Please read through the info on the next page carefully!

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.

5. If possible, don't print... Paper is valuable.

6. These are previous school and departmental papers. Therefore some of them contains mistakes, these mistakes are corrected in the videos. This also means that you can use and share this document. You are NOT ALLOWED to sell it. You did not buy this doc from us, we give it away for free, with the Video's that we sell.

7. When using this product: Complete the paper as if it is an exam, mark the paper with the memo and THEN watch the Video's of the questions you don't understand.

8. I am only Human. Therefore, I make mistakes. If you find one, please let me know!

9. The most important thing regarding your subscription is that it "runs until cancelled". If you chose not to cancel before the and of the year then I will automatically put you on the next Grades course next year. I will automatically cancel your subscription at the end of Grade 12.

10. If anything isn't working like it's supposed to (Video's wont play, files wont download, etc.) PLEASE Let me know! You have my WhatsApp # as well as my email. Do NOT Let me. Know via social media (I do not check those messages regularly).

11. Good Luck! Don't forget to tell your friends about PolyMathic!

PolyMathic

Paper 1

May/June

Algebra

PolyMathic

Grade 8 – June Paper

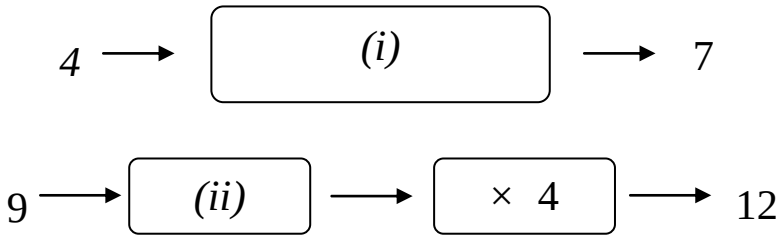
Time available: 2 hours Marks available: 109

Instructions:

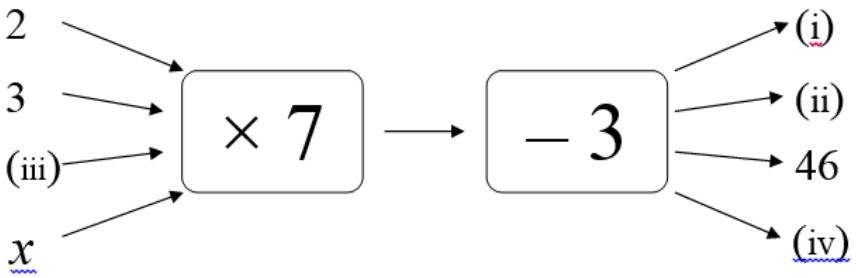
- **You may not use a calculator.**
- **Answer all questions on lined paper, showing full working.**
- **Keep your question paper.**

Question 1 – Flow Diagrams (6)

a) Write down the missing parts of the flow diagrams below, marked (i) to (ii). (2)



b) Write down the missing parts of the flow diagram below marked (i) to (iv). (4)



Question 2 – Patterns (15)

A pattern is made of matches forming squares, as shown below.
The outside matches form the perimeter.

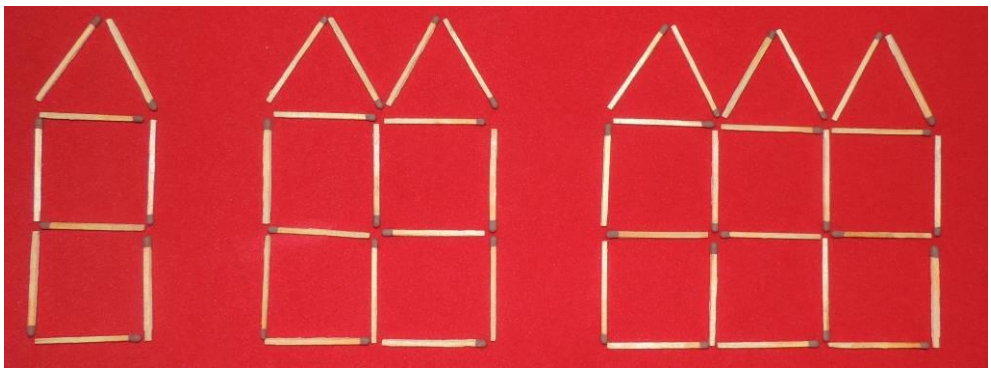


Figure 1 **Figure 2** **Figure 3**

a) If the pattern is continued in the same way, complete the table below.
Provide the answers for ***S1-S3***, ***D1-D3*** and ***P1- P3*** (9)

Figure Number (*n*)	Number of small squares *(S)*	Number of matches (*M*)	Perimeter (*P*)
1	**2**	**9**	**7**
2	***S1***	***D1***	**10**
3	**6**	***23***	***P1***
5	***S2***	***D2***	***P2***
7	***S3***	***D3***	***P3***

b) Write down a formula connecting *S* and *n*. (2)

c) Write down a formula connecting *M* and *n*. (2)

d) Write down a formula connecting *P* and *n*. (2)

Question 3 – Order of work (21)

a) Rewrite the following expressions. Insert a **double vertical line** after each term and indicate the **number of terms** in each expression: (4)

(i) $6x \div 3 + x(c+2) - \dfrac{8-y}{x \times 9}$

(ii) $5x - 6 \times y + 2x^2(y-3)$

Question 3 continues

b) What is the fourth term of the following expression?

(2)

$$8 \times 4x + \frac{3}{y-2} \times 7a - 1 \times b^2 + 2 - 5 \times 4b^2 - 9$$

c) Simplify the following expressions without using a calculator?

(i) $\frac{12-(13-9)}{2}$ (2)

(ii) $20 - 5 \times 2$ (2)

(iii) $6 \times 4 - 22 \div (5-3)$ (3)

(iv) $5 + 7 - 6$ (1)

(v) $9 \times (5-2) + 15 \div (3+2)$ (3)

(vi) $\frac{24-24 \div 4}{1+15 \div 3}$ (4)

Question 4 – Substitution (17)

a) If $a = 3$ and $b = 7$, find the values of:

(i) $a \times b - 9$ (2)

(ii) $3 \times a - 7 \div b$ (3)

(iii) $2\,(4a + 2b - 1) + b \times 3a$ (5)

b) Complete the following table of substitutions by providing the answers for (***b.1-b.7***). (7)

p	4	7
q	2	1
$p - q$	***b.1***	
$3p - 8$	***b.2***	***b.5***
$2(3p - 4q)$	***b.3***	***b.6***
$5pq - 5 \times 4$	***b.4***	***b.7***

Question 5 – Adding and subtracting (20)

An extra 2 marks are assigned in this task to the correct layout of your work. (2)

Simplify the following expressions:

a) $3x + 8x - 6$ (1)

b) $11c - 7 \times c$ (2)

c) $3t \times 4 - 8t \div 2$ (3)

d) $4(2p + 8r) + 3(3p - 5r)$ (4)

e) $\frac{5(7f - 3f + 6)}{10} - f - 3$ (4)

f) $9xyz + 4yzx$ (1)

g) $(9g - 3h + 27) \div 3$ (3)

Question 6 – Equations (25)

An extra 2 marks are assigned in this task to the correct layout of your work. (2)

a) $a - 3 = 8$ (1)

b) $7b = 30$ (1)

c) $\frac{7c}{2} = 28$ (2)

d) $3d - 6 = 27$ (2)

e) $4e - 6 = 7e - 60$ (3)

f) $4 + 7(3f + 2) - 8f = 6(f - 1) + 31$ (5)

g) $3(g + 1) + 2(2g + 3) = 125 + 4(g + 1)$ (5)

For the following word problem you must set up and solve an equation.

h) If you take a number and add 12, then triple your answer, you get 51.
What is the number? (4)

Question 7 – Bonus (not on video) (5)

The following questions must ONLY be attempted once you have completed the rest of the examination.

a. Simplify: (1)

$$2+3(5^2+35)-\frac{8}{15-(8-(3-2))}+(36\div 12)\times 2+7-2(45-(50-(60-50)))-2(8+2)(8-2)-1$$

b. Simplify: (1)

$$8(3a+7)+a(a^2+3a-5)-\frac{16}{8}+\frac{3\times a\times 6-12\times 4}{6}-a^3+(3a)^2+36-12(a^2)+a+20\div 4$$

c. If $x = 7$, $y = 4$, $z = 2$, find the value of : (1)

$$xyz-x^2+(2y)^2-10x+x(3y-5z)-\left(\frac{x-\frac{yz}{4z}}{3}\right)$$

d. (d.1) If $a = 1$, find the value of $b=\frac{1}{2}\left(a+\sqrt{5a^2-4}\right)$

(d.2) Now find the value of $c=\frac{1}{2}\left(b+\sqrt{5b^2+4}\right)$

(d.3) Now find the value of $d=\frac{1}{2}\left(c+\sqrt{5c^2-4}\right)$

(d.4) Now find the value of $e=\frac{1}{2}\left(d+\sqrt{5d^2+4}\right)$

(d.5) Now find the value of $f=\frac{1}{2}\left(e+\sqrt{5e^2-4}\right)$ (1)

e. Cricket pads and gloves together cost R750. The pads cost R170 more than the gloves. The cost, in cents, of the pads is: (1)

Memo

Question 1

1. a) i) +3 ✓ (1)

ii) ÷3 ✓ (1)

1. b. i) 11 ✓

ii) 18 ✓

iii) 7 ✓

iv) 7x - 3 ✓ (4)

Question 2:

2. a. S1) 4. ✓

S2) 10 ✓

S3) 14 ✓

D1) 16 ✓

D2) 37 ✓

D3) 51 ✓

P1) 13 ✓

P2) 19 ✓

P3) 25 ✓ (9)

2. b. $S = 2n$ ✓✓ (2)

2. c. $m = 7n + 2$ ✓✓ (2)

2. d. $P = 3n + 4$ ✓✓ (2)

Question 3:

3. a. i. $6x \div 3 + x(c+2) - \frac{8-y}{x \times 9}$; 3 terms ✓✓ (2)

ii $5x - 6 \times y + 2x^2(y-3)$; 3 terms ✓✓ (2)

Q3 - continues.

3.b +2 ✓✓ (2)

3.c(i) $\frac{12-(13-9)}{2}$

$= \frac{8}{2}$ ✓

$= 4$ ✓ (2)

3.c(ii) $20 - 5 \times 2$

$= 10$ ✓✓ (2)

3.c(iii) $6 \times 4 - 22 \div (5-3)$

$= 24 - 11$ ✓✓

$= 13$ ✓ (3)

3.c(iv) $5 + 7 - 6$

$= 6$ ✓ (1)

3.c.(v) $9 \times (5-2) + 15 \div (3+2)$

$= 9 \times 3 + 15 \div 5$

$= 27 + 3$ ✓✓

$= 30$ ✓ (3)

3.c.(vi) $\frac{24 - 24 \div 4}{1 + 15 \div 3}$

$= \frac{24-6}{1+5}$ ✓✓

$= \frac{18}{6}$ ✓ (4)

$= 3$ ✓

Question 4: a=3 b=7.

a.i $a \times b - 9$

$(3) \times (7) - 9$ ✓ (For substituting)

$= 12$ ✓ (2)

Q4 - continues

4.a.(ii) $3 \times a - 7 \div b$

$= 3 \times (3) - 7 \div (7)$

$= 9 - 1$

$= 8$ → (3)

4.a.(iii) $2(4a + 2b - 1) + b \times 3a$

$= 2(4(3) + 2(7) - 1) + (7) \times 3(3)$

$= 2(12 + 14 - 1) + 63$

$= 50 + 63$

$= 113$ → (5)

4. b.1. 2

b2 4

b3 8

b4 # * edited: 20

b5 13

b6 34 ~~-0~~ 34

b7 2 * edited: 15. (7)

Question 5: (+2)

a. $3x + 8x - 6$

$= 11x - 6$ → (1)

b. $11c - 7 \times c$

$= 11c - 7c$

$= 4c$ → (2)

c. $3t \times 4 - 8t \div 2$

$= 12t - 4t$

$= 8t$ → (3)

Q5 Continues:

5.d. $4(2p + 8r) + 3(3p - 5r)$

$= 8p + 32r + 9p - 15r$

$= 17p + 17r$ → (4)

e. $\frac{5(7f - 3f + 6)}{10} - \frac{1}{2}f - 3$ * edit!

$= \frac{5(4f + 6)}{10} - \frac{1}{2}f - 3$

$= \frac{20f + 30}{10} - \frac{1}{2}f - 3$

$= 2f + 3 - \frac{1}{2}f - 3$

$= f$ → (4)

f. $9xyz + 4yzx$

$= 13xyz$ → (1)

g. $(9g - 3h + 27) \div 3$

$= 3g - h + 9$ → (3)

Question 6. (+2)

6.a. $a \cdot 3 = 8$

$\therefore a = 11$ → (1)

b. ~~$7b = 35$~~ * edited: $7b = 30$

~~$\therefore b = 5$~~ $\therefore b = \frac{30}{7}$ → (1)

c. ~~$\frac{7c}{2} = 15$~~ * edit: $\frac{7c}{2} = 28$

$\therefore 7c = 30$ $\therefore 7c = 56$

$\therefore c = \frac{30}{7}$ $\therefore c = 8$ → (2)

d. $3d - 6 = 27$

$\therefore 3d = 33$

$\therefore d = 11$ → (2)

Question 6 continues

6.e. $4e - 6 = 7e - 60$

$\therefore 3e = 54$ ✓

$\therefore e = 18$. ✓

6f. $4 + 7(3f + 2) - 8f = 6(f - 1) + 31$

$\therefore 4 + 21f + 14 - 8f = 6f - 6 + 31$ ✓

$\therefore 13f + 18 = 6f - 25$

$\therefore 7f = 7$ ✓

$\therefore f = 1$. ✓

6g. $3(g+1) + 2(2g+3) = 125 + 4(g+1)$

$\therefore 3g + 3 + 4g + 6 = 125 + 4g + 4$

$\therefore 7g + 9 = 4g + 129$.

$\therefore 3g = 120$ ✓

$\therefore g = 40$

Question 7: Enrichment

(a) 47 ✓

(b) $21a + 89$ ✓

(c) 13. ✓

(d1) 1

(d2) 2

(d3) 3

(d4) 5

(d5) 8.

1 mark only.

(e) 46 000 cents ✓

PolyMathic

Paper 2

May/June

Geometry

PolyMathic

Grade 8 – June Paper **Geometry**

Time allowed: 90 minutes Maximum Marks: 85

Instructions:

1. Where relevant all reasons and all steps in logic need to be clearly given.
2. Any construction lines need to be left in place and diagrams need to be clearly labelled.
3. Questions 1, 2, 3, 4 and 9 must all be completed on the diagram sheet that has been provided. All other questions must be completed on lined paper. Please staple the diagram sheet to the front of your lined paper.
4. No calculators may be used.
5. GOOD LUCK AND ENJOY THE PAPER!

Question 1:

In the space provided construct ΔABC with $A\hat{B}C = 37^\circ$, BC = 14 cm and AB = 100 mm. (8)

Question 2:

You are given ΔGHK on the diagram sheet.

a) Measure the size of $K\hat{G}H$ to the nearest degree. (2)

b) Measure the length of GH to the nearest millimetre. (2)

c) Construct the angle bisector of $G\hat{H}K$. (4)

d) Construct the altitude from G. (4)

Question 3:

You are given ΔPQR on the diagram sheet.

Construct the perpendicular bisectors of the sides and thus construct the circumscribed circle of the triangle. (8)

Question 4:

You are given ΔXYZ on the diagram sheet.

a) Construct the centroid of the triangle. (6)

b) Measure the distance from X to the centroid, correct to the nearest millimetre. (2)

Question 5:

Complete the following sentences:

a) The supplement of 67° is . . . . . (1)

b) The exterior angle of a triangle is equal to . . . . . (1)

c) The co-interior angles formed when a transversal cuts a pair of parallel lines are . . . . . (1)

d) An octagon has . . . . . sides. (1)

e) The diagonals of a kite intersect . . . . . (1)

f) A triangle with all sides unequal is called a /an . . . . . triangle. (1)

g) An equilateral triangle has each angle equal to . . . . . degrees. (1)

h) An angle of 223° is called a / an . . . . . angle. (1)

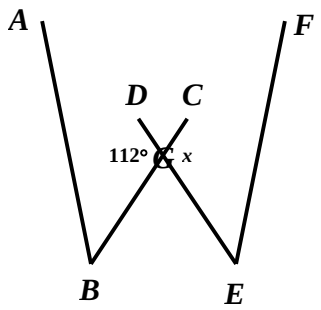
i) The minute hand of a clock moves through . . . . . degrees in 35 minutes. (1)

j) The complement of 30° – *x* is . . . . . (2)

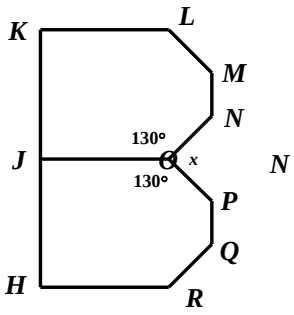
Question 6:

Find, with reasons, the size of *x* in each of the diagrams below.
(Do not redraw diagrams unless you need to do so.) (2, 2, 2, 4)

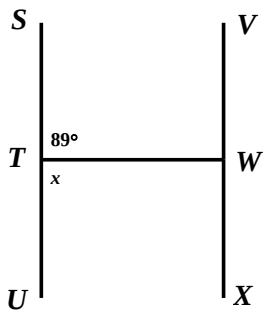
a)



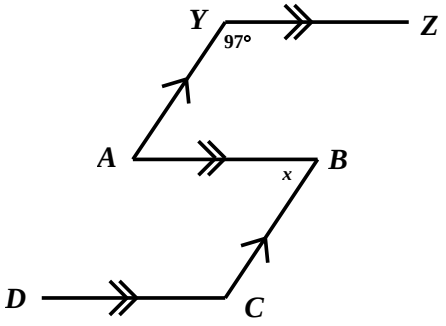
b)



c)



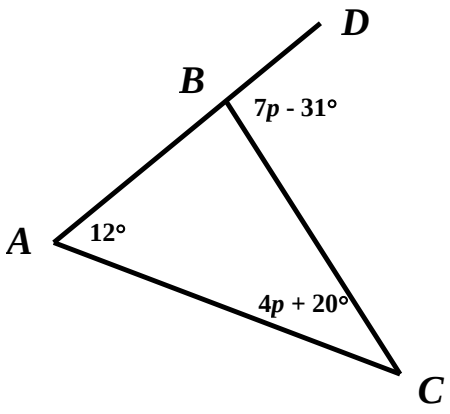
d)



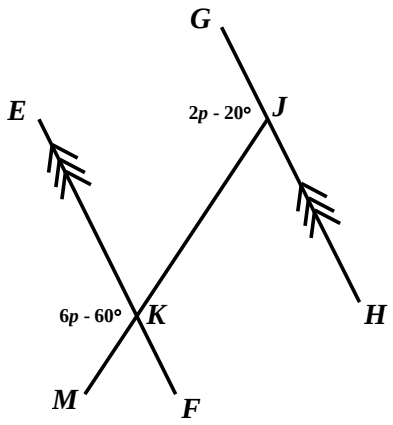
Question 7:

For each of the diagrams, set up an equation and solve it to find the value of p.
(Do not redraw diagrams unless you need to do so.) (4 × 5)

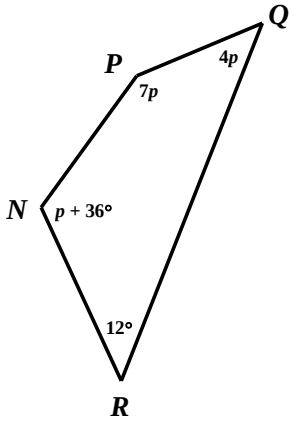
a)



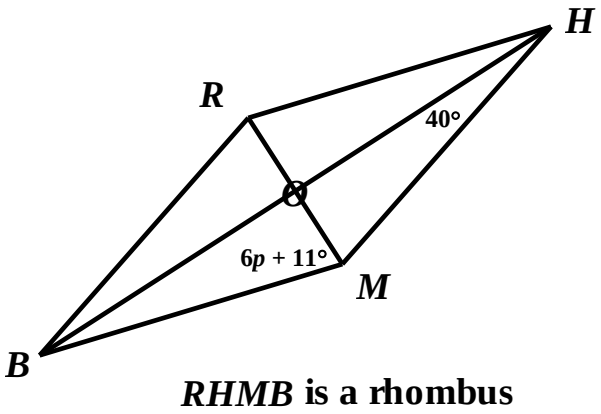
b)



c)

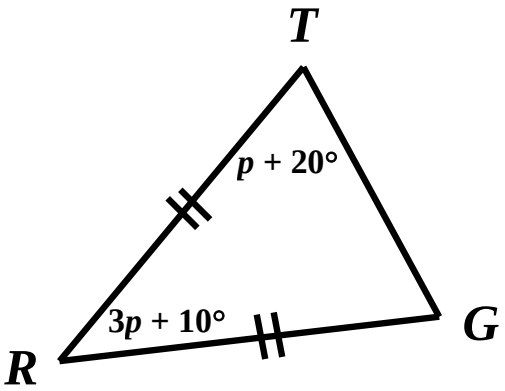


d)



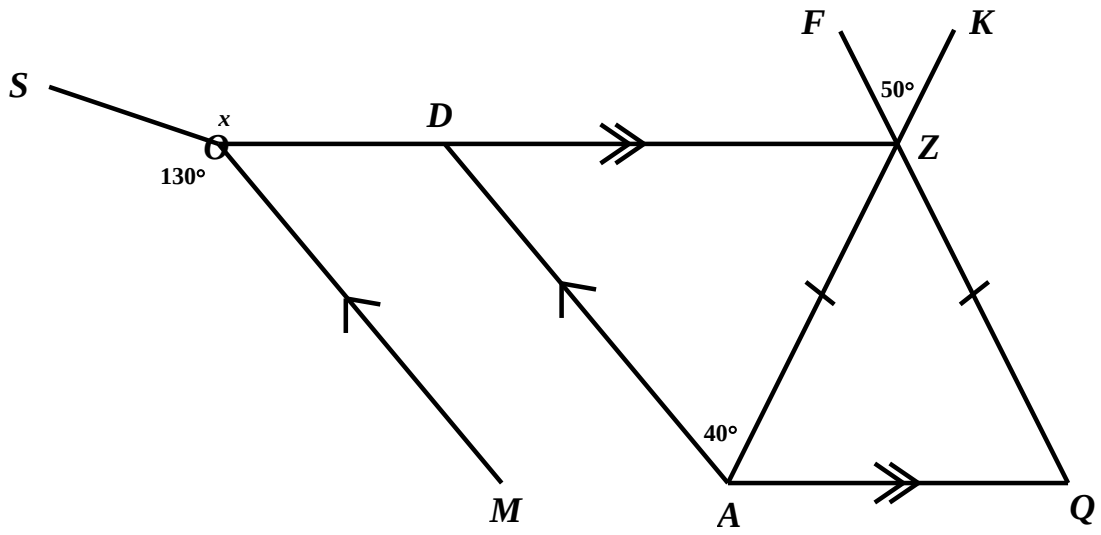
***RHMB* is a rhombus**

e)



Question 8:

Find the size of the angle marked *x*, showing all reasoning. (5)



Question 9:

On the diagram sheet the figure below (in which *AB* // *CD*) has been reproduced three times.
On the first copy draw an extra line and below the diagram show how you would find the value of *x*.
Now by drawing a different line on each of the next two copies, show how you could find *x* in two different ways. Full working and reasons must be given below each diagram. (3)

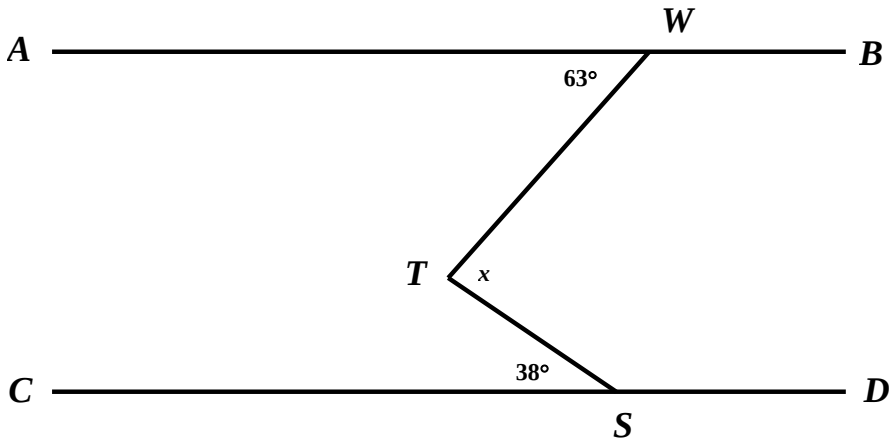


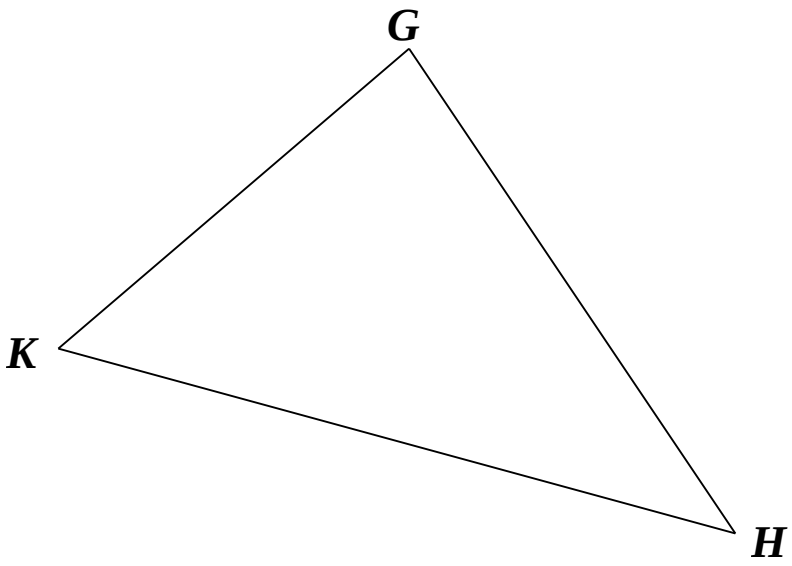
Diagram Sheet

Question 1: **Name: . . . . . .**

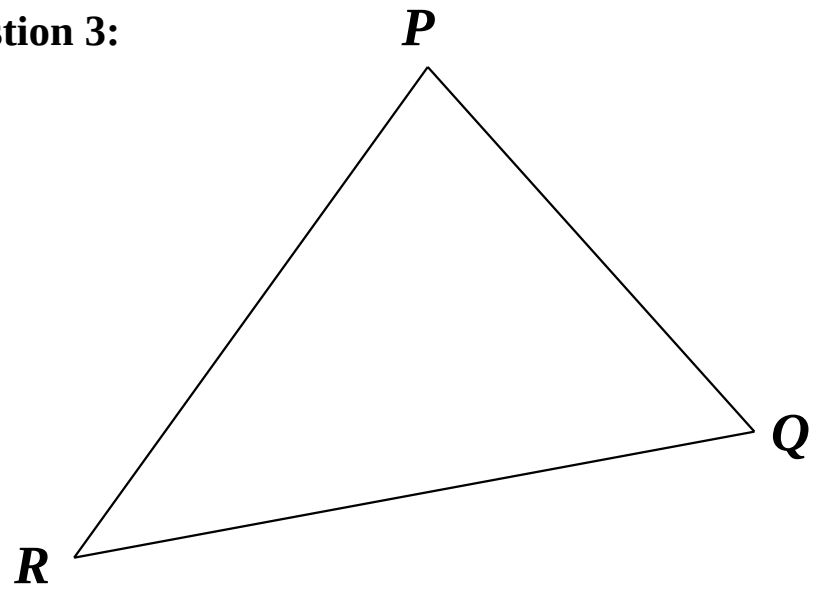
Question 2:

a) $K\hat{G}H =$ . . . . . .

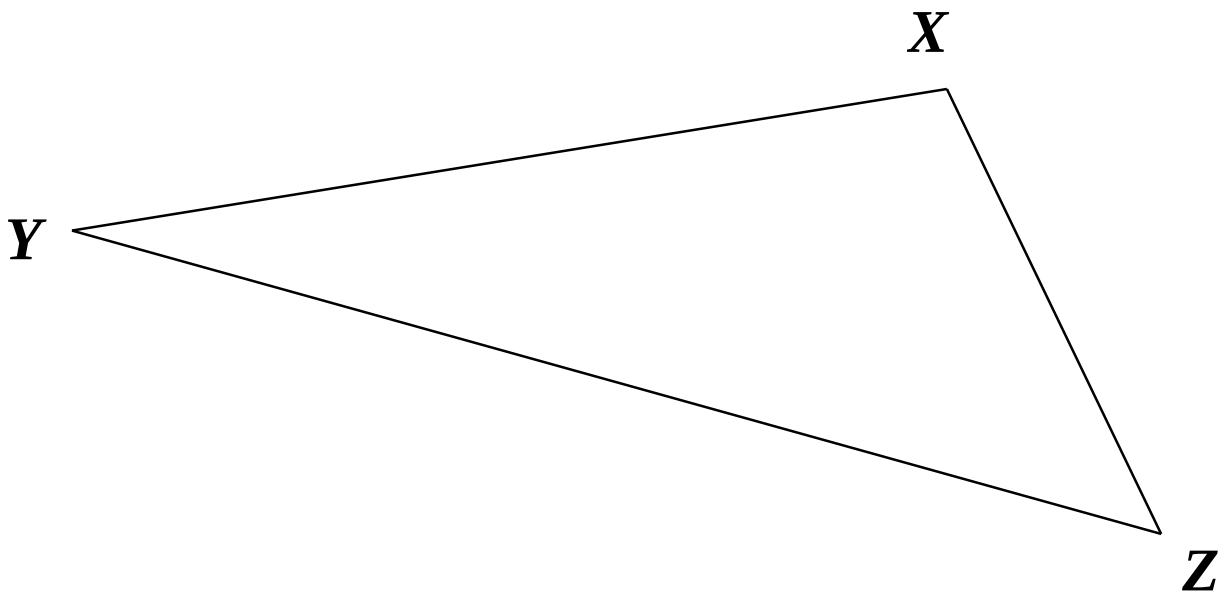
b) $GH =$ . . . . . .



Question 3:

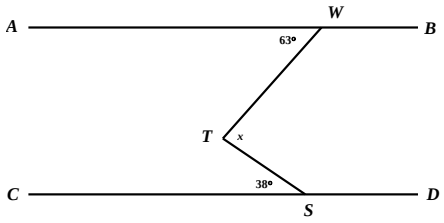


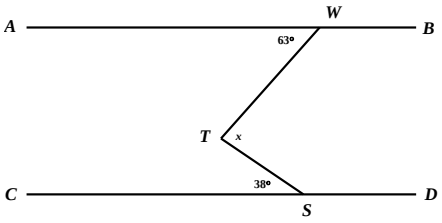
Question 4:

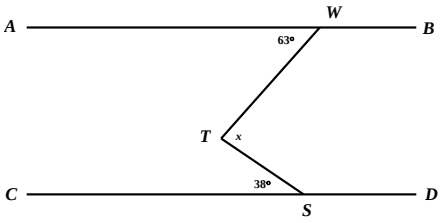


b) *X* to centroid = ...

Question 9:



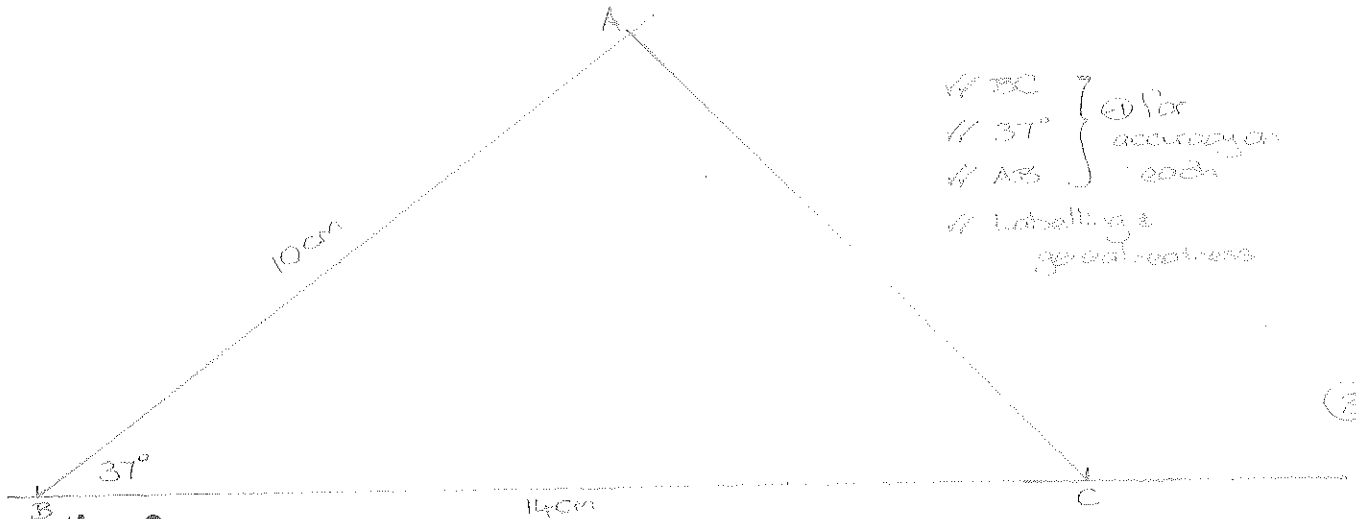




Memo

Diagram Sheet

Question 1: **Name:** ...Memo... [85]



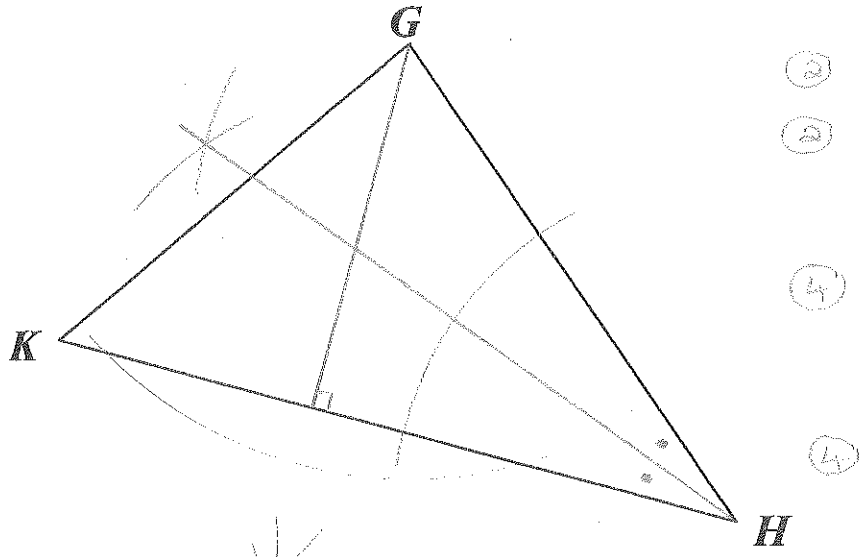
✓ BC
✓ 37°
✓ AB
} 6 @ 1 for accuracy on each
✓ Labelling & geometrons

(3)

Question 2:

2.1 $K\hat{G}H$ = ...85° ±1° ✓

2.2 GH = ...77mm ±1mm ✓



(2)

(2)

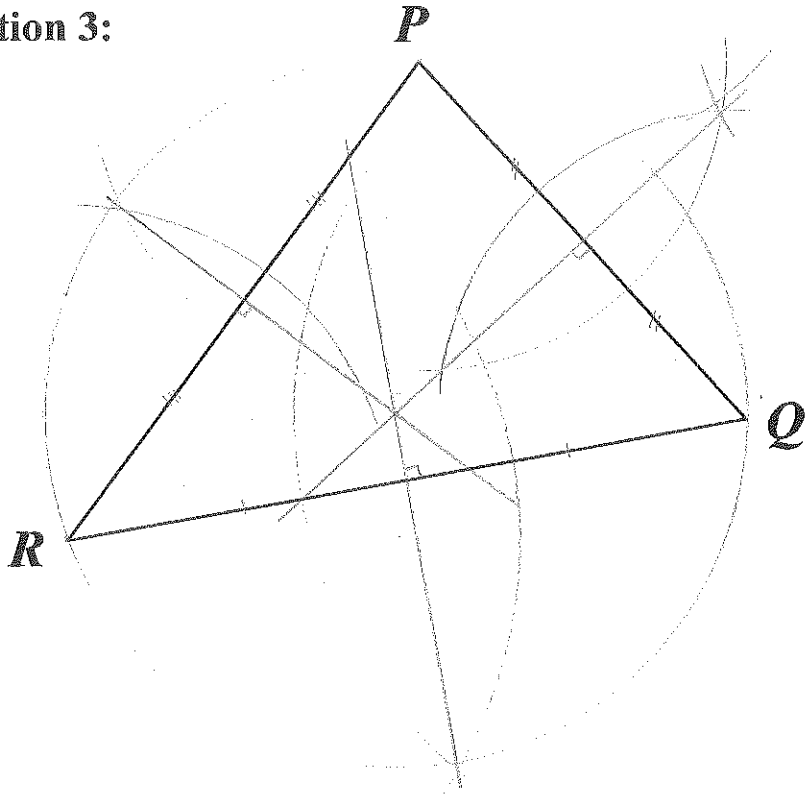
2.3 ✓ First arc
✓ 2 intersecting arcs
✓ Accuracy

(4)

2.4 ✓ First arc
✓ 2 intersecting arcs
✓ 90° label
✓ Accuracy

(4)

Question 3:



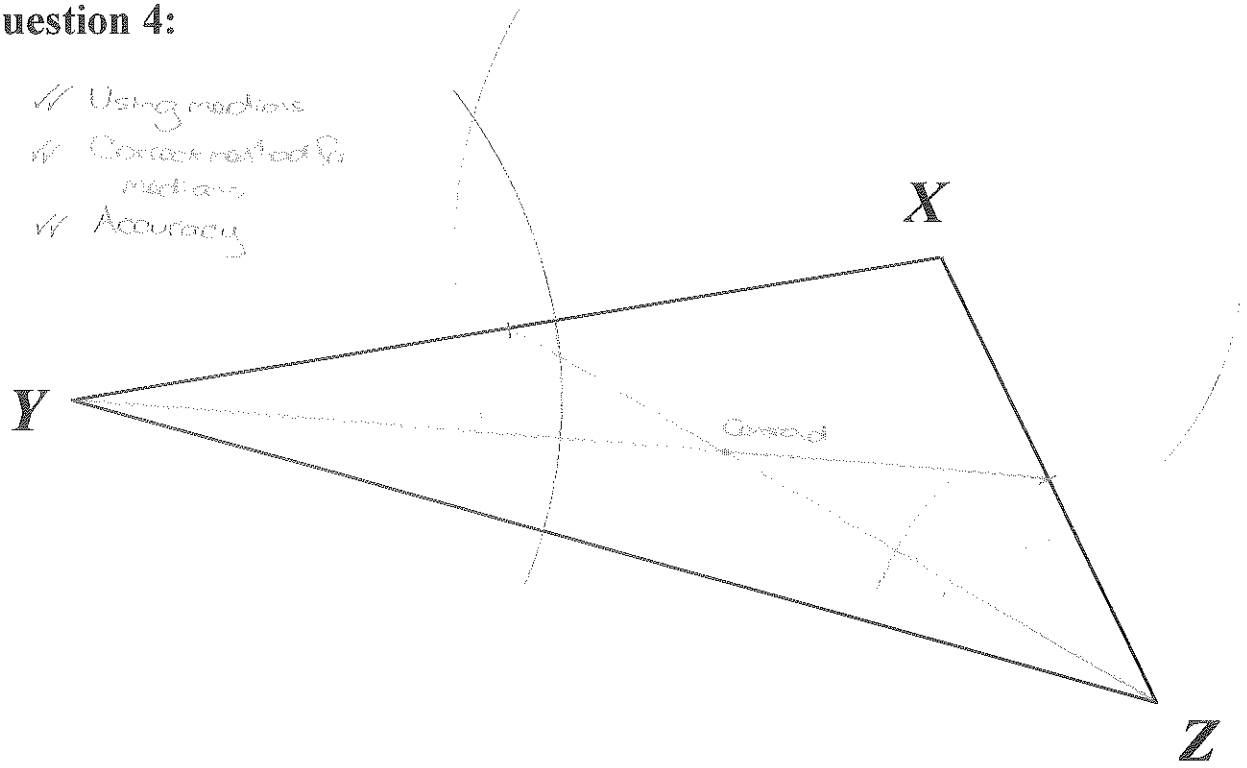
3 × ✓ for each ⊥ bisector
✓ circumscribed circle

(5)

Question 4:

✓✓ Using medians
✓✓ Construction of medians
✓✓ Accuracy

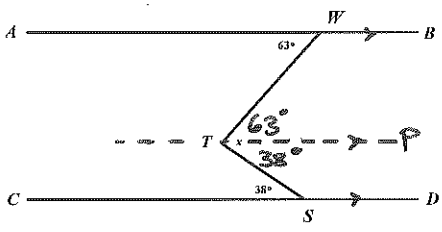
(6)



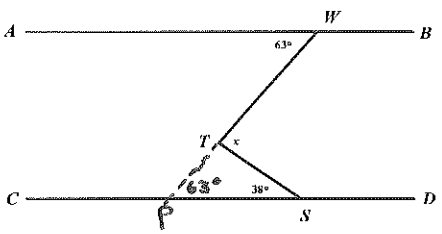
4.2 X to centroid = .**39 mm**

(2)

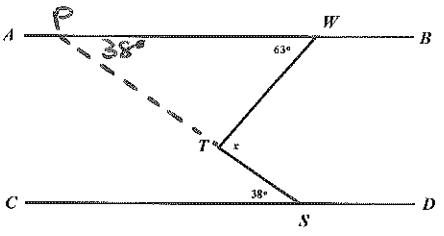
Question 9:



Constr: TP ∥ CD
Proof: $\hat{PTS}$ = 38° (alt.∠s; TP ∥ CD)
$\hat{WTP}$ = 63° (alt.∠s; AB ∥ TP)
∴ x = 101°



Constr: Extend WT to P
Proof: $\hat{WPS}$ = 63° (alt.∠s; AB ∥ CD)
∴ x = 101° (ext.∠ of ΔTPS)



Constr: Extend ST to P
Proof: $\hat{WPT}$ = 38° (alt.∠s; AB ∥ CD)
∴ x = 101° (ext.∠ of ΔWPT)

✓ for each - be reasonably lenient

Other constructions are possible.

(3)

[85]

Gr. 8 – June 2016 P2 Memo [85]

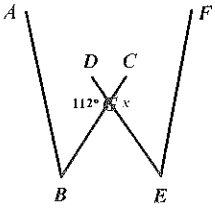
Question 5:

a) 113° ✓
b) the sum of the interior opposite angles ✓
c) supplementary ✓
d) eight ✓
e) at 90° ✓
f) scalene ✓
g) sixty ✓
h) reflex ✓
i) 210° ✓
j) 60° + x° ✓

(11)

Question 6:

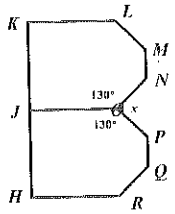
a)



$x = 112°$ ✓ (vert. opp. ∠s equal) ✓

(2)

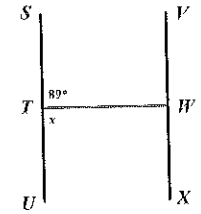
b)



$x = 100°$ ✓ (∠s around pt. O) ✓

(2)

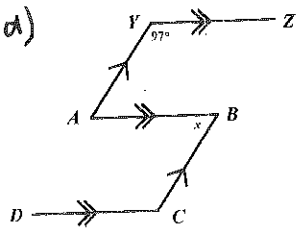
c)



$x = 91°$ ✓ (∠s on str. line SU) ✓

(2)

d)



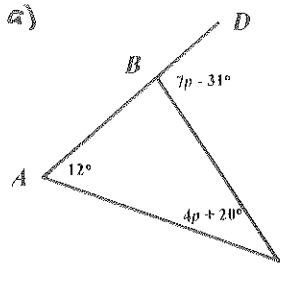
$\hat{YAB} = 83°$ ✓ (co-int. ∠s; YZ ∥ AB) ✓

$\therefore x = 83°$ ✓ (alt ∠s; AY ∥ CB) ✓

(4)

Question 7:

a)



$12° + 4p + 20° = 7p - 31°$ ✓ (ext ∠ of ΔABC) ✓

$\therefore 4p + 32° = 7p - 31°$

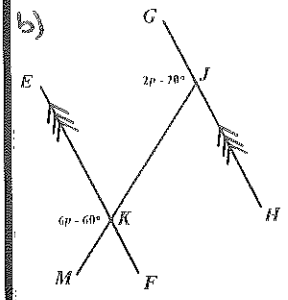
$\therefore 4p + 63° = 7p$

$\therefore 63° = 3p$ ✓

$\therefore p = 21°$ ✓

(4)

b)



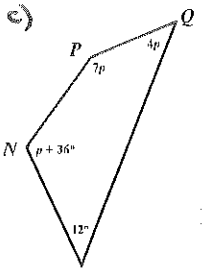
$6p - 60° = 2p - 20°$ ✓ (corr ∠s; HG ∥ FE) ✓

$\therefore 4p = 40°$ ✓

$\therefore p = 10°$ ✓

But this makes an impossible diagram. (4)

c)



$4p + 7p + p + 36° + 12° = 360°$ ✓ (∠ sum quad NPQR) ✓

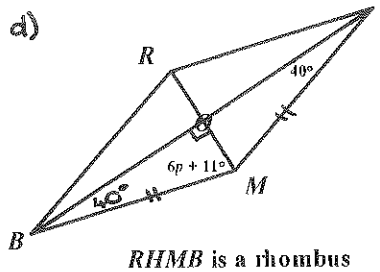
$\therefore 12p + 48° = 360°$

$\therefore 12p = 312°$ ✓

$\therefore p = 26°$ ✓

(4)

d)



RHMB is a rhombus

$\hat{BOM} = 90°$ ✓ (diags of rhombus)

$\hat{OBM} = 40°$ ✓ (∠s opp = sides; isos Δ)

$\therefore 6p + 11° + 40° + 90° = 180°$

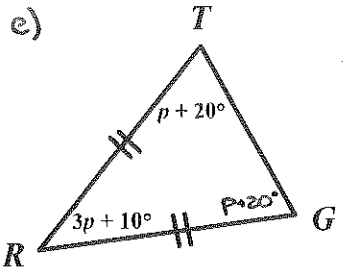
$\therefore 6p + 141° = 180°$

$\therefore 6p = 39°$ ✓

$\therefore p = 6\frac{1}{2}°$ ✓

(4)

e)



$\hat{TGR} = p + 20°$ ✓ (∠s opp. = sides; TR = RG) ✓

$3p + 10° + p + 20° + p + 20° = 180°$ ✓ (∠ sum in ΔTRG)

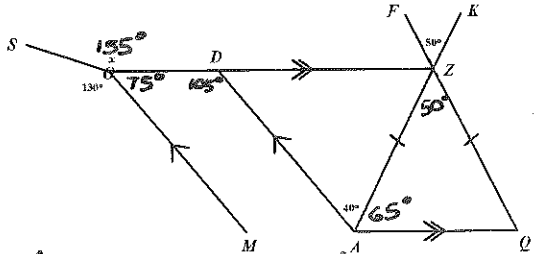
$\therefore 5p + 50° = 180°$

$\therefore 5p = 130°$ ✓

$\therefore p = 26°$ ✓

(4)

Question 8:



$\hat{AZQ} = 30°$ (vert opp ∠s =) ✓

$\hat{ZAQ} = 65°$ (∠ sum ΔZAQ & ∠s opp = sides, ZA = ZQ) ✓

$O\hat{S}A = 105°$ (alt ∠s; OZ ∥ AQ) ✓

$M\hat{O}Z = 75°$ (co-int. ∠s; MO ∥ AD) ✓

$x = 155°$ (∠s around pt. O) ✓

(Give 3 for answer, but no reasons; 5)

PolyMathic

Paper 3
May/June
Algebra and Geometry

(Q1 - Combined)

(Q2 - Q5: Algebra)

(Q6 - Q9: Geometry)

PolyMathic

Grade 8 Maths Paper
Algebra

9 June

Marks: 135
Time: 2 Hours

GENERAL INSTRUCTIONS

1. Answer all questions.
2. Calculators are not permitted.
3. Show ALL working; solutions will not necessarily be awarded any marks if no working is shown.
4. Write your name and your Maths teacher's monogram at the top of your answer script.
5. **6 Extra marks have been assigned for the layout of your algebraic work.**

Question 1

1.1) Rewrite the expression and insert a double vertical line after each term of the following expression: (3)

$$10b + 7 \times c \div (k + 2) - \frac{16 - t}{s \div 4} + 3[d + 2(j - 5)] - 6^2$$

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

$$(3 + 6k) \times (k - 2) \div (16k + 1)$$

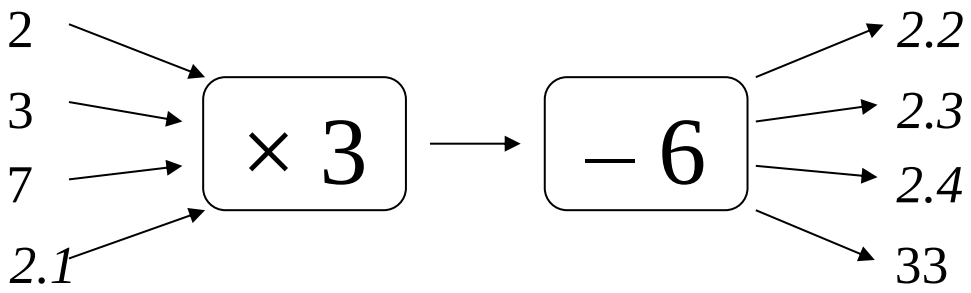
1.3) What is the third term of the following expression? (2)

$$\frac{3}{w - 2} - 7b - 6 \times a \ + 2$$

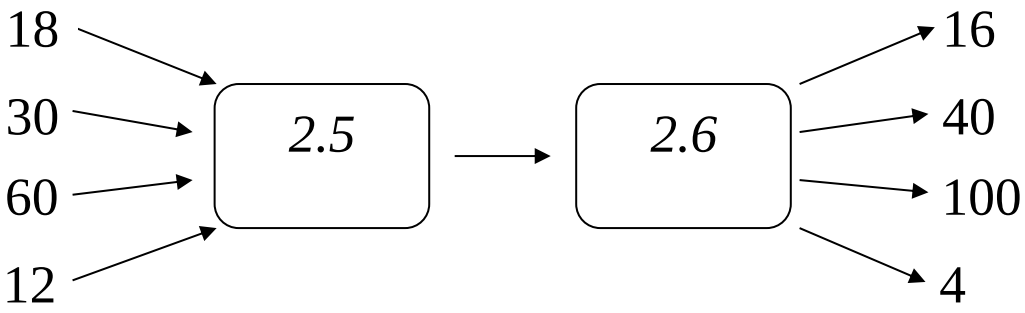
Question 2

Complete the following flow diagrams:

(2.1 – 2.6)



(8)



(4)

Question 3

Simplify:

3.1) $6 - 3 + 2$ (1)

3.2) $17 - (6 + 2)$ (2)

3.3) $100 - (80 - (60 - 20)$ (3)

3.4) $12 \div 3 + 7 \times 6 \div (5 \times 2 - 8)$ (4)

3.5) $\frac{20 \div (3+2)}{5-2\times 2} + 7(2 + 4)$ (4)

Question 4

Simplify where possible:

4.1) $15b - b$ (1)

4.2) $3e - 3$ (1)

4.3) $7m + 3 + 8m$ (2)

4.4) $4pk - 2kp + 5kj + 2pk$ (2)

4.5) $\frac{24t-36}{6}$ (2)

4.6) $5(g + 4) + 4(2g - 3)$ (4)

4.7) $8 \times 5 + 20p \div 2 + (2 + 3) \times (4 - 2p)$ (5)

Question 5

Solve the following equations:

5.1) $3p - 7 = 8$ (2)

5.2) $9t + 6 = 18$ (2)

5.3) $3h + 30 = 7(h + 3)$ (3)

5.4) $\frac{30-2m}{4} = 7$ (3)

5.5) $\frac{p}{5} + p = 12$ (3)

5.6) $6(m - 2) + 4(2m - 1) = 2m - 11$ (4)

5.7) $3(x + 5) = 2x + 15 + x$ (3)

Question 6

6.1) Complete the following table:
(6.1.1 – 6.1.5)

m	5	6	0
n	2	7	6
$3\mathrm{m} - 2\mathrm{n}$	6.1.1	6.1.2	
$\frac{\mathrm{mn}}{2}$	6.1.3	6.1.4	6.1.5

(5)

6.2) If $a = 6, b = 3$ and $c = 0$ find the value of

6.2.1) $a - b$ (1)

6.2.2) $a \times b + c \div a + 4b$ (4)

6.2.3) $\frac{a}{c}$ (2)

6.3) Find the value of x if $u = 2, v = 3u + 1, w = 4 + v$ and $x = u + w - 4$ (3)

Question 7

7.1) In the following table there is a relationship between the top row of numbers and the bottom row.

Study the pattern and then complete the table, by filling in the missing values.

15	3	7	12	1	4	23	n
⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩
17	5	9	14	7.1.1)	7.1.2)	7.1.3)	7.1.4)

(5)

7.2) In the following table there is a relationship between the top row of numbers and the bottom row.

Study the pattern and then complete the table, by filling in the missing values.

7	12	5	16	8	13	27	n
⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩
13	23	9	31	7.2.1)	7.2.2)	7.2.3)	7.2.4)

(5)

7.3) Consider the following figures, created using matches.

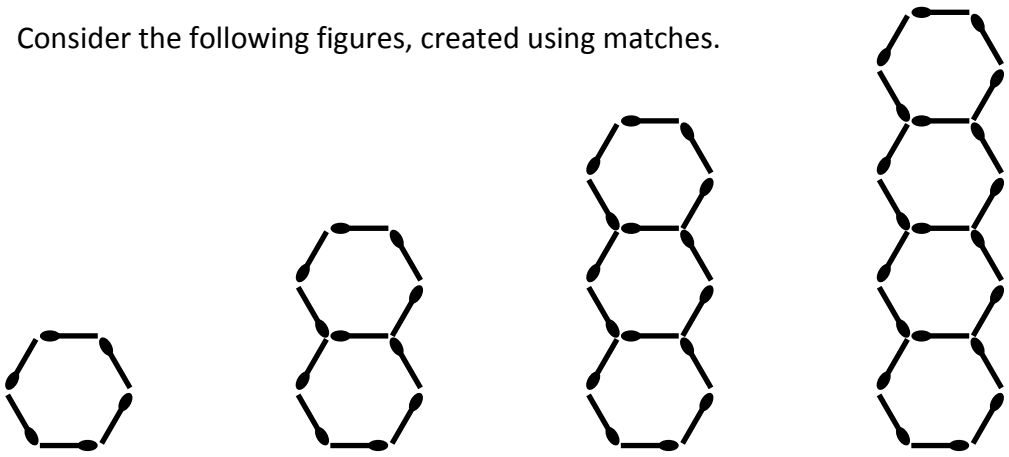


Figure 1 **Figure 2** **Figure 3** **Figure 4**

As you can see, in **Figure 1** there are 6 matches, in **Figure 2** there are 11 matches and in **Figure 3** there are 16 matches.

7.3.1) Complete the following table, assuming that this pattern is continued.

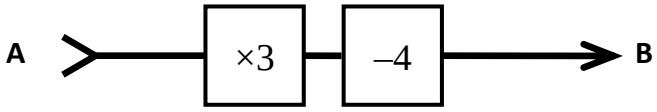
Figure Number (*n*)	1	2	3	**4**	**6**
Number of Matches (M)	6	11	16	a)	b)

(2)

7.3.2) Determine a formula which links the Figure Number (*n*), with the Number of Matches (M).

Write your formula in the form M = (2)

7.4) Consider the following flow diagram.



7.4.1) Write down the formula for this flow diagram which links A to B.
In other words, write your answer in the form B = ...

B = (1)

7.4.2) Now write down the formula in the form A = …

A = (2)

Question 8

Simplify:

8.1) $a \times b$ (1)

8.2) $2b \times 3b$ (2)

8.3) $4a^2 \times a^3$ (2)

8.4) $\frac{c^5}{c^3}$ (1)

8.5) $18p^6r^3 \div 6p^3r^2$ (3)

8.6) $(2m^3)^2$ (2)

8.7) $5r^2s + 3s^2r + 4s^2r + 2r^2s$ (2)

8.8) $(6m)^2 - \frac{2m \times 12m^5}{3m^4}$ (5)

8.9) $\frac{6a^9}{3a^6}$ (3)

8.10) $3(f^2 - 6f^3 + 8f^7)$ (3)

Question 9 - Bonus

Complete the following only once you have finished everything else

Simplify:

9.1)

$$15-5\times(13-5\times2)+\left[17-\left\{17-\left(17-(17-12)\right)\right\}\right]-\frac{\frac{13-4}{2+2\div2}+6\times2}{7-\frac{10}{7-\frac{10}{3+\frac{4}{2}}}}+2\times3(4-2\times2)+4!$$

(2)

Solve:

9.2) $3(m+5) + \frac{2m+6}{2} + 5(3m+2m) + 15m - 12 \div 3 + \frac{20m-12m}{4m} = 60$ (2)

Memo

Question 1

✓✓✓ (Subtract 1 per mistake)

1.1) $10b + 7 \times c \div (k+2) - \frac{16-t}{5 \div 4} + 3[d+2(j-5)] - 6^2$

1.2) 1 ✓

1.3) -69 ✓✓

Question 2

2.1) 13 ✓✓

2.2) 0 ✓✓

2.3) 3 ✓✓

2.4) 15 ✓✓

2.5) $\times 2$ / -10 ✓✓

2.6) -20 / $\times 2$ ✓✓

Question 3

3.1) $6 - 3 + 2$
$= 5$ ✓

3.2) $17 - (6+2)$
$17 - 8$ ✓
$= 9$ ✓

3.3) $100 - (80 - (60 - 20))$
$100 - (80 - 40)$
$100 - 40$
$= 60$ ✓

3.4) $12 \div 3 + 7 \times 6 \div (5 \times 2 - 8)$
$4 + 42 \div (10 - 8)$
$4 + 42 \div 2$
$4 + 21$ ✓
$= 25$ ✓

3.5) $\frac{20 \div (3+2)}{5 - 2 \times 2} + 7(2+4)$
$\frac{20 \div 5}{5 - 4}$ ✓ $+ 7(6)$
$\frac{4}{1} + 42$ ✓
$= 46$ ✓

Question 4

4.1) $15b - b$
$= 14b$ ✓

4.2) $3e - 3$
$= 3e - 3$ (cannot be simplified)

4.3) $7m + 3 + 8m$
$= 15m + 3$ ✓✓

4.4) $4pk - 2kp + 5kj + 2pk$
$= 4pk + 5kj$

4.5) $\frac{24t - 36}{6}$
$= 4t - 6$ ✓✓

4.6) $5(g+4) + 4(2g-3)$
$5g + 20 + 8g - 12$
$= 13g + 8$ ✓

4.7) $8 \times 5 + 20p \div 2 + (2+3) \times (4 - 2p)$
$40 + 10p + 5 \times (4 - 2p)$
$40 + 10p + 20 - 10p$
$= 60$ ✓

Question 5

5.1) $3p - 7 = 8$
$3p = 8 + 7$ ✓
$3p = 15$ ✓
$p = 5$ ✓

5.2) $9t + 6 = 18$
$9t = 18 - 6$
$9t = 12$ ✓
$t = \frac{12}{9} / 1\frac{3}{9} / 1\frac{1}{3}$ ✓

5.3) $3h + 30 = 7(h+3)$
$3h + 30 = 7h + 21$ ✓
$3h - 7h = 21 - 30$
$-4h = -9$ ✓
$h = \frac{+9}{+4} / 2\frac{1}{4}$ ✓

5.4) $\frac{30 - 2m}{4} = 7$
$30 - 2m = 28$ ✓
$-2m = 28 - 30$
$-2m = -2$ ✓
$m = \frac{-2}{-2} / 1$ ✓

5.5) $\frac{p}{5} + p = 12$
$p + 5p = 60$ ✓
$6p = 60$ ✓
$p = 10$ ✓

5.6) $6(m-2)+4(2m-1)=2m-11$

$6m-12+8m-4=2m-11$

$14m-16=2m-11$

$14m-2m=-11+16$

$12m=5$

$m=\frac{5}{12}$

5.7) $3(x+5)=2x+15+x$

$3x+15=2x+15+x$

$3x+15=3x+15$

$\therefore$ Identity

Question 6

6.1.1) 11

6.1.2) 4

6.1.3) 5

6.1.4) 21

6.1.5) 0

6.2.1) $6-3$

$=3$

6.2.2) $6\times3+0\div6+4(3)$ (sub)

$18+0+12$

$=30$

6.2.3) $\frac{6}{0}$ (sub)

= undefined.

6.3) $u=2$

$v=3(2)+1$

$v=7$

$w=4+(7)$

$w=11$

$x=2+(11)-4$

$x=9$

Question 7

7.1.1) 3

7.1.2) 6

7.1.3) 25

7.1.4) $n+2$

7.2.1) 15 ✓

7.2.2) 25 ✓

7.2.3) 53 ✓

7.2.4) $2n-1$ ✓✓

7.3.1) a) 21 ✓
b) 31 ✓

7.3.2) $m = 5n + 1$ ✓✓

7.4.1) $B = 3A - 4$ ✓

7.4.2) $A = \frac{B+4}{3}$ ✓✓

Question 8

8.1) $a \times b$
$= ab$ ✓

8.2) $2b \times 3b$
$= 6b^2$ ✓

8.3) $4a^2 \times a^3$
$= 4a^5$ ✓

8.4) $\frac{c^5}{c^3}$
$= c^2$ ✓

8.5) $18p^6r^3 \div 6p^3r^2$
$= 3p^3r$ ✓

8.6) $(2m^3)^2$
$= 4m^6$ ✓

8.7) $5r^2s + 3s^2r + 4s^2r + 2r^2s$
$= 7r^2s + 7s^2r$ ✓

8.8) $(6m)^2 - \frac{2m \times 12m^5}{3m^4}$
$36m^2 - \frac{24m^6}{3m^4}$
$36m^2 - 8m^2$
$= 28m^2$

8.9) $\frac{6q^9}{3q^6}$
$= 2a^3$ ✓✓

8.10) $3(f^2 - 6f^3 + 8f^7)$
$= 3f^2 - 18f^3 + 24f^7$ ✓

Question 9

9.1) 33 ✓✓

9.2) $m = 1$ ✓✓

6 MARKS FOR LAYOUT

PolyMathic

Paper 4

May/June

Algebra and Geometry

(Q1 - Combined)

(Q2 - Q4: Algebra)

(Q5 + Q6: Geometry)

PolyMathic

Grade 8 Mathematics
June Geometry
Time allowed: 2 hours
Maximum Marks: 110

Quest One of a Knight

a) An angle between 180º and 360º is called a / an . . . . . angle.

b) An octagon has . . . . . sides.

c) An exterior angle of a triangle is equal to . . . . . .

d) When a transversal cuts two parallel lines, the co-interior angles thus formed are . . . . . .

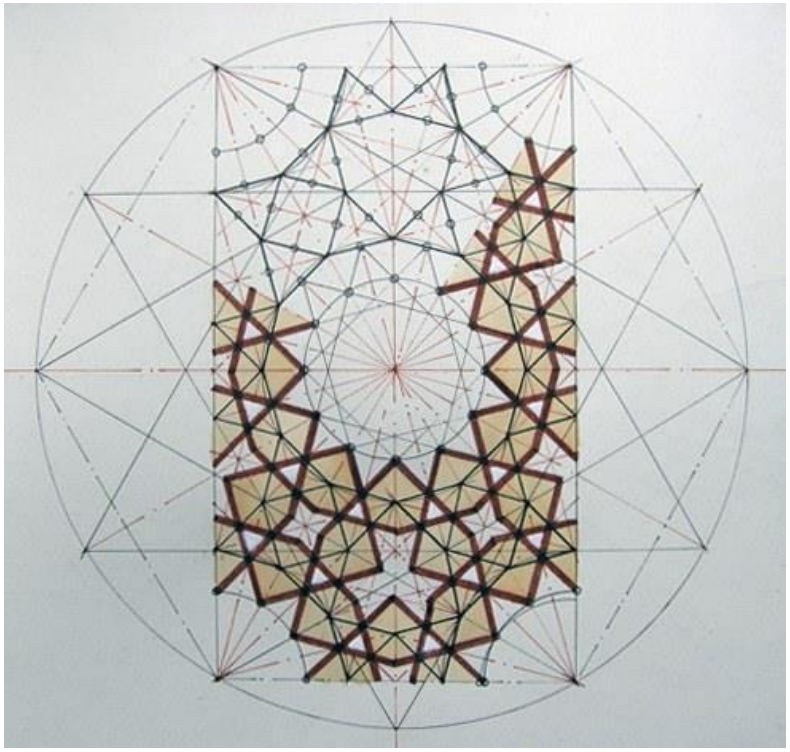
e) The complement of 63º is . . . . . .

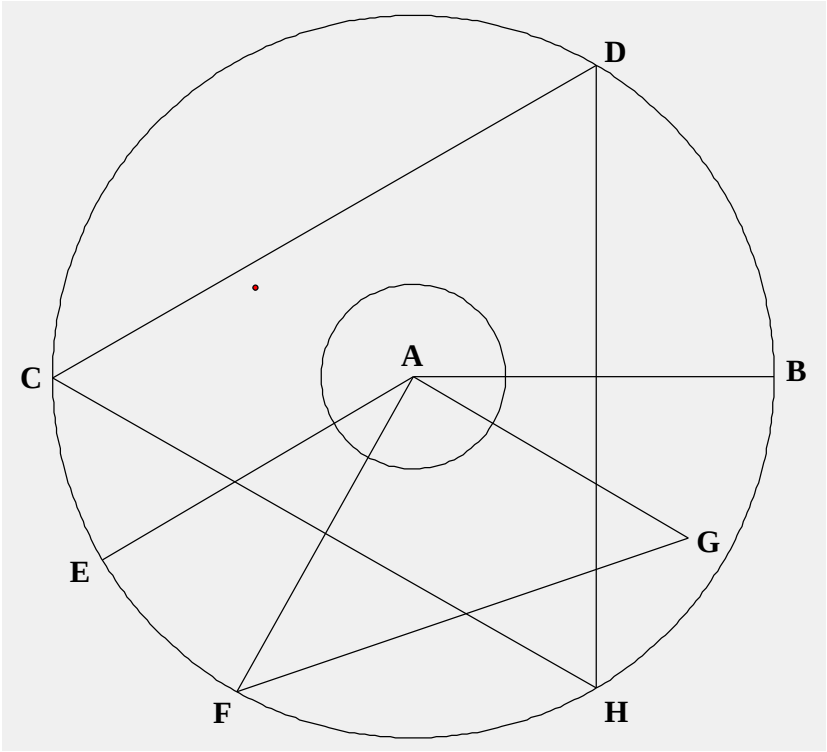
f) Any number of angles which add up to 180° are called . . . . . angles.

g) The complement of $(128 - 3x)^\circ$ is . . . . . (7)

Quest Two of a Knight

The Eastern architects were very skilled in geometric construction. A portion of the plan for the inner ceiling of a mosque is shown in the figure on the left. A simplified version of part of the figure is shown on the right. This has been drawn on the diagram sheet. All your answers must be constructed on that diagram sheet.





a) Find line segment **AB** and use it to construct angle **ABM** = 38º. (2)

b) Construct the perpendicular bisector of line segment **CD**. (3)

c) A line segment **AE** has been drawn. Use it to draw Δ**AEP** with **PA** = 5 cm and **PE** = 7 cm. (3)

d) Draw the angle bisector of the angle at **G** in Δ**AGF**. (3)

e) Draw the altitude from **A** of Δ**AGF**. (3)

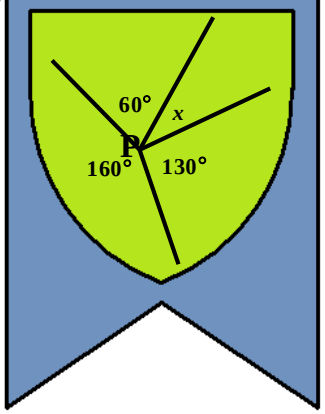
Quest Three of a Knight

1 – O	14 – O
2 – R	15 – D
3 – S	16 – F
4 – V	17 – R
5 – G	18 – T
6 – K	19 – N
7 – N	20 – J
8 – A	21 – A
9 – M	22 – L
10 – P	23 – T
11 – D	24 – C
12 – E	25 – P
13 – H	26 – R

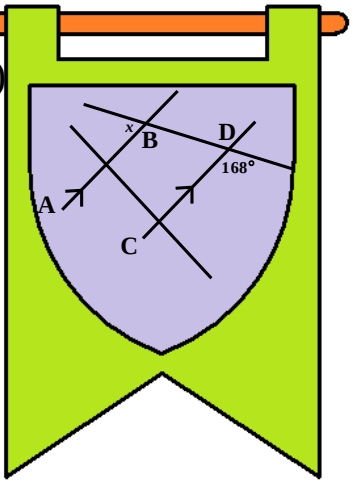
A knight wants to hang his family name on his banners on the castle bridge and decides to use geometry to do so. On the next page are 9 geometric designs. In each case, write down the value of x, with reasons (number your answers a) to i) as shown). Each value of x is attached to a letter in the table on the page. Try to find the family name.

(18)

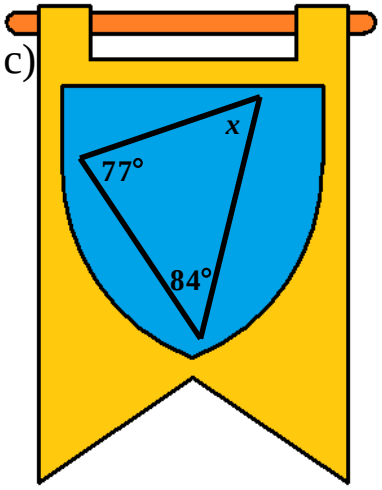
a)



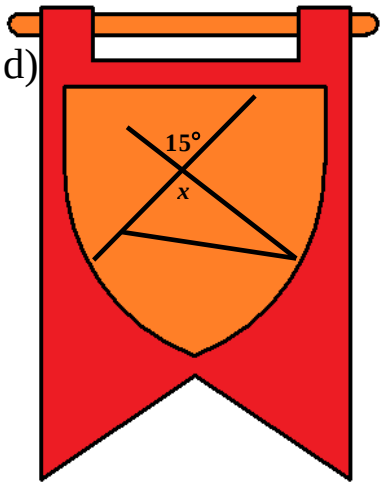
b)



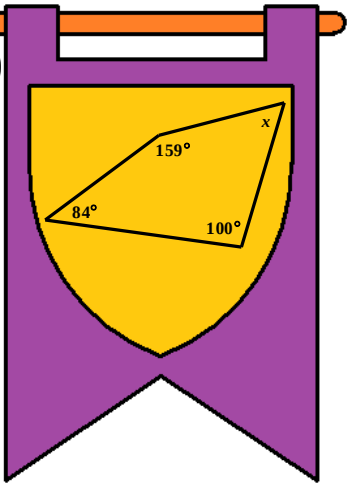
c)



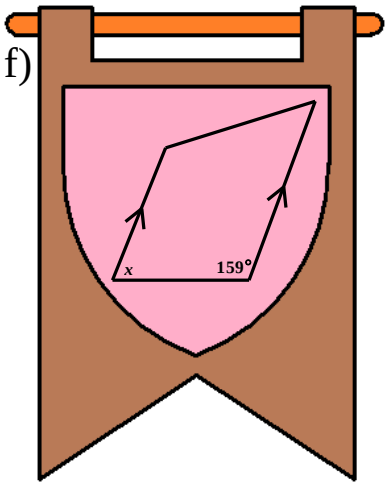
d)



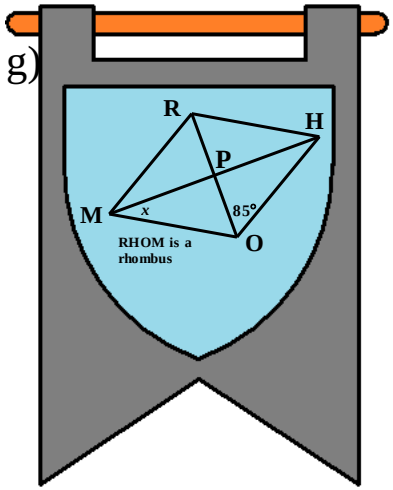
e)



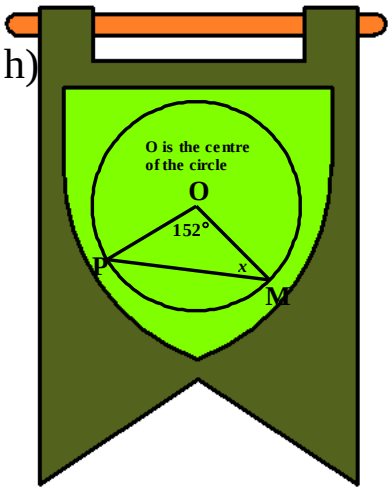
f)



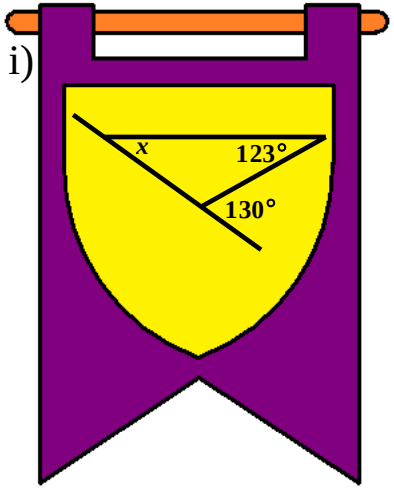
g)



h)



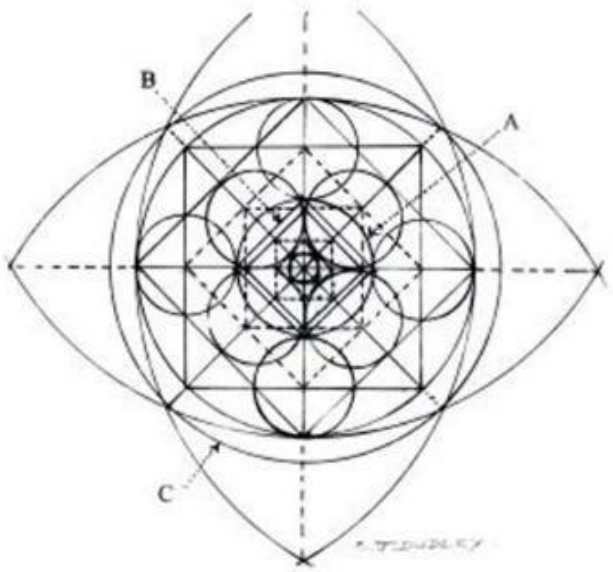
i)

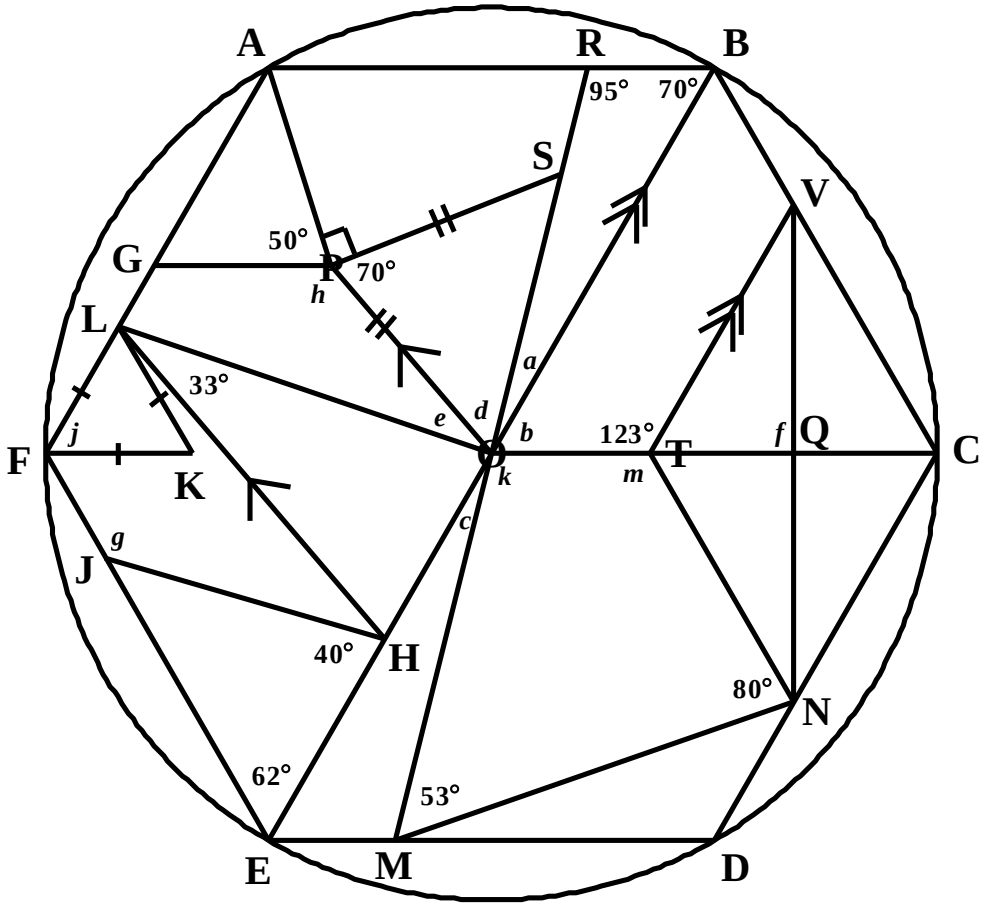


Quest Four of a Knight

The stained glass windows of cathedrals were carefully designed using geometry. The figure on the right shows a lot of geometry that you know. Find the values of all the small letters. Answer this in the table on your diagram sheet. You are given that VTNC is a kite.

(22)





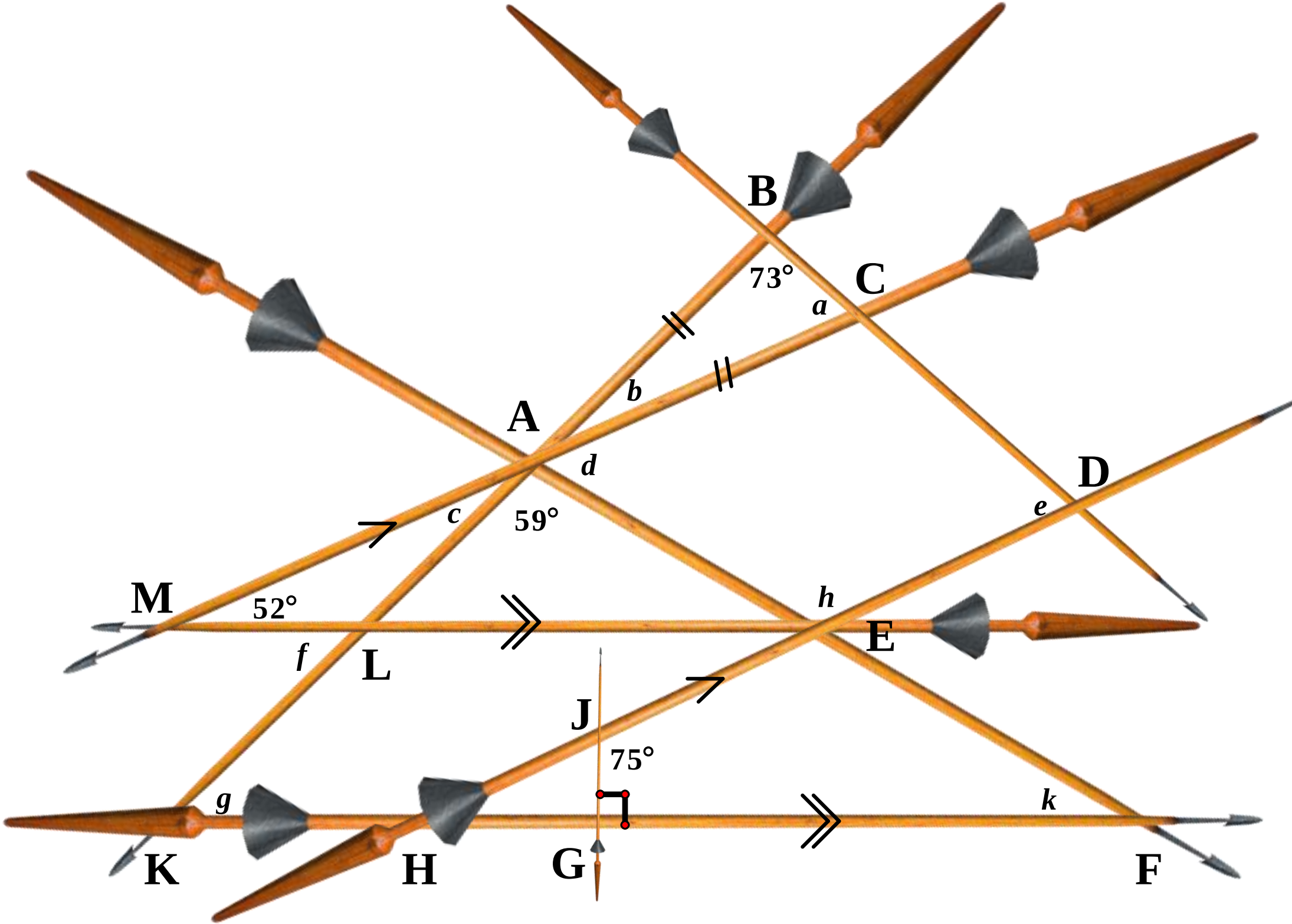
Quest Five of a Knight

The lances for a jousting conquest are all piled at various angles in the diagram on the next page. Assume that each lance is a straight line.

You are also given that AB = AC, MC // HD and ME // KF.

Find the values of the small letters from a to h and k, in alphabetical order.

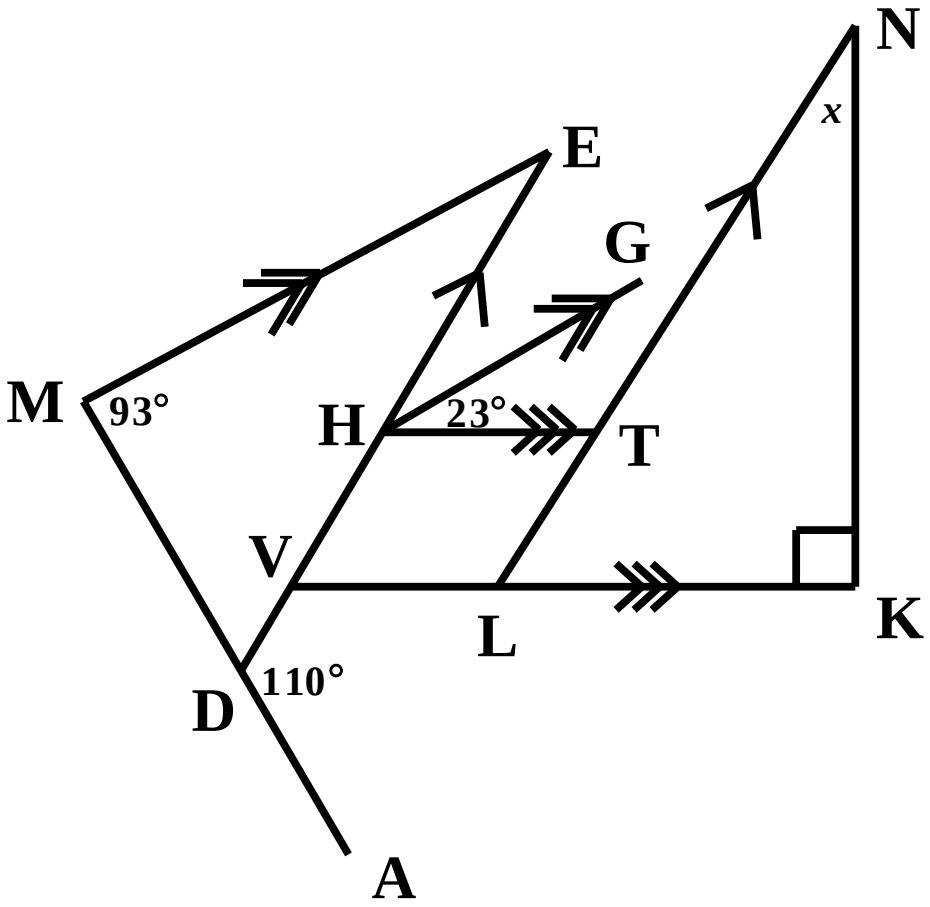
(18)


B
73°
C
a
b
A
d
D
c
59°
e
M
52°
h
E
f
L
J
75°
g
k
K
H
G
F

Quest Six of a Knight

The outside wall of this mosque from the Middle Ages contains a lot of geometry involving straight lines and triangles. A piece has been simplified in the diagram. Find, with reasons, the value of x.

(10)

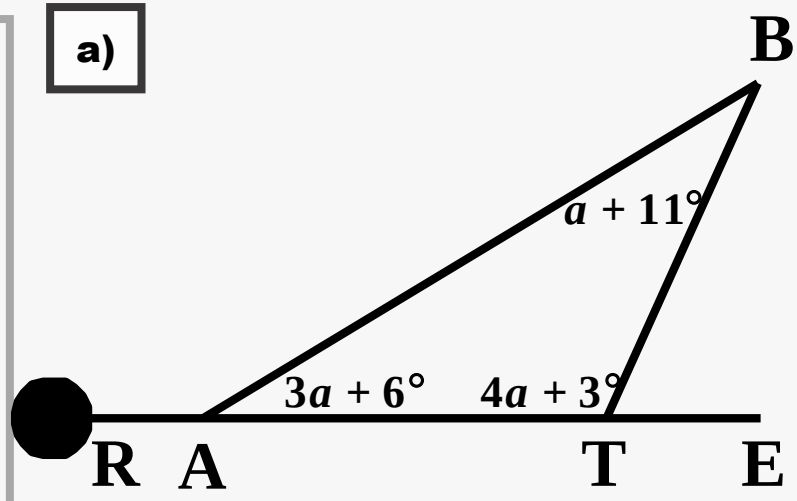


Quest Seven of a Knight

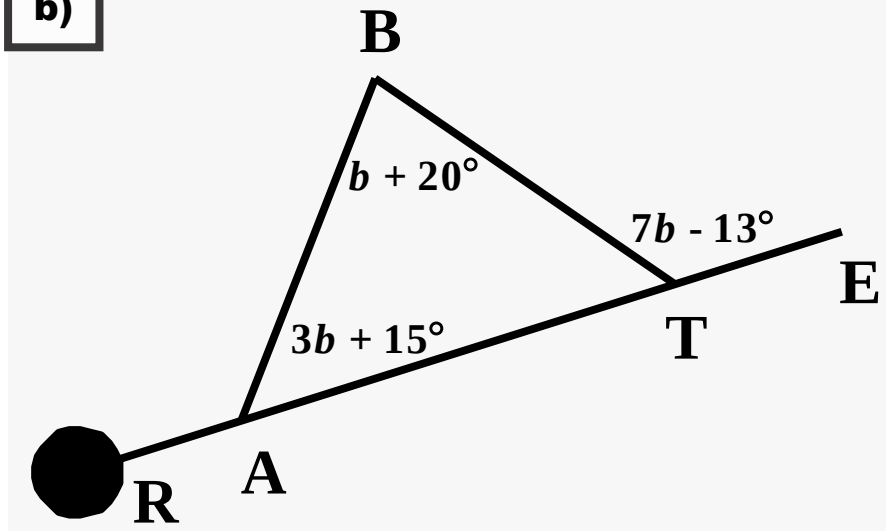
A battering ram is used to bash down the doors of castles under siege. It is hung from ropes and swung. Three different positions are shown below. In each case set up and solve an equation to find the values of a, b and c.

(10)

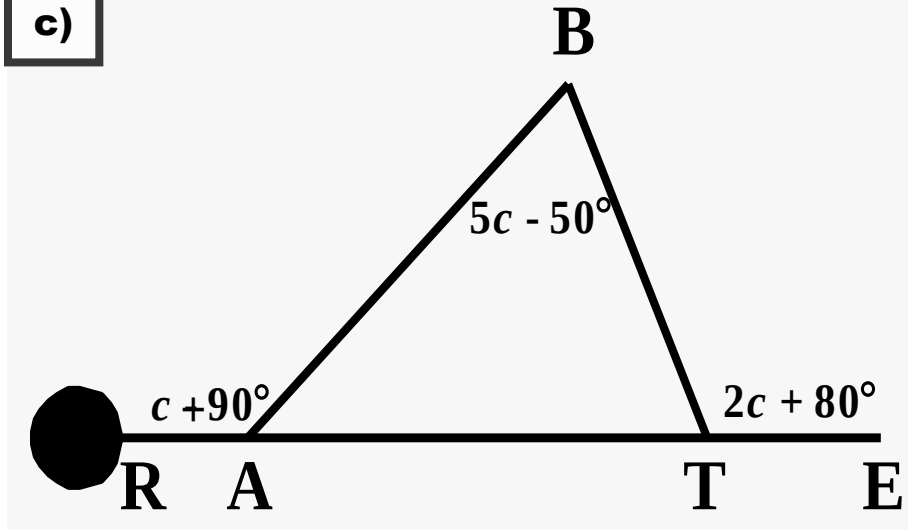
a)



b)

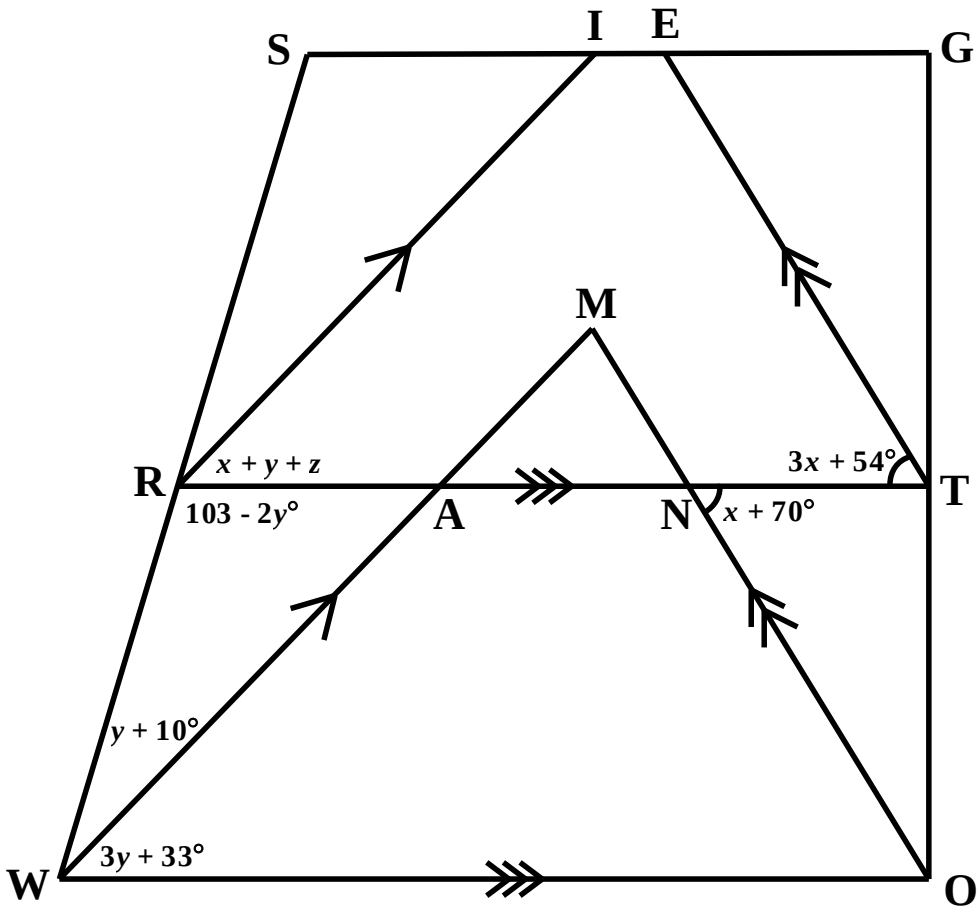


c)



Quest Eight of a Knight

Siege towers were rolled up to the walls to attempt to break the defences. A picture of a tower and a simplified figure of a part of the tower are shown.



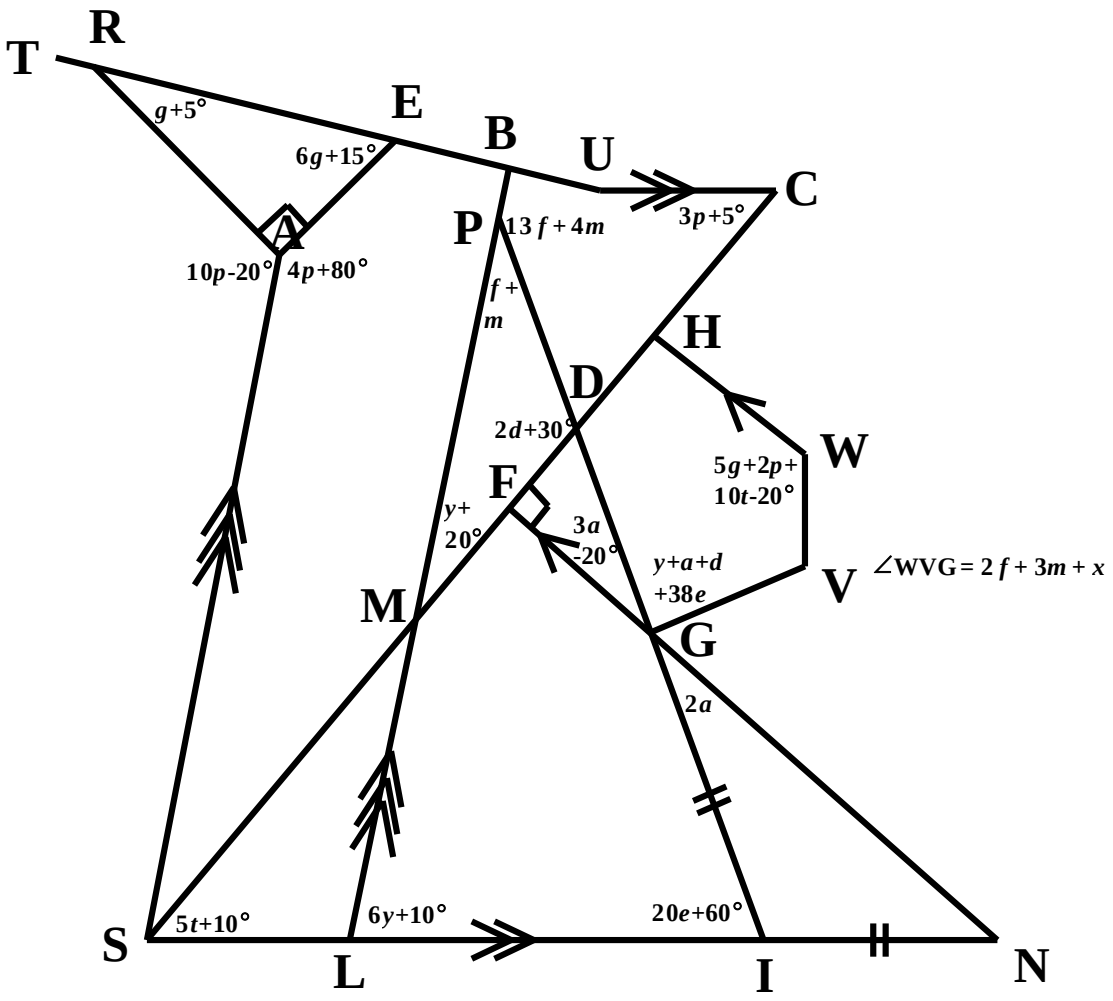
Remember to show all your steps and reasons.

a) Set up and solve an equation to find the value of x. (3)

b) Set up and solve an equation to find the value of y. (3)

c) Now find the value of z. (3)

Quest Nine of a Knight



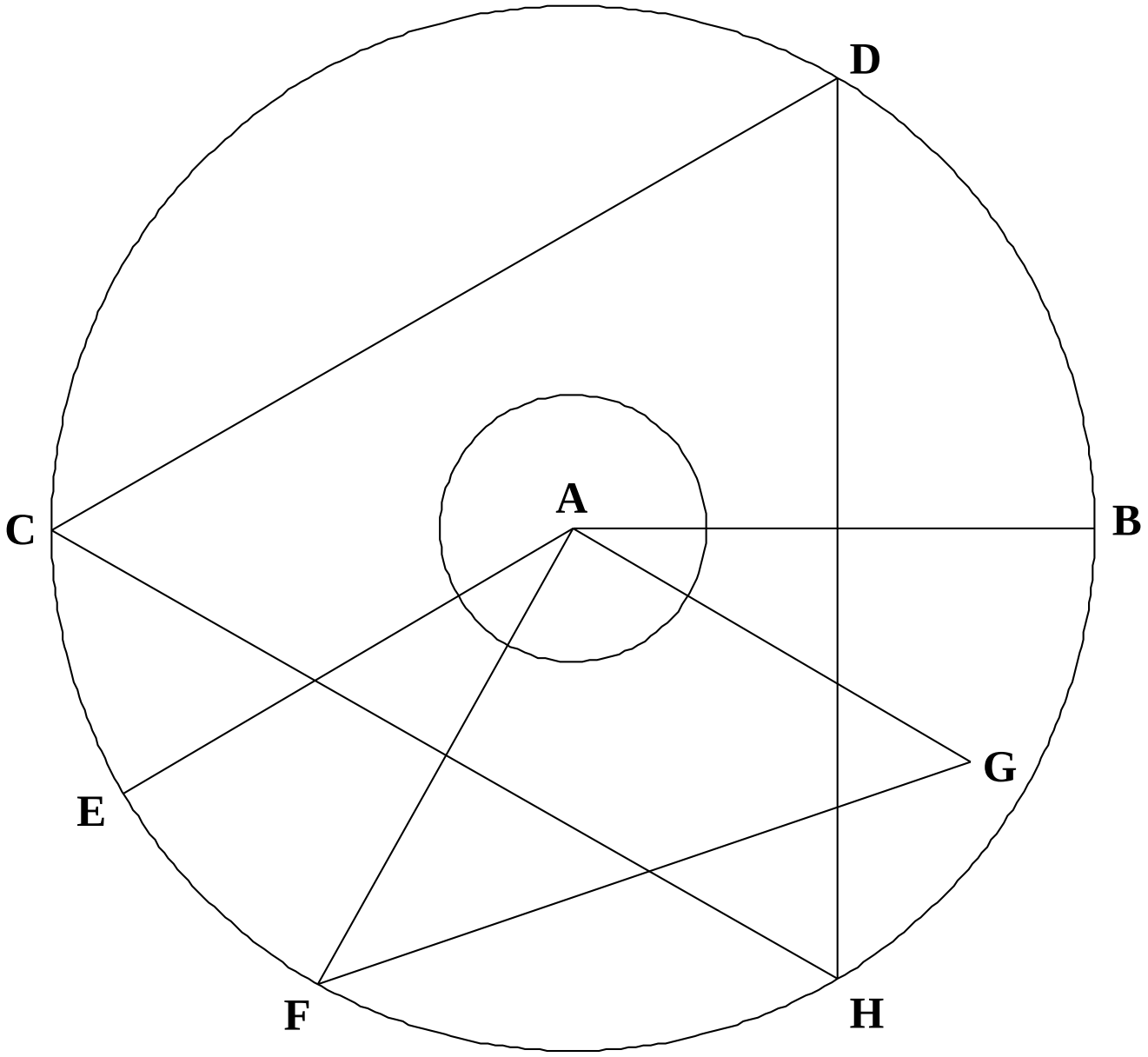
Do not attempt this quest until you have conquered all the rest.

A trebuchet is a type of catapult used to hurl rocks and other things at castles. A simplified diagram is shown. Find the value of x.

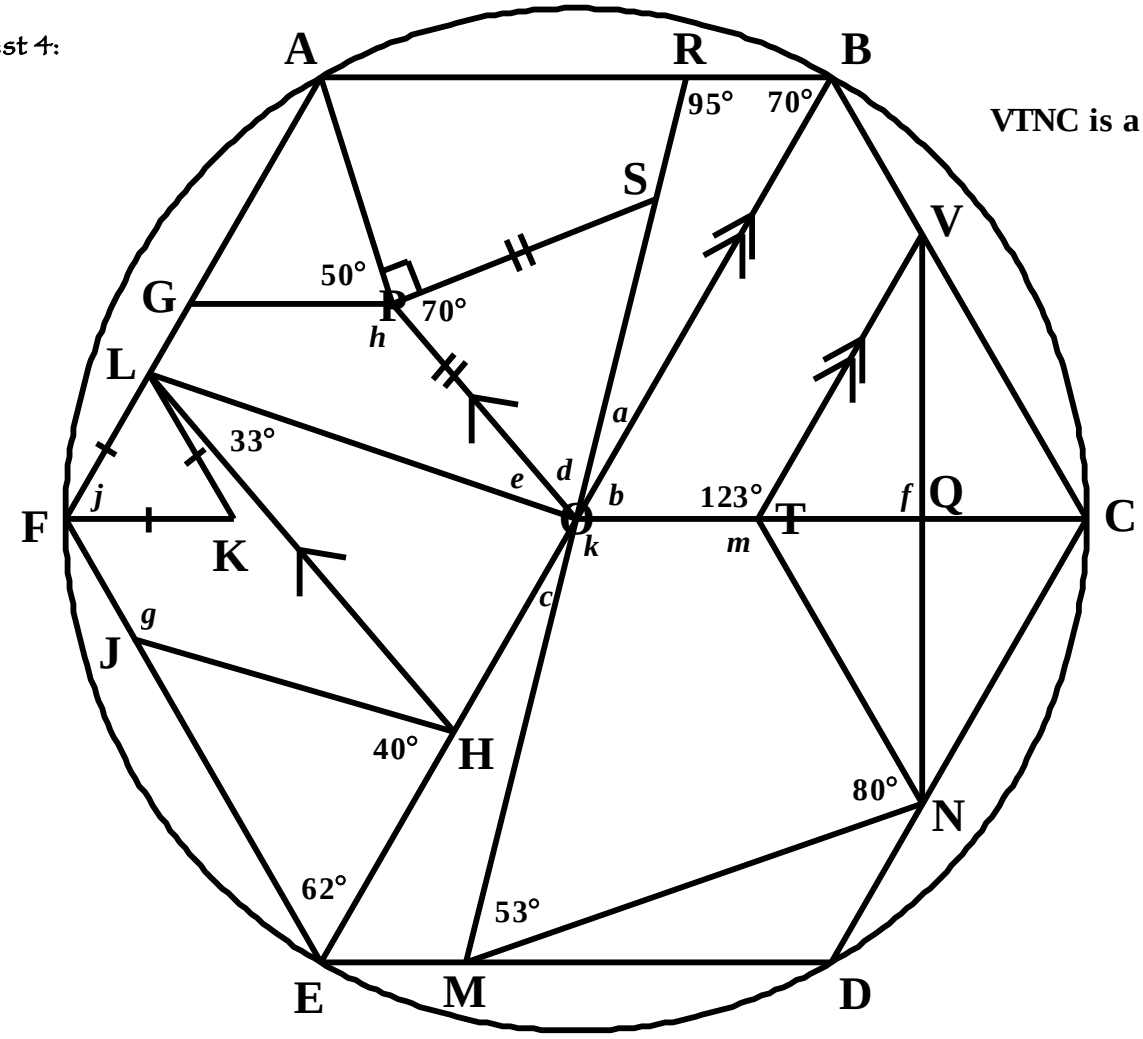
(2)

Name: ..... Teacher: ED SI WI ZE

Quest 2:



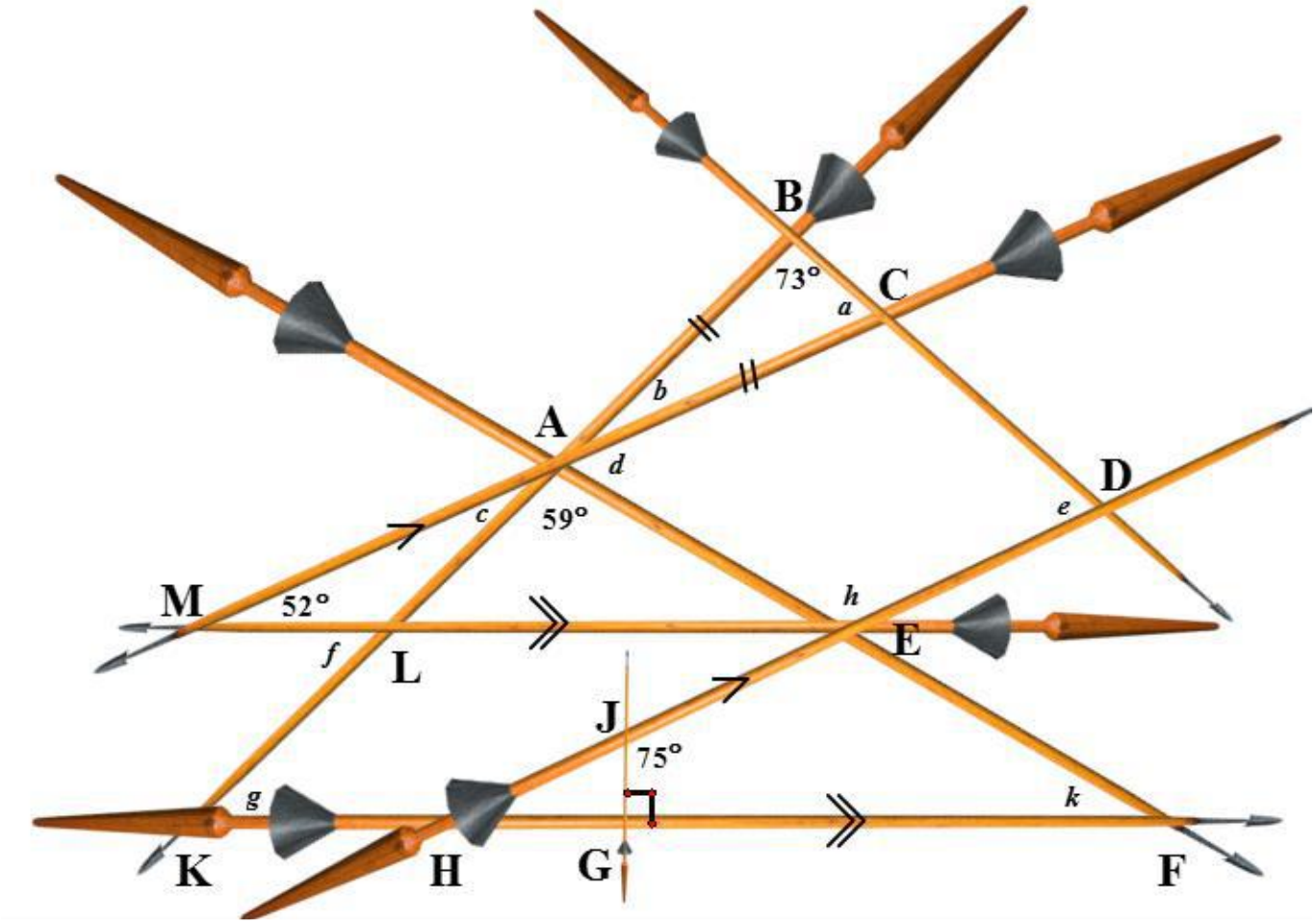
Quest 4:



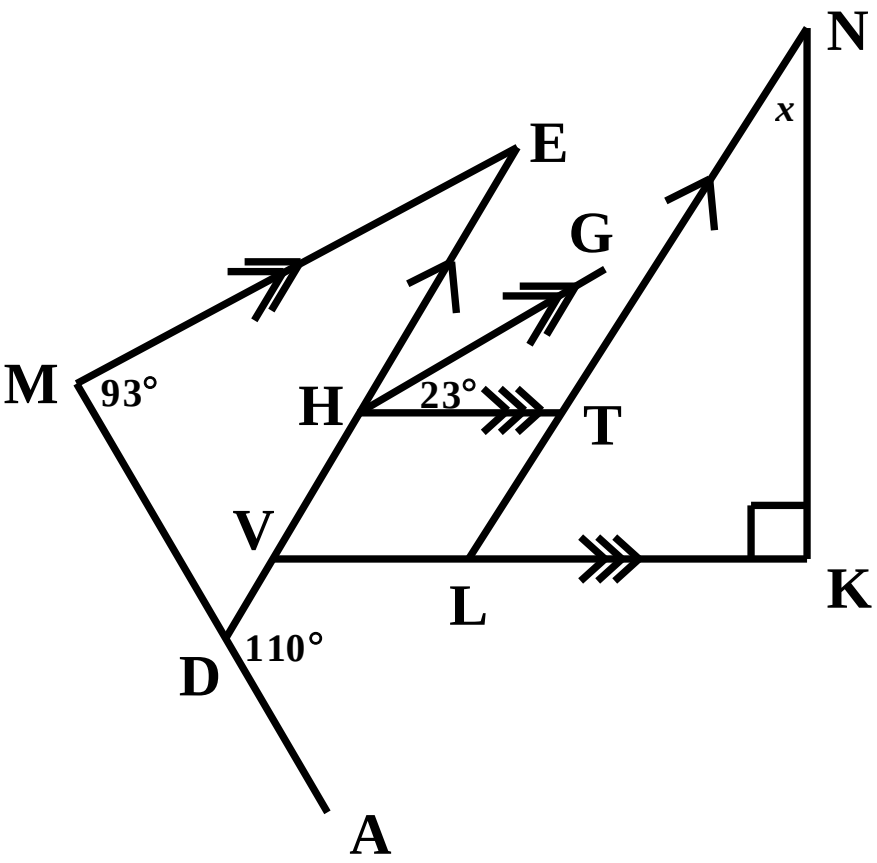
VTNC is a kite

Value of angle	Reason
a =	
b =	
c =	
d =	
e =	
f =	
g =	
h =	
j =	
k =	
m =	

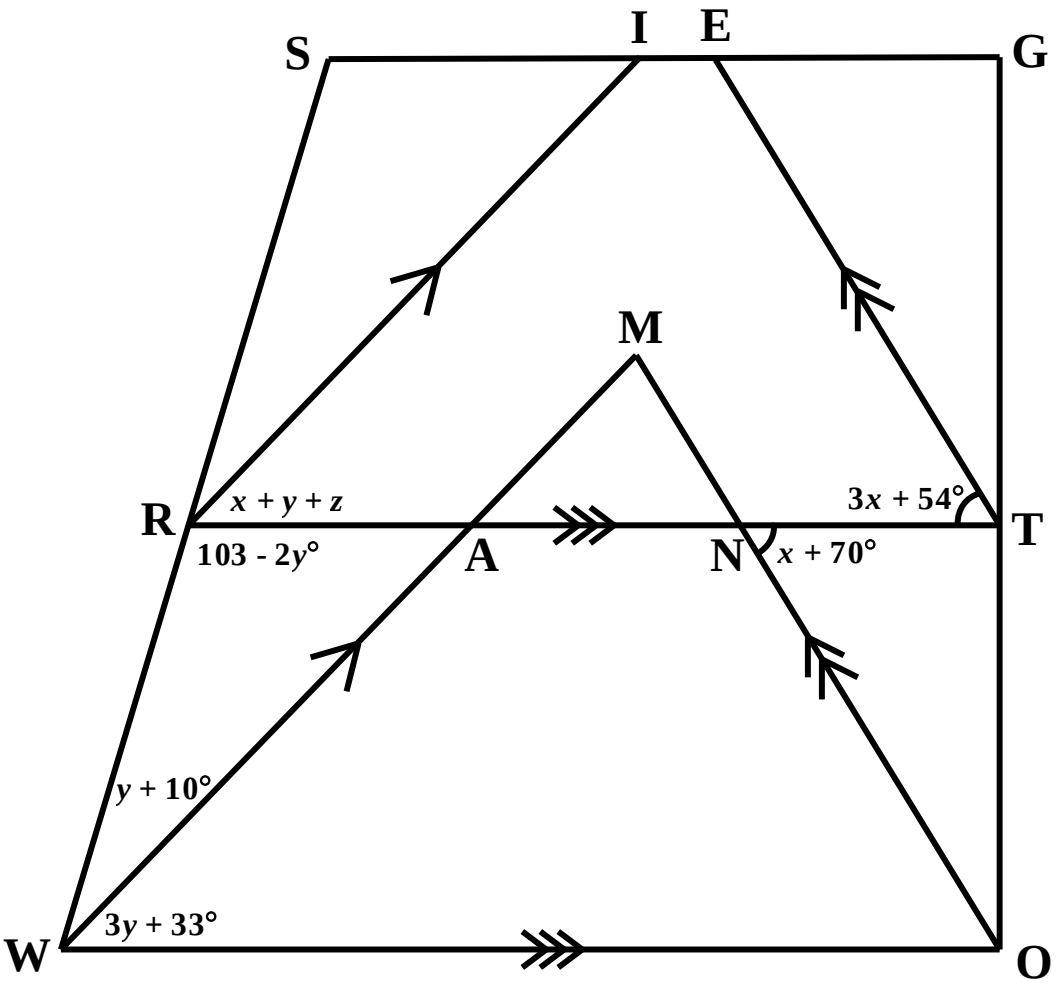
Quest 5:



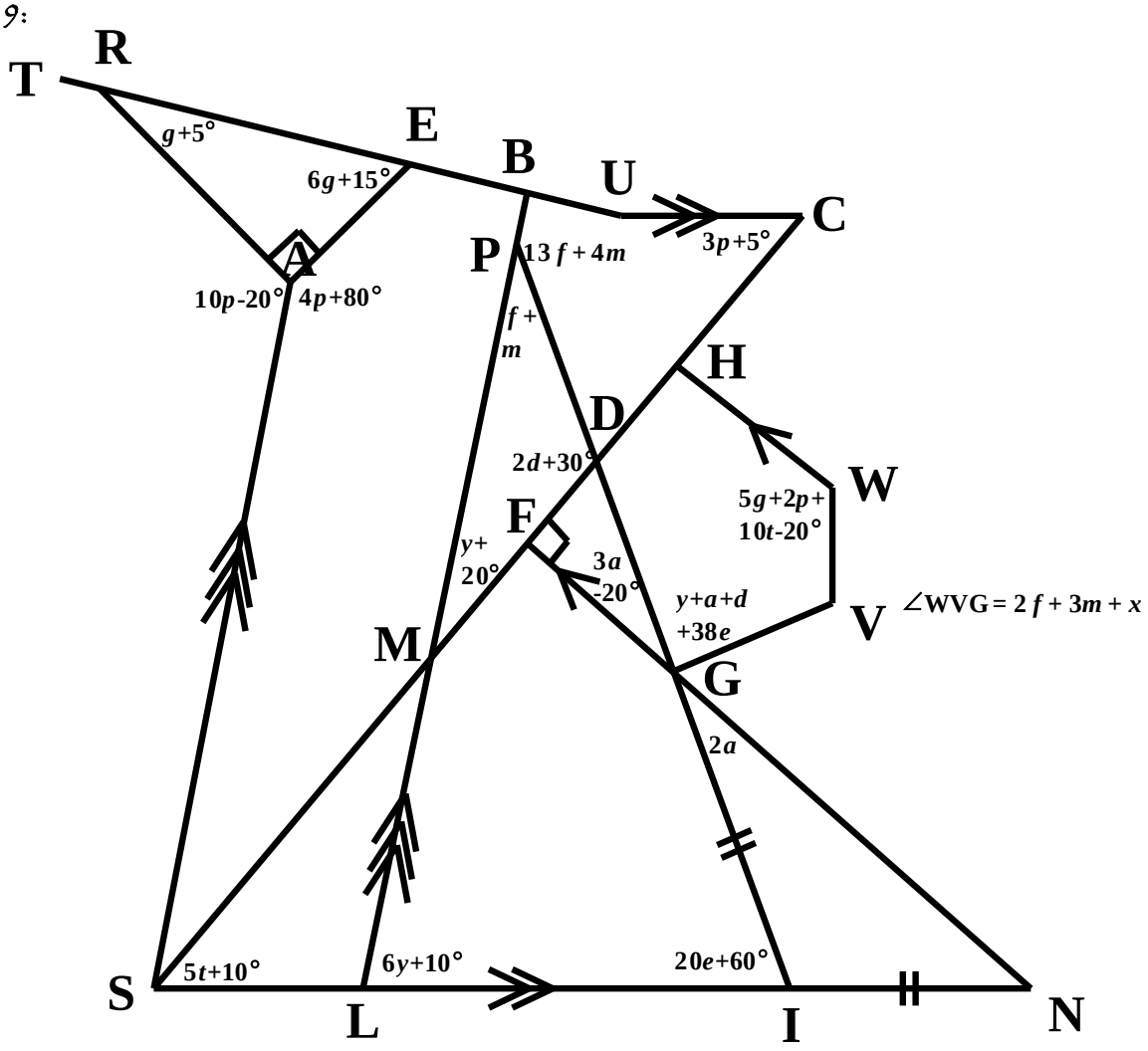
Quest 6:



Quest 8:

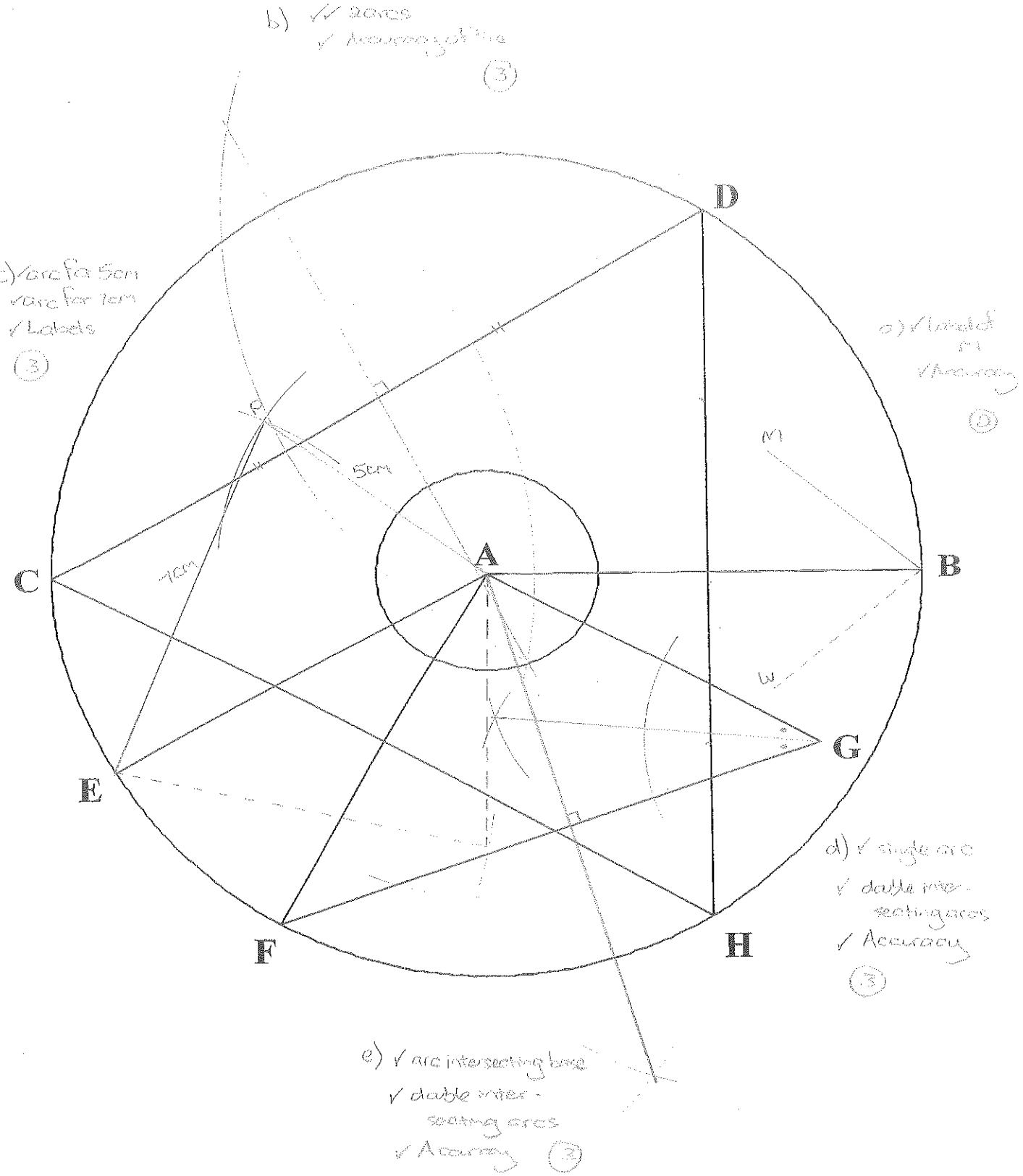


Quest 9:



Memo

Quest 2:



[14]

L1101

QUEST 1:

a) reflex ✓
b) 8 ✓
c) the sum of the interior opposite angles ✓
d) supplementary ✓
e) 27° ✓
f) supplementary ✓
g) 3x − 38° ✓

(7)

QUEST 3:

a) $x = 10°$ ✓ (∠s around pt) P
b) $B\hat{D}C = 12°$ (∠s on str. line BE) E
$x = 12°$ ✓ (corr. ∠s; AB // CD)
c) $x = 19°$ ✓ (∠ sum of △) ✓ N
d) $x = 15°$ ✓ (vert. opp. ∠s =) ✓ D
e) $x = 17°$ ✓ (∠ sum of quad) ✓ R
f) $x = 21°$ ✓ (co-int ∠s; // lines) ✓ A
g) $M\hat{P}O = 90°$ (diags of rhombus) ✓
$P\hat{O}M = 85°$ (diags of rhombus)
$x = 5°$ ✓ (∠ sum of △MPO) G
h) $C\hat{P}M = x$ (∠s opp. equal sides, isos △)
$x = 14°$ ✓ (∠ sum of △CPM) O
i) $x = 7°$ ✓ (ext. ∠ of △) ✓ N

(18)

QUEST 5:

a = 73° ✓ (∠s opp. equal sides; AB = AC) ✓
b = 34° ✓ (∠ sum of △ABC) ✓
c = 34° ✓ (vert. opp. ∠s are =) ✓
d = 87° ✓ (∠s on str. line MC) ✓
e = 73° ✓ (corr. ∠s; MC // HD) ✓
f = 86° ✓ (ext. ∠ of △MAL) ✓
g = 86° ✓ (alt. ∠s; ME // KF) ✓
h = 93° ✓ (co-int. ∠s; MC // HD) ✓
$J\hat{E}F = 93°$ (vert. opp. ∠s are =) ✓
∴ k = 102° ✓ (∠ sum of quad JEFG)

(18)

If they make a mistake, mark positively from there on, carrying their mistake

QUEST 6:

$M\hat{E}D = 17°$ ✓ (ext. ∠ of △MED)
$E\hat{H}G = 17°$ ✓ (alt. ∠s; ME // HG) ✓
$L\hat{V}K = 40°$ ✓ (corr. ∠s; HT // VK) ✓
$N\hat{L}K = 40°$ ✓ (corr. ∠s; DE // LN) ✓
∴ x = 50° ✓ (∠ sum of △LNK) ✓

(10)

QUEST 7:

a) $a + 11° + 3a + 6° + 4a + 3° = 180°$ ✓ (∠ sum of △BAT)
$\therefore 8a + 20° = 180°$
$\therefore 8a = 160°$ ✓
$\therefore a = 20°$ ✓

(4)

b) $7b - 13° = b + 20° + 3b + 15°$ ✓ (ext. ∠ of △BAT) ✓
$\therefore 7b - 13° = 4b + 35°$
$\therefore 3b - 13° = 35°$ ✓
$\therefore 3b = 48°$
$\therefore b = 16°$ ✓

(4)

c) $B\hat{A}T = 90° - c$ (∠s on str. line BE)
$\therefore 5c - 50° + 90° - c = 2c + 80°$ (ext. ∠ of △BAT)
$\therefore 4c + 40° = 2c + 80°$
$2c + 40° = 80°$
$2c = 40°$
$c = 20°$ ✓

(2)

QUEST 8:

a) $3x + 54° = x + 76°$ (alt. ∠s; TE // OM) ✓
$\therefore 2x + 54° = 76°$
$\therefore 2x = 16°$
$\therefore x = 8°$ ✓

(3)

b) $103° - 2y + y + 10° + 3y + 33° = 180°$ ✓ (co-int. ∠s; RT // WO)
$\therefore 2y + 146° = 180°$
$\therefore 2y = 34°$
$\therefore y = 17°$ ✓

(3)

c) $R\hat{A}W = 84°$ (∠ sum of △RAW) ✓
$\therefore x + y + z = 84°$ (alt. ∠s; RI // WM) ✓
$\therefore 8 + 17° + z = 84°$
$\therefore z = 59°$ ✓

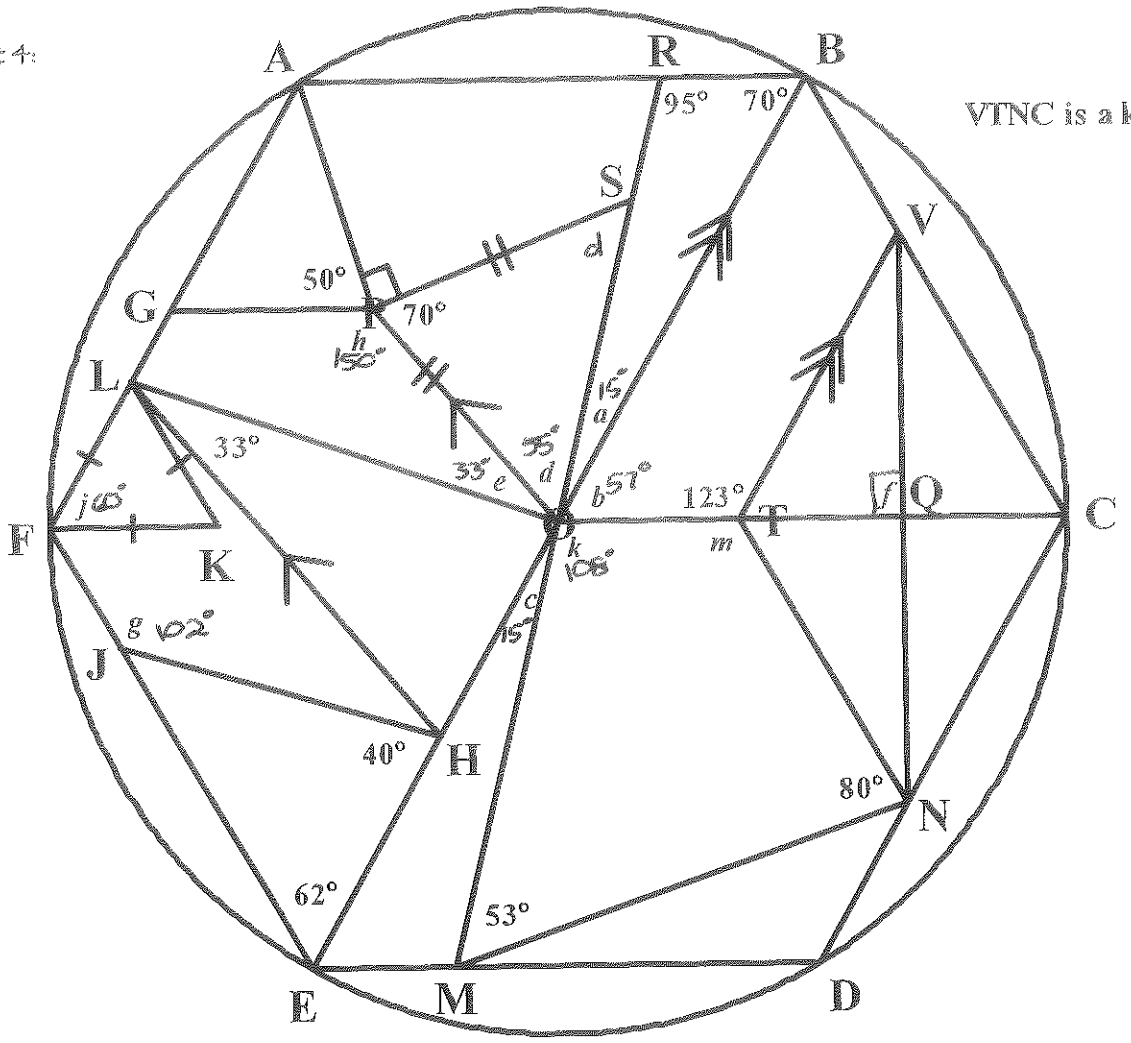
(3)

QUEST 9:

g = 10° (∠ sum of △BEA)
p = 15° (∠s around pt A)
t = 8° (alt. ∠s; UC // SN)
y = 12° (corr. ∠s; SA // LB)
a = 20° (vert. opp. ∠s =)
e = 1° (ext ∠ of △GIN)
d = 50° (ext. ∠ of △DFG)
f = 10° } (∠ sum of △PDM
m = 8° } & ∠s on str. line BL)
∴ x = 16° (co-int. ∠s; WH // GF) ✓

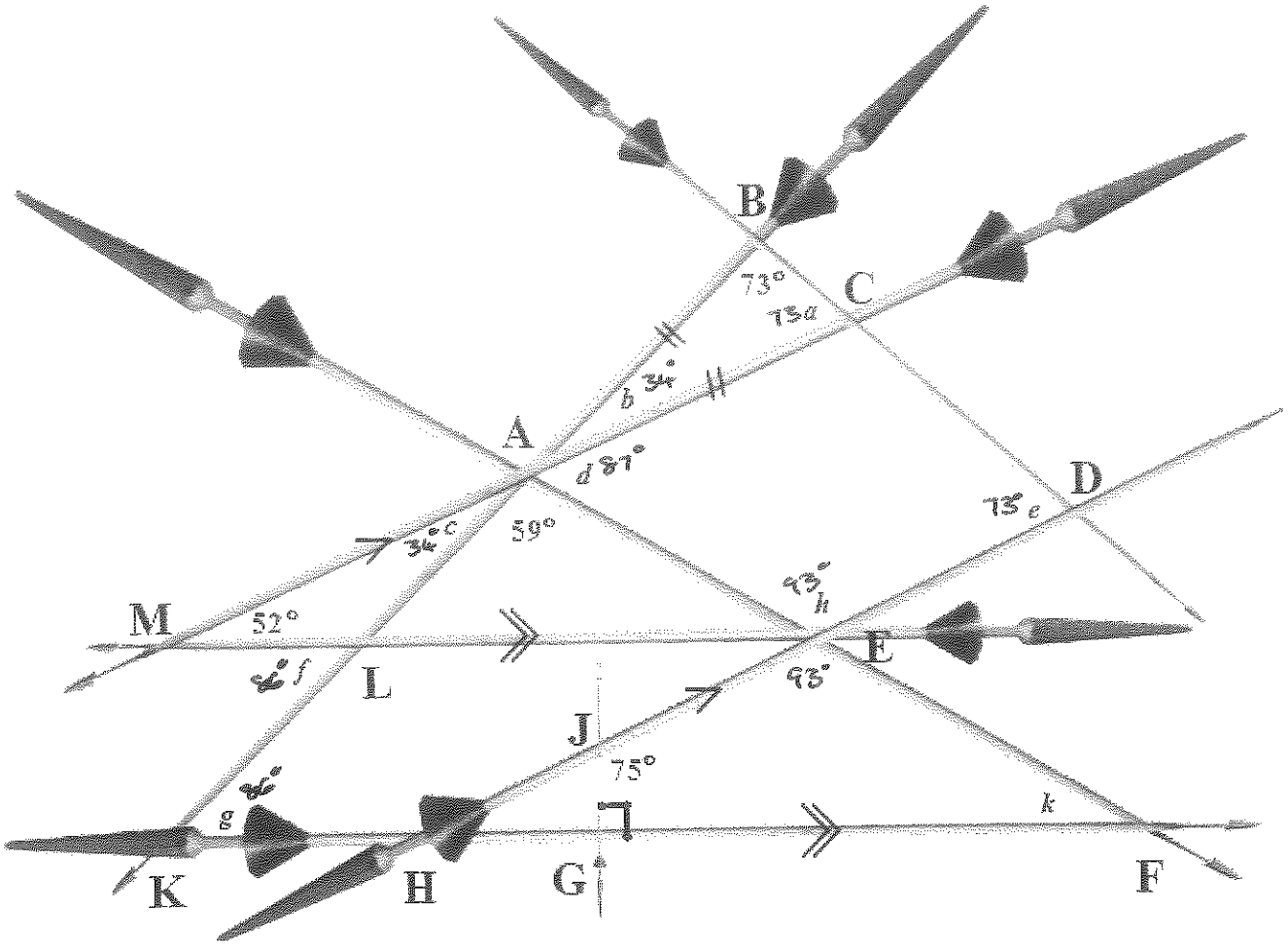
(2)

Quest 4:

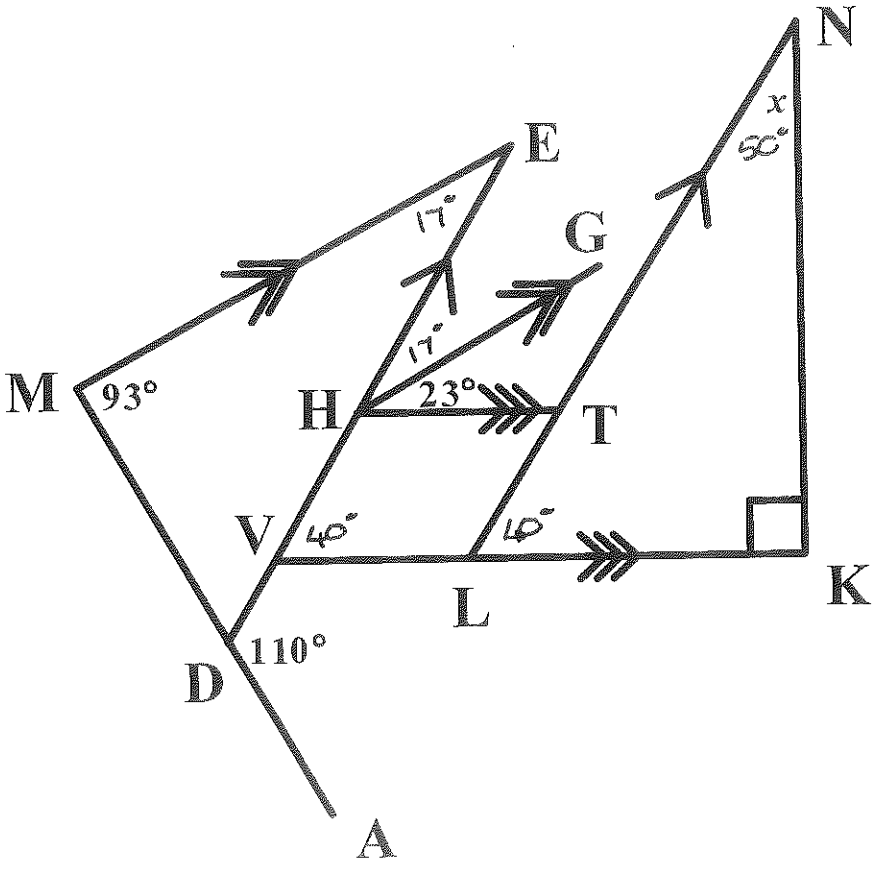


Value of angle	Reason
$a = 15°$ ✓	L sum of △ROG ✓
$b = 57°$ ✓	co-int. Ls ; EB // TV ✓
$c = 15°$ ✓	vert. opp. Ls are = ✓
$\hat{PSO} = d$	Ls opp. equal sides ; PS = PO ✓
$d = 55°$ ✓	L sum of △PSO
$e = 33°$ ✓	alt. Ls ; OP // HL ✓
$f = 90°$ ✓	diags of kite VTNC ✓
$g = 102°$ ✓	ext. L of △HJE ✓
$h = 150°$ ✓	Ls around pt P ✓
$j = 60°$ ✓	equilateral △FLK ✓
$k = 108°$ ✓	Ls on str. line RM ✓
$m = 119°$ ✓	L sum of quad OTNM ✓

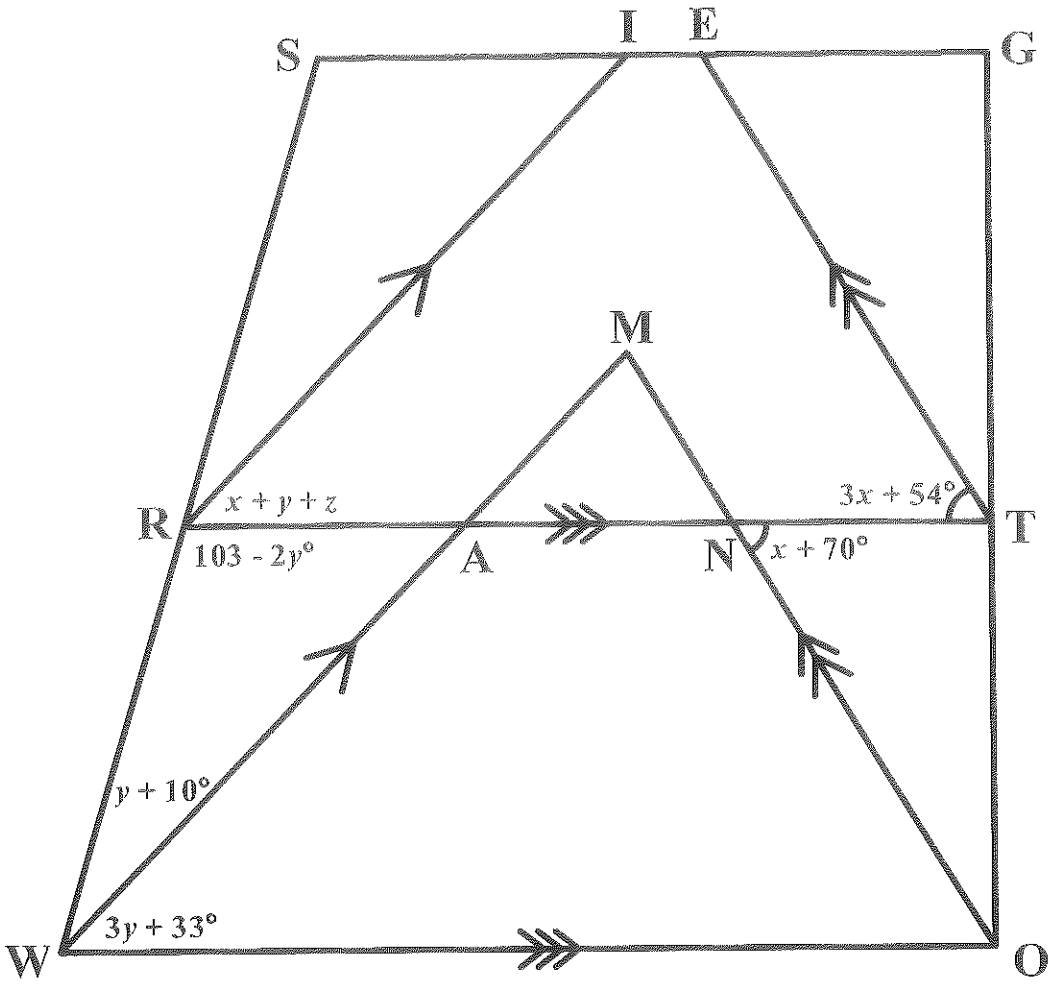
Quest 5:



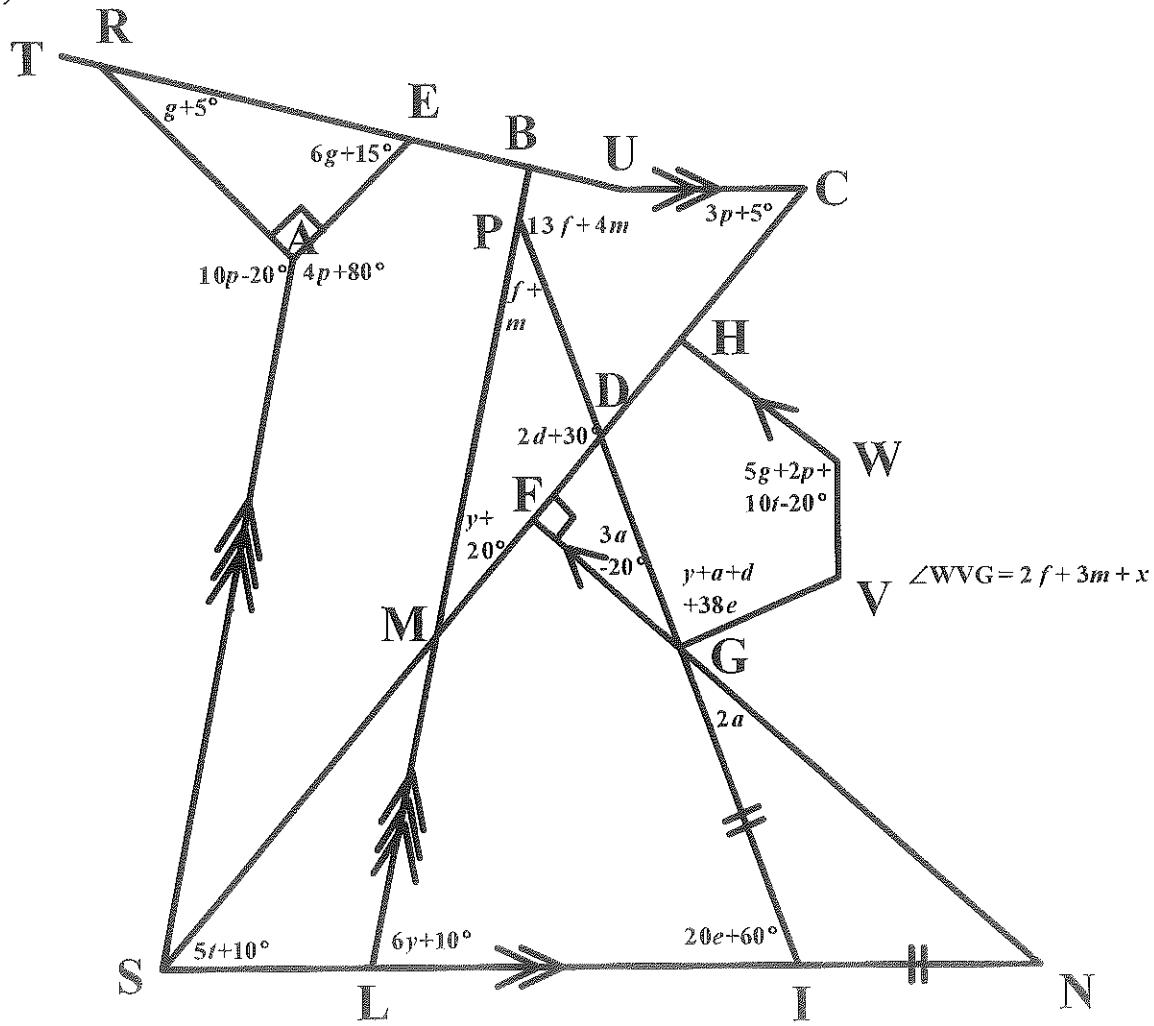
Quest 6:



Quest 8:



Quest 9:



PolyMathic

Paper 5
May/June
Algebra and Geometry

(Q1 - Combined)

(Q2 - Q4: Algebra)

(Q5 - Q7: Geometry)

PolyMathic

Grade 8	Mathematics	June
Duration:		Marks: 75
1½ Hours	**Algebra and Geometry**	

Instructions:

1. Write your name and grade (e.g. 8E) as well as the name of your SUBJECT TEACHER at the top of your answer script.
2. This paper consists of 5 Pages including a **DIAGRAM SHEET**.
3. This paper consists of **4 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 What is the highest prime number between 5 and 25. (1)

1.2.1 List all the factors of 8 (1)

1.2.2 write down a squared number from the list in 1.2.1 (1)

1.3 Determine the HCF of 150 and 320 using ***prime factors***. (3)

1.4 Is 789250 divisible by 5? Use the rules of divisibility to explain your answer. (1)

1.5 Determine $\sqrt{3136}$ using ***prime factors.*** (2)

1.6 The numbers a, b and c are PRIME FACTORS of 30. Determine the greatest possible value of a^b x c. (3)

[12]

QUESTION 2

2.1 Simplify the following:

2.1.1 $\frac{555}{10-5}$ (1)

2.1.2 (–2) x (–1) (–4) (2)

2.1.3 $-\frac{8}{2}(5-6)+\sqrt[3]{64}$ (2)

2.2 Calculate the following:

2.2.1 $\sqrt[3]{0{,}064}$ (2)

2.2.2 $\sqrt[3]{\sqrt[3]{8}+25}$ (3)

2.2.3 $\frac{5}{8}+3\div\frac{9}{10}$ (3)

[13]

QUESTION 3

3.1 Study the algebraic expression below and answer the following questions.

$$3x^2+x^5+4x^3+6x^4-12+\frac{x}{2}$$

3.1.1 How many terms are in the expression? (1)

3.1.2 Rewrite the expression in descending powers of x. (1)

3.1.3 Write down the constant term. (1)

3.1.4 Write down the coefficient of x . (1)

3.2 Simplify the following:

3.2.1 $7a - 6b - 5a - 8b$ (2)

3.2.2 $6a \times (9b) \times (-a) \times (-3b)$ (2)

3.2.3 $-4pq^5 \times 2p^2q \times q$ (2)

3.2.4 $\sqrt{64b^{16}}$ (2)

3.2.5 $\left(ac^3\right)^3$ (2)

3.2.6 $3n^2\left(8m^5 - n^2\right)$ (2)

3.2.7 $\dfrac{4mn^4 - 8m^4n^6}{4m^2n^3}$ (2)

3.2.8 $-3y\left(-6x^2\right)^2$ (2)

3.2.9 $\dfrac{\left(3x^3\right)\left(-5x^2\right)\left(x^7\right)}{x^4}$ (2)

3.3 Multiply $2ab$ **by** $(-5ab + ca - bc)$ (3)

3.4 Subtract $8x - 2y + 7z$ **from** $5x + 4y + 10z$. (3)

3.5 Solve for x:

3.5.1 $2(x + 1) = 10$ (3)

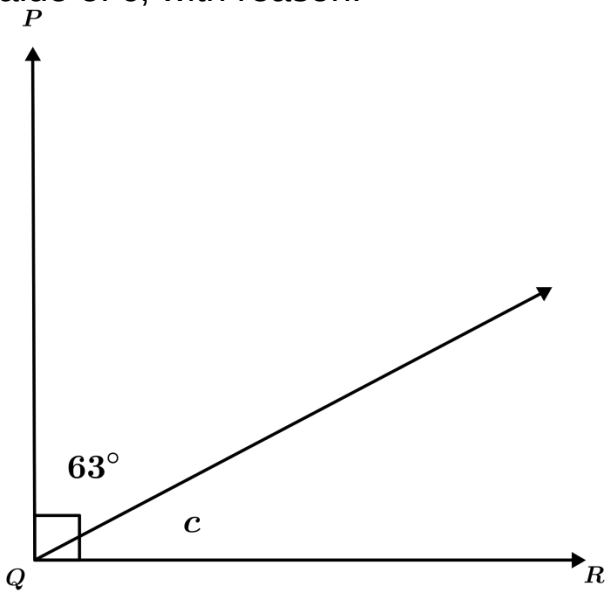
3.5.2 $\frac{x}{5} + 6 = -4$ (3)

3.5.3 $4(x - 2) - 3x = 2(x - 5)$ (4)

[38]

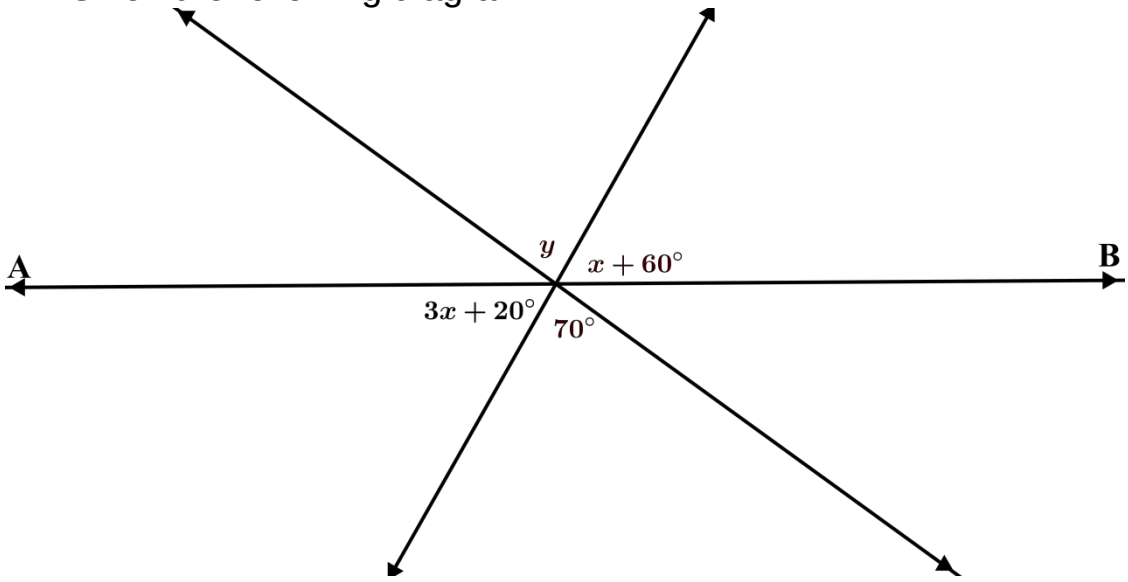
QUESTION 4

4.1 Determine the value of c, with reason.



(3)

4.2 Given the following diagram:



In the diagram above, AB is a straight-line. Determine the following:

4.2.1 the value of x, with reason. (3)

4.2.2 write down the value of y, with reason. (2)

4.3 Bisect the following:

4.3.1 line AB on **DIAGRAM SHEET 1**. Show ALL construction lines. (2)

4.3.2 angle $A\hat{B}C$ to construct line BD on **DIAGRAM SHEET 1**. Show ALL construction lines. (2)

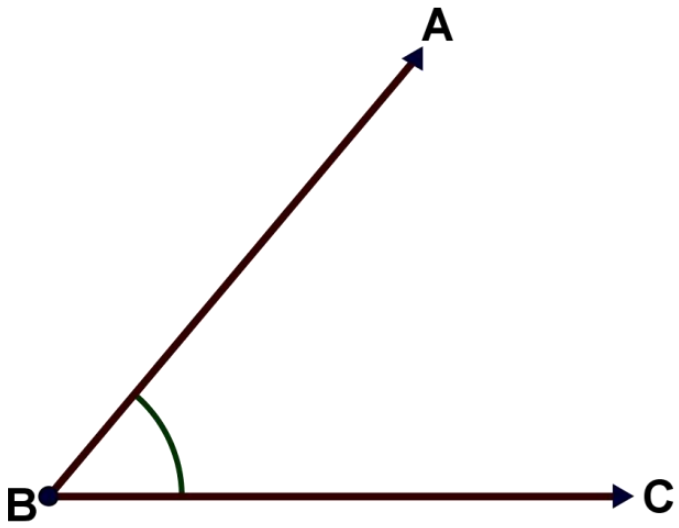
[12]

DIAGRAM SHEET 1 **Name: ……..**

Teacher Name: …….. **Grade: ……**

Question 4.3.1

Question 4.3.2



Memo

QUESTION 1 [12]

1.1	23	✓ answer	(1)
1.2.1	1, 2, 4, 8	✓ answer	(1)
1.2.2	1 or 4	✓ answer	(1)
1.3	$150 : 2 \times 3 \times 5 \times 5$ $320 : 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 5$ $HCF : 2 \times 5 = 10$	✓ prime factors (150) ✓ prime factors (320) ✓ answer	(3)
1.4	Yes, because the last two digits are divisible by 5	✓ answer	(1)
1.5	$\sqrt{2^6 \times 7^2}$ $= 2^3 \times 7$ $= 8 \times 7$ $= 56$	✓ prime factors ✓ answer	(2)
1.6	$30 : 2 \times 3 \times 5$ $\therefore 5^3 \times 2 = 150$	✓✓✓ answer	(3) **[12]**

QUESTION 2 [13]

2.1.1	111	✓ answer	(1)
2.1.2	– 8	✓✓ answer	(2)
2.1.3	$= -4(-1) + 4$ $= 4 + 4$ $= 8$	✓ simplifying ✓ answer	(2)
2.2.1	$\sqrt[3]{\frac{64}{1000}}$ $= \frac{4}{10}$	✓ converting to fraction ✓ answer	(2)
2.2.2	$\sqrt[3]{2 + 25}$ $= \sqrt[3]{27}$ $= 3$	✓ 2 ✓ 2+25 ✓ answer	(3)

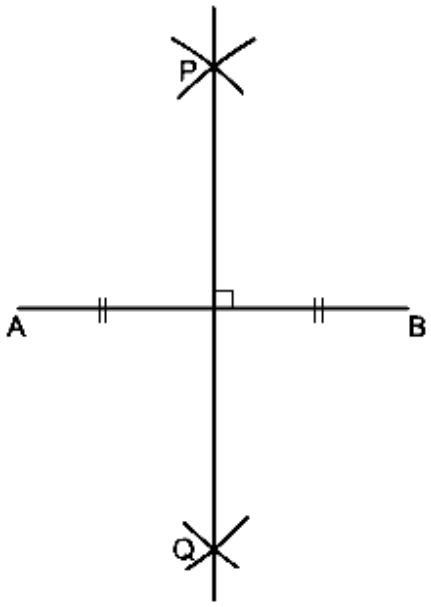
2.2.3	$= \frac{5}{8} + 3 \times \frac{10}{9}$ $= \frac{5}{8} + \frac{10}{2}$ $= 5\frac{5}{8}$	✓ $\times \frac{10}{9}$ ✓ $\frac{10}{2}$ ✓ answer	(3) **[13]**

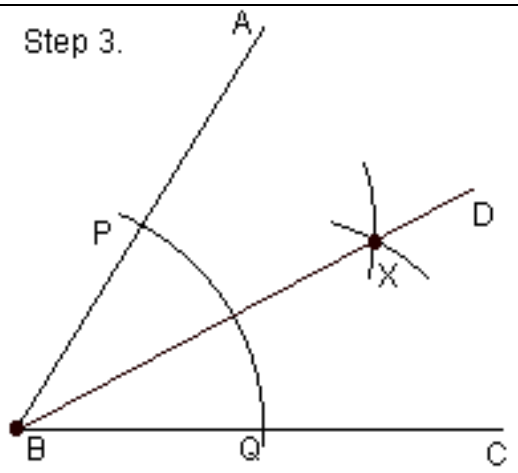
QUESTION 3 [38]

3.1.1	6 terms	✓ answer	(1)
3.1.2	$x^5 + 6x^4 + 4x^3 + 3x^2 + \frac{x}{2} - 12$	✓ answer	(1)
3.1.3	–12	✓ answer	(1)
3.1.4	$\frac{1}{2}$	✓ answer	(1)
3.2.1	$2a - 14b$	✓✓ answer	(2)
3.2.2	$162a^2b^2$	✓✓ answer	(2)
3.2.3	$-8p^3q^7$	✓✓ answer	(2)
3.2.4	$8b^8$	✓✓ answer	(2)
3.2.5	a^3c^9	✓✓ answer	(2)
3.2.6	$24m^5n^2 - 3n^4$	✓ $24m^5n^2$ ✓ $-3n^4$	(2)
3.2.7	$m^{-1}n - 2m^2n^3$	✓ $m^{-1}n$ ✓ $-2m^2n^3$	(2)
3.2.8	$= -3y(36x^4)$ $= -108x^4y$	✓ $36x^4$ ✓ answer	(2)
3.2.9	$= \frac{-15x^{12}}{x^4}$ $= -15x^8$	✓ $-15x^{12}$ ✓ answer	(2)
3.3	$-10a^2b^2 + 2a^2bc - 2ab^2c$	✓✓✓ answer	(3)

3.4	$-3x+6y+3z$	✓✓✓ answer	(3)
3.5.1	$\therefore 2x+2=10$ $\therefore 2x=8$ $\therefore x=4$	✓ $2x+2$ ✓ 8 ✓ answer	(3)
3.5.2	$\therefore \frac{x}{5}=-10$ $\therefore x=-50$	✓ -10 ✓ $\times 5$ ✓ answer	(3)
3.5.3	$4x-2-3x=2x-10$ $\therefore -x=-8$ $\therefore x=8$	✓ $4x-2-3x$ ✓ $2x-10$ ✓ $-x=-8$ ✓ answer	(4) **[38]**

QUESTION 4 [12]

4.1	$c=90°-63°$…(complementary Angle) $\therefore c=27°$	✓ $c=90°-63°$ ✓ Reason ✓ answer	(3)
4.2.1	$3x+20°=x+60°$…(vertically opposite) $\therefore 2x=40°$ $\therefore x=20°$	✓ $3x+20°=x+60°$ ✓ Reason ✓ answer	(3)
4.2.2	$y=70°$…(vertically opposite)	✓ Reason ✓ answer	(2)
4.3.1		✓ Points P & Q ✓ line segment PQ	(2)

4.3.2		✓ Points P, Q, D ✓ line segment BD (2) **[12]**

PolyMathic

Paper 6
Oct/Nov
Algebra and Geometry

(Q1: Combined)

(Q2 - Q6: Algebra)

(Q7 - Q10: Geometry)

PolyMathic

Grade 8 Paper - November Exam
Algebra, Geometry and Trig

QUESTION 1

1.1 $x + x + x =$

A x^3

B $3x$

C $3x^3$

D $4x$ (1)

1.2 Complete: $(12 \div 2) + (6 \times 3) - 3 =$

A 105

B 27

C 21

D 33 (1)

1.3 What is the value of x if $\frac{2}{7} = \frac{x}{21}$?

A 6

B 7

C 11

D 14 (1)

1.4 The next term in the sequence 1 ; 3 ; 9 ; __ is …

A 24

B 12

C 18

D 27 (1)

1.5 The value of $\sqrt[3]{125} =$

A 5

B -5

C 25

D 15 (1)

1.6 How many terms are there in the expression $-6x^4 + 4x^3$?

A 1

B 2

C 3

D 4 (1)

1.7 The surface area of a cube is 750 cm². The surface area measured in m² is

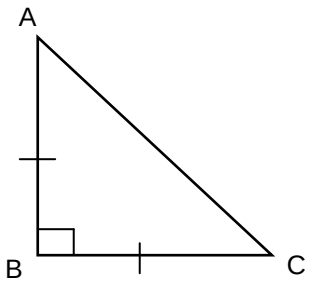
A $0{,}075$ m²

B $7{,}50$ m²

C $75{,}0$ m²

D $0{,}75$ m² (1)

1.8 In the right-angled triangle ABC below, $AB = BC$. The size of $\hat{C}$ is …



A $15°$

B $30°$

C $45°$

D $60°$ (1)

1.9 $0{,}15 \times 0{,}3 =$

A $4{,}5$

B $0{,}45$

C $0{,}0045$

D $0{,}045$ (1)

1.10 Which number is missing in the number sequence below?

$1\ ;\ 1\ ;\ 2\ ;\ 3\ ;\ \_\_\ ;\ 8\ ;\ 13$

A 3

B 2

C 5

D 7 (1)

[10]

QUESTION 2

2.1 Complete:

2.1.1 $\frac{0}{7} = \_\_\_\_\_$ (1)

2.1.2 $\left(\frac{1}{2}\right)^3 = \_\_\_\_\_$ (1)

2.2 Write $12\,000$ in scientific notation.

_____ (1)

2.3 Answer the following questions.

2.3.1 Write down the LCM of 12 and 48.

_____ (1)

2.3.2 Write down all the factors of 28.

Then, write down the prime factors of 28.

_____

_____ (2)

2.4 Calculate the average speed of a car that travelled 720 kilometres in 6 hours.

_____

_____

_____ (2)

2.5 Fill in the missing number in the number sequence below.

$-1\,;-4\,;-7\,;$ ____ $;-13\,;-16$ (1)

[9]

QUESTION 3

3.1 Calculate each of the following:

3.1.1 $-4-(-2)\ +(-3-4)$

_____

_____ (3)

3.1.2 $3\frac{2}{3}-\ \frac{7}{12}$ (Write the answer as a mixed number.)

_____

_____

_____

_____ (4)

3.1.3 $1\frac{2}{3}\times\frac{5}{6}$ (Write the answer as a mixed number.)

_____

_____

_____ (3)

3.1.4 $\frac{2}{5}\div\frac{1}{2}$

_____

_____

_____ (3)

3.1.5 4% of 500

_____

_____

_____ (3)

3.2 Currently my bank balance is $\mathrm{R}2\ 000$. What will the new balance be if I withdraw $\mathrm{R}600$ from the account in each of the next 3 months?

_____

_____

_____ (3)

3.3 Peter ate $\frac{1}{5}$ of his 250 Smarties. How many Smarties were left?

_____

_____

_____ (3)

3.4 Calculate how much interest Mr Jones owed if he borrowed $\mathrm{R}10\ 000$ at 15% per annum, simple interest, for a period of 3 years.

_____

_____

_____

_____ (4)

[26]

QUESTION 4

4.1 Study the pattern in the figures below and then answer the questions that follow.

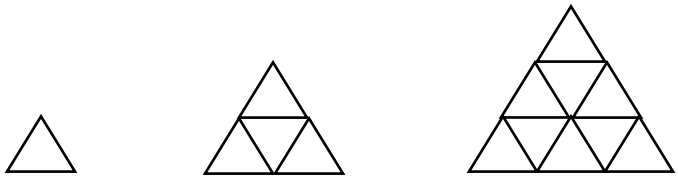


Figure 1 Figure 2 Figure 3

4.1.1 Fill in the missing numbers in the table below:

Figure	1	2	3	4	5
Number of small triangles	1	4	9		

(2)

4.1.2 Write down the general term, T_n, of the number sequence formed by the number of small triangles in the above pattern.

T_n = _____ (1)

[3]

QUESTION 5

5.1 Consider the expression $7x^2 + 5x + 4$ and then answer the questions that follow.

5.1.1 Write down the constant term.

_____ (1)

5.1.2 What is the degree of the expression?

_____ (1)

5.1.3 Write down the coefficient of the second term.

_____ (1)

5.1.4 Calculate the value of the expression $7x^2 + 5x + 4$ if $x = -1$.

_____

_____

_____

_____ (3)

5.2 Simplify the expression: $2x - 3y + 4 - 3x - \text{y} - 2$

_____

_____ (3)

5.3 Calculate:

5.3.1 $4x + 3 - (3x - 2)$

_____

_____

_____ (4)

5.3.2 $\frac{18x^2 - 12x - 6}{6}$

_____

_____

_____ (3)

5.4 Complete the simplification steps below:

$2y \times 3y^2 - 14y \times y^2$

$=$ _____ $-$ _____

$=$ _____ (3)

[19]

QUESTION 6

6.1 Solve for x in each of the following equations.

6.1.1 $x - 10 = 2$

_____

_____ (2)

6.1.2 $2x + 1 = 203$

_____

_____

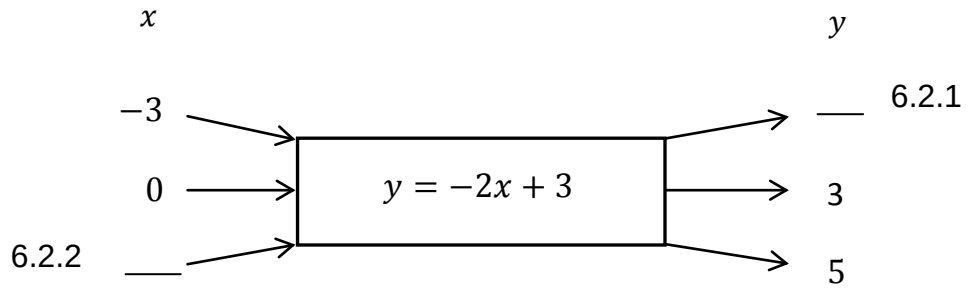
_____ (3)

6.1.3 $x^3 = 64$

_____

_____ (2)

6.2 Fill in the missing values for Question 6.2.1 and 6.2.2 in the flow diagram below.



(1)

(2)

[10]

QUESTION 7

7.1 Choose the correct angle size from the list below only once to complete each statement.

$60°$	$90°$	$180°$	$360°$

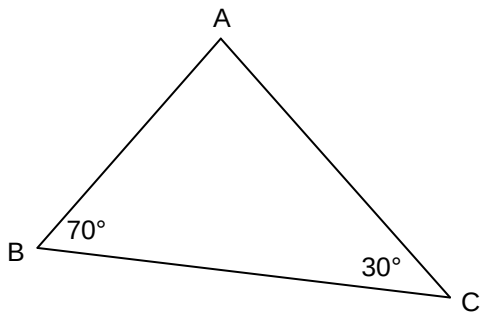
7.1.1 The sum of the interior angles of a triangle = _____ (1)

7.1.2 Each interior angle in an equilateral triangle = _____ (1)

7.1.3 The largest angle in a right-angled triangle = _____ (1)

7.1.4 The sum of the interior angles of any quadrilateral = _____ (1)

7.2 In ΔABC, $\hat{B} = 70°$ and $\hat{C} = 30°$. Calculate the size of $\hat{A}$.



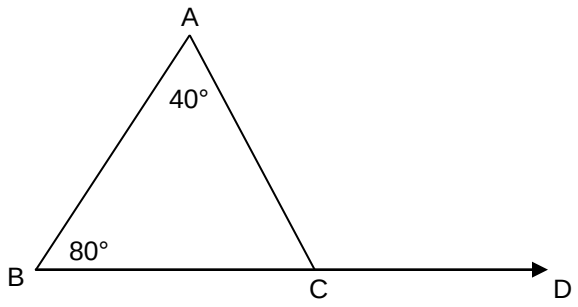
_____

_____

_____

_____ (4)

7.3 In the diagram, $\widehat{A} = 40°$ and $\widehat{B} = 80°$. Calculate the size of $A\widehat{C}D$.

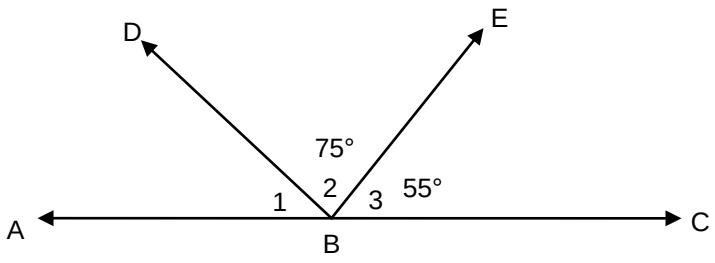


Statement	Reason
$A\widehat{C}D = 40° + \_\_\_\_\_$	
$\therefore A\widehat{C}D = \_\_\_\_\_$	

(3)

7.4 In the diagram below, ABC is a straight line. $\widehat{B}_2 = 75°$ and $\widehat{B}_3 = 55°$.

Determine the size of $\widehat{B}_1$.

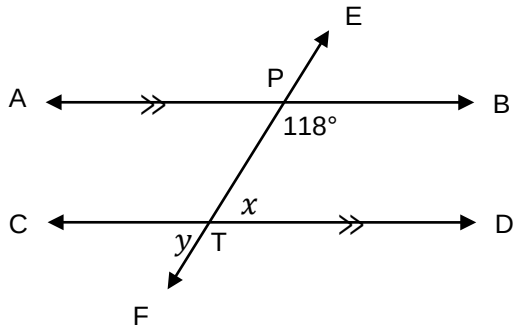


Statement	Reason
$\widehat{B}_1 + 75° + 55° = \_\_\_\_\_$	sum of ∠s on a straight line
$\therefore \widehat{B}_1 = \_\_\_\_\_$	

(2)

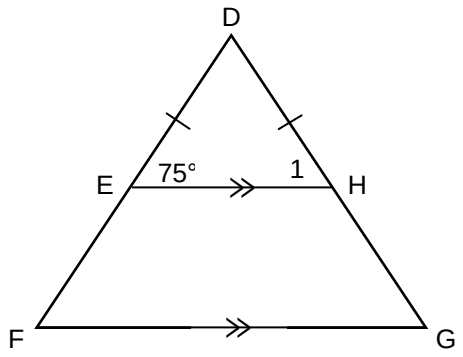
7.5 In the diagram below, $\text{AB} \parallel \text{CD}$ and $\text{B}\widehat{\text{P}}\text{T} = 118°$.

Calculate the value of x and y.



	Statement	Reason	
7.5.1	$x =$	co-interior ∠s and $\text{AB} \parallel \text{CD}$	(1)
7.5.2	$y =$		(2)

7.6 In the diagram, $DE = DH$, $EH \parallel FG$ and $D\hat{E}H = 75°$.



7.6.1 Calculate the size of $\hat{H}_1$

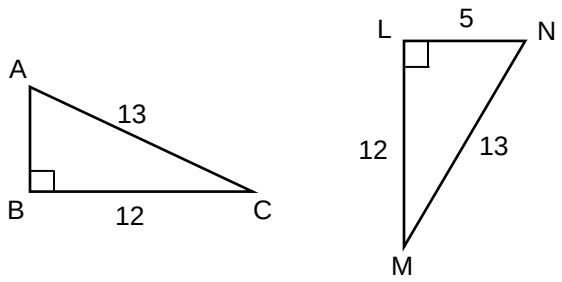
7.6.2 Give a reason why $\hat{G} = \hat{H}_1$.

	Statement	Reason	
7.6.1	$\hat{H}_1 =$	∠s opp. equal sides of Δ	(1)
7.6.2	$\hat{G} = \hat{H}_1$		(1)

[18]

QUESTION 8

8.1 Two right-angled triangles are given below. The dimensions are in cm.



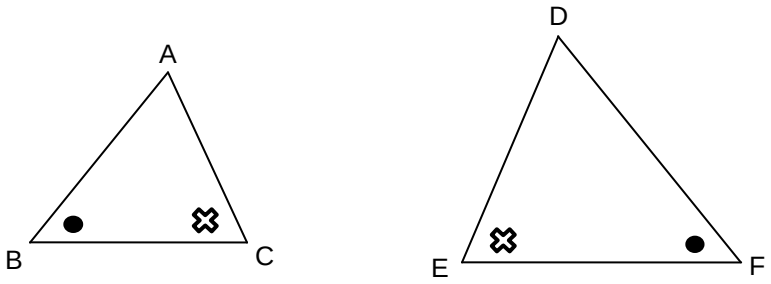
Use the above triangles to complete the following statements:

8.1.1 $\Delta ABC \equiv \Delta$ _____ with the vertices written in the correct order. (1)

8.1.2 $AB =$ _____ (1)

8.1.3 $\hat{C} =$ _____ (1)

8.2 The acute-angled triangles ABC and DEF are given below.



Use the information given in the triangles to complete the following statements:

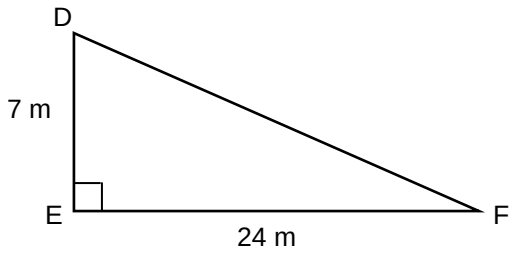
8.2.1 $\hat{C} =$ ____ (1)

8.2.2 $\hat{D} =$ ____ (1)

8.2.3 Then ΔABC ____ ΔDFE ($\angle\angle\angle$) (1)

QUESTION 9

9.1 In ΔDEF, $\widehat{E} = 90°$, $DE = 7$ m and $EF = 24$ m. Use the Theorem of Pythagoras to calculate the length of DF.



_____

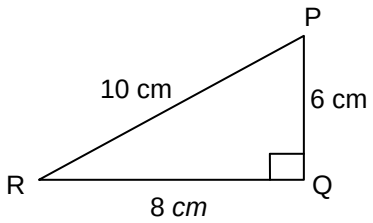
_____

_____

_____

_____ (4)

9.2 In ΔPQR, $\widehat{Q} = 90°$, $PQ = 6$ cm, $QR = 8$ cm and $PR = 10$ cm.
Calculate the area of ΔPQR.

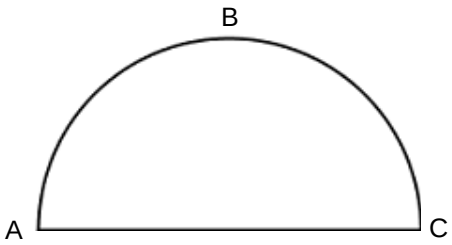


_____

_____

_____ (3)

9.3 AC, the diameter of the given semi-circle ABC, is $20\ cm$.



Use $\pi = 3{,}14$ to calculate the perimeter of the figure correct to two decimal places. The formula for the circumference of a circle is $C = \pi d$ or $C = 2\pi r$.

_____

_____

_____

_____ (4)

9.4 Calculate the volume of a rectangular prism with length 2 m, breadth $1{,}5$ m and height $0{,}5$ m.

_____

_____

_____ (3)

[14]

QUESTION 10

The Mathematics test marks of a group of Grade 8 learners are given below.

54 66 92 70 50 81 84 36 78 58 58

10.1 Determine the median of the marks.

_____

_____ (2)

10.2 Write down the range.

_____ (1)

10.3 What is the modal mark?

_____ (1)

10.4 Calculate the mean of the marks, correct to two decimal places.

_____

_____ (2)

[6]

QUESTION 11

The difference between two natural numbers is 12 and their sum is 54.

Calculate the value of the larger number.

_____

_____

_____

_____

_____

_____

_____ (4)

[4]

TOTAL: 125

Memo

QUESTION 1

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

Give one mark for each correct answer. [10]

QUESTION 2

2.1	2.1.1	$\frac{0}{7} = 0$ ✓**A**	Answer: 1 mark	(1)
	2.1.2	$\left(\frac{1}{2}\right)^3 = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}$ ✓**A** or $\left(\frac{1}{2}\right)^3 = \frac{1^3}{2^3} = \frac{1}{8}$ ✓**A** or $\left(\frac{1}{2}\right)^3 = 0{,}125$ ✓**A**	Answer: 1 mark	(1)
2.2		$12\,000$ $= 1{,}2 \times 10^4$ ✓**A**	Answer: 1 mark	(1)

2.3	2.3.1	LCM $= 48$ ✓**A**	Answer: 1 mark	(1)
	2.3.2	Factors of 28 are $1\ ,\ 2\ ,\ 4\ ,\ 7\ ,\ 14\ ,\ 28$ ✓**A** Prime factors are 2 and 7 ✓**CA**	List of factors: 1 mark Answer: 1 mark ANSWER ONLY: 2 marks ANSWER ONLY 2 or 7: 1 mark	(2)
2.4	Average speed $= \frac{\text{distance}}{\text{time}}$ $= \frac{720\text{ kilometres}}{6\text{ hours}}$ ✓**M** $= 120\ km/h$ ✓**A**		$\frac{720}{6}$: 1 mark Answer: 1 mark Do not penalize for missing units	(2)
2.5	$-1\ ;-4\ ;-7\ ;-10\ ;-13\ ;-16$ ✓**A**		-10: 1 mark	(1)
				[9]
QUESTION 3				
3.1	3.1.1	$-4-(-2)\ +(-3-4)$ $=-4+2-7$ ✓✓**M** $=-9$ ✓**CA**	$+2$: 1 mark -7: 1 mark Answer: 1 mark ANSWER ONLY: 3 marks	(3)
	3.1.2	$3\frac{2}{3}-\frac{7}{12}$ $=\frac{11}{3}-\frac{7}{12}$ ✓**M** $=\frac{44}{12}-\frac{7}{12}$ ✓**M** $=\frac{37}{12}$ ✓**CA** $=3\frac{1}{12}$ ✓**CA** or $3\frac{2}{3}-\frac{7}{12}$ $=3+\frac{2}{3}-\frac{7}{12}$ ✓**M** $=3+\frac{8}{12}-\frac{7}{12}$ ✓**M** $=3+\frac{1}{12}$ ✓**CA** $=3\frac{1}{12}$ ✓**CA**	$\frac{11}{3}$: 1 mark $\frac{44}{12}$: 1 mark $\frac{37}{12}$: 1 mark Answer: 1 mark ANSWER ONLY: 4 marks	(4)
	3.1.3	$1\frac{2}{3}\times\frac{5}{6}$ $=\frac{5}{3}\times\frac{5}{6}$ ✓**A** $=\frac{25}{18}$ ✓**M** $=1\frac{7}{18}$ ✓**CA**	$\frac{5}{3}$: 1 mark $\frac{25}{18}$: 1 mark Answer: 1 mark ANSWER ONLY: 3 marks	(3)
	3.1.4	$\frac{2}{5}\div\frac{1}{2}$ $=\frac{2}{5}\times\frac{2}{1}$ ✓✓**M** $=\frac{4}{5}$ ✓**CA**	$\times$: 1 mark $\frac{2}{1}$: 1 mark Answer: 1 mark ANSWER ONLY: 3 marks	(3)

	3.1.5	4% of 500 or $\frac{1}{25} \times 500$ $= \frac{1}{25} \times 500$ ✓✓**M** $= 500 \div 5 \div 5$ ✓✓**M** $= 20$ ✓**CA** $= 100 \div 5$ $= 20$ ✓**CA** or 4% of 500 $= \frac{4}{100} \times 500$ ✓✓**M** $= \frac{2000}{100}$ $= 20$ ✓**CA**	$\frac{1}{25}$: 1 mark $\times 500$: 1 mark Answer: 1 mark ANSWER ONLY: 3 marks	(3)
3.2	New balance $= R2\,000 - 3 \times R600$ ✓**M** $= R2\,000 - R1\,800$ ✓**CA** $= R200$ ✓**CA** or Amount withdrawn $= R600 \times 3$ ✓**M** $= R1\,800$ ✓**CA** New balance $= R2\,000 - R1\,800$ $= R200$ ✓**CA** or New balance $= R2\,000 - R600 - R600 - R600$ ✓✓**M** $= R200$ ✓**CA**	$3 \times R600$: 1 mark $R1\,800$: 1 mark Answer: 1 mark ANSWER ONLY: 3 marks	(3)
3.3	No. left $= \frac{4}{5}$ of 250 ✓✓**M** or Number eaten $= \frac{1}{5}$ of 250 ✓**M** $= 200$ ✓**CA** $= 50$ ✓**CA** No. left $= 250 - 50$ $= 200$ ✓**CA**	$\frac{4}{5}$: 2 marks Answer: 1 mark ANSWER ONLY: 3 marks	(3)
3.4	$15\,\%$ of $R10\,000 = \frac{15}{100} \times R10\,000$ ✓**M** or $0{,}15 \times R10\,000$ $= R1\,500$ ✓**CA** Interest for 3 years $= 3 \times R1\,500$ ✓**CA** $= R4\,500$ ✓**CA** or SI $= \frac{Pni}{100}$ $= \frac{R10\,000 \times 3 \times 15}{100}$ ✓✓✓**M** $= R4\,500$ ✓**CA**	$\frac{15}{100} \times R10\,000$: 1 mark Answer: 1 mark Multiply by 3: 1 mark Answer: 1 mark	(4)

	or $A = P(1 + ni)$ $= \text{R}10\,000(1 + 3 \times \frac{15}{100})$ ✓✓**M** or $\text{R}10\,000(1 + 3 \times 0{,}15)$ $= \text{R}10\,000(1{,}45)$ $= \text{R}14\,500$ ✓**CA** Interest $= \text{R}14\,500 - \text{R}10\,000$ $= \text{R}4\,500$ ✓**CA**		
				[26]

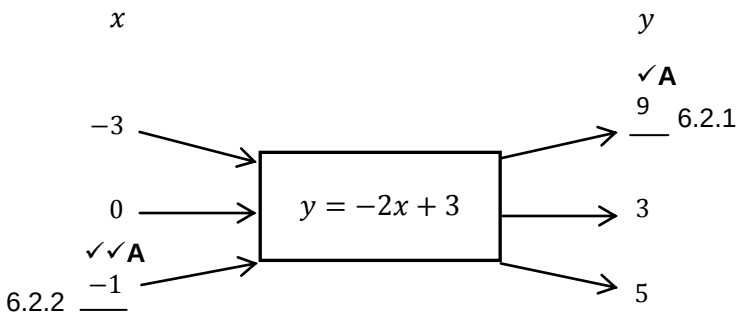
QUESTION 4

4.1	4.1.1	<table><tr><td>Figure</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>Number of small triangles</td><td>1</td><td>4</td><td>9</td><td>16</td><td>25</td></tr></table> ✓**A** ✓**A**	16: 1 mark 25: 1 mark	(2)
	4.1.2	$T_n = n^2$ ✓**A** or $T_n = n \times n$ ✓**A**	n^2: 1 mark	(1)
				[3]

QUESTION 5

5.1	5.1.1	4 ✓**A**	4: 1 mark	(1)
	5.1.2	second ✓**A** or 2nd ✓**A**	second: 1 mark	(1)
	5.1.3	5 ✓**A**	5: 1 mark	(1)
	5.1.4	$7x^2 + 5x + 4$ $= 7(-1)^2 + 5(-1) + 4$ $= 7 - 5 + 4$ ✓✓**M** $= 6$ ✓**CA**	7: 1 mark -5: 1 mark Answer: 1 mark	(3)
5.2		$2x - 3y + 4 - 3x - y - 2$ $= -x - 4y + 2$ ✓**A** ✓**A** ✓**A**	$-x$: 1 mark $-4y$: 1 mark 2: 1 mark	(3)

5.3	5.3.1	$4x + 3 - (3x - 2)$ $= 4x + 3 - 3x + 2$ ✓✓**M** $= x + 5$ ✓ ✓**CA**	$-3x$: 1 mark $+2$: 1 mark x: 1 mark $+5$: 1 mark	(4)
	5.3.2	$\frac{18x^2-12x-6}{6}$ $= \frac{18x^2}{6} - \frac{12x}{6} - \frac{6}{6}$ $= 3x^2 - 2x - 1$ ✓ ✓ ✓**M**	$3x^2$: 1 mark $-2x$: 1 mark -1: 1 mark ANSWER ONLY:3 marks	(3)
5.4		$2y \times 3y^2 - 14y \times y^2$ $= 6y^3 - 14y^3$ ✓✓**M** $= -8y^3$ ✓**CA**	$6y^3$: 1 mark $14y^3$: 1 mark $-8y^3$: 1 mark	(3)
				[19]
QUESTION 6				
6.1	6.1.1	$x - 10 = 2$ $x = 10 + 2$ ✓**M** $x = 12$ ✓**CA**	$x = 10 + 2$: 1 mark Answer: 1 mark ANSWER ONLY: 2 marks	(2)
	6.1.2	$2x + 1 = 203$ $2x = 203 - 1$ ✓**M** $2x = 202$ ✓**CA** $x = 101$ ✓**CA**	Subtracting 1: 1 mark $2x = 202$: 1 mark Answer: 1 mark ANSWER ONLY: 3 marks	(3)
	6.1.3	$x^3 = 64$ $x = \sqrt[3]{64}$ ✓**M** $x = 4$ ✓**CA** or $x = \sqrt[3]{4 \times 4 \times 4}$ ✓**M** $x = 4$ ✓**CA**	$x = \sqrt[3]{64}$: 1 mark or $x = \sqrt[3]{4 \times 4 \times 4}$: 1 mark Answer: 1 mark ANSWER ONLY: 2 marks	(2)

6.2		9: 1 mark -1: 2 marks	(1) (2)
			[10]

QUESTION 7

7.1	7.1.1	$180°$ ✓**A**	Answer: 1 mark	(1)
	7.1.2	$60°$ ✓**A**	Answer: 1 mark	(1)
	7.1.3	$90°$ ✓**A**	Answer: 1 mark	(1)
	7.1.4	$360°$ ✓**A**	Answer: 1 mark	(1)
7.2	$\hat{A} + 70° + 30° = 180°$ ✓**M** (sum of ∠s of Δ) $\hat{A} + 100° = 180°$ ✓**CA** $\hat{A} = 180° - 100°$ ✓**CA** $\hat{A} = 80°$ ✓**CA**		Correct statement: 1 mark Simplification: 2 marks Answer: 1 mark No marks for reason ANSWER ONLY: 4 marks	(4)
7.3			$80°$: 1 mark Reason: 1 mark Answer: 1 mark	(3)
7.4			$180°$: 1 mark Answer: 1 mark	(2)

7.3

Statement	Reason
$A\hat{C}D = 40° + 80°$ ✓**A**	Exterior ∠ of Δ ✓**A**
$\therefore A\hat{C}D = 120°$ ✓**A**	

7.4

Statement	Reason
$\hat{B}_1 + 75° + 55° = 180°$ ✓**A**	Sum of ∠s on a straight line
$\therefore \hat{B}_1 = 50°$ ✓**A**	

<table>
<tr><td>7.5</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>7.5.1</td><td>$x = 62°$ ✓A
Co-interior ∠s and
AB ∥ CD</td><td>$62°$: 1 mark</td><td>(1)</td></tr>
<tr><td></td><td>7.5.2</td><td>$y = 62°$ ✓CA
Vertically opp. ∠s ✓A</td><td>$y = 62°$: 1 mark
Reason: 1 mark</td><td>(2)</td></tr>
<tr><td>7.6</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>7.6.1</td><td>$\hat{H}_1 = 75°$ ✓A
∠s opp. equal sides of Δ</td><td>$75°$: 1 mark</td><td>(1)</td></tr>
<tr><td></td><td>7.6.2</td><td>$\hat{G} = \hat{H}_1$
Corresponding ∠s and
EH ∥ FG ✓A</td><td>Reason: 1 mark</td><td>(1)</td></tr>
<tr><td></td><td></td><td></td><td></td><td>[18]</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td colspan="5">QUESTION 8</td></tr>
<tr><td>8.1</td><td>8.1.1</td><td>ΔABC ≡ ΔNLM ✓A</td><td>ΔNLM: 1 mark
Vertices must be in the correct order</td><td>(1)</td></tr>
<tr><td></td><td>8.1.2</td><td>AB = NL or LN ✓A or AB = 5 cm ✓A</td><td>NL or 5 cm: 1 mark
Do not penalize for missing unit</td><td>(1)</td></tr>
<tr><td></td><td>8.1.3</td><td>$\hat{C} = \hat{M}$ ✓A or angle M ✓A</td><td>$\hat{M}$: 1 mark</td><td>(1)</td></tr>
<tr><td>8.2</td><td>8.2.1</td><td>$\hat{C} = \hat{E}$ ✓A</td><td>$\hat{E}$: 1 mark</td><td>(1)</td></tr>
<tr><td></td><td>8.2.2</td><td>$\hat{D} = \hat{A}$ ✓A</td><td>$\hat{A}$: 1 mark</td><td>(1)</td></tr>
<tr><td></td><td>8.2.3</td><td>ΔABC ||| ΔDFE ✓A</td><td>|||: 1 mark</td><td>(1)</td></tr>
<tr><td></td><td colspan="2"></td><td></td><td>[6]</td></tr>
<tr><td colspan="5"></td></tr>
</table>

QUESTION 9			
9.1	$\text{DF}^2 = (24^2 + 7^2)\ m^2$ ✓**M** (Pythagoras) $= (576 + 49)\ m^2$ ✓**A** $= 625\ m^2$ ✓**CA** $\text{DF} = \sqrt{625}\ m$ $\text{DF} = 25\ m$ ✓**CA**	Correct statement: 1 mark Calculation $576 + 49$: 1 mark Simplification: 1 mark Answer: 1 mark Do not penalize for missing units	(4)
9.2	Area of $\Delta = \frac{1}{2}(\text{b} \times \text{h})$ ✓**A** or Area of $\Delta = \frac{\text{b} \times \text{h}}{2}$ ✓**A** $= \frac{1}{2}(8 \times 6)\ m^2$ ✓**M** $= \frac{(8 \times 6)}{2}\ m^2$ ✓**M** $= 24\ m^2$ ✓**CA** $= 24\ m^2$ ✓**CA**	Correct formula: 1 mark 8×6: 1 mark Answer: 1 mark Do not penalize for missing units ANSWER ONLY: 3 marks	(3)
9.3	Perimeter of semi-circle $= \frac{\pi\, d}{2} + \text{AC}$ ✓**A** $= \frac{3{,}14 \times 20}{2} + 20\ cm$ ✓✓**M** $= 51{,}40\ cm$ ✓**CA** or $51{,}4\ cm$ or Perimeter of semi-circle $= \frac{2\pi\text{r}}{2} + \text{AC}$ ✓**A** $= \frac{2 \times 3{,}14 \times 10}{2} + 20\ cm$ ✓✓**M** $= 51{,}40\ cm$ ✓**CA** or $51{,}4\ cm$	Correct formula: 1 mark Substitution $\frac{3{,}14 \times 20}{2}$: 1 mark Substitution $20\ cm$: 1 mark Answer: 1 mark Do not penalize for missing units If π on the calculator, answer $= 51{,}42$: 3 marks If $\pi = \frac{22}{7}$, answer $= 51{,}43$: 3 marks	(4)
9.4	Volume = Area of base × Height ✓**A** $= 2 \times 1{,}5 \times 0{,}5\ m^3$ ✓**M** $= 1{,}5\ m^3$ ✓**CA** or Volume $= \ell \times b \times h$ ✓**A** $= 2 \times 1{,}5 \times 0{,}5\ m^3$ ✓**M** $= 1{,}5\ m^3$ ✓**CA**	Correct formula: 1 mark Substitution: 1 mark Answer: 1 mark Do not penalize for missing units ANSWER ONLY: 3 marks	(3)
			[14]

QUESTION 10			
10.1	$36 \quad 50 \quad 54 \quad 58 \quad 58 \quad 66 \quad 70 \quad 78 \quad 81 \quad 84 \quad 92$ ✓**M** Median mark $= 66$ ✓**A**	Data in correct order: 1 mark Answer: 1 mark ANSWER ONLY: 2 marks	(2)
10.2	Range $= 92 - 36$ $= 56$ ✓**A**	Answer: 1 mark	(1)
10.3	Modal mark $= 58$ ✓**A** or Mode $= 58$ ✓**A**	Answer: 1 mark	(1)
10.4	Mean mark $= \frac{\text{sum of marks}}{\text{number of learners}}$ $= \frac{727}{11}$ ✓**M** $\approx 66{,}09$ ✓**CA**	$\frac{727}{11}$: 1 mark Answer: 1 mark ANSWER ONLY: 2 marks If answer equals 66 or $66{,}1$: 1 mark	(2)
			[6]
QUESTION 11			
Let the numbers be x and $x + 12$ ✓**A** The sum $= 54$ $\Rightarrow x + x + 12 = 54$ ✓**M** $2x = 42$ ✓**CA** $x = 21$ Larger number $= 21 + 12$ $= 33$ ✓**CA** or Let the numbers be x and $x - 12$ ✓**A** The sum $= 54$ $\Rightarrow x + x - 12 = 54$ ✓**M** $2x = 66$ ✓**CA** $x = 33$ Larger number $= 33$ ✓**CA**	x and $x + 12$: 1 mark Equation: 1 mark Simplification: 1 mark Answer: 1 mark ANSWER ONLY: 4 marks	(4)
			[4]
		TOTAL:	**125**

PolyMathic

Paper 7

Oct/Nov

Algebra and Geometry

(Sections are Mixed)

PolyMathic

Total: 120
Time: 2hours

SECTION A [NO CALCULATOR]

QUESTION 1
Consider the following list of natural numbers, written in ascending order (from smallest to biggest).

1 ; 2 ; 3 ; 4 ; 5 ; 8 ; 9 ; 13 ; 16 ; 24 ; 27

FROM THIS LIST write down **ALL** the numbers which satisfy each of the following criteria. In some cases there may be only one number that is correct.

1.1 Prime numbers …… (1)

1.2 Factors of 4 …… (1)

1.3 Multiples of 4 …… (1)

1.4 Perfect cubes …… (1)
[4]

QUESTION 2

2.1 Determine the highest common factor (HCF) of 252 and 90

You may find the following information useful.

$252 = 2 \times 2 \times 3 \times 3 \times 7$ **$90 = 2 \times 3 \times 3 \times 5$**

……

…… (2)

2.2 Determine the lowest common multiple (LCM) of 60 and 180.

You may find the following information useful.

$60 = 2 \times 2 \times 3 \times 5$ **$180 = 2 \times 2 \times 3 \times 3 \times 5$**

……

……

……

…… (2)
[4]

QUESTION 3
Simplify each of the following expressions as far as possible. **Show all your working**.

3.1 $15 - 4 \times (-2)$

= ……

= …… (1)

3.2 $5 - 8 - 3 + 4$

= ……

= …… (1)

3.3 $(14 - 7) - 2(6 - 2)(1 - 3)$

= ……

= ……

= ……

= …… (3)
[5]

QUESTION 4
Simplify each of the following expressions as far as possible. **Show all your working**.

4.1 $\frac{3}{4} \times \frac{5}{6} \times \frac{2}{3}$

=.....

=..... (1)

4.2 $\frac{4}{5} \div \frac{6}{11}$

=.....

=.....

=..... (2)

4.3 $\frac{2}{3} - \frac{1}{2}$

=.....

=..... (3)

[6]

QUESTION 5

If $a = -2$, $b = -4$ and $c = 3$, determine the value of each of the following expressions.

Show all your working.

5.1 $a + 4b + 2c$

=.....

=.....

=.....

=..... (2)

5.2 $\frac{b+c}{a}$

=.....

=.....

=.....

=..... (2)

[4]

QUESTION 6

Simplify each of the following expressions as far as possible, giving your answers without brackets. **Show all your working**.

6.1 $m+2m+3m$

$=$..... (1)

6.2 $n\times 2n\times 3n$

$=$..... (1)

6.3 $m+2m+3m-4m$

$=$..... (1)

6.4 $n\times(-n)\times 3n\times(-4n)$

$=$..... (2)

6.5 $2a+3b-3a-4b+a$

$=$.....

$=$.....

$=$..... (2)

6.6 $2y\times y\times 3-4\times y\times 2y$

$=$.....

$=$.....

$=$..... (3)

[10]

QUESTION 7

Solve for x.

Show all your working. In some cases you may not need every line available for working, so you may leave empty spaces.

7.1 $3x+5=11$

$\therefore$……

$\therefore$……

$\therefore$…… (2)

7.2 $7x+12=5x-4$

$\therefore$……

$\therefore$……

$\therefore$……

$\therefore$…… (3)

7.3 $8(x-1)-5=7$

$\therefore$ ……

$\therefore$ ……

$\therefore$ ……

$\therefore$ …… (3)
[8]

QUESTION 8

Consider the following set of 10 values, arranged in ascending order (smallest to biggest).

1	**2**	**2**	**3**	**4**	**5**	**6**	**6**	**6**	**8**

Refer to this set of values and determine each of the following.

8.1 The range …… (1)

8.2 The mode …… (1)

8.3 The median …… (1)

8.4 The mean ……

…… (2)
[5]

QUESTION 9

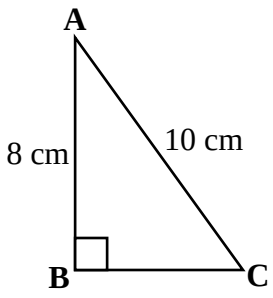
9.1 Complete the statement of the theorem of Pythagoras in words.

In a right-angled triangle ……..

……

…… (2)

9.2 In ΔABC, shown alongside, $\hat{B}=90^o$,
AB = 8 cm and AC = 10 cm.



9.2.1 Determine the length of BC.

.....

.....

.....

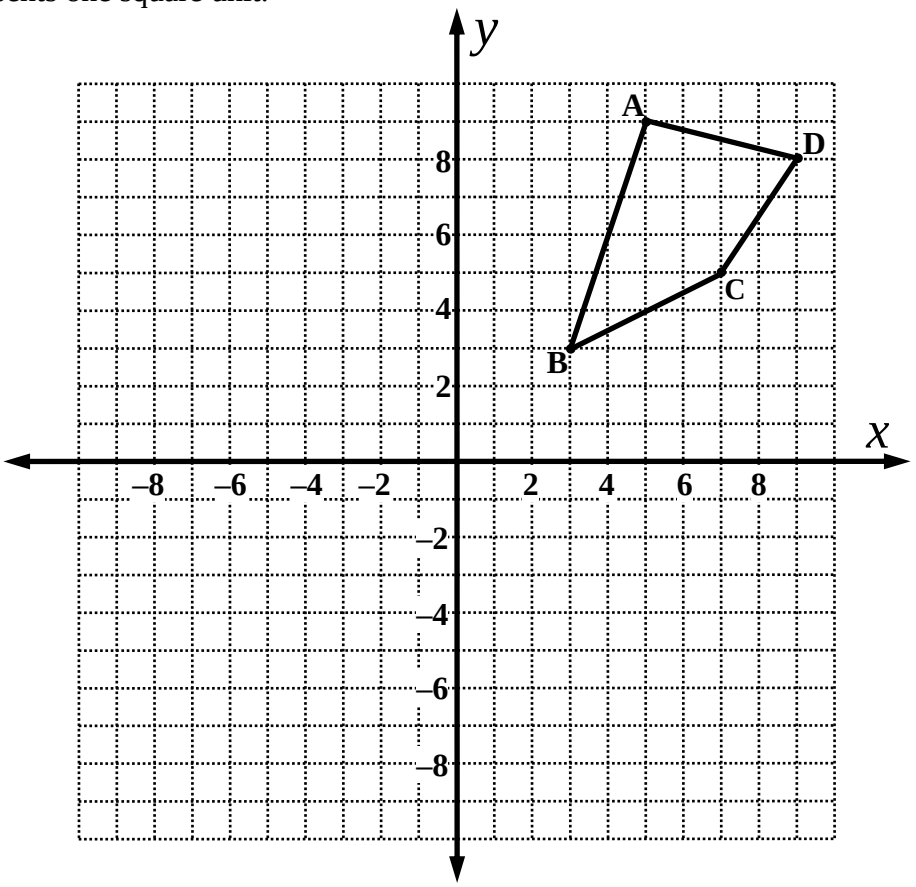
..... (3)

9.2.2 Calculate the perimeter of the triangle, giving your answer in millimetres (mm).

..... (1)
[6]

QUESTION 10

The given diagram shows quadrilateral (four-sided figure) ABCD, drawn in a Cartesian plane. Each block represents one square unit.



10.1 Write down the coordinates of points A and C, two of the vertices (corners) of the quadrilateral.

A (…… ; ……)

C (…… ; ……) (2)

10.2 ABCD is translated left 10 units and down 3 units.

Write down the coordinates of the **new position** of A. A' (…… ; ……) (2)

10.3 **The original quadrilateral**, ABCD, is reflected in the *x*-axis.

10.3.1 Write down the coordinates of the **new position** of C. C" (…… ; ……) (2)
[6]

QUESTION 11

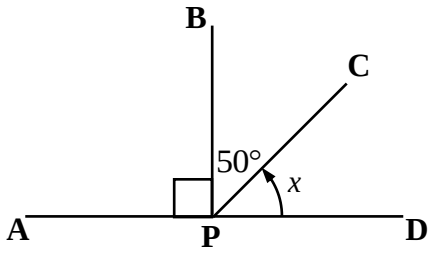
<u>In this question you do NOT need to show any working and you do NOT need to give reasons to justify your statements.</u>

Determine the value of x in each of the following diagrams.

11.1 Consider the diagram alongside.

APD is a straight line, with BP ⊥ AD.

$\hat{BPC} = 50°$ and $\hat{CPD} = x$.



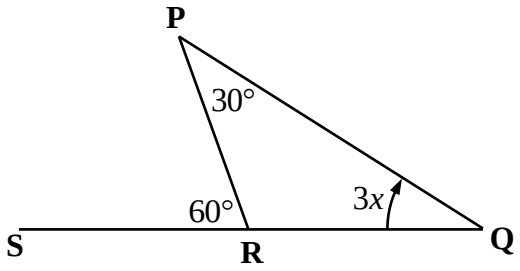
……

…… (1)

11.2 Consider the diagram alongside.

SRQ is a straight line.

$\hat{P} = 30°$, $\hat{PRS} = 60°$, and $\hat{Q} = 3x$.



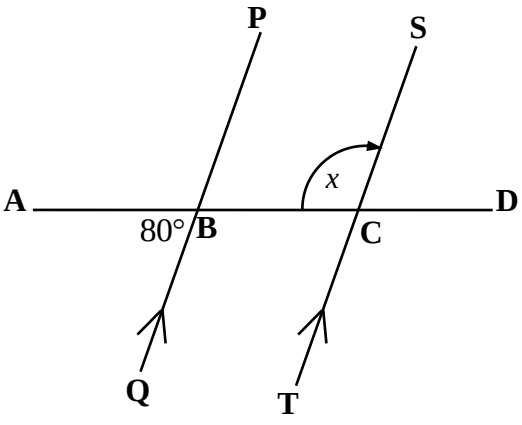
……

…… (1)

11.3 Consider the diagram alongside.

ABCD is a straight line.

PQ // ST, $\hat{ABQ} = 80°$ and $\hat{ACS} = x$.



……

……

…… (2)

[4]

QUESTION 12

Consider the following figures, created from regular hexagons. As you can see, in Figure 1 there are 4 hexagons, in Figure 2 there are 7 hexagons and in Figure 4 there are 13 hexagons.

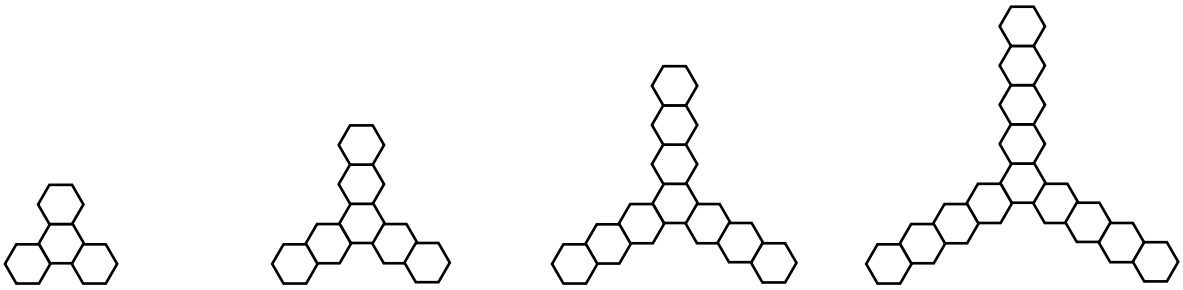


Figure 1 **Figure 2** **Figure 3** **Figure 4**

12.1 Complete the following table, assuming that this pattern is continued.

Figure Number (***n***)	1	2	3	4	5	8
Number of Hexagons (***h***)	4	7	.....	13	16	.....

(2)

12.2 Determine a formula which links the Figure Number (***n***), with the Number of Hexagons (***h***), allowing you to work out the Number of Hexagons, if you are given the Figure Number. Write your formula in the form ***h* = ...**

…… (1)

12.3 Assuming this pattern continues, use your formula to determine the number of squares in **Figure 100**. Write your answer in the space provided in the table. (Space for working is provided below the table.)

Figure Number (***n***)	1	2	4	100
Number of Hexagons (***h***)	4	7	13	.....

……

……

…… (1)

[4]

QUESTION 13

Consider the following figures, created using matches. As you can see, in Figure 1 there are 21 matches, in Figure 2 there are 36 matches and in Figure 4 there are 66 matches.

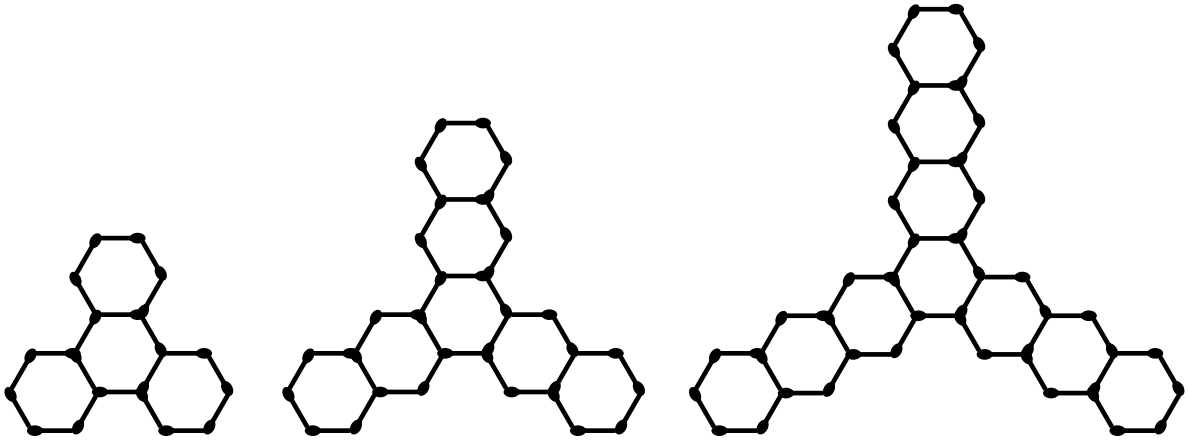


Figure 1 **Figure 2** **Figure 3**

13.1 Complete the following table, assuming that this pattern is continued.

Figure Number (***n***)	1	2	3	4	5	7
Number of Matches (***m***)	21	36	.....	66	81	.....

(2)

13.2 Determine a formula which links the Figure Number (***n***), with the Number of Matches (***m***), allowing you to work out the Number of Matches required, if you are given the Figure Number. Write your formula in the form ***m* = ...**

…… (1)

13.3 Assuming this pattern continues, use your formula to determine the number of the figure which would require the use of exactly **201 matches**. Write your answer in the space provided in the table. (Space for working is provided below the table.)

Figure Number (***n***)	1	2	3	.....
Number of Matches (***m***)	21	36	51	201

……

……

…… (1)

[4]

SECTION B [NO CALCULATOR]

QUESTION 1

If $a=-2$, $b=6$ and $c=-10$, determine the value of each of the following expressions.

1.1 $\sqrt{c^2-b^2}$

$=$……

$=$……

$=$……

$=$…… (3)

1.2 $\dfrac{a^2b+abc}{ac-b}$

$=$……

$=$……

$=$……

$=$……

$=$……

$=$…… (4)

[7]

QUESTION 2

Simplify each of the following expressions as far as possible, giving your answers without brackets. **Show all your working**.

2.1 $-4(2n)^2 - 2(3n)^2$

$=$……

$=$…… (3)

2.2 $\left(3a^2 - a^2\right)^4 - \left(4a^4 - a^4\right)^2$

$=$……

$=$……

$=$……

$=$…… (3)

2.3 $\dfrac{8x^2y^5 - 3x^4y^2}{4x^2y^2}$

$=$……

$=$……

$=$…… (3)

[9]

QUESTION 3

Consider the following information.

> **I think of a number. Let this number be x.**
>
> **I multiply this number by 6 and then subtract 12.**
>
> **My final answer is 24.**

3.1 Using the given information, **create an equation**, which contains x.

…… (4)

3.2 Determine the value of x.

……

……

……

…… (2)
[6]

QUESTION 4

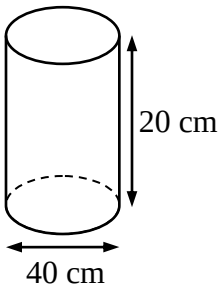
4.1 Consider the solid cylinder shown below. The diameter of the cylinder is 20 cm and its height is 10 cm. Calculate the **volume** of this solid. Give your final answer in cubic centimetres (cm^3), rounded off correctly to the nearest unit (whole number). Where necessary, use $\pi = 3{,}1416$.

……

……

……

……



You may find the following formulae useful.

$C = \pi \times d$

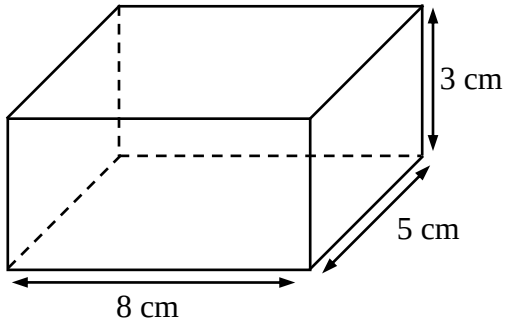
$A = \pi \times r^2$

……

……

…… (3)

4.2 Consider the solid rectangular right prism (cuboid) shown below. The dimensions of the solid are shown on the diagram.



4.2.1 Calculate the **total surface area** of this solid, in square centimetres (cm^2). Show all your working.

……

……

……

…… (4)

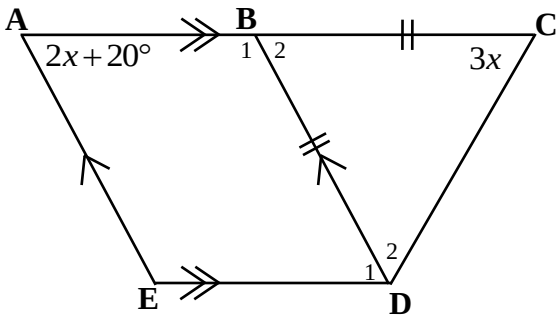
4.2.2 Give the total surface area of this solid in square millimetres (mm^2).

…… (1)

[8]

QUESTION 5

In this question you MUST give reasons to justify your statements, and you must show all necessary working.



In the given diagram AE // BD, AC // ED and BC = BD.
$\hat{C} = 3x$ and $\hat{A} = 2x + 20°$.

Determine the value of x.

……

……

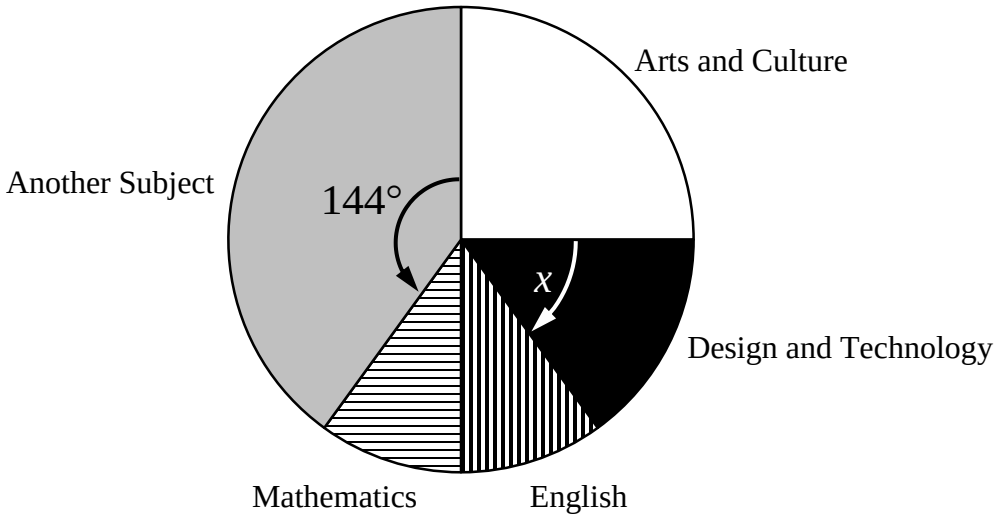
……

……

…… **[7]**

QUESTION 6

One hundred and eighty boys in Grades 8 and 9 were asked which subject is their most enjoyable. The pie chart below shows the breakdown of their responses.



6.1 Forty five of the boys said that **Arts and Culture** is their most enjoyable subject. Express forty five out of one hundred and eighty as a percentage.

…… (1)

6.2 Twenty seven of the boys said that **Design and Technology** is their most enjoyable subject. Calculate the size of the angle x (in degrees) in the **Design and Technology** sector of the pie chart. Give your answer correct to the nearest degree.

……

……

…… (2)

6.3 If the angle between the radii of the sector marked **"Another Subject"** is 144^{o}, determine the number of boys included in this group.

……

……

…… (2)

[5]

QUESTION 7

Ten boys in Grade 8 were discussing their recent test results and they compared their performances in a particular test, which was marked out of 100.

7.1 Use the following information (points A to F below) to **complete the given table**, filling in **nine results** that were mentioned, ranking them from highest (position 1) to lowest (position 10). **You will not fill in the second highest result (in Position 2), represented by *x*.**

- **A** The highest test mark was 95%.
- **B** The range of the results was 80%.
- **C** The lowest result was 15% lower than the second lowest.
- **D** The median of the data was 65%, but no boy achieved exactly 65%.
- **E** The data was bimodal, with two modes, 45% and 75%, each appearing twice.
- **F** One boy achieved 70% (out of 20).

	Position	**Test Result (%)**
Highest	1	
	2	***x***
	3	
	4	
	5	
	6	
	7	
	8	
	9	
Lowest	10	

(6)

7.2 If the mean test result for the group of **ten boys** was 60%, **calculate the value of *x*** (the second highest result). Show all your working.

……

……

…… (2)

[8]

TOTAL: [120]

Memo

QUESTION 1

Consider the following list of natural numbers, written in ascending order (from smallest to biggest).

1 ; 2 ; 3 ; 4 ; 5 ; 8 ; 9 ; 13 ; 16 ; 24 ; 27

FROM THIS LIST write down **ALL** the numbers which satisfy each of the following criteria. In some cases there may be only one number that is correct.

1.1 Prime numbers ...2;3;5;13... ✓a (1)

1.2 Factors of 4 ...1;2;4... ✓a (1)

1.3 Multiples of 4 ...4;8;16;24... ✓a (1)

1.4 Perfect cubes ...1;8;27... ✓a (1)

[4]

QUESTION 2

2.1 Determine the highest common factor (HCF) of 252 and 90

You may find the following information useful.

252 = 2 × 2 × 3 × 3 × 7 **90 = 2 × 3 × 3 × 5**

...HCF = 2×3×3... ✓m (any common factor)...

= 12 ✓a ... (2)

2.2 Determine the lowest common multiple (LCM) of 60 and 180.

You may find the following information useful.

60 = 2 × 2 × 3 × 5 **180 = 2 × 2 × 3 × 3 × 5**

...

...LCM = 2×2×3×3×5 ✓a (2×2×3×3)...

...= 180 ✓a ...

... (2)

[4]

QUESTION 3

Simplify each of the following expressions as far as possible. **Show all your working.**

3.1 $15 - 4 \times (-2)$

$= 15 + 8$

$= 23$ ✓a (1)

3.2 $5 - 8 - 3 + 4$

$= 9 - 11$

$= -2$ ✓ a (1)

3.3 $(14 - 7) - 2(6 - 2)(1 - 3)$

$= 7 - 8(-2)$ ✓ ✓

$= 7 + 16$ ✓✓ a

$= 23$ ✓ a

$=$ (3)

[5]

QUESTION 4

Simplify each of the following expressions as far as possible. **Show all your working.**

4.1 $\frac{3}{4} \times \frac{5}{6} \times \frac{2}{3}$

$= \frac{30}{72}$

$= \frac{5}{12}$ ✓ a (1)

4.2 $\frac{4}{5} \div \frac{6}{11}$

$= \frac{4}{5} \times \frac{11}{6}$ ✓

$= \frac{44}{30}$ ✓a

$= \frac{22}{15}$ ✓a (2)

4.3 $\frac{2}{3} - \frac{1}{2}$

$= \frac{4}{6} - \frac{3}{6}$ ✓✓a

$= \frac{1}{6}$ ✓a (3)

[6]

QUESTION 5

If $a = -2$, $b = -4$ and $c = 3$, determine the value of each of the following expressions.
Show all your working.

5.1 $a + 4b + 2c$

$= -2 + 4(-4) + 2(3)$

$= -2 - 16 + 6$ ✓a

$= -18 + 6$

$= -12$ ✓a (2)

5.2 $\frac{b+c}{a}$

$= \frac{-4+3}{-2}$

$= \frac{-1}{-2}$ ✓a

$= \frac{1}{2}$ ✓a

$=$ (2)

[4]

QUESTION 6

Simplify each of the following expressions as far as possible, giving your answers without brackets. **Show all your working.**

6.1 $m+2m+3m$

$= 6m$ ✓a ..... (1)

6.2 $n\times 2n\times 3n$

$= 6n^3$ ✓ a ..... (1)

6.3 $m+2m+3m-4m$

$= 2m$ ✓a ..... (1)

6.4 $n\times(-n)\times 3n\times(-4n)$

$= 12n^4$ ✓✓ a ..... (2)

6.5 $2a+3b-3a-4b+a$

$= 3a-3a+3b-4b$

$= -b$ ✓✓ a

$=$ ..... (2)

6.6 $2y\times y\times 3-4\times y\times 2y$

$= 6y^2-8y^2$ ✓✓a

$= -2y^2$ ✓ a

$=$ ..... (3)

[10]

QUESTION 7

Solve for x.

Show all your working. In some cases you may not need every line available for working, so you may leave empty spaces.

7.1 $3x+5=11$

$\therefore 3x=6$ ✓ a

$\therefore x=2$ ✓ a

$\therefore$ ..... (2)

7.2 $7x+12=5x-4$

$\therefore 2x=-16$ ✓✓ a

$\therefore x=-8$ ✓ a

$\therefore$

$\therefore$ ..... (3)

7.3 $8(x-1)-5=7$

$\therefore 8x-8-5=7$

$\therefore 8x-13=7$ ✓a

$\therefore 8x=20$ ✓a

$\therefore x=\frac{20}{8}$ ✓$=1\frac{1}{2}$ a (3)

[8]

QUESTION 8

Consider the following set of 10 values, arranged in ascending order (smallest to biggest).

1	2	2	3	4	5	6	6	6	8

Refer to this set of values and determine each of the following.

8.1 The range $8-1=7$ ✓a (1)

8.2 The mode 6 ✓a (1)

8.3 The median 4,5 ✓a (1)

8.4 The mean $43\div 10$ ✓m (attempt to add values)

$=4,3$ ✓a (2)

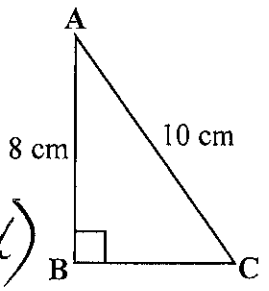
[5]

QUESTION 9

9.1 Complete the statement of the theorem of Pythagoras in words.

In a right-angled triangle the square of the hypotenuse ✓a is equal to the sum of the squares of the other two sides ✓a (2)

9.2 In ΔABC, shown alongside, $\hat{B}=90^o$, AB = 8 cm and AC = 10 cm.



9.2.1 Determine the length of BC.

$BC^2=10^2-8^2$

$=36$ ✓m ✓a (attempt Pyth)

$\therefore BC=\sqrt{36}$

$=6$ ✓a (3)

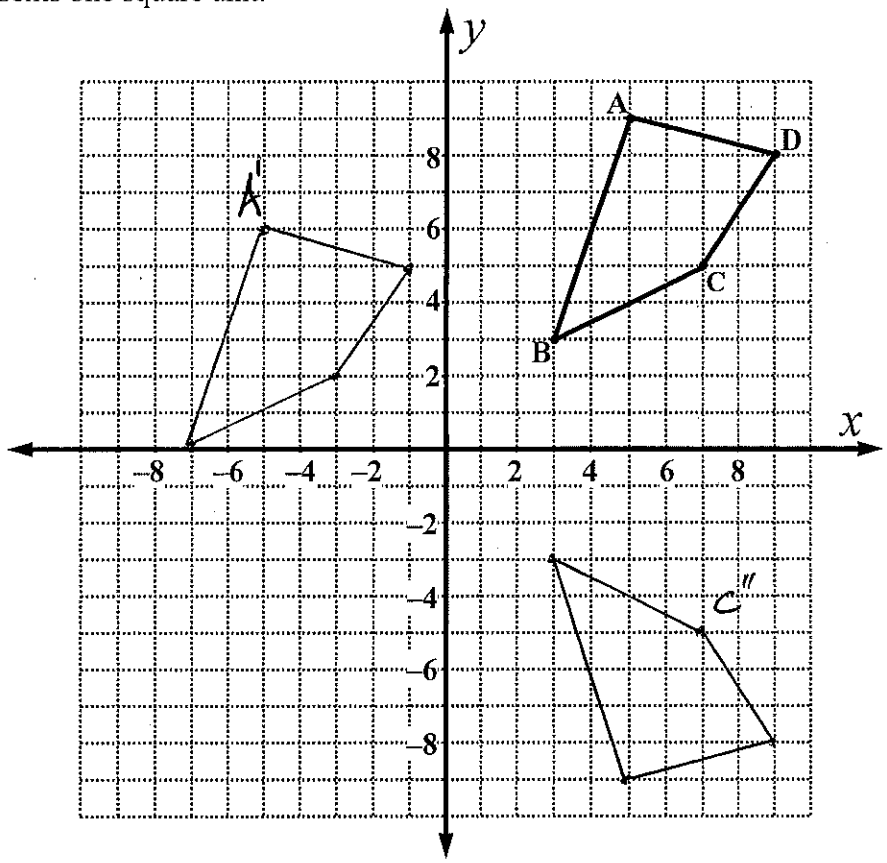
9.2.2 Calculate the perimeter of the triangle, giving your answer in millimetres (mm).

24 cm = 240 mm ✓ a (1)

[6]

QUESTION 10

The given diagram shows quadrilateral (four-sided figure) ABCD, drawn in a Cartesian plane. Each block represents one square unit.



10.1 Write down the coordinates of points A and C, two of the vertices (corners) of the quadrilateral.

A (5 ; 9) ✓a

C (7 ; 5) ✓a (2)

10.2 ABCD is translated left 10 units and down 3 units.

Write down the coordinates of the **new position** of A. ✓a ✓a A' (−5 ; 6) (2)

10.3 **The original quadrilateral**, ABCD, is reflected in the *x*-axis.

10.3.1 Write down the coordinates of the **new position** of C. ✓a ✓a C'' (7 ; −5) (2)

[6]

QUESTION 11

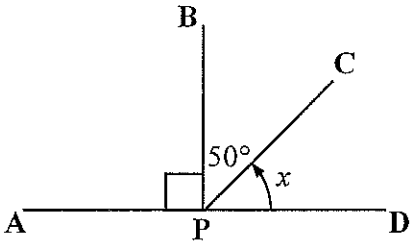
In this question you do NOT need to show any working and you do NOT need to give reasons to justify your statements.

Determine the value of x in each of the following diagrams.

11.1 Consider the diagram alongside.

APD is a straight line, with BP ⊥ AD.

$B\hat{P}C = 50°$ and $C\hat{P}D = x$.



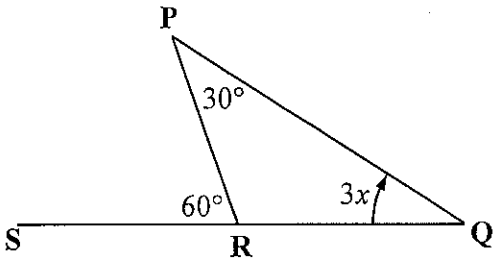
$x = 40°$ ✓a

..... (1)

11.2 Consider the diagram alongside.

SRQ is a straight line.

$\hat{P} = 30°$, $P\hat{R}S = 60°$, and $\hat{Q} = 3x$.



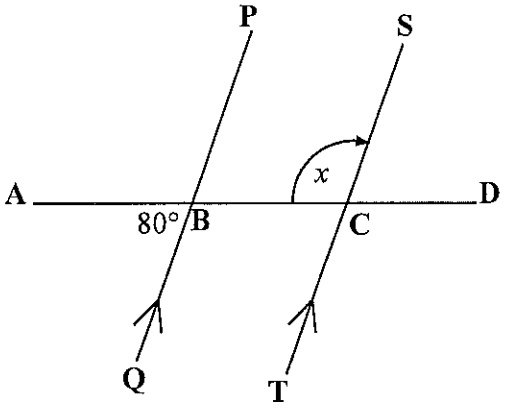
$x = 10°$ ✓a

..... (1)

11.3 Consider the diagram alongside.

ABCD is a straight line.

PQ // ST, $A\hat{B}Q = 80°$ and $A\hat{C}S = x$.



$A\hat{C}T = 80°$

$\therefore x = 100°$ ✓✓a

..... (2)

[4]

QUESTION 12

Consider the following figures, created from regular hexagons. As you can see, in Figure 1 there are 4 hexagons, in Figure 2 there are 7 hexagons and in Figure 4 there are 13 hexagons.

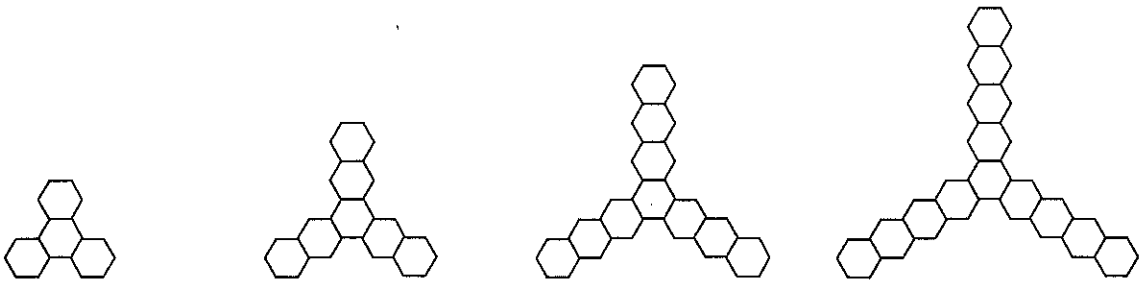


Figure 1 **Figure 2** **Figure 3** **Figure 4**

12.1 Complete the following table, assuming that this pattern is continued.

Figure Number (n)	1	2	3	4	5	8
Number of Hexagons (h)	4	7	10 ✓a	13	16	25 ✓a

(2)

12.2 Determine a formula which links the Figure Number (n), with the Number of Hexagons (h), allowing you to work out the Number of Hexagons, if you are given the Figure Number. Write your formula in the form $h = ...$

$h = 3n + 1$ ✓a (1)

12.3 Assuming this pattern continues, use your formula to determine the number of squares in **Figure 100**. Write your answer in the space provided in the table. (Space for working is provided below the table.)

Figure Number (n)	1	2	4	100
Number of Hexagons (h)	4	7	13	301 ✓a

.....

.....

..... (1)

[4]

QUESTION 13

Consider the following figures, created using matches. As you can see, in Figure 1 there are 21 matches, in Figure 2 there are 36 matches and in Figure 4 there are 66 matches.

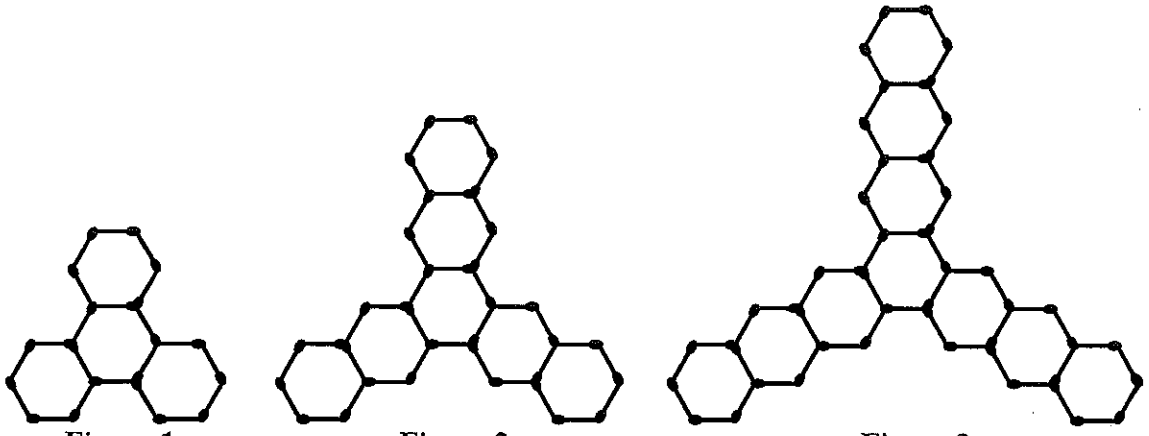


Figure 1 **Figure 2** **Figure 3**

13.1 Complete the following table, assuming that this pattern is continued.

Figure Number (n)	1	2	3	4	5	7
Number of Matches (m)	21	36	51 ✓	66	81	111 ✓

(2)

13.2 Determine a formula which links the Figure Number (n), with the Number of Matches (m), allowing you to work out the Number of Matches required, if you are given the Figure Number. Write your formula in the form $m = ...$

$m = 15n + 6$ ✓ (1)

13.3 Assuming this pattern continues, use your formula to determine the number of the figure which would require the use of exactly **201 matches**. Write your answer in the space provided in the table. (Space for working is provided below the table.)

Figure Number (n)	1	2	3	13 ✓
Number of Matches (m)	21	36	51	201

.....

.....

..... (1)

[4]

SECTION B [NO CALCULATOR]

QUESTION 1

If $a=-2$, $b=6$ and $c=-10$, determine the value of each of the following expressions.

1.1 $\sqrt{c^2-b^2}$

$=\sqrt{(-10)^2-(6)^2}$ ✓a

$=\sqrt{100-36}$ ✓a

$=8$ ✓a

$=$ (3)

1.2 $\dfrac{a^2b+abc}{ac-b}$

$=\dfrac{(-2)^2(6)+(-2)(6)(-10)}{(-2)(-10)-(6)}$

$=\dfrac{24+120}{20-6}$ ✓a(24)

$=\dfrac{144}{14}$ ✓a

$=10\dfrac{4}{14}$ ✓a

$=$

$=$ (4)

[7]

QUESTION 2

Simplify each of the following expressions as far as possible, giving your answers without brackets. **Show all your working.**

2.1 $-4(2n)^2 - 2(3n)^2$

$= -8n^2 - 18n^2$ ✓a ✓a

$= -26n^2$ ✓a (3)

2.2 $(3a^2 - a^2)^4 - (4a^4 - a^4)^2$

$= (2a^2)^4 - (3a^4)^2$ ✓a

$= 16a^8 - 9a^8$ ✓a

$= 7a^8$ ✓a

= ..... (3)

2.3 $\dfrac{8x^2y^5 - 4x^4y^2}{4x^2y^2}$

$= 2y^3 - x^2$ ✓✓✓a

= .....

= ..... (3)

[9]

QUESTION 3

Consider the following information.

I think of a number. Let this number be x.
I multiply this number by 6 and then subtract 12.
My final answer is 24.

3.1 Using the given information, **create an equation**, which contains x.

$6x - 12 = 24$ ✓ ✓ ✓ a ..... (4)

3.2 Determine the value of x.

$6x = 36$ ✓ a

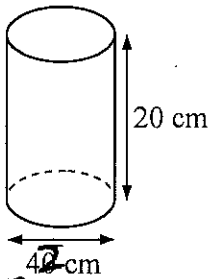
$\therefore x = 6$ ✓ a

..... (2)

[6]

QUESTION 4

4.1 Consider the solid cylinder shown below. The diameter of the cylinder is 20 cm and its height is 10 cm. Calculate the **volume** of this solid. Give your final answer in cubic centimetres (cm^3), rounded off correctly to the nearest unit (whole number). Where necessary, use $\pi = 3{,}1416$. 22/7



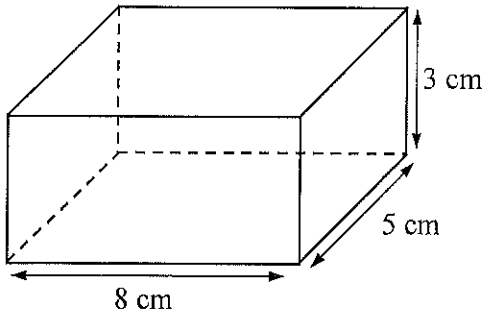
You may find the following formulae useful.
$C = \pi \times d$
$A = \pi \times r^2$

$V = \frac{22}{7} \times \frac{3}{1} \times \frac{21}{1} \times \frac{20}{1}$ ✓ a

$= 66 \times 420$ ✓ a

$= 27720$ ✓ a (hectic with no calculator) haha! ..... (3)

4.2 Consider the solid rectangular right prism (cuboid) shown below. The dimensions of the solid are shown on the diagram.



4.2.1 Calculate the **total surface area** of this solid, in square centimetres (cm^2). Show all your working.

TSA = 2(3×5) + 2(5×8) + 2(3×8) ✓m any face
✓m (double)
= 30 + 80 + 48 ✓m (add areas)
= 158 cm^2 ✓a (4)

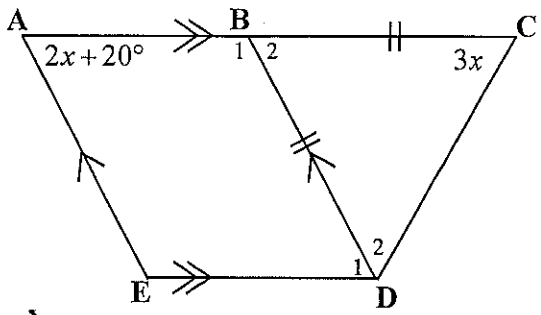
4.2.2 Give the total surface area of this solid in square millimetres (mm^2).

15 800 mm^2 ✓a (1)

[8]

QUESTION 5

In this question you MUST give reasons to justify your statements, and you must show all necessary working.



In the given diagram AE // BD, AC // ED and BC = BD.
$\hat{C} = 3x$ and $\hat{A} = 2x + 20°$.

Determine the value of x.

$\hat{D}_2 = 3x$ ✓a ($\overline{BD} = \overline{BC}$) ✓a

$\hat{B}_2 = \hat{A} = 2x + 20°$ ✓a (corr $\angle$'s; $\overline{AC} \parallel \overline{ED}$) ✓a

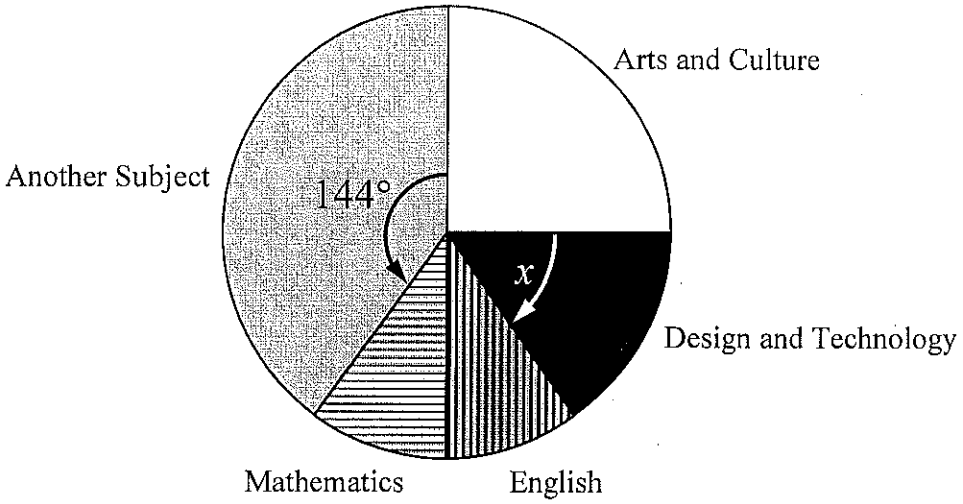
$\therefore 2x + 20° + 3x + 3x = 180$ ✓a ($\angle$ Sum $\triangle BCD$) ✓a

$\therefore 8x = 160°$

$\therefore x = 20°$ ✓a [7]

QUESTION 6

One hundred and eighty boys in Grades 8 and 9 were asked which subject is their most enjoyable. The pie chart below shows the breakdown of their responses.



6.1 Forty five of the boys said that **Arts and Culture** is their most enjoyable subject. Express forty five out of one hundred and eighty as a percentage.

25% ✓a

..... (1)

6.2 Twenty seven of the boys said that **Design and Technology** is their most enjoyable subject. Calculate the size of the angle x (in degrees) in the **Design and Technology** sector of the pie chart. Give your answer correct to the nearest degree.

$\frac{27}{180} \times \frac{360^\circ}{1}$ ✓m

$= 54^\circ$ ✓a

..... (2)

6.3 If the angle between the radii of the sector marked **"Another Subject"** is 144°, determine the number of boys included in this group.

$\frac{144^\circ}{360^\circ} \times \frac{180}{1}$ ✓m

$= 72$ boys ✓a

..... (2)

[5]

QUESTION 7

Ten boys in Grade 8 were discussing their recent test results and they compared their performances in a particular test, which was marked out of 100.

7.1 Use the following information (points A to F below) to **complete the given table**, filling in **nine results** that were mentioned, ranking them from highest (position 1) to lowest (position 10). **You will not fill in the second highest result (in Position 2), represented by *x*.**

- **A** The highest test mark was 95%.
- **B** The range of the results was 80%.
- **C** The lowest result was 15% lower than the second lowest.
- **D** The median of the data was 65%, but no boy achieved exactly 65%.
- **E** The data was bimodal, with two modes, 45% and 75%, each appearing twice.
- **F** One boy achieved 70% (out of 20).

	Position	Test Result (%)
Highest	1	95%
	2	*x*
	3	75% } ✓a
	4	75% }
	5	70% ✓a
	6	60% ✓a
	7	45° } ✓a
	8	45° }
	9	30° ✓a
Lowest	10	15° ✓a

(6)

7.2 If the mean test result for the group of **ten boys** was 60%, **calculate the value of *x*** (the second highest result). Show all your working.

$x = 10 \times 60 - 510$ ✓a

$= 90\%$ ✓a

(2)

[8]

TOTAL: [120]

PolyMathic

Paper 8
Oct/Nov
Algebra

PolyMathic

Grade 8 – Paper **November**

Time available: 1 hour Marks available: 70 marks

> Calculators have made us all a bit lazy when it comes to doing sums. But worse, they have deprived us of discovering some of the beautiful patterns to be found in ordinary numbers.
>
> - Rob Eastaway

Where necessary, give answers correct to 2 decimal places.
GOOD LUCK AND ENJOY THE PAPER!

Task 1

Complete the following cross-number on the extra sheet provided – staple this to the front of your answer sheets. Use your calculator to make all calculations. (16)

1.	2.			3.
				
	4.	5.		
6.				
		7.		

Across:

1. $54\times 23+200000\div 10-1$

4. $5{,}4\times 10^{3}-2{,}18\times 10^{2}$

6. $\dfrac{25!}{23!}$

7. $\dfrac{\left(\frac{3}{4}\right)^{5}}{\left(\frac{1}{4}\right)^{5}}-\dfrac{20}{7}\div\dfrac{1}{70}$

Down:

2. $\sqrt{\dfrac{18750036}{12}-3}$

3. $\dfrac{6^{6}}{3^{3}}$

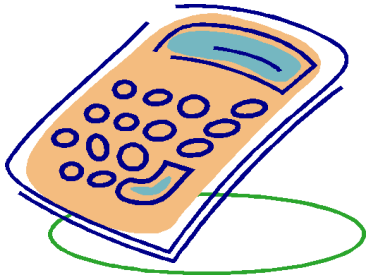
5. $\left(\sqrt[5]{2{,}48832}\right)^{2}\times 100-\left(\dfrac{\left(3^{2}\right)^{3}}{18}-0{,}5\right)$

6. $-4^{2}+(-9)^{2}$

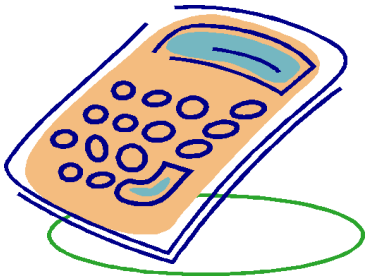
Task 2

A programmable calculator can have any rule entered. It then uses this rule to give you an output for any input.

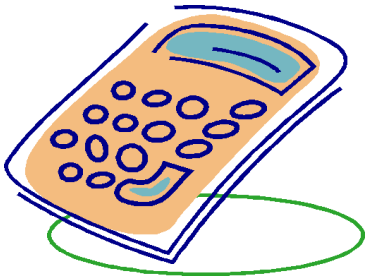
For example a calculator programmed with the rule: $M = 5a - 12$ would work as shown below.

a = 4 →  → **M = 8**

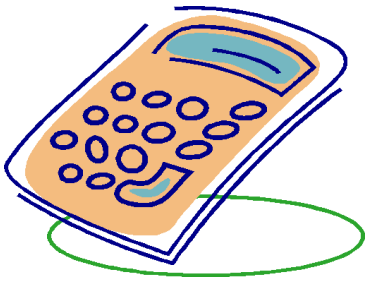
a) Find the output if the rule used is $M = 23x + 50{,}4$. (2)

x = 1,2 →  → **M = ?**

b) Find the output if the rule used is $M = \sqrt{a} + b^2$ (2)

a = 6,25
b = 8,1 →  → **M = ?**

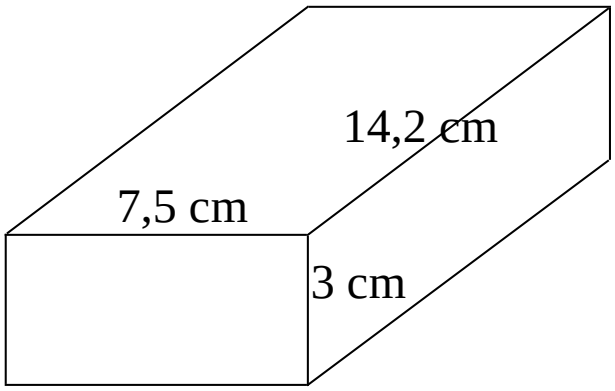
c) Find the input if the rule used is $M = 4{,}5p - 2{,}3$ (2)

p = ? →  → **M = 29,2**

Task 3

Calculators are packed in 2 different boxes as shown:

a) A cuboid:

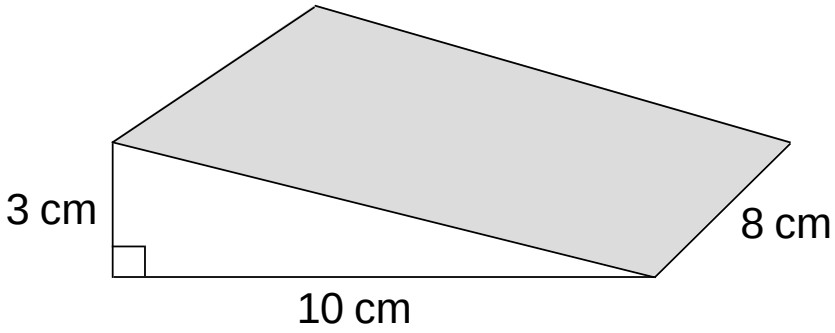


i) Calculate the volume of the box. (2)

ii) Convert this volume to mm^3. (2)

iii) Calculate the surface area of the box. (2)

b) A triangular prism:

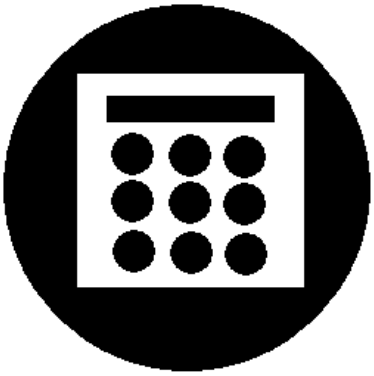


i) Calculate the volume of the prism. (3)

ii) Calculate the area of the shaded face. (3)

Task 4

The logo for a calculator is shown.



The radius of the outer circle is 6 cm.

The diameter of each of the small circles is 0,5 cm.

The calculator is a square with side 7 cm.

The screen of the calculator has dimensions 1 cm × 4 cm.

Calculate the area of the logo that is shaded black. (5)

Task 5

a) The first calculator that went on sale in the 1960s sold for $2 500.
If the dollar : rand exchange rate is

1 : 8,569

then calculate the rand value of this calculator. (2)

b) A calculator is worth R120 today.
What will it be worth in 30 years' time if simple interest of 13% per annum is added? (3)

c) The calculators that were on sale at the school for R100 included VAT of 14%.
How much was VAT? (3)

d) A graphical calculator costs R650.

You enter into a hire purchase agreement with a company to buy this item.

The details of the agreement are as follows:

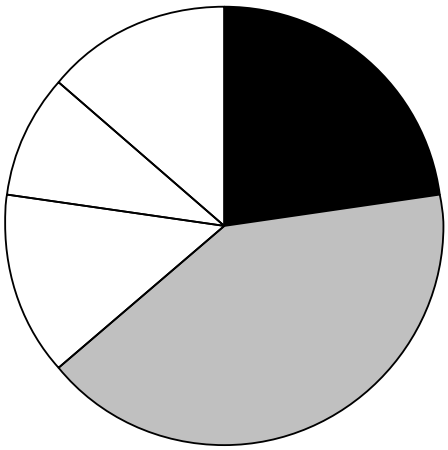
- You will pay a deposit of 10%.
- You will pay off the remainder of the amount in 24 months.
- The interest rate is 12% p.a.

How much will you have to pay per month? (5)

Task 6

Five major brands of calculator are used in schools across the world. The number of schools using each is listed below:

Casarp	125 000
Shasio	225 000
Kensio	75 000
Casko	50 000
Kenioarp	75 000



A pie chart of this information is also drawn.

a) Which brand is shaded grey? (1)

b) What angle has been used to draw the Casarp wedge? (3)

c) What percentage of the schools uses Casko? (3)

d) One of the brands holds 13,6% of the market.
What angle has been used to draw this wedge? (3)

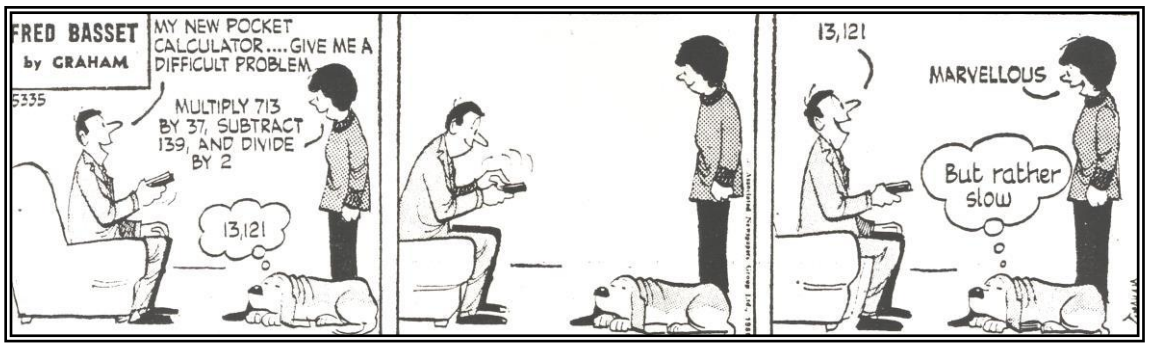
Task 7

The cost of purchasing calculators in different countries is given below:

Japan	R53,09
USA	R150,23
South Africa	R100,00
China	R73,28

a) What is the mean price for the 4 countries? (3)

b) What is the median price for the 4 countries? (3)



Task 8

ONLY ATTEMPT THESE TWO PROBLEMS ONCE YOU HAVE COMPLETED EVERYTHING ELSE.

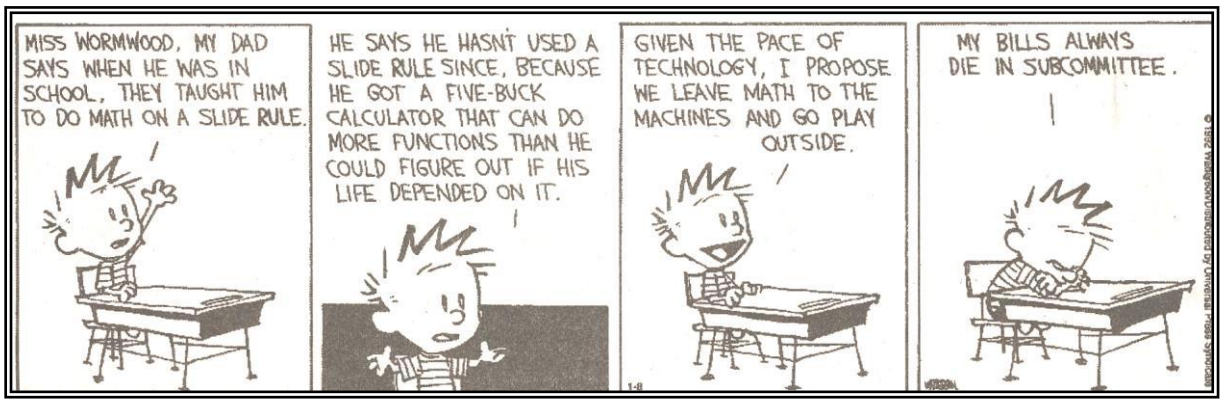
a) Take the digits 0 to 9 and use each of them once make a 6-digit number that is a cube and a 4-digit number that is a square. (1)

b) The game of "Four Out" is to reduce a 6-digit number to zero in 4 moves, each move consisting of adding, subtracting or dividing by a 2-digit number.

For example reduce the number 307 135:

$$\begin{aligned} 307135 &- 35 = 307100 \\ 307100 &\div 50 = 6142 \\ 6142 &\div 83 = 74 \\ 74 &- 74 = 0 \end{aligned}$$

Now try to reduce the number 716 638 in four moves. (1)



Memo

[70]

TASK 2:

a) $M = 78$ ✓

b) $M = 68,11$ ✓

c) $p = 7$ ✓

(6)

TASK 3:

Penalise once for units

ai) $V = 7,5 \times 3 \times 14,2$ ✓

$= 319,5\ cm^3$ ✓ (2)

ii) $V = 319\ 500\ mm^3$ ✓✓ (2)

iii) $TSA = 2 \times 7,5 \times 3 + 21 \times 14,2$ ✓

$= 343,2\ cm^2$ ✓ (2)

bi) $V = \frac{1}{2} \times 3 \times 10 \times 8$ ✓✓

$= 120\ cm^3$ ✓ (3)

ii) $d^2 = 3^2 + 10^2$ (Pythag)

$= 109$

$\therefore d = 10,44\ cm$ ✓

$\therefore$ Area $= 8 \times 10,44$

$= 83,52\ cm^2$ ✓ (3)

TASK 4:

$A_{big} = \pi r^2 = \pi \times 36 = 113,10$ ✓

$A_{small} = \pi r^2 = \pi \times 0,25^2 = 0,20$ ✓

$A_{square} = 4$ ✓

$A_{rect} = 4$ ✓

$\therefore A_{block} = 113,10 - 4 - 4 + 9 \times 0,20$

$= 69,86\ cm^2$ ✓ (5)

TASK 5:

a) R21 422,50 ✓✓ (2)

b) Interest p.a. $= \frac{13}{100} \times 120 =$ R15,60 ✓

$\therefore$ Total $= 120 + 30 \times 15,60 =$ R588 ✓✓ (3)

c) R12,28 ✓✓✓ (3)

d) Deposit = R65 ✓

Interest $= \frac{12}{100} \times 585 \times 2 =$ R140,40 ✓✓

$\therefore$ Total amount $= 585 + 140,40$

$=$ R725,40 ✓

$\therefore$ Monthly = R30,23 ✓ (5)

TASK 6:

a) Shasic ✓ (1)

b) $\frac{125}{550} \times 360 = 81,82°$ ✓✓ (3)

c) $\frac{50}{550} \times 100 = 9,09\%$ ✓✓ (3)

d) $\frac{13,6}{100} \times 360 = 48,96°$ ✓✓ (3)

TASK 7:

a) $\frac{376,80}{4} =$ R94,15 ✓✓ (3)

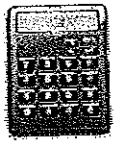
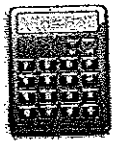
b) $\frac{73,28 + 100}{2} =$ R86,64 ✓✓ (3)

TASK 8:

a) 328509 & 1764 / 804357 & 1296 / 328509 & 4761 / 804 357 & 2916 / 804357 & 9216 (1)

b) −76 ÷99 ÷94 −77 (1)

TASK 1

1. 2	1	2	4	3. 1 ✓✓
	2			7
	4. 5	5. 1	8	2 ✓✓
6. 6	0 ✓✓	0 ✓✓		8 ✓✓
5 ✓✓		7. 4 ✓✓	3 ✓✓	

(16)

[70]

PolyMathic

Paper 9
Oct/Nov
Algebra and Geometry

(Q1 - Q2: Algebra)

(Q3: Geometry)

PolyMathic

Grade 8 November Exam
Paper - Algebra and Geometry
Total: 105
Time: 2 hours

Instructions:

1. Write your name and grade (e.g. 8E) as well as the name of your SUBJECT TEACHER at the top of your answer script.
2. This paper consists of 6 Pages.
3. This paper consists of **3 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 Determine the:

1.1.1 lowest prime number between 1 and 20. (1)

1.1.2 HCF of 125 and 275 using ***prime factors***. (3)

1.1.3 $\sqrt{1764}$ using ***prime factors.*** (2)

1.2 Simplify the following:

1.2.1 $\frac{75}{10}$ (1)

1.2.2 (3) x (–8) (2) (2)

1.2.3 $-\frac{5}{10}(4-6)+\sqrt[3]{8}$ (2)

1.3 Calculate the following:

1.3.1 $\sqrt{0{,}25}$ (2)

1.3.2 $\sqrt{\sqrt[3]{64} + 21}$ (3)

1.3.3 $\frac{2}{5} + 2 \div \frac{6}{7}$ (4)

1.4 I think of any whole number, I double it, and add 5. I then double this answer and add 2. I then subtract the number I first thought of.

Write an algebraic expression for the statement made above. (4)

[25]

QUESTION 2

2.1 Study the algebraic expression below and answer the following questions.

$$-8x^4 + 2 - \frac{5x^2}{7} + x + 9x^5 - 3x^3$$

2.1.1 How many terms are in the expression? (1)

2.1.2 Rewrite the expression in ascending powers of x. (1)

2.1.3 Write down the constant term. (1)

2.1.4 Write down the coefficient of x^2. (1)

2.2 Simplify the following:

2.2.1 $-3p^4q^6 \times 5p^3q \times q^3$ (2)

2.2.2 $4k^2(10k^5 - k)$ (2)

2.2.3 $x^2.y.x.y^2$ (2)

2.2.4 $(5x^2y^3)(-3x^2y^2)(-x)$ (2)

2.2.5 $6x - 3x(2x - 1)$ (3)

2.3 Calculate:

2.3.1 $\dfrac{2m^2n^3 - 6m^4n^6}{2m^2n^3}$ (2)

2.3.2 $-2x\left(-3x^2\right)^3$ (2)

2.3.3 $\dfrac{\left(4x^2\right)\left(-2x^6\right)\left(x^3\right)}{x^5}$ (2)

2.4 Multiply $5r$ **by** $(b + ra - 2brc)$ (3)

2.5 Subtract $6x^2 - 2x - 1$ **from** $3x^2 + 2x - 1$. (3)

2.6 Solve for x:

2.6.1 $12x + 6x = 9$ (2)

2.6.2 $\dfrac{x}{7} = 6$ (1)

2.6.3 $-2\,(2x - 1) = 3\,(x+4) + 4$ (3)

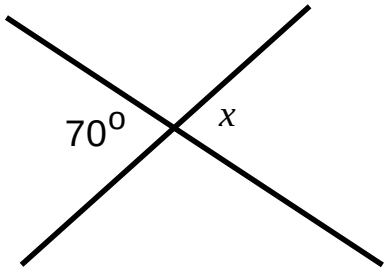
2.6.4 $4(x - 2) - (1 - x) = 6(x - 1) + x + 3$ (4)

[38]

QUESTION 3

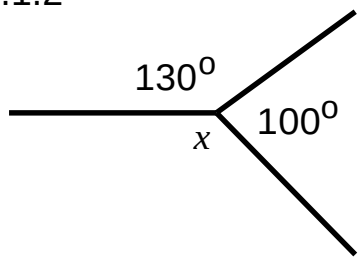
3.1 Find the size of each of the angles marked *x* in the diagrams below. Give reasons for your answer.

3.1.1



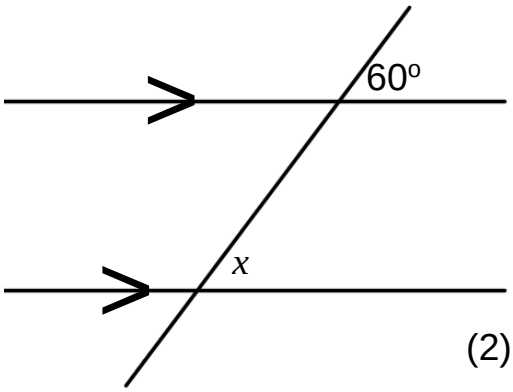
(2)

3.1.2



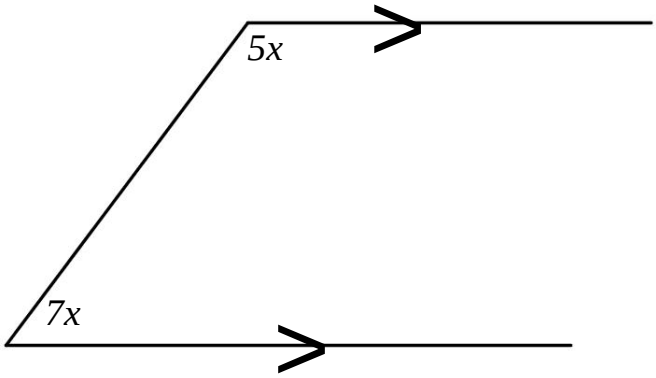
(2)

3.1.3



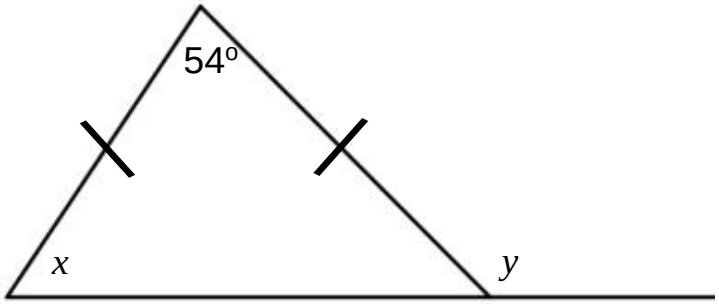
(2)

3.1.4



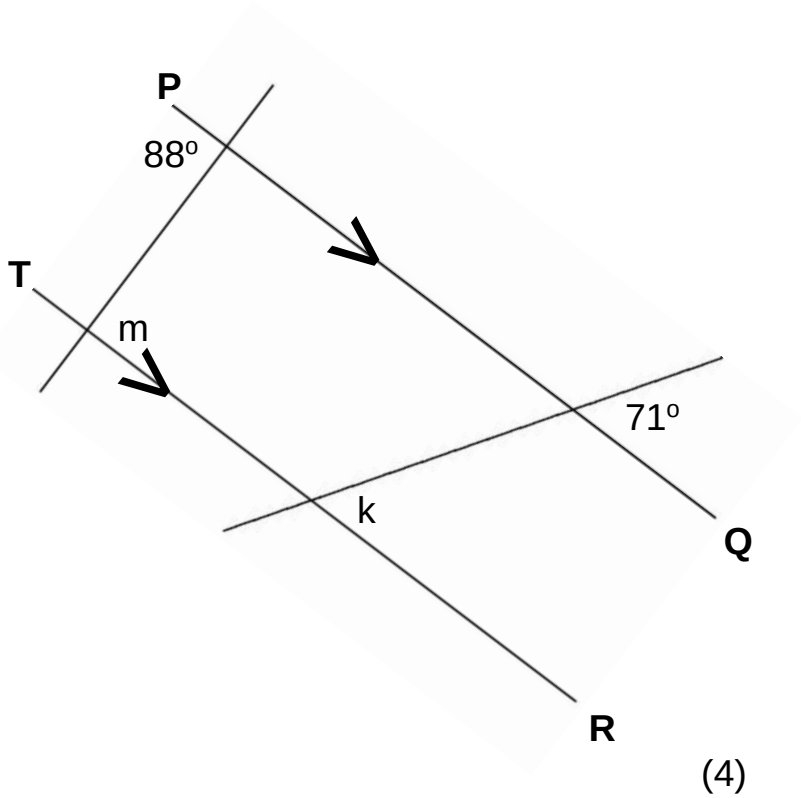
(2)

3.1.5



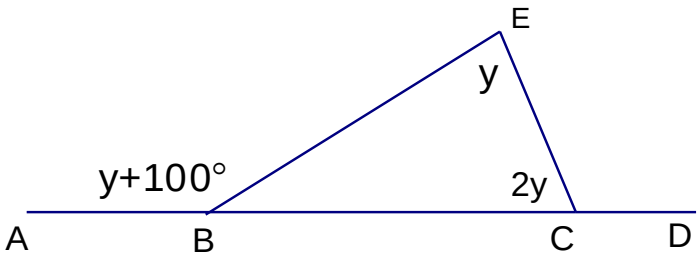
(3)

3.2 In the diagram PQ∥TR. Find, with reasons, the sizes of the angles marked m and k.



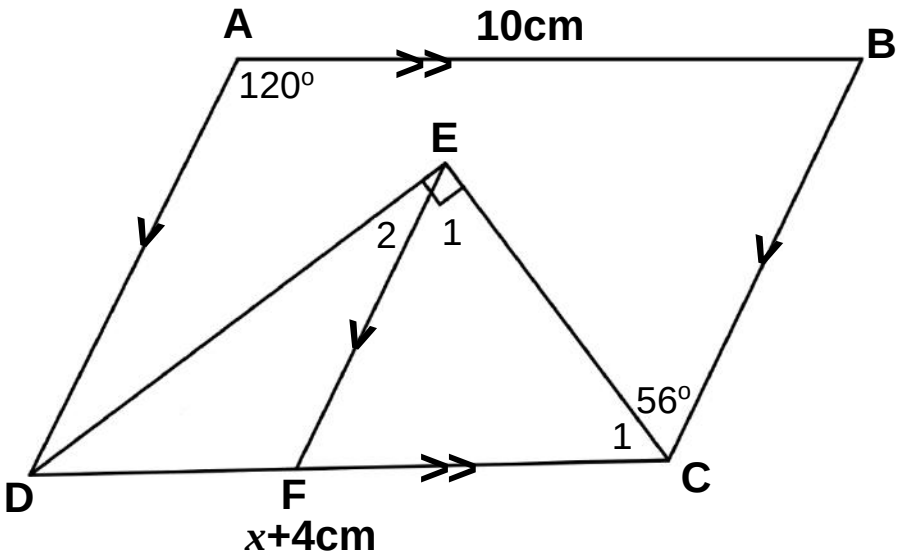
(4)

3.3 Use the diagram to form an equation in y and therefore determine value of y.



(3)

3.4 In the diagram below, $\hat{A} = 120°$, $B\hat{C}E = 56°$, $AB \parallel DC$, $AD \parallel BC$, AB=10cm and DC=x+4cm.



Determine with reasons:

3.4.1 $\angle C_1$ (2)

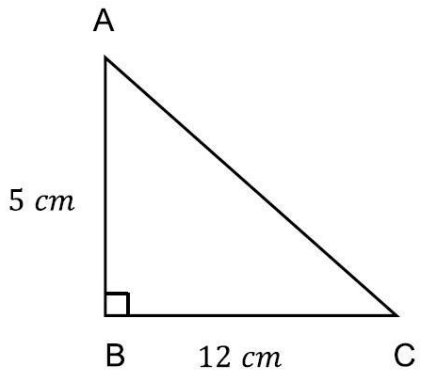
3.4.2 $\angle E_1$ (2)

3.4.3 $\angle E_2$ (2)

3.4.4 $E\hat{D}C$ (2)

3.4.5 x (2)

3.5 In ΔABC, $AB \perp BC$. AB = 5cm and BC = 12cm.

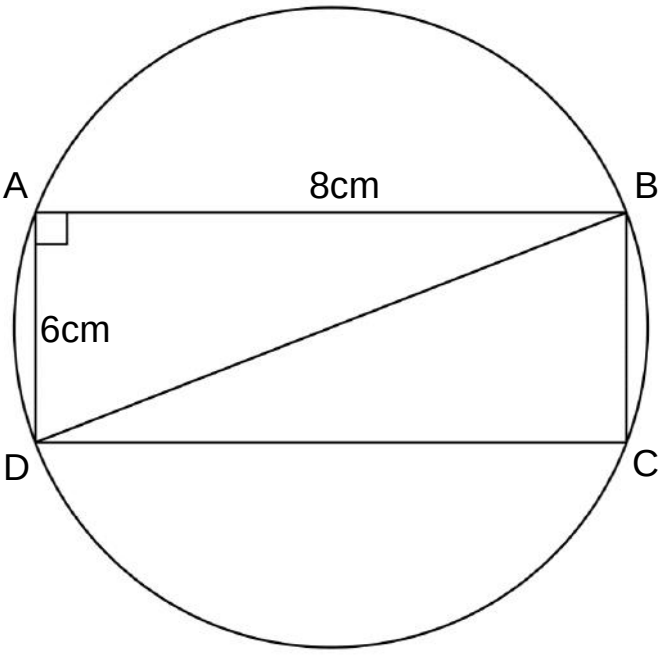


Determine the:

3.5.1 length of AC. (3)

3.5.2 perimeter of ΔABC. (2)

3.6 The vertices of rectangle ABCD lay on the circumference of a circle. The line BD is the diameter of the circle. AB⊥AD, AB=8cm and AD=6cm.



Calculate the:

3.6.1 length of BD (4)

3.6.2 area of the circle (Leave your answer in terms of π) (4)

3.6.3 circumference of the circle (Leave your answer in terms of π) (3)

[44]

QUESTION 1 [24] **Memo**

1.1.1	2	✓ answer	(1)
1.1.2	125: 5 x 5 x 5 275: 5 x 5 x 11 HCF: 5 x 5 =25	✓ prime factors 125 ✓ prime factors 275 ✓ answer	(3)
1.1.3	$\sqrt{1764}$ $=\sqrt{2^2\times3^2\times7^2}$ $=2\times3\times7$ $=42$	✓ Prime factors ✓ answer	(2)
1.2.1	7,5	✓ answer	(1)
1.2.2	–48	✓✓ answer	(2)
1.2.3	$-\frac{1}{2}(-2)+2$ $=1+2$ $=3$	✓ simplifying ✓ answer	(2)
1.3.1	$\sqrt{\frac{25}{100}}$ $=\frac{5}{10}$ $=\frac{1}{2}$	✓ simplifying ✓ answer	(2)
1.3.2	$\sqrt{4+21}$ $=\sqrt{25}$ $=5$	✓ simplifying ✓ simplifying ✓ answer	(3)
1.3.3	$\frac{2}{5}+2\times\frac{7}{6}$ $=\frac{2}{5}+\frac{7}{3}$ $=\frac{6+35}{15}$ $=\frac{41}{15}$	✓ operation switch ✓ simplifying ✓ LCD ✓ answer	(4)

1.4	[2(2x+5)+2]–x	✓ (2x+5) ✓ multiplying by 2 and adding 2 ✓ subtracting x ✓ answer	(4) **[24]**

QUESTION 2 [37]

2.1.1	6 expressions	✓ answer	(1)
2.1.2	$2+x-\frac{5x^2}{7}-3x^3-8x^4+9x^5$	✓ answer	(1)
2.1.3	2	✓ answer	(1)
2.1.4	$-\frac{5}{7}$	✓ answer	(1)
2.2.1	$-15p^7q^{10}$	✓✓ answer	(2)
2.2.2	$40k^7-4k^3$	✓✓ answer	(2)
2.2.3	x^3y^3	✓✓ answer	(2)
2.2.4	$15x^5y^5$	✓✓ answer	(2)
2.2.5	$6x-6x^2+3x$ $=-6x^2+9x$	✓✓ $-6x^2+3x$ ✓ answer	(3)
2.3.1	$1-3m^2n^3$	✓✓ answer	(2)
2.3.2	$-2x(-27x^6)$ $=54x^7$	✓ ✓ answer	(2)
2.3.3	$\frac{-8x^{11}}{x^5}$ $=-8x^6$	✓ simplify ✓ answer	(2)
2.4	$5rb+5r^2a-10br^2c$	✓✓✓ answer	(3)
2.5	$-3x^2+4x$	✓✓✓ answer	(3)
2.6.1	$18x=9$ $\therefore x=\frac{1}{2}$	✓ simplify ✓ answer	(2)

2.6.2	$x = 42$	✓ answer	(1)
2.6.3	$-4x + 2 = 3x + 12 + 4$ $\therefore -4x - 3x = 12 + 4 - 2$ $\therefore -7x = 14$ $\therefore x = -2$	✓ simplifying brackets ✓ simplifying ✓ answer	(3)
2.6.4	$4x - 8 - 1 + x = 6x - 6 + x + 3$ $\therefore 4x + x - 6x - x = -6 + 3 + 8 + 1$ $\therefore -2x = 6$ $\therefore x = -3$	✓✓ simplifying brackets ✓ simplifying ✓ answer	(4) **[37]**

QUESTION 3 [46]

3.1.1	$x = 70^\circ$...vertcally opposite	✓✓ answer	(2)
3.1.2	$x = 130^\circ$...$\angle$'s around a point $= 360^\circ$	✓✓ answer	(2)
3.1.3	$x = 60^\circ$...corresponding $\angle$'s	✓✓ answer	(2)
3.1.4	$12x = 180^\circ$...co - interior $\angle$'s $x = 15^\circ$	✓ reason ✓ answer	(2)
3.1.5	$x = \frac{180^\circ - 54^\circ}{2}$...isosceles$\Delta$ $x = 63^\circ$ $y = 54^\circ + 63^\circ$...two opp. int. $\angle$'s = ext. $\angle$ $y = 117^\circ$	✓✓ reason ✓ answer ✓ reason ✓ answer	(5)
3.2	$m = 88^\circ$...Alt $\angle$'s PQ$\|$TR $k = 71^\circ$...Corr. $\angle$'s	✓✓ answer ✓✓ answer	(4)
3.3	$y + 100^\circ = 2y + y$...two opp. int.$\angle$'s = ext. $\angle$ $\therefore 2y = 100^\circ$ $\therefore y = 50^\circ$	✓✓ reason ✓ answer	(3)
3.4.1	$\angle C_1 + 56^\circ = 120^\circ$...opp $\angle$'s of a parm are = $\therefore \angle C_1 = 120^\circ - 56^\circ$ $\therefore \angle C_1 = 64^\circ$	✓ reason ✓ answer	(2)
3.4.2	$\angle E_1 = 56^\circ$...Alt. $\angle$'s	✓✓ answer	(2)

3.4.3	$\angle E_2 = 90^\circ - 56^\circ ...\text{Right } \angle \Delta$ $\therefore \angle E_2 = 34^\circ$	✓ reason ✓ answer	(2)
3.4.4	$\angle EDC = 180^\circ - 90^\circ - 64^\circ ...\text{int} \angle' s \text{ of a } \Delta = 180^\circ$ $\therefore \angle EDC = 26^\circ$	✓ reason ✓ answer	(2)
3.4.5	$x + 4\text{cm} = 10cm ...\text{opp. sides are} =$ $\therefore x = 6cm$	✓ reason ✓ answer	(2)
3.5.1	$AC^2 = AB^2 + BC^2 ...pythagoras$ $\therefore AC^2 = 5^2 + 12^2$ $\therefore AC^2 = 25 + 144$ $\therefore AC^2 = 169$ $\therefore AC = 13cm$	✓ formula ✓ simplifying ✓ answer	(3)
3.5.2	AC+BC+AB=30cm	✓✓ answer	(2)
3.6.1	$BD^2 = AB^2 + AD^2 ...pythagoras$ $\therefore BD^2 = 8^2 + 6^2$ $\therefore BD^2 = 64 + 36$ $\therefore BD^2 = 100$ $\therefore BD = 10cm$	✓ formula ✓✓ simplifying ✓ answer	(4)
3.6.2	$A = \pi(\frac{d}{2})^2$ $\therefore A = \pi(5)^2$ $\therefore A = 25\pi$	✓ formula ✓✓ simplifying ✓ answer	(4)
3.6.3	$C = 2\pi r$ $\therefore C = 2\pi 5$ $\therefore C = 10\pi$	✓ formula ✓ simplifying ✓ answer	(3)

PolyMathic

Paper 10
Oct/Nov
Algebra and Geometry

(Q1 - Q2: Algebra)
(Q3 - Q5: Geometry)

PolyMathic

Grade 8 Mathematics November

Duration: Marks: 100

2 Hours

Instructions:

1. Write your name and grade (e.g. 8E) as well as the name of your SUBJECT TEACHER at the top of your answer script.
2. This paper consists of 8 Pages.
3. This paper consists of **5 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. Determine the:

1.1.1. LCM of 68 and 320 using ***prime factors***. (3)

1.1.2. $\sqrt{729}$ using ***prime factors.*** (2)

1.2 Simplify the following:

1.2.1 $\frac{6}{9} + \frac{3}{18} \times \frac{1}{6}$ (4)

1.2.2 (–4) x (8) x (–3) (1)

1.2.3 $(-4)^3 \div [8 \times (-8)]$ (2)

1.3 Calculate the following:

1.3.1 $\sqrt{0{,}0144}$ (2)

1.3.2 $\sqrt{23+\sqrt[3]{8}}+\sqrt{169}$ (3)

1.3.3 Increase R600 by 25% (2)

1.4 There are 36 students in a class. The ratio of boys to girls is 2:4.
How many boys are in the class? (2)

[21]

QUESTION 2

2.1 Given the algebraic expression below:

$$x+\ 4x^2+\frac{x^3}{2}-x^4-8x^5-1$$

Use the expression to answer the following questions:

2.1.1 How many terms are in the expression? (1)

2.1.2 Rewrite the expression in descending powers of x. (1)

2.1.3 Write down the constant term. (1)

2.1.4 Write down the coefficient of x^4. (1)

2.2 Simplify the following:

2.2.1 $n^2+7n-3m+6m^2+6m-2n$ (2)

2.2.2 $m^5\times m^2\times m\times m^7$ (1)

2.2.3 $4a(2a-3)-3(2a^2+a)$ (3)

2.2.4 $\frac{3ab^2+6a^2b^3}{3ab^2}$ (3)

2.3 Subtract $3m+2n-11+3mn$ **from** $-4+3n+2m-8mn$. (3)

2.4 Solve for x:

2.4.1 $\frac{x}{2}+5=25$ (2)

2.4.2 $3+6x=-2x+27$ (2)

2.4.3 $2x(x-2)-x(2x+5)=36$ (4)

2.5 When twice a certain number (x) is subtracted from 13, the answer is 3. Create an equation and solve for x. (3)

[27]

QUESTION 3

3.1 Write down the name of each of the following:

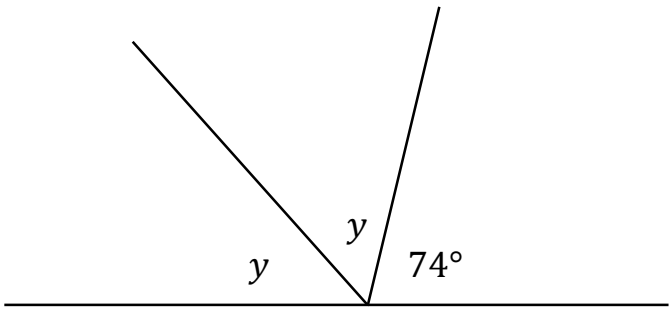
3.1.1 A quadrilateral with four 90^o angles (1)

3.1.2 A triangle with equal sides (1)

3.1.3 A quadrilateral with **only** two opposite sides parallel (1)

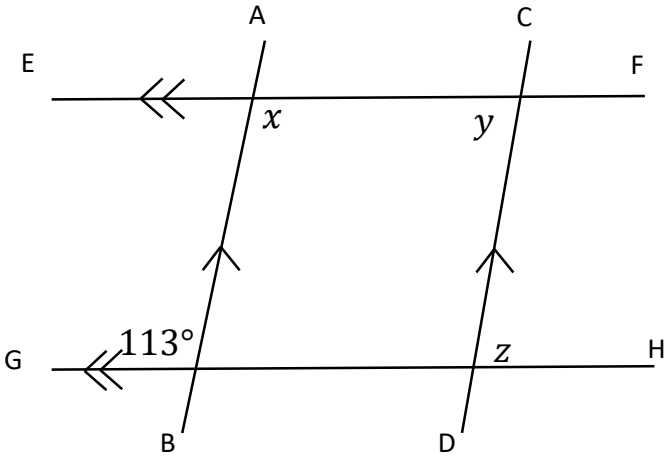
3.2 Determine, with reasons the value of the unknown letters in the each of the following figures below:

3.2.1



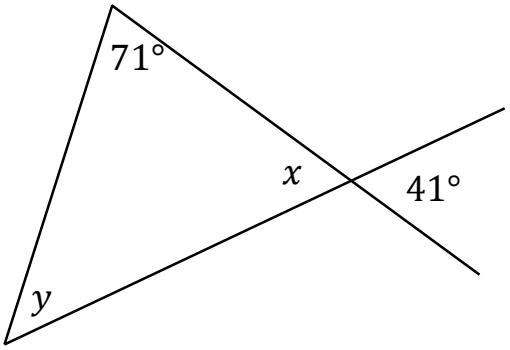
(3)

3.2.2



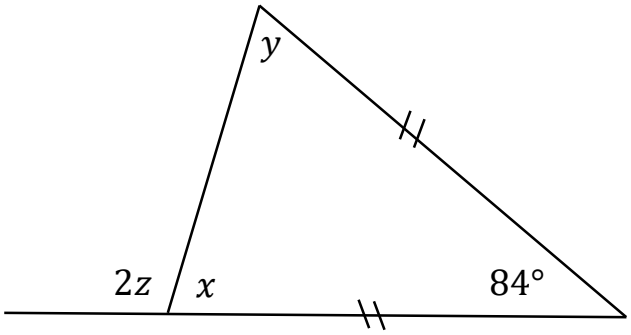
(7)

3.2.3



(5)

3.2.3

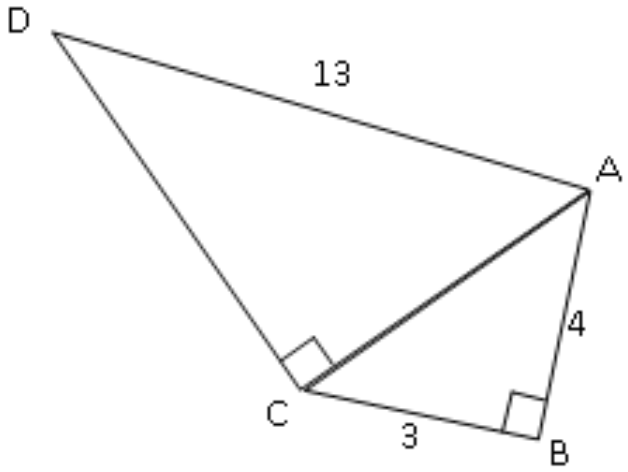


(6)

[24]

QUESTION 4

4.1 Given the information in the sketch below:



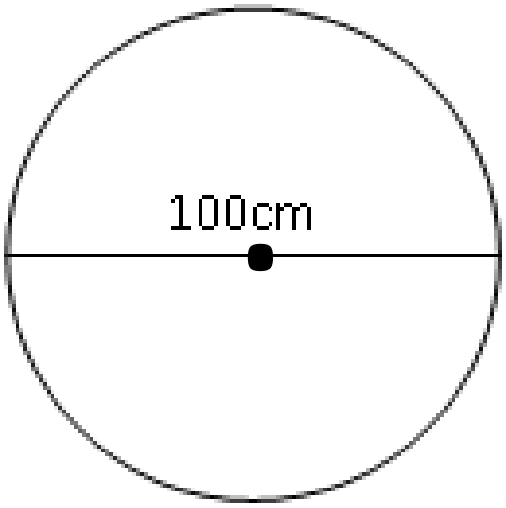
Determine the:

4.1.1 length of AC. (2)

4.1.2 length of CD (1)

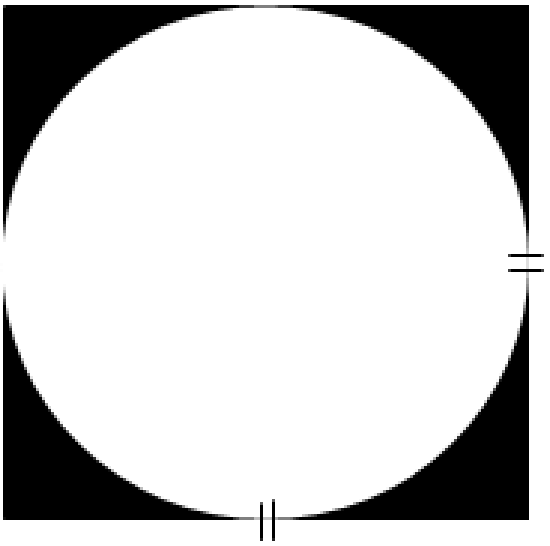
4.1.2 perimeter of ΔABCD. (2)

4.2 Determine the circumference of the circle with diameter 100cm:



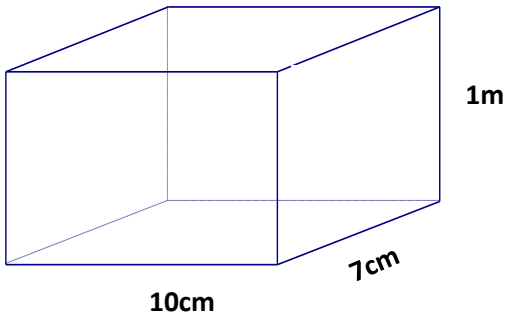
(3)

4.3 Calculate the area of the shaded region in the given figure:



(3)

4.4 Calculate the Volume of a rectangular prism with length 10cm, breathe 7cm and height 1m.



(3)

[14]

QUESTION 5

5.1 Mrs Sampson keeps a record of the number of pies that she sells each day. The data for 7 days is shown below:

7, 20, 25, 5, 10, 3, 7

Determine:

5.1.1 the mean (2)

5.1.2 the median (1)

5.1.3 the mode (1)

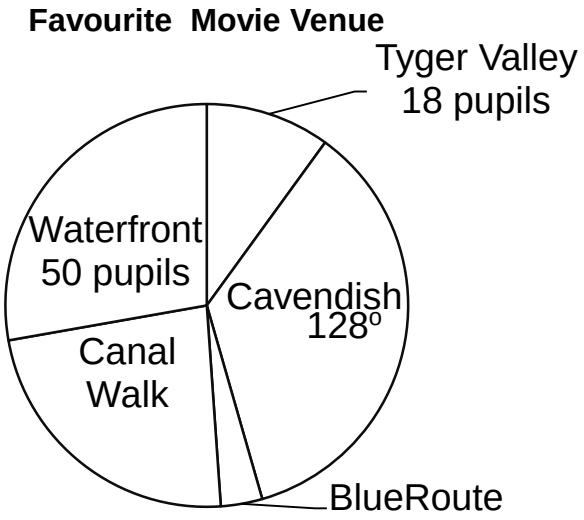
5.1.4 the range (2)

5.2 On a farm there are 6 cows, 3 bulls and 11 calves. All the cattle are gathered to be weighed. What is the probability of randomly choosing that the first one weighed is:

5.2.1 A cow? (1)

5.2.2 A bull? (1)

5.3 The pie chart below indicates the favourite movie venue amongst 180 Grade 8 pupils from the Middle School.



5.3.1 How many pupils chose Cavendish Square? (2)

5.3.2 How many pupils chose Blue Route and Canal Walk together? (2)

5.3.3 Determine the size of the sector (in degrees) for Tyger Valley. (2)

[14]

Memo

QUESTION 1 [21]

1.1.2	68: 2 x 2 x 17 320: 2 x 2 x 2 x 2 x 2 x 2 x 5 LCM:5440	✓ prime factors 68 ✓ prime factors 320 ✓ answer	(3)
1.1.3	$\sqrt{729}$ $=\sqrt{3^6}$ $=3^3$ $=27$	✓ Prime factors ✓ answer	(2)
1.2.1	$\frac{6}{9}+\frac{3}{18}\times\frac{1}{6}$ $=\frac{6}{9}+\frac{1}{36}$ $=\frac{25}{36}$	✓✓ simplifying ✓ LCD ✓ answer	(4)
1.2.2	96	✓✓ answer	(1)
1.2.3	$(-4)^3\div[8\times(-8)]$ $=-64\div(-64)$ $=1$	✓ simplifying ✓ answer	(2)
1.3.1	$\sqrt{\frac{144}{10000}}$ $=\frac{12}{100}$ $=\frac{6}{50}$	✓ simplifying ✓ answer	(2)
1.3.2	$\sqrt{23+\sqrt[3]{8}}+\sqrt{169}$ $=\sqrt{23+2}+13$ $=5+13$ $=18$	✓✓ simplifying ✓ answer	(3)
1.3.3	$\frac{25}{100}\times 600=R150$ $150+600=R750$	✓ R150 ✓ R750	(2)

1.4	$\frac{2}{6}\times 36 = 12$ boys	✓ fraction ✓ answer	(2) **[21]**

QUESTION 2 [27]

2.1.1	6 expressions	✓ answer	(1)
2.1.2	$-8x^5 - x^4 + \frac{x^3}{2} + 4x^2 + x - 1$	✓ answer	(1)
2.1.3	–1	✓ answer	(1)
2.1.4	–1	✓ answer	(1)
2.2.1	$n^2 + 7n - 3m + 6m^2 + 6m - 2n$ $= n^2 + 5n + 3m + 6m^2$	✓✓answer	(2)
2.2.2	$m^5 \times m^2 \times m \times m^7$ $= m^{15}$	✓ answer	(1)
2.2.3	$4a(2a-3) - 3(2a^2 + a)$ $= 8a^2 - 12a - 6a^2 - 3a$ $= 2a^2 - 15a$	✓✓ expanding ✓ answer	(2)
2.2.4	$\frac{3ab^2 + 6a^2b^3}{3ab^2}$ $= 1 + 2ab$	✓✓✓ answer	(3)
2.3	$-m + n - 11mn + 7$	✓✓✓ answer	(3)
2.4.1	$\frac{x}{2} + 5 = 25$ $\frac{x}{2} = 20$ $x = 40$	✓ simplifying ✓ answer	(2)
2.4.2	$3 + 6x = -2x + 27$ $8x = 24$ $x = 3$	✓ simplifying ✓ answer	(2)

2.4.3	$2x(x-2)-x(2x+5)=36$ $2x^2-4x-2x^2-5x=36$ $-9x=36$ $x=-4$	✓✓ expanding ✓ simplifying ✓ answer	(4)
2.5	$13-2x=3$ $2x=10$ $x=5$	✓ formula ✓ simplifying ✓ answer	(3) **[27]**

QUESTION 3 [24]

3.1.1	square or rectangle	✓ answer	(1)
3.1.2	equilateral triangle	✓ answer	(1)
3.1.3	trapezium	✓ answer	(1)
3.2.1	$2y+74^o=180^o$ adjacent supplementary $\therefore \quad y=53^o$	✓S ✓R ✓ answer	(3)
3.2.2	$x=113°$ Alt $\angle$s AE||BG $y=180°-113°$ Co-int $\angle$s AB||DC $y=67°$ $z=67°$ Alt $\angle$s CF||DH	✓S ✓R ✓S ✓R ✓ answer ✓S ✓R	(7)
3.2.3	$x=41°$ vertically opp. $y=180°-41°$ int $\angle$s of a $\Delta=180°$ $y=68°$	✓S ✓R ✓S ✓R ✓ answer	(5)
3.2.4	x and $y=\frac{180°-84°}{2}$ int $\angle$s of a isos $\Delta=180°$ x and $y=48°$ $2z=180°-48°$ adjacent supp $\angle$s $z=66°$	✓S ✓R ✓ answer ✓S ✓R ✓ answer	(6) **[24]**

QUESTION 4 [14]

4.1.1	$AC^2 = AB^2 - BC^2$ $AC^2 = 4^2 + 3^2$ $AC^2 = 16 + 9$ $AC^2 = 25$ $AC = 5units$	✓ formula ✓ answer	(2)
4.1.2	$CD^2 = AD^2 - AC^2$ $CD^2 = 13^2 - 5^2$ $CD^2 = 169 - 25$ $CD^2 = 144$ $CD = 12units$	 ✓ answer	(1)
4.1.3	13+4+3+12= 32units	✓✓ answer	(2)
4.2	$C = 2\pi r$ $C = 2\pi(50)$ $C = 100\pi cm$	✓ formula ✓ subst ✓ answer	(3)
4.3	$A = (s \times s) - \pi r^2$ $A = 14^2 - \pi(7)^2$ $A = 196 - 49\pi cm^2$	✓ formula ✓ subst ✓ answer	(3)
4.4	$1m = 100cm$ $V = l \times b \times h$ $V = 10 \times 7 \times 100$ $V = 7000cm^3$	✓ converting m to cm ✓ formula ✓ answer	(3) **[14]**

QUESTION 5 [14]

5.1.1	$\frac{77}{7}=11$	✓ fraction ✓ answer	(2)
5.1.2	Median = 7	✓ answer	(1)
5.1.3	Mode = 7	✓ answer	(1)
5.1.4	Range = 25 – 3 =22	✓✓ answer	(2)
5.2.1	$\frac{6}{20}=\frac{3}{10}$	✓ answer	(1)
5.2.2	$\frac{3}{20}$	✓ answer	(1)
5.3.1	$\frac{128}{360}\times 180=64\,pupils$	✓ fraction ✓ answer	(2)
5.3.2	$180-(50+18+64)=48\,pupils$	✓ formula ✓ answer	(2)
5.3.3	$\frac{18}{180}\times 360°=36°$	✓ formula ✓ answer	(2) **[14]**