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education

Department of
Education
FREE STATE PROVINCE

GRADE 9

MATHEMATICS PAPER 2

NOVEMBER 2022

TIME: 1 HOUR 30 MINUTES

TOTAL: 60

This question paper consists of 14 pages.

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INSTRUCTIONS AND INFORMATION

Read the instructions carefully.

1. Answer ALL the questions.
2. Write neatly and legible.
3. Number your answers exactly as questions are numbered.
4. Give reasons for each statement in QUESTION 1 to QUESTION 3.
5. Show ALL working.
6. You may use an approved scientific calculator (non-programmable and non-graphical).
7. Diagrams are NOT necessarily drawn to scale.

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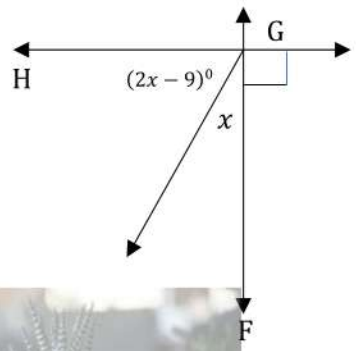
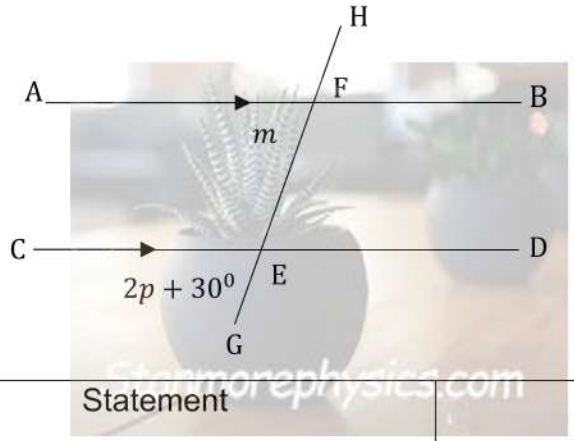
QUESTION 1

1.1 In the diagram FG ⊥ GH. Find the value of x (3)



Statement	Reason

1.2 In the diagram below, AB ∥ CD, $\hat{m} = 110^0$ and $C\hat{E}G = 2p + 30^0$. Calculate the size of p. (3)



Statement	Reason

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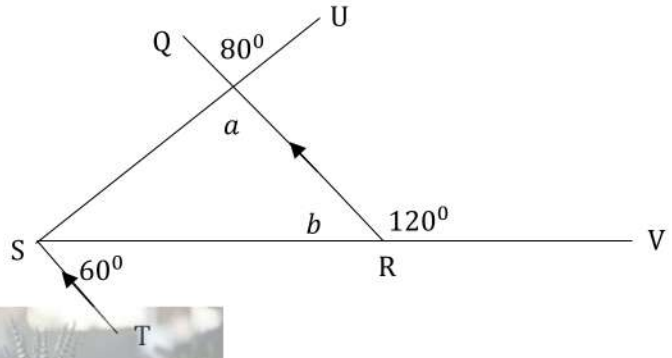
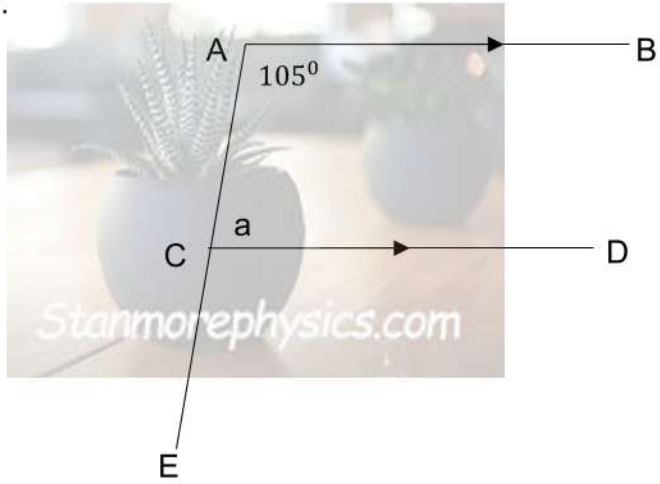
1.3 Determine the value of *a* and *b* in alphabetical order. All reasons must be given **(4)**

1.3.1



Statement	Reason

1.3.2 Determine the value of the variable in the diagrams Give reasons for your. (3)



Statement	Reason

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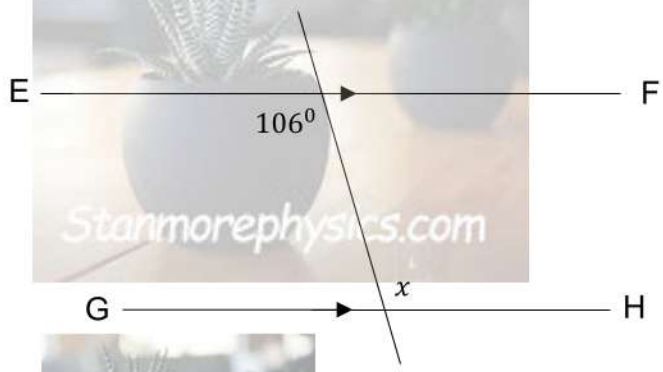
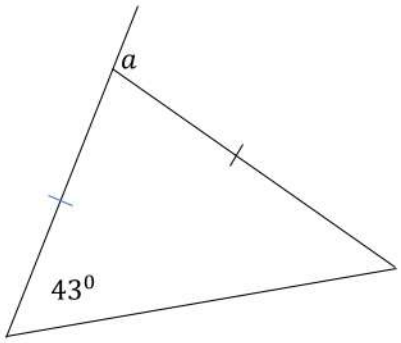
1.3.3 Determine the value of the variable in the diagrams Give reasons for your statements **(2)**



Statement	Reason

1.3.4 Determine the value of the variable in the diagrams Give reasons for your statements (2)



Statement	Reason

[17]

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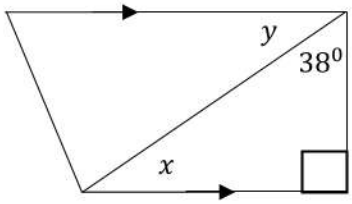
QUESTION 2

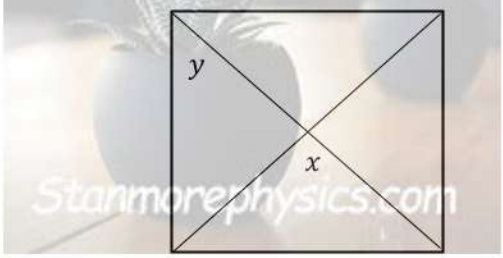
2. Determine the value of x. All reasons must be given (4)

2.1



Statement	Reason

2.2 The quadrilateral below is a square. Determine the value of x and y in alphabetical order. All reasons must be given. (4)



Statement	Reason

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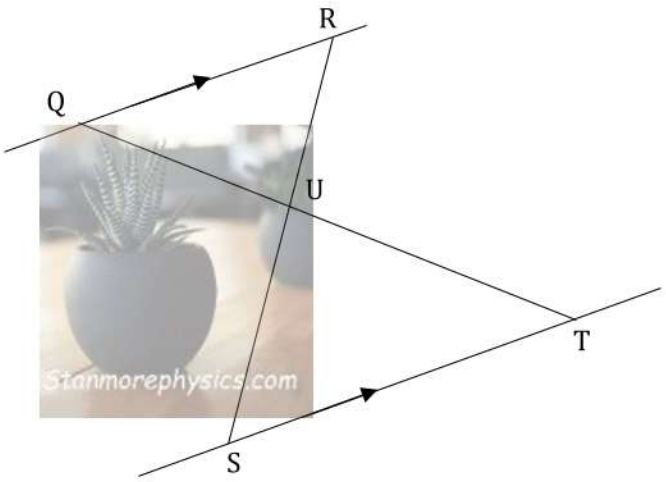
QUESTION 3

3.1 Give one minimum condition for congruent triangles (1)

3.2 Line segment QR is parallel to line segment ST. Complete the following proof that $\Delta QRU \|\| \Delta TSU$ (3)



In ΔQRU and ΔTSU

Statement	Reason
$R\hat{Q}T = Q\hat{T}S$	Alt angle QR ∥ ST
$Q\hat{R}S$ = _____ _____ = $T\hat{U}S$	_____ Vert. opp. angles
$\therefore \Delta QRU \|\|\| \Delta TSU$	Equal angles or AAA

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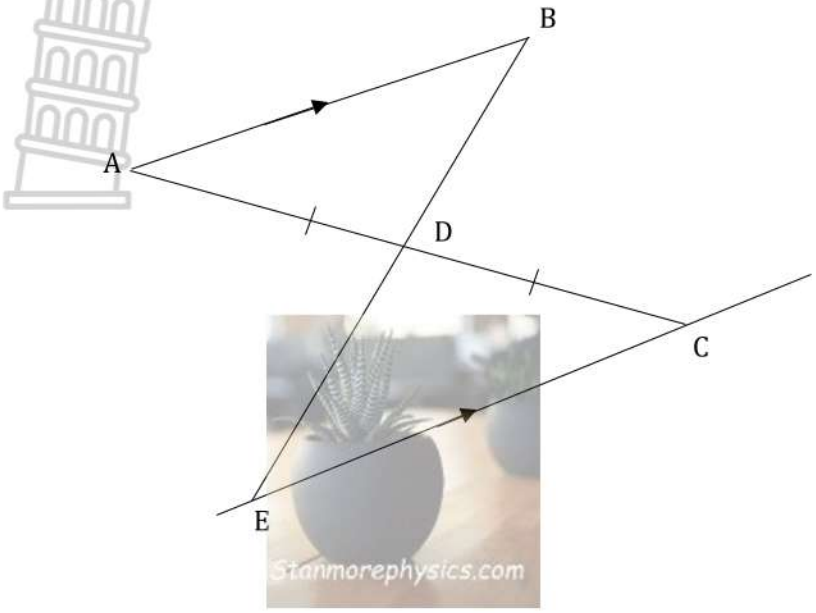
3.3 Proof that : $\Delta ABD \equiv \Delta CED$ (4)



Statement	Reason
In ΔABD and ΔCED	

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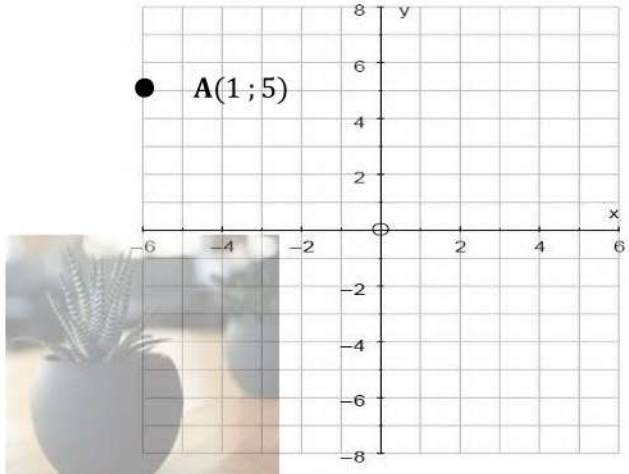
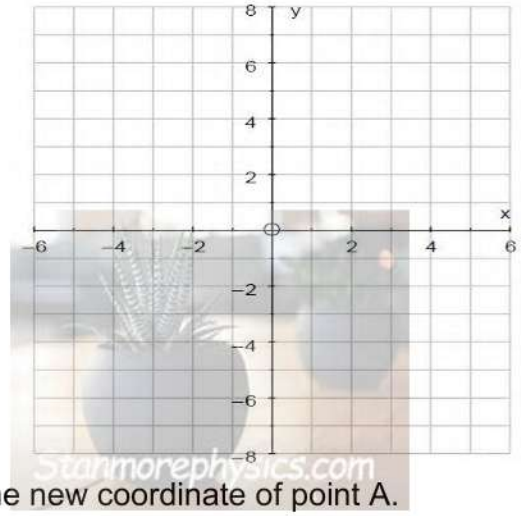
QUESTION 4

4.1 Point A$(1\,;5)$ is plotted on the Cartesian Plane below.



4.1.1 Translate point A, 3 units to the right and then 5 units down. (1)



4.1.2 Write down the new coordinate of point A. (1)

_____

_____

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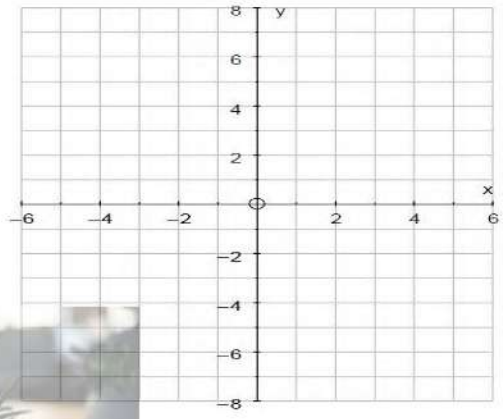
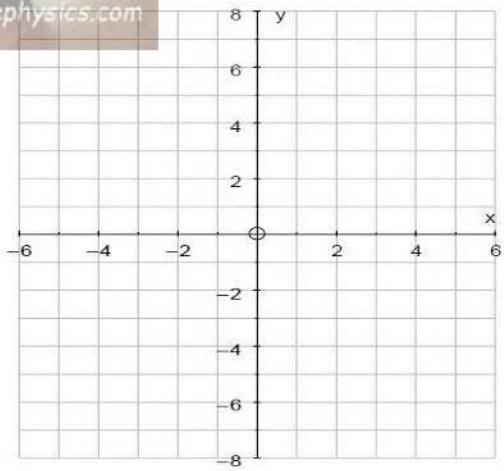
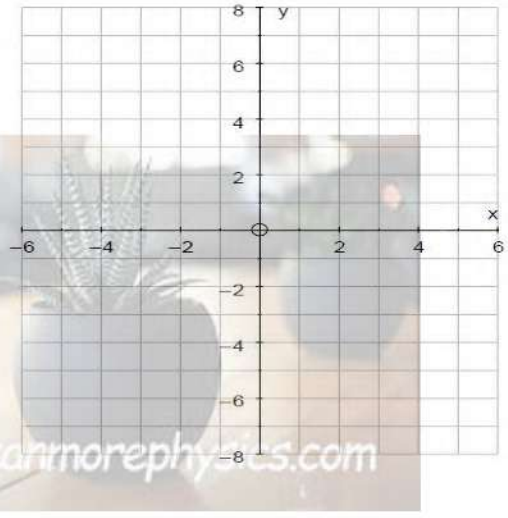
4.2 Draw ΔABC with vertex coordinates of A$(-3\,;5)$, B$(-6\,;3)$ and C$(-2\,;3)$



4.2.1 Draw the image of ΔABC, if is translated using the rule $(x\,;y) \longrightarrow (x+3\,;y-7)$. (1)



4.2.2 Reflex ΔABC about the $y-$ **axis**. (1)



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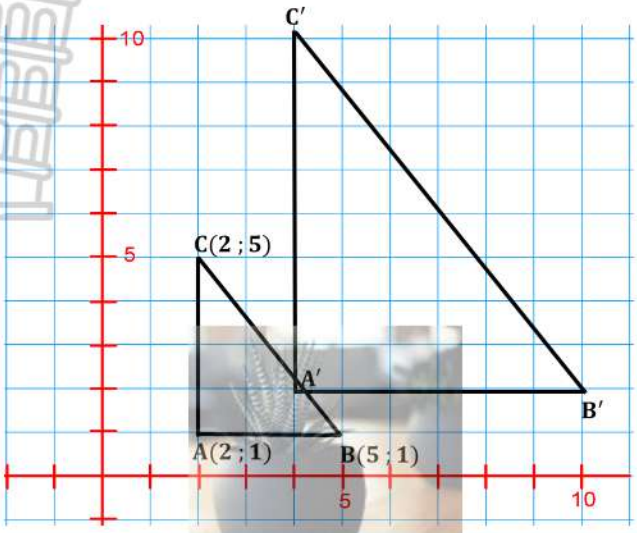
4.3 In the given diagram, ΔABC is enlarged through the origin by a factor of 2 to form its image $\Delta A'B'C'$.



4.3.1 Determine the coordinates of the vertices of $\Delta A'B'C'$ (3)

_____

_____

_____

_____

4.3.2 Determine the lengths of the sides of $\Delta \mathbf{A'B'C'}$. (3)

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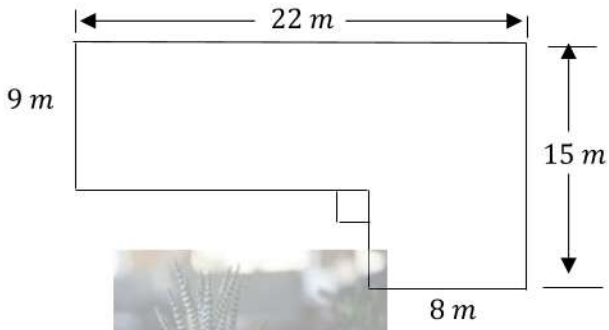
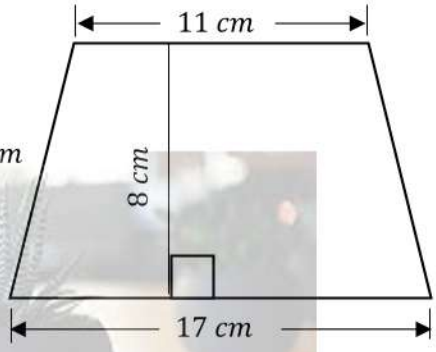
QUESTION 5

5.1 Calculate the perimeter of the diagram. (2)



5.2 The quadrilateral below is a trapezium. Find the area and the perimeter of the diagram below. (2)



Perimieter = _____

Area = _____

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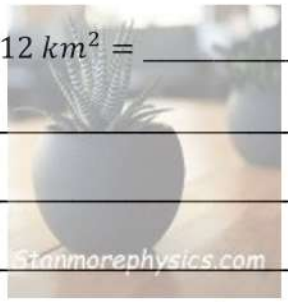
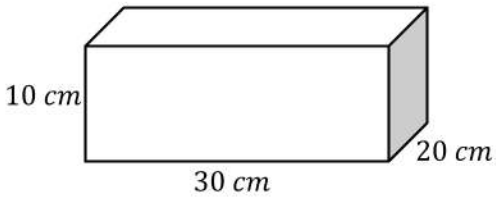
5.3 The perimeter of a rectangle is 46 cm. If the length $= (2x + 5)$ cm and the breadth$= (x + 6)$ cm, calculate the area of the rectangle. (3)

5.4 Calculate: $1{,}12\ km^2 =$ _____ m^2 (1)



5.5 A carton that is the shape of a rectangular prism is $30\ cm$ long, $20\ cm$ wide and $10\ cm$ high. Calculate the surface area of the carton. (3)



5.6 A cylinder has a radius of $7\ cm$ and height of $10\ cm$.
'n Silinder het 'n radius van 7cm en 'n hoogte van 10cm.

5.6.1 Calculate the volume of the cylinder. (if $\pi = 3{,}14$) (2)
Bereken die volume van die silinder (as $\pi = 3{,}14$)

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5.6.2 Find the total surface area of a closed cylinder. (3)

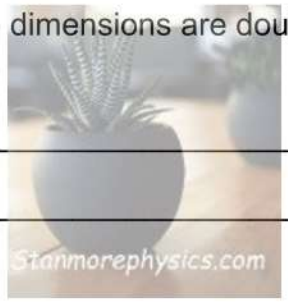
_____

_____

_____

_____

5.6.3 If the dimensions are doubled, what would the total surface area be? (1)



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_____

[16]

TOTAL **[60]**

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GRADE 9
MATHEMATICS PAPER 2 ENGLISH
MARKING GUIDELINE
NOVEMBER 2022

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This mathematics marking guideline consist of 13 pages

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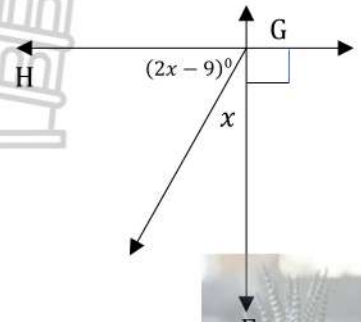
QUESTION 1

1.1

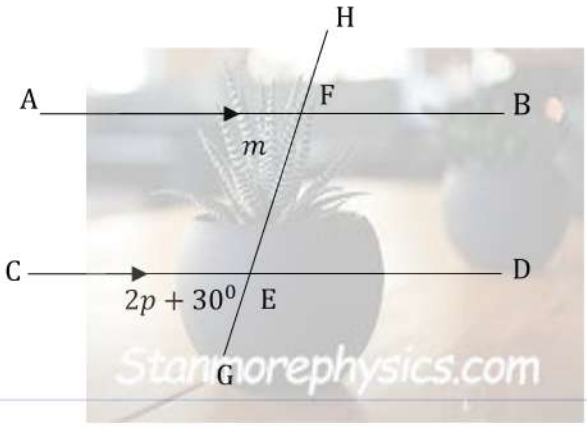


Statement	Reason
$x = \frac{90^0 + 9^0}{3}$	Compl. angles add up to 90^0
$= 33^0$	

Statement: 1 mark
Reason: 1 mark
Answer: 1 mark

(3)

1.2



Statement	Reason
$p = \frac{110^0 - 30^0}{2}$	Corr, angles AB ǁ CD
$= 40^0$	

Statement: 1 mark
Reason: 1 mark
Answer: 1 mark

(3)

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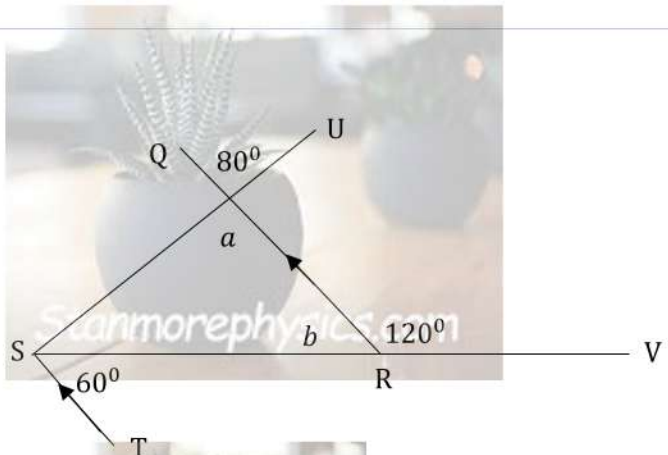
1.3.1

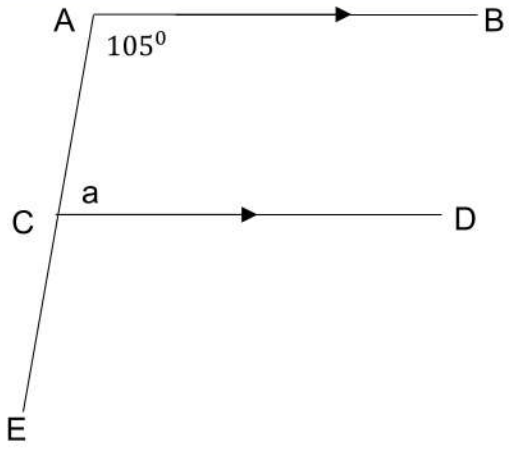


Statement	Reason
$a = 80^0$	Vert. opp angles
$b = 60^0$	Alt. angles, ST∥QR **OR**
$b = 60^0$	Angles on a str. line

Statement: 1 mark
Reason: 1 mark
Statement: 1 mark
Reason: 1 mark

(4)

1.3.2



Statement	Reason
$a = 75^0$	Co-int, angles, AB∥CD

Statement: 1 mark
Reason: 1 mark

(2)

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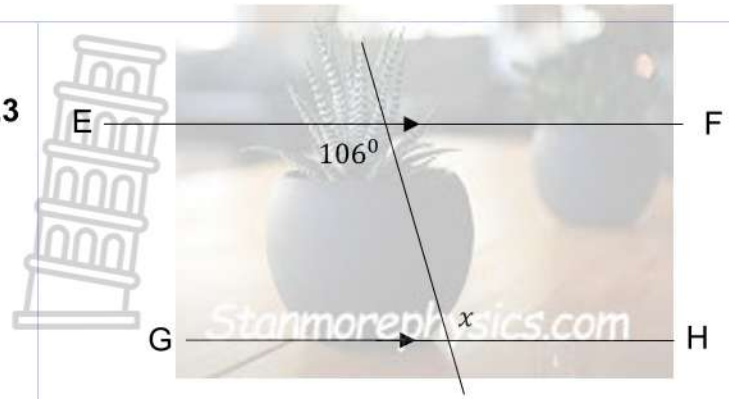
1.3.3

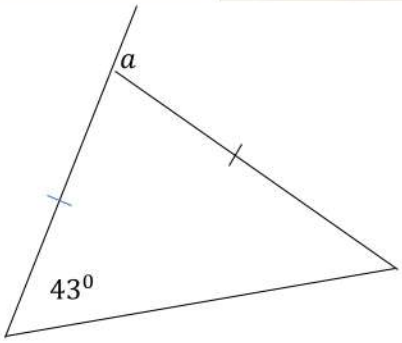


Statement	Reason
$x = 106^0$	alt, angles, EF||GH

Statement: 1 mark
Reason: 1 mark

(2)

1.3.4



Statement	Reason
$a = 2(43^0) = 86^0$	Ext. angle of Δ=twice int. angle of a Δ

Statement: 1 mark
Reason: 1 mark

(2)

[16]

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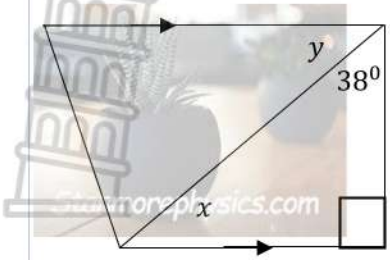
QUESTION 2

2.1

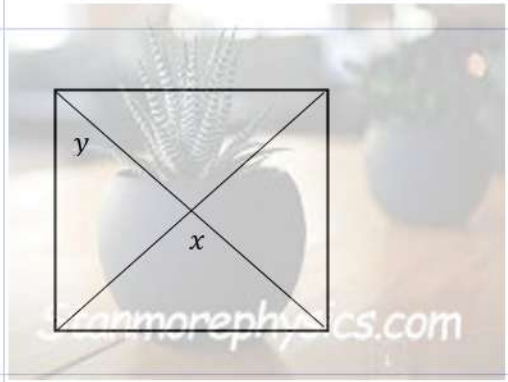


Statement	Reason
$x = 52^0$	Int. angles of a Δ add up 180^0
$y = 52^0$	Alt, angles, ∥ lines

Statement: 1 mark
Reason: 1 mark
Statement: 1 mark
Reason: 1 mark

(4)

2.2



Statement	Reason
$x = 90^0$	Diag. bisect each other ⊥
$y = 45^0$	Diag. bisect the corners

Statement: 1 mark
Reason: 1 mark
Statement: 1 mark
Reason: 1 mark

(4)

[8]

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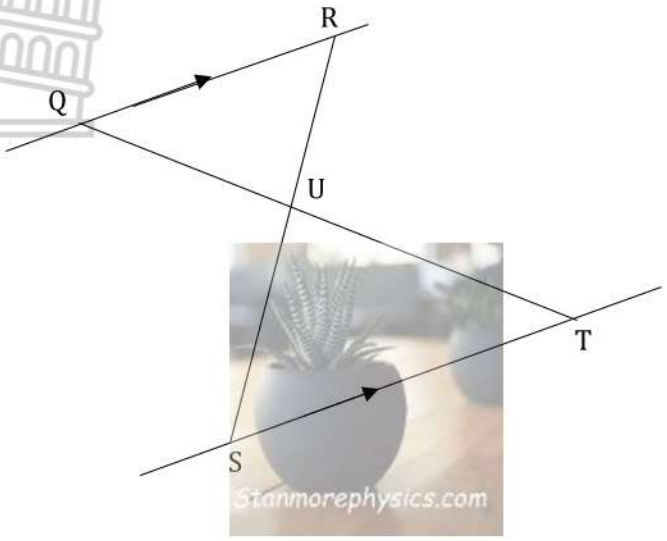
QUESTION 3

3.1 i. SSS or ii. AAS or iii. SAA or iv. RHS — One answer: 1 mark — (1)

3.2



In ΔQRU and ΔTSU

Statement	Reason
$R\hat{Q}T = Q\hat{T}S$	alt angle, QR ∥ ST
$Q\hat{R}S = T\hat{S}R$	alt angle, QR ∥ ST
$Q\hat{U}R = T\hat{U}S$	vert. opp. angles
$\therefore \Delta QRU \|\|\| \Delta TSU$	equal angles or AAA

$T\hat{S}R$: 1 mark

Reason: 1 mark

$Q\hat{U}R$: 1 mark

(3)

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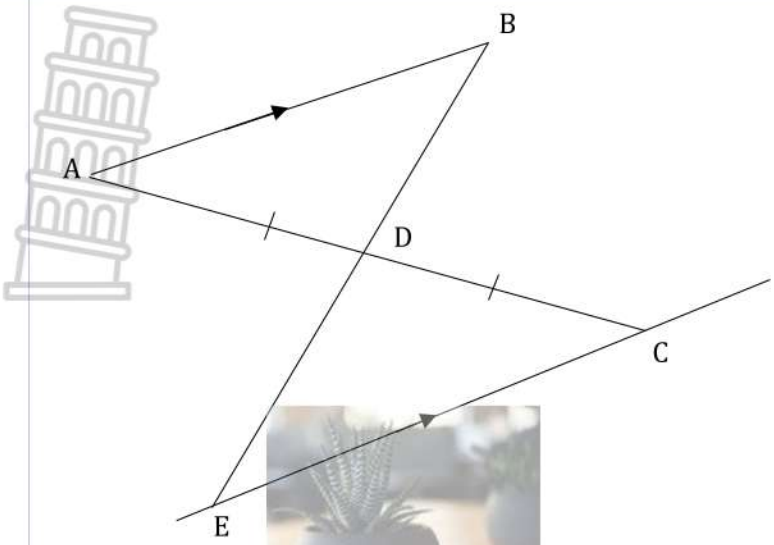
3.3



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Statement	Reason
In ΔABD and ΔCED	
AD = DC	given
$A\hat{D}B = C\hat{D}E$	Vert. opp. angles
$B\hat{A}D = E\hat{C}D$	Alt. angles, AB$\parallel$EC
ΔABD $\equiv$ ΔCED	AAS

Statem & Reason: 1 mark

Statem & Reason: 1 mark

Statem & Reason: 1 mark

AAS: 1 mark

(4)

[8]

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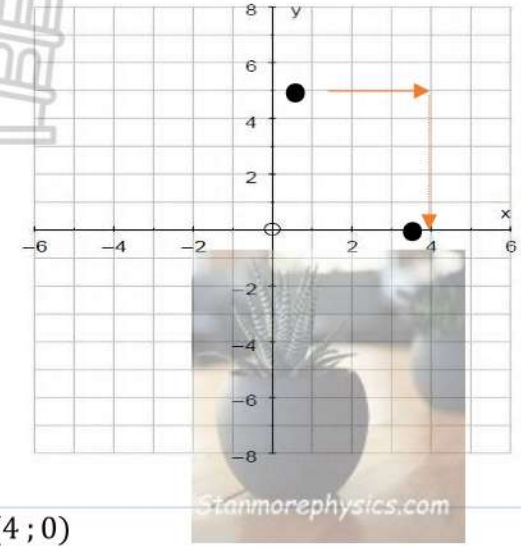
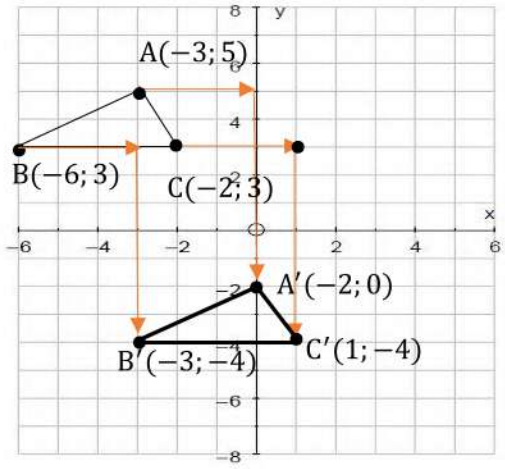
QUESTION 4			
4.1.1		Answer/ translate: 1 mark	(1)
4.1.2	$A(4\,;0)$	Answer: 1 mark	(1)
4.2.1		Answer: 1 mark	(1)

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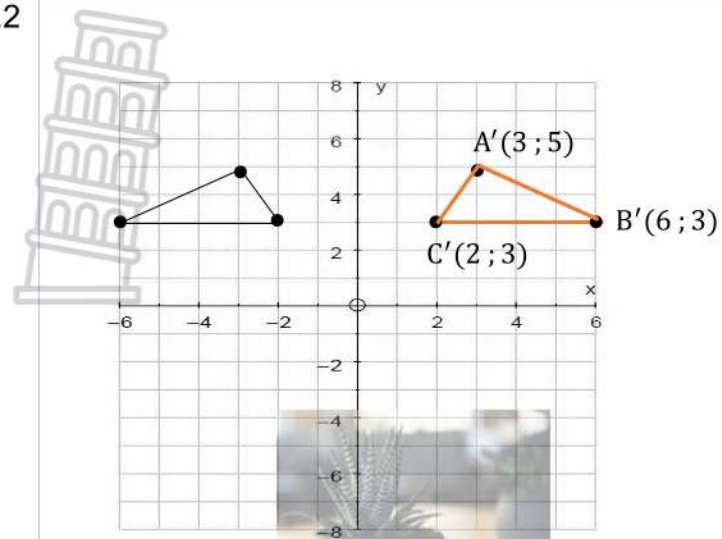
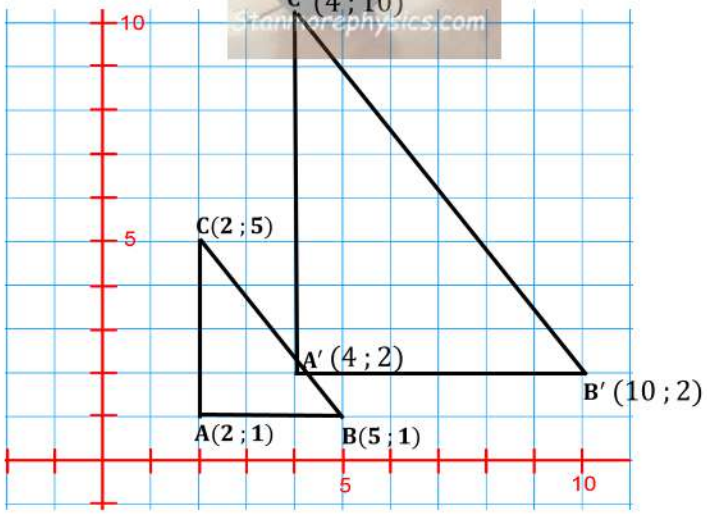
4.2.2			Answer: 1 mark	(1)
4.3	 Determine the coordinates of the vertices of $\Delta A'B'C'$			
	4.3.1	$A'(4\,;2)$ $B'(10\,;2)$ $C'(4\,;10)$	Answer: 3 marks	(3)

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	4.3.2	Determine the lengths of the sides of $\Delta A'B'C'$. $A'B' = 6$ units OR (count the blocks) $A'C' = 8$ units OR (count the blocks) $(B'C')^2 = (6)^2 + (8)^2$ (Pythagoras) $= 36 + 64$ $= 100$ $\sqrt{(B'C')^2} = \sqrt{100}$ $BC = 10$ units	Each side: 1 mark	(3)
				[10]
QUESTION 5				
5.1				
		This is irregular shape $P = 22\ m + 15\ m + 9\ m + 6\ m + 14\ m + 8\ m$ $= 74\ m$	6 m + 14 m: 1 mark Answer: 1 mark	(2)

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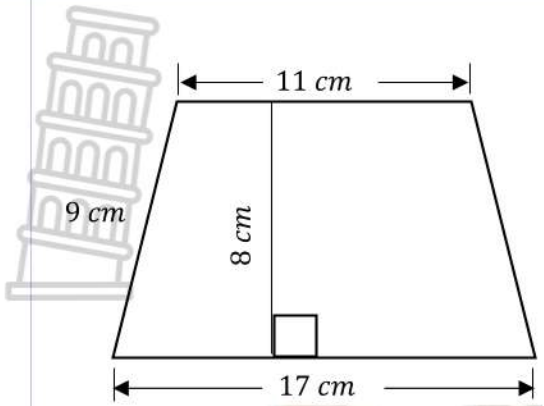
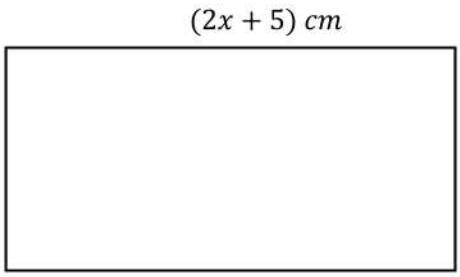
5.2			
	$Area = \frac{1}{2}(a+b) \times H$ Area $= \frac{1}{2}(11\text{ cm} + 17\text{ cm}) \times 8\ cm$ **OR** $\frac{(11\ cm+17\ cm) \times 8\ cm}{2}$ $= 28\ cm \times 4\ cm$ $= 112\ cm^2$ P $= 9\ cm + 17\ cm + 9\ cm + 11\ cm$ $= 46\ cm$	Area (answer): 1 mark Perimeter (answer): 1 mark	(2)
5.3	Not drawn to scale.  P= 46 cm $Area = l \times b$ $= [(2x+5)(x+6)]cm^2$ $= 2x(x+6) + 5(x+6)]cm^2$ $= (2x^2 + 12x + 5x + 30)cm^2$ $= (2x^2 + 17\ cm + 30)cm^2$	Formula: 1 mark Subst: 1 mark Simplify: 1 mark Answer: 1 mark If a learner did not write the formula, give 2 marks for showing distributive law OR simplifying	(3)

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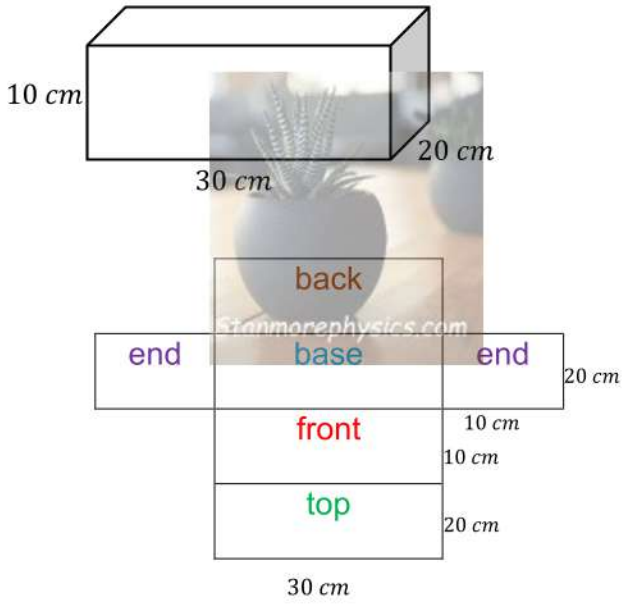
5.4	$1\ km^2 = 1\ 000\ 000\ m^2$ $\therefore\ 1{,}12\ \ square\ kilometre\ (km^2) = \mathbf{1\ 120\ 000\ m^2}$ $= 1{,}12\ \times 1\ 000\ 000\ m^2$ $= 1\ 120\ 000\ m^2$	Answer: 1 mark	(1)
5.5	Not drawn to scale  		
	Area of base $= (30\ \times 20)cm^2$ $= 600\ cm^2$ Area of each end $= (10 \times 20)\ cm^2$ $= 200\ cm^2$ Area of front $= (10\ \times 30)cm^2$ $= 300\ cm^2$ Total surface area $= 2(600\ +\ 200\ +\ 300)cm^2$ $= 2 \times 1\ 100\ cm^2$ $= 2\ 200\ cm^2$ OR $SA\ =\ 2(l\ \times b) + 2(h \times b) + 2(h \times l)$ $= 2(30 \times 20) + 2(10 \times 20) + 2(10 \times 30)$ $= 2(600 + 200 + 300)$ $= 1\ 200 + 400 + 600$ $= 2\ 200\ cm^2$		(3)

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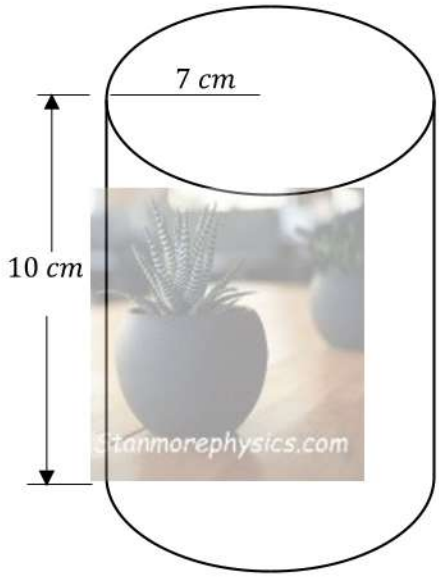
5.6	A cylinder has a radius of 7 cm and height of 10 cm. Not drawn to scale  			
	5.6.1	Volume of cylinder $= \pi r^2 H$ $= \frac{22}{7} \times 7 \times 7 \times 10\ cm$ $= 1\,540\ cm^2$	Formula: 1 mark Answer: 1 mark	(2)
	5.6.2	TSA $= 2\pi rh + 2\pi r^2$ $= (2 \times \frac{22}{7} \times 7 \times 10) + (2 \times \frac{22}{7} \times 7 \times 7)$ $= 440 + 308$ $= 748cm^2$	Formula: 1 mark Subst: 1 mark Answer: 1 mark	(3)
	5.6.3	Doubled	Answer: 1 mark	(1)
				[17]
			TOTAL	**[60]**