	B		
1.8	B		
1.9	C		
1.10	C		
			[10]
QUESTION 2			
2.1	13 ✓A	13: 1 mark	(1)
2.2	$T_n = 3n + 1$ ✓✓A **OR** $T_n = 4 + 3(n-1)$ ✓✓A	$3n$: 1 mark $+1$: 1 mark 4: 1 mark $3(n-1)$: 1 mark	(2)
2.3	$T_{20} = 3(20) + 1$ $= 61$ ✓CA **OR** $T_{20} = 4 + 3(20-1)$ $= 61$ ✓ CA	Answer: 1 mark	(1)
			[4]
QUESTION 3			
3.1	$(5^x)^0$ $= 1$ ✓A	1: 1 mark	(1)
3.2	$\frac{x}{2} - \frac{y}{3} + 1$ $= \frac{3x-2y}{6} + \frac{6}{6}$ ✓ M $= \frac{3x-2y+1}{6}$ ✓A	Same denominator: 1 mark $3x - 2y + 1$: 1 mark	(2)

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3.3	$-(3x-2)^2+4x$ $=-(9x^2-6x+4)+4x$ ✓ M $=-9x^2+6x-4+4x$ ✓ M $=9x^2+10x-4$ ✓ CA	$9x^2-6x+4$: 1 mark $-9x^2+6x-4$: 1 mark $-9x^2+10x-4$: 1 mark	(3)
			[6]
QUESTION 4			
4.1	$x^2-8x+15$ $=(x-3)$✓$(x-5)$ ✓A	$(x-3)$: 1 mark $(x-5)$: 1 mark	(2)
4.2	$\frac{1}{2}x^2-8$ $=\frac{x^2-16}{2}$ ✓A $=\frac{(x-4)(x+4)}{2}$ ✓A	$\frac{x^2-16}{2}$: 1 mark $\frac{(x-4)(x+4)}{2}$: 1 mark	(2)
4.3	$x^2+3x+tx+3t$ $=x(x+3)+t(x+3)$ ✓ M $=(x+3)$ ✓$(x+t)$ ✓A	Grouping: 1 mark $(x+3)$: 1 mark $(x+t)$: 1 mark	(3)
			[7]
QUESTION 5			
5.1	$3x+4=10$ $\frac{3x}{3}=\frac{10-4}{3}$ ✓ M $x=2$ ✓ A	Calculation: 1 mark Answer: 1 mark	(2)
5.2	$\frac{x}{3}+\frac{x+5}{2}=0$ $6(\frac{2x+3x+15}{6})=0\times 6$ ✓ M $5x+15=0$ ✓ M $5x=-15$ $x=-3$ ✓CA	Multiply LHS and RHS by 6 Simplification: 1 mark Answer: 1 mark	(3)
5.3	$x^3=125$ $x^3=5^3$ ✓M $x=5$ ✓A **OR** $x^3=125$ $x=\sqrt[3]{125}$ ✓M $x=5$ ✓A	Calculation: 1 mark Answer: 1 mark	(2)
			[7]

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QUESTION 6			
6.1	$1{,}7 \times 10^{13}$ ✓A	Answer: 1 mark	(1)
6.2	$90\ km/h = \frac{7}{2}\ h$ $\therefore x\ km/h = 3\ h$ $3 \times x\ km/h$ ✓ $= 90 \times \frac{7}{2}$ ✓M Average speed $= 105\ km/h$ ✓A	$3 \times x\ km/h$: 1 mark $90 \times \frac{7}{2}$: 1 mark Answer: 1 mark	(3)
6.3	S.I. $= \frac{P.n.r}{100}$ ✓M $= \frac{R4\,400 \times 4 \times 7}{100}$ ✓M $= R1\,232.00$ ✓CA **OR** $SI = Pni$ ✓M $= 4\,400 \times 7 \times 0{,}04$ ✓M $= R\ 1\,232{,}00$ ✓CA	Formula: 1 mark Substitution: 1 mark Answer: 1 mark	(3)
6.4	A = $P(1 + \frac{r}{100})^n$ $= 5\,600\mathrm{P}(1 + \frac{7}{100})^4$ ✓M = R7 340,46 ✓CA **OR** A = $P(1 + i)^n$ $= 5\,600(1 + 0{,}07)^4$ ✓M = R7 340,46 ✓CA	Substitution: 1 mark Answer: 1 mark	(2)
6.5	now 6yrs ago Son is x $x - 6$ Father $3x$ $3x - 6$ $3x - 6 = 5(x - 6)$ ✓M $2x = 24$ ✓M $x = 12$ Son = 12 years ✓A Father = 36 years ✓CA	Correct statement: 1 mark Calculation: 1 mark 12 years: 1 mark 36 years: 1 mark	(4)
			[13]

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QUESTION 7

7.1

$X(-1;4)$ $Y(0;5)$

$m = \frac{y_2 - y_1}{x_2 - x_1}$ ✓M

$m = \frac{5-4}{0+1}$

$= 1$ ✓M

y-intercept $= 5$

$y = mx + 5$

$= x + 5$ ✓A

Calculation: 1 mark

m = 1: 1 mark

Answer: 1 mark

OR

$Y(0;5)$ $Z(1;6)$

$m = \frac{y_2 - y_1}{x_2 - x_1}$ ✓M

$m = \frac{6-5}{1-0}$

$= 1$ ✓M

$y-$ intercept $= 5$

$y = mx + 5$

$= x + 5$ ✓A

OR

$X(-1;4)$ $Z(1;6)$

$m = \frac{y_2 - y_1}{x_2 - x_1}$ ✓M

$m = \frac{6-4}{1-(-1)}$

$= \frac{2}{2}$

$= 1$ ✓M

y-intercept $= 5$

$y = mx + 5$

$= x + 5$ ✓A

(3)

7.2

x	-2	-1	0	1	2
$y = 2x - 1$	-6	-4	-2	0	2
$y = -1$	-1	-1	-1	-1	-1

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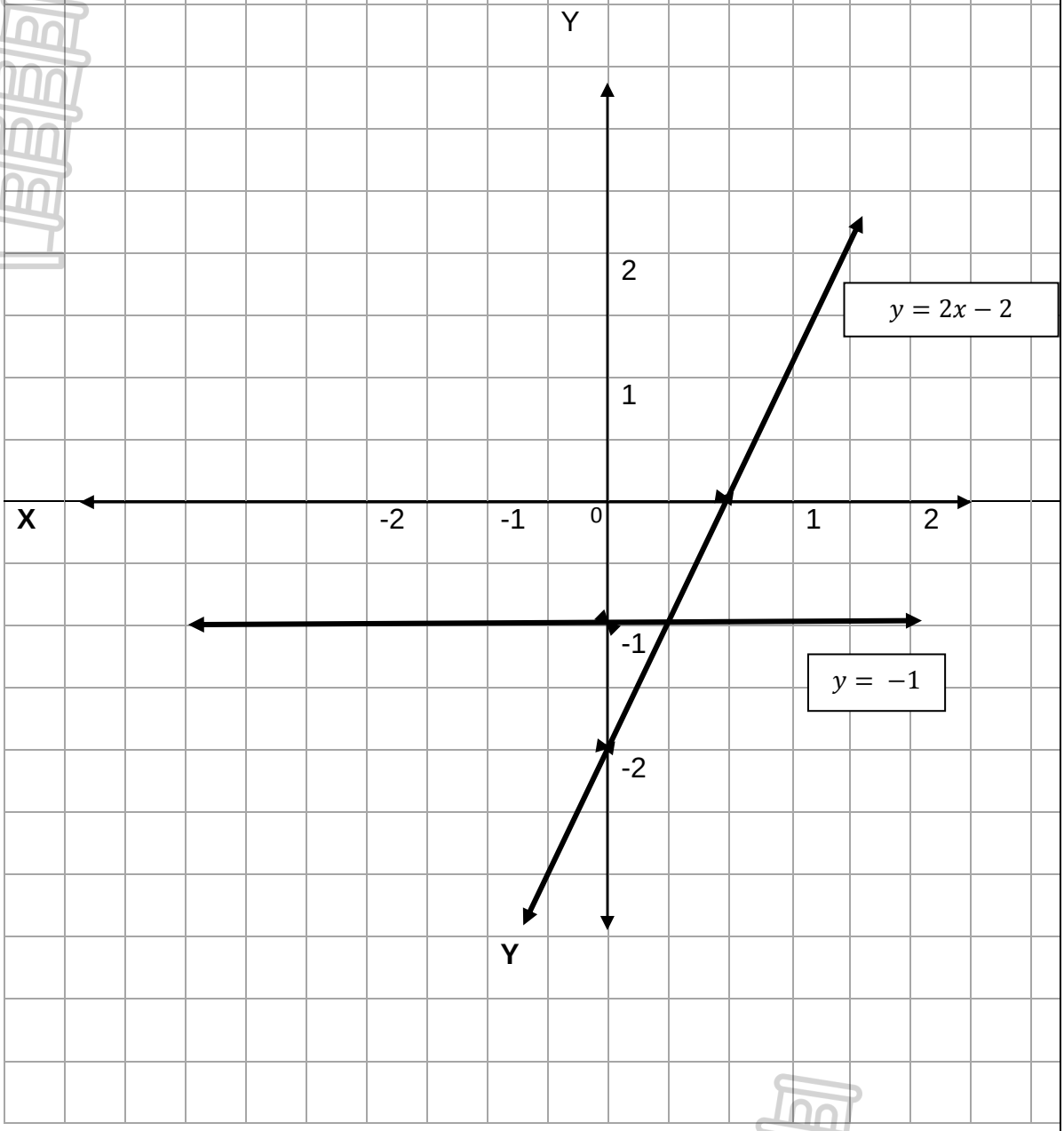
7.2



x-intercept : 1 mark ✓
y-intercept : 1 mark per graph ✓ + ✓
Labelling graph ✓ + ✓
(5)

[8]

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QUESTION 8				
8.1	8.1.1	$\widehat{SRT} = \hat{Q} = x + 70°$ (corr. $\angle s$, $RT//QP$) ✓A $\hat{S} + T\hat{R}S + \hat{P} = 180°$ (sum of f $\angle s$ of Δ) ✓A $x + 10° + 28° + 70° = 180°$ $2x + 108° = 180°$ $2x = 72°$ ✓A $x = 36°$ ✓A	Correct statement with reason: 1 mark Correct statement with reason: 1 mark Simplification: 1 mark Answer: 1 mark	(4)
	8.1.2	$S\hat{T}R = \hat{P} = x + 10°$ ✓A (corr. $\angle s$, $RT//QP$) ✓ A $S\hat{T}R = 36° + 10°$ $= 46°$ ✓A	Correct statement: 1 mark Correct statement: 1 mark Answer: 1 mark	(3)
	8.1.3	$\widehat{SRT} = \hat{Q} = x + 70°$ (corr. $\angle s$, $RT//QP$) $x + 70° = 36° + 70°$ ✓A $= 106°$ $106° \neq 90°$ $\therefore PQS$ is not a right angled triangle ✓A	Correct statement: 1 mark Substitution: 1 mark Answer: 1 mark	(3)
8.2	8.2.1	$In \quad \Delta ABC \; and \; \Delta TSP$ $\hat{B} = \hat{P} = 70°$ (given) ✓ $\hat{C} = \hat{S} = 70°$ (base $\angle s$ of is os. Δ) ✓A $\hat{A} = \hat{T} = 40°$ (sum of $\angle s$ of Δ) ✓A $\therefore \Delta ABC /// \Delta TSP$ ($\angle\angle\angle$) ✓A	Correct statement with reason: 1 mark Correct statement with reason: 1 mark Correct statement with reason: 1 mark Correct statement with reason: 1 mark	(4)
	8.2.2	$y = AC = 15$ (given) ✓A $\frac{PS}{BC} = \frac{TS}{AB} = \frac{PT}{AC}$ (Sides are proportional)✓A $\frac{x}{12} = \frac{5 \times 12}{15}$ $\therefore x = 4$ units ✓A	Correct statement with reason: 1 mark Correct statement with reason: 1 mark Answer: 1 mark	(3)
8.3	8.3.1	In $\Delta ABC \; and \; \Delta DCB$ 1. $\hat{A} = \hat{D}$ (given) ✓A 2. $A\hat{C}B = D\hat{B}C$ (given) ✓A 3. $BC = BC$ (Common) ✓A 4. $\Delta ABC \equiv \Delta DCB$ ($\angle\angle S$) ✓A	Correct statement with reason: 1 mark Correct statement with reason: 1 mark Correct statement with reason: 1 mark Correct statement with reason: 1 mark	(4)

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	8.3.2	$AB = DC$ (From congruency) ✓A $\therefore BC = 4$ units ✓A	Correct statement with reason: 1 mark Answer: 1 mark	(2)
				[23]
QUESTION 9				
9.1	$P'(-4;-1)$ ✓A $Q'(-1;3)$ ✓A $R'(4;1)$ ✓A		Answer: 1 mark Answer: 1 mark Answer: 1 mark	(3)
9.2	Translation ✓A		Answer: 1 mark	(1)
				[4]
QUESTION 10				
10.1	$V = \pi r^2 h$ ✓M $= (3{,}14 \times 7^2)\ cm^2 \times 20)\ cm^1$ ✓M $= 3{,}14 \times 49\ cm^2 \times 20\ cm$ $= 3077{,}2\ cm^3$ ✓A		Formula: 1 mark Substitution: 1 mark Answer: 1 mark	(3)
10.2	In ΔDBC $DB^2 = 64 + 34\ cm^2$ (Pythagoras) ✓ M $=100\ cm^2$ $= 10\ cm$ ✓ A In ΔABD : $AD^2 = (26^2 - 10^2)\ cm^2$ (Pythagoras) ✓ M $= (676 - 100)\ cm^2$ $= 576\ cm^2$ $\therefore AD = 24\ cm$ ✓ A		Correct statement with reason: 1 mark $10cm$: 1 mark Correct statement with reason: 1 mark Answer: 1 mark	(4)
10.3	$V = 30\ cm^3$ (given) Volume when all dimensions are doubled: $V = 10\ cm \times 6\ cm \times 4\ cm$ ✓ M $= \frac{240}{30} cm^3$ = 8 8 times ✓ A		Calculation: 1 mark 8 times: 1 mark	(2)
				[9]

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QUESTION 11

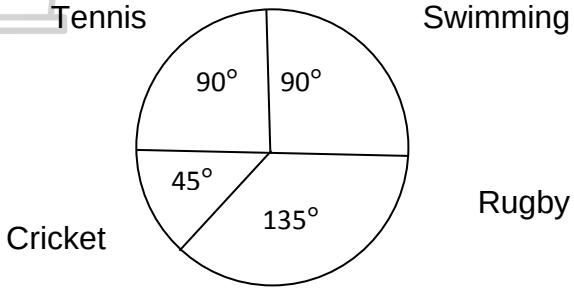
11.1

Tennis $= \frac{12}{48} \times 360° = 90°$ ✓M

Rugby $= \frac{18}{48} \times 360° = 135°$

Cricket $= \frac{6}{48} \times 360° = 45°$ ✓M

Swimming $= \frac{12}{48} \times 360° = 90°$



Pie chart showing learners participating in different extra-mural activities ✓A

✓A

Calculation for any two: 1 mark

Calculation for any two: 1 mark

Pie chart: 1 mark

Label: 1 mark (4)

11.2

Range = 145 – 116

= 29 ✓A

Answer: 1 mark (1)

11.3

11.3.1

		Second toss	
		Head	Tail
First toss	Head	H ; H	H ; T
	Tail	T ; H	T ; T

✓ ✓A

Answer: 1 mark

Answer: 1 mark (2)

11.3.2

n(S) = 4 ✓A

Answer: 1 mark (1)

11.3.3

P (at least T) $= \frac{3}{4}$ ✓A

Answer: 1 mark (1)

[9]

TOTAL: 100