GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL EXAMINATION

NOVEMBER 2023

GRADE 9

MATHEMATICS

PAPER 2

TIME: 1½ hours

MARKS: 75

15 pages

NAME OF LEARNER: _____

GRADE/CLASS: _____

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

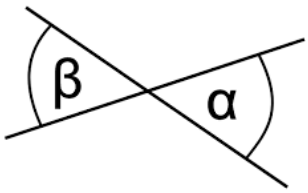
1. This question paper consists of 6 questions.
2. Answer ALL the questions on the question paper.
3. A non-programmable calculator may be used unless otherwise stated.
4. Clearly show all calculations, diagrams, and graphs that you have used in determining your answers. Answers only will not necessarily be awarded full marks.
5. If necessary, round-off your answers to 2 decimal places, unless otherwise stated.
6. Diagrams are not necessarily drawn to scale.
7. Answer QUESTION 1 by circling the letter next to the correct answer.
8. Answer QUESTIONS 2 to 6 in SECTION B in the spaces provided.
9. Write neatly and legibly.

SECTION A

QUESTION 1

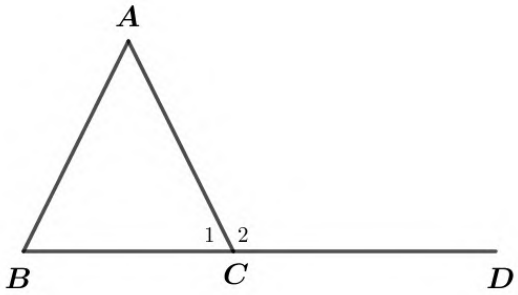
Answer the following questions by choosing the correct answer. Circle the letter next to the correct answer.

1.1 Angles β and α are created by two intersecting straight lines. What are these angles called?



A Supplementary angles
B Complementary angles
C Vertically opposite angles
D Adjacent supplementary angles (1)

1.2 BCD is a straight line. Study the diagram below and decide which of the statements given below is TRUE.

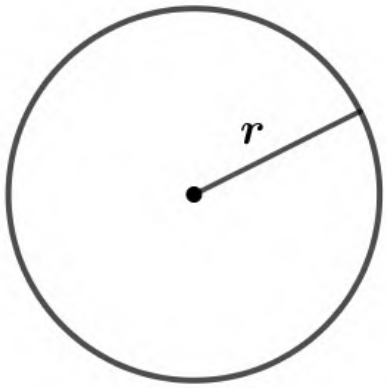


A $\hat{C}_2 = \hat{A} + \hat{C}_1$
B $\hat{C}_2 = \hat{A} - \hat{C}_1$
C $\hat{C}_2 = \hat{A} + \hat{B}$
D $\hat{C}_2 = \hat{A} - \hat{B}$ (1)

1.3 Describe the transformation $(x; y) \rightarrow (-x; y)$.

A The x-coordinate shifted or translated left.
B Reflection about the y-axis.
C Reflection about the x-axis.
D The x-coordinate shifted or translated right. (1)

1.4 Identify the correct formula for the area of the shape.



A πr^2
B $2\pi r$
C $l \times b$
D $\frac{1}{2} bh$

(1)

1.5 A bucket contains 3,5 ℓ of water. Determine the volume of the water in cm^3.

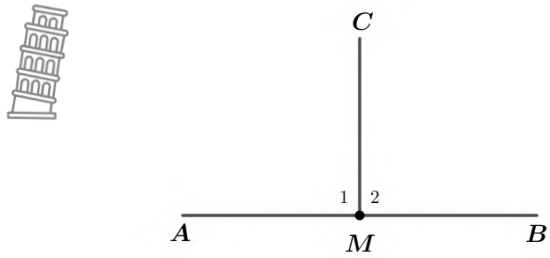
A 0,0035 cm^3
B 3,5 cm^3
C 35 cm^3
D 3 500 cm^3

(1)
[5]

SECTION B

QUESTION 2

2.1 Straight lines AB and CM intersect at M such that $\hat{M}_1 = \hat{M}_2$.



2.1.1 What is the size of $\hat{M}_1$?

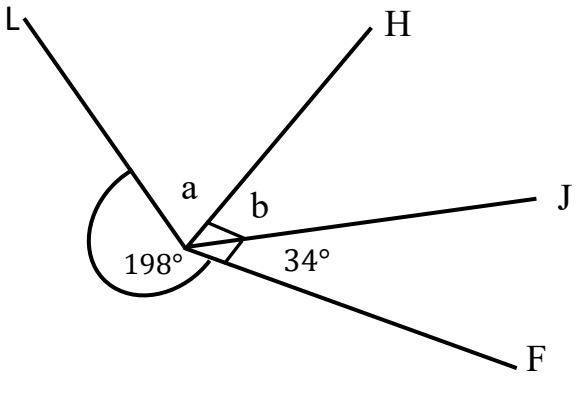
$\hat{M}_1 =$ _____ ° (1)

2.1.2 Consider your response in QUESTION 2.1.1 and complete the following statement.

Line AB is _____ to line CM. (1)

2.2 Study the diagram in QUESTION 2.2.1 below and complete the statements and/or reasons in the table provided.

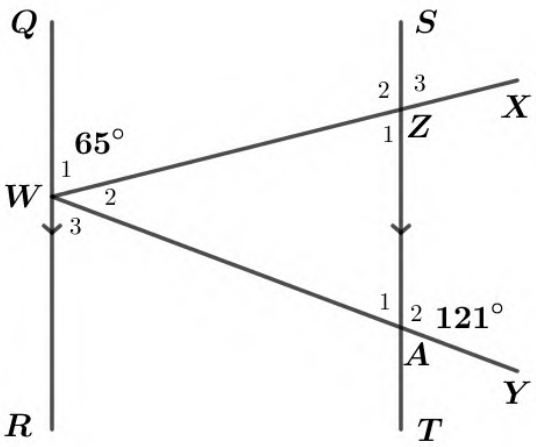
2.2.1 Determine the values of a and b.



STATEMENT	REASON
$a + 90° + 198° =$ _____	_____
$\therefore a =$ _____°	
$b =$ _____°	Complementary $\angle s$

(3)

2.2.2 Given: QWR ∥ SZAT, WX and WY intersect ST at Z and A respectively; $\hat{W}_1 = 65°$ and $\hat{A}_2 = 121°$. Complete the statements and/or reasons in the table below to calculate the sizes of $\hat{A}_1$, $\hat{W}_3$, $\hat{Z}_2$ and $\hat{Z}_3$.



STATEMENT	REASON
$\hat{A}_1 + \hat{A}_2 =$ _____ $\hat{A}_2 = 121°$ $\therefore \hat{A}_1 =$ _____	_____ Given
$\hat{W}_3 =$ _____ $\hat{W}_1 + \hat{Z}_2 =$ _____	$alt\ \angle s; QR \parallel ST$ _____
$\hat{W}_1 = 65°$ $\therefore \hat{Z}_2 =$ _____	Given
$\hat{Z}_3 =$ _____	_____

(6)

2.3 Complete the following statements.

2.3.1 If GU ∥ LE and QR ∥ LE, then GU and QR are _____. (1)

2.3.2 If ST ⊥ UV and JK ⊥ UV, then ST and JK are _____. (1)

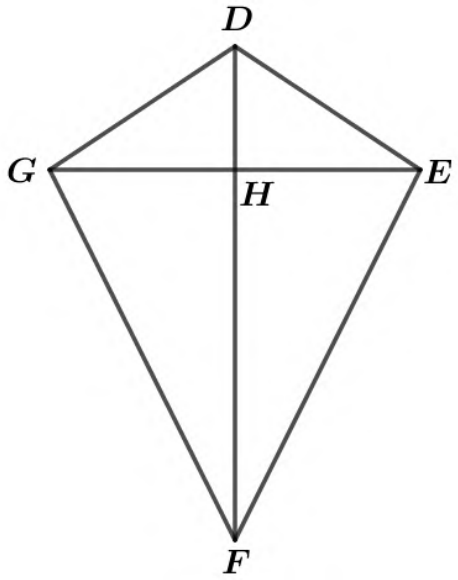
[13]

QUESTION 3

3.1 Complete:

The exterior angle of a triangle is equal to the _____ of the interior _____ angles. (2)

3.2 DEFG below is a kite. Diagonals DF and GE intersect at H. Mark all the known properties of a kite related to sides and diagonals on the diagram below. Use appropriate geometric symbols.



(2)

3.3 In ΔEFG, $\hat{E} : \hat{F} : \hat{G} = 4 : 3 : 4$. Determine the size of $\hat{F}$ to the nearest degree.

STATEMENT	REASON

(3)

3.4 In the diagram below TV ∥ SW and TV = SW.

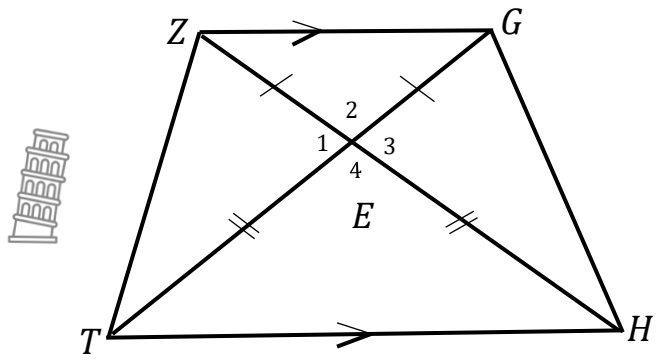
3.4.1 What type of quadrilateral is TVWS? Give a reason for your answer.

(2)

3.4.2 What type of quadrilateral is TVWX? Give a reason for your answer.

(2)

3.5 In the following diagram ZGHT is a quadrilateral as such that, ZG ∥ TH, ZE = GE and ET = EH. Diagonals ZH and GT intersect at E.



3.5.1 Prove that TZ = HG.

STATEMENT	REASON

(5)

3.5.2 Using the diagram in QUESTION 3.5 above, it is further given that ΔZGE ||| ΔTHE such that ZE = GE = 4 cm, ET = HE = 6 cm and ZG = 6 cm. Use this information to complete the statement or the reason in the table below and hence calculate the length of HT, if HT = x.

STATEMENT	REASON
$\frac{HE}{ZE} = \frac{HT}{ZG}$	_____
$\frac{6}{\quad} = \frac{\quad}{6}$	

(4)

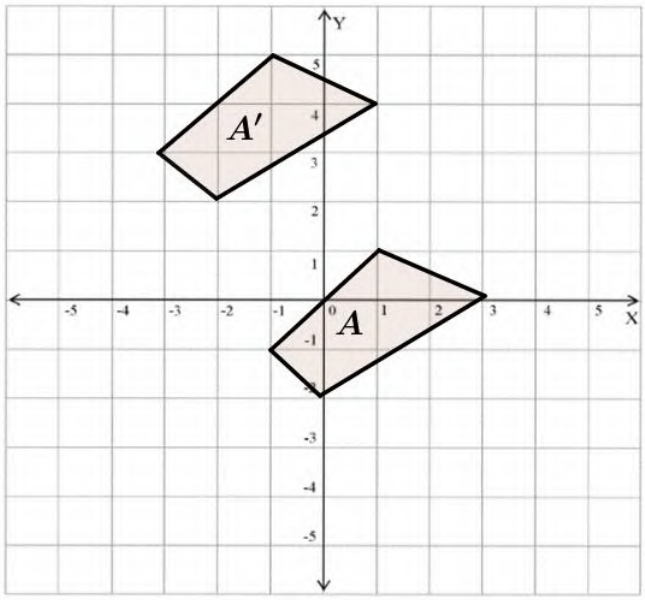
[20]

QUESTION 4

4.1 Match the transformation in COLUMN A with its description in COLUMN B. Write only the letter of the correct answer in the ANSWER column.

COLUMN A		COLUMN B		ANSWER
Number	**Transformation**	**Letter**	**Description**	
4.1.1	Reflection	A	Slide	4.1.1 _____ (1)
		B	Turn	
4.1.2	Translation	C	Rotate	4.1.2 _____ (1)
		D	Flip	

4.2 Shape A on the Cartesian plane below has undergone a transformation into A'.



Name the transformation that took place and describe in detail how A was transformed into A'.

_____

_____

_____

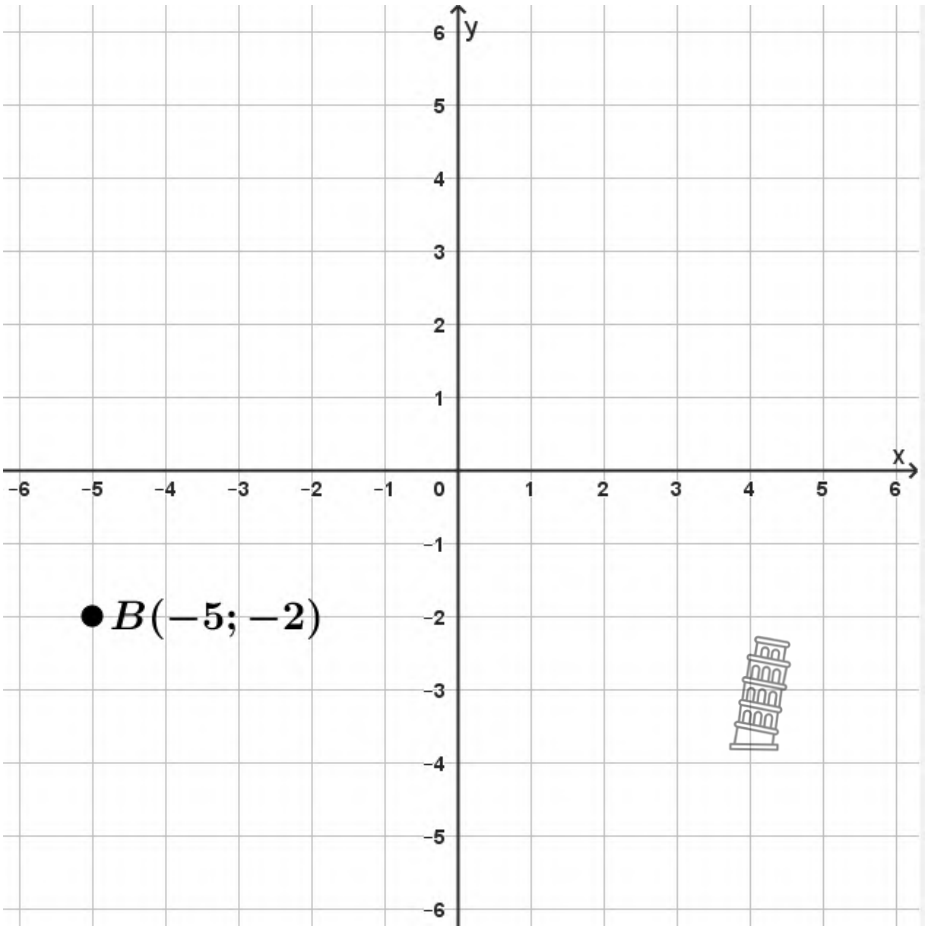
_____ (3)

4.3 The table below shows the coordinates of the vertices for a shape BEFORE and AFTER reflection. Determine the coordinates of the original or reflected shape if it is reflected about the x-axis $(y = 0)$ by completing the table below.

ORIGINAL SHAPE VERTEX	REFLECTED SHAPE VERTEX
Q(5; 4)	Q'(____; ____)
R(____; ____)	R'(–2; –1)
S(____; ____)	S'(5; 0)
T(7; 2)	T'(____; ____)

(4)

4.4 On the same set of axes, reflect point B(–5; –2) in the line $y = x$. Plot image B' on the set of axes below and write down its coordinates.

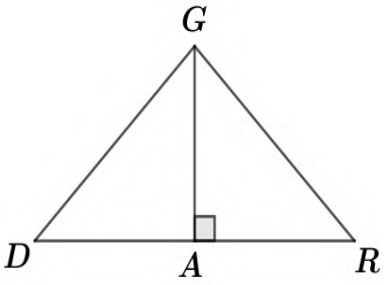


(2)

[11]

QUESTION 5

5.1 In ΔGRD, DA = AR, height GA = 8 cm and base DR = 12 cm.



5.1.1 Calculate the area (A) of ΔGRD. Given: $A = \frac{1}{2} \times b \times h$.

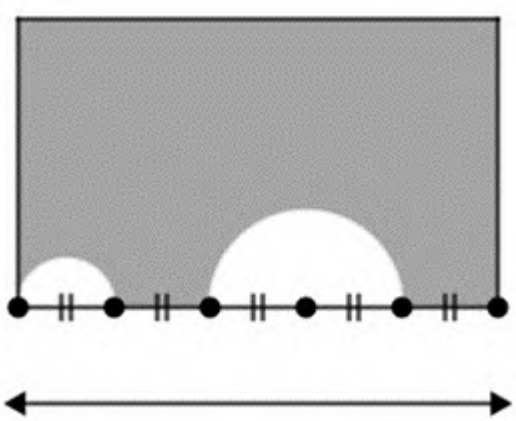
(2)

5.1.2 Calculate the perimeter of ΔGRA.

(5)

5.2 The length of one side of the rectangle is 125 mm and that length was divided into 5 equal parts as shown in the picture below. The breadth of the rectangle is $\frac{3}{5}$ of its length. Calculate the perimeter of the shaded part correct to two decimal places.

Hint: The unshaded parts are semicircles. Use $\pi = 3{,}14$.



(6)
[13]

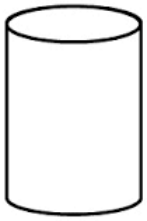
QUESTION 6

6.1 Name the objects shown below.

6.1.1

_____ (1)

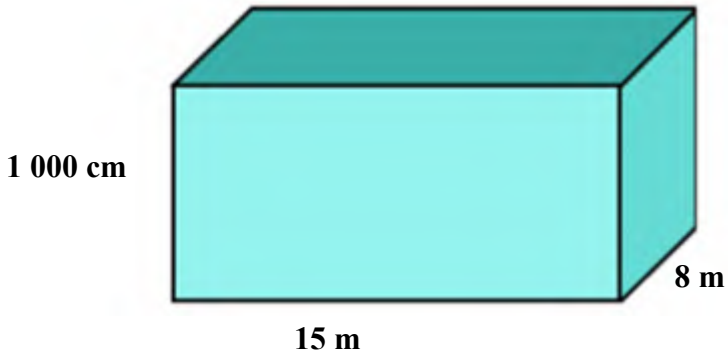
6.1.2



_____ (1)

6.2 Given: A rectangular prism below with the following dimensions:

height = 1 000 cm; length = 15 m and breadth = 8 m.



Calculate the total surface area of the prism in m^2.

_____

_____

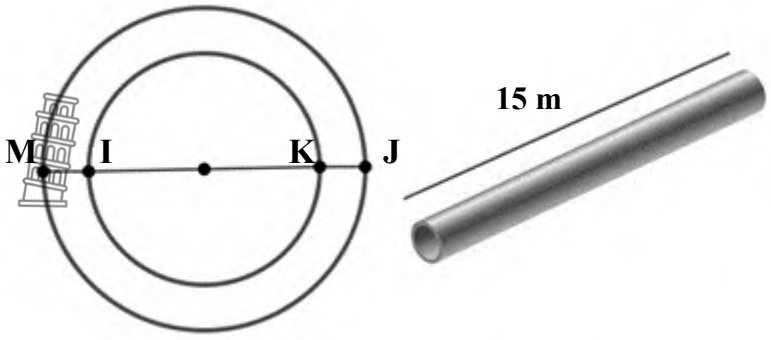
_____

_____

_____

_____ (5)

6.3 Calculate the volume of the material used to produce a 15 m pipe if the internal diameter IK is 0,2 m (IK = 0,2 m), and external diameter MJ is 0,35 m (MJ = 0,35 m).
Use π = 3,14.



(6)
[13]

TOTAL: 75

GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL EXAMINATION

PROVINSIALE EKSAMEN

NOVEMBER 2023

GRADE/*GRAAD* 9

MARKING GUIDELINES/

NASIENRIGLYNE

MATHEMATICS/*WISKUNDE*

PAPER/*VRAESTEL 2*

7 pages/*bladsye*

SECTION/*AFDELING* A

QUESTION/*VRAAG* 1

1.1	1.2	1.3	1.4	1.5
C ✓**A**	C ✓**A**	B ✓**A**	A ✓**A**	D ✓**A**

[5]

SECTION/*AFDELING* B

QUESTION/*VRAAG* 2

2.1	2.1.1	$\widehat{M}_1 = 90°$ ✓**A**	1 mark for correct answer *1 punt vir korrekte antwoord*	(1)
	2.1.2	Perpendicular/*Loodreg* ✓**CA**	1 mark for correct answer *1 punt vir korrekte antwoord*	(1)
2.2	2.2.1	**STATEMENT/ *BEWERING*** / **REASON/*REDE*** $a + 90° + 198° = 360°$ / ∠*s* around a pt/∠*e om 'n punt* ✓**SR** $\therefore a = 72°$ ✓**CA** $b = 56°$ ✓**A** / Complementary ∠*s*/ *Komplementêre ∠e*	1 mark for the S and R/ *1 punt vir die S en R* 1 mark for $a = 72°$ *1 punt vir* $a = 72°$ 1 mark for $b = 56°$ *1 punt vir* $b = 56°$	(3)
	2.2.2	**STATEMENT/ *BEWERING*** / **REASON/*REDE*** $\hat{A}_1 + \hat{A}_2 = 180°$ / ∠*s on a str line /∠e op reguit lyn* ✓**SR** $\hat{A}_2 = 121°$ $\therefore \hat{A}_1 = 59°$ ✓**A** / Given/*Gegee* $\widehat{W}_3 = 59°$ ✓**A** / *alt ∠s; QR ∥ ST* / verw. *∠e; QR ∥ ST* $\widehat{W}_1 + \hat{Z}_2 = 180°$ / Co-int ∠*s*/ *ko-binne ∠e; QR ∥ ST* ✓ **SR** $\widehat{W}_1 = 65°$ $\therefore \hat{Z}_2 = 115°$ ✓**CA** / Given/*Gegee* $\hat{Z}_3 = 65°$ / Corresp ∠*s*/*ooreenk. ∠e; QR ∥ ST* ✓**SR**	1 mark for the S and R *1 punt vir die B en R* 1 mark for $\hat{A}_1 = 59°$ *1 punt vir* $\hat{A}_1 = 59°$ 1 mark for $\widehat{W}_3 = 59°$ *1 punt vir* $\widehat{W}_3 = 59°$ 1 mark for the S and R *1 punt vir die B en R* 1 mark for $\hat{Z}_2 = 115°$ *1 punt vir* $\hat{Z}_2 = 115°$ 1 mark for the S and R *1 punt vir die S en R*	(6)
2.3	2.3.1	Parallel/*Ewewydig* ✓**A**	1 mark for correct answer/*1 punt vir korrekte antwoord*	(1)

	2.3.2	Parallel/*Ewewydig* ✓**A**	1 mark for correct answer *1 punt vir korrekte antwoord*	(1)
				[13]

QUESTION/*VRAAG* 3

3.1	sum; opposite/ *som; teenoorstaande* ✓✓**A**	1 mark for sum/*1 punt vir som* 1 mark for opposite/*1 punt vir teenoorstaande*	(2)
3.2	$GD = DE$ and/*en* $GF = FE$ ✓**A** $G\hat{H}D = 90°$ or/*of* $DF \perp GE$ ✓**A** **OR/*OF*** $GH = HE$ ✓**A**	1 mark for showing both pairs of adjacent sides equal/*1 punt vir beide pare aangrensende sye gelyk* 1 mark showing diagonals intersect at 90° *1 punt vir hoeklyne loodreg (90°)* **or/*of*** 1 mark showing long diagonal bisects short diagonal/*1 punt vir die wys van lang hoeklyn halveer kort hoeklyn* (any 2 of the above/*enige 2 van bogenoemde)*	(2)
3.3		1 mark for the Statement and Reason *1 punt vir die Bewering & Rede* 1 mark for $\frac{3}{11}$/*1 punt vir* $\frac{3}{11}$ 1 mark for correct answer rounded-off correctly/ *1 punt vir regte antwoord en regte afronding*	(3)

STATEMENT/ *BEWERING*	**REASON/*REDE***
$\hat{E} + \hat{F} + \hat{G} = 180°$	*sum of ∠s in a Δ* *som ∠s in 'n Δ* ✓**SR**
But/*Maar* $\hat{E} : \hat{F} : \hat{G} = 4 : 3 : 4$	Given/*Gegee*
$4 + 3 + 4 = 11$	
$\therefore \hat{F} = \frac{3}{11} \times 180°$ ✓**M**	
$\hat{F} = 49°$ ✓**CA**	

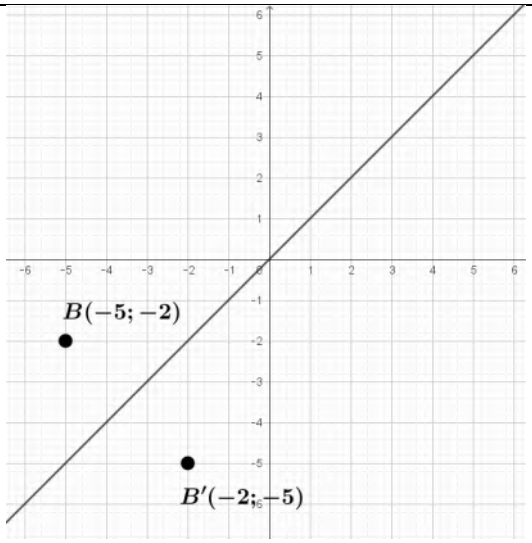
<table>
<tr><td>3.4</td><td>3.4.1</td><td>Parallelogram; ✓
One pair of opposite sides equal and parallel.
Een paar teenoorst. sye en parallel ✓A</td><td>1 mark for parallelogram
1 punt vir parallelogram
1 mark for correct reason
1 punt vir korrekte rede</td><td>(2)</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>3.4.2</td><td>Trapezium; ✓
One pair of opposite sides parallel
Een paar teenoorst. sye parallel ✓✓A</td><td>1 mark for trapezium
1 punt vir trapesium
1 mark for correct reason
1 punt vir korrekte rede</td><td>(2)</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>3.5</td><td>3.5.1</td><td>
<table>
<tr><th>STATEMENT/
BEWERING</th><th>REASON/REDE</th></tr>
<tr><td>In ΔZET and/en
ΔGEH
$Z\hat{E}T = G\hat{E}H$</td><td>$vert.opp.\angle s$
Vert. teenoorstaande $\angle e$ ✓SR</td></tr>
<tr><td>$\boldsymbol{ZE = GE}$,</td><td>Given/gegee ✓SR</td></tr>
<tr><td>$\boldsymbol{TE = HE}$</td><td>Given/gegee ✓SR</td></tr>
<tr><td>$\therefore \Delta ZET$
$\equiv \Delta GEH$</td><td>SAS/$s\angle s$ ✓SR</td></tr>
<tr><td>$\therefore TZ = HG$</td><td>Corr. sides of $\equiv \Delta s$
Ooreenk sye $\equiv \Delta e$ ✓SR</td></tr>
</table>
</td><td>1 mark for $Z\hat{E}T = G\hat{E}H$ and reason
1 punt vir $Z\hat{E}T = G\hat{E}H$ en rede
1 mark for $ZE = GE$ and reason
1 punt vir $ZE = GE$ en rede
1 mark for $TE = HE$ and reason
1 punt vir $TE = HE$ en rede
1 mark for $\Delta ZET \equiv \Delta GEH$
1 punt vir $\Delta ZET \equiv \Delta GEH$
1 mark for conclusion and correct reason
1 punt vir gevolgtrekking en korrekte rede</td><td>(5)</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>3.5.2</td><td>
<table>
<tr><th>STATEMENT/
BEWERING</th><th>REASON/REDE</th></tr>
<tr><td>$\frac{HE}{ZE} = \frac{HT}{ZG}$</td><td>Proportional sides of |||Δs.
Verwante sye van |||Δe ✓R</td></tr>
<tr><td>$\frac{6}{4} = \frac{x}{6}$ ✓A</td><td></td></tr>
<tr><td>$4x = 36$ ✓CA</td><td></td></tr>
<tr><td>$x = 9$ cm ✓CA</td><td></td></tr>
</table>
</td><td>1 mark for correct reason
1 punt vir korrekte rede
1 mark for correct substitution
1 punt vir korrekte vervanging
1 mark for simplification
1 punt vir vereenvoudiging
1 mark for correct answer
1 punt vir korrekte antwoord</td><td>(4)</td></tr>
<tr><td></td><td></td><td></td><td></td><td>[20]</td></tr>
</table>

QUESTION/*VRAAG* 4

<table>
<tr><td>4.1</td><td>4.1.1</td><td>D – Flip ✓A</td><td>1 mark for answer
1 punt vir antwoord</td><td>(1)</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>4.1.2</td><td>A – Slide/Gly ✓A</td><td>1 mark for answer
1 punt vir antwoord</td><td>(1)</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>4.2</td><td colspan="2">Translation/Translasie ✓A
All the vertices in shape A slid/moved/translated four units upward and 2 units to the left
Al die hoekpunte van vorm A skuif/gly 4 eenhede op en 2 eenhede na links ✓✓CA
Or/of
$(x-2;\ y+4)$. ✓✓CA</td><td>1 mark for translation
1 punt vir translasie
1 mark for 4 units upward or $y+4$
1 punt vir 4 eenhede op of $y+4$
1 mark for 2 units left or $x-2$
1 punt vir 2 eenhede na links of $x-2$</td><td>(3)</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>4.3</td><td colspan="2"><table><tr><th>ORIGINAL SHAPE VERTEX
OORSPRONKLIKE VORM HOEKPUNT</th><th>REFLECTED SHAPE VERTEX
GEREFLEKTEERDE VORM HOEKPUNT</th></tr><tr><td>$Q(5;4)$</td><td>$Q'(5;-4)$ ✓A</td></tr><tr><td>$R(-2;1)$ ✓A</td><td>$R'(-2;-1)$</td></tr><tr><td>$S(5;0)$ ✓A</td><td>$S'(5;0)$</td></tr><tr><td>$T(7;2)$</td><td>$T'(7;-2)$ ✓A</td></tr></table></td><td>1 mark for $Q'(5;-4)$
1 punt vir $Q'(5;-4)$

1 mark for $R(-2;1)$
1 punt vir $R(-2;1)$

1 mark for $S(5;0)$
1 punt vir $S(5;0)$

1 mark for T$'(7;-2)$
1 punt vir $T'(7;-2)$</td><td>(4)</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>4.4</td><td colspan="2"> 

$B'(-2,-5)$ ✓✓A</td><td>1 mark for correct plotting on the graph
1 punt vir korrekte aanstipping op grafiek
1 mark for correct labelling and coordinates
1 punt vir korrekte benoeming en koördinate</td><td>(2)</td></tr>
<tr><td></td><td></td><td></td><td></td><td>[11]</td></tr>
</table>

QUESTION/*VRAAG* 5

5.1	5.1.1	$A = \frac{1}{2}bh$ $A = \frac{1}{2} \times 12\ cm \times 8\ cm$ ✓**M** $A = 48\ cm^2$ ✓**CA**	1 mark for correct substitution. *1 punt vir korrekte vervanging* 1 mark for correct answer and unit *1 punt vir korrekte antwoord en eenheid*	(2)
	5.1.2	DA = AR (given/*gegee*) DR = 12 cm (given/*gegee*) DR = DA + AR ∴ AR = 6 cm ✓**A** $GR^2 = (6\ cm)^2 + (8\ cm)^2$ (Pythagoras) ✓**M (SR)** $GR^2 = 100\ cm^2$ GR = 10 cm ✓**CA** Perimeter = 6 cm + 8 cm + 10 cm Omtrek = 6 cm + 8 cm + 10 cm ✓**CA** Perimeter = 24 cm Omtrek = 24 cm ✓**CA**	1 mark for 6 cm *1 punt vir 6 cm* 1 mark for substitution into Pythagoras theorem *1 punt vir vervanging in Pythagoras se stelling* 1 mark for length of GR *1 punt vir lengte GR* 1 mark for adding all sides *1 punt vir som van alle sye* 1 mark for correct answer *1 punt vir korrekte antwoord*	(5)
5.2	125 ÷ 5 = 25 mm ✓**A** Breadth/*Breedte* = $\frac{3}{5} \times 125$ = 75 mm ✓**M** Circumference (small semicircle) = (3,14)(12,5) = 39,25 mm *Omtrek (klein halfsirkel)* = (3,14)(12,5) = 39,25 mm ✓**A** Circumference (big semicircle) = (3,14)(25) = 78,5 mm *Omtrek (groot halfsirkel)* = (3,14)(25) = 78,5 mm ✓**A** P(shaded part)/*Omtrek(geskakeerde deel)* = 125 + 2(75) + 25 + 39,25 + 78,5 + 25 ✓**M** = 442,75 mm ✓**CA**	1 mark for 25 *mm* *1 punt vir 25 mm* 1 mark for 75 *mm* *1 punt vir 75 mm* 1 mark for 39,25 *mm* *1 punt vir 39,25 mm* 1 mark for 78,5 *mm* *1 punt vir 78,5 mm* 1 mark for addition *1 punt vir som* 1 mark for answer *1 punt vir antwoord*	(6)
				[13]

QUESTION/*VRAAG* 6

6.1	6.1.1	Triangular prism/ *Driehoekige prisma* ✓**A**	1 mark for answer *1 punt vir antwoord*	(1)
	6.1.2	Cylinder *Sillinder* ✓	l mark for answer *1 punt vir antwoord*	(1)
6.2		1 000 $cm = 10\ m$ ✓**A** $TSA = 2(10)(15) + 2(10)(8) + 2(8)(15)$ $= 300\ m^2 + 160\ m^2 + 240\ m^2$ ✓✓✓**M** $= 700\ m^2$ ✓**CA**	1 mark for 10 m *1 punt vir 10 m* 1 mark for 300 m^2 *1 punt vir 300 m²* 1 mark for 160 m^2 *1 punt vir 160 m²* 1 mark for 240 m^2 *1 punt vir 240 m²* 1 mark for answer *1 punt vir antwoord*	(5)
6.3		$Volume = (\pi {r_1}^2 - \pi {r_2}^2) \times H$ ✓✓ $= [(3{,}14(0{,}175)^2) - (3{,}14(0{,}1)^2)] \times 15$ ✓✓ $= [0{,}0961625 - 0{,}0314] \times 15$ $= 0{,}0647625 \times 15$ ✓ $= 0{,}9714375$ $= 0{,}97\ m^3$ ✓	1 mark for area of base × height *1 punt vir oppv. basis × hoogte* 1 mark for subtracting area of small circle from area of big circle *1 punt vir die aftrek van die area van die klein sirkel van die area van die groot sirkel.* 1 mark for 0,175 *1 punt vir 1,175* 1 mark for 0,1 *1 punt vir 0,1* 1 mark for 0,0647625 *1 punt vir 0,0647625* 1 mark for correct answer rounded-off correctly with correct unit *1 punt vir korrekte antwoord, korrek afgerond met korrekte eenheid.*	(6)
				[13]
			TOTAL/*TOTAAL*:	**75**