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through the info
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Your Guide

This is your guide, please read through it carefully.

1. This PDF contains 10+ Papers and Memos for each.
2. The layout of this document is: Paper/Memo ; Paper/Memo ; etc.
3. There is a page before each Paper indicating the new Paper and Memo. It also indicates for which exam the Paper is.
4. All front, instruction and formula sheets have been removed to reduce the pages.
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PolyMathic

Paper 1

May/June

Algebra

PolyMathic

**Grade 9 Algebra
June Exam**

**Total: 100
Time: 2h**

QUESTION 1 (20 marks)

Answer the following questions on the answer sheet

1.1 Circle the rational numbers in the list of numbers below. (2)

6 ; $\sqrt[3]{8}$; $\sqrt{5}$; $\sqrt{-16}$; $1,2$; π ; -2 ; $\frac{3}{4}$

1.2 Circle the prime numbers in the list of numbers below. (2)

2 ; 3 ; 4 ; 5 ; 31 ; 49

1.3 Circle the factors of 24 in the list of numbers below. (1)

8 ; 12 ; 24 ; 48

1.4 Evaluate the following without using a calculator. Show all working!

1.4.1 $3^0 + 2^{-1}$ (2)

1.4.2 $(\frac{5}{2})^5 \times 4^5$ (2)

1.4.3 $\frac{4^{2015}}{4^{2016}}$ (1)

1.5 Find the values of the variables in the following equations.

1.5.1 $5 + a = 21$ (1)

1.5.2 $6x = 18$ (1)

1.5.3 $(y + 9)(y + 5) = 0$ (2)

1.5.4 $2b = 4b$ (1)

1.5.5 $2^x = 16$ (1)

1.6 How many terms are in the following expression? (1)

$$x^2 \div 3 + (2 + x)y - y^2 \times 5x$$

1.7 Write down a common factor of $x^2 + x$ and $x^2 - 1$ (1)

1.8 Write down 2 factors of $(x + 1)(x)(x - 4)$ (2)

QUESTION 2 (10 marks)

No calculator may be used in this question

- 2.1 Write 300 as a product of its prime factors. (2)
- 2.2 What is the smallest number that 300 must be multiplied by to make a square number? (1)
- 2.3 Write 0,495 as a fraction. (2)
- 2.4 Write $0,2\bar{7}$ as a fraction. (3)
- 2.5 Evaluate the following expression, and express the final answer as a decimal. (2)

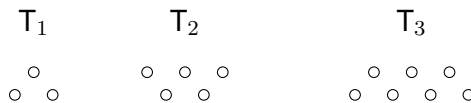
$$\left(\sqrt{\frac{144}{25}} + \sqrt[3]{-8}\right) \times \frac{2}{3}$$

QUESTION 3 (12 marks)

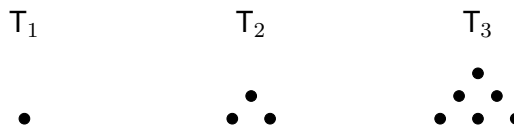
- 3.1 Simplify the following, leaving the answers with positive exponents.
- 3.1.1 $3a^2 \times 4a$ (1)
- 3.1.2 $x^3y^{-3} \times x^3y$ (2)
- 3.1.3 $(3x^2y^3)^3$ (2)
- 3.1.4 $\frac{x^4y^2z^{-3}}{x^{-1}y^4z^2}$ (4)
- 3.2 Write in scientific notation: $1,03 \times 10^{-2} + 13,8 \times 10^{-2}$ (2)
- 3.3 Write in expanded form: $9,34 \times 10^{-3}$ (1)

QUESTION 4 (12 marks)

- 4.1 Consider a number pattern that has the rule $T_n = 3n - 1$.
- 4.1.1 Calculate the value of the 4th term. (2)
- 4.1.2 Which term has a value of 68? (2)
- 4.2 Inspect the following number pattern and answer the questions that follow.



- 4.2.1 Write down the number of circles in the next two terms in the sequence. (2)
- 4.2.2 Find a formula for the sequence, in the form $T_n = \dots$ (2)
- 4.3 Inspect the following number pattern and answer the questions that follow.



- 4.3.1 Write down the number of circles in the next two terms in the sequence. (2)
- 4.3.2 Find a formula for the sequence, in the form $T_n = \dots$ (2)

·QUESTION 5 (6 marks)

5.1 How much money would you have to invest at 10% simple interest p.a. to have a final value of R5000 after 7 years? (3)

5.2 Calculate the final amount if you invest R500 at 5% compound interest p.a. for 3 years. (3)

·QUESTION 6 (13 marks)

Factorize the following expressions completely:

6.1 $4xy + 6x^2 + 2x$ (2)

6.2 $32x^4 - 2x^2$ (3)

6.3 $x^2 + 3x + 2$ (2)

6.4 $3(k - 1) - (1 - k)(3 - k)$ (3)

6.5 $(a + 2)(3a - 1) - 2(a^2 - 4)$ (3)

·QUESTION 7 (13 marks)

Simplify the following completely:

7.1 $(2y - 3x)(y + 5x - 2)$ (3)

7.2 $\frac{1}{6}(3x + 2) - \frac{3}{4}(2x - 1)$ (4)

7.3 $\frac{14p+21}{7p}$ (2)

7.4 $\frac{y^2-x^2}{2} \times \frac{6}{3x+3y}$ (4)

·QUESTION 8 (14 marks)

Solve for x in the following equations:

8.1 $3x + 2 = x - 8$ (2)

8.2 $x^2 - 2x = 8$ (3)

8.3 $\frac{x+3}{4} - \frac{x+2}{8} = \frac{x}{2} - 1$ (5)

8.4 $\frac{x+2}{x^2-2x} = \frac{2}{x-2}$ (4)

Memo

QUESTION 1 (20 marks)

Answer the following questions on the answer sheet

1.1 Circle the rational numbers in the list of numbers below.

(2)

6 ; $\sqrt[3]{8}$; $\sqrt{5}$; $\sqrt{-16}$; $1.\dot{2}$; π ; -2 ; $\frac{3}{4}$

Solution: 6 ; $\sqrt[3]{8}$; $\sqrt{5}$; $\sqrt{-16}$; $1.\dot{2}$; π ; -2 ; $\frac{3}{4}$

1.2 Circle the prime numbers in the list of numbers below.

(2)

2 ; 3 ; 4 ; 5 ; 31 ; 49

Solution: 2 ; 3 ; 4 ; 5 ; 31 ; 49 ✓ all correct

1.3 Circle the factors of 24 in the list of numbers below.

(1)

8 ; 12 ; 24 ; 48

Solution: 8 ; 12 ; 24 ; 48 ✓ all correct

1.4 Evaluate the following without using a calculator. Show all working!

1.4.1 $3^0 + 2^{-1}$

(2)

Solution:

$$\begin{aligned} &= 1 \checkmark + \frac{1}{2} \checkmark \\ &= \frac{3}{2} \text{ or } 1\frac{1}{2} \checkmark \end{aligned}$$

1.4.2 $(\frac{5}{2})^5 \times 4^5$

(2)

Solution:

$$\begin{aligned} &= (\frac{5}{2} \times 4)^5 \checkmark \\ &= (\frac{20}{2})^5 \\ &= 10^5 \checkmark \\ &= 100000 \end{aligned}$$

1.4.3 $\frac{4^{2015}}{4^{2016}}$

(1)

Solution:

$$\begin{aligned} &= 4^{2015-2016} \\ &= 4^{-1} \\ &= \frac{1}{4} \checkmark \end{aligned}$$

1.5 Find the values of the variables in the following equations.

1.5.1 $5 + a = 21$ (1)

Solution: $a = 16$ ✓

1.5.2 $6x = 18$ (1)

Solution: $x = 3$ ✓

1.5.3 $(y + 9)(y + 5) = 0$ (2)

Solution: $y = -9$ ✓ or $y = -5$ ✓

1.5.4 $2b = 4b$ (1)

Solution: $b = 0$ ✓

1.5.5 $2^x = 16$ (1)

Solution: $x = 4$ ✓

1.6 How many terms are in the following expression? (1)

$$x^2 \div 3 + (2 + x)y - y^2 \times 5x$$

Solution: 3 ✓

1.7 Write down a common factor of $x^2 + x$ and $x^2 - 1$ (1)

Solution: $(x + 1)$ ✓

1.8 Write down 2 factors of $(x + 1)(x)(x - 4)$ (2)

Solution: $(x + 1)$ or $(x - 4)$ or x ✓ ✓ one tick for each answer

QUESTION 2 (10 marks)

No calculator may be used in this question

2.1 Write 300 as a product of its prime factors. (2)

Solution:

3	300
5	100
5	20
2	4
2	2
2	1

✓ for correct working

$3 \cdot 5 \cdot 5 \cdot 2 \cdot 2$ ✓ written as product

2.2 What is the smallest number that 300 must be multiplied by to make a square number? (1)

Solution: 3 ✓

2.3 Write 0,495 as a fraction. (2)

Solution: $0,495 = \frac{495}{1000}$ ✓
 $\frac{99}{200}$ ✓ only if working has been shown

2.4 Write $0,2\dot{7}$ as a fraction. (3)

Solution:

$$\begin{aligned}x &= 0,2\dot{7} \\100x &= 27,2\dot{7} \quad \checkmark \\100x - x &= 27,2\dot{7} - 0,2\dot{7} \quad \checkmark \\99x &= 27 \\x &= \frac{27}{99} \\&= \frac{3}{11} \quad \checkmark\end{aligned}$$

2.5 Evaluate the following expression, and express the final answer as a decimal. (2)

$$\left(\sqrt{\frac{144}{25}} + \sqrt[3]{-8}\right) \times \frac{2}{3}$$

Solution:

$$\begin{aligned} &= \left(\frac{12}{5} - 2\right) \times \frac{1}{2} \checkmark \\ &= \frac{12 - 10}{5} \times \frac{3}{4} \\ &= \frac{6}{20} \\ &= \frac{3}{10} \checkmark \text{ anything that shows they didn't use a calculator} \\ &= 0.3 \end{aligned}$$

QUESTION 3 (12 marks)

3.1 Simplify the following, leaving the answers with positive exponents.

3.1.1 $3a^2 \times 4a$

(1)

Solution:

$$= 12a^3 \checkmark$$

3.1.2 $x^3y^{-3} \times x^3y$

(2)

Solution:

$$\begin{aligned} &= x^6y^{-2} \checkmark \\ &= \frac{x^6}{y^2} \checkmark \end{aligned}$$

3.1.3 $(3x^2y^3)^3$

(2)

Solution:

$$= 27x^6y^9 \checkmark \text{ applying power to at least one factor } \checkmark \text{ correct}$$

3.1.4 $\frac{x^4y^2z^{-3}}{x^{-1}y^4z^2}$

(4)

Solution: $\frac{x^5}{y^2z^5} \checkmark \checkmark \checkmark \text{ one for each power } \checkmark \text{ for positive exponents}$

3.2 Write in scientific notation: $1,03 \times 10^{-2} + 13,8 \times 10^{-2}$

(2)

Solution:

$$\begin{aligned} &= 14,83 \times 10^{-2} \\ &= 1,483 \checkmark \times 10^{-1} \checkmark \end{aligned}$$

3.3 Write in expanded form: $9,34 \times 10^{-3}$

(1)

Solution:

$$0,00934 \checkmark$$

QUESTION 4 (12 marks)

4.1 Consider a number pattern that has the rule $T_n = 3n - 1$.

4.1.1 Calculate the value of the 4th term.

(2)

Solution:

$$\begin{aligned} T_n &= 3(4) - 1 \checkmark \\ &= 11 \checkmark \end{aligned}$$

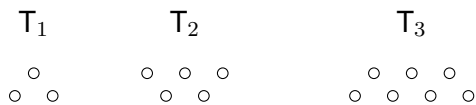
4.1.2 Which term has a value of 68?

(2)

Solution:

$$\begin{aligned} 68 &= 3(n) - 1 \checkmark \text{sub} \\ n &= 23 \checkmark \text{ans} \end{aligned}$$

4.2 Inspect the following number pattern and answer the questions that follow.



4.2.1 Write down the number of circles in the next two terms in the sequence.

(2)

Solution:

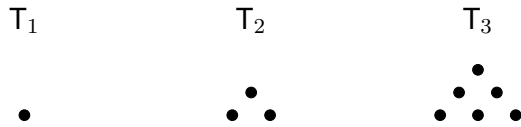
$$\begin{aligned} T_4 &= 9 \checkmark \\ T_5 &= 11 \checkmark \end{aligned}$$

4.2.2 Find a formula for the sequence, in the form $T_n = \dots$

(2)

Solution: $T_n = 2n + 1$

4.3 Inspect the following number pattern and answer the questions that follow.



4.3.1 Write down the number of circles in the next two terms in the sequence. (2)

Solution:

$$T_4 = 10$$

$$T_5 = 15$$

4.3.2 Find a formula for the sequence, in the form $T_n = \dots$ (2)

Solution: $T_n = \frac{1}{2}n^2 + \frac{1}{2}n$ or $\frac{1}{2}n(n + 1)$

·QUESTION 5 (6 marks)

- 5.1 How much money would you have to invest at 10% simple interest p.a. to have a final value of R5000 after 7 years? (3)

Solution:

$$\begin{aligned}A &= P(1 + in) \\R5000 &= P(1 + (0.1)(7)) \checkmark \text{sub} \\P &= \frac{R5000}{1.7} \checkmark \text{rearrange} \\&= R2941.18 \checkmark\end{aligned}$$

- 5.2 Calculate the final amount if you invest R500 at 5% compound interest p.a. for 3 years. (3)

Solution:

$$\begin{aligned}A &= P(1 + i)^n \checkmark \\&= 500(1 + 0.05)^3 \checkmark \\&= 578.8125 \checkmark\end{aligned}$$

·QUESTION 6 (13 marks)

Factorize the following expressions completely:

- 6.1 $4xy + 6x^2 + 2x$ (2)

Solution:

$$= 2x(2y + 3x + 1) \checkmark 2x \checkmark \text{bracket}$$

- 6.2 $32x^4 - 2x^2$ (3)

Solution:

$$\begin{aligned}&= 2x^2(16x^2 - 1) \checkmark \text{common factor} \\&= 2x^2(4x + 1)(4x - 1) \checkmark a \checkmark \text{each bracket}\end{aligned}$$

- 6.3 $x^2 + 3x + 2$ (2)

Solution:

$$= (x + 2)(x + 1) \checkmark \checkmark$$

$$6.4 \quad 3(k - 1) - (1 - k)(3 - k) \quad (3)$$

Solution:

$$\begin{aligned} &= 3(k - 1) + (k - 1)(3 - k) \quad \checkmark \text{ switch} \\ &= (k - 1)(3 + (3 - k)) \quad \checkmark \text{ common factor} \\ &= (k - 1)(6 - k) \quad \checkmark \end{aligned}$$

$$6.5 \quad (a + 2)(3a - 1) - 2(a^2 - 4) \quad (3)$$

Solution:

$$\begin{aligned} &= (a + 2)(3a - 1) - 2(a + 2)(a - 2) \quad \checkmark \\ &= (a + 2)((3a - 1) - 2(a - 2)) \quad \checkmark \\ &= (a + 2)(3a - 1 - 2a + 4) \\ &= (a + 2)(a + 3) \quad \checkmark \end{aligned}$$

QUESTION 7 (13 marks)

Simplify the following completely:

$$7.1 \quad (2y - 3x)(y + 5x - 2) \quad (3)$$

Solution:

$$\begin{aligned} &= 2y^2 + 10xy - 4y - 3xy - 15x^2 + 6x \quad \checkmark \quad \checkmark \\ &= 2y^2 - 4y + 7xy + 6x - 15x^2 \quad \checkmark \text{ ca} \end{aligned}$$

$$7.2 \quad \frac{1}{6}(3x + 2) - \frac{3}{4}(2x - 1) \quad (4)$$

Solution:

$$\begin{aligned} &= \frac{(6x + 4 \quad \checkmark) - (18x - 9) \quad \checkmark}{12 \quad \checkmark} \\ &= \frac{-12x + 13 \quad \checkmark}{12} \quad \checkmark \end{aligned}$$

$$7.3 \quad \frac{14p+21}{7p} \quad (2)$$

Solution:

$$\begin{aligned} &= \frac{7(2p + 3) \quad \checkmark}{7p} \\ &= \frac{2p + 3 \quad \checkmark}{p} \end{aligned}$$

$$7.4 \frac{y^2 - x^2}{2} \times \frac{6}{3x + 3y} \quad (4)$$

Solution:

$$\begin{aligned} &= \frac{(y^2 - x^2)6}{2(3x + 3y)} \checkmark \\ &= \frac{6(y + x)(y - x) \checkmark \text{DOTS}}{6(x + y) \checkmark \text{com. fac.}} \\ &= (y - x) \checkmark \end{aligned}$$

QUESTION 8 (14 marks)

Solve for x in the following equations:

$$8.1 \quad 3x + 2 = x - 8 \quad (2)$$

Solution:

$$\begin{aligned} 3x + 2 - 2 &= x - 8 - 2 \\ 3x &= x - 10 \\ 3x - x &= x - x - 10 \\ 2x &= -10 \checkmark \\ x &= -5 \checkmark \end{aligned}$$

$$8.2 \quad x^2 - 2x = 8 \quad (3)$$

Solution:

$$\begin{aligned} x^2 - 2x - 8 &= 0 \checkmark \\ (x - 4)(x + 2) &= 0 \checkmark \text{for both brackets} \end{aligned}$$

$$x = 4 \text{ or } x = -2 \checkmark \text{ca for both}$$

$$8.3 \quad \frac{x+3}{4} - \frac{x+2}{8} = \frac{x}{2} - 1 \quad (5)$$

Solution:

$$\frac{2(x+3) \checkmark - (x+2)}{8} = \frac{4x \checkmark - 8}{8}$$

$$2(x+3) - (x+2) = 4x - 8 \checkmark \text{ multiplying through by common factor}$$

$$x + 4 = 4x - 8$$

$$3x = 12 \checkmark$$

$$x = 4 \checkmark$$

8.4 $\frac{x+2}{x^2-2x} = \frac{2}{x-2}$

(4)

Solution:

$$\frac{x+2}{x(x-2) \checkmark} = \frac{2}{(x-2)}$$

$$\frac{x+2}{x(x-2)} = \frac{2(x) \checkmark}{x(x-2)}$$

$$x+2 = 2x \checkmark \text{ mult. through with com.denom.}$$

$$x = 2 \checkmark \text{ ca}$$

PolyMathic

Paper 2

May/June

Geometry

PolyMathic

QUESTION 1

Complete the following statements by filling in the missing words. Write your answers in the answer boxes provided.

1.1 Co-interior angles are when inside parallel lines. (1)

1.2 The theorem of Pythagoras states that, in a right-angled triangle, ... (2)

1.3 The reason given when two angles are equal in an isosceles triangle is ... (1)

1.4 The exterior angle of a triangle is equal to the sum of ... (1)

1.5 The complement of 57° is ... (1)

[6]

QUESTION 3

In this question, you must show all construction lines, and label all diagrams fully.

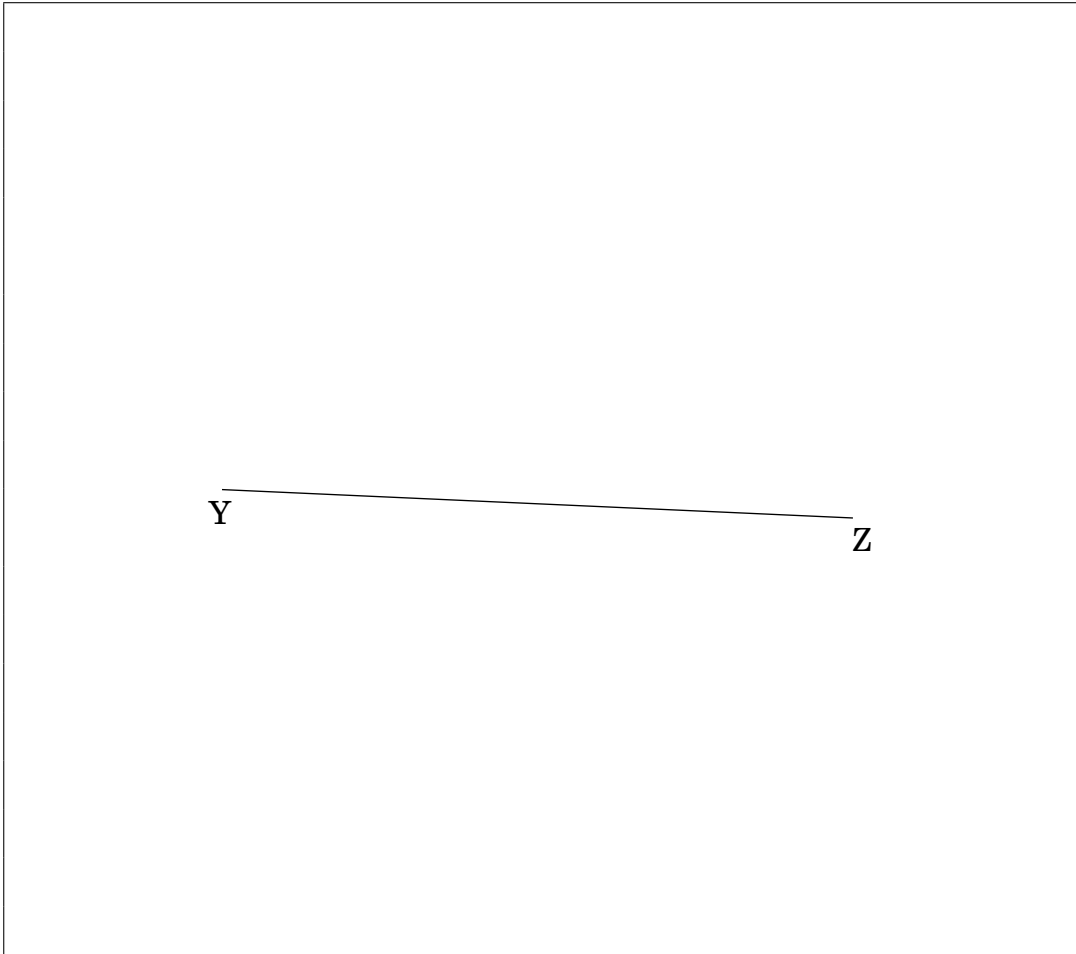
- 3.1 Construct triangle JKL with $JK = 33 \text{ mm}$, $KL = 56 \text{ mm}$ and $JL = 65 \text{ mm}$. (5)



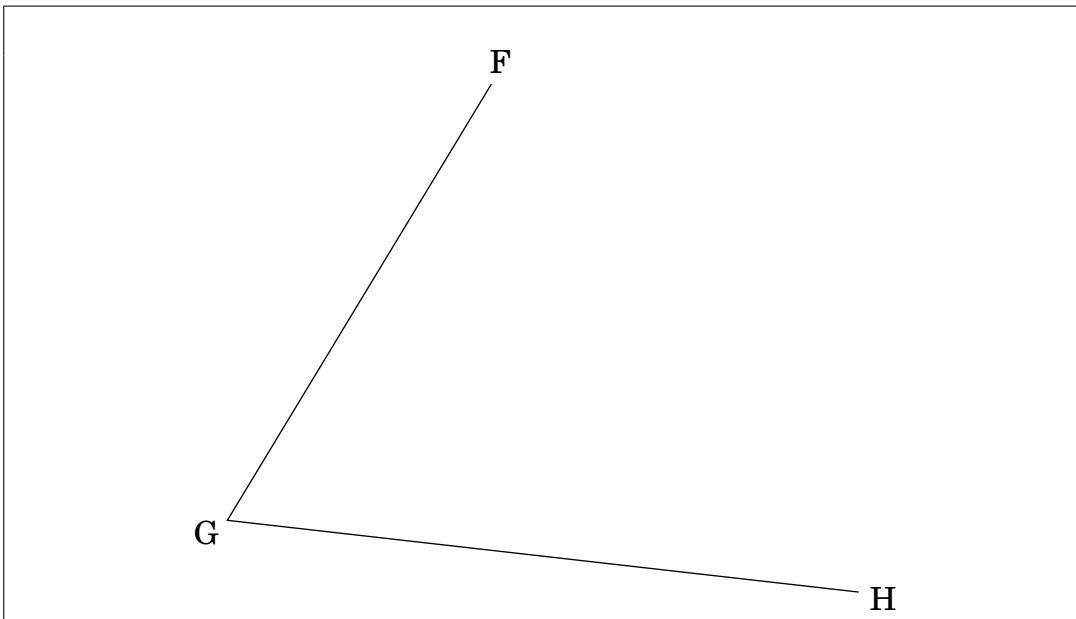
- 3.2 Using a protractor, measure angle \hat{K} in 3.1 and label the angle on the diagram above. (1)

3.3 Using only a compass and ruler, construct the perpendicular bisector of the line segment YZ shown below:

(3)



3.4 Without using a protractor, bisect the angle \widehat{FGH} below.



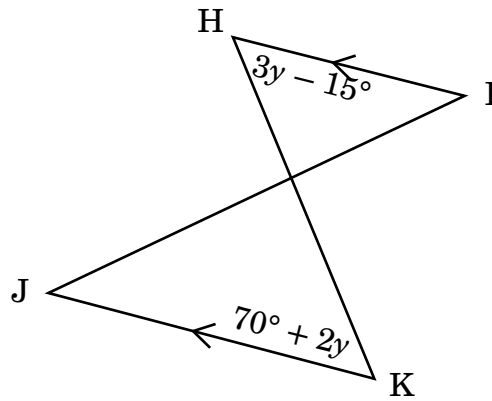
(3)

[12]

QUESTION 4

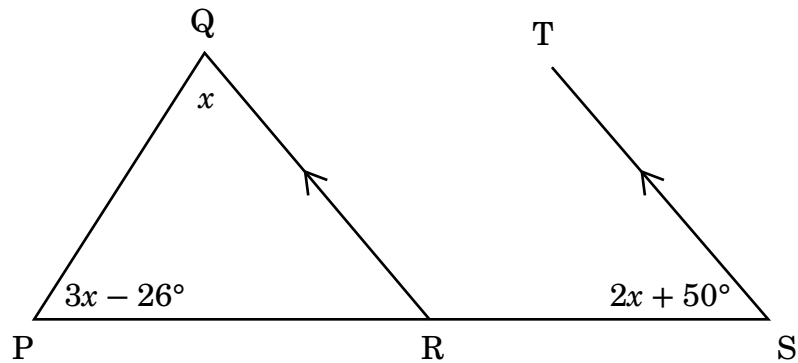
In each of the following questions, determine the value of the unknown variable. Remember to give reasons where necessary.

4.1 In the diagram below, it is given that $HI \parallel JK$. Solve for y .



(3)

4.2 In the diagram below, $QR \parallel TS$. Solve for x .

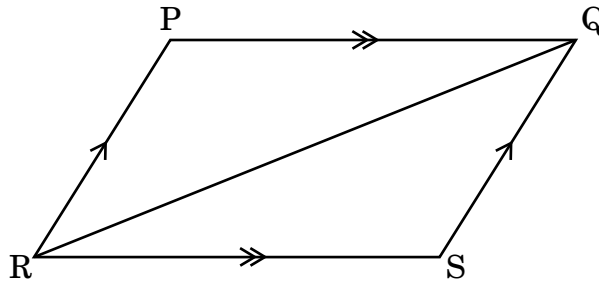


(5)

[8]

QUESTION 5

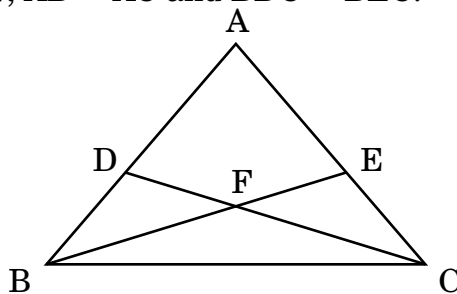
5.1 In quadrilateral PQSR shown below, $PQ \parallel RS$ and $PR \parallel QS$.



Using congruency, prove that $PQ = RS$ and $PR = QS$.

(5)

5.2 In the diagram below, $AB = AC$ and $\hat{BDC} = \hat{BEC}$.



5.2.1 Prove that $\triangle BDC \cong \triangle CEB$.

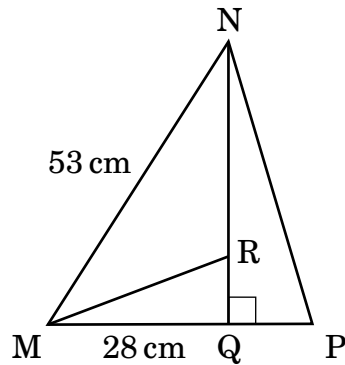
(4)

5.2.2 Hence prove that $BD = EC$.

(1)

QUESTION 6

- 6.1 In $\triangle MNP$ below, $MN = 53$ cm, $QM = 28$ cm, and QN is an altitude of the triangle.



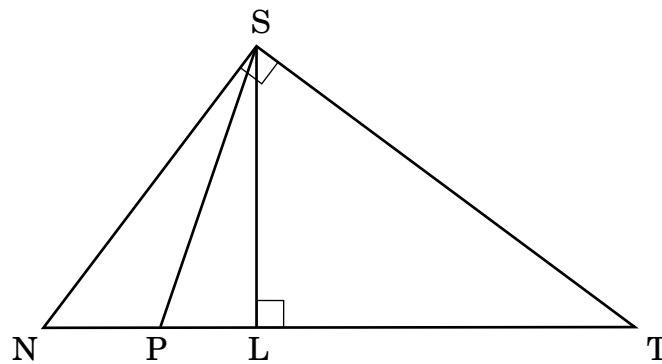
- 6.1.1 Determine the length of NQ . (3)

- 6.1.2 If RN is four times the length of QR , find the length of QR . (2)

- 6.1.3 Determine the length of MR . Round your answer off to two decimal places if necessary. (3)

QUESTION 7

In the diagram below, $ST = PT$, $SL \perp NT$, and $NS \perp ST$.



You have been asked to prove that SP bisects the angle \widehat{NSL} by completing the partial proof given below. Fill in all missing steps, indicated by the dotted lines. (5)

To prove: SP bisects \widehat{NSL}	
Let $\widehat{SPT} = x$	
$\therefore \widehat{PST} = x$	(.....)
$\widehat{SLP} = \dots\dots\dots$	(Given)
$\therefore \widehat{PSL} = \dots\dots\dots$	(.....)
$\widehat{NSP} = \dots\dots\dots$	(Given $NS \perp ST$)
$\therefore \widehat{NSP} = \widehat{PSL}$	
$\therefore SP$ bisects \widehat{NSL}	

[5]

TOTAL: 75

Memo

QUESTION 1

Complete the following statements by filling in the missing words. Write your answers in the answer boxes provided.

- 1.1 Co-interior angles are when inside parallel lines. (1)

Supplementary ✓

- 1.2 The theorem of Pythagoras states that, in a right-angled triangle, ... (2)

The square on the hypotenuse ✓

is equal to the sum of the squares on the other two sides. ✓

- 1.3 The reason given when two angles are equal in an isosceles triangle is ... (1)

∠s opp equal sides. ✓

- 1.4 The exterior angle of a triangle is equal to the sum of ... (1)

the opposite interior angles. ✓

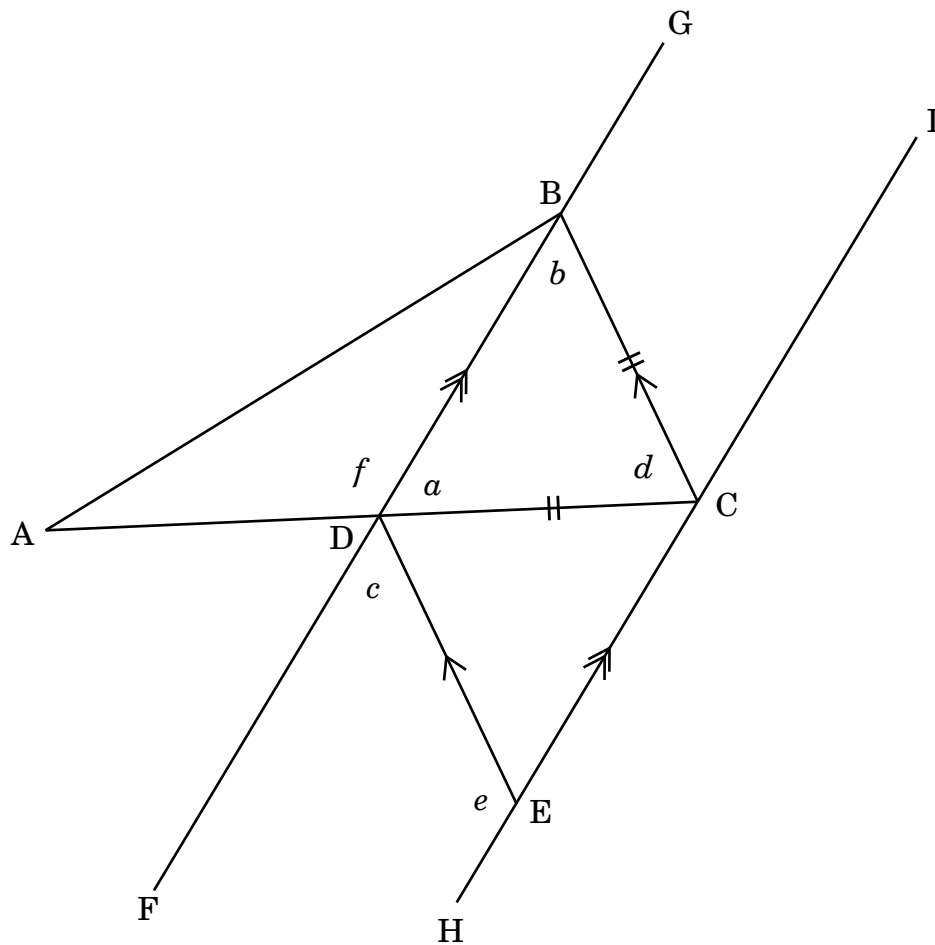
- 1.5 The complement of 57° is ... (1)

33° ✓

[6]

QUESTION 2

In the diagram below, it is given that $\widehat{ADF} = 46^\circ$, $BC = DC$, $FG \parallel HI$, and $DE \parallel BC$.



Find, in alphabetical order, the values of a through to f . Give a reason for each step.

(12)

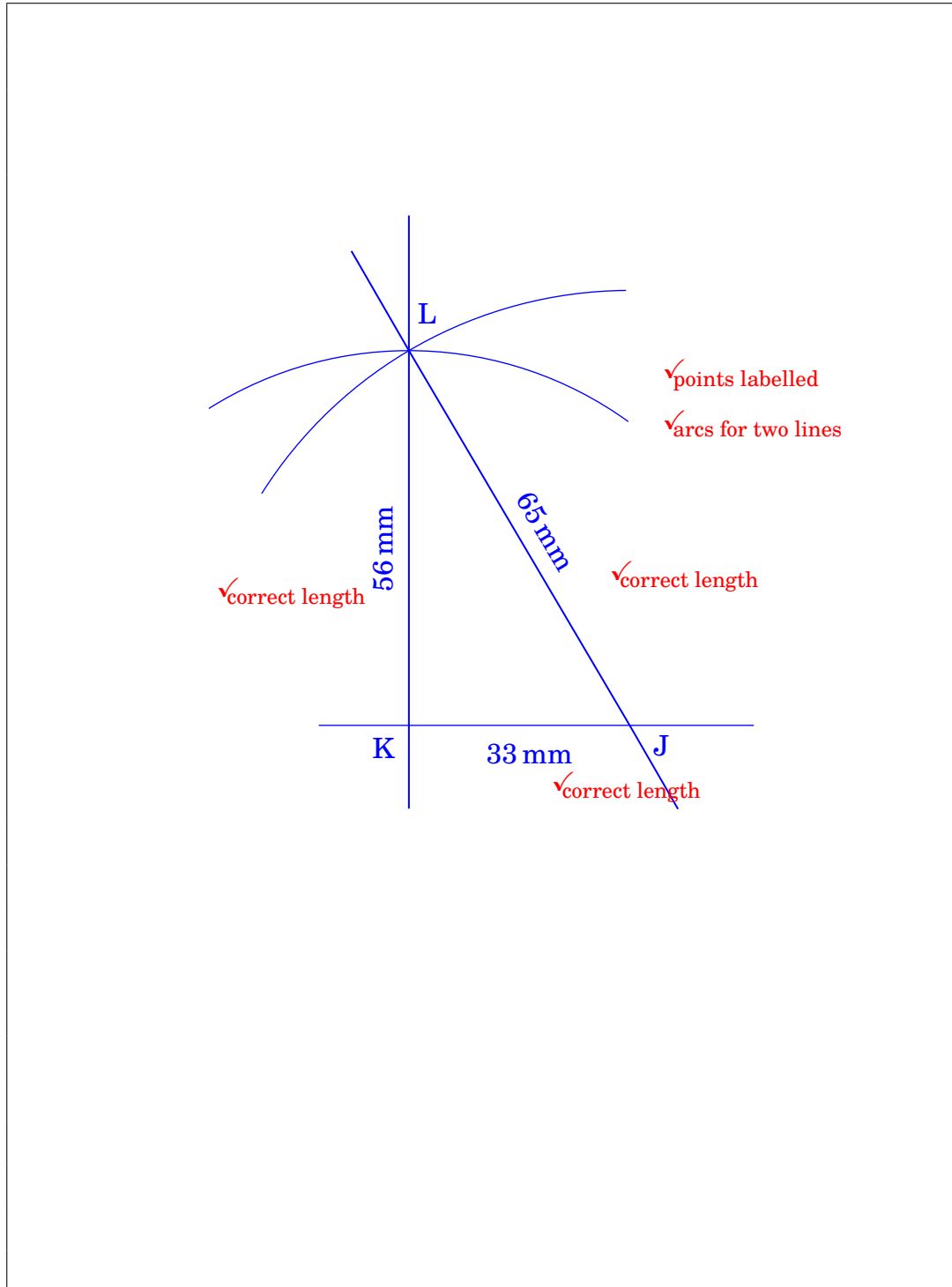
$a = 46^\circ \checkmark$	(vert opp \angle s) \checkmark
$b = 46^\circ \checkmark$	(\angle s opp equal sides, $BC = CD$) \checkmark
$c = 46^\circ \checkmark$	(corresp \angle s, $BC \parallel DE$) \checkmark
$d = 88^\circ \checkmark$	(\angle sum in $\triangle BCD$) \checkmark
$e = 134^\circ \checkmark$	(co-int \angle s, $FG \parallel HI$) \checkmark
$f = 134^\circ \checkmark$	(\angle s on str line FG) \checkmark

[12]

QUESTION 3

In this question, you must show all construction lines, and label all diagrams fully.

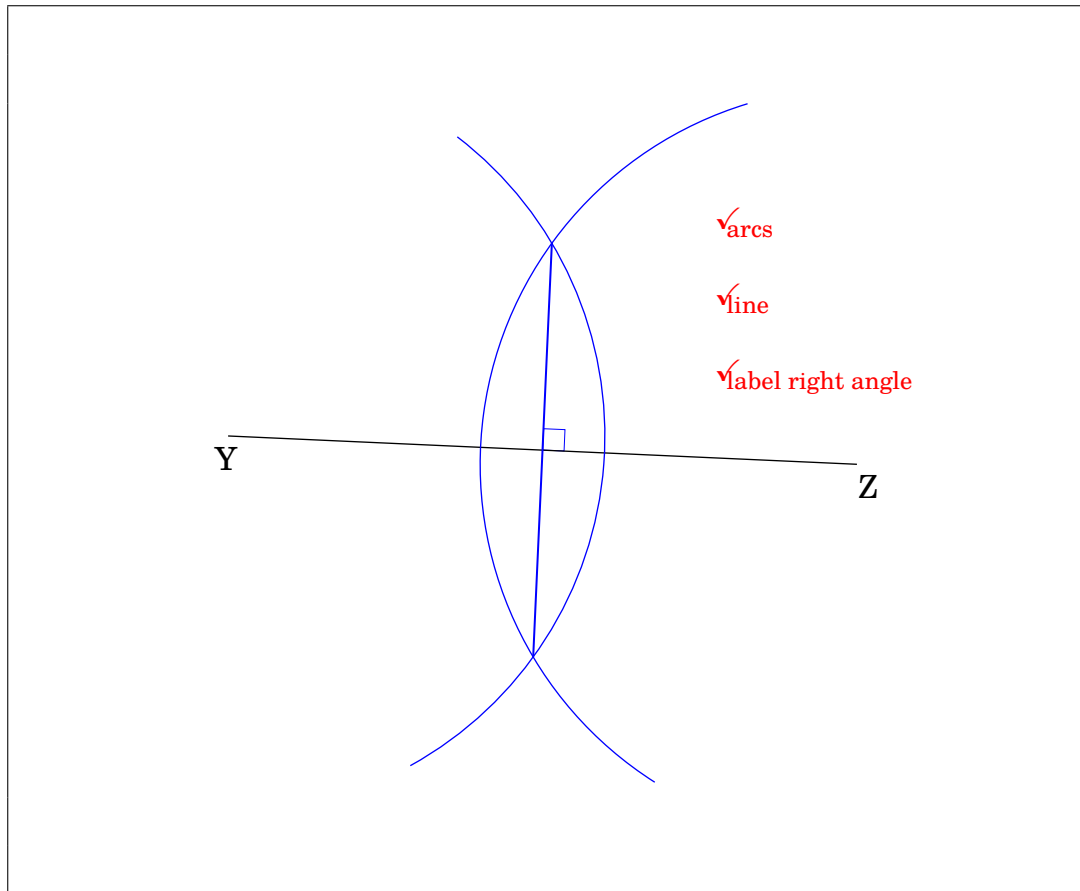
- 3.1 Construct triangle JKL with JK = 33 mm, KL = 56 mm and JL = 65 mm. (5)



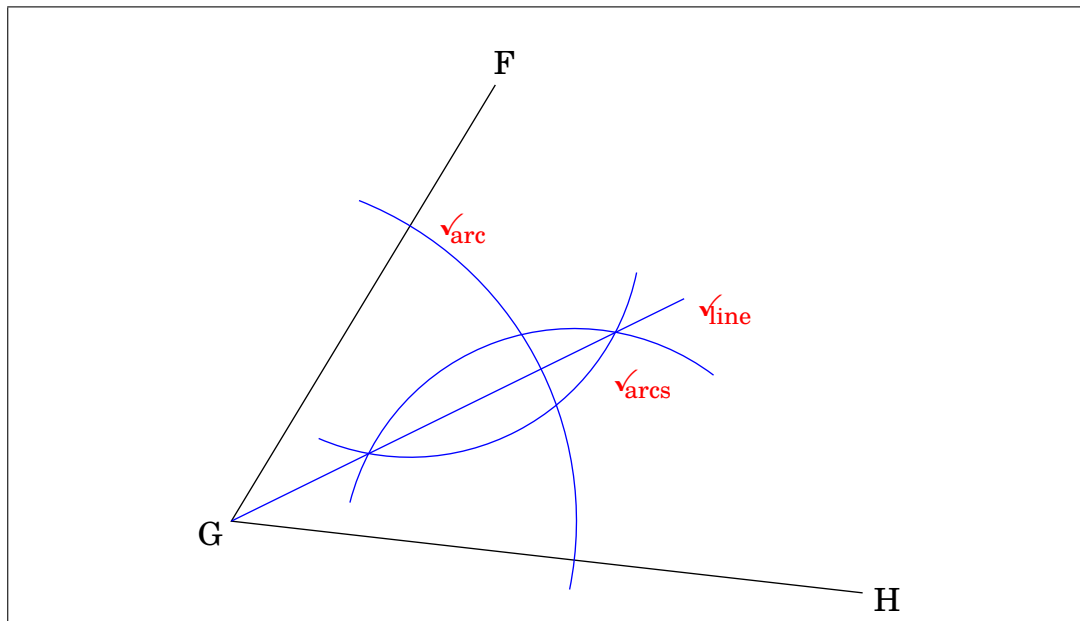
- 3.2 Using a protractor, measure angle \hat{K} in 3.1 and label the angle on the diagram above. (\hat{K} should equal 90° . Accept 89° to 91° .) (1)

3.3 Using only a compass and ruler, construct the perpendicular bisector of the line segment YZ shown below:

(3)



3.4 Without using a protractor, bisect the angle \widehat{FGH} below.



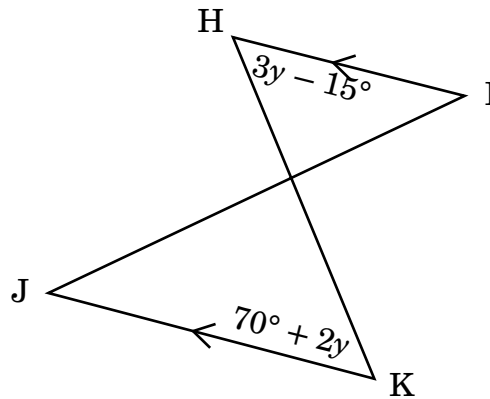
(3)

[12]

QUESTION 4

In each of the following questions, determine the value of the unknown variable. Remember to give reasons where necessary.

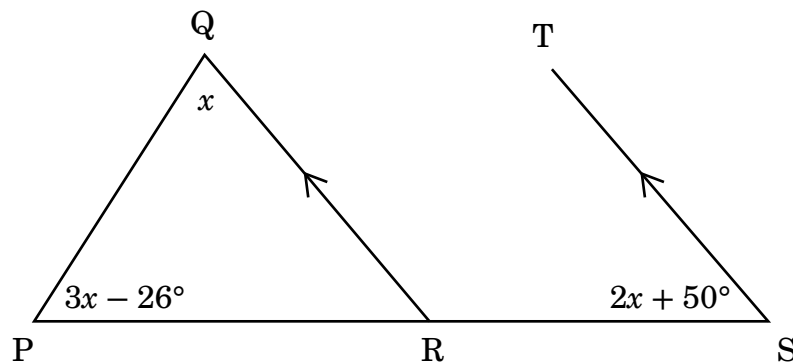
- 4.1 In the diagram below, it is given that $HI \parallel JK$. Solve for y .



(3)

$3y - 15^\circ = 70^\circ + 2y$ ✓ _{eqn} (alt \angle s, $HI \parallel JK$) ✓ _{reason}
$\therefore y = 85^\circ$ ✓ _{ans}

- 4.2 In the diagram below, $QR \parallel TS$. Solve for x .



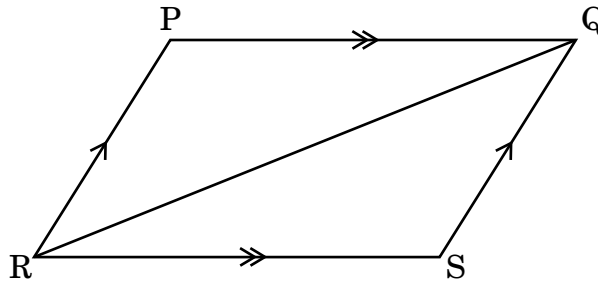
(5)

$\widehat{QRS} = x + 3x - 26^\circ$ (ext \angle of $\triangle QPR$) ✓ _{reason}
$= 4x - 26^\circ$ ✓
$4x - 26^\circ + 2x + 50^\circ = 180^\circ$ ✓ _{eqn} (co-int \angle s, $QR \parallel TS$) ✓ _{reason}
$\therefore 6x + 24^\circ = 180^\circ$
$\therefore 6x = 156^\circ$
$\therefore x = 26^\circ$ ✓

[8]

QUESTION 5

5.1 In quadrilateral PQSR shown below, $PQ \parallel RS$ and $PR \parallel QS$.

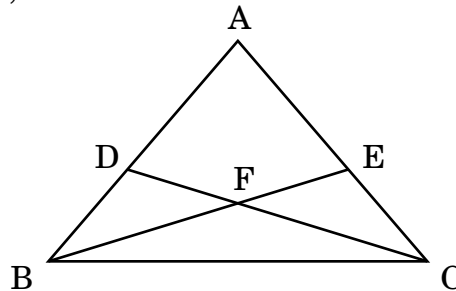


Using congruency, prove that $PQ = RS$ and $PR = QS$.

(5)

In $\triangle PQR$ and $\triangle SRQ$:	
1. $\hat{P}QR = \hat{S}RQ$	(alt \angle s, $PQ \parallel RS$) ✓with reason
2. $\hat{P}RQ = \hat{S}QR$	(alt \angle s, $PR \parallel QS$) ✓with reason
3. QR is common ✓	
$\therefore \triangle PQR \equiv \triangle SRQ$	(AAS) ✓with reason
$\therefore PQ = RS$ and $PR = QS$	(By congruency) ✓with reason

5.2 In the diagram below, $AB = AC$ and $\hat{B}DC = \hat{B}EC$.



5.2.1 Prove that $\triangle BDC \equiv \triangle CEB$.

(4)

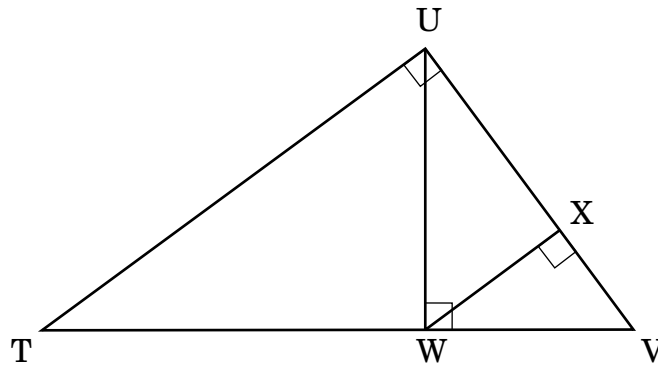
In $\triangle BDC$ and $\triangle CEB$:	
1. $\hat{B}DC = \hat{B}EC$	(Given) ✓with reason
2. $\hat{B} = \hat{C}$	(\angle s opp equal sides, $AB = AC$) ✓with reason
3. BC is common ✓	
$\therefore \triangle BDC \equiv \triangle CEB$	(AAS) ✓with reason

5.2.2 Hence prove that $BD = EC$.

(1)

$BD = EC$	(By congruency) ✓with reason

5.3 In the diagram below, right-angled $\triangle TUV$ has altitude UV , and $\triangle UWV$ has altitude WX .



5.3.1 Prove that $UT \parallel WX$. (1)

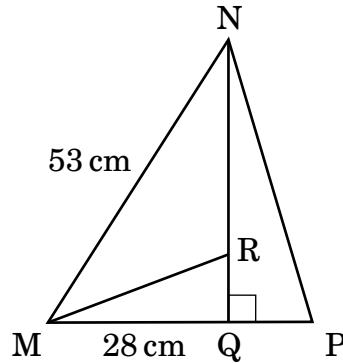
$UT \parallel WX$	(corres \angle s equal, $\hat{U} = \hat{WXV}$) ✓with reason

5.3.2 Hence or otherwise, prove that $\triangle TUV \parallel \triangle UXW$. (6)

Let $\hat{T} = x$ ✓m	
$\therefore \hat{V} = 90^\circ - x$	(\angle sum in $\triangle TUV$)
$\therefore \hat{WUV} = x$	(\angle sum in $\triangle WUV$)
$\therefore \hat{UWX} = 90^\circ - x$	(\angle sum in $\triangle WUX$) ✓
In $\triangle TUV$ and $\triangle UXW$:	
1. $\hat{T} = \hat{WUV} = x$	✓with working (above)
2. $\hat{V} = \hat{UWX} = 90^\circ - x$	✓with working (above)
3. $\hat{U} = \hat{UXW}$	(Given) ✓
$\therefore \triangle TUV \parallel \triangle UXW$	(AAA) ✓with reason

QUESTION 6

- 6.1 In $\triangle MNP$ below, $MN = 53$ cm, $QM = 28$ cm, and QN is an altitude of the triangle.



- 6.1.1 Determine the length of NQ . (3)

$53^2 = NQ^2 + 28^2$ ✓ (Pythag) ✓
$\therefore NQ^2 = 53^2 - 28^2$
$\therefore NQ^2 = 2025$
$\therefore NQ = 45$ cm ✓ ignore units

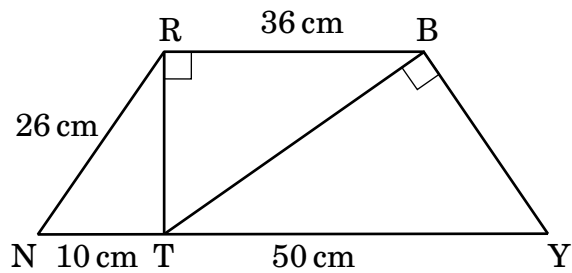
- 6.1.2 If RN is four times the length of QR , find the length of QR . (2)

$45 \div (4 + 1) = 9$ cm ✓ ans ✓ units

- 6.1.3 Determine the length of MR . Round your answer off to two decimal places if necessary. (3)

$MR^2 = 9^2 + 28^2$ ✓ (Pythag) ✓
$\therefore MR^2 = 865$
$\therefore MR = 29.41$ cm ✓ ign units

6.2 In quadrilateral RBYN, $RB \parallel NY$, $RT \perp RB$ and $TB \perp BY$.



6.2.1 Give, with a reason, the magnitude of angle \widehat{NTR} . (1)

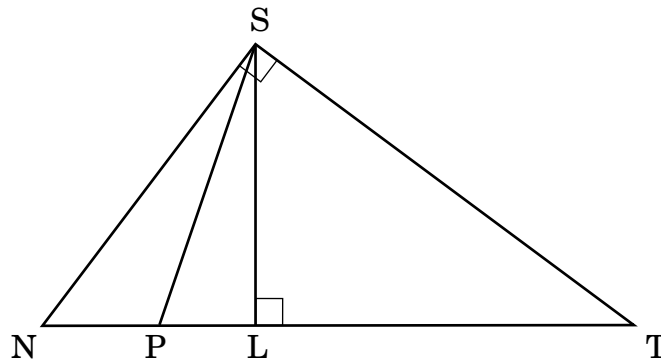
$\widehat{NTR} = 90^\circ$	(co-int \angle s, $RB \parallel NY$) ✓ with reason
----------------------------	---

6.2.2 Determine the length of BY. Round your final answer off to two decimal places. (6)

$RT^2 = 26^2 - 10^2$ ✓	(Pythag)
$\therefore RT^2 = 576$ ✓	
$BT^2 = RT^2 + RB^2$ ✓	(Pythag)
$BT^2 = 576 + 36^2$	
$\therefore BT^2 = 1872$ ✓	
$BY^2 = TY^2 - BT^2$ ✓	(Pythag)
$\therefore BY^2 = 50^2 - 1872$	
$\therefore BY^2 = 628$	
$\therefore BY = 25.06 \text{ cm}$ ✓	
OR:	
$RT^2 = 576$	(Pythag)
Drop perpendicular from B to Z on NY.	
$BZ = 24$ and $ZY = 14$	
$BY^2 = 24^2 + 14^2$	(Pythag)
$\therefore BY = 27.78 \text{ cm}$	

QUESTION 7

In the diagram below, $ST = PT$, $SL \perp NT$, and $NS \perp ST$.



You have been asked to prove that SP bisects the angle \widehat{NSL} by completing the partial proof given below. Fill in all missing steps, indicated by the dotted lines. (5)

To prove: SP bisects \widehat{NSL}

Let $\widehat{SPT} = x$

$\therefore \widehat{PST} = x$ (\angle s opp equal sides, $ST = PT$) ✓

$\widehat{SLP} = 90^\circ$ ✓ (Given)

$\therefore \widehat{PSL} = 90^\circ - x$ ✓ (\angle sum in $\triangle PSL$) ✓

$\widehat{NSP} = 90^\circ - x$ ✓ (Given $NS \perp ST$)

$\therefore \widehat{NSP} = \widehat{PSL}$

$\therefore SP$ bisects \widehat{NSL}

[5]

TOTAL: 75

PolyMathic

Paper 3

May/June

Algebra and
Geometry

(Q1: Combined)

(Q2 - Q5: Algebra)

(Q6 - Q9: Geometry)

PolyMathic

QUESTION 1

MULTIPLE-CHOICE QUESTIONS

1.1 The prime factors of 30 are ...

- A 1; 2; 3; 5; 12.
- B 3; 5; 6.
- C 2; 3; 5.
- D None of the above. (1)

1.2 The number 0,000147560 in scientific notation is ...

- A $0,14756 \times 10^{-3}$
- B $1,4756 \times 10^{-4}$
- C $1,4756 \times 10^4$
- D $0,14756 \times 10^{-5}$ (1)

1.3 $1\frac{3}{4} + 1\frac{4}{5} =$

- A $3\frac{11}{20}$.
- B $2\frac{7}{9}$.
- C $2\frac{7}{20}$.
- D $3\frac{7}{9}$. (1)

1.4 0,034297 correctly rounded-off to 4 decimals is ...

- A 0,0342.
- B 0,3430.
- C 0,0343.
- D 0,034. (1)

1.5 Which number is both a square **and** a cube?

- A 64
- B 16
- C 8
- D 4 (1)

1.6 Which number is missing in the sequence: $1; \frac{1}{2}; \frac{1}{4}; \dots; \frac{1}{16}$?

- A $\frac{1}{8}$
- B $\frac{1}{10}$
- C $\frac{1}{12}$
- D $\frac{1}{14}$

(1)

1.7 $(x-2)^2 =$

- A $x^2 - 4$.
- B $x^2 - 4x + 4$.
- C $x^2 + 4$.
- D $x^2 + 4x + 4$.

(1)

1.8 If $3(x-1)(x+2) = 0$; then $x =$

- A -1 or 2 .
- B 1 or -2 .
- C 3 or 1 or 2 .
- D 2 or 1 .

(1)

1.9 The factors of $x^2 + 5x - 6$ are ...

- A $(x-3)(x-2)$.
- B $(x+2)(x+3)$.
- C $(x+6)(x-1)$.
- D $(x-3)(x-2)$.

(1)

1.10 The area of a rectangular figure is 200 m^2 . If the length is doubled, the new area will be ...

- A 300 m^2 .
- B 400 m^2 .
- C 200 m^2 .
- D 600 m^2 .

(1)

[10]

QUESTION 2

- 2.1 Calculate the value of $3x^3 - 2x^2 - 9x + 2$ if $x = -2$. (2)
- 2.2 Simplify the following expressions. (Leave your answer in its positive exponential form.)
- 2.2.1 $3xy^2 - 5x^2y - 9xy^2 + 8x^2y - 3x^2$ (2)
- 2.2.2 $2^{x+y} \cdot 2^{x-y}$ (1)
- 2.2.3 $\frac{-2pq \times (2p^2q^3)^2}{32p^6q^7}$ (3)
- 2.2.4 $(2x-4)(2x+4)$ (2)
- 2.2.5 $\frac{2m+4}{m-3} \times \frac{m^2-3m+2}{m^2-4}$ (4)
- 2.3 Simplify the following without using a calculator. (Leave your answer in scientific notation.)
- $3,4 \times 10^{-3} + 5,8 \times 10^{-5}$ (2)
- 2.4 Solve for x .
- 2.4.1 $8x + 3 = 3x - 22$ (2)
- 2.4.2 $x - \frac{x-1}{2} = 3$ (3)
- 2.4.3 $2^x = 16$ (2)
- 2.5 Factorise fully.
- 2.5.1 $3a^3 - 9a^2 + 6a$ (4)
- 2.5.2 $9x^2 - y^2$ (2)
- 2.5.3 $t^2(x-y) - w^2(y-x)$ (2)

QUESTION 3

Nomvula and Sam decided to apply for motor vehicle finance to buy a car for the amount of R 150 000, 00. The loan is payable over 5 years at 9 % compound interest per annum.

- 3.1 Use the formula on ANNEXURE A to calculate the total amount payable at the end of the 5 years. (3)
- 3.2 Calculate the monthly instalments that will be paid. (3)
- 3.3 The previous owner bought the car for R 120 000,00 and sold it for R 150 000,00. Calculate the percentage profit made by the owner. (3)
- [9]

QUESTION 4

It takes the Gautrain 2 hours to travel a certain distance at an average speed of 150 km/h. The following table shows other options as well:

Average speed (km/h)	<i>a</i>	150	300	<i>c</i>
Time travelled in hours	4	2	<i>b</i>	$2\frac{1}{2}$

- 4.1 Determine **a**, **b** and **c** by showing all calculations. (6)
- 4.2 Plot the graph using the table and answers from Question 4.1. Use ANSWER SHEET B to answer this question. (4)
- 4.3 By using the graph that you have drawn for Question 4.2, determine how long it will take to cover the distance at an average speed of 100 km/h. (2)
- [12]

QUESTION 5

The following patterns are constructed by laying out matches in a pattern. Study the diagram below to answer the questions that follow.

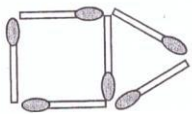


Figure 1

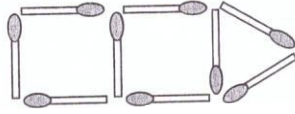


Figure 2

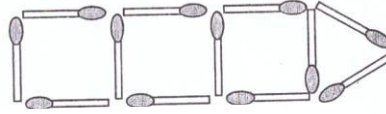
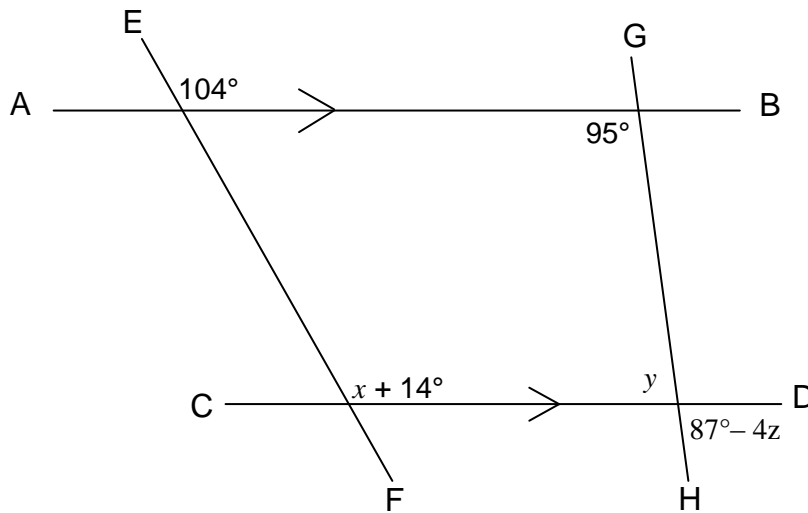


Figure 3

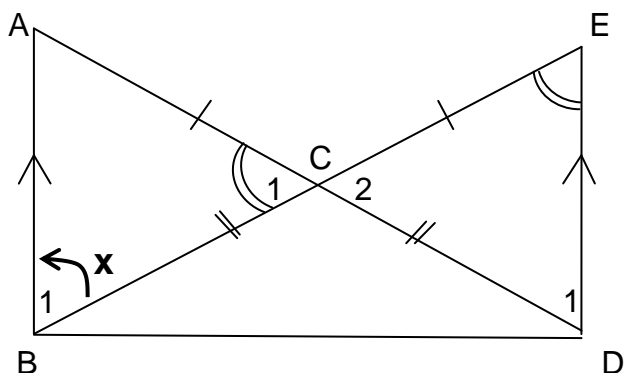
- 5.1 Determine the number of matchsticks in the next figure if the pattern is continued. (1)
 - 5.2 Describe the pattern rule in your own words. (1)
 - 5.3 Write the general term of the pattern in the form $T_n =$. (2)
 - 5.4 Use your answer to Question 5.3 to determine the number of matchsticks in the 20th figure. (2)
- [6]**

QUESTION 6



- 6.1 Calculate y . (3)
 - 6.2 Calculate x . (3)
 - 6.3 Construct a special angle of 30° without using a protractor. (3)
- [9]**

QUESTION 7



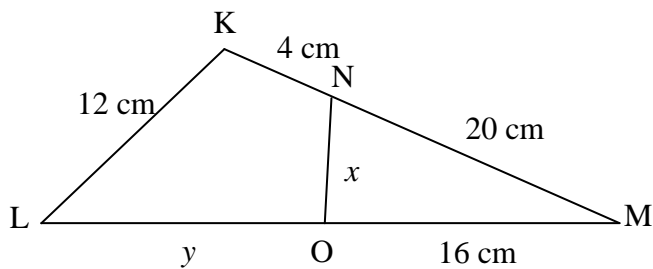
In the given figure $AB \parallel ED$, $AC = CE$, $BC = CD$, $\hat{C}_1 = 60^\circ$ and $\hat{C}_1 = \hat{E}$.

7.1 Prove, with reasons, that $\triangle ABC \equiv \triangle EDC$. (4)

7.2 Calculate x . (3)
[7]

QUESTION 8

In the diagram below it is proven that $\triangle KLM \parallel \parallel \triangle ONM$.

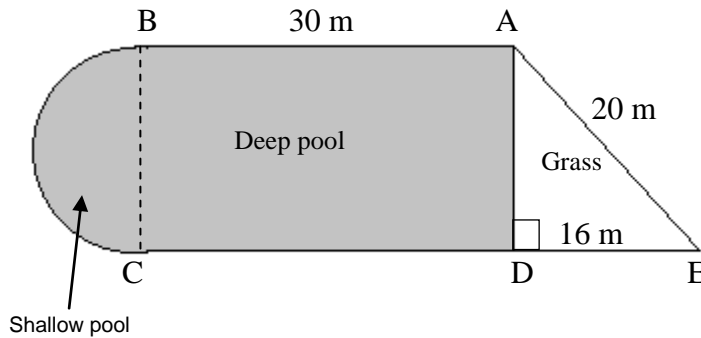


8.1 Calculate the length of NO (x). (2)

8.2 Calculate the length of LO (y). (3)
[5]

QUESTION 9

Refer to ANNEXURE A for formulae to answer this question.



Study the diagram above of the entertainment area at a family resort. The grey area is made up of a shallow children's pool and a deep adults' pool. There is a triangular-shaped grass area, where visitors can relax. The dimensions of the space are as follows:

AB is 30 m, AE is 20 m, EC is 46 m and AD is perpendicular to EC.

- 9.1 Calculate the width of the entire swimming pool (AD). (2)
- 9.2 Determine the area of the entire pool if the width is given as 12 m. (4)
- 9.3 Determine the perimeter of the entire entertainment area.
(Make use of the width as stated in Question 9.2.) (5)
- [11]

TOTAL: 100

ANNEXURE A

QUESTION 3.1

$$A = P(1 + i)^n \quad \text{or} \quad A = P \left(1 + \frac{r}{100} \right)^n$$

QUESTION 9

Full circle:

$$\text{Area} = \pi r^2$$

$$\text{Perimeter} = 2\pi r$$

$$\pi = 3,14$$

Rectangle:

$$\text{Area} = l \times b$$

$$\text{Perimeter} = 2(l + b)$$

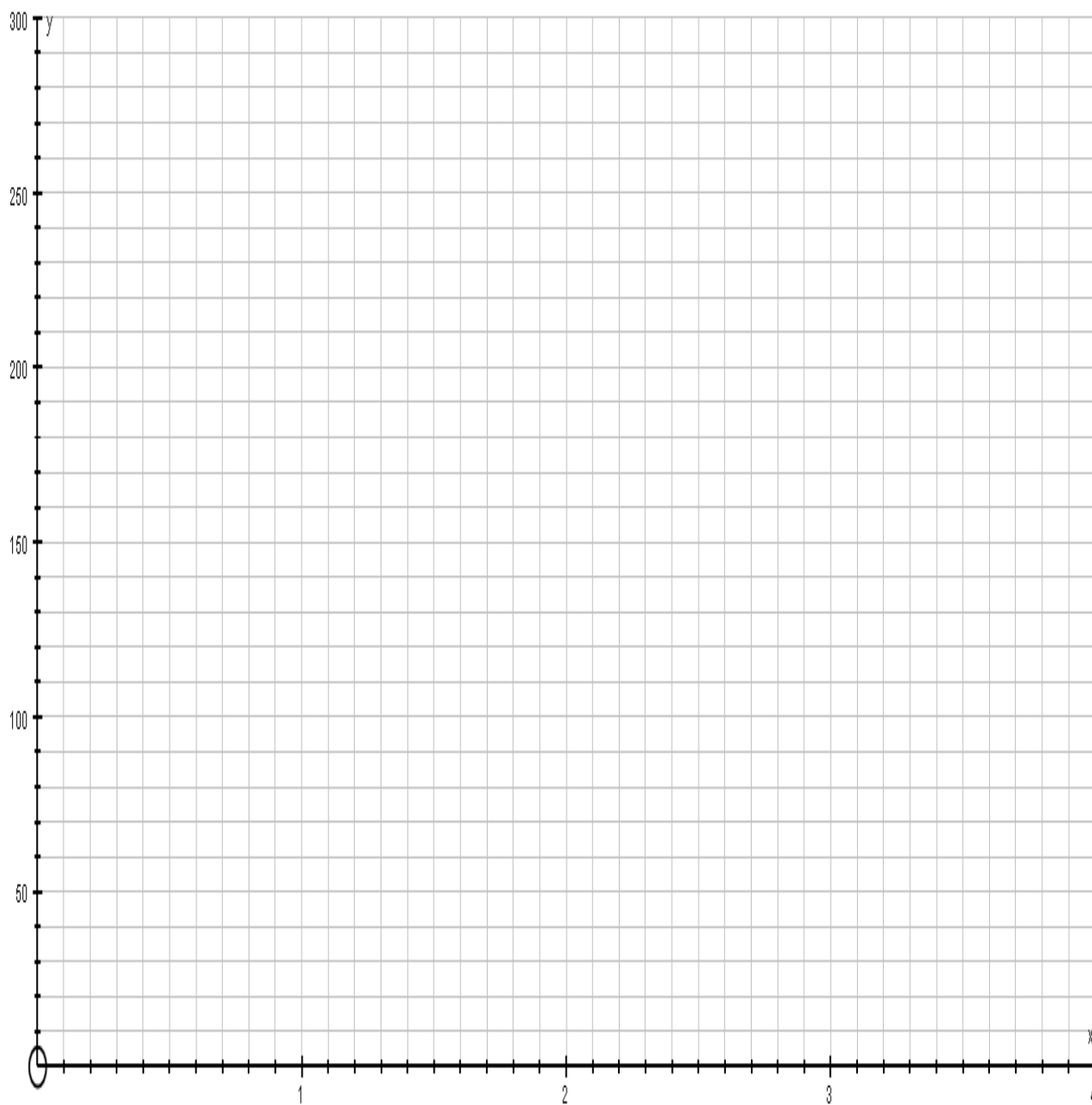
Triangle:

$$\text{Area} = \frac{1}{2} b \times h$$

$$\text{Perimeter} = \text{Side}_1 + \text{Side}_2 + \text{Side}_3$$

ANSWER SHEET B

QUESTION 4



Memo

QUESTION / VRAAG 1

- 1.1. C
- 1.2. B
- 1.3. A
- 1.4. C
- 1.5. A
- 1.6. A
- 1.7. B
- 1.8. B
- 1.9. C
- 1.10. B

1 Mark per correct answer

1 Punt per korrekte antwoord

(1)

QUESTION / VRAAG 2

2.1 $3x^3 - 2x^2 - 9x + 2$
 $= 3(-2)^3 - 2(-2)^2 - 9(-2) + 2$
 $= 3(-8) - 2(4) + 18 + 2$
 $= -24 - 8 + 18 + 2$
 $= -12$

1 Substitution / *Substitusie*
1 Answer / *Antwoord*

(2)

2.2

2.2.1. $3xy^2 - 5x^2y - 9xy^2 + 8x^2y - 3x^2$
 $= -6xy^2 + 3x^2y - 3x^2$

1 Adding / *Optel*
 $= 6xy^2$
1 Adding / *Optel*
 $3x^2 - 3x^2$

(2)

2.2.2 $2^{x+y} \times 2^{x-y}$
 $= 2^{x+y+x-y}$
 $= 2^{2x}$

1 Answer / *Antwoord*

(1)

$$\begin{aligned}
2.2.3 \quad & \frac{-2pq \times (2p^2q^3)^2}{32p^6q^7} \\
& = \frac{-2pq \times 4p^4q^6}{32p^6q^7} \\
& = \frac{-8p^5q^7}{32p^6q^7} \\
& = -\frac{1}{4p}
\end{aligned}$$

1 Multiplying with exponents into brackets

1 Law of Exponents / *Maal magte*

1 Answer / *Antwoord*

(3)

$$\begin{aligned}
2.2.4 \quad & (2x - 4)(2x + 4) \\
& = 4x^2 - 16
\end{aligned}$$

1 Answer / *Antwoord* $4x^2$

1 Answer / *Antwoord* -16

(2)

$$\begin{aligned}
2.3 \quad & 3,4 \times 10^{-3} + 5,8 \times 10^{-5} \\
& = 3,4 \times 10^{-3} + 0,058 \times 10^{-3} \\
& = 3,458 \times 10^{-3}
\end{aligned}$$

1 for / *vir* $0,058 \times 10^{-3}$

1 for / *vir* $\times 10^{-3}$

or / of

$$\begin{aligned}
& 3,4 \times 10^{-3} + 5,8 \times 10^{-5} \\
& = 340 \times 10^{-5} + 5,8 \times 10^{-5} \\
& = 345,8 \times 10^{-5} \\
& = 3,458 \times 10^{-3}
\end{aligned}$$

1 for / *vir* 340×10^{-5}

1 for / *vir* $3,458 \times 10^{-3}$

(2)

2.4

$$\begin{aligned}
2.4.1 \quad & 8x + 3 = 3x - 22 \\
& 8x - 3x = -22 - 3 \\
& 5x = -25 \\
& x = -5
\end{aligned}$$

1 Simplify / *Vereenvoudig*

$5x = -25$

1 Answer / *Antwoord*

No mark = 5 / *Geen punte* = 5

(2)

$$\begin{aligned}
2.4.2 \quad & x - \frac{x-1}{2} = 3 \\
& 2x - (x-1) = 6 \\
& 2x - x + 1 = 6 \\
& x = 5
\end{aligned}$$

1 Multiply entire equation by 2 / *Vermenigvuldiging met 2*

1 for / *vir* $-x + 1$

1 Answer / *Antwoord*

(3)

$$\begin{aligned}
2.4.3 \quad & 2^x = 16 \\
& 2^x = 2^4 \\
& x = 4
\end{aligned}$$

1 for / *vir* 2^4

1 Answer / *Antwoord*

(2)

QUESTION / VRAAG 3

3.1 $A = P(1 + i)^n$

$$A = 150000 \left(1 + \frac{9}{100}\right)^5$$

$$A = R230\,793,59$$

OR

$$A = P(1 + i)^n$$

$$A = 150\,000(1 + 0,009)^5$$

$$A = R230\,793,59$$

1 Substitution of 150 000/Substitusie van 150 000

1 Substitution $\left(1 + \frac{9}{100}\right)^5$

/ Substitusie $\left(1 + \frac{9}{100}\right)^5$

1 Answer / Antwoord

(3)

3.2 $\frac{R230\,793,59}{60} = R3\,846,56$

CA from 3.1

1 for / vir **R230 793,59**

1 for / vir 60 maande / months

1 Answer / Antwoord

(3)

3.3 $\frac{R150\,000 - R120\,000}{R120\,000} \times 100\%$
 $= \frac{R30\,000}{R120\,000} \times 100\%$
 $= 25\%$

1 for / vir R30 000

1 for / vir 100%

1 Answer / Antwoord

(3)

QUESTION / VRAAG 4

4.1 a - $\frac{300}{4} = 75\text{km/h}$

$S = \frac{\text{distance}}{\text{time}}$ 1 Substitution / $S = \frac{\text{Afstand}}{\text{Tyd}}$ Substitusie

1 Answer / Antwoord

b - $300 \times b = 300$
 $b = 1$

$T = \frac{\text{distance}}{\text{speed}}$ 1 Substitution / $T = \frac{\text{afstand}}{\text{spoed}}$ Substitusie

1 Answer / Antwoord

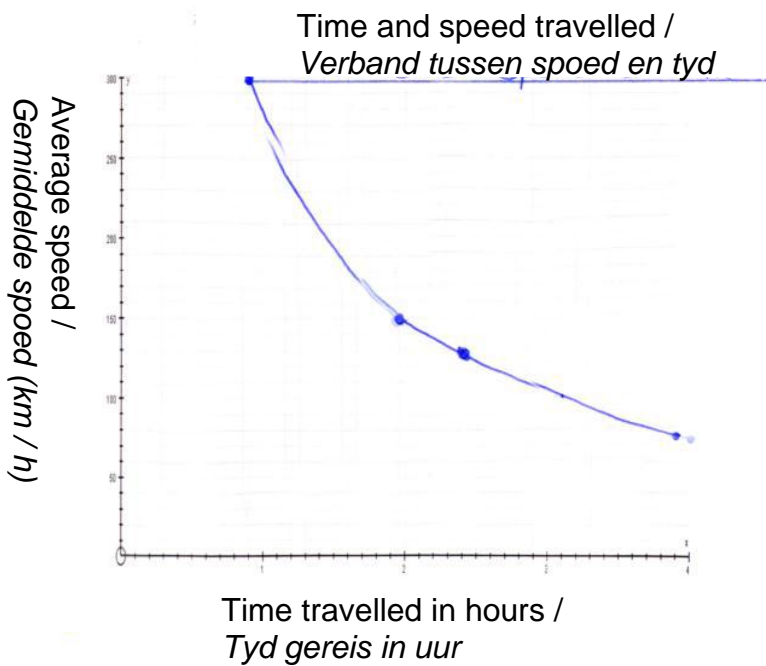
c - $\frac{300}{2,5} = 120\text{km/h}$

1 Substitution / Substitusie

1 Answer / Antwoord

(6)

4.2



CA from 4.1

1 Benoeming van Asse /

Labelling of Axes

1 Plot van punte / Plotting

1 Connect points / Verbind punte

1 Heading / Opskrif

(4)

4.3 3 hours / uur

CA from 4.2.

2 Answers / Antwoorde

(2)

QUESTION / VRAAG 5

5.1 15 matchsticks / vuurhoutjies.

1 Answer / Antwoord

(1)

5.2 Add 3 with every term that follows. / Plus 3 by elke volgende term

1 Explanation / Verduideliking

(1)

5.3 $T_1 = 3(1) + 3 = 6$
 $T_2 = 3(2) + 3 = 9$
 $T_3 = 3(3) + 3 = 12$
 $\therefore T_n = 3n + 3$

1 for / vir **3n**

1 for / vir **+3**

(2)

5.4 $T_{20} = 3(20) + 3$
 $T_{20} = 60 + 3$
 $T_{20} = 63$ matchsticks / *vuurhoutjies*

CA from 5.3.
 1 Substitution / *Substitusie*
 1 Answer / *Antwoord*

(2)

QUESTION / VRAAG 6

6.1 $95^\circ + y = 180^\circ$ CO-interior angles (AB // CD) /
 $y = 85^\circ$ KO-binne hoeke (AB // CD)

1 Statement / *Uitdrukking*
 1 Answer / *Antwoord*
 1 Reason and parallel lines /
Rede en ewewydige lyne

OR

Alternative Mathematical methods (3)

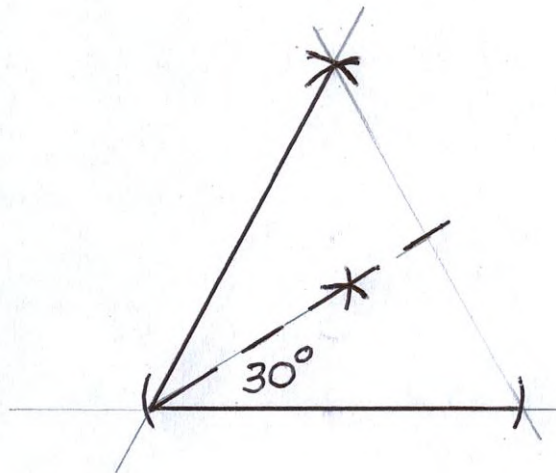
6.2 $x + 14^\circ = 104^\circ$ Corresponding angles (AB // CD) /
 $x = 90^\circ$ Ooreenkomstige hoeke (AB // CD)

1 Statement / *Uitdrukking*
 1 Answer / *Antwoord*
 1 Reason and parallel lines /
Rede en ewewydige lyne

OR

Alternative Mathematical Methods (3)

6.3



1 Construct 60° angle/
Skets van 60° hoek
 1 Bisect the 60° angle/
Deel van 60° hoek
 1 Measurement of the 30° angle/
Meting van 30° hoek

OR

Alternative Mathematical Methods
 (except with a protractor)

(3)

QUESTION / VRAAG 8

$$8.1 \quad \frac{KM}{MO} = \frac{KL}{NO} = \frac{LM}{NM}$$

$$\frac{24}{16} = \frac{12}{x} = \frac{y+16}{20}$$

$$\frac{24}{16} = \frac{12}{x}$$

$$192 = 24x$$

$$x = 8\text{cm}$$

1 Multiply / *Vermenigvuldig*
 $192 = 24x$

1 Answer / *Antwoord*
 $x=8$

(2)

$$8.2 \quad \frac{24}{16} = \frac{y+16}{20}$$

$$480 = 16(y+16)$$

$$480 = 16y + 256$$

$$224 = 16y$$

$$14\text{cm} = y$$

1 Substitution / *Substitusie*
 $\frac{24}{16} = \frac{y+16}{20}$

1 Multiply / *Vermenigvuldig*
 $224 = 16y$

1 Answer / *Antwoord*
 $x = 14$

(3)

QUESTION / VRAAG 9

$$9.1 \quad \text{Pythagoras} \quad 20^2 - 16^2 = (AD)^2$$

$$400 - 256 = (AD)^2$$

$$\sqrt{144} = AD$$

$$12\text{m} = AD$$

1 Substitution / *Substitusie*
 1 Answer / *Antwoord*

(2)

$$9.2 \quad \text{Oppv reghoek / Area rectangle} = l \times b$$

$$= 12 \text{ m} \times 30 \text{ m}$$

$$= 360 \text{ m}^2$$

CA from 9.1

1 Answer / *Antwoord* 360 m²
 Do not penalise for units

$$\text{Oppv semi sirkel / Area semi circle} = \frac{\pi r^2}{2}$$

$$= \frac{3,14(6)^2}{2}$$

$$= 56,52 \text{ m}^2$$

1 Radius
 1 Answer / *Antwoord* 56,52m²

$$360 \text{ m}^2 + 56,52 \text{ m}^2 = 416,52 \text{ m}^2$$

1 Answer / *Antwoord* 416,52 m²
 Do not penalise for units

(4)

$$\begin{aligned}
 9.3 \quad \text{Omtrek/ Perimeter} &= \frac{2\pi r}{2} + 30 + 30 + 20 + 16 \\
 &= \frac{2(3,14)(6)}{2} + 30 + 30 + 20 + 16 \\
 &= 18,84 + 96 \\
 &= 114,84 \text{ m}
 \end{aligned}$$

CA from 9.1.

1 Adding / *Optel*

1 for dividing by 2/

Vir deel met 2

1 Simplify / *Vereenvoudig*

1 Answer / *Antwoord*

1 for unit / *vir eenheid*

(5)

PolyMathic

Paper 4

May/June

Algebra and
Geometry

(Q1: Combined)

(Q2 - Q4: Algebra)

(Q5 + Q6: Geometry)

PolyMathic

SECTION A

QUESTION 1

1.1 Which one of the following is a rational number?

A $\sqrt{39}$

B $\sqrt{16}$

C $\sqrt{-9}$

D $\sqrt{15}$

(1)

1.2 The ... of 64 is 8.

A Irrational number

B Square root

C Cube root

D Integer

(1)

1.3 If $\frac{2x}{3} = -2$, then $x =$

A 9.

B -3.

C 6.

D -4.

(1)

1.4 Which one of the following options is NOT a property of congruency?

A S, <, S

B S, S, S

C <, <, <

D 90° , H, S

(1)

1.5 The following numbers are written in scientific notation.

$$2,4 \times 10^{-2} \quad -2,4 \times 10^2 \quad 5,6 \times 10^{-3} \quad 3,4 \times 10^1$$

Which one of the following is arranged in ascending order?

- A $-2,4 \times 10^2$ $2,4 \times 10^{-2}$ $3,4 \times 10^1$ $5,6 \times 10^{-3}$
B $2,4 \times 10^{-2}$ $-2,4 \times 10^2$ $5,6 \times 10^{-3}$ $3,4 \times 10^1$
C $2,4 \times 10^{-2}$ $-2,4 \times 10^2$ $3,4 \times 10^1$ $5,6 \times 10^{-3}$
D $-2,4 \times 10^2$ $5,6 \times 10^{-3}$ $2,4 \times 10^{-2}$ $3,4 \times 10^1$ (1)

1.6 It takes 9 men 8 days to paint a big wall. How long will it take 6 men to paint the same wall?

- A 7 days
B 4 days
C 12 days
D 3 days (1)

1.7 Evaluate $(-3xy^2)^2$

- A $-6x^2y^2$
B $-9x^2y^2$
C $9x^2y^4$
D $6x^2y^2$ (1)

1.8 Study the pattern below and determine the terms represented by m and n :

$$2; 5; 8; m; \dots; 17; n; \dots$$

- A $m = 10; n = 13$
B $m = 11; n = 21$
C $m = -9; n = 20$
D $m = 11; n = 20$ (1)

1.9 Simplify: $(x - 2)^2 =$

A $x^2 - 4.$

B $x^2 - 2x + 4.$

C $x^2 + 4.$

D $x^2 - 4x + 4.$

(1)

1.10 An exterior angle of a triangle is equal to ...

A the sum of the two interior opposite angles.

B the difference of the two interior angles.

C the product of the two interior angles.

D the sum of all the angles of a triangle.

(1)

[10]

SECTION B

QUESTION 2

2.1 Simplify and leave your answers with positive exponents where possible.

2.1.1 $-a^2b + 3ab^2 + 2a^2b - 4ab^2$

(1)

2.1.2 $2(x + y) + 4(3x - 2y) - 4(2x - 3y)$

(2)

2.1.3 $\frac{(2a^2b^3)^2(2a^{-2}b)^3}{4a^6b^{-1}}$

(4)

2.1.4 $3\sqrt{\frac{-27x^3}{64}}$

(2)

2.2 Solve for x by solving the following exponents.

2.2.1 $5(x - 2) = 3x - 4$

(3)

2.2.2 $3^{x-1} = 81$

(3)

2.2.3 $\frac{x}{3} + \frac{x}{4} = 1$

(3)

2.3 Determine the value of $x^2 - (2xy)^3$ if $x = -1$ and $y = 2$.

(3)

[21]

QUESTION 3

3.1 A top of the range TV costs R50 000. The dealer offers you two payment options.

Option 1: 20% deposit and the balance paid back over 36 months (3 years) at 12% simple interest per annum.

Option 2: No deposit, but the product needs to be paid-off over 42 months (3½ years) at 9% compound interest per annum.

3.1.1 Calculate the deposit amount, if option 1 is chosen. (2)

3.1.2 Calculate the total amount that you will pay on the TV after the 36 months (3 years) if you choose option 1. (Include the deposit.) (4)

3.1.3 Calculate the total amount that you will pay for the TV if you choose option 2. (4)

3.1.4 Which option will you choose, and why? (2)

3.2 The exchange rate of the Rand (R) to the Singapore Dollar (S\$) is R1 : S\$ 0,1923.

3.2.1 Calculate the Rand value that you will receive for S\$ 1. (1)

3.2.2 Calculate

(a) S\$ 550 in Rands. (2)

(b) the number of DVDs that you will be able to buy at R100 if you have S\$ 550 spend. (2)

[17]

QUESTION 4

Examine the table below and answer the questions that follow.

N	1	2	3	4	5	6
T_n	10,25	10,5	10,75	11	11,25	

4.1 Determine the 6th term in the pattern. (2)

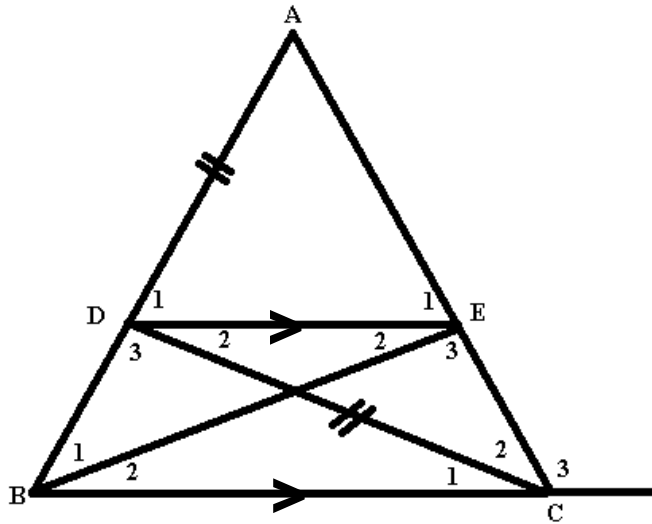
4.2 Write down the rule for the above sequence in your own words. (2)

4.3 If $T_n = 25$, calculate the value of n using the rule $T_n = 0,25n + 10$. (3)

[7]

QUESTION 5

5.1 Study the diagram below and answer the questions that follow.



Given: $AD=DC$; $DE//BC$

$$\hat{D}_2 = 20^\circ \text{ and } \hat{B}_1 + \hat{B}_2 = 68^\circ$$

Determine with reasons, the sizes of the following angles as indicated in the diagram.

5.1.1 \hat{C}_1 (2)

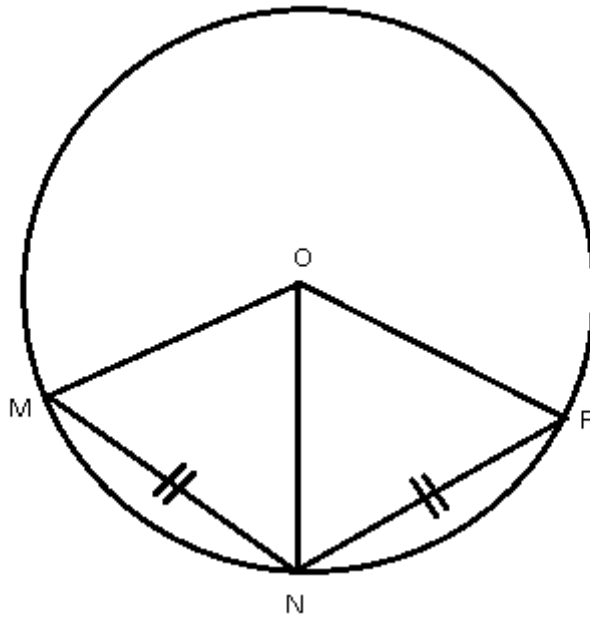
5.1.2 \hat{D}_3 (2)

5.1.3 \hat{ADC} (2)

5.1.4 \hat{C}_3 (3)

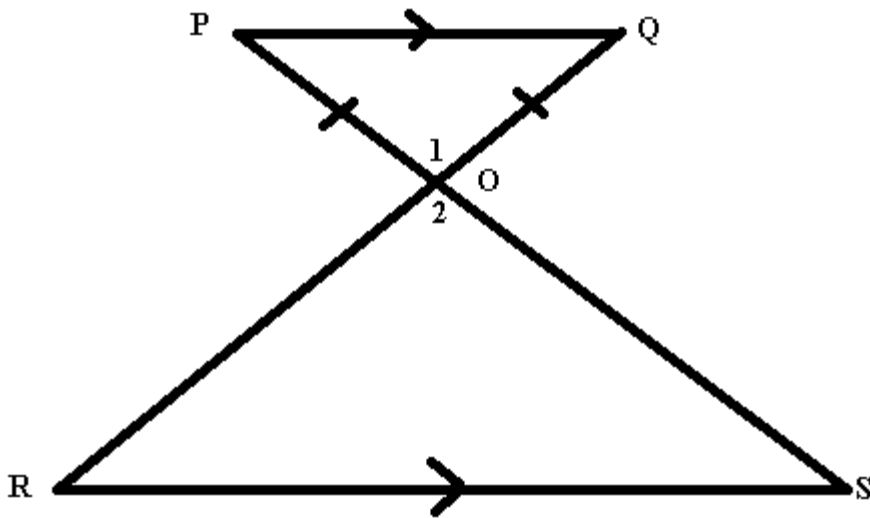
5.2 Given: Circle with centre O and $MN = NP$ in the diagram below.
 Prove with reason that $\triangle MNO \cong \triangle PNO$.

(4)

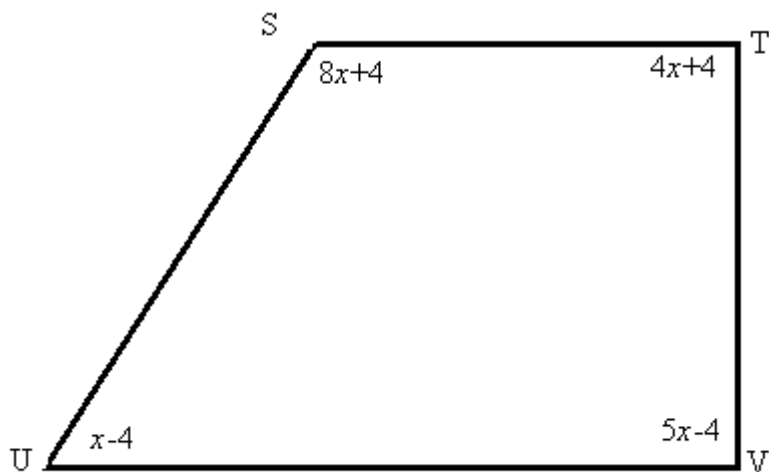


5.3 In the diagram below OPQ is a triangle with $OP = OQ$, $PQ \parallel RS$ and $\hat{O}_1 = 74^\circ$
 Prove with reasons that $\triangle OPQ \cong \triangle OSR$.

(4)



5.4 In the diagram below, STVU is a quadrilateral with angles in terms of x .



5.4.1 Calculate, with reasons the value for x . (4)

5.4.2 If $x = 20^\circ$, prove with reasons that $ST \parallel UV$. (4)

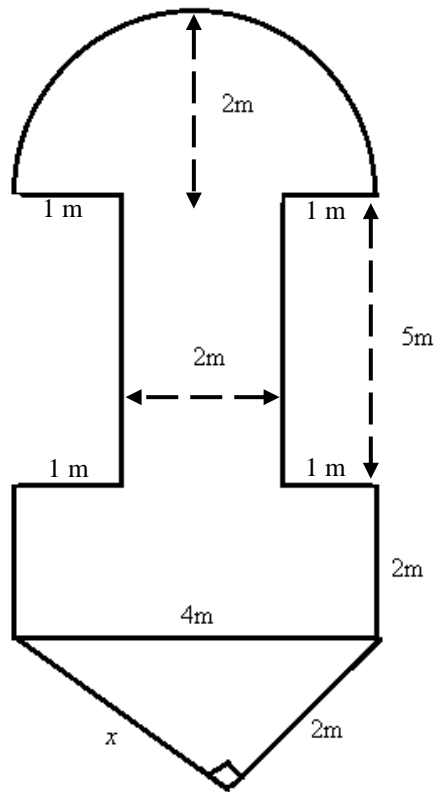
5.5 Draw an equilateral triangle with sides of 5 cm without using a protractor. (3)

[28]

QUESTION 6

Lucas Potgieter High School is hosting their annual Mr and Miss Pottie pageant, where they crown the prettiest and most handsome students in the school.

The diagram below is a top view of the ramp that they will be using to show off their looks and abilities. (Please note that the diagram is NOT drawn to scale.)



USE: $\pi = 3,14$

- 6.1 Calculate, using the Theorem of Pythagoras, the length of x . (3)
- 6.2 Calculate the perimeter of the entire ramp in metres. (6)
- 6.3 Calculate the total area (top view) of the ramp. (8)

[17]

TOTAL: 100

FORMULA SHEET

Simple Interest: $I = \frac{Prn}{100}$ $A = P(1 + in)$ $A = P\left(1 + \frac{rn}{100}\right)$	Compound Interest: $A = P(1 + i)^n$ $A = P\left(1 + \frac{r}{100}\right)^n$
--	--

	Perimeter	Area
Rectangle	$2(l + b)$	$l \times b$
Circle	$2\pi r$	πr^2
Triangle	$(s1 + s2 + s3)$	$\frac{1}{2}b \times \perp h$

Memo

QUESTION 1 / VRAAG 1

Q/V	ANSWER / ANTWOORD	MARK ALLOCATION / PUNTE-TOEKENNING
1.1.	B	1 mark / <i>punt</i>
1.2.	B	1 mark / <i>punt</i>
1.3.	B	1 mark / <i>punt</i>
1.4.	C	1 mark / <i>punt</i>
1.5.	D	1 mark / <i>punt</i>
1.6.	C	1 mark / <i>punt</i>
1.7.	C	1 mark / <i>punt</i>
1.8.	D	1 mark / <i>punt</i>
1.9.	D	1 mark / <i>punt</i>
1.10	A	1 mark / <i>punt</i>

QUESTION 2 / VRAAG 2

Q/V	ANSWER / ANTWOORD	MARK ALLOCATION / PUNTETOEKENNING
2.1.1	$-a^2b + 3ab^2 + 2a^2b - 4ab^2$ $a^2b - ab^2$	1 mark for / <i>punt vir</i> 3,5 x
2.1.2	$2(x + y) + 4(3x - 2y) - 4(2x - 3y)$ $= 2x + 2y + 12x - 8y - 8x + 12y$ $= 6x + 6y$	1 mark for / <i>punt vir</i> $2x + 2y + 12x - 8y - 8x + 12y$ 1 mark for / <i>1 punt vir</i> $6x + 6y$
2.1.3	$\frac{(2a^2b^3)^2(2a^{-2}b)^3}{4a^6b^{-1}}$ $= \frac{4a^4b^6 \times 8a^{-6}b^3}{4a^6b^{-1}}$ $= \frac{32a^{-2}b^9}{4a^6b^{-1}}$ $= \frac{8b^{10}}{a^8}$ <p style="text-align: center;">OR / OF</p> $= \frac{4a^4b^6 \times 8a^{-6}b^3}{4a^6b^{-1}}$ $= \frac{8a^{-2}b^9}{a^6b^{-1}}$ $= \frac{8b^{10}}{a^8}$	1 mark for / <i>punt vir</i> $4a^2b^6 \times 8a^{-6}b^3$ 1 mark for / <i>punt vir</i> $32a^{-2}b^9$ 1 mark for / <i>punt vir</i> $8b^{10}$ 1 mark for / <i>punt vir</i> a^{10}
2.1.4	$\sqrt[3]{\frac{-27x^3}{64}}$ $= \frac{-3x}{4}$	1 mark for / <i>punt vir</i> $-3x$ 1 mark for / <i>punt vir</i> for 4
2.2.1	$5(x - 2) = 3x - 4$ $5x - 10 = 3x - 4$ $5x - 3x = -4 + 10$ $2x = 6$ $x = 3$	1 mark for / <i>punt vir</i> $5x - 10$ 1 mark for / <i>punt vir</i> for $2x = 6$ 1 mark for / <i>punt vir</i> for $x = 3$
2.2.2	$3^{x-1} = 81$ $3^{x-1} = 3^4$ $x - 1 = 4$ $x = 5$	1 mark for / <i>punt vir</i> for 3^4 1 mark for / <i>punt vir</i> $x - 1 = 4$ 1 mark for / <i>1 punt vir</i> $x = 5$
2.2.3	$\frac{x}{3} + \frac{x}{4} = 1$ $4x + 3x = 12$ $7x = 12$ $x = \frac{12}{7}$	1 mark for / <i>punt vir</i> $4x + 3x = 12$ 1 mark for / <i>punt vir</i> $7x = 12$ 1 mark for / <i>punt vir</i> $x = \frac{12}{7}$
2.3.	$x^2 - (2xy)^3$ $= (-1)^2 - (2(-1)(2))^3$ $= 1 - (-4)^3$ $= 1 - (-64)$ $= 65$	1 mark for substitution / <i>punt vir vervanging</i> 1 mark for / <i>punt vir</i> $1 - (-64)$ 1 mark for / <i>punt vir</i> 65

QUESTION 3 / VRAAG 3

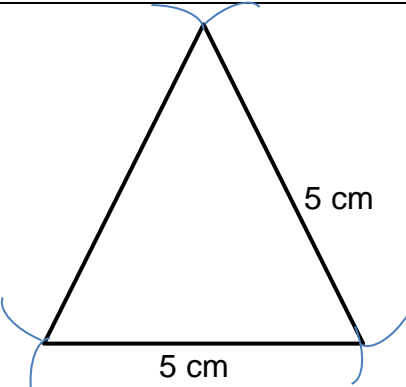
Q/V	ANSWER / ANTWOORD	MARK ALLOCATION/ PUNTETOEKENNING
3.1.1	$\frac{20}{100} \times 50\,000,00$ $= R\,10\,000,00 \text{ Deposit / Deposito}$	1 mark for / <i>punt vir</i> $\frac{20}{100} \times 50\,000,00$ 100 1 mark for / <i>punt vir</i> R 10 000.00
3.1.2	$A = P(1 + i \times n)$ $= R\,40\,000 (1 + 0,12 \times 3)$ $= R\,54\,400$ $\text{Total amount} = R\,10\,000 + R\,54\,400$ $\text{Totale bedrag} = R\,64\,400,00$	1 mark formula / <i>punt vir</i> <i>formule</i> 1 mark for / <i>punt vir</i> R 54 400 1 mark for / <i>punt vir</i> R 10 000 + R 54 400 1 mark for / <i>punt vir</i> R 64 400
3.1.3	$A = P(1 + i)^n$ $= 50\,000 (1 + 0,09)^{3,5}$ $= R\,67\,602,50$	1 mark formula correct / <i>punt vir korrekte formule</i> 1 mark for / <i>punt vir</i> $50\,000(1 + 0,09)$ $3,5$ 1 mark for / <i>punt vir</i> R 67 602,50
3.1.4	Option 1, it is a cheaper option than Option 2 / <i>Opsie 1, dit is 'n goedkoper opsie as opsie 2</i> (or any reasonable explanation)	1 mark for Option 1 / <i>punt vir Opsie 1</i> 1 mark for reason / <i>punt vir rede</i>
3.2.1	$1 \div 0,1923$ $= R\,5,20$	1 mark for / <i>punt vir</i> R5,20
3.2.2 (a)	$S\$ 1 = R\,5,20$ $S\$ 550 = R\,5,20 \times 550$ $= R\,2\,860$	1 mark for / <i>punt vir</i> $R\,5,20 \times 550$ 1 mark for / <i>punt vir</i> R 2 860
(b)	$\text{Number of DVDs} = R\,2860 \div 100$ $\text{Aantal DVD's} = 28,6$ ≈ 28	1 mark for / <i>punt vir</i> $R\,2860 \div 100$ 1 mark for / <i>punt vir</i> 28

QUESTION 4 / VRAAG 4

Q/V	ANSWER / ANTWOORD	MARK ALLOCATION / PUNTETOEKENNING
4.1	$T_6 = 11,50$	2 marks for / <i>punte vir</i> 11,50
4.2	Add 0,25 to the previous term to get the next term / <i>plus 0,25 by vorige term om volgende term te kry</i>	2 marks for answer / <i>2 punte vir antwoord</i>
4.3	$T_n = 25$ $25 = 0,25n + 10$ $15 = 0,25n$ $n = 60$	1 mark for / <i>punt vir</i> $25 = 0,25n + 10$ 1 mark for / <i>punt vir</i> $15 = 0,25n$ 1 mark for / <i>punt vir</i> $n = 60$

QUESTION 5 / VRAAG 5

Q/V	ANSWER / ANTWOORD	MARK ALLOCATION / PUNTETOEKENNING
5.1.1	$C_1 = D_2 = 20^\circ$ Alt. \angle ; DE//BC <i>Verwisselende hoeke DE//BC</i>	1 for / <i>vir</i> 20° 1 for reason / <i>vir rede</i>
5.1.2	$D_3 = 180^\circ - 68^\circ - 20^\circ$ Angles of triangle / <i>Hoeke van driehoek = 180^\circ</i> $D_3 = 92^\circ$	1 mark for / <i>punt vir</i> 1 mark for / <i>punt vir</i>
5.1.3	$B_1 + B_2 = D_1 = 68^\circ$ Corresponding / <i>Ooreenstemmend</i> \angle ; $\angle ADC = D_1 + D_2$ DE//BC $= 68^\circ + 20^\circ$ $= 88^\circ$ OR/OF $180^\circ - 20^\circ - 92^\circ = 88^\circ$ <i>Angles on straight line / Hoeke op reguit lyn</i>	1 mark for / <i>punt vir</i> $B_1 + B_2 = D_1 = 68^\circ$ <i>Corresponding / Ooreenstemmend</i> \angle ; DE//BC 1 mark for / <i>punt vir</i> $ADC = 88^\circ$
5.1.4.	$A = C_2 = (180^\circ - 88) \div 2$ $A = 46^\circ$ $C_3 = B_1 + B_2 + A$ Exterior angle of triangle / <i>Buitehoek van 'n driehoek</i> $= 68^\circ + 46^\circ$ $= 114^\circ$ OR / OF $C_1 + C_2 + C_3 = 180^\circ$ <i>Angles on a straight line / Hoeke op reguitlyn = 180^\circ</i> $C_3 = 180^\circ - 20^\circ - 46^\circ$ $= 114^\circ$	1 mark for / <i>punt vir</i> $A = 46^\circ$ 1 mark for / <i>punt vir</i> $C_3 = B_1 + B_2 + A$ and reason / <i>en rede</i> 1 mark for / <i>punt vir</i> $C_3 = 114^\circ$ OR / OF 1 mark for / <i>punt vir</i> $C_1 + C_2 + C_3 = 180^\circ$ <i>Angles on a straight line / Hoeke op 'n reguitlyn = 180^\circ</i> 1 mark for / <i>punt vir</i> for $C_3 = 180^\circ - 20^\circ - 46^\circ$ 1 mark for / <i>punt vir</i> $C_3 = 114^\circ$

Q/V	ANSWER / ANTWOORD	MARK ALLOCATION / PUNTETOEKENNING
5.4.2	$4x + 4 + 5x - 4$ $= 4(20^\circ) + 4 + 5(20^\circ) - 4$ $= 80^\circ + 4 + 100^\circ - 4$ $= 180^\circ$ <p>Therefore / Dus ST // UV Co-interior / Mede-binnehoek $\leq 180^\circ$</p> <p style="text-align: center;">OR / OF</p> $8x + 4 + x - 4$ $= 8(20^\circ) + 4 + (20^\circ) - 4$ $= 160^\circ + 4 + 20^\circ - 4$ $= 180^\circ$ <p>Therefore ST // UV Co-interior / Mede binnehoek $\leq 180^\circ$</p>	<p>1 mark for / punt vir $4x + 4 + 5x - 4$</p> <p>1 mark for substitution / punt vir vervanging</p> <p>1 mark for / punt vir for 180°</p> <p>1 mark for / punt vir Therefore / Dus ST//UV</p> <p>Co-interior / Mede binnehoek $\leq 180^\circ$</p> <p style="text-align: center;">OR / OF</p> <p>1 mark for / punt vir $8x + 4 + x - 4$</p> <p>1 mark for substitution / punt vir vervanging</p> <p>1 mark for / punt vir 180°</p> <p>1 mark for / punt vir Therefore / Dus ST//UV</p> <p>Co-interior / Mede binnehoek $\leq 180^\circ$</p>
5.5		<p>1 mark answer / 1 punt vir antwoord</p> <p>For each side.</p>

QUESTION 6 / VRAAG 6

Q/V	ANSWER / ANTWOORD	MARK ALLOCATION PUNTETOEKENNING
6.1	$4^2 - 2^2 = x^2$ $16 - 4 = x^2$ $x^2 = 12$ $x = \sqrt{12} = 3,46$	1 mark for/ <i>punt vir</i> $4^2 - 2^2 = x^2$ 1 mark for / <i>punt vir</i> $x^2 = 12$ 1 mark for/ <i>punt vir</i> $x = \sqrt{12}$ or 3,46
6.2	$C = 2 \pi r$ $= 2(3,14) 2 = 12,56 \text{ m} \div 2 = 6,28$ $P = 6,28 + 1 + 5 + 1 + 2 + 2 + 3,46 + 2 + 1 + 5 + 1$ $= 29,74 \text{ m}$	1 mark for/ <i>punt vir</i> 2(3,14) 1 mark for / <i>punt vir</i> 6,28 1 mark for/ <i>punt vir</i> 3,46 1 mark for/ <i>punt vir</i> 20 + 3,46 1 mark for / <i>punt vir</i> 23,46 + 6,28 1 mark for answer/ <i>punt vir</i> <i>antwoord</i>
6.3	$\text{Area} = (\frac{1}{2} \pi \times 2^2) + (5 \text{ m} \times 2 \text{ m}) + (4 \text{ m} \times 2 \text{ m}) + (\frac{1}{2} \times 3,46 \text{ m} \times 2 \text{ m})$ $= 6,28 + 10 + 8 + 3,46$ $= 27,74 \text{ m}^2$	1 mark for/ <i>punt vir</i> $(\frac{1}{2} \pi \times 2^2)$ 1 mark for/ <i>punt vir</i> $(5 \text{ m} \times 2 \text{ m})$ 1 mark for/ <i>punt vir</i> $(4 \text{ m} \times 2 \text{ m})$ 1 mark for/ <i>punt vir</i> $(\frac{1}{2} \times 3,46 \text{ m} \times 2 \text{ m})$ 1 mark for/ <i>punt vir</i> 6,28 1 mark for/ <i>punt vir</i> 10+ 8 + 3,46 2 marks for/ <i>punte vir</i> 27,74 m ²

PolyMathic

Paper 5

May/June

Algebra and
Geometry

(Q1: Combined)

(Q2 - Q4: Algebra)

(Q5 - Q7: Geometry)

PolyMathic

QUESTION 1

In this question, FOUR possible answers are given for each question. **Write only** the correct letter for the correct answer you have chosen next to the corresponding question number. Do not rewrite the question.

EXAMPLE :

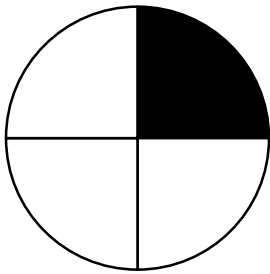
e.g. 1.11 $\frac{1+2+3+4}{1 \times 2 \times 5}$ is:

- A 0 B 1 C 2 D 3

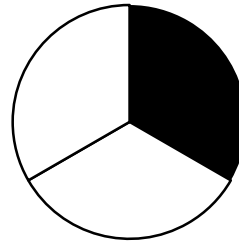
The correct answer is 1 which is letter B.

Answer: 1.11 B

1.1 The circles below are divided into parts. When the shaded in circle 1 is added to the shaded part in circle 2, their sum is equivalent to:



Circle 1



Circle 2

- A $\frac{2}{7}$
B $\frac{1}{2}$
C $\frac{2}{5}$
D $\frac{7}{12}$

(1)

1.2 How many numbers from 11 to 69 have the sum of their digits as a square number?

- A 14
B 15
C 10
D 17

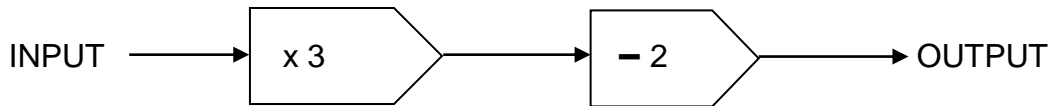
(1)

1.3 The seventh term in the sequence 1; 7; 17; 31; 49; ... is:

- A 96
- B 97
- C 98
- D 99

(1)

1.4 In the machine below the output value is 19. What is the input value?



- A 13
- B 55
- C 25
- D 7

(1)

1.5 Which of the following is a solution to $2x + y = 5$?

- A (0 ; 3)
- B (-2 ; 1)
- C (5 ; -5)
- D $(-\frac{1}{2}; 6)$

(1)

1.6 In two years' time Thandile will be $\frac{1}{3}$ the age of the elder sister. If her sister is 34 years at the moment then Thandile's age at the moment is ...

- A 2 years.
- B 11 years.
- C 12 years.
- D 10 years.

(1)

1.7 Bonga has a sheet of cardboard, he wants to cut it into pieces to make a rectangular pyramid. He will cut the following pieces:

- A Four rectangles and two squares
- B Two rectangles and four squares
- C Three rectangles and one triangle
- D One rectangle and four triangles

(1)

- 1.8 A type of a polyhedron (3-dimensional object) has 12 edges; 8 vertices and 6 faces. Which of the formulae given below for working out the number of edges is incorrect?
- A $E = (V + F) - 2$
 B $E = (V - 2) + F$
 C $E = (V - F) + 2$
 D $E = (F - 2) + V$ (1)
- 1.9 From the information given below, choose the form of transport that uses the least fuel/petrol.
- A A truck uses 40 litres of fuel for 200 km
 B A car travels 500 km on 50 litres of fuel
 C A bus uses 30 litres of fuel to travel 165 km
 D A Rocker motorcycle travels 450 km on 22,5 litres of petrol (1)
- 1.10 The average of the given numbers $\{1; 2; 5\frac{3}{5}; 12; 6\frac{1}{10}; 10\}$ is:
- A 6,98
 B 6,93
 C 6,12
 D 6,75 (1)

[10]

QUESTION 2

- 2.1 Some Eastern Cape schools are experiencing a problem in submitting documents on time to their relevant district offices because of lack of suitable transport to suit the road conditions. The price of the new car to suit the road conditions is R315 000. The value of a car depreciates by 7% every year.
- 2.1.1 If the Eastern Cape government has to provide all its schools with cars and change them after every period of three years, what will be the value of a car be after 3 years? (3)
- 2.1.2 Suppose the government may need to pay an interest (SI) of R39 500 in 3 years' time. Work out the interest rate of the car that is sold for R315 000. (3)
- 2.2 A certain school has 720 pupils. The ratio of the number of senior pupils to the number of junior pupils is 4 : 5.
 How many junior pupils are there in the school? (2)
- 2.3 Kenneth has to divide R1 300 among his 3 workers A, B and C. Worker A must get R200 more than worker B, and worker B must get R100 more than worker C.
 What will worker C get? (2)

[10]

QUESTION 3

- 3.1 Copy and complete the table below which shows the conversion of degrees in celsius to degrees in fahrenheit.

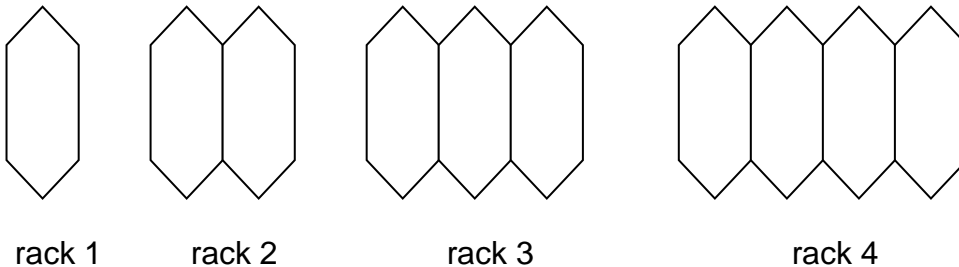
TABLE 3.1

°C	0	20	40	60	80
°F = $\frac{9}{5}$ °C + 32	32	68	104		

(2)

- 3.2 Use ANNEXURE 1 to draw the graph illustrating the information in TABLE 3.1. (2)

- 3.3 During school holidays Teddy assists his uncle who is working with steel. One day he thought of using the waste steel material to make racks for placing hot pots. He bought nails, cut pieces of steel and joined them one by one forming hexagonal patterns as shown below. (3)



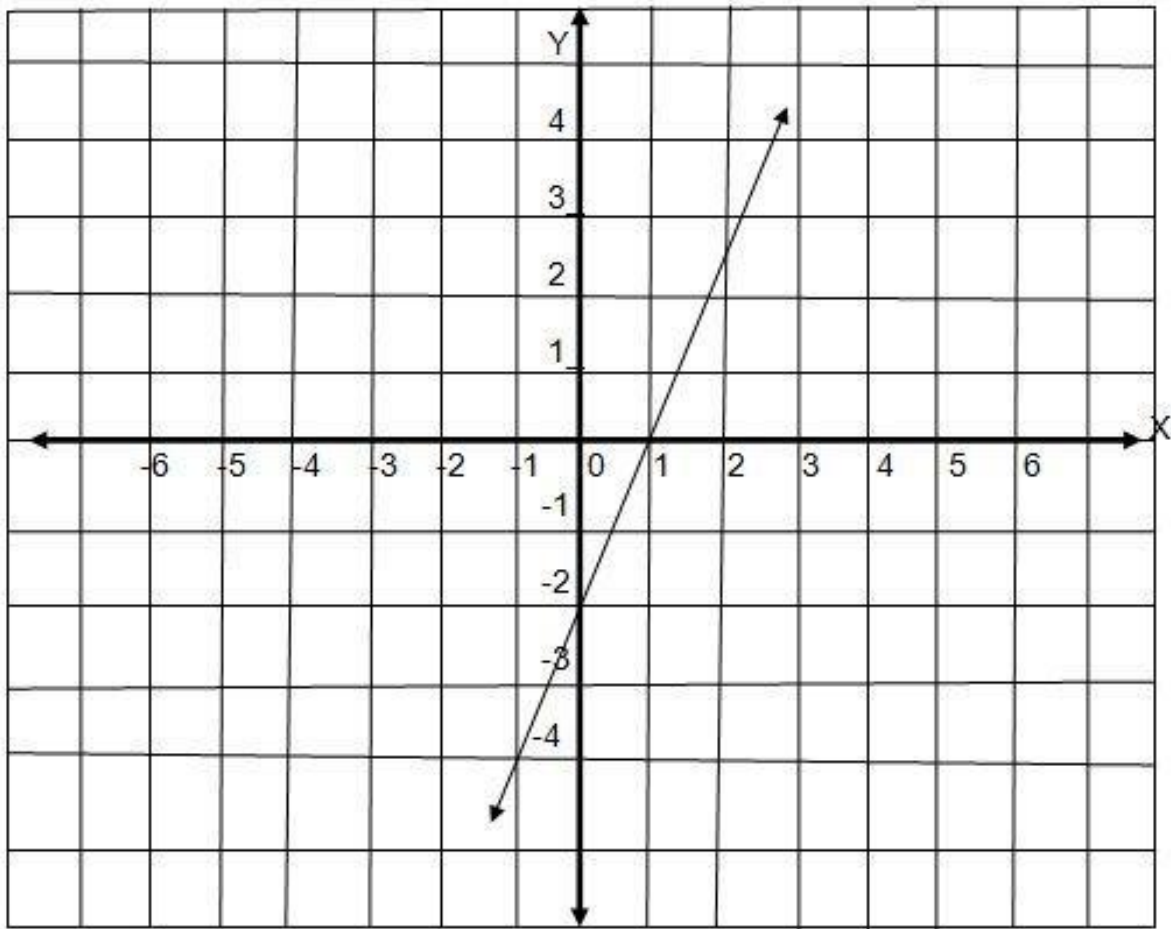
The table below shows the relationship between the rack number and the number of joined pieces.

Rack no.	1	2	3	4	<i>n</i>
Number of pieces	6	11	16	21	

- 3.3.1 Determine the general rule for the number of steel pieces. (2)

- 3.3.2 What rack number can Teddy develop using 46 pieces? (2)

3.4 Study the graph below and then determine the equation.



(2)
[10]

QUESTION 4

4.1 Factorise completely:

4.1.1 $24x^3y^2 - 8x^2y - 16x^2y^2$ (2)

4.1.2 $m^2(m - 2) - 4(m - 2)$ (3)

4.2 Solve for x in the equations below:

4.2.1 $4x - (3x - 7) - (2x - 3) = 8(x - 1)$ (3)

4.2.2 $\frac{x^2}{x^2 - 3x} = \frac{x - 3}{x - 5}$ (4)

4.2.3 $2^{4x} = 256$ (2)

4.3 Simplify:

4.3.1 $3^{2n+3} \cdot 3^{-n-5}$ (2)

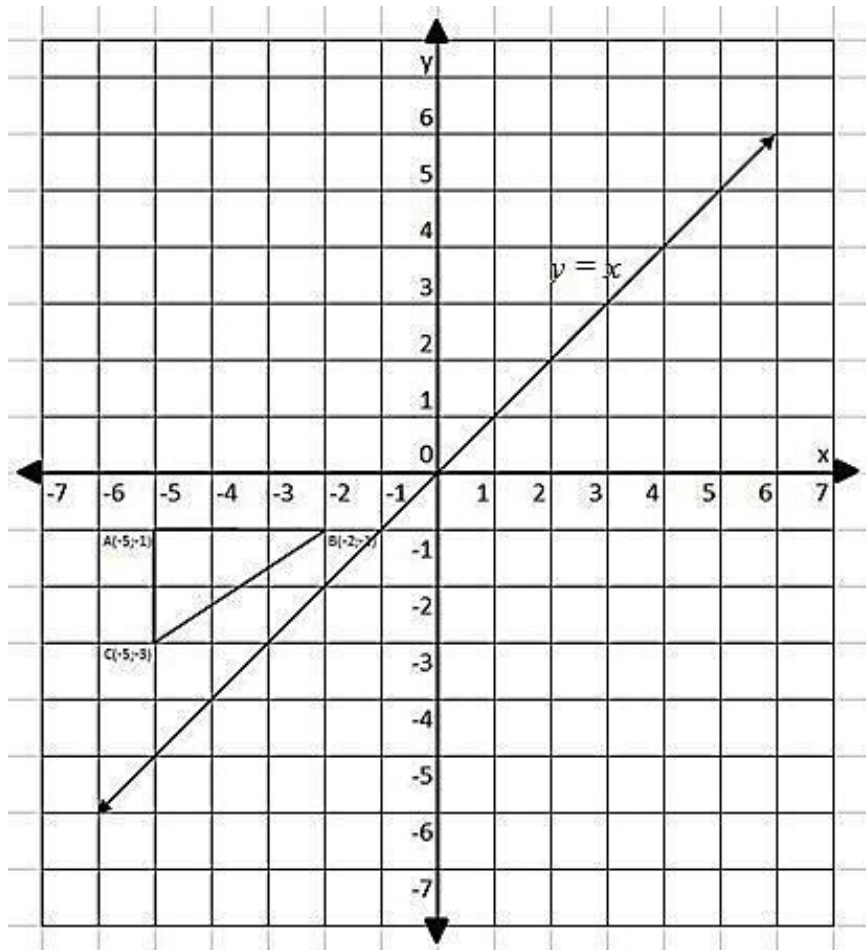
4.3.2 $\frac{15a(ab)^2}{7c^5} \div \frac{5ab}{21c^3}$ (3)

4.3.3 Using $x^2 - (x + 2)(x - 2)$ or otherwise, determine $(54\ 321)^2 - (54\ 323)(54\ 319)$ (2)

[21]

QUESTION 5

5.1 Use ANNEXURE 2 to answer the following questions.

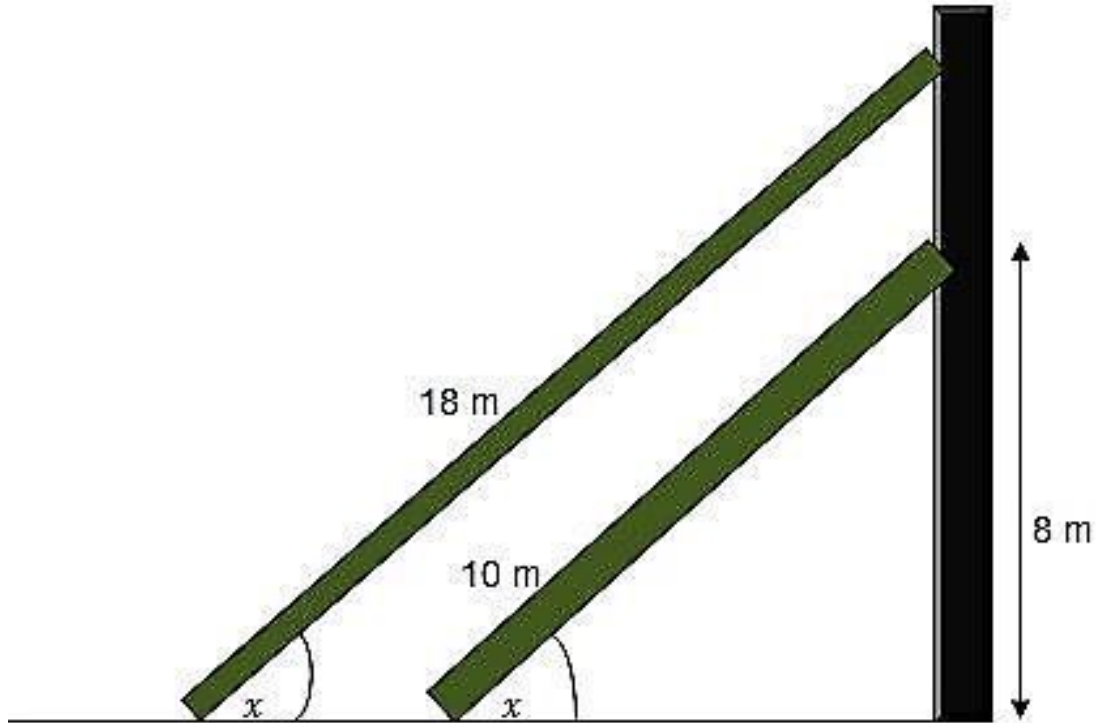


5.1.1 Reflect $\triangle ABC$ in the line $y = x$ in the same quadrant. (2)

5.1.2 What is the general rule of the reflection in the line $y = x$? (1)

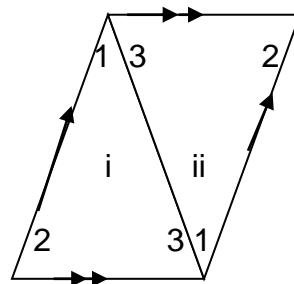
5.1.3 Translate the reflected image 4 units to the right. (1)

- 5.2 Two similar triangles are formed by two different ladders of lengths 10 m and 18 m that are leaning against a wall, such that they make the same angle with the ground. The 10 m ladder reaches 8 m up the wall. How much further up the wall does the 18 m ladder reach?



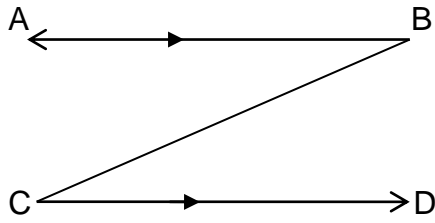
(3)

- 5.3 Carefully study the figure below which shows the first two steps of tessellating the triangle and then answer the questions that follow.



- 5.3.1 Complete the tessellation step iii and step iv. (2)
- 5.3.2 What type of quadrilateral is formed after completing step iv? (1)
- 5.3.3 Give any TWO properties of the shape you mentioned in QUESTION 5.3.2. (2)

5.4 A Z-letter shape is drawn below ($AB \parallel CD$) showing a pair of alternate angles.

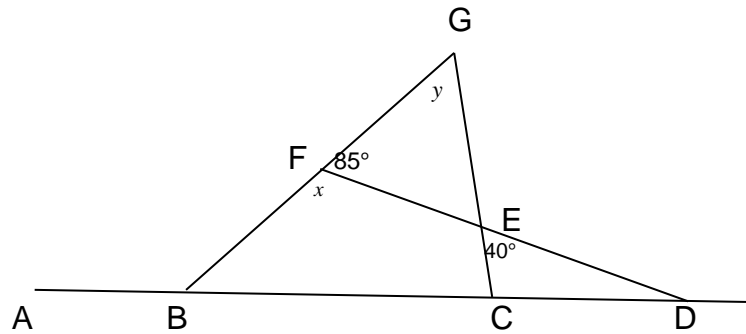


In the shape above identify the:

5.4.1 Angle of elevation (1)

5.4.2 Angle of depression (1)

5.5 Study the figure below:



AD; BG; FD and GC are straight lines. Calculate the value of y .

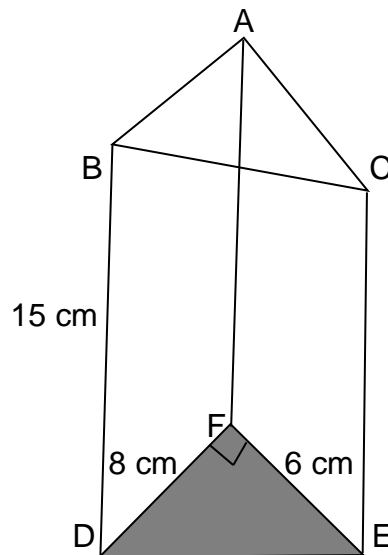
(3)
[17]

QUESTION 6

- 6.1 The figure below represents a classroom. The four walls with the ceiling form a right rectangular prism with the following dimensions: length of the wall is 9 m, the breadth is 7 m and the height is 5 m.



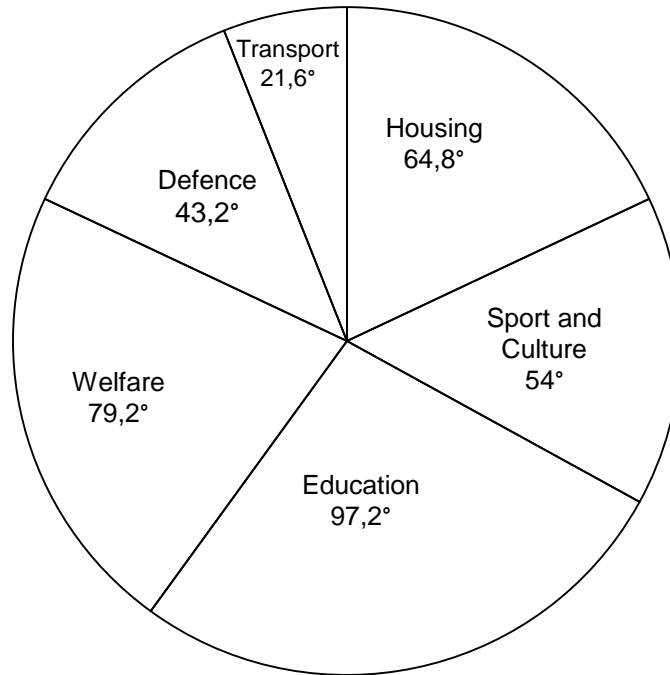
- 6.1.1 Determine the volume of air enclosed in the classroom. (2)
- 6.1.2 Convert your answer in QUESTION 6.1.1 to cubic centimetres. (1)
- 6.2 Miso's sister lives and works in United Kingdom where they measure lengths in yards.
- 6.2.1 Miso needs 5 metres of cloth material to sew her dress. How many yards must the sister buy?
[Hint: 1 m = 1,094 yards] (2)
- 6.2.2 If the sister buys 8 yards of cloth material, how many metres will be left after making the dress? (2)
- 6.3 A triangular prism is drawn. The base is a right angled triangle with $DF = 8$ cm, $FE = 6$ cm and its height is 15 cm. B is joined to F.



- 6.3.1 Calculate the length of BF. (2)
- 6.3.2 Show that $\triangle FDE$ and $\triangle ABC$ are congruent. (4)

QUESTION 7

- 7.1 The South African minister of finance allocated R9 billion in the 2003 budget as shown in the pie chart below.



- 7.1.1 Work out the fraction of the circle that represents the amount allocated to Defence. (1)
- 7.1.2 What percentage of the budget was allocated to Welfare and Education? (2)
- 7.1.3 If the percentages for Sport and Culture, Housing, Transport and Defence are 15%, 18%, 6% and 12% respectively, including the answer in QUESTION 7.1.2, draw an ordered stem and leaf diagram. (2)
- 7.1.4 Calculate the mean of the percentages allocated for the departments. (2)
- 7.2 South Africa has experienced a high rate of police officers killed *on duty* and *off duty* from 2002 to 2007. The information is shown below.

Year	2002	2003	2004	2005	2006	2007
On duty	93	93	86	100	101	60
Off duty	160	136	125	125	125	110

- Use ANNEXURE 3 to draw a double bar graph to show the information. (3)

7.3 The list below are the marks obtained by learners in a Mathematics test:

44	87	57	41	45	72	67	59	45	80
53	90	75	57	86	48	38	63	76	30

Determine the:

7.3.1 Median (2)

7.3.2 Range (1)

7.4 Using the marks obtained by learners in the Mathematics test in QUESTION 7.3, draw a tally-frequency table with 5 classes of equal width. [Hint: the first class interval is 21 – 35] (3)

7.5 Pairs of socks are neatly packed in a drawer of a wardrobe. There are 4 pairs of black socks, 2 pairs of blue socks, 3 pairs of yellow socks and 5 pairs of white socks. One pair of socks is taken from the drawer without looking. What is the probability of:

7.5.1 Taking a pair of blue socks or a pair of yellow socks? (1)

7.5.2 Not getting a pair of white socks? (1)

7.5.3 Choosing pairs of socks from one of the odd numbered pairs? (1)

[19]

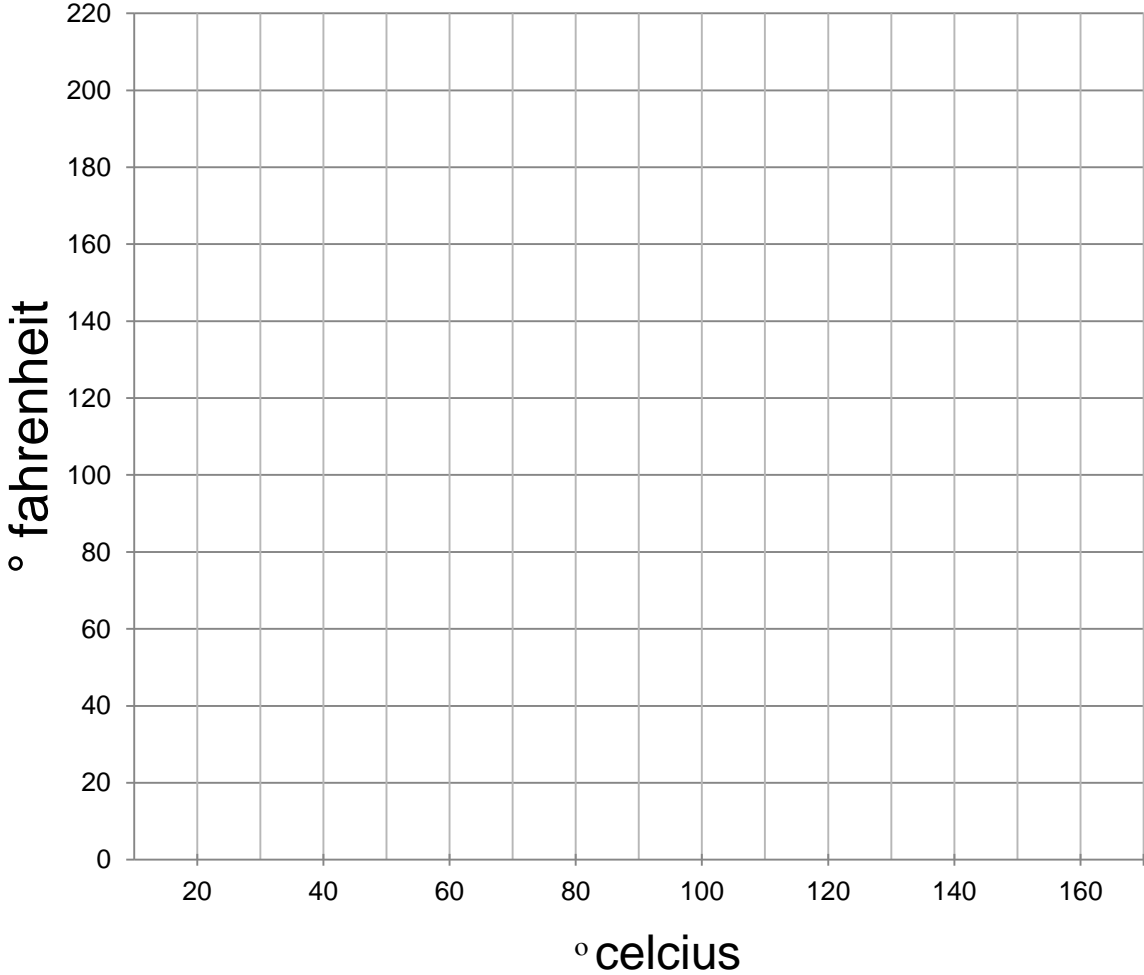
TOTAL: 100

ANNEXURE 1

|

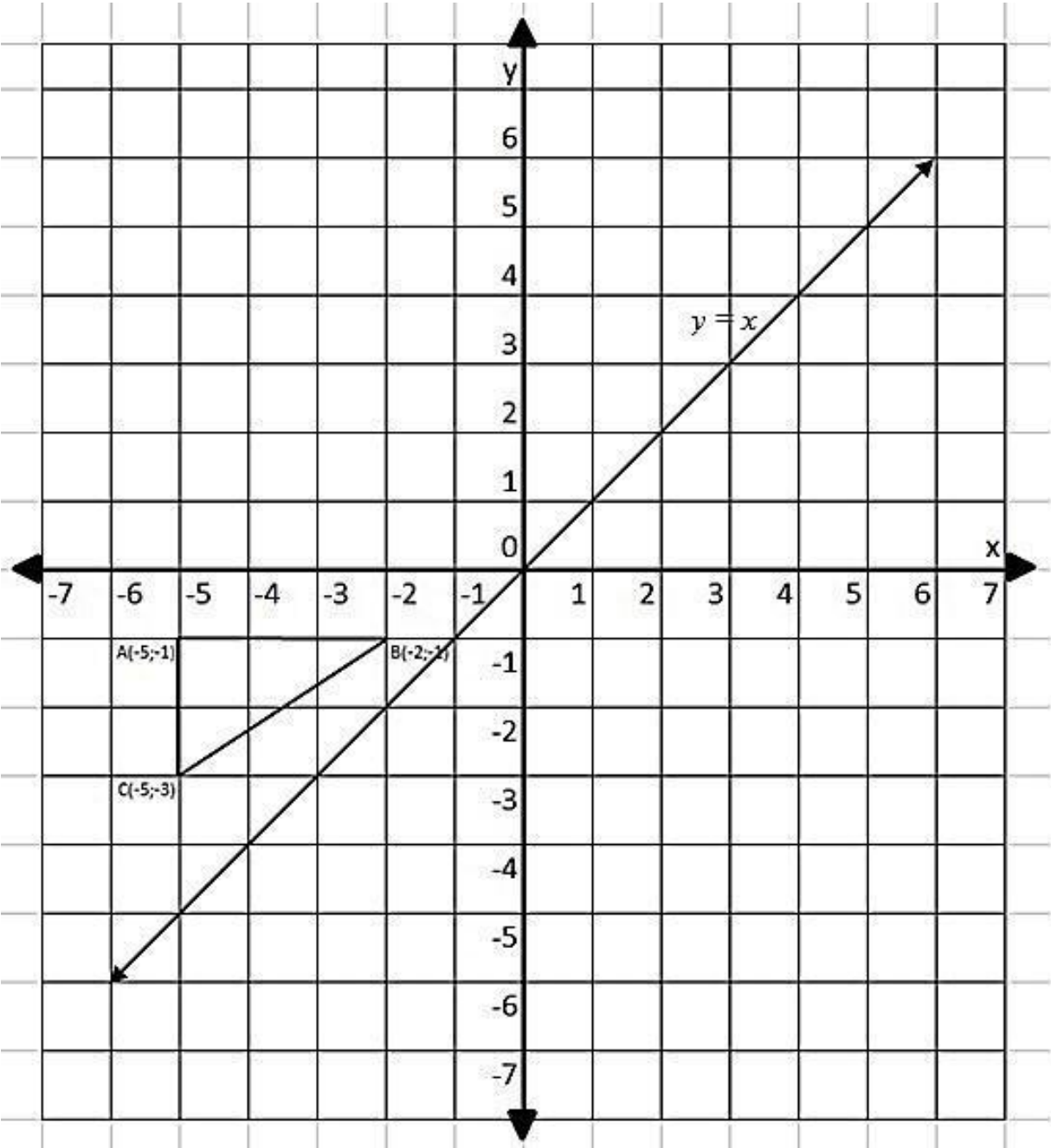
QUESTION 3.2

CONVERSION OF °C TO °F



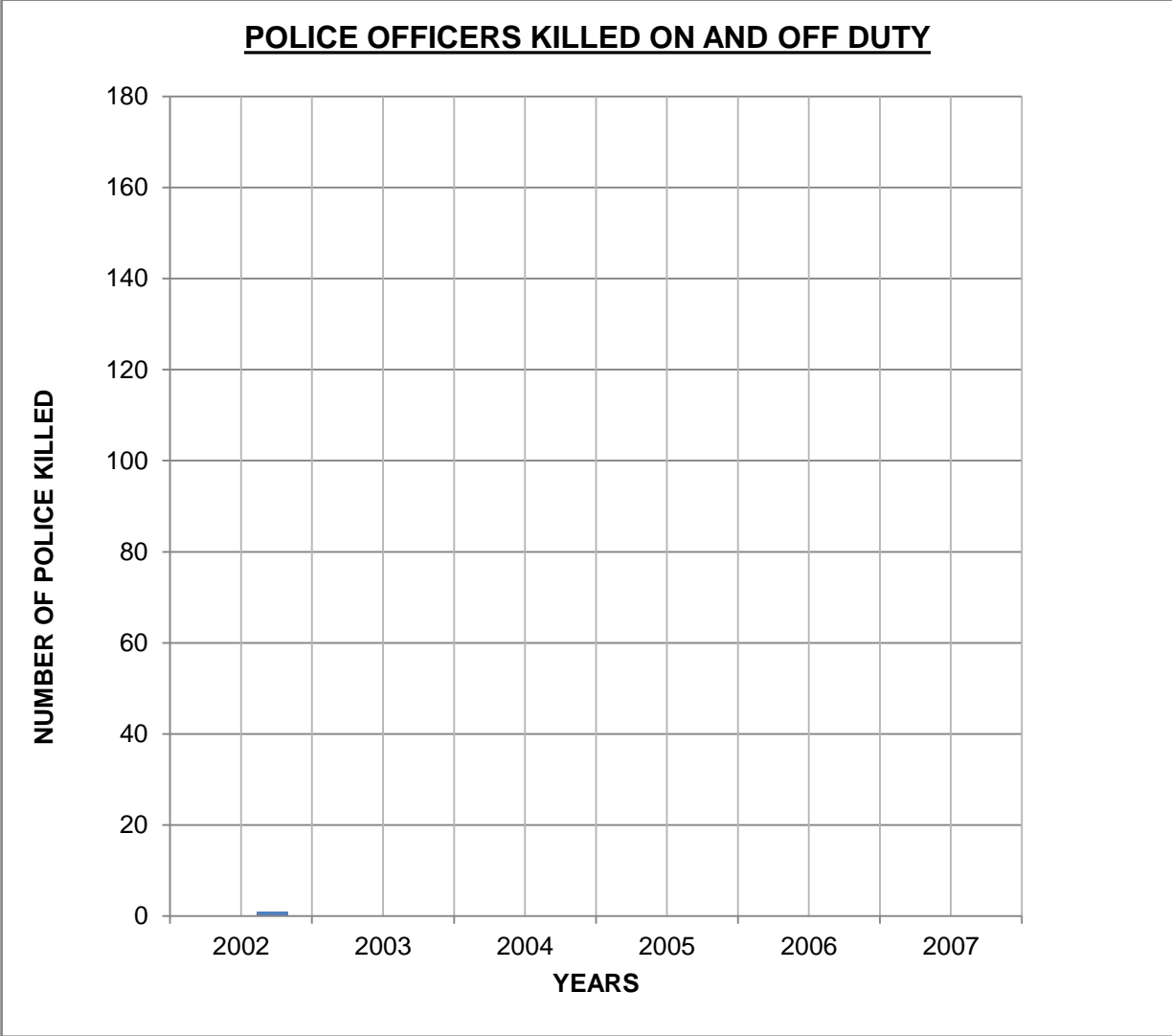
ANNEXURE 2

QUESTION 5.1



ANNEXURE 3

QUESTION 7.2



Memo

1.1	D ✓	(1)
1.2	D ✓	(1)
1.3	B ✓	(1)
1.4	D ✓	(1)
1.5	C ✓	(1)
1.6	D ✓	(1)
1.7	D ✓	(1)
1.8	C ✓	(1)
1.9	D ✓	(1)
1.10	C ✓	(1)
		[10]

QUESTION 2

2.1	2.1.1	<p>Initial Price (Value for the first year) of a car = R315 000,00</p> <p>Depreciation @ 7% = $\frac{7}{100} \times 315\ 000 = R22\ 050,00$</p> <p>Value of car for the second year = R292 950,00 ✓</p> <p>Depreciation @ 7% = $\frac{7}{100} \times 292\ 000 = R20\ 506,50$</p> <p>Value of car for the third year = R272 443,50 ✓</p> <p>Depreciation @ 7% = $\frac{7}{100} \times 272\ 443,50 = R19\ 071,05$</p> <p>Value of car at end of third year = R253 372,45 ✓</p>	(3)	<p>1 mark for the value for second year</p> <p>1 mark for the value for the third year</p> <p>1 mark for Answer</p>
	2.1.2	<p>$SI = \frac{P.r.t}{100}$</p> <p>$r = \frac{I.100}{P.t} = \frac{39\ 500 \times 100}{315\ 000 \times 3} \checkmark$</p> <p>$= \frac{3950\ 000}{945\ 000}$</p> <p>$\therefore r = 4,18\ \% \checkmark$</p>	(3)	<p>1 mark for the formula</p> <p>1 mark for correct substitution</p> <p>1 mark for answer</p>

2.2	<p>No. of pupils = 720 Ratio of senior pupils to junior pupils = 4 : 5 Sum of ratio = 4 + 5 = 9</p> <p>No. of junior pupils in the school = $\frac{5}{9} \times \frac{750}{1} \checkmark$</p> <p style="text-align: center;">= $\frac{5}{1} \times \frac{80}{1}$</p> <p style="text-align: center;">= 400 \checkmark</p> <p>Hence there are 400 junior pupils in the school</p>	(2)	<p>1 mark for calculation</p> <p>1 mark for answer</p>
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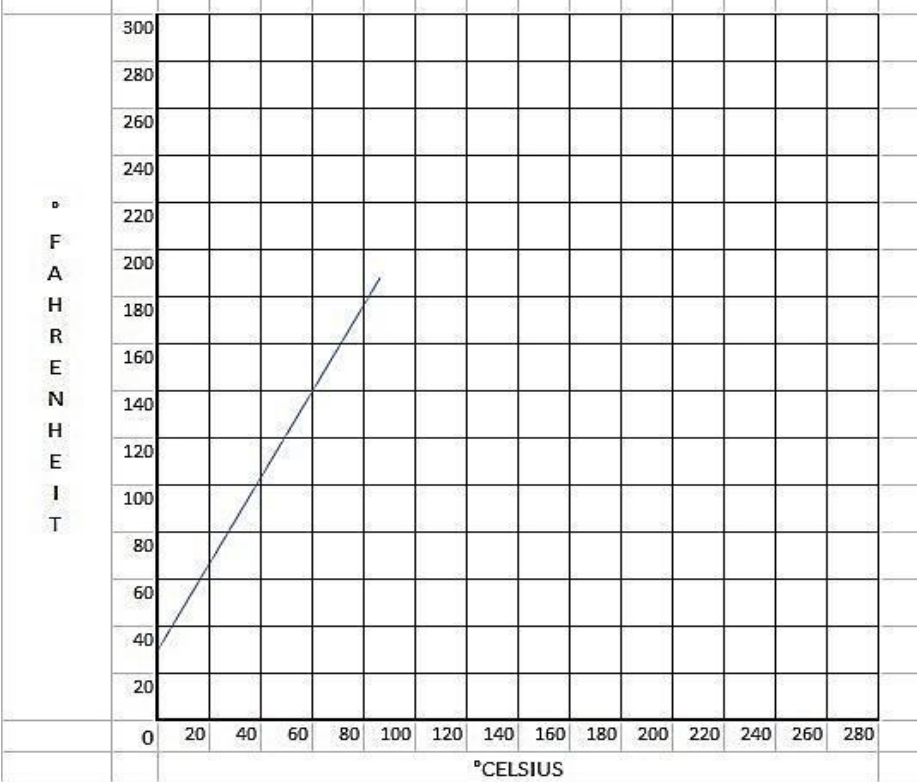
2.3	<p>Let amount for worker C be represented by x If C gets x Then B gets $100 + x$ And A gets $200 + (100 + x)$ Thus</p> <p>$x + (100 + x) + 200 + (100 + x) = 1\ 300 \quad \checkmark$</p> <p style="text-align: center;">$3x + 400 = 1\ 300$</p> <p style="text-align: center;">$3x = 1\ 300 - 400$</p> <p style="text-align: center;">$3x = 900$</p> <p>$\frac{3x}{3} = \frac{900}{3}$ $x = 300$</p> <p>Hence Worker C will get R300,00 \checkmark</p>	(2)	<p>1 mark for calculation</p> <p>1 mark for the answer</p>
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	[10]	
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QUESTION 3

3.1	<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 25%;">°C</td> <td style="width: 12.5%;">0</td> <td style="width: 12.5%;">20</td> <td style="width: 12.5%;">40</td> <td style="width: 12.5%;">60</td> <td style="width: 12.5%;">80</td> </tr> <tr> <td>°F = $\frac{5}{9} \text{°C} + 32$</td> <td>32</td> <td>68</td> <td>104</td> <td>140</td> <td>176</td> </tr> </table> <p style="text-align: right;">$\checkmark\checkmark$</p>	°C	0	20	40	60	80	°F = $\frac{5}{9} \text{°C} + 32$	32	68	104	140	176	(2)	<p>2 marks for correctly completing the table 1 mark for a wrong value in table</p>
°C	0	20	40	60	80										
°F = $\frac{5}{9} \text{°C} + 32$	32	68	104	140	176										

3.2



2 marks plotting all points correctly

1 mark for at least a wrong point

3.3

3.3.1 The first term : $5(1) + 1 = 6$
 The second term : $5(2) + 1 = 11$
 The third term : $5(3) + 1 = 16$ and so on
 The rule is the product of 5 and the rack number plus 1
 i.e. $5n + 1$ ✓✓

(2)

2 marks for getting rule correct

3.3.2 $5n + 1 = 46$ ✓
 $5n + 1 - 1 = 46 - 1$
 $5n = 45$
 $\frac{5n}{5} = \frac{45}{5}$
 $n = 9$
 Teddy can develop rack number 9 with 46 pieces ✓

(2)

1 mark for the equation

1 mark for the answer

3.4

The graph intersects y-axis at point (0, -2) ∴ $C = -2$
 If $x = 1 ; y = 0$
 $mx + C = 0$
 $(m \times 1) - 2 = 0$
 $m - 2 = 0$
 $2 = 0 + 2$
 $m = 2$ ✓
 the equation is $y = 2x - 2$ ✓

(2)

1 mark for finding the value of m

1 mark for the correct equation

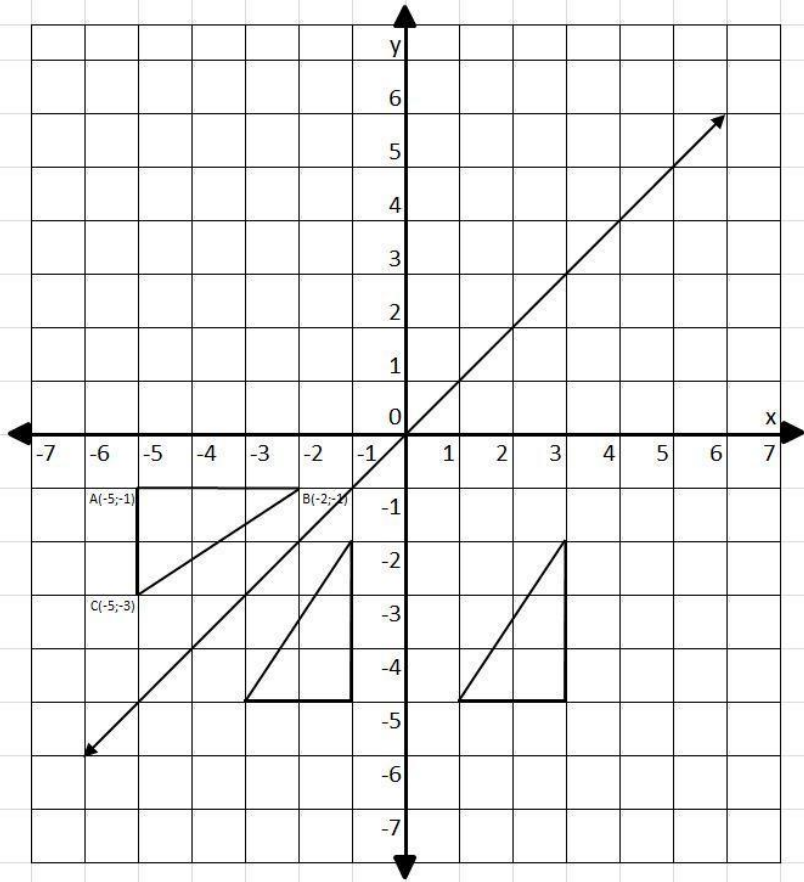
[10]

QUESTION 4				
4.1	4.1.1	$24x^3y^2 - 8x^2y - 16x^2y^2$ $= 8x^2y(3xy - 1 - 2y) \quad \checkmark\checkmark$	(2)	Answer
	4.1.2	$m^2(m-2) - 4(m-2)$ $= (m-2)(m^2 - 4) \checkmark$ $= (m-2)[(m-2)(m+2)] \quad \checkmark\checkmark$	(3)	1 mark for taking out correct factor 2 marks Factorising to get difference of 2 squares
4.2	4.2.1	$4x - (3x - 7) - (2x - 3) = 8(x - 1)$ $4x - 3x + 7 - 2x + 3 = 8x - 8 \checkmark$ $-x + 10 = 8x - 8$ $-x - 8x = -8 - 10$ $-9x = -18 \checkmark$ $\frac{-9x}{-9} = \frac{-18}{-9}$ <p>hence $x = 2 \checkmark$</p>	(3)	1 mark for removing the brackets 1 mark for simplifying and finding the like terms Answer
	4.2.2	$\frac{x^2}{x^2 - 3x} = \frac{x - 3}{x - 5}$ $\frac{x^2}{x(x-3)} = \frac{x - 3}{x - 5} \quad \checkmark$ $\frac{x}{x-3} = \frac{x - 3}{x - 5}$ $(x - 3)(x - 3) = x(x - 5)$ $x^2 - 6x + 9 = x^2 - 5x \quad \checkmark$ $x^2 - x^2 - 6x + 5x = -9 \quad \checkmark$ $-x = -9$ $\therefore x = 9 \quad \checkmark$	(4)	1 mark for factorising left side 1 mark for cross multiplication 1 mark for simplifying like terms Answer
	4.2.3	$2^{4x} = 2^8 \quad \checkmark$ $4x = 8$ $x = 2 \quad \checkmark$	(2)	1 mark for writing 256 in exponential form Answer

4.3	4.3.1	$3^{2n+3} \cdot 3^{-n-5}$ $= 3^{2n+3+(-n-5)}$ $= 3^{2n+3-n-5} \quad \checkmark$ $= 3^{n-2} \quad \checkmark$	(2)	1 mark for simplification 1 mark for answer
	4.3.2	$\frac{15a(ab)^2}{7c^5} \div \frac{5ab}{21c^3}$ $= \frac{15a^3b^2}{7c^5} \div \frac{21c^3}{5ab} \quad \checkmark$ $= \frac{3a^2b}{7c^2} \times \frac{3}{1} \quad \checkmark$ $= \frac{9a^2b}{7c^2} \quad \checkmark$	(3)	1 mark for changing division to multiplication and inverting fraction on the right 1 mark for simplification of numerical coefficients Answer
	4.3.3	<p>Let $54\,321 = x$</p> <p>Then</p> $54\,323 = x + 2$ $54\,319 = x - 2$ <p>And</p> $54\,321^2 - (54\,323)(54\,319) = x^2 - (x+2)(x-2) \quad \checkmark$ $= x^2 - (x^2 - 4)$ $= x^2 - x^2 + 4$ $= 4 \quad \checkmark$	(2)	1 mark for equation Answer
			[21]	

QUESTION 5

5.1



1 mark for reflected image

1 mark for correct shape and size of image

5.1.1 Refer to reflected image in diagram above ✓✓

(2)

5.1.2 $(x, y) \longrightarrow (y, x)$ ✓

(1)

5.1.3 See the translated image in the diagram above. ✓

(1)

5.2

Let the required length be x

$$\frac{18}{10} = \frac{x}{8} \checkmark$$

$$10x = 146 \checkmark$$

$$\frac{10x}{10} = \frac{146}{10}$$

$$x = 14,6$$

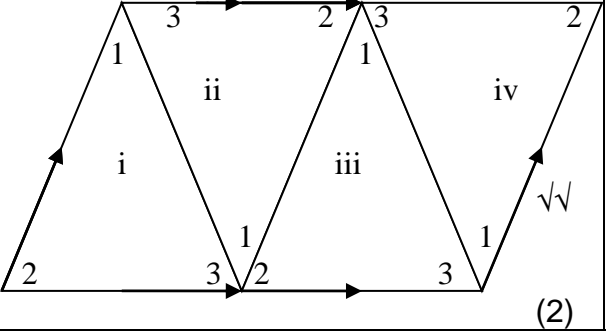
\therefore 18 m ladder is 14,6 m up the wall. ✓

1 mark for setting the corresponding sides

1 mark for cross multiplication

(3)

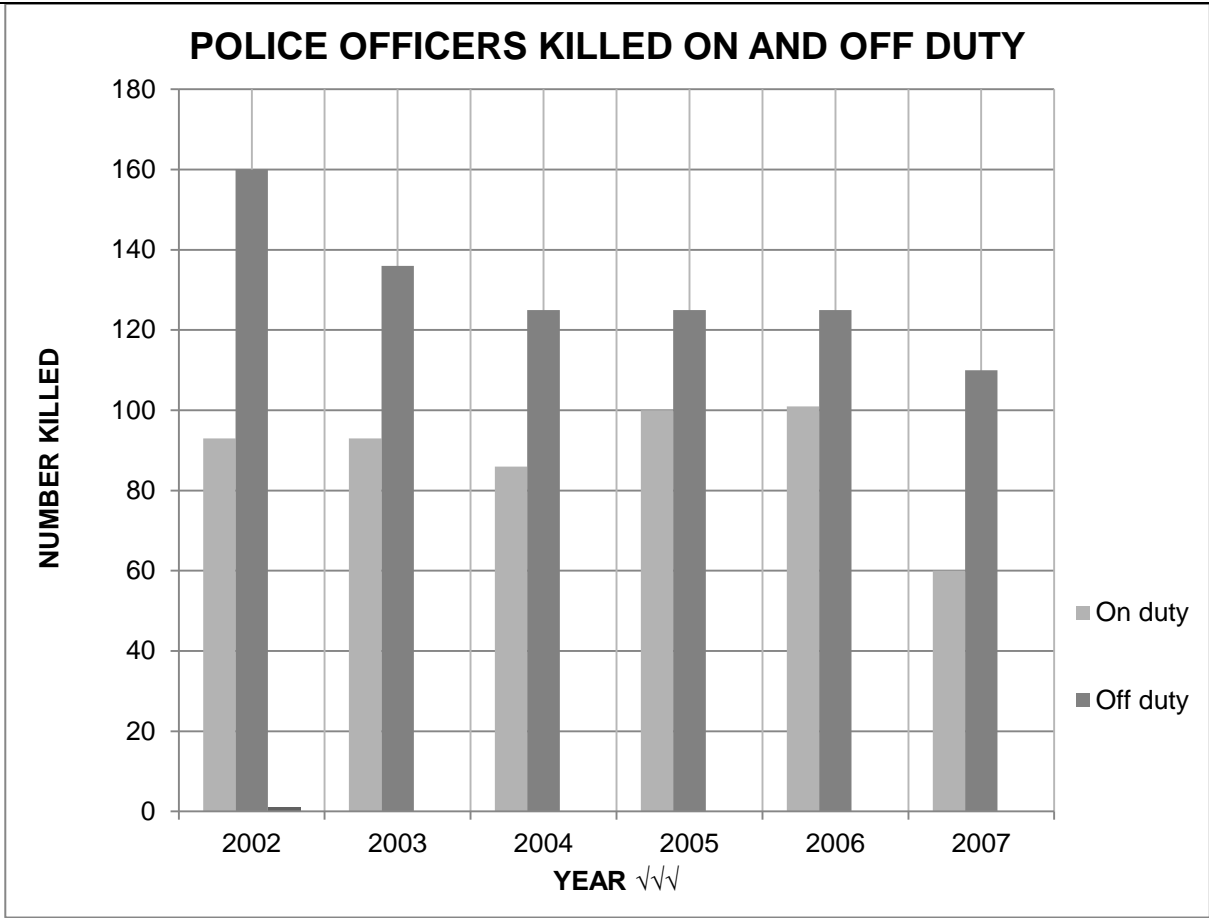
Answer

5.3	5.3.1		Correctly completing the shapes	
	5.3.2	Parallelogram ✓	(1)	Answer
	5.3.3	Any 2 (i) Both pairs of opposite sides are parallel (ii) Both pairs of opposite sides are equal (iii) Both pairs of opposite angles are equal (iv) Diagonals bisect each other (v) One pair of opposite sides are equal and parallel ✓✓	(2)	1 mark per each correct property stated
5.4	5.4.1	$\angle BCD$ or $\angle DCB$ ✓	(1)	
	5.4.2	$\angle ABC$ or $\angle CBA$ ✓	(1)	
5.5		$\angle FEG = \angle DEC$ vertically opp $\angle s$ ✓ $\angle FEG = 40^\circ$ $\angle y + 85^\circ + 40^\circ = 180^\circ$ sum $\angle s$ of a Δ ✓ $\therefore \angle y = 55^\circ$ ✓	(3)	1 mark for reason 1 mark for reason 1 mark for answer
[17]				

QUESTION 6			
6.1	6.1.1	Volume of prism = base area x height \checkmark $= l \times b \times h$ $= 9 \text{ m} \times 7 \text{ m} \times 5 \text{ m}$ $= 315 \text{ m}^3 \quad \checkmark$	Formula Answer (2)
	6.1.2	$1 \text{ m} = 100 \text{ cm}$ $1 \text{ m}^3 = 1\,000\,000 \text{ cm}^3$ $315 \text{ m}^3 = 315 \times 1\,000\,000 \text{ cm}^3$ $315 \text{ m}^3 = 315\,000\,000 \text{ cm}^3 \quad \checkmark$	Correct conversion units Answer (1)
6.2	6.2.1	Let the number of yards be represented by k $1 \text{ metre} = 1,094 \text{ yards}$ $5 \text{ metres} = k \text{ yards}$ $k = 5 \times 1,094 \quad \checkmark$ $k = 5,47 \text{ yards}$ \therefore The sister must buy <i>5,47 yards</i> of cloth material. \checkmark	Cross multiplication Answer (2)
	6.2.2	Let length in metres be p $1 \text{ metre} = 1,094 \text{ yards}$ $p \text{ metres} = 8 \text{ yards}$ $1,094 p = 8$ $p = \frac{8}{1,094} = 7,31 \text{ metres} \quad \checkmark$ The extra length = $7,31 - 5$ $= 2,31 \text{ metres} \quad \checkmark$ Hence 2,31 metres of the cloth material will be left over after making Andiswa's dress.	Converted units Answer (2)

6.3	6.3.1	$BF^2 = (15 \text{ cm})^2 + (8 \text{ cm})^2$ Pythagoras Theorem \checkmark $= 225 \text{ cm}^2 + 64 \text{ cm}^2$ $BF = \sqrt{289 \text{ cm}^2}$ $BF = 19 \text{ cm}$ \checkmark	(2)	1 mark for stating theorem 1 mark for correct answer								
	6.3.2	In $\triangle DFE$ and $\triangle BAC$ $DF = BA$ opposite sides of rect. ABDF \checkmark $FE = AC$ opposite sides of rect. ACEF \checkmark $DE = BC$ opposite sides of rect. BCED \checkmark $\triangle DFE \equiv \triangle BAC$ SSS \checkmark	(4)	1 mark for each reason								
			[13]									
QUESTION 7												
7.1	7.1.1	Fraction allocated to defence = $\frac{43,2^\circ}{360^\circ}$ $= \frac{3}{25}$ \checkmark	(1)	Answer simplified								
	7.1.2	Welfare $- \frac{79,2}{360} \times 100 = 22\%$ \checkmark Education $- \frac{97,2}{360} \times 100 = 27\%$ \checkmark	(2)	1 mark for each correct answer								
	7.1.3	Percentages are 6; 12; 15; 18; 22 and 27 <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Stem</th> <th>Leaf</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>6</td> </tr> <tr> <td>1</td> <td>2 5 8</td> </tr> <tr> <td>2</td> <td>2 7</td> </tr> </tbody> </table> $\checkmark\checkmark$	Stem	Leaf	0	6	1	2 5 8	2	2 7	(2)	1 mark for Stem-Leaf Diagram 1 mark for correct order Do not penalise for using wrong percentages from QUESTION 7.1.2
Stem	Leaf											
0	6											
1	2 5 8											
2	2 7											
	7.1.4	$\text{Mean} = \left(\frac{15 + 6 + 12 + 18 + 22 + 27}{6} \right) \%$ $= \frac{100}{6} \%$ \checkmark $= 16,7\%$ \checkmark	(2)	Sum of percentages Answer Do not penalise for using wrong percentages from QUESTION 7.1.2								

7.2



(3)

3 marks for getting all bars correct, a missing set gets 1 mark

7.3

7.3.1

$$\text{Median} = \frac{57 + 59}{2} = \frac{116}{2} = 58 \quad \checkmark$$

(2)

1 mark for identifying middle 2 values
Answer

7.3.2

$$\text{Range} = 90 - 30 = 60 \quad \checkmark$$

7.4

Class	Tally	Frequency
21 - 35	I	1
36 - 50	III I	6
51 - 65	III	5
66 - 80	III	5
81 - 95	III	3

✓✓✓

(3)

1 mark for getting 5 classes correct

1 mark for Tallies

1 mark for frequency

7.5	7.5.1	$P(\text{blue socks or yellow socks}) = \frac{2}{14} + \frac{3}{14}$ $= \frac{5}{14} \checkmark$	(1)	1 mark for correct answer
	7.5.2	$P(\text{no white socks}) = \frac{14}{14} - \frac{5}{14}$ $= \frac{9}{14} \checkmark$	(1)	1 mark for correct answer
	7.5.3	$P(\text{odd numbered pairs of socks}) = \frac{3}{14} + \frac{5}{14}$ $= \frac{8}{14}$ $= \frac{4}{7} \checkmark$	(1)	1 mark for correct answer
			[19]	
		TOTAL:	100	

PolyMathic

Paper 6

Oct/Nov

Algebra and
Geometry

(Q1 - Combined)

(Q2 - Q5: Algebra)

(Q6 - Q8: Geometry)

PolyMathic

SECTION A

QUESTION 1

1. Circle the letter of the correct answer from the four possible answers.

1.1 Simplify $\sqrt{4^2}$

- A 16
- B 4
- C 2
- D 8

(1)

1.2 Simplify $4,8 \div 0,2$

- A 2,4
- B 240
- C 0,24
- D 24

(1)

1.3 Study the pattern below and determine the terms represented by m and n .
 $2 ; 5 ; 8 ; m ; \dots ; 17 ; n ; \dots$

- A $m = 10$ and $n = 13$.
- B $m = 11$ and $n = 21$.
- C $m = 9$ and $n = 20$.
- D $m = 11$ and $n = 20$.

(1)

1.4 $(x - 3)^2 = \dots$

- A $x^2 - 9$.
- B $x^2 + 9x - 9$.
- C $x^2 - 6x + 9$.
- D $x^2 - 6x - 9$.

(1)

1.5 If $2x + 8 = 16$, then $x = \dots$

- A 1.
- B -4.
- C 1,6.
- D 4.

(1)

1.6 How many values of x satisfy the equation $5(x - 3) = -15 + 5x$?

- A 0
- B 1
- C 2
- D More than 2

(1)

1.7 The correct tally table for the following data
1 ; 2 ; 3 ; 1 ; 2 ; 3 ; 4 ; 1 ; 3 ; 2 ; 2 ; 1 ; 1 is:

A

Number	Tally
1	
2	
3	
4	

B

Number	Tally
1	
2	
3	
4	

C

Number	Tally
1	
2	
3	
4	

D

Number	Tally
1	
2	
3	
4	

(1)

1.8 Pairs of socks are neatly packed in a drawer of a wardrobe. There are 4 pairs of black socks, 2 pairs of blue socks, 3 pairs of yellow socks and 5 pairs of white socks. One pair of socks is taken from the drawer without looking. What is the probability of not taking a pair of white socks?

- A 5
- B $\frac{5}{14}$
- C $\frac{9}{14}$
- D $\frac{5}{9}$

(1)

1.9 A polygon can be defined as:

- A A closed three-dimensional shape with straight sides
- B A closed two-dimensional shape with three or more sides
- C A closed plain figure with straight sides
- D A closed figure with length, width and height

(1)

1.10 The height of a cube with a volume of 64 cm^3 is ...

- A 16 cm.
- B 8 cm.
- C 4 cm.
- D 32 cm.

(1)

[10]

SECTION B

QUESTION 2

- 2.1 Determine the value of b in $\frac{3}{5} + \frac{2}{b} = 1$. (1)
- 2.2 Determine 20% of an amount if 10% of the amount is R400. (1)
- 2.3 Which number is the biggest,
 $3\sqrt{2}$ or $2\sqrt{3}$? (1)
- 2.4 Simplify without using a calculator:
 $(2x)^3 \times -2x^2$ (2)
- 2.5 Paul invests R2 000 at 6% compound interest per annum. How much money will he have at the end of 5 years? (3)
- 2.6 Sandra borrowed R2 500 from her friend. They agreed that she will repay all the money over a certain period of time plus simple interest of 9% p.a. How long did it take her to repay all the money if the total interest paid was R675? (3)
- 2.7 If the sizes of the angles of a triangle are in the ratio 5 : 6 : 7. Calculate the size of the largest angle. (3)
- [14]**

QUESTION 3

- 3.1 Study the pattern bellow and answer the questions that follow.

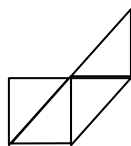


Figure 1

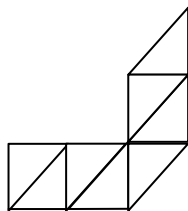


Figure 2

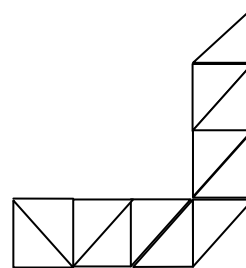


Figure 3

- 3.1.1 Copy and complete the table in your answer book.

Figure	1	2	3	4
Number of Triangles	4	8		

(2)

- 3.1.2 Describe the pattern in words. (1)

- 3.1.3 Determine the general rule (T_n) for the pattern. (1)

3.2 Factorise completely.

3.2.1 $3p^2q + 15pq^2 - 12pq$ (2)

3.2.2 $3x(x-3) + 2(3-x)$ (3)

3.2.3 $75x^3 - 12x$ (3)

3.3 Find the value of $2x^2 + 5x - 12$ if $x = 3$. (3)

[15]

QUESTION 4

4.1 Simplify.

4.1.1 $\frac{2x^3y^3}{2x^4} \times \frac{4xy^3}{6y} \times \frac{3x^2}{xy^3}$ (4)

4.1.2 $\sqrt[3]{\frac{54x^6}{2x^3}} - \sqrt{\frac{8x^2y^3}{2y}}$ (3)

4.1.3 $\frac{y+4}{3} - \frac{3y+2}{4}$ (4)

4.1.4 $\frac{(x+3)(x-2)}{4-2x}$ (3)

4.1.5 $-3(x+2) + 4x - 3 + 2(2x-1)$ (3)

4.2 Solve for x .

4.2.1 $3(x+1) = 2x+3$ (3)

4.2.2 $\frac{2x+1}{3} = 5 - \frac{1}{2}x$ (5)

4.2.3 $2^{x+1} = 16$ (3)

4.3 If I multiply a certain number by 5, I get the same answer as when I subtract the number from 48. What is the number? (3)

[31]

QUESTION 5

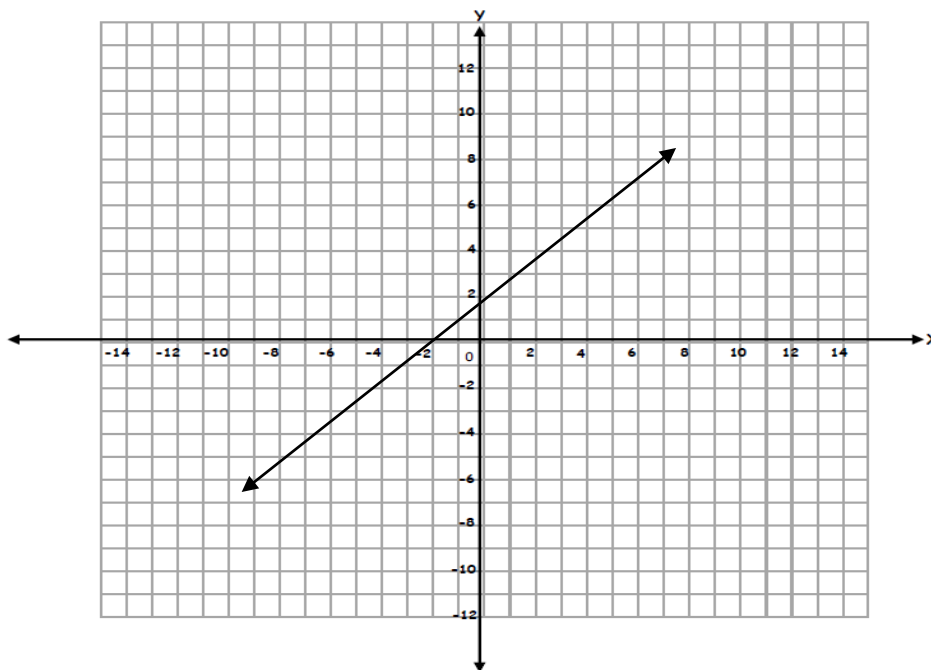
5.1 A straight line graph is defined by $4x + 2y = -3$.

5.1.1 Determine the X-intercept of the graph. (2)

5.1.2 Determine the Y-intercept of the graph. (1)

5.1.3 Draw the graph showing all your intercepts. Use **ANSWER SHEET B**. (2)

5.2 Study the straight line graph below and answer the questions that follow.



5.2.1 Calculate the gradient of the graph. (2)

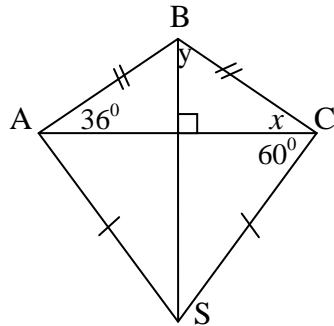
5.2.2 Determine the equation of the graph and write it in the form $y = mx + c$. (2)

[9]

QUESTION 6

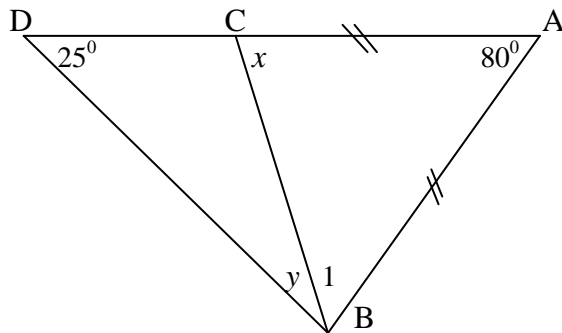
6.1 Determine with reasons, the sizes of angles x and y in each diagram below.

6.1.1



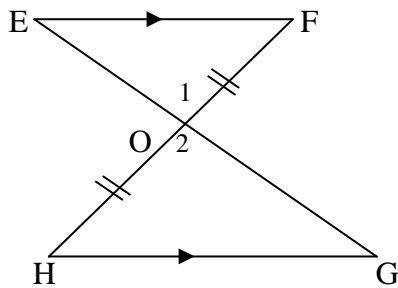
(4)

6.1.2



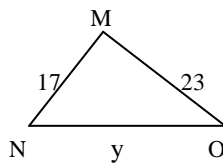
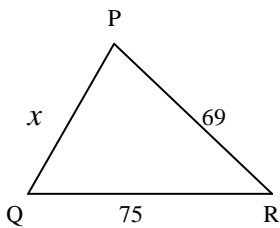
(4)

6.2 Study the sketch below and prove that $\triangle EFO \cong \triangle GHO$, with reasons.



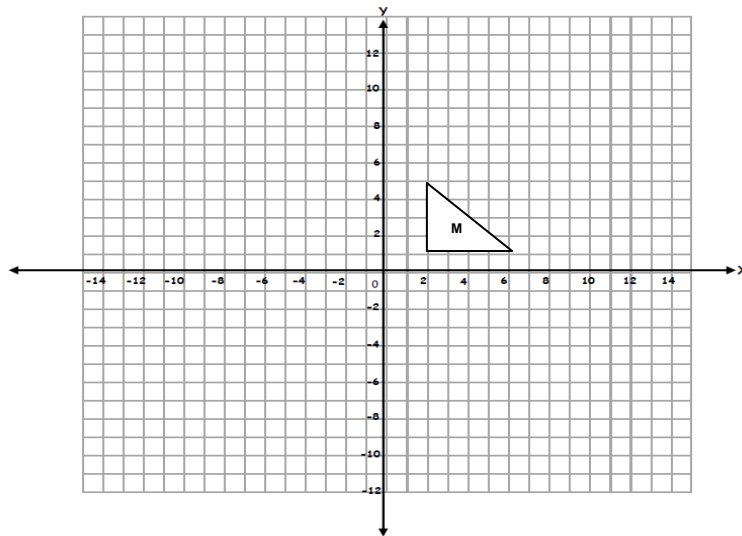
(4)

6.3 Given, $\triangle PQR \sim \triangle MNO$. Find the lengths of unknown sides, x and y .



(5)

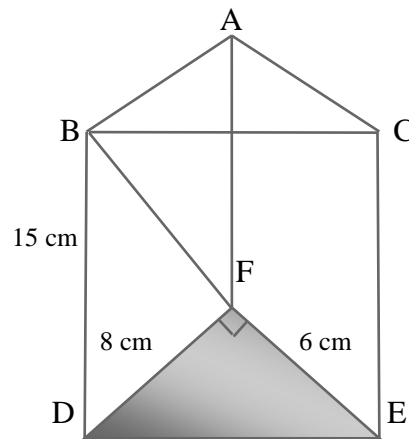
- 6.4 Enlarge ΔM with a scale factor 2. $O(0; 0)$ is the Centre of enlargement. Use **ANSWER SHEET C**.



(3)
[20]

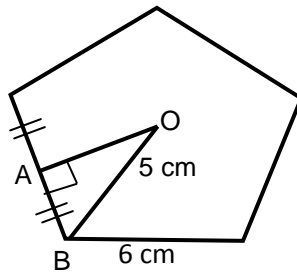
QUESTION 7

- 7.1 A triangular prism is shown in the figure below. The base is a right-angled triangle with $DF = 8$ cm, $FE = 6$ cm and the height 15 cm.



- 7.1.1 Calculate the area of ΔDEF . (2)
- 7.1.2 Calculate the volume of the prism. (2)

7.2 Given, a regular pentagon with sides of 6 cm.



7.2.1 Calculate the perimeter of the pentagon. (1)

7.2.2 Calculate the length of OA. (3)

7.2.3 Calculate the area of the regular pentagon. (3)

[11]

QUESTION 8

A survey was conducted to test the relationship between the hand and shoe size. The table below shows 10 measurements of different hand lengths and shoe sizes.

Hand length	5	7	2	9	6	7	4	9	8	5
Shoe size	12	13	10	15	12	15	11	16	15	11

8.1 Use **ANSWER SHEET D** to draw a scatter plot using the information in the table. (4)

8.2 Draw a line of best fit. (1)

8.3 What conclusion can you draw about the relationship between a hand length and a shoe size? (1)

8.4 Find the mode for the shoe size. (1)

8.5 Calculate the mean for the shoe size. (2)

8.6 Determine the range for the hand size. (1)

[10]

TOTAL: 120

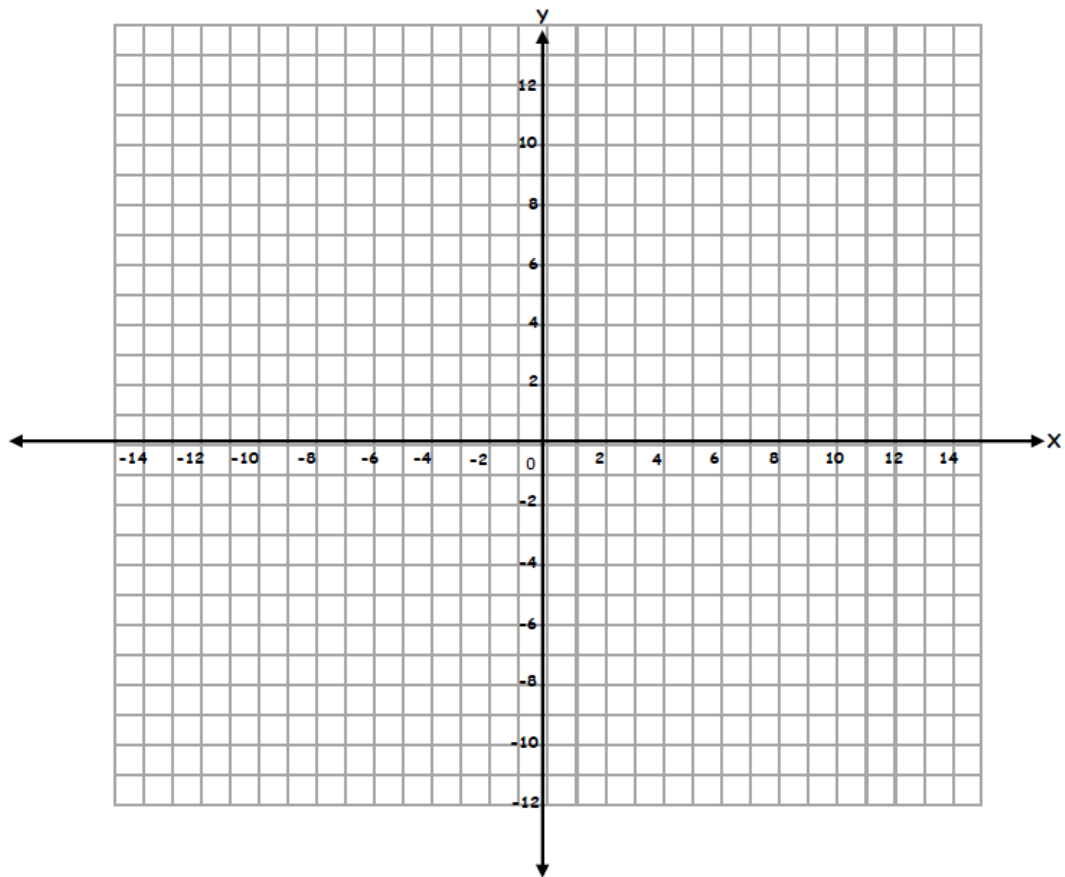
FORMULA SHEET

<p>Simple Interest:</p> $I = \frac{Prn}{100}$ $A = P(1 + in)$ $A = P\left(1 + \frac{rn}{100}\right)$	<p>Compound Interest:</p> $A = P(1 + i)^n$ $A = P\left(1 + \frac{r}{100}\right)^n$
--	--

	Perimeter	Area
Square	$4(l)$	l^2
Rectangle	$2(l + b)$	$l \times b$
Circle	$2\pi r$	πr^2
Triangle	$(s1 + s2 + s3)$	$\frac{1}{2}b \times \perp h$
Parallelogram	$2(b + l)$	$b \times \perp h$
Trapezium	Sum of the 4 sides	$\frac{1}{2}(a + b) \times \perp h$ a and b = parallel lines
Rhombus	$4l$	$b \times \perp h$
Kite	$2(a + b)$ a and b = length of equal sides	$\frac{1}{2} \times d_1 d_2$ d_1 and d_2 = diagonals

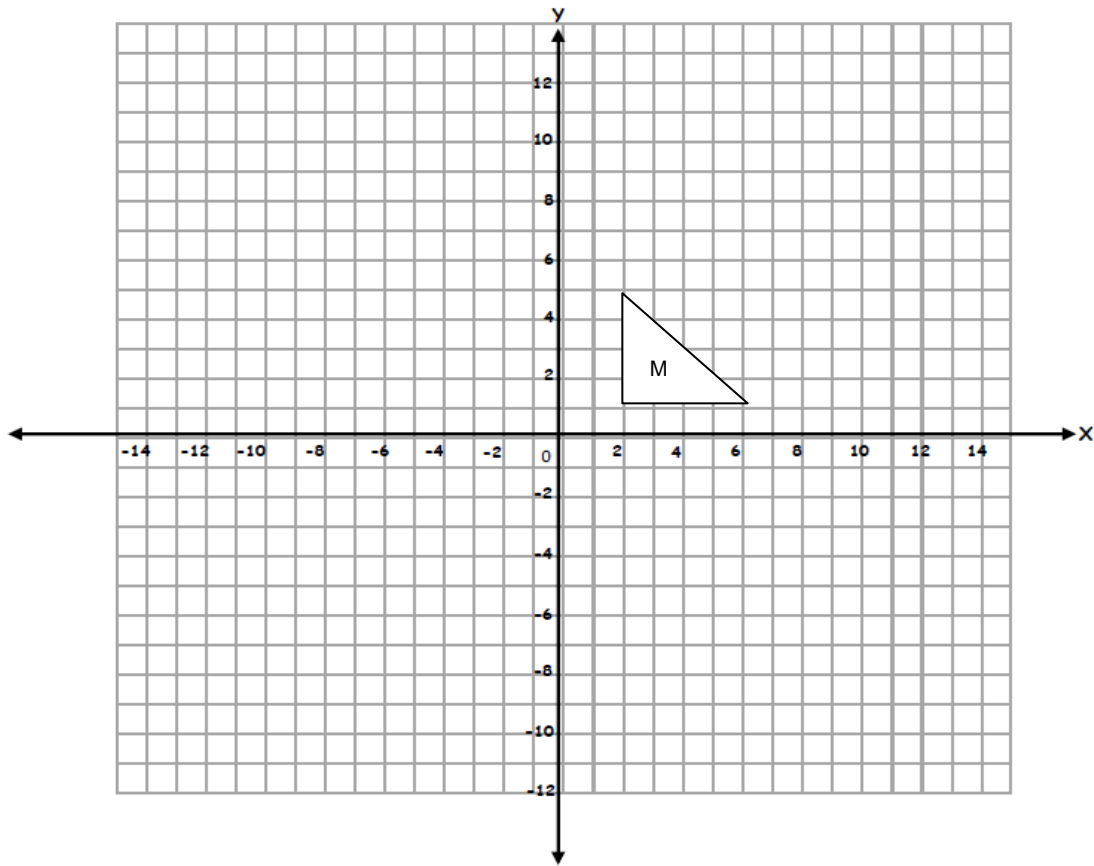
QUESTION 5.1.3

ANSWER SHEET B



QUESTION 6.4

ANSWER SHEET C



Memo

SECTION A

QUESTION 1

1.1	B	✓
1.2	D	✓
1.3	D	✓
1.4	C	✓
1.5	D	✓
1.6	D	✓
1.7	B	✓
1.8	C	✓
1.9	B	✓
1.10	C	✓

[10]

SECTION B

QUESTION 2

2.1 $b = 5$ ✓ (1)

2.2 R800 ✓ (1)

2.3 $3\sqrt{2}$ ✓ (1)

2.4 $(2x)^3 \times -2x^2$
 $8x^3 \times -2x^2$ ✓
 $-16x^5$ ✓ (2)

2.5 $P = A(1+i)^n$ ✓
 $= 2000(1+0,06)^5$ ✓
 $= R2676,45$ ✓ (3)

$$2.6 \quad I = \frac{Pnr}{100}$$

$$675 = \frac{2500 \times n \times 9}{100} \checkmark$$

$$675 = 225n \checkmark$$

$$n = \frac{675}{225}$$

$$n = 3 \checkmark$$

It took her 3 years. (3)

$$2.7 \quad 5 + 6 + 7 = 18 \checkmark$$

The size $= \frac{7}{18} \times 180^\circ \checkmark$

$$= 70^\circ \checkmark$$

(3)
[14]

QUESTION 3

3.1 3.1.1

Figure	1	2	3	4
Number of Triangles	4	8	12 \checkmark	16 \checkmark

(2)

3.1.2 Add 4 to each term to get the next term. \checkmark (1)

$$3.1.3 \quad T_n = 4 = 4(1)$$

$$T_n = 8 = 4(2)$$

$$T_n = 12 = 4(3)$$

$$T_n = 4n \checkmark$$

(1)

$$3.2 \quad 3.2.1 \quad 3p^2q + 15pq^2 - 12pq$$

$$= 3pq \checkmark (p + 5q - 4) \checkmark$$

(2)

$$3.2.2 \quad 3x(x - 3) + 2(3 - x)$$

$$= 3x(x - 3) - 2(x - 3) \checkmark \checkmark$$

$$= (x - 3)(3x - 2) \checkmark$$

(3)

$$3.2.3 \quad 75x^3 - 12x$$

$$= 3x \checkmark (25x^2 - 4) \checkmark$$

$$= 3x(5x - 2)(5x + 2) \checkmark$$

(3)

$$3.3 \quad = 2(3)^2 + 5(3) - 12 \checkmark$$

$$= 18 + 15 - 12 \checkmark$$

$$= 21 \checkmark$$

(3)
[15]

QUESTION 4

4.1 Simplify.

$$\begin{aligned} 4.1.1 \quad \frac{2x^3y^3}{2x^4} \times \frac{4xy^3}{6y} \times \frac{3x^2}{xy^3} & \quad \text{OR} \quad \frac{6x^2y^5}{3xy^3} \checkmark\checkmark\checkmark \quad \text{OR} \quad \frac{24x^6y^6}{12x^5y^4} \checkmark\checkmark\checkmark \\ & = \frac{y^3}{x} \times \frac{2xy^2}{3} \times \frac{3x}{y^3} \checkmark\checkmark\checkmark \\ & = 2xy^2 \checkmark \end{aligned} \tag{4}$$

$$\begin{aligned} 4.1.2 \quad \sqrt[3]{\frac{54x^6}{2x^3}} - \sqrt{\frac{8x^2y^3}{2y}} \\ & = \sqrt[3]{27x^3} \checkmark - \sqrt{4x^2y^2} \checkmark \\ & = 3x - 2xy \checkmark \end{aligned} \tag{3}$$

$$\begin{aligned} 4.1.3 \quad \frac{y+4}{3} - \frac{3y+2}{4} \\ & = \frac{4(y+4) - 3(3y+2)}{12} \checkmark\checkmark \\ & = \frac{4y+16-9y-6}{12} \checkmark \\ & = \frac{-5y+10}{12} \checkmark \end{aligned} \tag{4}$$

$$\begin{aligned} 4.1.4 \quad \frac{(x+3)(x-2)}{4-2x} \\ & = \frac{(x+3)(x-2)}{-2(x-2)} \checkmark\checkmark \\ & = -\frac{(x+3)}{2} \checkmark \end{aligned} \tag{3}$$

$$\begin{aligned} 4.1.5 \quad -3(x+2) + 4x - 3 + 2(2x-1) \\ & = -3x - 6 \checkmark + 4x - 3 + 4x - 2 \checkmark \\ & = 5x - 11 \checkmark \end{aligned} \tag{3}$$

$$\begin{aligned}
 4.2.1 \quad & 3(x+1) = 2x+3 \\
 & 3x+3 = 2x+3 \checkmark \\
 & 3x-2x = 3-3 \checkmark \\
 & x = 0 \checkmark
 \end{aligned}
 \tag{3}$$

$$\begin{aligned}
 4.2.2 \quad & \frac{2x+1}{3} = 5 - \frac{1}{2}x \\
 & \frac{2x+1}{3} \times 6 = 5 \times 6 - \frac{1}{2}x \times 6 \checkmark \\
 & 2(2x+1) = 30 - 3x \checkmark \\
 & 4x+2 = 30 - 3x \checkmark \\
 & 7x = 28 \checkmark \\
 & x = 4 \checkmark
 \end{aligned}
 \tag{5}$$

$$\begin{aligned}
 4.2.3 \quad & 2^{x+1} = 16 \\
 & 2^{x+1} = 2^4 \checkmark \\
 & x+1 = 4 \checkmark \\
 & x = 3 \checkmark
 \end{aligned}
 \tag{3}$$

$$\begin{aligned}
 4.3 \quad & 5x = 48 - x \checkmark \\
 & 6x = 48 \checkmark \\
 & x = 8 \checkmark \text{ The number is 8.}
 \end{aligned}
 \tag{3}$$

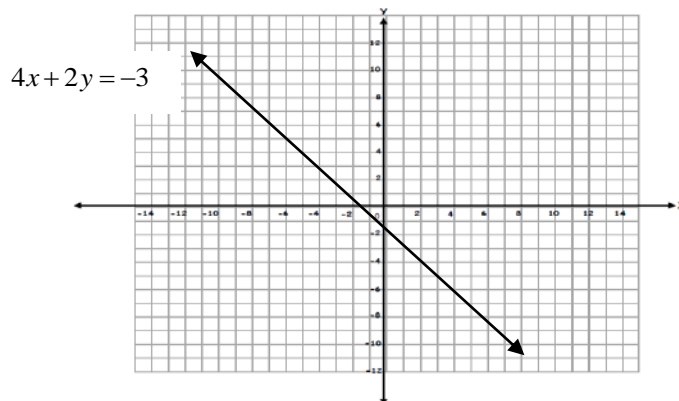
[31]

QUESTION 5

$$\begin{aligned}
 5.1 \quad 5.1.1 \quad & 4x + 2(0) = -3 \checkmark \\
 & 4x = -3 \\
 & x = -\frac{3}{4} \\
 & \left(-\frac{3}{4}; 0\right) \checkmark \quad \text{OR} \quad (-0,75; 0)
 \end{aligned}
 \tag{2}$$

$$5.1.2 \quad \left(0; -\frac{3}{2}\right) \checkmark \quad \text{OR} \quad (0; -1,5)
 \tag{1}$$

5.1.3



(2)

$$5.2 \quad 5.2.1 \quad m = \frac{\Delta y}{\Delta x} = \frac{2}{2} \checkmark \quad \text{OR} \quad m = \frac{2-0}{0-(-2)} = 1 \quad (2)$$

$$= 1 \checkmark$$

$$5.2.2 \quad y = x + 2 \checkmark \checkmark \quad (2)$$

[9]

QUESTION 6

$$6.1 \quad 6.1.1 \quad \begin{array}{ll} x = 36^\circ \checkmark & [\text{angles opposite equal sides}] \checkmark \quad (1/2) \\ y = 90^\circ - 36^\circ \checkmark & [\text{sum of angles of a triangle}] \checkmark \quad (1/2) \\ y = 54^\circ \checkmark & \end{array} \quad (4)$$

$$6.1.2 \quad \text{In } \triangle CAB \quad \begin{array}{ll} x = \hat{B} \checkmark \quad (1/2) & [\text{angles opposite equal sides}] \checkmark \quad (1/2) \\ 2x = 180^\circ - 80^\circ \checkmark \quad (1/2) & [\text{sum of angles of a triangle}] \checkmark \quad (1/2) \\ x = 50^\circ \checkmark \quad (1/2) & \\ x = y + 25^\circ \checkmark \quad (1/2) & [\text{exterior angle of a triangle}] \checkmark \quad (1/2) \\ y = 50 - 25^\circ \checkmark \quad (1/2) & \\ y = 25^\circ \checkmark \quad (1/2) & \end{array} \quad (4)$$

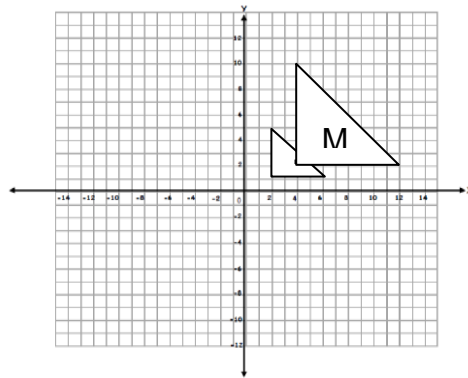
$$6.2 \quad \begin{array}{ll} \hat{E} = \hat{G} \checkmark \quad (1/2) & [\text{alternate angles; } EF \parallel HG] \checkmark \quad (1/2) \\ \hat{F} = \hat{H} \checkmark \quad (1/2) & [\text{alternate angles; } EF \parallel HG] \checkmark \quad (1/2) \end{array}$$

$$\left(\begin{array}{l} \text{OR} \\ \hat{O}_1 = \hat{O}_2 \text{ vertical opposite angles} \\ \therefore \triangle EFO \equiv \triangle GHO \checkmark \quad (1/2) \quad [\text{AAS}] \checkmark \quad (1/2) \end{array} \right)$$

$$FO = OH \checkmark \quad (1/2) \quad [\text{given}] \checkmark \quad (1/2) \quad (4)$$

$$6.3 \quad \begin{array}{l} \frac{x}{17} = \frac{69}{23} \checkmark \\ x = 17 \times 3 = 51 \checkmark \checkmark \\ \frac{y}{75} = \frac{23}{69} \checkmark \\ 3y = 75 \\ y = 25 \checkmark \end{array} \quad (5)$$

6.4



✓✓✓ (1 mark for each vertex)

(3)

[20]

QUESTION 7

$$7.1.1 \quad \text{Area } \triangle DEF = \frac{1}{2} \times 8 \text{ cm} \times 6 \text{ cm} \checkmark$$

$$= 24 \text{ cm}^2 \checkmark$$

(2)

$$7.1.2 \quad V = \text{Area of base} \times \text{height}$$

$$= 24 \text{ cm}^2 \times 15 \text{ cm} \checkmark$$

$$= 360 \text{ cm}^3 \checkmark$$

(2)

$$7.2.1 \quad \text{Perimeter} = 5 \times 6 \text{ cm} = 30 \text{ cm} \checkmark$$

(1)

$$7.2.2 \quad OA^2 = OB^2 - AB^2$$

$$OA^2 = (5 \text{ cm})^2 - (3 \text{ cm})^2 \checkmark$$

$$OA^2 = 25 \text{ cm}^2 - 9 \text{ cm}^2$$

$$OA^2 = 16 \text{ cm}^2 \checkmark$$

$$OA = 4 \text{ cm} \checkmark$$

(3)

$$7.2.3 \quad A = 10 \text{ (Area of } \triangle AOB) \checkmark$$

$$= 10 \left(\frac{1}{2} \times 3 \text{ cm} \times 4 \text{ cm} \right) \checkmark$$

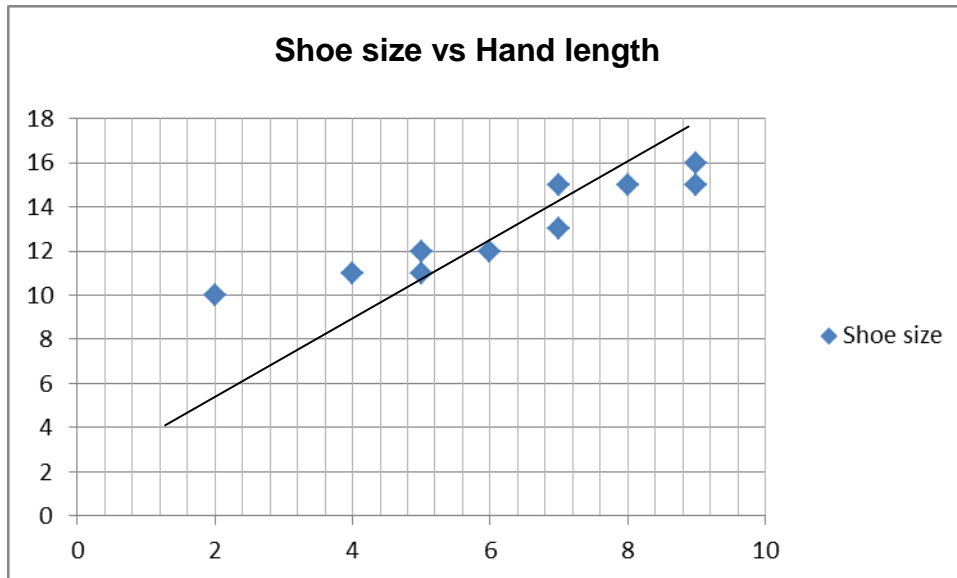
$$= 60 \text{ cm}^2 \checkmark$$

(3)

[11]

QUESTION 8

8.1



✓✓✓✓

(4)

8.2 For line of best fit see the graph. ✓

(1)

8.3 The length of the hand is in direct proportion with the shoe size. ✓

(1)

8.4 Mode = 15 ✓

(1)

8.5 Calculate the mean for the shoe size.

$$\text{Mean} = \frac{12 + 13 + 10 + 15 + 12 + 15 + 11 + 16 + 15 + 11}{10} \checkmark$$

$$= 13 \checkmark$$

(2)

8.6 Range = $9 - 2 = 7$ ✓

(1)

[10]

TOTAL: 120

PolyMathic

Paper 7

Oct/Nov

Algebra and
Geometry

(Q1 - Combined)

(Q2 - Q5: Algebra)

(Q6 - Q8: Geometry)

PolyMathic

SECTION A

QUESTION 1

Circle the letter of the correct answer from the four possible answers.

1.1 Which of the following numbers is a rational number?

A $\sqrt{-4}$

B 0,141141114

C $\sqrt[3]{-8}$

D π

(1)

1.2 Simplify $5,6 + 1,2 \times 3$

A 9,2

B 20,4

C 41,6

D 204

(1)

1.3 The next term in the sequence 1 ; 1 ; 1 ; 4 ; 1 ; 9 ; 1 ; ... , is ...

A 1.

B 16.

C 14.

D 10.

(1)

1.4 Complete the statement: The expression $\frac{2x+5}{3} \times \frac{4x+1}{7}$ has ... terms.

A 1

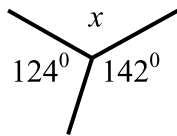
B 4

C 2

D 5

(1)

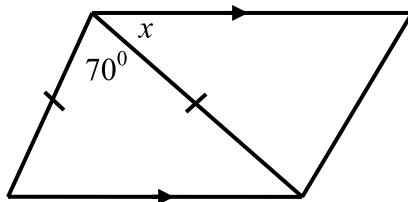
1.5 The value of x in the figure below is:



- A 38°
- B 56°
- C 94°
- D 90°

(1)

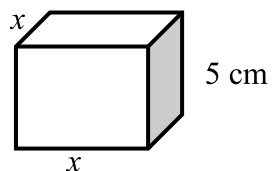
1.6 The value of x is:



- A 70°
- B 110°
- C 30°
- D 55°

(1)

1.7 The volume of the given prism is:



- A $5x^2 cm^3$
- B $5x^2 cm^2$
- C $10x cm^3$
- D $(2x + 5)cm^3$

(1)

1.8 If the perimeter of a square is 20 cm, then the area of the square is equal to:

- A $400 cm^2$
- B $25 cm^2$
- C $5 cm^2$
- D $100 cm^2$

(1)

1.9 The median of a set of data is the:

- A Biggest number – smallest number
- B Middle number
- C Most common number
- D Average of the data

(1)

1.10 In how many ways can you arrange the four cards side by side as shown below?



- A 32
- B 24
- C 16
- D 8

(1)

[10]

SECTION B

QUESTION 2

2.1 An amount of R15 000 is invested for 5 years at compound interest of 8% per annum.

2.1.1 What is the total value of the investment after 1 year?

(2)

2.1.2 Calculate the total value of the investment after 5 years.

(3)

2.2 Calculate $\sqrt[3]{-64} + (-3)^2$ without using a calculator.

(2)

2.3 A recipe needs $\frac{3}{4}$ cups of sugar, $1\frac{1}{2}$ cups of flour and a $\frac{1}{3}$ cup of milk.

Write the ratio of the ingredients in the simplest form.

(2)

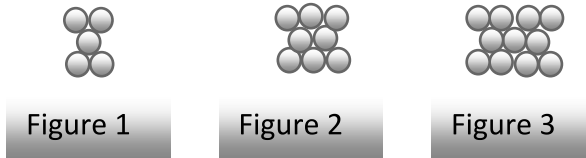
2.4 A large truck uses 16,5 litres of diesel per 100 kilometres. Calculate how much diesel the truck will need to travel 1 284 km.

(3)

[12]

QUESTION 3

3.1 Study the pattern below and answer the questions that follow.



3.1.1 How many balls must be added to draw the next figure? (1)

3.1.2 Draw and complete the table in your answer book.

Figure	1	4	5
Number of balls	5		

(2)

3.1.3 Is the general rule $T_n = 3(n-1) + 5$ correct to determine the number of balls for any figure in the pattern? Prove your answer by finding the general rule using the table above. (3)

3.2 Is the following statement correct? Show by calculation to prove your answer.

$$(2x-1)^2 = 4x^2 + 1 \quad (2)$$

[8]

QUESTION 4

4.1 Subtract $4x^2 - 3$ from $-2(2x^2 - 3x + 5)$ (3)

4.2 Simplify.

4.2.1 $-\frac{b^3}{12}(4b - \frac{2ab}{6} + 12)$ (3)

4.2.2 $\frac{4x^3 - 2x(3x^2)}{2x^3}$ (3)

4.3 Factorise fully.

$$x(a+y) - (y+a) \quad (2)$$

4.4 Solve the following equations.

4.4.1 $2(x+2) - (x-3) = 5$ (4)

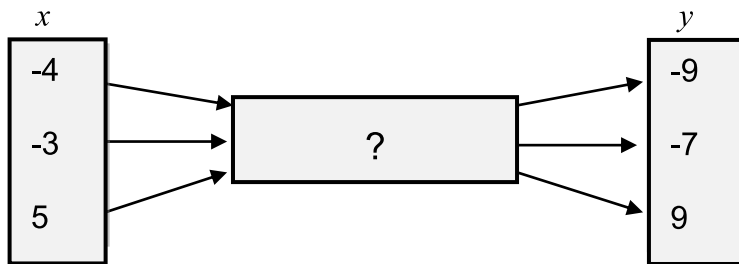
4.4.2 $\frac{2x}{x+1} + \frac{2x}{1-x} = \frac{1}{x^2-1}$ (5)

4.4.3 $10^x = 0,0001$ (2)

4.5 The sum of three consecutive even numbers is 78. Determine the three numbers. (5)
[27]

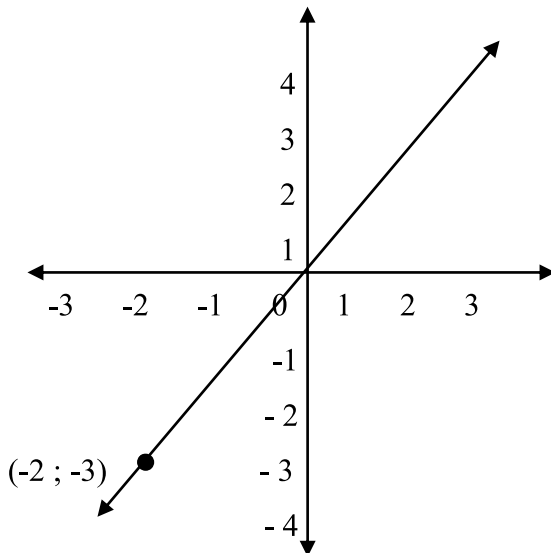
QUESTION 5

5.1 Determine the rule for the following flow diagram.



(2)

5.2 Calculate the gradient of a line through the points (0 ; 0) and (-2 ; -3).



(2)

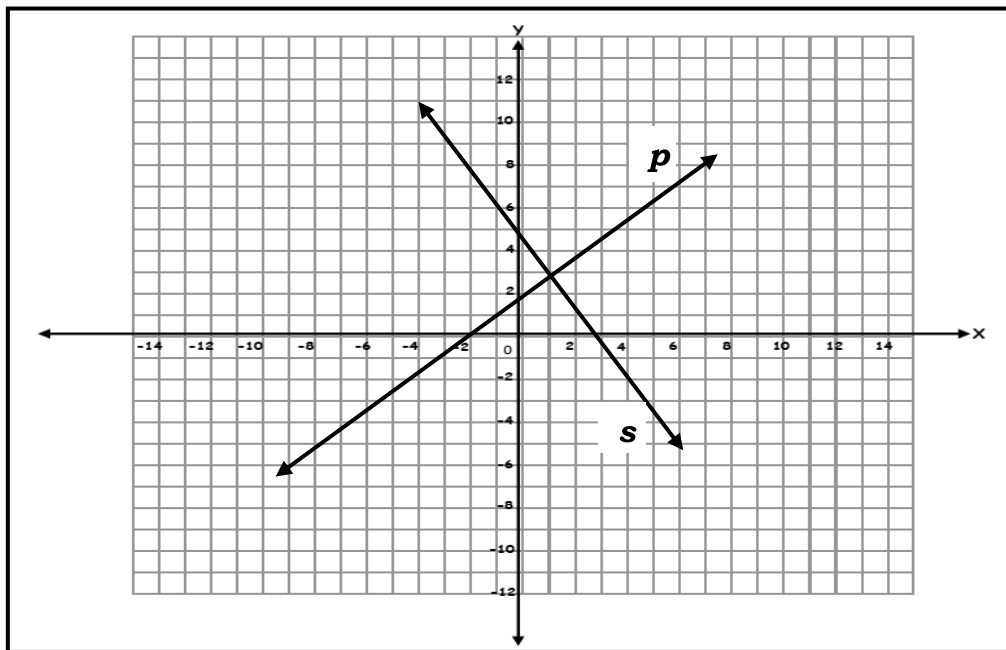
5.3 The equation $y-1 = 2(x-2)$ defines a straight line graph.

5.3.1 Write down the y-intercept of the graph. (1)

5.3.2 Calculate the x-intercept of the graph. (3)

5.3.3 Draw the graph in your answer book. (2)

5.4 Study the graph below and answer the questions that follow.



5.4.1 Which of the two graphs, p or s has a positive gradient? Explain.

(2)

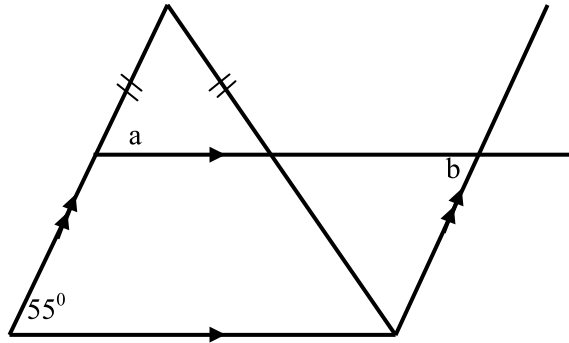
5.4.2 The equation of p is $y = x + 2$. If $p \perp s$ and the y -intercept of s is the point $(0 ; 5)$, determine the equation of s .

(2)

[14]

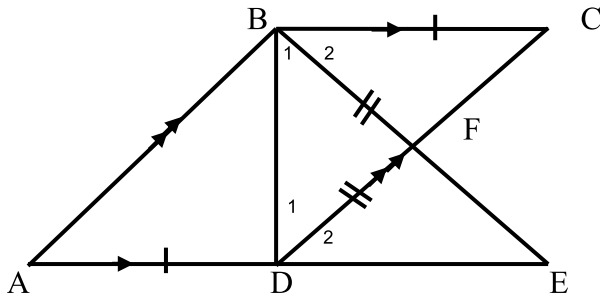
QUESTION 6

6.1 Determine with reasons, the sizes of angles a and b in the diagram below.



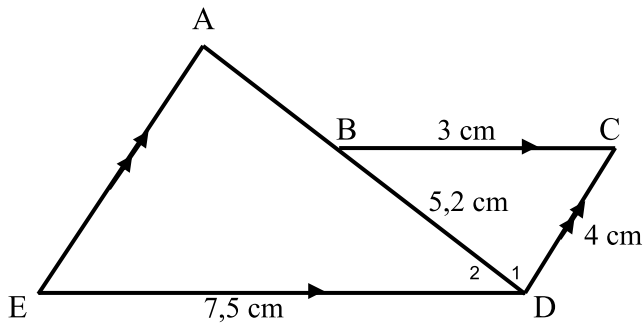
(4)

6.2 $AB = BE$ and $BF = FD$. Prove that $DC = BE$.



(4)

6.3 Study the diagram below and answer the questions that follow.



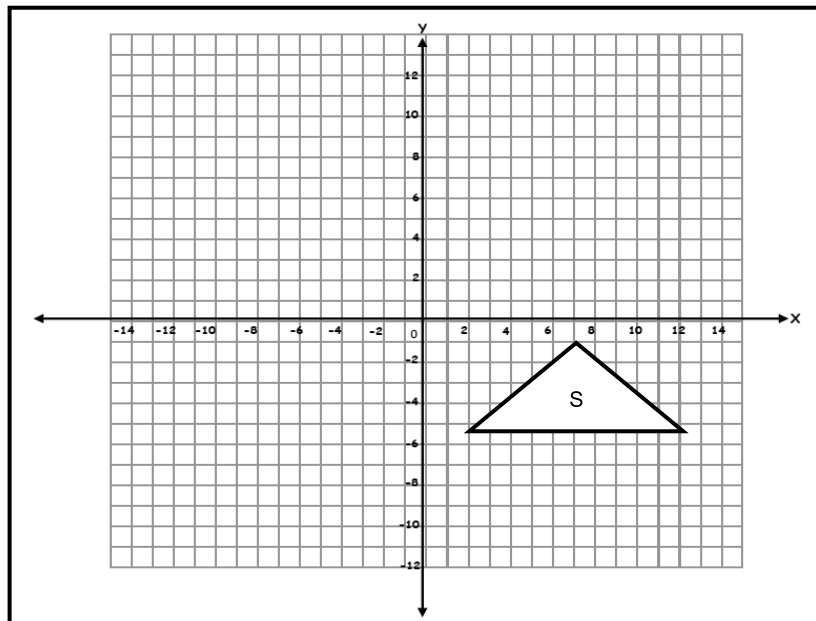
6.3.1 Prove that $\triangle AED \parallel \triangle DCB$.

(6)

6.3.2 Hence, find the length of AD.

(4)

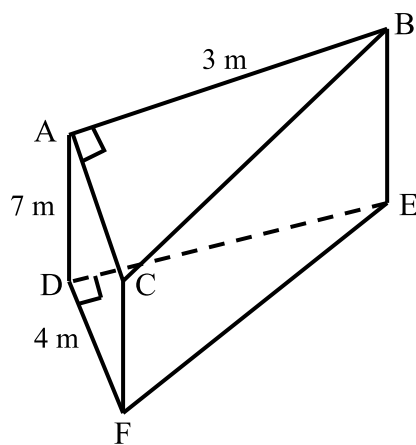
- 6.4 Draw the image of ΔS after a rotation of 90° anticlockwise about the origin $O(0; 0)$.
Use ANSWER SHEET B to answer this question.



(3)
 [21]

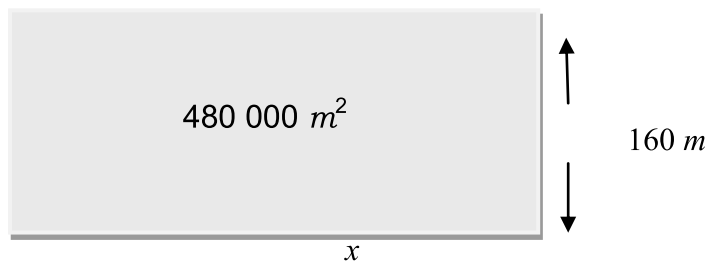
QUESTION 7

- 7.1 Study the prism below and answer the questions that follow.



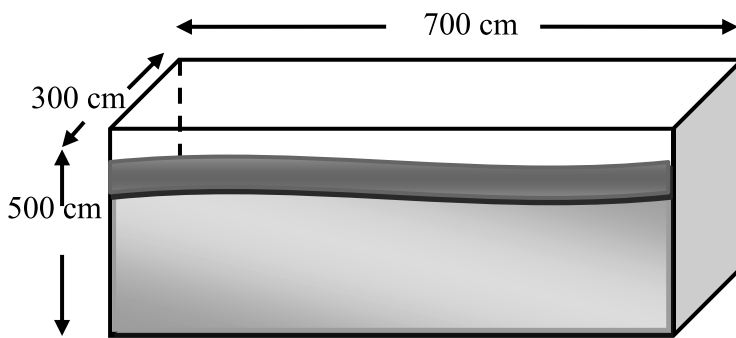
- 7.1.1 Find the length of BC. (4)
- 7.1.2 Draw the net of the prism in your answer book. (1)
- 7.1.3 Calculate the surface area of the prism. (3)

7.2 A field, $480\,000\text{ m}^2$ is 160 m wide. What length of fencing is needed to fence it?



(4)

7.3 A rectangular fish tank with an open top is shown below.



7.3.1 Calculate the volume of the tank.

(2)

7.3.2 How many litres of water do we need to fill the tank?

(2)

[16]

QUESTION 8

8.1 A set of data below are marks obtained by Grade 9 learners in one of their Mathematics tests. The test was out of 50 marks.

4, 12, 16, 8, 16, 24, 32, 12, 24, 36, 48, 16, 32, 48

8.1.1 Calculate the mean and median of the data.

(3)

8.1.2 What is the mode?

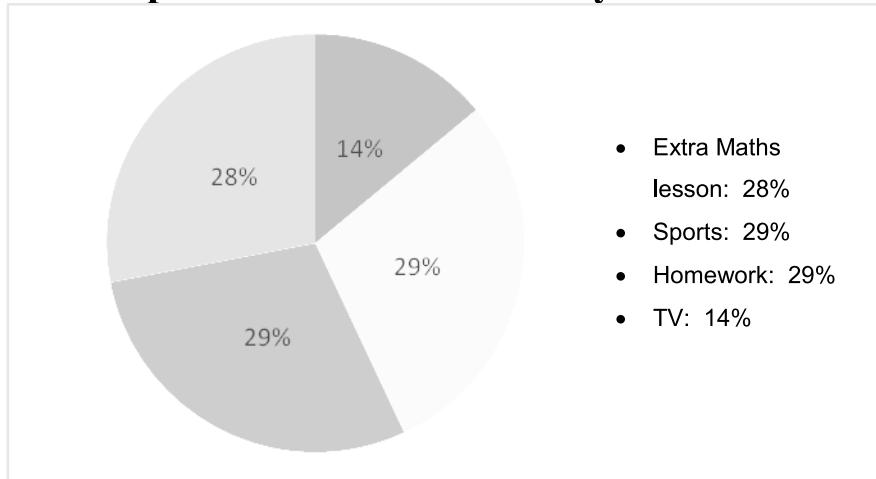
(1)

8.1.3 Calculate the range.

(1)

8.2 The chart below represents Siphó's daily activities after school from Monday to Friday of each week. He has seven hours daily to run all these activities.

Siphó's after school activity schedule



8.2.1 On which activity does he spend the most of his time? How many hours does he spend on this activity? (2)

8.2.2 On which activity does he spend the least time? How many hours does he spend on this activity? (2)

8.3 Two red, one white and three blue marbles are put into a bag. If you put your hand once into the bag without looking and pull out one marble, what is the probability of:

8.3.1 Pulling out a blue marble? (2)

8.3.2 Not pulling out a white marble? (1)
[12]

TOTAL: 120

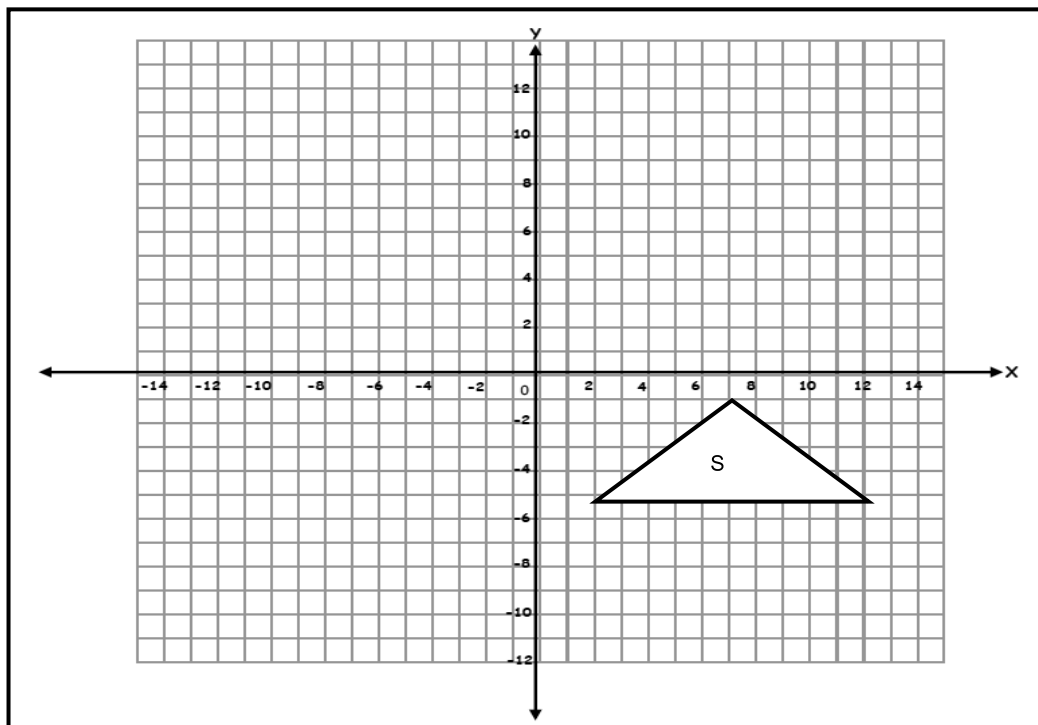
FORMULA SHEET

<p>Simple Interest:</p> $I = \frac{Prn}{100}$ $A = P(1 + in)$ $A = P\left(1 + \frac{rn}{100}\right)$	<p>Compound Interest:</p> $A = P(1 + i)^n$ $A = P\left(1 + \frac{r}{100}\right)^n$
--	--

	Perimeter	Area
Square	$4(l)$	l^2
Rectangle	$2(l + b)$	$l \times b$
Circle	$2\pi r$	πr^2
Triangle	$(s_1 + s_2 + s_3)$	$\frac{1}{2}b \times \perp h$
Parallelogram	$2(b + l)$	$b \times \perp h$
Trapezium	Sum of the 4 sides	$\frac{1}{2}(a + b) \times \perp h$ a and b = parallel lines
Rhombus	$4l$	$b \times \perp h$
Kite	$2(a + b)$ a and b = length of equal sides	$\frac{1}{2} \times d_1 d_2$ d ₁ and d ₂ = diagonals

ANSWER SHEET B

QUESTION 6.4



Memo

SECTION A

QUESTION 1

1.1	C	✓
1.2	A	✓
1.3	B	✓
1.4	A	✓
1.5	C	✓
1.6	D	✓
1.7	A	✓
1.8	B	✓
1.9	B	✓
1.10	B	✓

SECTION B

[10]

QUESTION 2

2.1 2.1.1 $P = A(1+i)^n$ ✓

(3)

$$= 15000(1+0,08)^1$$

$$= R16200$$

2.1.2 $P = A(1+i)^n$ ✓

$$= 15000(1+0,08)^5$$

$$= R22039,92115 \approx R22039,92$$

(3)

$$\begin{aligned}
 2.2 \quad & \sqrt[3]{-64} + (-3)^2 \\
 & = -4 + 9 \checkmark \\
 & = 5 \checkmark
 \end{aligned}
 \tag{2}$$

$$\begin{aligned}
 2.3 \quad & \frac{3}{4} : 1\frac{1}{2} : \frac{1}{3} \\
 & \frac{3}{4} : \frac{3}{2} : \frac{1}{3} \checkmark \\
 & 9 : 18 : 4 \checkmark
 \end{aligned}
 \tag{2}$$

$$\begin{aligned}
 2.4 \quad & \frac{16,5l}{100km} = \frac{xl}{1284km} \checkmark \\
 & 100x = 21186 \checkmark \\
 & x = 211,86 \checkmark
 \end{aligned}
 \tag{2}$$

[12]

QUESTION 3

$$3.1 \quad 3.1.1 \quad 3 \text{ Balls } \checkmark \tag{1}$$

3.1.2

Figure	1	4	5
Number of balls	5	14 \checkmark	17 \checkmark

(2)

3.1.3 Yes. \checkmark

Difference is 3

$$T_n = 3n + 2 \checkmark$$

$$3(n-1) + 5 = 3n - 3 + 5 = 3n + 2 \checkmark$$

(3)

$$3.2 \quad (2x-1)^2 = 4x^2 + 1$$

$$\text{LHS} = (2x-1)(2x-1)$$

$$= 4x^2 - 4x + 1 \checkmark$$

$$\text{Not correct} / 4x^2 + 1 \neq 4x^2 - 4x + 1 \checkmark$$

(2)

[8]

QUESTION 4

$$\begin{aligned} 4.1 \quad & -2(2x^2 - 3x + 5) - (4x^2 - 3) \\ & = -4x^2 + 6x - 10 - 4x^2 + 3 \checkmark \checkmark \\ & = -8x^2 + 6x - 7 \checkmark \end{aligned} \quad (3)$$

$$\begin{aligned} 4.2 \quad 4.2.1 \quad & -\frac{b^3}{12} \left(4b - \frac{2ab}{6} + 12 \right) \\ & = -\frac{b^4}{3} \checkmark + \frac{ab^4}{36} \checkmark - b^3 \checkmark \end{aligned} \quad (3)$$

$$\begin{aligned} 4.2.2 \quad & \frac{4x^3 - 2x(3x^2)}{2x^3} \\ & = \frac{4x^3 - 6x^3}{2x^3} \checkmark \\ & = \frac{-2x^3}{2x^3} \checkmark \\ & = -1 \checkmark \end{aligned} \quad (3)$$

$$\begin{aligned} 4.3 \quad & x(a + y) - (y + a) \\ & = x(a + y) - (a + y) \checkmark \\ & = (a + y)(x - 1) \checkmark \end{aligned} \quad (2)$$

$$\begin{aligned} 4.4 \quad 4.4.1 \quad & 2(x + 2) - (x - 3) = 5 \\ & 2x + 4 - x + 3 = 5 \checkmark \checkmark \\ & x + 7 = 5 \checkmark \\ & x = -2 \checkmark \end{aligned} \quad (4)$$

$$\begin{aligned} 4.4.2 \quad & \frac{2x}{x+1} + \frac{2x}{1-x} = \frac{1}{x^2-1} \\ & \frac{2x}{x+1} - \frac{2x}{x-1} \checkmark = \frac{1}{(x-1)(x+1)} \checkmark \\ & 2x(x-1) - 2x(x+1) = 1 \\ & 2x^2 - 2x \checkmark - 2x^2 - 2x \checkmark = 1 \\ & -4x = 1 \\ & x = -\frac{1}{4} \checkmark \end{aligned} \quad (5)$$

$$4.4.3 \quad 10^x = 0,0001$$

$$10^x = 10^{-4} \checkmark$$

$$x = -4 \checkmark$$

(2)

4.5 Let the first number be $2x$, then the second is $2x+2$ and third $2x+4$

$$\therefore 2x + 2x + 2 + 2x + 4 = 78 \checkmark$$

$$6x + 6 = 78$$

$$6x = 78 - 6$$

$$\frac{6x}{6} = \frac{72}{6}$$

$$x = 12 \checkmark$$

\therefore the numbers are $24 \checkmark$, $26 \checkmark$ and $28 \checkmark$

(5)

[27]

QUESTION 5

$$5.1 \quad y = 2x - 1 \checkmark \checkmark$$

(2)

$$5.2 \quad m = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{OR} \quad m = \frac{\Delta y}{\Delta x} \checkmark = \frac{3}{2} \checkmark$$

$$m = \frac{-3 - 0}{-2 - 0} \checkmark$$

$$= \frac{3}{2} \checkmark$$

(2)

5.3 The equation $y - 1 = 2(x - 2)$ defines a straight line graph.

$$5.3.1 \quad y\text{-intercept} = -3$$

(1)

$$5.3.2 \quad y - 1 = 2(x - 2)$$

$$0 - 1 = 2(x - 2) \checkmark$$

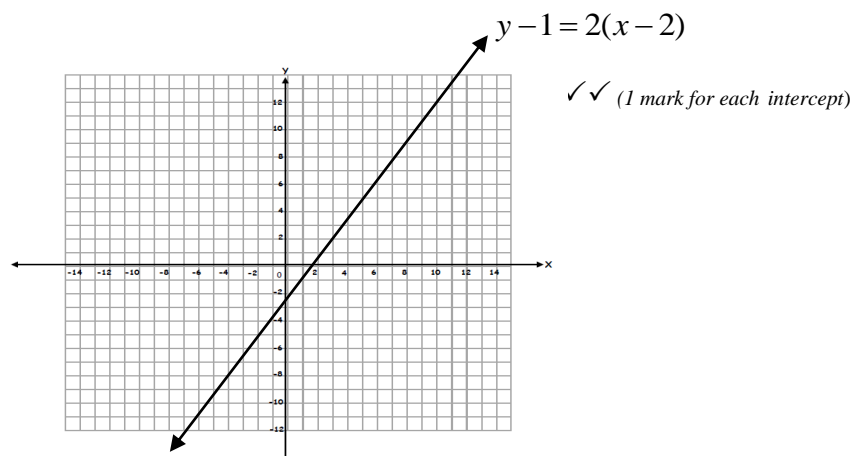
$$0 - 1 = 2x - 4$$

$$3 = 2x \checkmark$$

$$x = \frac{3}{2} \checkmark$$

(3)

5.3.3



(2)

5.4 5.4.1 *p.* ✓ Increasing graph **OR** when x increases, y also increases **OR** x and y are directly proportional ✓

(2)

5.4.2 $y = -x + 5$ ✓

(2)

[14]

QUESTION 6

6.1 $a = 55^\circ$ ✓ [corresponding angles of parallel lines] ✓

$b = 55^\circ$ ✓ [opposite angles of a parallelogram] ✓

(4)

6.2 $AB = BE$ [given] ✓

$AB = DC$ ✓ [opposite sides of a parallelogram] ✓

$\therefore DC = BE$ ✓ [both = AB] ✓

(4)

6.3 6.3.1 In $\triangle DCB$ and $\triangle AED$

$\hat{D}_1 = \hat{A}$ ✓ [alternate angles; $DC \parallel AE$] ✓

$\hat{B} = \hat{D}_2$ ✓ [alternate angles; $BC \parallel DE$] ✓

$\therefore \hat{C} = \hat{E}$ ✓ [interior angles of a triangle] ✓

$\therefore \triangle DCB \parallel \triangle AED$ [AAA]

(6)

$$6.3.2 \quad \frac{AD}{DB} = \frac{ED}{CB} \checkmark$$

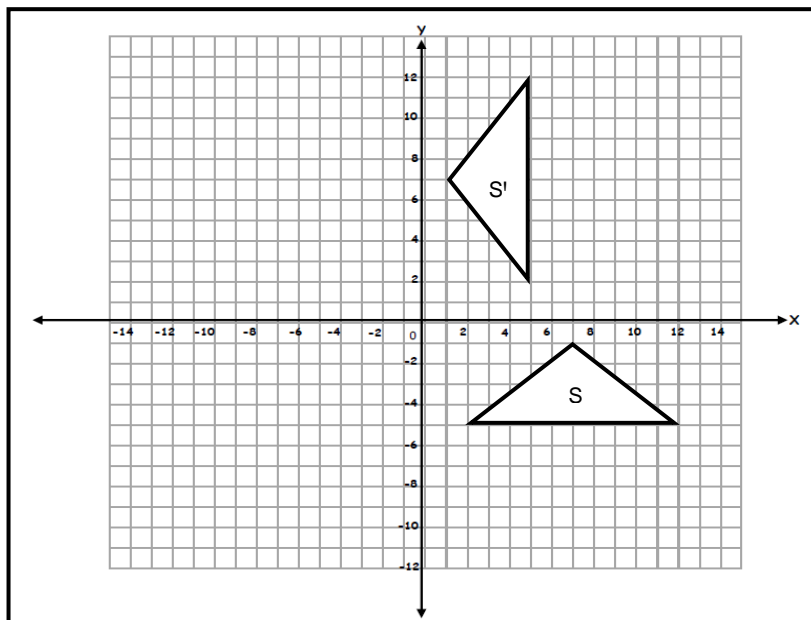
$$\frac{AD}{5,2 \text{ cm}} = \frac{7,5 \text{ cm}}{3 \text{ cm}} \checkmark$$

$$AD = 13 \text{ cm} \checkmark$$

$$\begin{aligned} \therefore AB &= 13 \text{ cm} - 5,2 \text{ cm} \\ &= 7,8 \text{ cm} \checkmark \end{aligned}$$

(4)

6.4



✓✓✓ (1 mark for each vertex of the image)

(3)
[21]

QUESTION 7

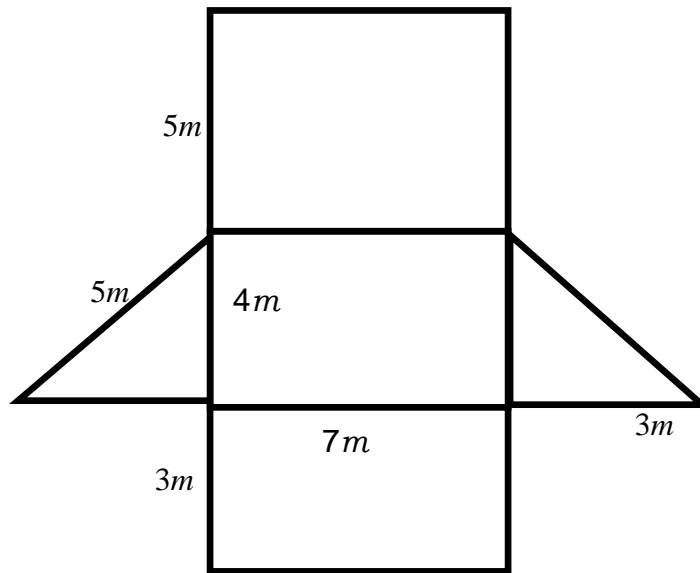
7.1 7.1.1 Find the length of BC.

$$\begin{aligned} BC^2 &= AB^2 + AC^2 \\ &= (3 \text{ m})^2 + (4 \text{ m})^2 \checkmark \\ &= 9 \text{ m}^2 + 16 \text{ m}^2 \checkmark \\ &= 25 \text{ m}^2 \checkmark \end{aligned}$$

$$BC = 5 \text{ m} \checkmark$$

(4)

7.1.2



(1)

$$\begin{aligned}
 7.1.3 \quad \text{Surface Area} &= (5 \text{ m} \times 7 \text{ m}) + (4 \text{ m} \times 7 \text{ m}) + 2\left(\frac{1}{2} \times 4 \times 3\right) + (3 \text{ m} \times 7 \text{ m}) \checkmark \\
 &= 35 \text{ m}^2 + 28 \text{ m}^2 + 12 \text{ m}^2 + 21 \text{ m}^2 \checkmark \\
 &= 96 \text{ m}^2 \checkmark
 \end{aligned}$$

(3)

7.2

$$160m \times x = 480\,000 \text{ m}^2 \checkmark$$

$$160xm = 480\,000 \text{ m}^2$$

$$x = \frac{480\,000 \text{ m}^2}{160 \text{ m}}$$

$$x = 3\,000 \text{ m} \checkmark$$

$$\text{Length needed} = 2(160 \text{ m} + 3\,000 \text{ m}) \checkmark$$

$$= 6\,320 \text{ m} \checkmark$$

(4)

$$7.3 \quad 7.3.1 \quad V = 300 \text{ cm} \times 500 \text{ cm} \times 700 \text{ cm} \checkmark$$

$$= 105\,000\,000 \text{ cm}^3 \checkmark$$

(2)

$$7.3.2 \quad \text{Amount of water} = \frac{105\,000\,000 \text{ cm}^3}{1\,000} \checkmark$$

$$= 105\,000 \text{ l} \checkmark$$

(2)

[16]

QUESTION 8

8.1.1 4, 8, 12, 12, 16, 16, **16, 24**, 24, 32, 32, 36, 48, 48 ✓

$$\text{Median} = \frac{16 + 24}{2} \checkmark$$

$$= 20 \checkmark$$

(3)

8.1.2 16 ✓

(1)

8.1.3 Range = 48 - 4 = 44 ✓

(1)

8.2 8.2.1 Both homework and sports ✓ 2 hours each OR 4 hours altogether ✓

(2)

8.2.2 Watching TV ✓ 1 hour ✓

(2)

8.3 8.3.1 $P(B) = \frac{3}{6} \checkmark = \frac{1}{2} \checkmark$

(2)

8.3.2 $P(\text{Not W}) = \frac{5}{6} \checkmark$

(1)

[12]

TOTAL: 120

PolyMathic

Paper 8

Oct/Nov

Algebra and
Geometry

(Q1 - Combined)

(Q2 - Q7: Algebra)

(Q8 - Q11: Geometry)

PolyMathic

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)

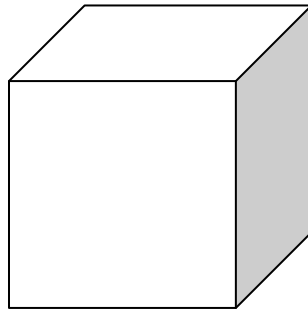
1.4 The next term in the sequence 1; 4; 9; ...; is:

- 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)

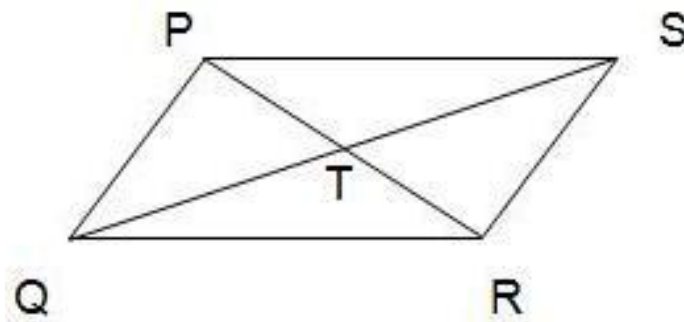
1.6 The volume of a cube below whose height is 4 cm is ...



- 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 $\triangle ABC$, $\hat{B} = 50^\circ$ and $\hat{C} = 80^\circ$. 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)

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 20th 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]

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

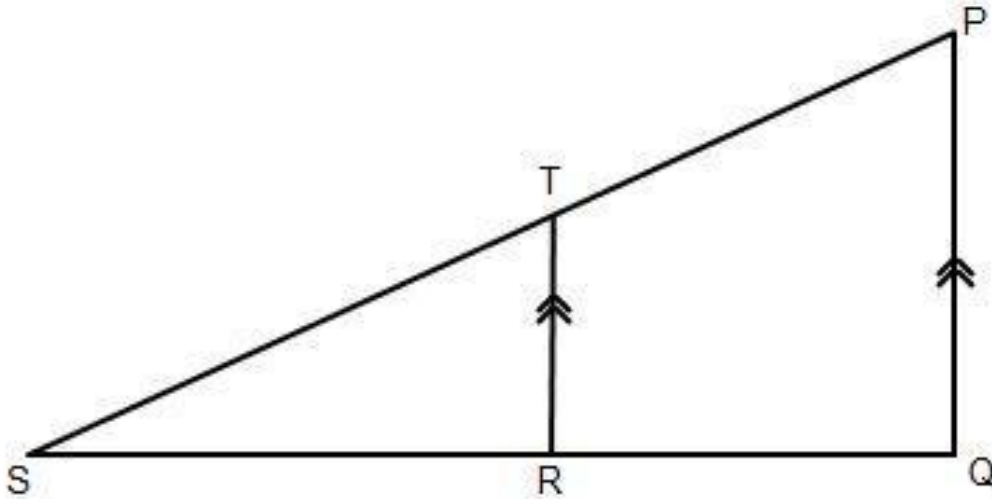
7.1 $X(-1;4)$, $Y(0;5)$, $Z(1;6)$ are points on a straight line XYZ. Determine the equation of the line. (3)

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]

QUESTION 8

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

8.1 In the diagram below, $TR \parallel PQ$, $\hat{S} = 28^\circ$, $\hat{TRS} = x + 70^\circ$ and $\hat{P} = x + 10^\circ$

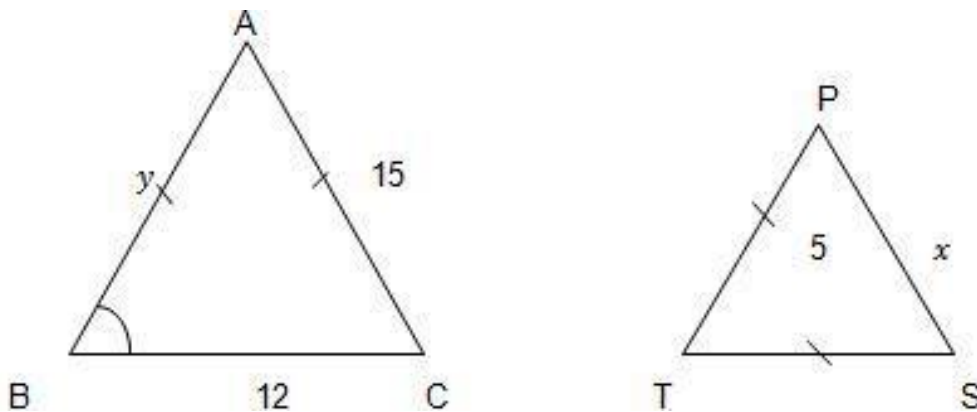


8.1.1 Calculate the value of x , giving reasons. (4)

8.1.2 Calculate the value of \hat{STR} , giving reasons. (3)

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

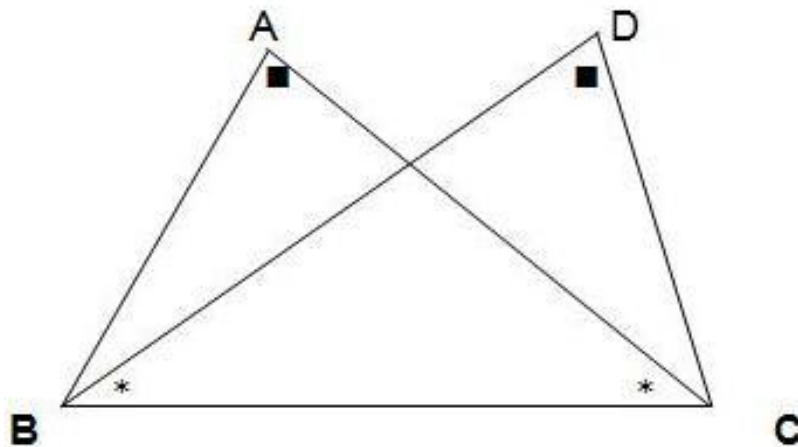
8.2 In ΔABC and ΔPTS $\hat{B} = 70^\circ$ and $\hat{P} = 70^\circ$



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

8.2.2 Determine y and x . (3)

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



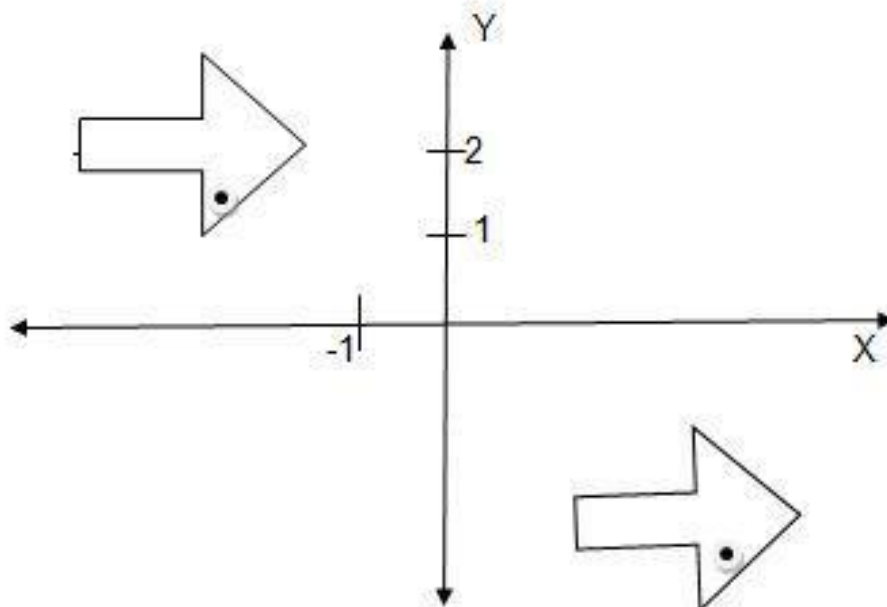
8.3.1 Prove with reasons that $\triangle ABC \cong \triangle DCB$ (4)

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 $\triangle PQR$. 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?

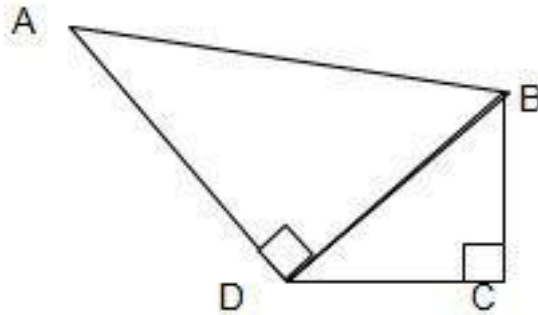


(1)
[4]

QUESTION 10

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

10.2 In the figure below $BC = 8 \text{ cm}$, $CD = 6 \text{ cm}$ and $AB = 26 \text{ cm}$. 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. (4)

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

11.2 Calculate the range of the following set of test scores. (1)
143 128 132 128 116 145 128 136 141

11.3 A coin is tossed twice: (2)
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

ANNEXURE

The image shows a full page of graph paper. At the top left, the word "ANNEXURE" is printed in a bold, black, sans-serif font. Below this, the page is filled with a grid of small squares. The grid is divided into ten horizontal sections by thicker lines. Each section contains 20 columns and 10 rows of small squares. The grid is otherwise empty, with no text or markings inside the cells.

Memo

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)

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

QUESTION 6									
6.1	$1,7 \times 10^{13} \checkmark A$	Answer: 1 mark	(1)						
6.2	$90 \text{ km/h} = \frac{7}{2} h$ $\therefore x \text{ km/h} = 3 h$ $3 \times x \text{ km/h} \checkmark = 90 \times \frac{7}{2} \checkmark M$ Average speed = $105 \text{ km/h} \checkmark A$	$3 \times x \text{ km/h}: 1 \text{ mark}$ $90 \times \frac{7}{2}: 1 \text{ mark}$ Answer: 1 mark	(3)						
6.3	S.I. = $\frac{P.n.r}{100} \checkmark M$ = $\frac{R4\,400 \times 4 \times 7}{100} \checkmark M$ = $R1\,232.00 \checkmark CA$ OR $SI = Pni \checkmark M$ = $4\,400 \times 7 \times 0,04 \checkmark M$ = $R\,1\,232,00 \checkmark CA$	Formula: 1 mark Substitution: 1 mark Answer: 1 mark	(3)						
6.4	$A = P(1 + \frac{r}{100})^n$ = $5\,600P(1 + \frac{7}{100})^4 \checkmark M$ = $R7\,340,46 \checkmark CA$ OR $A = P(1 + i)^n$ = $5\,600(1 + 0,07)^4 \checkmark M$ = $R7\,340,46 \checkmark CA$	Substitution: 1 mark Answer: 1 mark	(2)						
6.5	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center;">now</td> <td style="text-align: center;">6yrs ago</td> </tr> <tr> <td style="text-align: center;">Son is x</td> <td style="text-align: center;">$x - 6$</td> </tr> <tr> <td style="text-align: center;">Father $3x$</td> <td style="text-align: center;">$3x - 6$</td> </tr> </table> $3x - 6 = 5(x - 6) \checkmark M$ $2x = 24 \checkmark M$ $x = 12$ Son = 12 years $\checkmark A$ Father = 36 years $\checkmark CA$	now	6yrs ago	Son is x	$x - 6$	Father $3x$	$3x - 6$	Correct statement: 1 mark Calculation: 1 mark 12 years: 1 mark 36 years: 1 mark	(4)
now	6yrs ago								
Son is x	$x - 6$								
Father $3x$	$3x - 6$								
			[13]						

QUESTION 7

7.1

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

$$m = \frac{y_2 - y_1}{x_2 - x_1} \checkmark M$$

$$m = \frac{5 - 4}{0 - (-1)} \\ = 1 \checkmark M$$

y-intercept = 5

$$y = mx + 5 \\ = x + 5 \checkmark A$$

OR

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

$$m = \frac{y_2 - y_1}{x_2 - x_1} \checkmark M$$

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

y - intercept = 5

$$y = mx + 5 \\ = x + 5 \checkmark A$$

OR

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

$$m = \frac{y_2 - y_1}{x_2 - x_1} \checkmark M$$

$$m = \frac{6 - 4}{1 - (-1)} \\ = \frac{2}{2} \\ = 1 \checkmark M$$

y-intercept = 5

$$y = mx + 5 \\ = x + 5 \checkmark A$$

Calculation: 1 mark

m = 1: 1 mark

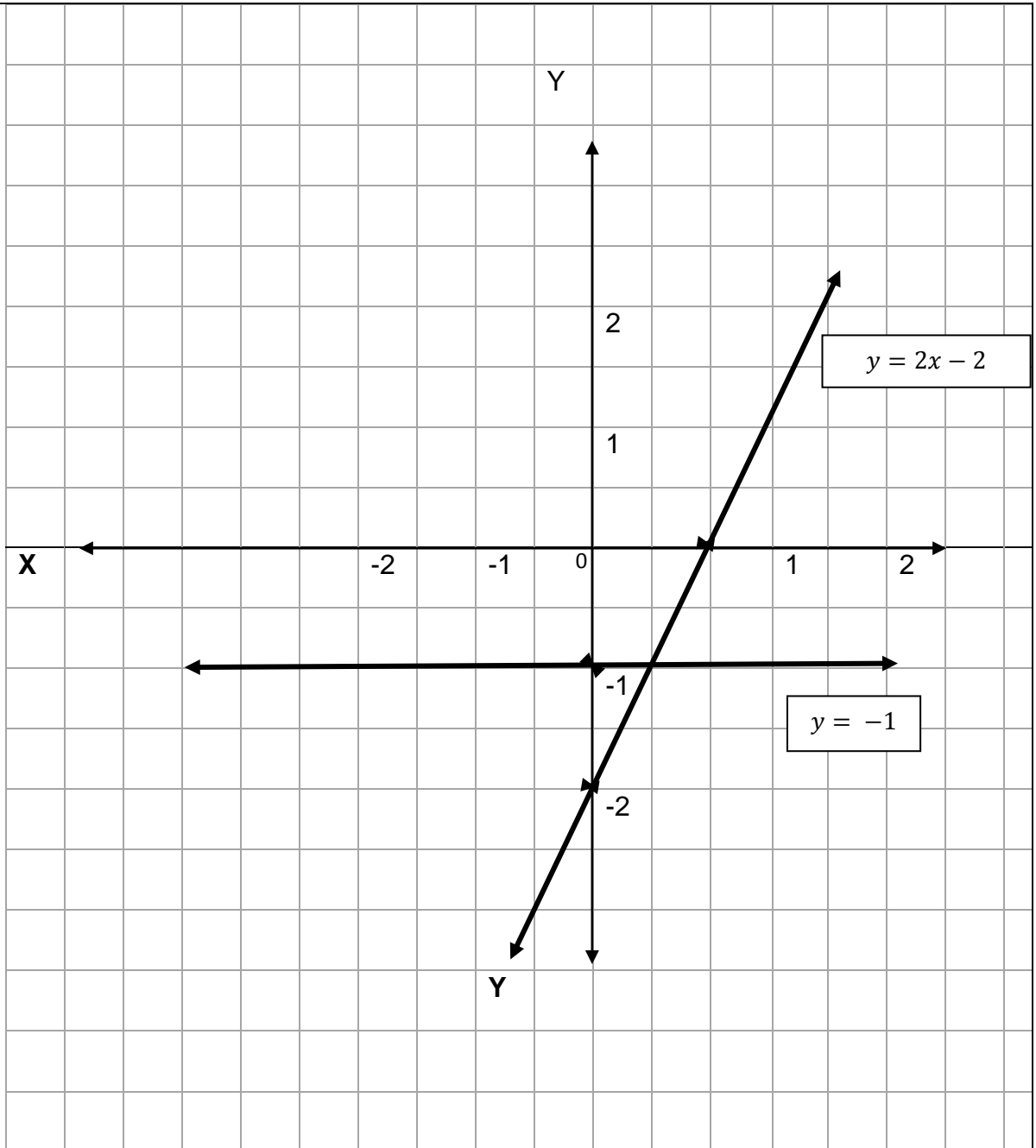
Answer: 1 mark

(3)

7.2

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

7.2



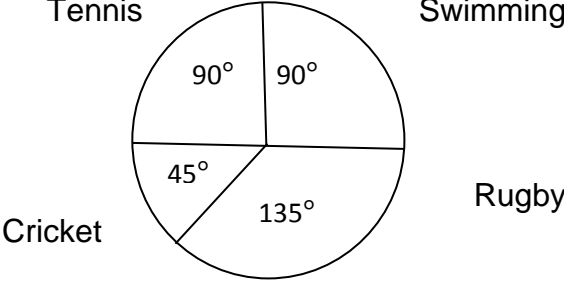
x-intercept : 1 mark ✓
y-intercept : 1 mark per graph ✓ + ✓
Labelling graph ✓ + ✓
(5)

[8]

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

	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 $= (3,14 \times 7^2) \text{ cm}^2 \times 20) \text{ cm}^1$ ✓M $= 3,14 \times 49 \text{ cm}^2 \times 20 \text{ cm}$ $= 3077,2 \text{ cm}^3$ ✓A	Formula: 1 mark Substitution: 1 mark Answer: 1 mark	(3)
	10.2	In $\triangle DBC$ $DB^2 = 64 + 34 \text{ cm}^2$ (Pythagoras) ✓ M $= 100 \text{ cm}^2$ $= 10 \text{ cm}$ ✓ A In $\triangle ABD$: $AD^2 = (26^2 - 10^2) \text{ cm}^2$ (Pythagoras) ✓ M $= (676 - 100) \text{ cm}^2$ $= 576 \text{ cm}^2$ $\therefore AD = 24 \text{ cm}$ ✓ A	Correct statement with reason: 1 mark 10cm: 1 mark Correct statement with reason: 1 mark Answer: 1 mark	(4)
	10.3	$V = 30 \text{ cm}^3$ (given) Volume when all dimensions are doubled: $V = 10 \text{ cm} \times 6 \text{ cm} \times 4 \text{ cm}$ ✓ M $= \frac{240}{30} \text{ cm}^3$ $= 8$ 8 times ✓ A	Calculation: 1 mark 8 times: 1 mark	(2)
				[9]

QUESTION 11

11.1	<p>Tennis = $\frac{12}{48} \times 360^\circ = 90^\circ$ ✓M Rugby = $\frac{18}{48} \times 360^\circ = 135^\circ$ Cricket = $\frac{6}{48} \times 360^\circ = 45^\circ$ ✓M Swimming = $\frac{12}{48} \times 360^\circ = 90^\circ$</p>  <p><u>Pie chart showing learners participating in different extra-mural activities</u> ✓A ✓A</p>	<p>Calculation for any two: 1 mark Calculation for any two: 1 mark</p> <p>Pie chart: 1 mark</p> <p>Label: 1 mark</p>	(4)													
11.2	<p>Range = 145 – 116 = 29 ✓A</p>	<p>Answer: 1 mark</p>	(1)													
11.3	<p>11.3.1</p> <table border="1" data-bbox="395 1086 933 1317"> <tr> <td colspan="2" rowspan="2"></td> <th colspan="2">Second toss</th> </tr> <tr> <th>Head</th> <th>Tail</th> </tr> <tr> <th rowspan="2">First toss</th> <th>Head</th> <td>H ; H</td> <td>H ; T</td> </tr> <tr> <th>Tail</th> <td>T ; H</td> <td>T ; T</td> </tr> </table> <p>✓ ✓A</p>			Second toss		Head	Tail	First toss	Head	H ; H	H ; T	Tail	T ; H	T ; T	<p>Answer: 1 mark Answer: 1 mark</p>	(2)
				Second toss												
		Head	Tail													
First toss	Head	H ; H	H ; T													
	Tail	T ; H	T ; T													
	<p>11.3.2 $n(S) = 4$ ✓A</p>	<p>Answer: 1 mark</p>	(1)													
	<p>11.3.3 $P(\text{at least T}) = \frac{3}{4}$ ✓A</p>	<p>Answer: 1 mark</p>	(1)													
			[9]													
TOTAL:			100													

PolyMathic

Paper 9

Oct/Nov

Algebra and
Geometry

(Q1 - Combined)

(Q2 - Q4: Algebra)

(Q5 - Q8: Geometry)

PolyMathic

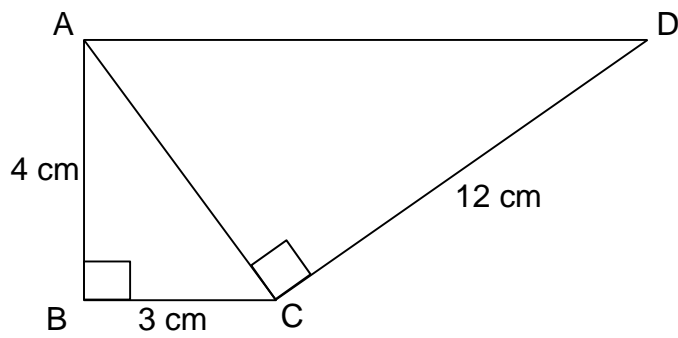
QUESTION 1

In this question, write only the correct letter next to the corresponding number, e.g. If the correct answer for question 1.1 is D, write **1.1 D** only.

- 1.1 What is the correct pair of values of x in $(x - 3)(x + 2) = 0$?
- A $x = -3$ and $x = -2$
 - B $x = 3$ and $x = -2$
 - C $x = -3$ and $x = 2$
 - D $x = 3$ and $x = 2$ (1)
- 1.2 What is the HCF of 210 and 350?
- A $2 \times 5 \times 5 \times 7$
 - B $2 \times 3 \times 5 \times 7$
 - C $2 \times 5 \times 7$
 - D 5×7 (1)
- 1.3 Calculate: $6 + 6 \div 2 - 6 \times (-2)$
- A 21
 - B 18
 - C 12
 - D 0 (1)
- 1.4 Determine the next term in the pattern 2; 5; 9; 14; ...?
- A 21
 - B 20
 - C 19
 - D 18 (1)
- 1.5 Which of the following statements is true about a kite?
- A The longer diagonal bisects the shorter diagonal at 90° .
 - B The shorter diagonal bisects the longer diagonal at 90° .
 - C Diagonals bisect each other.
 - D Diagonals are equal. (1)

- 1.6 What will be the volume of a rectangular prism if all its dimensions are doubled?
- A $2 \times$ the volume of the original prism.
 - B $4 \times$ the volume of the original prism.
 - C $6 \times$ the volume of the original prism.
 - D $8 \times$ the volume of the original prism. (1)
- 1.7 Which of the following statements has the same effect as rotating an object about the line $y = x$?
- A Rotating the object 270° anti-clockwise.
 - B Rotating the object 90° anti-clockwise.
 - C Rotating the object 180° clockwise.
 - D Rotating the object 90° clockwise. (1)
- 1.8 What will be the total surface area of a cube with a volume of 64 cm^3 ?
- A 96 cm^2
 - B 64 cm^2
 - C 16 cm^2
 - D 4 cm^2 (1)

1.9 What is the length of AD in the figure below?



A 16 cm

B 15 cm

C 13 cm

D 5 cm

(1)

1.10 What is the mode of the scores presented in the frequency distribution table below?

Score	Frequency
111	2
112,1	7
114,3	6
115	2
211	1

A 118,5

B 113,6

C 112,1

D 100

(1)
[10]

QUESTION 2

2.1 Write 0,000 000 674 in scientific notation. (1)

2.2 Simplify:

2.1.1 $\sqrt[3]{x^3} + x^0$ (2)

2.1.2 $\sqrt{0,03x^8 + 0,01x^8}$ (2)

2.2.2 $\frac{(2d^2e)^2}{(4d^{-3}e^{-2})^{-1}}$ (3)

2.2.4 $2(x+2)^2 - 2(x+1)(x+2)$ (4)

2.3 Factorise completely:

2.3.1 $x^2 + 5x - 24$ (2)

2.3.2 $2(a-b) - b + a$ (3)

2.4 Solve for x :

2.4.1 $4x - 10 = 6$ (2)

2.4.2 $\frac{3x - 10}{2} = \frac{2x - 5}{3}$ (3)

2.4.3 $x^2 = 4$ (2)

2.4.4 $3x^5 = 96$ (2)

[26]

QUESTION 3

3.1 Study the geometric pattern below and answer the questions that follow.

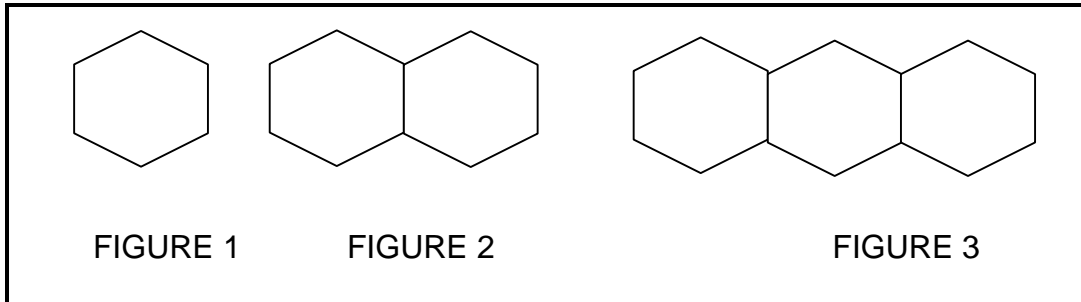
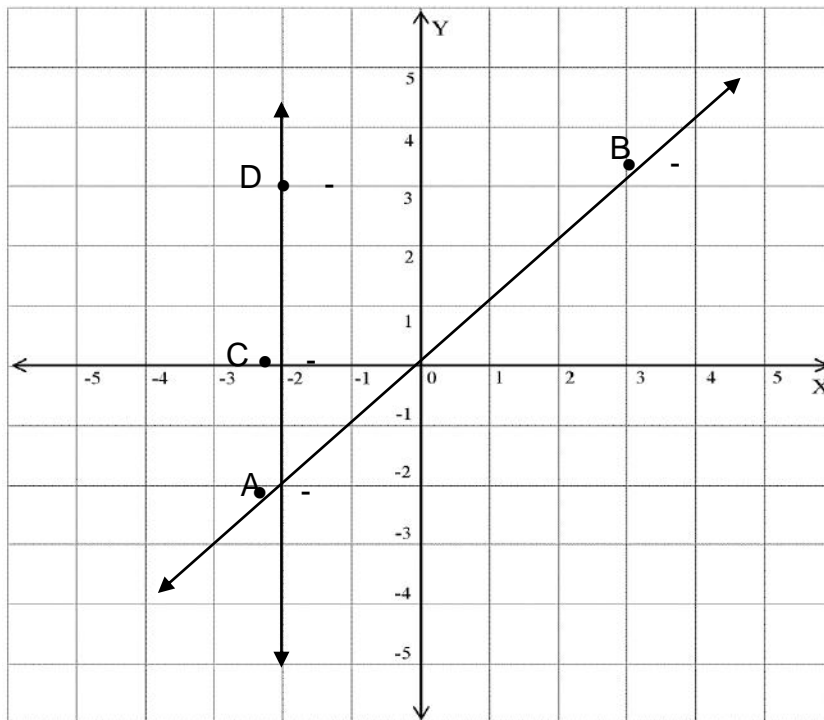


Figure	1	2	3
Number of lines	6	11	

3.1.1 Complete the table. (1)

3.1.2 Write down the general rule for the pattern in the form $T_n =$. (2)

3.2 Study the straight line graphs below and answer the questions that follow.



3.2.1 Write down the equation of AB. (1)

3.2.2 Write down the equation of AD. (1)

3.3 On the attached grid, draw a graph defined by $y = -2x + 1$. Remove the ANNEXURE and attach it in your ANSWER BOOK.

(3)
[8]

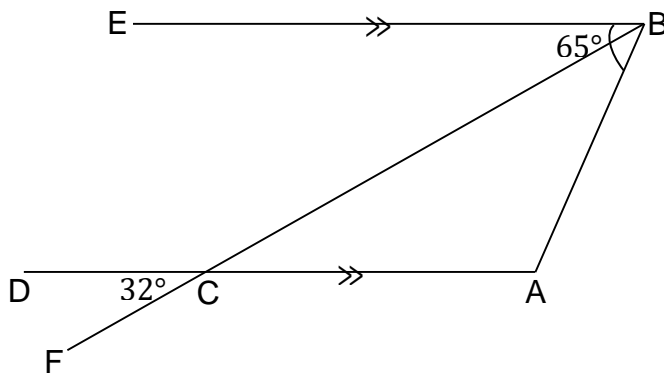
QUESTION 4

- 4.1 How long will it take an investment of R5 000 at 12% per annum simple interest to earn R1 800 interest? (3)
- 4.2 The sum of two numbers is 143 and their difference is 7, what are the numbers? (3)
- 4.3 There are 10 boxes, five contain pencils, four contain pens and two contain pens and pencils. How many boxes contain no pens and pencils? (2)
- 4.4 A car travelling at an average speed of 100 km/h covers a certain distance in 3 hours. At what average speed must the car travel to cover the same distance in 2 hours? (4)

[12]

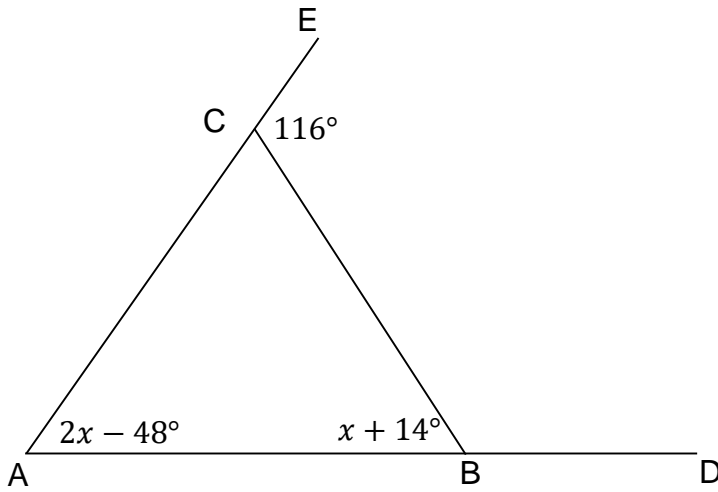
QUESTION 5

5.1 In the diagram below $\widehat{ABE} = 65^\circ$ and $\widehat{DCF} = 32^\circ$.



- 5.1.1 Calculate the size of \widehat{EBC} . Give reasons for your answer. (2)
- 5.1.2 Calculate the size of \widehat{AB} . Give reasons for your answer. (3)

5.2 In the diagram below, $\widehat{CAB} = 2x - 48^\circ$, $\widehat{ABC} = x + 14^\circ$ and $\widehat{BCE} = 116^\circ$.

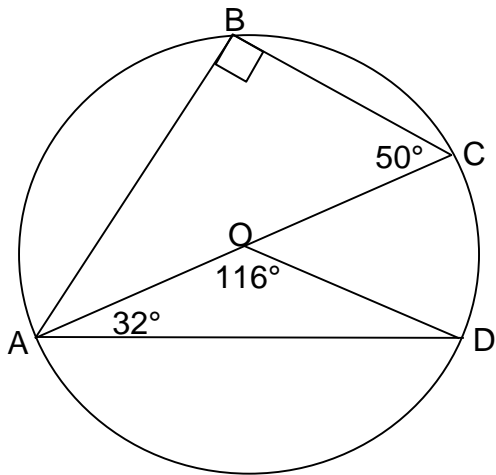


5.2.1 Calculate the value of x . Give reasons for your answer. (3)

5.2.2 Calculate the actual size of \widehat{CAB} . (2)

5.2.3 What type of Δ is ΔABC ? Give reasons for your answer. (2)

5.3 In the figure below, O is the centre of the circle.



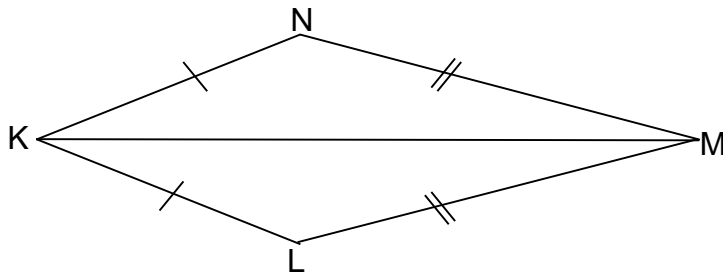
5.3.1 Calculate the size of \widehat{CAB} . Give a reason for your answer. (2)

5.3.2 Calculate the size of \widehat{ADO} . Give a reason for your answer. (2)

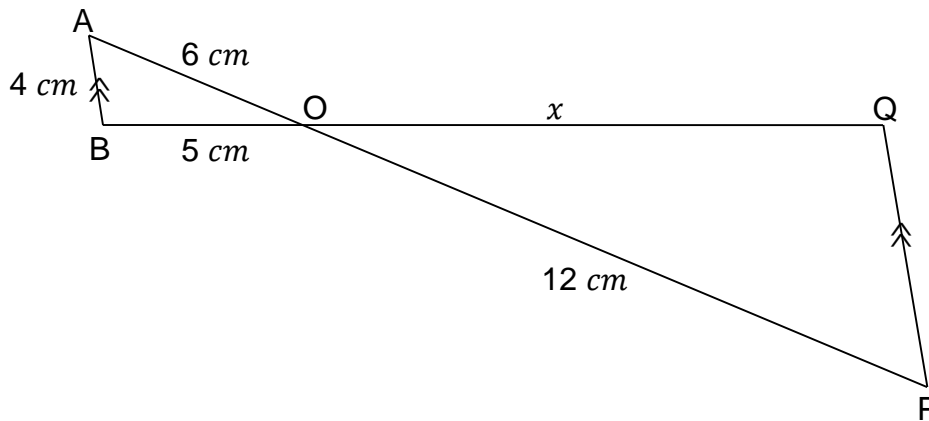
[16]

QUESTION 6

6.1 In the diagram below, prove that $\Delta KLM \equiv \Delta KNM$. (4)



6.2 In the diagram below, $AB \parallel PQ$.



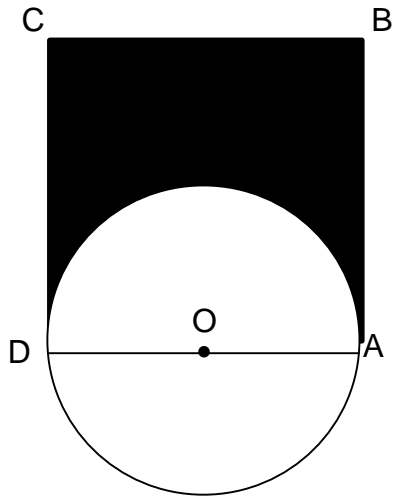
6.2.1 Prove that $\Delta ABO \sim \Delta PQO$. (4)

6.2.2 Calculate the value of x . (3)

[11]

QUESTION 7

- 7.1 In the figure below ABCD is a square and AOD is the diameter of the circle. Calculate the area of the shaded part if $r = 7 \text{ cm}$. N.B $\pi = \frac{22}{7}$ (4)



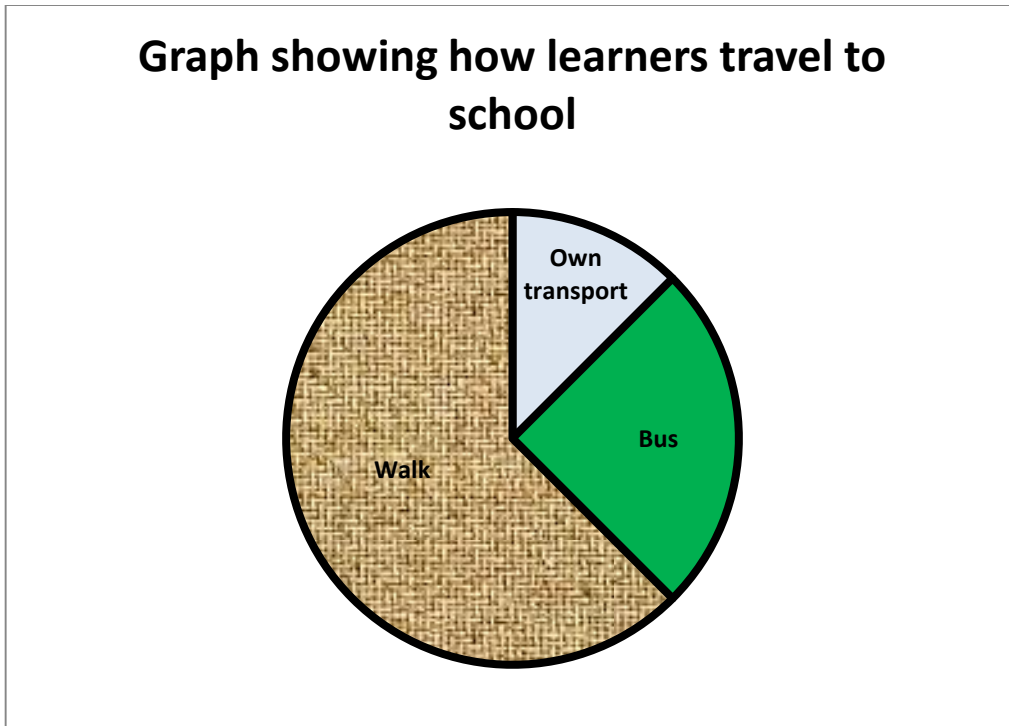
- 7.2 A rectangular carpet has a perimeter of 16 m and an area of 15 m^2 . What are the dimensions of the sides of the carpet? (4)

[8]

QUESTION 8

- 8.1 A spinner with 5 colours, red, yellow, green, black and white is spun and a coin is tossed, at the same time.
 - 8.1.1 Draw a tree diagram to illustrate the number of possible outcomes for the experiment. (2)
 - 8.1.2 What is the probability of spinning any colour and tossing a head? (1)
 - 8.1.3 What is the probability of spinning a red colour? (1)

8.2 The pie chart below shows different modes of transport used by learners of Boiteko Junior Secondary School when travelling to school. The total number of learners in the school is 600. Study the graph and answer the questions that follow.

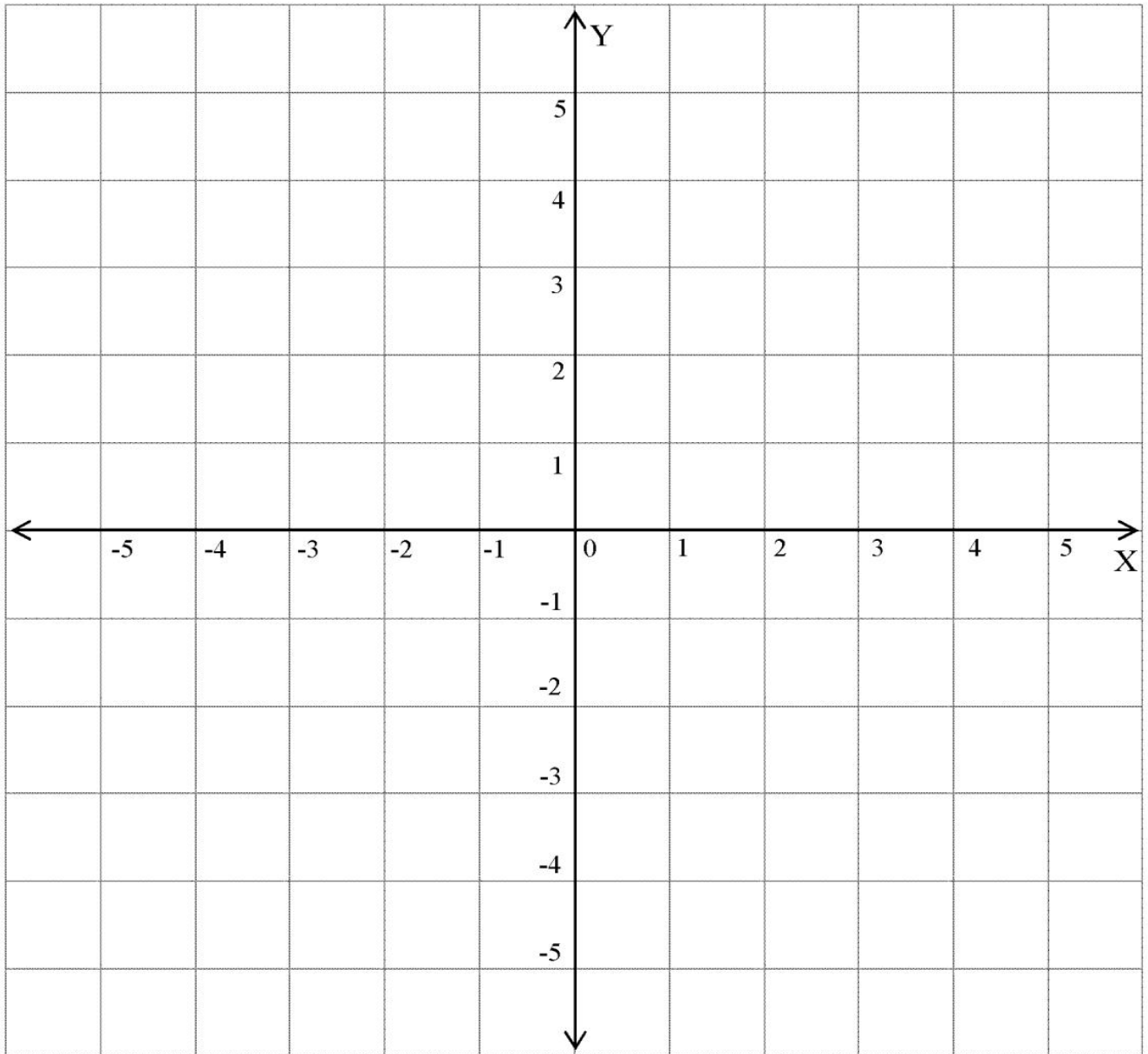


- 8.2.1 What fraction of learners walk to school? Give your answer as a fraction. (1)
- 8.2.2 Express the number of learners who travel by bus as a percentage. (2)
- 8.2.3 What is the ratio of learners who walk to school to those who use their own transport? (2)

[9]

TOTAL: 100

ANNEXURE A



Memo

KEY	
M	Method mark
CA	Consistent Accuracy mark
A	Accuracy mark
S	Statement
R	Reason
S/R	Statement and Reason

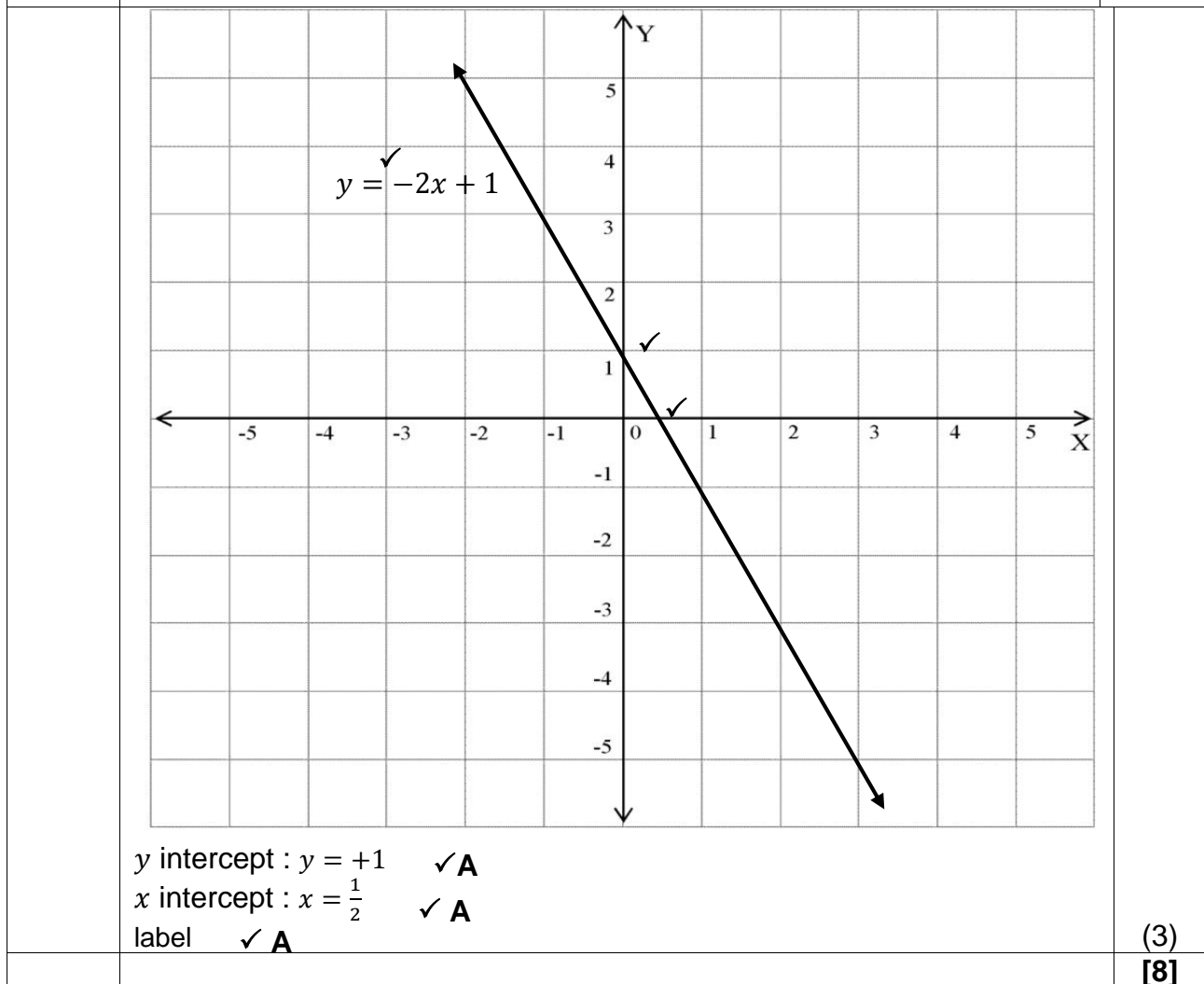
QUESTION 1 [10 marks]				
Ques.			Mark Allocation	Total
1.1	B	✓	1 mark for each correct answer	(1)
1.2	C	✓		(1)
1.3	A	✓		(1)
1.4	B	✓		(1)
1.5	A	✓		(1)
1.6	D	✓	(1)	
1.7	C	✓	(1)	
1.8	A	✓	(1)	
1.9	C	✓	(1)	
1.10	C	✓	(1)	
			[10]	

QUESTION 2 [26 marks]			
Ques.	Solution	Mark Allocation	Total
2.1	$6,74 \times 10^{-7}$ ✓ A	Answer: 1 mark	(1)
2.2.1	$\sqrt[3]{x^3} + x^0$ ✓ A ✓ A $x + 1$	x : 1 mark +1: 1 mark	(2)
2.2.2	$\sqrt{0,03x^8 + 0,01x^8}$ $\sqrt{0,04x^8}$ ✓ A $0,2x^4$ ✓ A	$\sqrt{0,04x^8}$: 1 mark Answer: 1 mark	(2)
2.2.3	$\frac{(2d^2e)^2}{(4d^{-3}e^{-2})^{-1}}$ ✓ M ✓ M $2^2d^4e^2 \times 2^2d^{-3}e^{-2}$ $16d$ ✓ A	$2^2d^4e^2$: 1 mark $2^2d^{-3}e^{-2}$: 1 mark Answer: 1 mark	(3)
2.2.4	$2(x+2)^2 - 2(x+1)(x+2)$ ✓ M ✓ M $2(x^2 + 4x + 4) - 2(x^2 + 3x + 2)$ $2x^2 + 8x + 8 - 2x^2 - 6x - 4$ ✓ A $2x + 4$ ✓ CA	$x^2 + 4x + 4$: 1 mark $x^2 + 3x + 2$: 1 mark $2x^2 + 8x + 8 - 2x^2 - 6x - 4$: 1 mark Answer: 1 mark	(4)
2.3.1	$x^2 + 5x - 24$ ✓ A ✓ A $(x+8)(x-3)$	$x+8$: 1 mark $x-3$: 1 mark	(2)
2.3.2	$2(a-b) - b + a$ $2(a-b) + 1(a-b)$ ✓ M $(2+1)(a-b)$ ✓ M $3(a-b)$ ✓ A	+1(a-b): 1 mark (2+1)(a-b): 1 mark Answer : 1 mark	(3)
2.4.1	$4x - 10 = 6$ $4x = 16$ ✓ M $x = 4$ ✓ A	$4x = 16$: 1 mark Answer : 1 mark	(2)
2.4.2	$\frac{3x-10}{2} = \frac{2x-5}{3}$ $6 \times \left(\frac{3x-10}{2}\right) = 6 \times \left(\frac{2x-5}{3}\right)$ ✓ M $9x - 30 = 4x - 10$ ✓ A $5x = 20$ $x = 4$ ✓ CA	× LCD: 6: 1 mark $9x - 30 = 4x - 10$: 1 mark Answer: 1 mark	(3)

2.4.3	$x^2 = 4$ $(x + 2)(x - 2) = 0$ ✓ M $x = -2$ or $x = 2$ ✓ A	$(x + 2)(x - 2) = 0$: 1 mark Answer: 1 mark	(2)
2.4.4	$3x^5 = 96$ $x^5 = 32$ $x^5 = 2^5$ ✓ M $x = 2$ ✓ A	2^5 : 1 mark Answer: 1 mark	(2)
			[26]

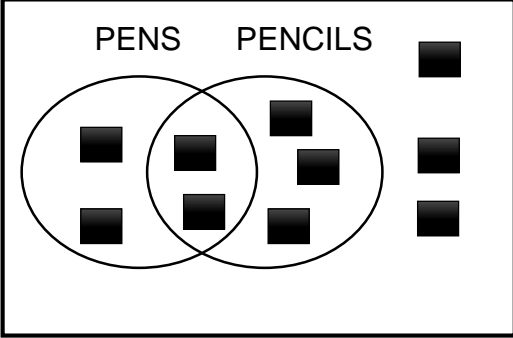
QUESTION 3 [8 marks]

Ques.	Solution	Mark Allocation	Total
3.1.1	16 ✓ A	Answer: 1 mark	(1)
3.1.2	✓ A ✓ A $5n + 1$	$5n$: 1 mark +1: 1 mark	(2)
3.2.1	$y = x$ ✓ A	Answer: 1 mark	(1)
3.2.2	$x = -2$ ✓ A	Answer: 1 mark	(1)



(3)
[8]

Question 4 [12 marks]			
Ques.	Solution	Mark Allocation	Total
4.1	$p.n.i = SI$ ✓M $5\,000 \times n \times 0,12 = 1\,800$ ✓M $n = 3$ ✓A OR $A = P(1 + ni)$ ✓M $6\,800 = 5\,000(1 + 0,12n)$ ✓M $1,36 = 1 + 0,12n$ $0,36 = 0,12n$ $n = 3$ ✓A	Formula: 1 mark Substitution: 1 mark Answer: 1 mark	(3)
4.2	Let the numbers be a and b ✓M $a + b = 143$ $a - b = 7$ $a = b + 7$ $b + 7 + b = 143$ $2b = 136$ $b = 68$ $a = 68 + 7$ $a = 75$ ✓A ✓A The numbers are 75 and 68 OR $a + b = 143$ $a - b = 7$ $\therefore 2a = 150$ (adding the 2 equations) $a = 75$ $75 + b = 143$ $b = 68$	Any method: 1 mark 75: 1 mark 68: 1 mark	(3)

<p>4.3</p>	<p style="text-align: right;">S = 10</p>  <p>$10 - 7 = 3$ boxes ✓✓A</p>	<p>Answer: 2 marks</p>							
<p>4.4</p>	<p> $d = s \times t$ ✓M $d = 100 \text{ km/h} \times 3h$ ✓A $d = 300 \text{ km}$ $S = \frac{d}{t}$ Av. Speed = $\frac{300\text{km}}{2\text{hrs}}$ ✓M $= 150 \text{ km/h}$ ✓CA OR <table border="1" data-bbox="306 958 866 1048"> <tr> <td>Speed</td> <td>100 km</td> <td>$x \text{ km}$</td> </tr> <tr> <td>Time</td> <td>3 hrs</td> <td>2 hrs</td> </tr> </table> $2x = 300$ $x = 150 \text{ km/h}$ </p>	Speed	100 km	$x \text{ km}$	Time	3 hrs	2 hrs	<p>Formula/method: 1 mark</p> <p>300 km: 1 mark $\frac{300 \text{ km}}{2 \text{ hrs}}$: 1 mark Answer: 1 mark</p>	<p>(2)</p> <p>(4)</p> <p>[12]</p>
Speed	100 km	$x \text{ km}$							
Time	3 hrs	2 hrs							

QUESTION 5 [16 marks]			
Ques.	Solution	Mark Allocation	Total
5.1.1	$\angle ACB = \angle DCF = 32^\circ$ (Vert. opp. \angle 's) $\angle EBC = \angle ACB = 32^\circ$ (Alt. \angle 's, $EB \parallel DA$)	Statement and reason: 1 mark each	(2)
5.1.2	$\angle CAB + \angle ABE = 180^\circ$ (Co int. \angle 's : $EB \parallel DA$) ✓S/R $\angle CAB = 180^\circ - 65^\circ$ ✓M $\angle CAB = 115^\circ$ ✓A OR $\angle CAB + \angle ACB + \angle ABC = 180^\circ$ (\angle 's of a Δ) ✓S/R $\angle CAB = 180^\circ - (32^\circ + 33^\circ)$ [$\angle ABC = 65^\circ - 32^\circ$] ✓M $\angle CAB = 180^\circ - 65^\circ$ $\angle CAB = 115^\circ$ ✓A	Statement and reason: 1 mark Substitution: 1 mark Answer: 1 mark	(3)
5.2.1	$\angle A + \angle ABC = \angle BCE$ (Ext \angle of a Δ) ✓S/R $(2x - 48^\circ) + (x + 14^\circ) = 116^\circ$ ✓M $3x - 34^\circ = 116^\circ$ $3x = 150^\circ$ ✓A $x = 50^\circ$ OR ✓S/R $\angle A + \angle ABC + \angle ACB = 180^\circ$ (\angle 's of a Δ) $(2x - 48^\circ) + (x + 14^\circ) + 64^\circ = 180^\circ$ ✓M $3x + 30^\circ = 180^\circ$ $3x = 150^\circ$ $x = 50^\circ$ ✓A	Statement and reason: 1 mark Substitution: 1 mark Answer: 1 mark	(3)
5.2.2	$\angle A = 2x - 48^\circ$ $= 2(50^\circ) - 48^\circ$ ✓M $= 100^\circ - 48^\circ$ $= 52^\circ$ ✓A	Substitution: 1 mark Answer: 1 mark	(2)
5.2.3	$\angle ABC = 50^\circ + 14^\circ = 64^\circ$ $\angle ACB = 180^\circ - 116^\circ = 64^\circ$ ✓S ✓R ΔABC is an isosceles triangle ($\angle ABC = \angle ACB$)	Correct statement: 1 mark Correct Reason: 1 mark	(2)
5.3.1	✓S ✓R $\angle ABC = 40^\circ$ (Complementary \angle 's)	Correct statement: 1 mark Correct Reason: 1 mark	(2)
5.3.2	✓S ✓R $\angle ADO = 32^\circ$ (AO = OD / radii)	Correct statement: 1 mark Correct Reason: 1 mark	(2)
			[16]

QUESTION 6 [11 marks]			
Ques.	Solution	Mark Allocation	Total
6.1	STATEMENT	REASON	Correct statement with reason: 1 mark each (4)
	$KL = KN$	Given ✓A	
	$LM = NM$	Given ✓A	
	$KM = KM$	Common ✓A	
	$\therefore \triangle KLM \equiv \triangle KNM.$	SSS ✓A	
6.2.1	STATEMENT	REASON	Correct statement with reason: 1 mark each (4)
	$\hat{A} = \hat{P}$	Alt \angle 's, $AB \parallel PQ$ ✓A	
	$\hat{B} = \hat{Q}$	Alt \angle 's, $AB \parallel PQ$ ✓A	
	$A\hat{O}B = P\hat{O}Q$	Vert. opp. \angle 's ✓A	
	$\therefore \triangle ABO \equiv \triangle PQO.$	AAA ✓A	
6.2.2	$\frac{OQ}{OB} = \frac{OP}{AO}$ (Corr. sides are proportional) ✓S/R $\frac{x}{5 \text{ cm}} = \frac{12 \text{ cm}}{6 \text{ cm}}$ ✓A $x = OQ = 10 \text{ cm}$ ✓CA	Statement and reason: 1 mark $\frac{x}{5 \text{ cm}} = \frac{12 \text{ cm}}{6 \text{ cm}}$: 1 mark Answer: 1 mark	(3)
			[11]
QUESTION 7 [8 marks]			
Ques.	Solution	Mark Allocation	Total
7.1	$d = 7 \times 2 = 14 \text{ cm}$ ✓M Area of the shaded part = $s^2 - \frac{\pi r^2}{2}$ ✓M $= 14 \times 14 - \frac{\frac{22}{7} \times 49}{2}$ $= 196 \text{ cm}^2 - 77 \text{ cm}^2$ ✓A $= 119 \text{ cm}^2$ ✓CA	14 cm : 1 mark $s^2 - \frac{\pi r^2}{2}$: 1 mark $196 \text{ cm}^2 - 77 \text{ cm}^2$: 1 mark Answer: 1 mark	(4)
7.2	$2l + 2b = 16$ ✓M $l + b = 8$ $b = 8 - l$ $l \times b = 15$ ✓M $l(8 - l) = 15$ $8l - l^2 = 15$ $l^2 - 8l - 15 = 0$ $(l - 5)(l - 3) = 0$ $l = 5$ or $l = 3$ ✓A $b = 3$ or $b = 5$ ✓A	$2l + 2b = 16$: 1 mark $l \times b = 15$: 1 mark 5 : 1 mark 3 : 1 mark	(4)
			[8]

Question 8 [9 marks]

Ques.	Solution	Mark Allocation	Total
8.1.1	<p style="text-align: right;">(2)</p>		
	<p>Key: G – Green, R – Red, Y – Yellow, B – Black, W – White, H – head, T – tail</p> <p>2 marks for correct tree diagram.</p>		
8.1.2	$\frac{5}{10} = \frac{1}{2}$ ✓A	Answer: 1 mark	(1)
8.1.3	$\frac{2}{10} = \frac{1}{5}$ ✓A	Answer: 1 mark	(1)
8.2.1	$\frac{5}{8}$ ✓A	Answer: 1 mark	(1)
8.2.2	✓A ✓A $\frac{1}{4} = 25\%$	$\frac{1}{4}$: 1 mark 25%: 1 mark	(2)
8.2.3	✓A ✓A 5:1	5: 1 mark 1: 1 mark	(2)
			[9]
		TOTAL:	100

PolyMathic

Paper 10

Oct/Nov

Algebra

PolyMathic

Grade 9 - Algebra

November Exam

Total: 75

Time: 90min

Instructions:

1. Write your name and grade (e.g. 9E) as well as the name of your SUBJECT TEACHER at the top of your answer script.
2. This paper consists of 4 Pages.
3. This paper consists of **6 Questions**. Answer ALL the questions.
4. Calculators may **NOT** be used.
5. Number your questions correctly according to the numbering system used in this question paper.
6. It is in your own interest to write LEGIBLY and to present your work neatly.

Question 1:

1.1. Write $4,7535 \times 10^{-5}$ out in full (1)

1.2. Expand by inspection: $(2x - 6)^2$ (3)

1.3. Simplify the following:

1.3.1. $\frac{-9x^5y^{-8}z^2}{3x^{-2}y^{-1}z^2}$ (3)

1.3.2. $\sqrt{225n^6} - \sqrt[3]{125n^9}$ (5)

[12]

Question 2

Factorise the following

2.1. $3x^2y - 9xy^2 + 12x^3y^3$ (2)

2.2. $m(r + 8) - p(r + 8)$ (2)

2.3. $r(q - 2) - (4 - 2q)$ (3)

2.4. $-2v^4 + 32v^2$ (3)

2.5. $n^2 - 11n + 18$ (2)

2.6. $x^4 + 2x^2y^2 - 3y^4$ (3)

[15]

Question 3

Solve for x

3.1. $(x + 3)^2 - 3x = (x - 2)(x - 2) - 2$ (4)

3.2. $\frac{x-3}{4} - \frac{x+2}{3} = 0$ (4)

3.3. $2x^2 - 2x = 40$ (5)

3.4. $3 \cdot 3^x = 27$ (3)

[16]

Question 4

4.1. Consider the figures below which were built using black and white tiles:



Figure 1

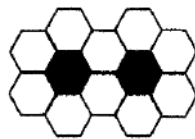


Figure 2

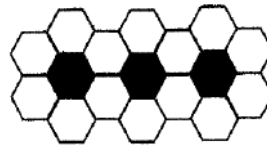


Figure 3

Determine:

4.1.1. Complete the following table:

Figure	1	2	3	4
Number of black tiles	1	2	3	4
Number of white tiles	6	10	(a)	(b)

(2)

4.1.2. Write down an expression for the general term, T_n , showing the number of white tiles in the n -th figure m. (2)

4.1.3. How many white tiles will be in figure 15? (2)

4.2. Examine the following expressions below

$$1$$

$$1 + 3$$

$$1 + 3 + 5$$

$$1 + 3 + 5 + 7$$

Hence, or otherwise, determine how many consecutive odd numbers add up to 225. (3)

[9]

Question 5

5.1. How long will it take to travel 384000 metres at an average speed of 96 km/hour. (3)

5.2. Study the table of the length of a side and area of a square:

The length of a side of a square in cm	3	4	5	...	y
Area of the square in cm^2	9	16	x	...	100

5.2.1 Is this an example of inverse or direct proportion. (1)

5.2.2 Determine the value of x and y . (2)

5.3. Jade and Caitlin collected money for a charity in the ratio of 3:4 respectively. Caitlin and Nabeelah on the other hand collected the ratio 3:5 respectively. Determine what ratio Jade collected to Nabeelah. (3)

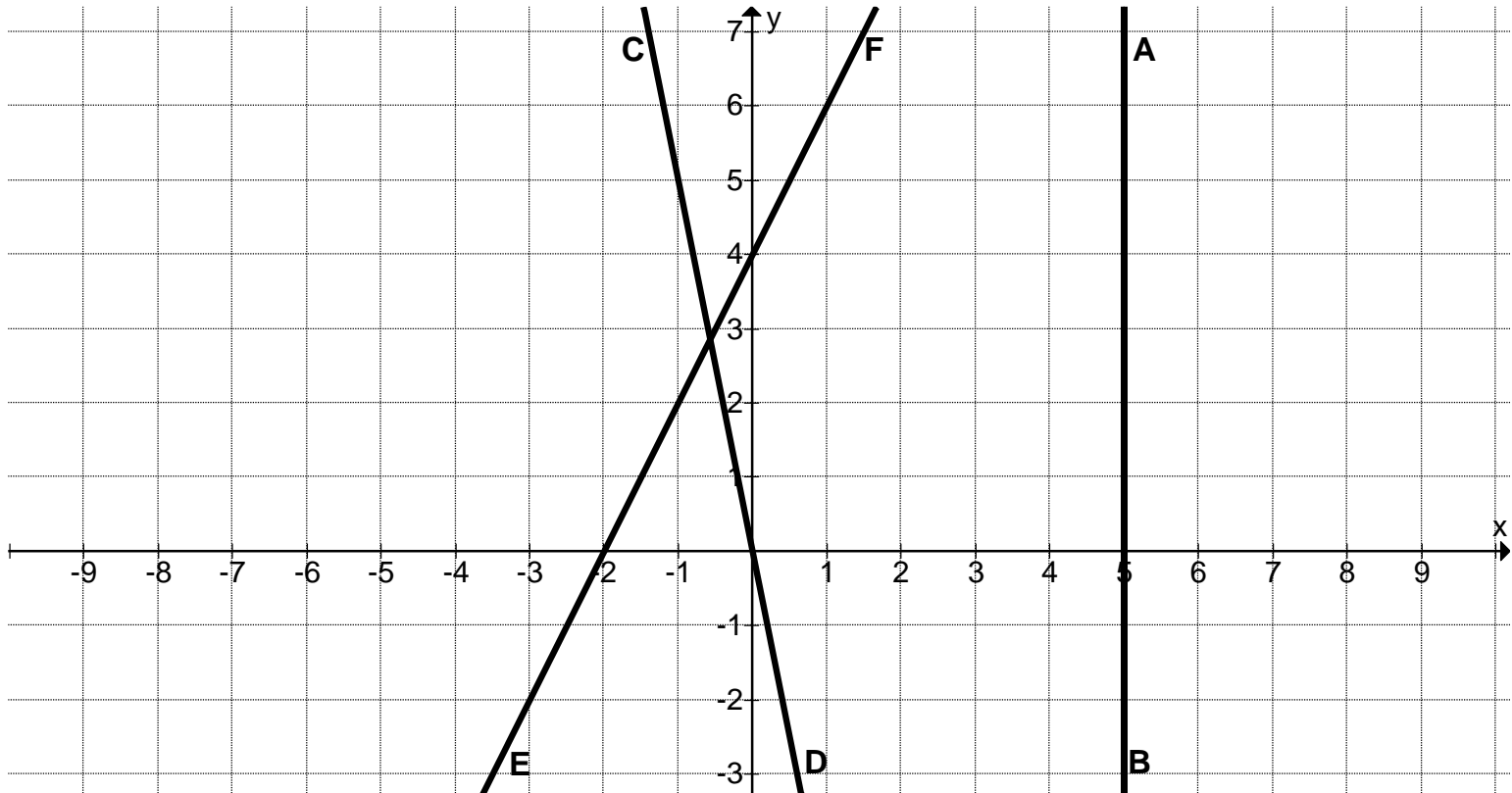
5.4. Calculate how long (in years) it will take for an investment of R4 000 at 5% per annum simple interest to earn an interest of R800. (4)

5.5. Devon invests R12 000 in a savings account at 15% per annum compound interest. Calculate how much there will be in the savings account after 2 years. (3)

[16]

Question 6

6.1. The graphs of line AB, CD and EF are shown in the accompanying sketch



Determine:

6.1.1. the equation of AB (1)

6.1.2 the equation of EF (2)

6.1.3. the equation of line CD (2)

6.2. Determine the gradient of a line perpendicular to $y = -\frac{5}{2}x + 6$. (2)

[7]

Memo

1.1	$4,7535 \times 10^{-5}$ $= 0,000047535$	✓ answer	(1)
1.2	$(2x - 6)^2$ $= 4x^2 - 24x + 36$	✓✓✓ answer	(3)
1.3.1	$\frac{-9x^5 y^{-8} z^2}{3x^{-2} y^{-1} z^2}$ $= -3x^7 y^{-7}$	✓✓✓ answer	(3)
1.3.2	$\sqrt{225n^6} - \sqrt[3]{125n^9}$ $= 15n^3 - 5n^3$ $= 10n^3$	✓✓✓✓ ✓ answer	(5) [12]

QUESTION 2 [15]

2.1	$3x^2 y - 9xy^2 + 12x^3 y^3$ $= 3xy(x - 3y + 4x^2 y^2)$	✓✓ answer	(2)
2.2	$m(r + 8) - p(r + 8)$ $= (r + 8)(m - p)$	✓✓ answer	(2)
2.3	$r(q - 2) - (4 - 2q)$ $= r(q - 2) + 2(q - 2)$ $= (r + 2)(q - 2)$	✓ common factor ✓✓ answer	(3)
2.4	$-2v^4 + 32v^2$ $= -2v^2(v^2 - 16)$ $= -2v^2(v + 4)(v - 4)$	✓ common factor ✓✓ answer	(3)
2.5	$n^2 - 11n + 18$ $= (n - 9)(n - 2)$	✓✓ answer	(2)

3.3	$x^4 + 2x^2y^2 - 3y^4$ $= (x^2 + 3y^2)(x^2 - y^2)$ $= (x^2 + 3y^2)(x + y)(x - y)$	✓✓ answer ✓✓ answer	(4) [15]
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QUESTION 3 [16]

3.1	$(x+3)^2 - 3x = (x-2)(x-2) - 2$ $\therefore x^2 + 6x + 9 - 3x = x^2 - 4x + 4 - 2$ $\therefore x^2 - x^2 + 6x - 3x + 4x = 4 - 2 - 9$ $\therefore 7x = -7$ $\therefore x = -1$	✓ $x^2 + 6x + 9$ ✓ $x^2 - 4x + 4$ ✓ $7x = -7$ ✓ answer	(4)
3.2	$\frac{x-3}{4} - \frac{x+2}{3} = 0$ x 12: $3x - 9 - 4x - 8 = 0$ $\therefore -x = 17$ $\therefore x = -17$	✓ $3x - 9$ ✓ $-4x - 8$ ✓ simplify ✓ answer	(4)
3.3	$2x^2 - 2x = 40$ $\therefore 2x^2 - 2x - 40 = 0$ $\therefore 2(x^2 - x - 20) = 0$ $\therefore 2(x - 5)(x + 4) = 0$ $\therefore x = 5 \text{ or } x = -4$	✓ common factor ✓✓ factorising ✓✓ answers	(5)
3.4	$3 \cdot 3^x = 27$ $\div 3$ $\therefore 3^x = 9$ $\therefore 3^x = 3^2$ $\therefore x = 2$	✓ simplifying ✓ power ✓ answer	(3) [16]

QUESTION 4 [9]

4.1.1	$a - 14$, $b - 18$	✓✓ answer	(2)
4.1.2	$T_n = 4n + 2$	✓✓ answer	(2)
4.1.3	$T_{15} = 4(15) + 2$ $T_{15} = 62$	✓✓ answer	(2)
4.2	1, 4, 9, 16, ... $\therefore T_n = n^2$ $\therefore 225 = n^2$ $\therefore n = \sqrt{225}$ $\therefore n = 15$	✓ formula ✓ simplify ✓ answer	(3) [9]

QUESTION 5 [16]

5.1	$384000m = 384km$ $t = \frac{d}{s}$ $\therefore t = \frac{384}{96}$ $\therefore t = 4hours$	✓ convert m to km ✓ formula ✓ answer	(3)
5.2.1	direct	✓ answer	(1)
5.2.2	$x = 25$ $y = 10$	✓✓ answer	(2)
5.3	Let Jade = x , Caitlin = y and Nabeelah = z $x : y$ and $y : z$ $\therefore 3 : 4$ and $3 : 5$ ($x \times 3$) and ($x \times 4$) $\therefore 9 : 12$ and $12 : 20$ $\therefore x : z = 9 : 20$	✓✓ $y = 12$ (Multiplying) ✓ answer	(3)
5.4	$SI = \frac{Pnr}{100}$ $800 = 4000 \times \frac{5}{100} \times n$ $800 = 200n$ $n = 4$	✓ substitution ✓ simplify ✓ simplify ✓ answer	(4)

5.5	Year 1 $12000 \times \frac{15}{100} = R1800$ $12000 + 1800 = R13800$	Year 2 $13800 \times \frac{15}{100} = R2070$ $13800 + 2070 = R15870$	Year 1 ✓ R1800 ✓ R13 800	Year 2 ✓ R15 870	(3) [16]
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QUESTION 6 [7]

6.1.1	$x = 5$	✓	answer	(1)
6.1.2	$y = 2x + 4$	✓	gradient	(2)
		✓	y-intercept	
6.1.3	$y = -5x$	✓✓	answer	(2)
6.2	$m = \frac{2}{5}$	✓✓	answer	(2) [7]