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education

Department of
Education
FREE STATE PROVINCE

GRADE 9

MATHEMATICS PAPER 2

MOCK NOVEMBER/DECEMBER TEST 2025

MARKS: 75

TIME: $1\frac{1}{2}$ Hours

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INSTRUCTION AND INFORMATION TO LEARNERS

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Clearly show ALL calculations.
3. Answer ONLY will not necessarily be awarded full marks.
4. You may use an approved scientific calculator (non-programmable and non-graphical) unless stated otherwise.
5. If necessary, round answers off to TWO decimal places, unless stated otherwise.
6. Write neatly and legibly.
7. ALL diagrams or figures are NOT drawn to scale.
8. Answer ALL questions on the question paper.
9. Circle ONLY the letter for the CORRECT ANSWER, e.g. If the correct answer in 1, is D, you should only circle (D)

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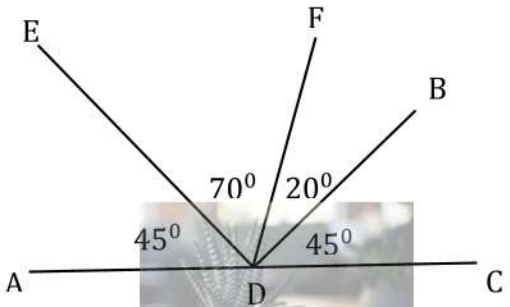
QUESTION 1

Circle ONLY the letter for the CORRECT ANSWER, e.g. If the correct answer in 1, is D, you should only circle (D)

1. Which line is perpendicular? (1)



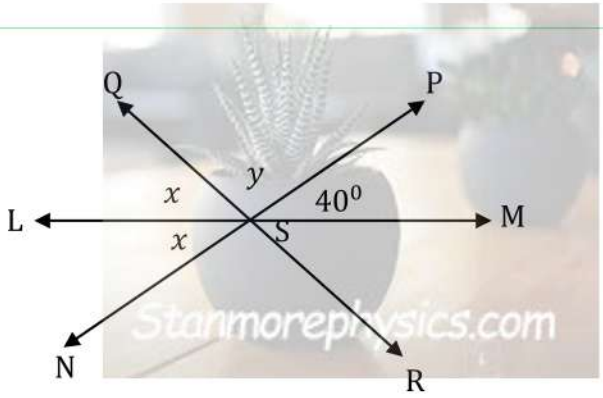
A ED ⊥ AD

B ED ⊥ FD

C ED ⊥ CD

D ED ⊥ BD

2. What is the size of N$\hat{S}$R? (1)



A 100^0

B 80^0

C 40^0

D 20^0

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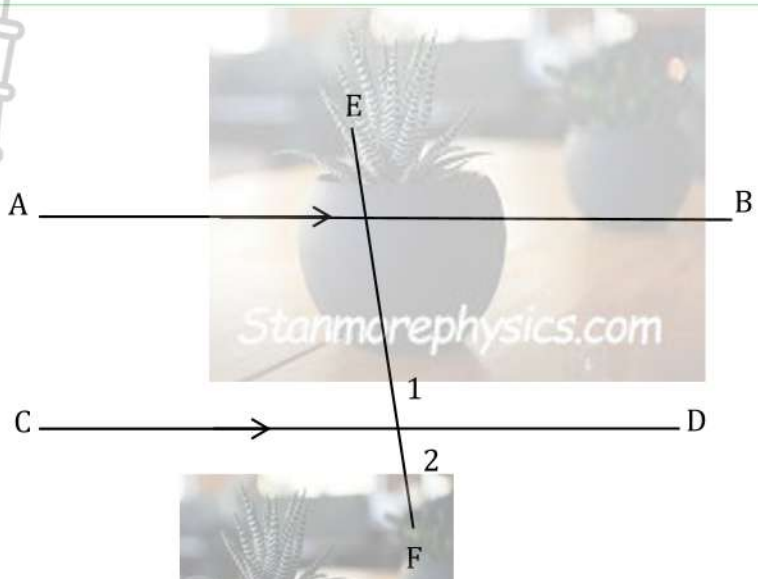
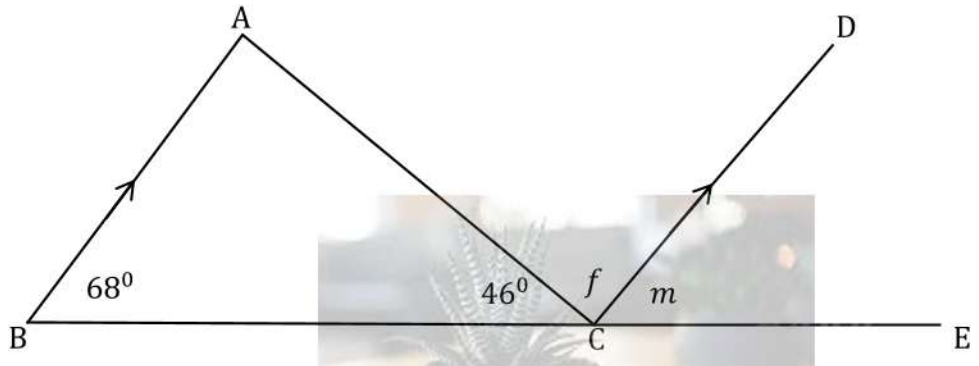
3.	What is the relationship between $\angle 1$ and $\angle 2$?	(1)
		
A	Adj. supplementary $\angle s$	
B	Adj. on the straight line	
C	Co-interior $\angle s$, AB||CD	
D	Complementary $\angle s$	
4.	What is the value of m?	(1)
		
A	44^0	
B	46^0	
C	68^0	
D	66^0	

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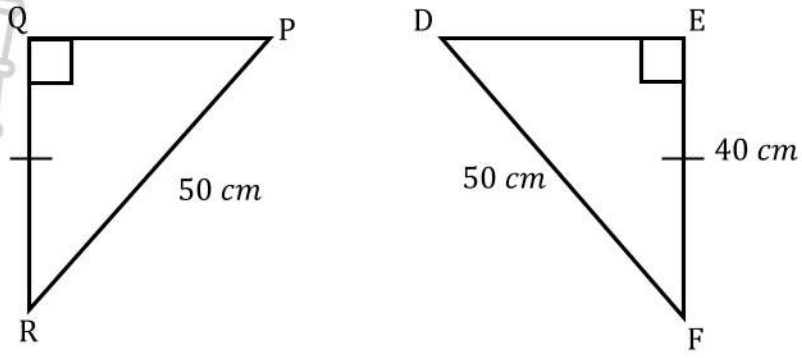
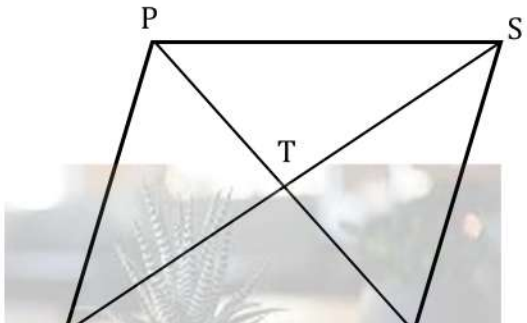
5.	What is the length of QP?	(1)
		
A	$30\ cm$	
B	$40\ cm$	
C	$50\ cm$	
D	$60\ cm$	
6.	PQRS us a rhombus. Which of the following statement is CORRECT?	(1)
		
A	$\Delta PQT \equiv \Delta PST$	
B	$\Delta PTR \equiv \Delta QTS$	
C	$\Delta QTS \equiv \Delta PST$	
D	$\Delta PTR \equiv \Delta PST$	

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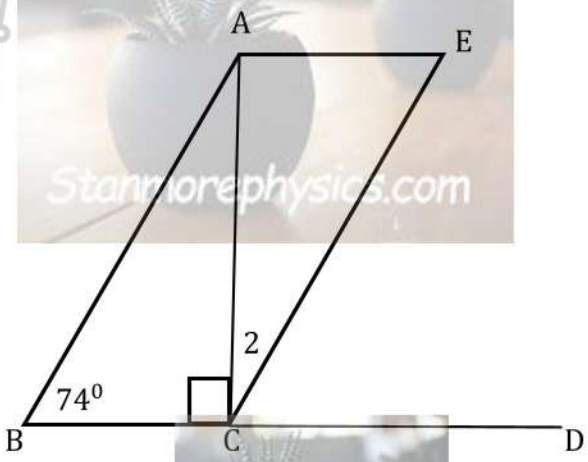
7.	ABCE is a parallelogram with $\hat{C} = 90^0$. Calculate, with reasons, the size of $\hat{C}_2$.	(1)
		
A	16^0	
B	105^0	
C	32^0	
D	45^0	
8.	In a quadrilateral, each of two angles has a measure of 115^0. If the measure of a third angle is 70^0. What is the measure of the remaining angles?	(1)
A	60^0	
B	70^0	
C	130^0	
D	140^0	
9.	What is the value of x if AB|| CD?	(1)

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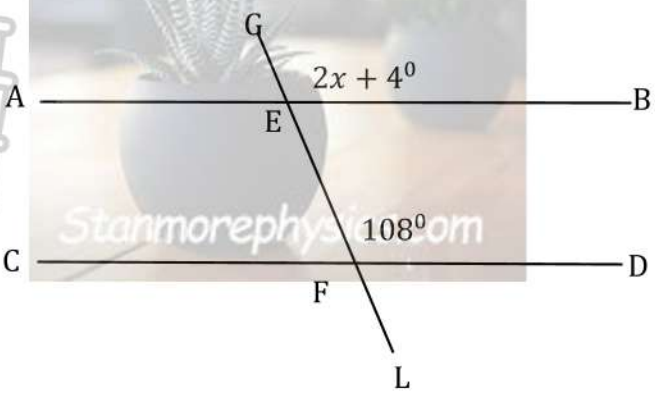
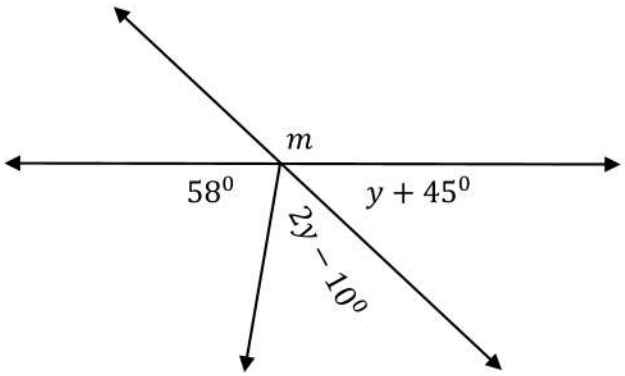


A	108^0	
B	104^0	
C	54^0	
D	52^0	
10.	What is the size of m?	(1)



A	113^0	
B	106^0	
C	87^0	
D	58^0	
		[10]

QUESTION 2

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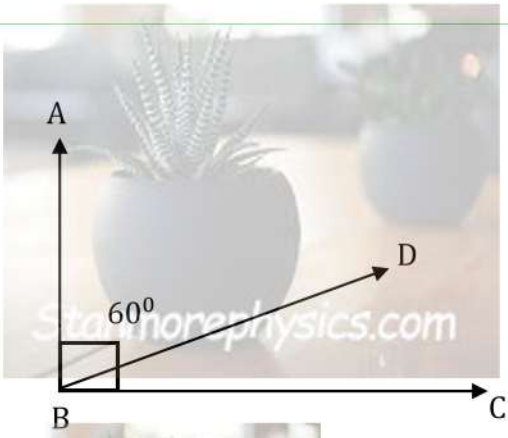
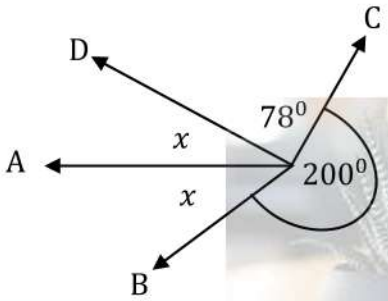
2.1	In the diagram below, AB is perpendicular to BC and $A\hat{B}D = 60^0$. Calculate, with reasons, the value of an angle indicated by the small letter (m) in the diagram.	(2)



Statement	Reason

2.2	Calculate the value of the unknown angles indicated by small letter.(x)	(3)



Statement	Reason

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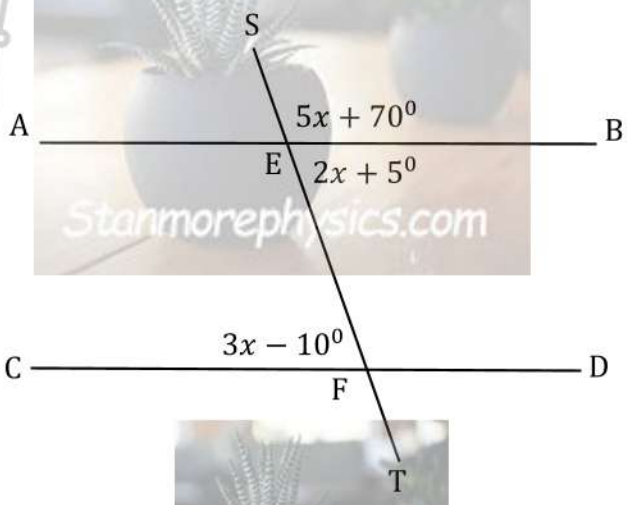
2.3 AB and CD are straight lines cut by transversal ST. Calculate, with reasons, the value of x and hence show that AB|| CD. (3)



Statement	Reason

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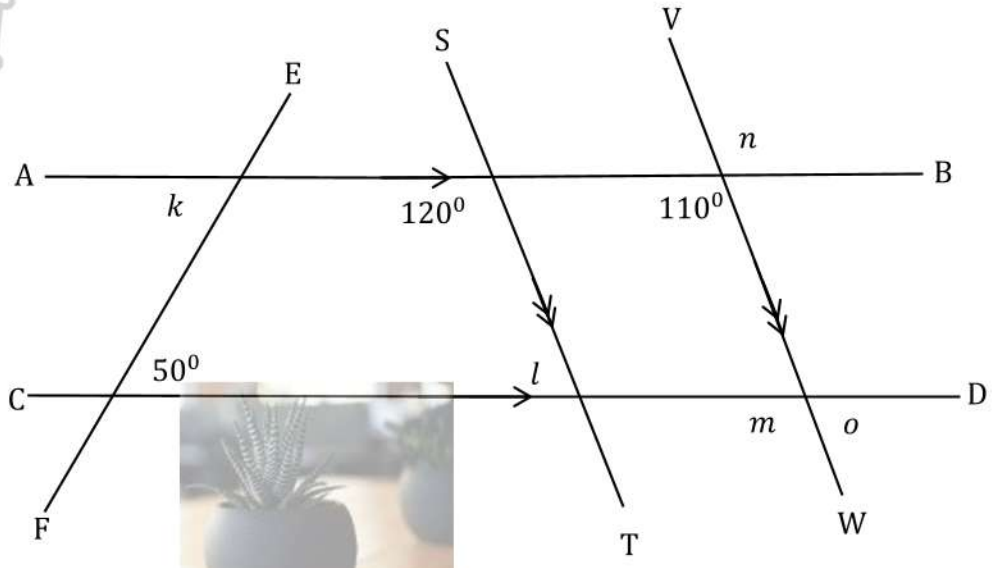
2.4 Calculate, with reasons, the values of an angle indicated by the small letter. **NB! You should NOT repeat the reasons. Answers must be in alphabetically order.** (10)



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Statement	Reason

[18]

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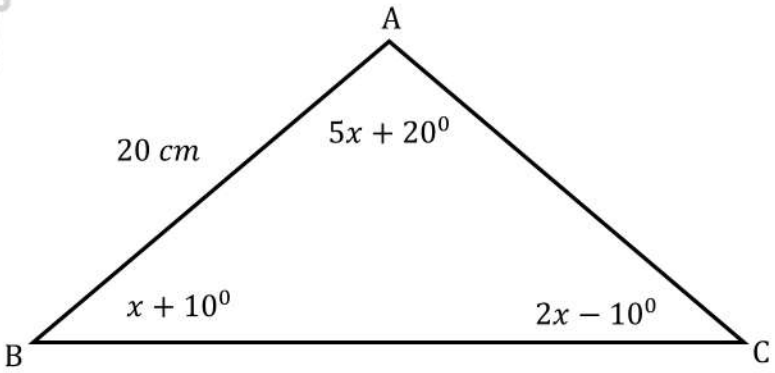
QUESTION 3

3.1 In ΔABC, calculate, with reasons:



3.1.1 The size of x and hence the size of the interior angles. (4)

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Statement	Reason

3.1.2 The length of AC (1)

_____

_____

_____

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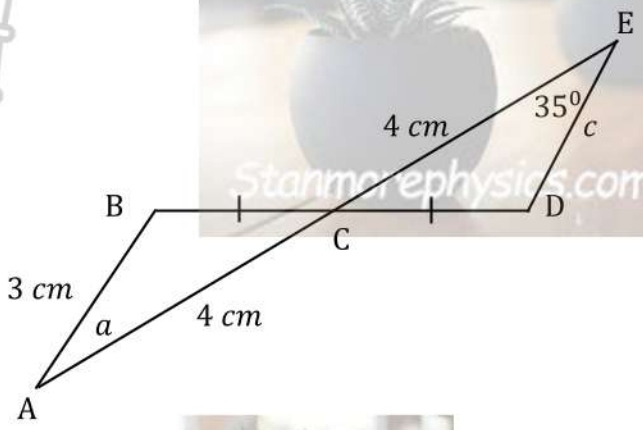
3.2 $\Delta ABC \equiv \Delta EDC$, BCD and ACE are staright lines. Find the unknown angle and side marked in the diagram



Statement	Reason

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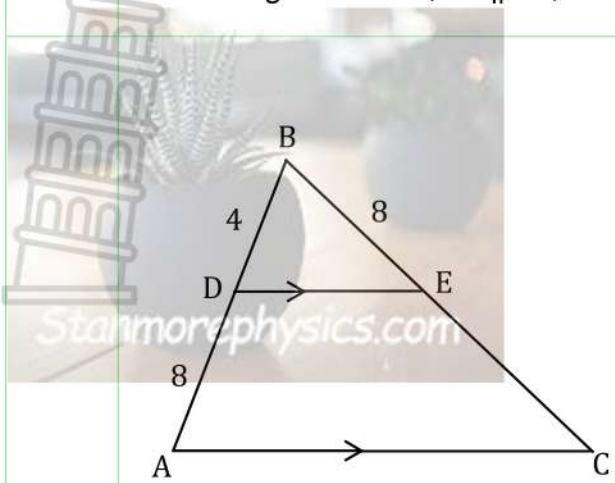
3.3 In the diagram below, DE||AC, BD= 4, DA $= 8$ and BE $= 8$.



3.3.1 Prove that $\Delta BAC \Vert\Vert \Delta BDE$ (5)

Statement	Reason

3.3.2 Find the length of EC. (5)

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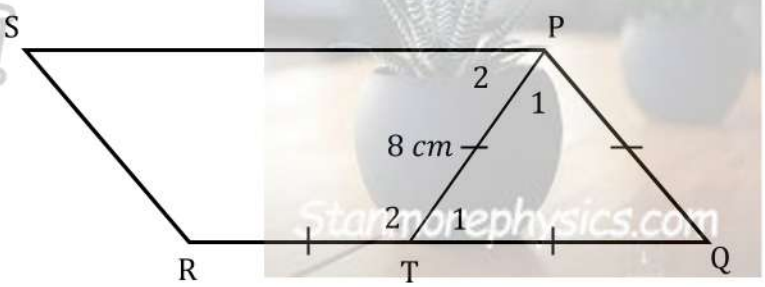
3.4 PQRS is a parallelogram. $PQ = QT = TR$ *and* $PT = 8\ cm$.



3.4.1 Calculate $\hat{Q}$ (2)

Statement	Reason

3.4.2 Calculate $\hat{R}$ (2)

Statement	Reason

3.4.3 Calculate $\hat{S}$

Statement	Reason

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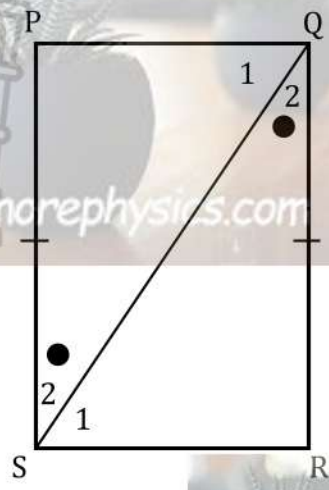
3.5 Consider ΔPQS and ΔRSQ. Prove that $\Delta PQS \equiv \Delta RSQ$ (5)



Statement	Reason

[30]

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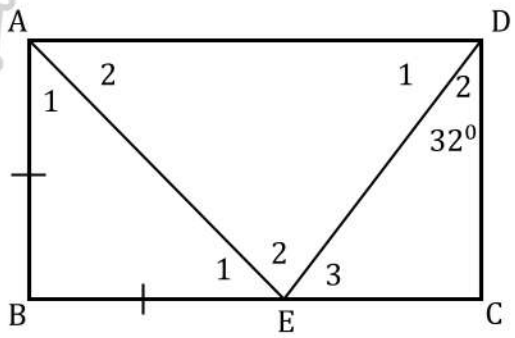
QUESTION 4

4.1 ABCD is a rectangle with $\widehat{D}_2 = 32^0$, AB = BE = 5 cm



4.1.1 Find the length of the unknown side DC. (1)

Statement	Reason

4.1.2 Calculate the value of the unknown $\widehat{E}_3$ (1

Statement	Reason

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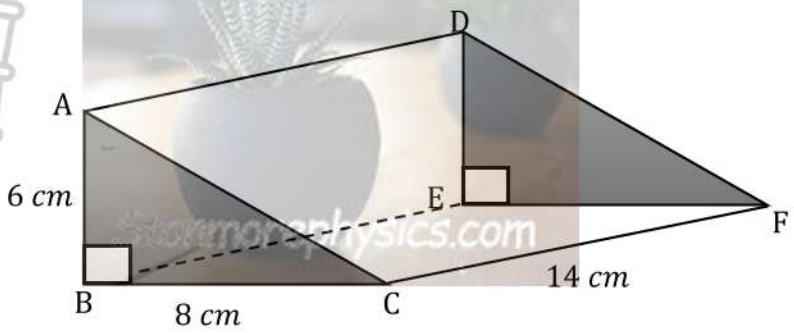
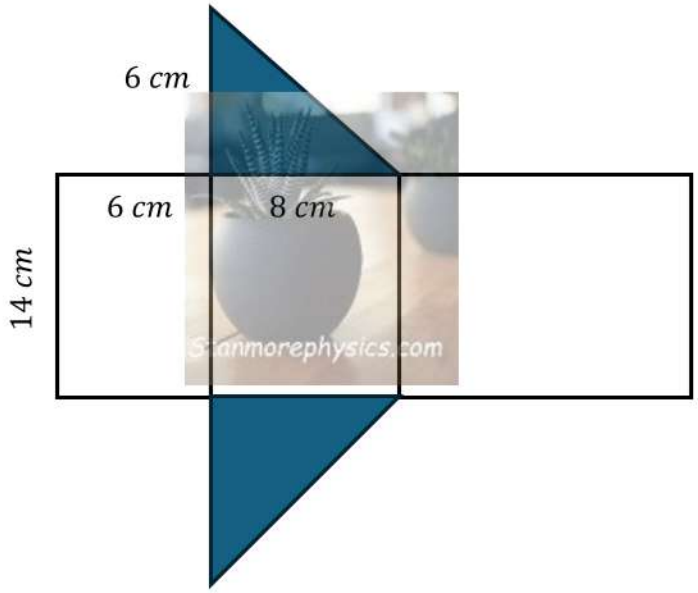
4.2 A triangular prism is given.





4.2.1 Find the length of AC. (1)

Statement	Reason

4.2.1 Calculate the surface area of the triangular prism. (2)

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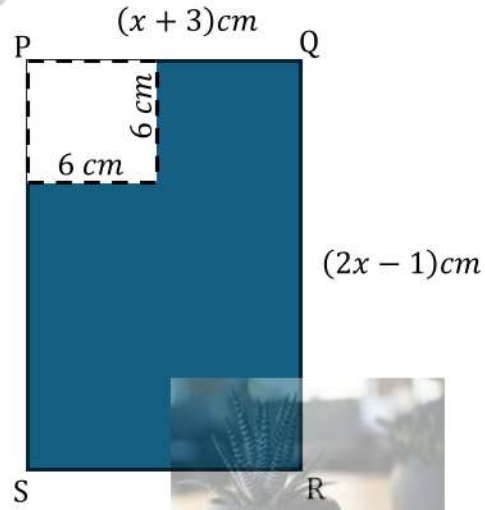
4.3	PQRS is a rectangle of length $(2x-1)\ cm$ and width $(x+2)\ cm$. If a square of side $6\ cm$ is cut from the corner P, show that the area of the shaded region is $(2x^2+3x-38)\ cm$	(4)
		
		[9]

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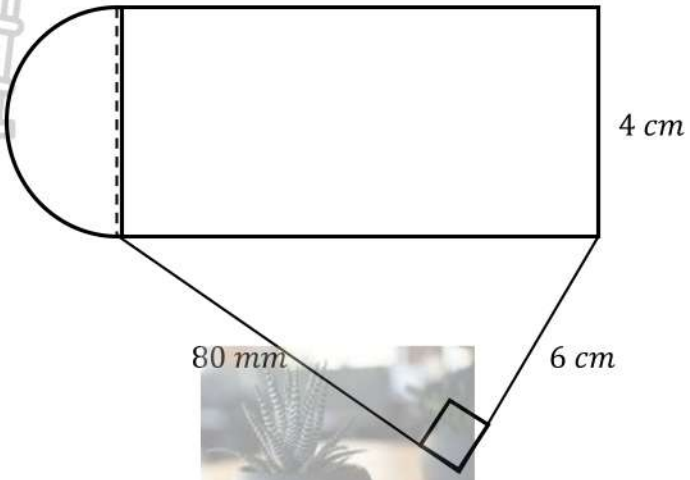
QUESTION 5

5.1 Study the diagram, NOT drawn to scale below. At the left of this shape is a semicircle with diameter of $4\ cm$. (5)



5.1.1 **Convert *mm* to *cm***

_____

_____

5.1.2 Determine the perimeter of the shape

Statement	Reason

_____

_____

_____

_____

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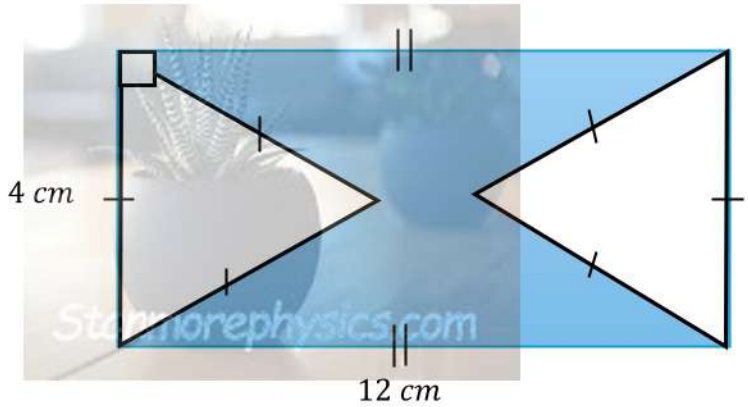
	5.1.3 The total area of the shape	
5.2	Study the diagram below and calculate, correct to two decimal places where necessary the area of the shaded region. [Hint: $h = 6\ cm$]	(3)
		

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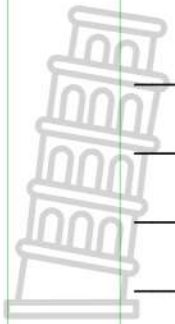

		[8]

TOTAL [75]

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QUESTION 1				
1.	D	✓		(1)
2.	A	✓		(1)
3.	A	✓		(1)
4.	C	✓		(1)
5.	A	✓		(1)
6.	A	✓		(1)
7.	A	✓		(1)
8.	B	✓		(1)
9.	D	✓		(1)
10.	B	✓		(1)
			TOTAL	**[10]**

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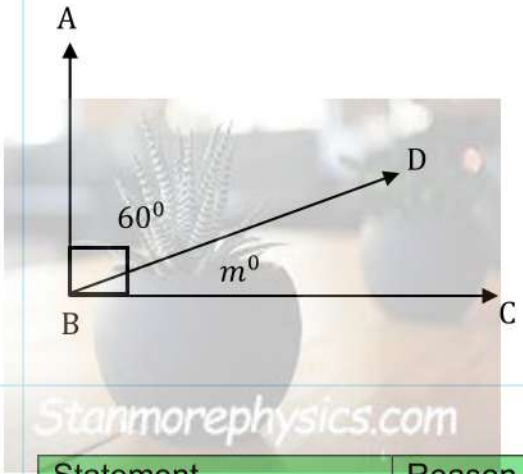
QUESTION 1			
2.1	In the diagram below, AB is perpendicular to BC and $A\hat{B}D = 60^0$. Calculate, with reasons, the value of an angle indicated by the small letter (m) in the diagram.		
			
		Statement: 1 mark Reason: 1 mark	(2)

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Statement	Reason
$m = 30^0$ ✓	Compl. $\angle s$ ✓

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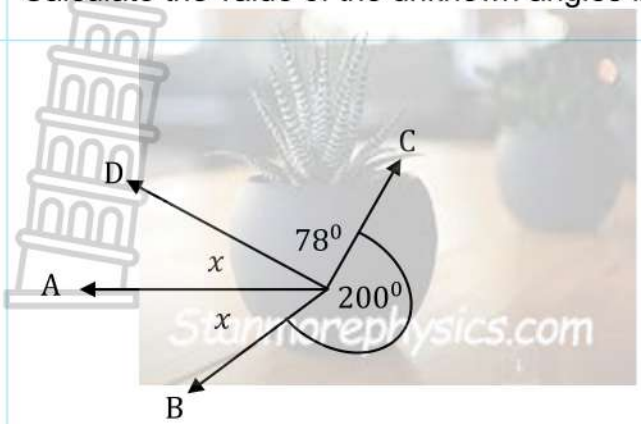
2.2 Calculate the value of the unknown angles indicated by small letter.(x)

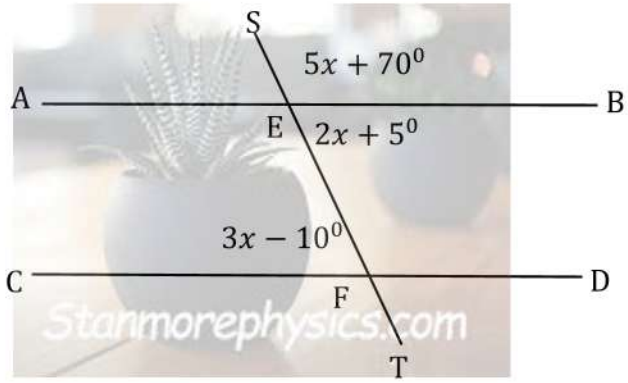


Statement	Reason
$x = \frac{360^0 - 278^0}{2}$ ✓ $= 41^0$ ✓	Rev / $\angle s$ around a point ✓

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

(3)

2.3 AB and CD are straight lines cut by transversal ST. Calculate, with reasons, the value of x and hence show that AB|| CD.



Statement	Reason
$2x + 5^0 = 3x - 10^0$ ✓	Alt. $\angle s$ AB|| CD. ✓
$\therefore x = 15^0$ ✓	
OR	
$x = \frac{180^0 - 75^0}{7}$ ✓	Adj. suppl $\angle s$ ✓
$\therefore x = 15^0$ ✓	

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

(3)

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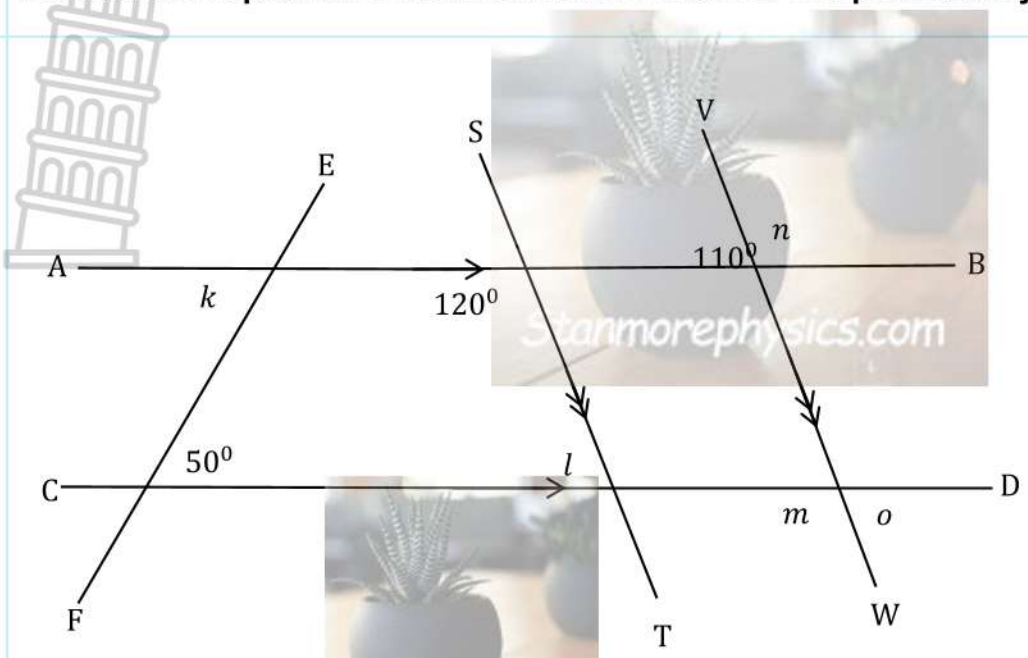
2.4 Calculate, with reasons, the values of an angle indicated by the small letter. **NB! You should NOT repeat the reasons. Answers must be in alphabetically order.**



Statement	Reason
$k = 50^0$ ✓	alt. ∠s AB|| CD. ✓
$l = 180^0 - 120^0$ $= 60^0$ ✓	co-int. ∠s AB|| CD. ✓
$m = 110^0$ ✓	corres. ∠s AB|| CD. ✓
$n = 110^0$ ✓	vert. opp ∠s ✓
$o = 70^0$ ✓	adj. suppl ∠s ✓

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

(10)

Here, the examiner wanted to check whether the learners understand all REASONING used in angles relationships with parallel line (XFUN)

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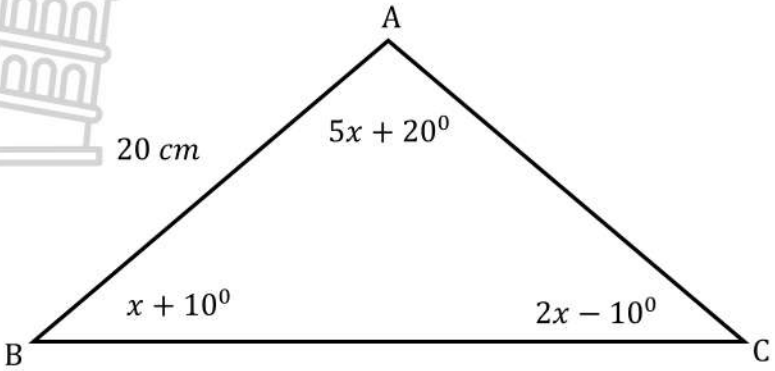
QUESTION 3

3.1 In ΔABC, calculate, with reasons:



3.1.1 The size of x and hence the size of the interior angles.

Statement	Reason
$x = \frac{180^0 - 20^0}{8}$ ✓ ✓	int ∠s of a Δ or sum ∠s of a Δ ✓
$= 20^0$ ✓	

Statement: 2 marks
Reason: 1 mark
Answer: 1 mark

3.1.2 The length of AC

$\hat{B} = x + 10^0$ $= 20^0 + 10^0$ $= 30^0$	$\hat{C} = 2x - 10^0$ $= 2(20^0) - 10^0$ $= 30^0$	$\hat{A} = 5x + 20^0$ $= 5(20^0) + 20^0$ $= 120^0$

Statement	Reason
The length of AC $= 20\ cm$	Isosceles Δ ✓

Statement & reason: 1 mark (1)

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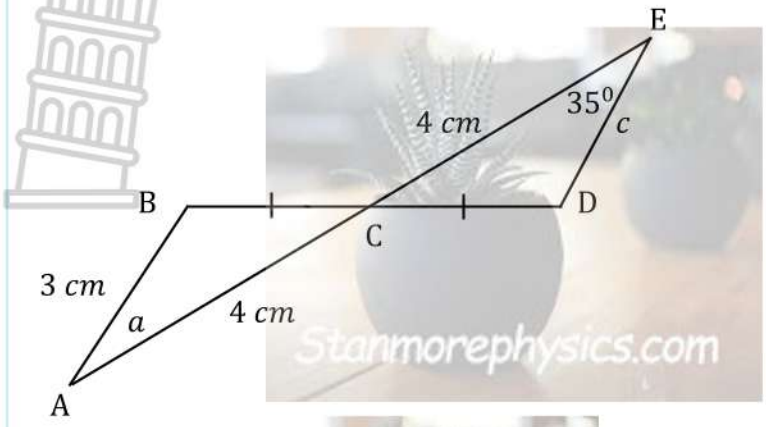
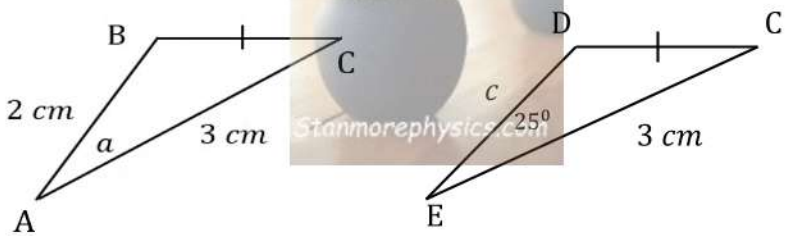
3.2 $\Delta ABC \equiv \Delta EDC$, BCD and ACE are staright lines. Find the unknown angle and side marked in the diagram



We can rotate ΔEDC and then compare it with ΔABC as shown below



Statement	Reason
$\hat{A} = \hat{E}$ ✓ $= 35^0$ ✓	$\Delta ABC \equiv \Delta EDC$ ✓
Since $ED = AB$ $\therefore c = 2\ cm$ ✓	SAS ✓

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

(5)

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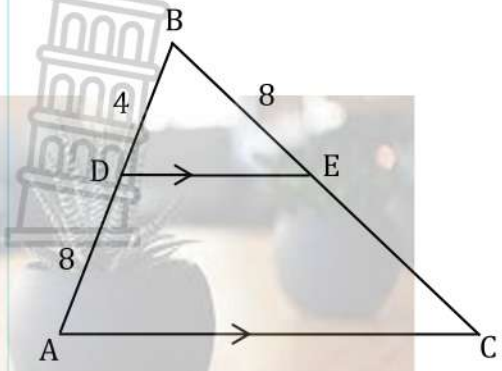
3.3 In the diagram below, DE||AC, BD= 4, DA = 8 and BE = 8.



3.3.1 Prove that ΔBAC||| ΔBDE

Statement	Reason
In ΔBAC and ΔBDE	
$B\hat{A}C = B\hat{D}E$ ✓	Corres ∠s; DE||AC ✓
$A\hat{C}B = B\hat{E}D$ ✓	Corres ∠s; DE||AC ✓
∴ ΔBAC ||| ΔBDE	AA ✓
Similarly $A\hat{B}C = D\hat{B}E$	Common

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

(5)

3.3.2 Find the length of EC

$\frac{BE}{EC} = \frac{BD}{DA}$ ✓ ✓

$\frac{8}{EC} = \frac{4}{8}$ ✓

$EC = \frac{8 \times 8}{4}$ ✓

$= 16$ ✓

Prop: 2 mark
Subst: 1 mark
Simpl: 1 mark
Answer: 1 mark

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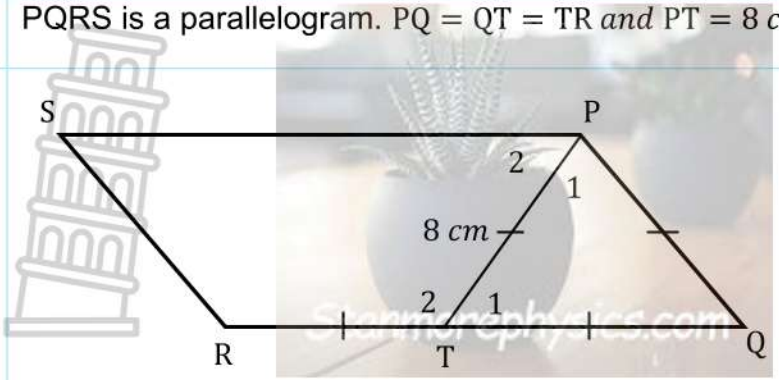
3.4 PQRS is a parallelogram. $PQ = QT = TR$ *and* $PT = 8\ cm$.



3.4.1 Calculate $\hat{Q}$

Statement	Reason
$\hat{Q} = 60^0$ ✓	ΔPQT is equilateral ✓

Statement: 1 mark
Reason: 1 mark (2)

3.4.2 Calculate $\hat{R}$

Statement	Reason
$\hat{R} = 120^0$ ✓	Co-int ∠s PQ||SR ✓

Statement: 1 mark
Reason: 1 mark (2)

3.4.3

Statement	Reason
$\hat{S} = 60^0$ ✓	Opp ∠s of parm ✓

Statement: 1 mark
Reason: 1 mark (2)

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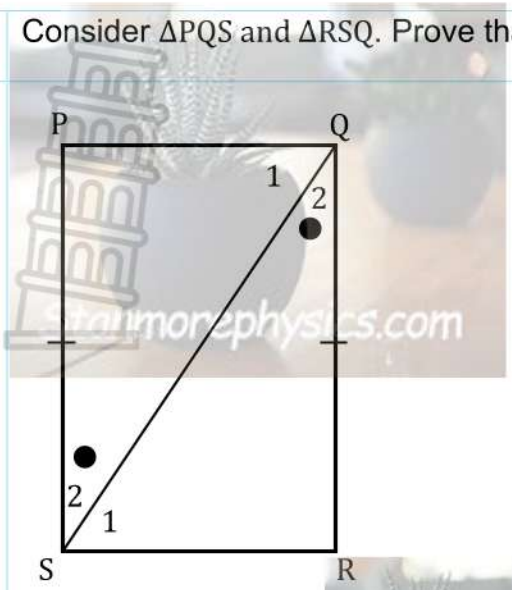
3.5 Consider ΔPQS and ΔRSQ. Prove that $\Delta PQS \equiv \Delta RSQ$



Statement	Reason
In ΔPQS and ΔRSQ	
$PS = RQ$ ✓	given ✓
$\hat{S}_2 = \hat{Q}_2$ ✓	given ✓
$QS = SQ$	Common side
$\therefore \Delta PQS \equiv \Delta RSQ$	SAS ✓

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

(5)

[30]

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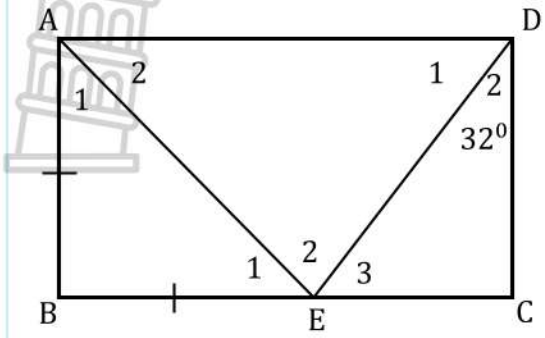
QUESTION 4

4.1 ABCD is a rectangle with $\hat{D}_2 = 32^0$, AB = BE = 5 cm



4.1.1 Find the length of the unknown side DC.

Statement	Reason
AB = DE = 5 cm	opp sides of rectangle are = ✓

Statement & Reason: 1 mark (1)

4.1.2 Calculate the value of the unknown $\hat{E}_3$

Statement	Reason
$\hat{E}_3 = 58^0$	∠s sum of Δ / int ∠s of a Δ ✓

Statement & Reason: 1 mark (1)

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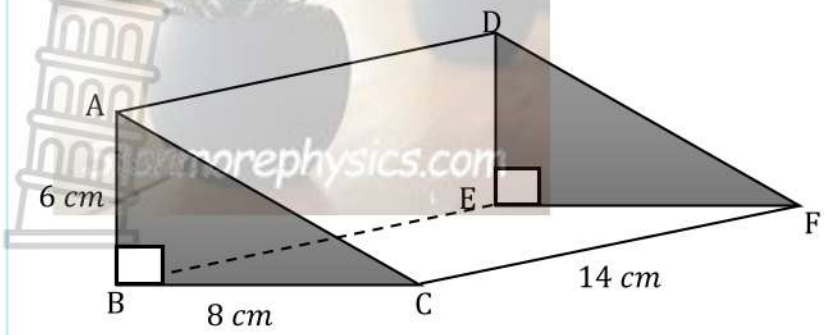
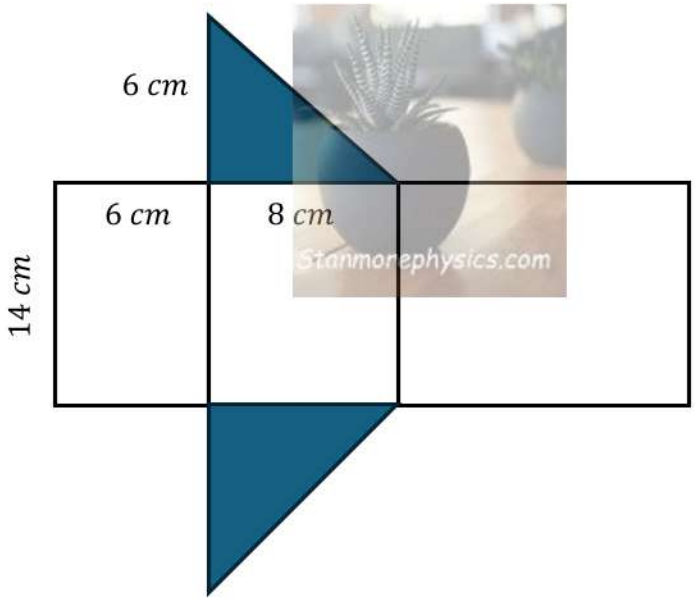
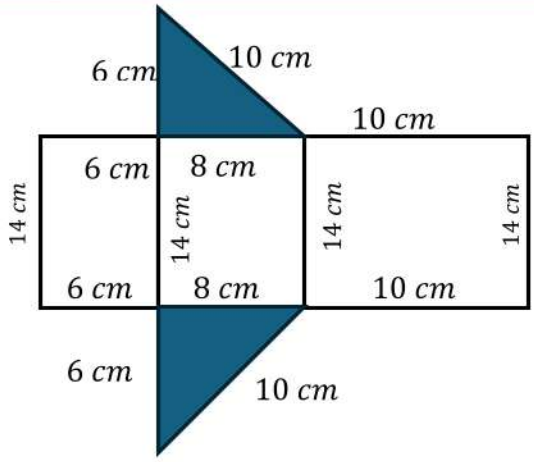
4.2 A triangular prism is given.





4.2.1 Find the length of AC



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Statement	Reason
$AC^2 = (6)^2 + (8)^2$ $= \sqrt{36 + 64}$ $= \sqrt{100}$ $\sqrt{AC^2} = 10\ cm$ $AC = 10\ cm$ ✓	Pythagoras

Length of AC: 1 mark (1)

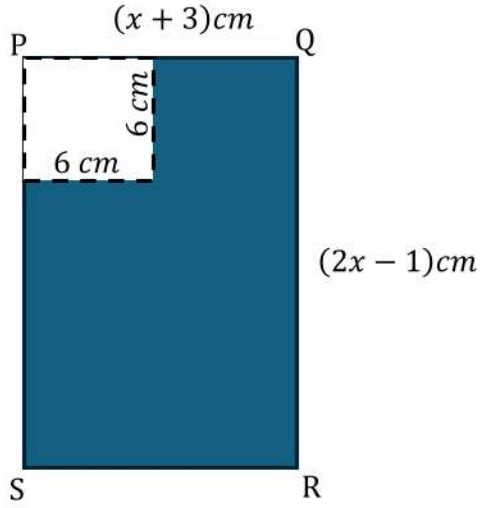
4.2.2 Calculate the surface area of the triangular prism.

Area of $\Delta ABC = \frac{1}{2}(8\ cm)(6\ cm) = 24\ cm^2$
Area of $\Delta DEF = \frac{1}{2}(8\ cm)(6\ cm) = 24\ cm^2$
Area of BCFE $= (14\ cm)(8\ cm) = 112\ cm^2$
Area of ABED $= (14\ cm)(6\ cm) = 112\ cm^2$
Area of ACFD $= (14\ cm)(10cm) = 112\ cm^2$

Surface area of triangular prism:
$= 24 + 24 + 112 + 84 + 140$ ✓
$= 384\ cm^2$ ✓

Calculation: 1 mark
Answer: 1 mark (2)

4.3 PQRS is a rectangle of length $(2x - 1)\ cm$ and width $(x + 2)\ cm$. If a square of side $6\ cm$ is cut from the corner P, show that the area of the shaded region is $(2x^2 + 3x - 38)\ cm$



Area shaded region = area of rectangle − area of square
$= (2x - 1)(x + 2) - (6 \times 6)$ ✓ ✓
$= 2x^2 + 3x - 2 - 36$ ✓
$= (2x^2 + 3x - 38)cm$ ✓

Sust: 2 marks
Simpl: 1 mark
Answer: 1 mark (4)

[9]

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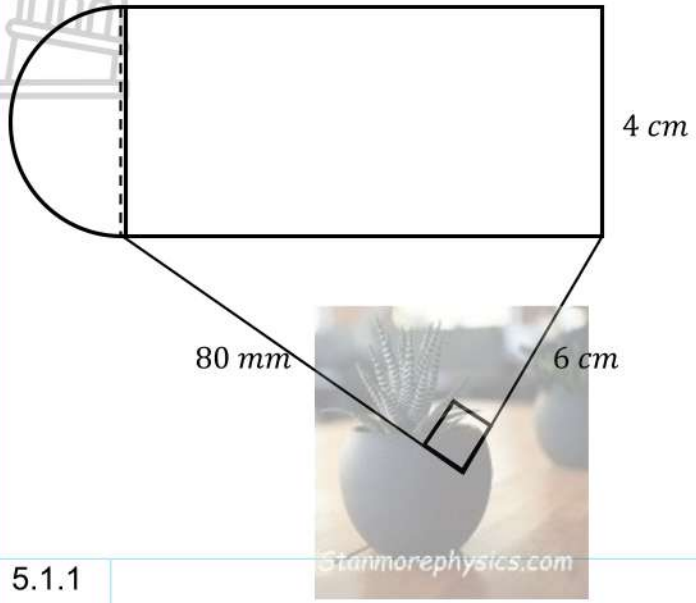
QUESTION 5

5.1 Study the diagram, NOT drawn to scale below. At the left of this shape is a semicircle with diameter of $4\ cm$.

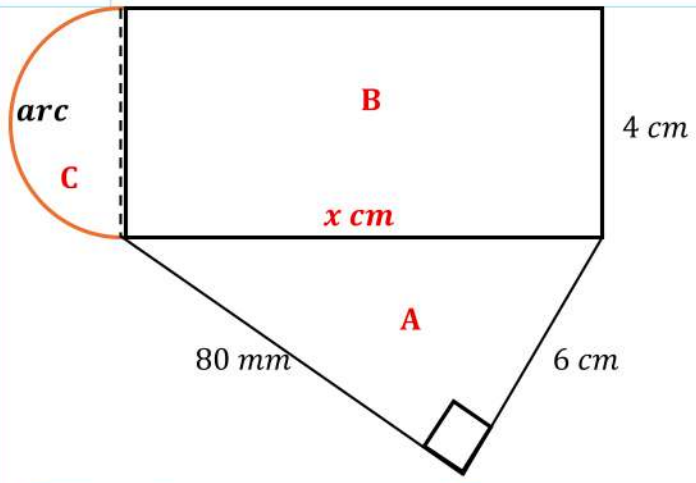


5.1.1 **Convert mm to cm**

Convert $80\ mm$ to cm
$80\ mm \div 10 = 8\ cm$ ✓

Conv: 1 mark (1)

5.1.2 Determine the perimeter of the shape



Statement	Reason
Length of the rectangle $x = 10\ cm$	Pythagoras ✓

Value of x: 1 mark (1)

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	The arc of the semicircle has a length of: $= \frac{1}{2}(\pi \times 4) = 2\pi\ cm$ Perimeter $= 2\pi + 10 + 4 + 6 + 8$ $= 34{,}28\ cm$ ✓	Perimeter: 1 mark	(1)
5.1.3	The total area of the shape		
	i. Area of the right– angled triangle **(A)** $= \frac{1}{2}(8 \times 6) = 24\ cm^2$ ii. Area of rectangle **(B)** $= 10 \times 4 = 40\ cm^2$ iii. Area of semicircle **(C)** $= \frac{1}{2}(\pi \times 2^2)$ $= 2\pi\ cm^2$ Total area of the shape $= 24 + 40 + 2\pi$ ✓ $= 70{,}28\ cm^2$ ✓	Total area: 2 mark	(2)

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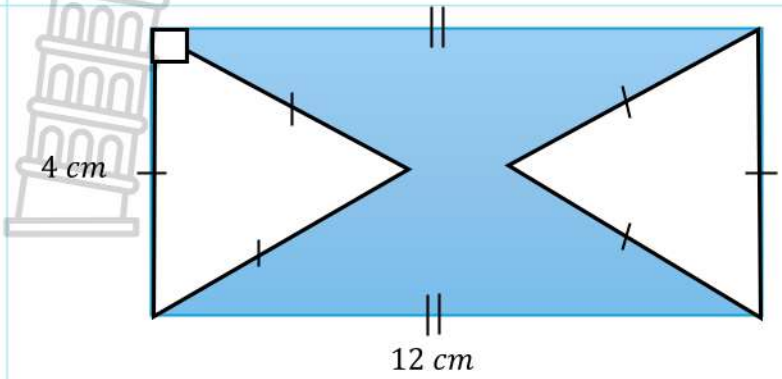
5.2	Study the diagram below and calculate, correct to two decimal places where necessary the area of the shaded region. [Hint: $h = 6\ cm$]		
			
	Area of 2 Δs $= 2[\left(\frac{1}{2}\ 4 \times 6\right)] = 24\ cm^2$ ✓ Area of rectangle $= 12 \times 4 = 48\ cm^2$ ✓ Area of the shaded region $= 48 - 24 = 24\ cm^2$ ✓	24 cm^2: 1 mark 48 cm^2: 1 mark Total area: 1 mark	(3)
			[9]
		Total	**[75]**

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