



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

INSTRUCTION AND INFORMATION TO LEARNERS

Read the following instructions carefully before answering the questions.

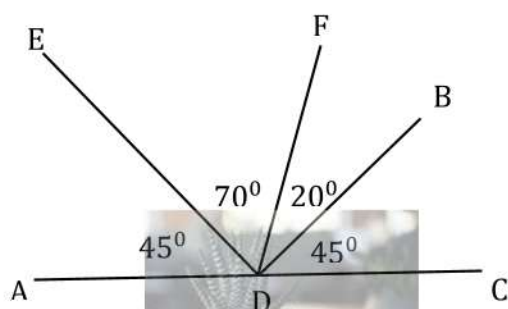
1. Answer ALL the questions.
2. Clearly show ALL calculations.
3. Answer ONLY will not necessarily be awarded full marks.
4. You may use an approved scientific calculator (non-programmable and non-graphical) unless stated otherwise.
5. If necessary, round answers off to TWO decimal places, unless stated 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**

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 $\perp$ AD

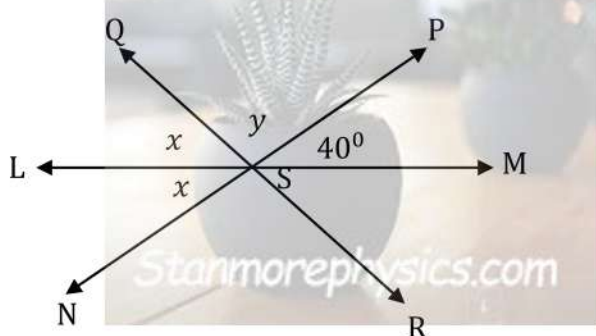
B ED $\perp$ FD

C ED $\perp$ CD

D ED $\perp$ BD

2. What is the size of $\angle SR$?

(1)



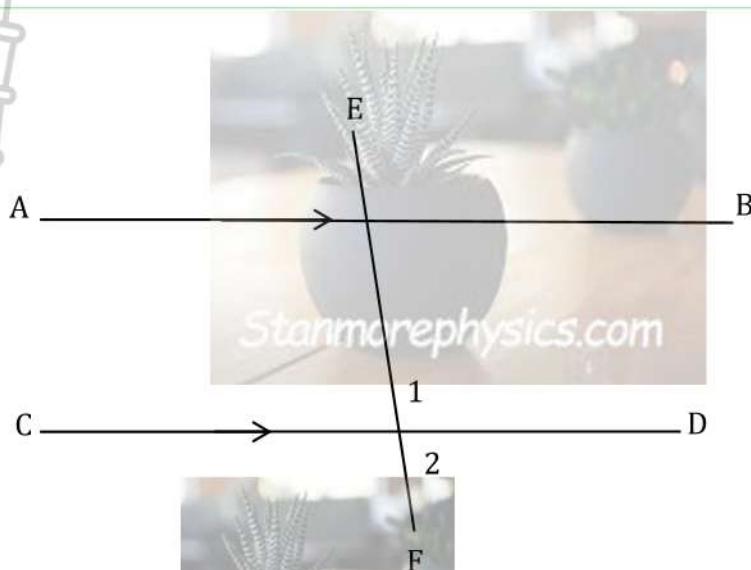
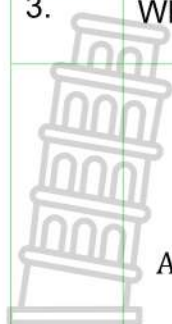
A 100°

B 80°

C 40°

D 20°

3. What is the relationship between $\angle 1$ and $\angle 2$? (1)



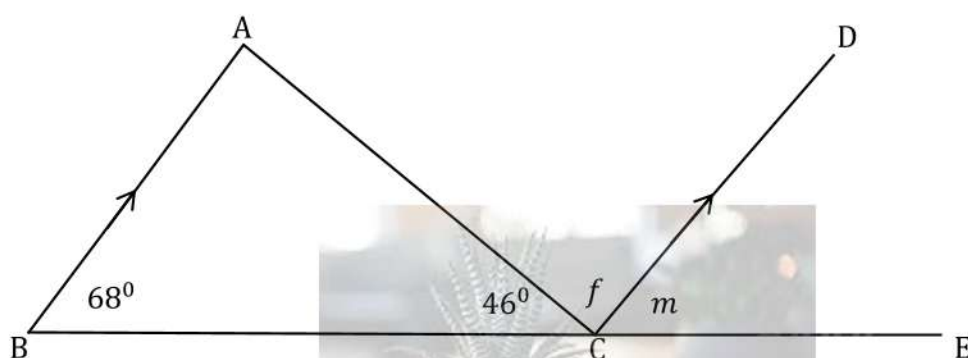
A Adj. supplementary $\angle$ s

B Adj. on the straight line

C Co-interior $\angle$ s, $AB \parallel CD$

D Complementary $\angle$ s

4. What is the value of m ? (1)



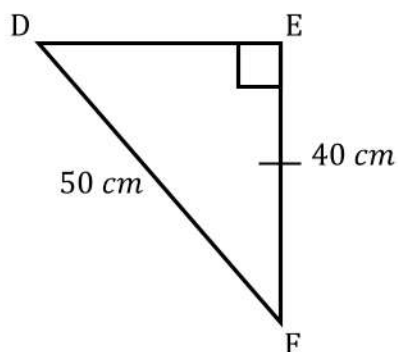
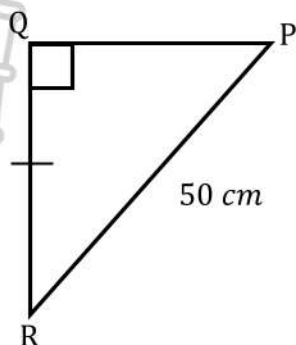
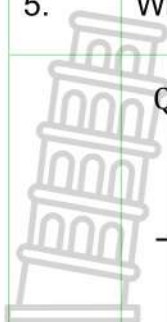
A 44°

B 46°

C 68°

D 66°

5. What is the length of QP? (1)



A 30 cm

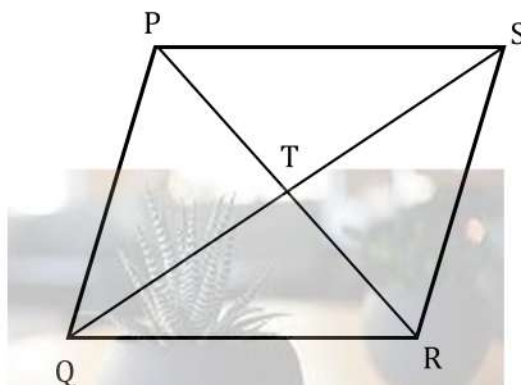
B 40 cm

C 50 cm

D 60 cm



6. PQRS is a rhombus. Which of the following statements is CORRECT? (1)



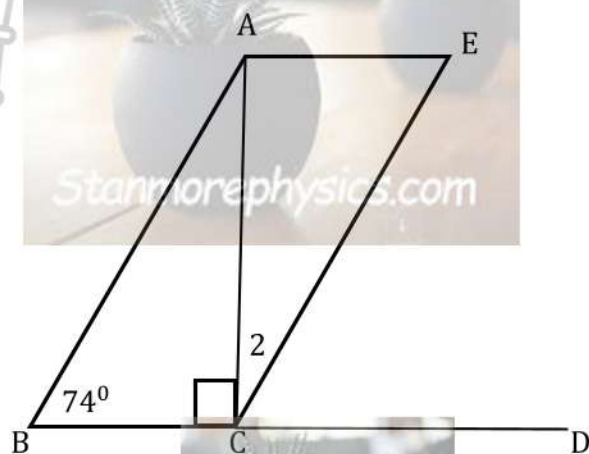
A $\triangle PQT \equiv \triangle PST$

B $\triangle PTR \equiv \triangle QTS$

C $\triangle QTS \equiv \triangle PST$

D $\triangle PTR \equiv \triangle PST$

7. $ABCE$ is a parallelogram with $\hat{C} = 90^\circ$. Calculate, with reasons, the size of $\hat{C}_2$. (1)



A 16°

B 105°

C 32°

D 45°

8. In a quadrilateral, each of two angles has a measure of 115° . If the measure of a third angle is 70° . What is the measure of the remaining angles? (1)

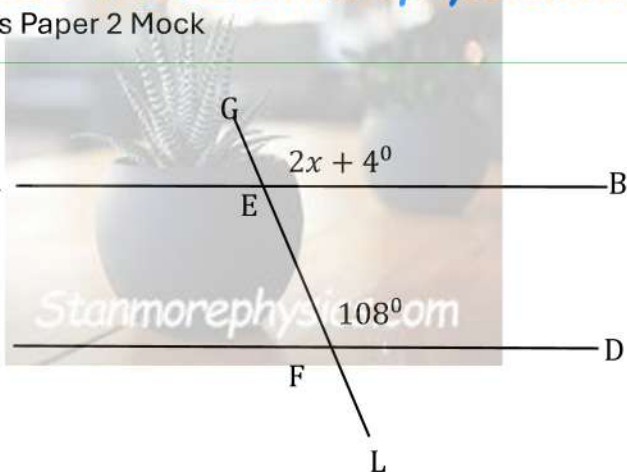
A 60°

B 70°

C 130°

D 140°

9. What is the value of x if $AB \parallel CD$? (1)



A 108°

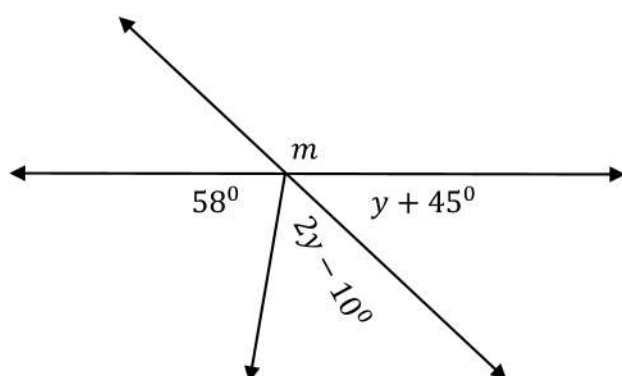
B 104°

C 54°

D 52°

10. What is the size of m ?

(1)



A 113°

B 106°

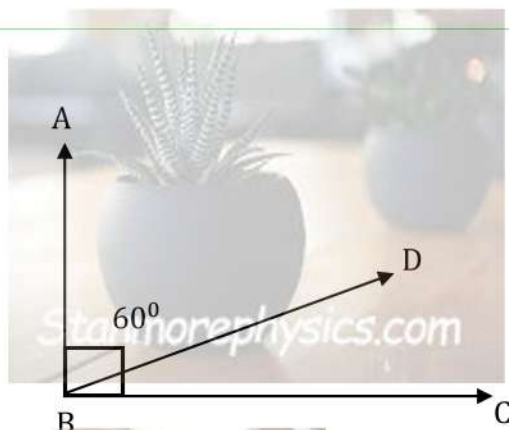
C 87°

D 58°

[10]

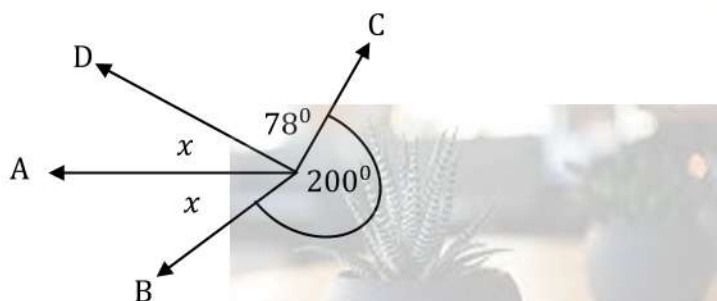
QUESTION 2

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



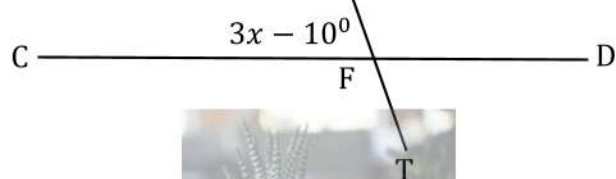
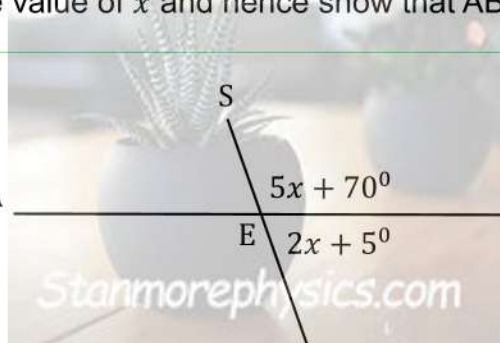
Statement	Reason

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



Statement	Reason

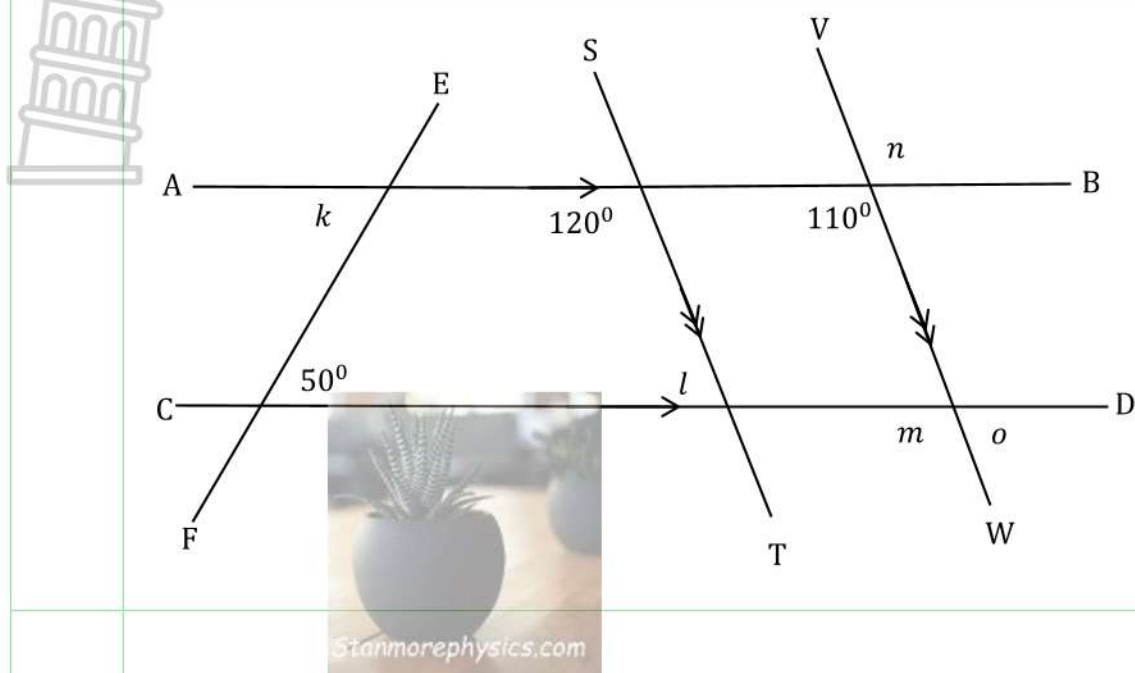
- 2.3 AB and CD are straight lines cut by transversal ST. Calculate, with reasons, the value of x and hence show that $AB \parallel CD$. (3)



Statement	Reason

- 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 alphabetical order.**

(10)

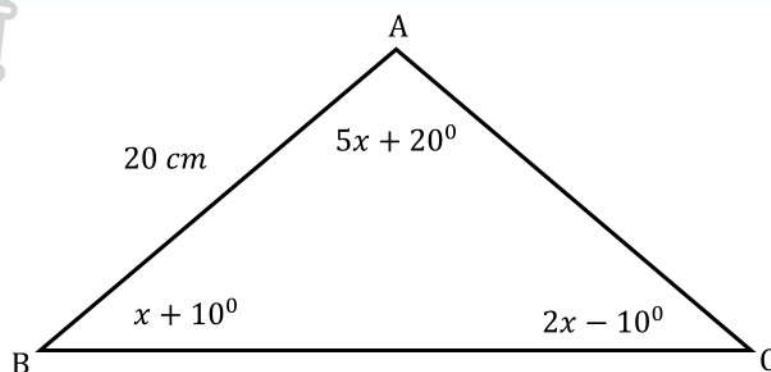


Statement	Reason

[18]

QUESTION 3

3.1 In $\triangle ABC$, calculate, with reasons:



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

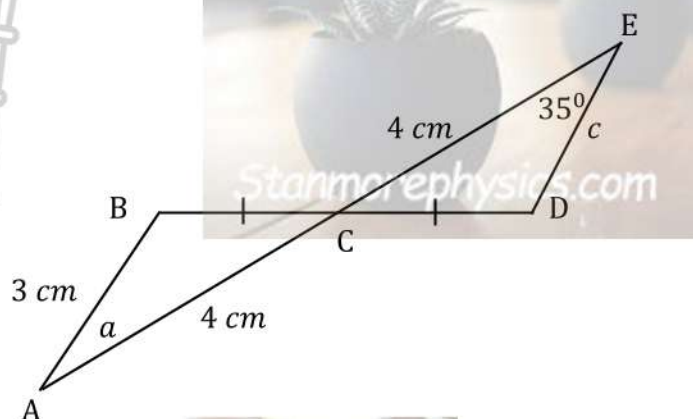
(4)

Statement	Reason

3.1.2 The length of AC

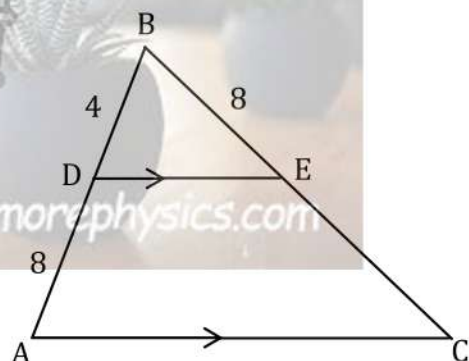
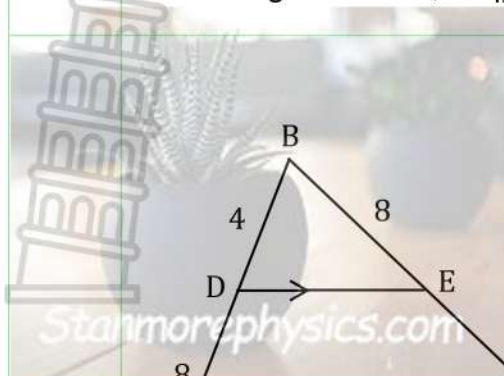
(1)

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



Statement	Reason

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



3.3.1 Prove that $\triangle BAC \sim \triangle BDE$

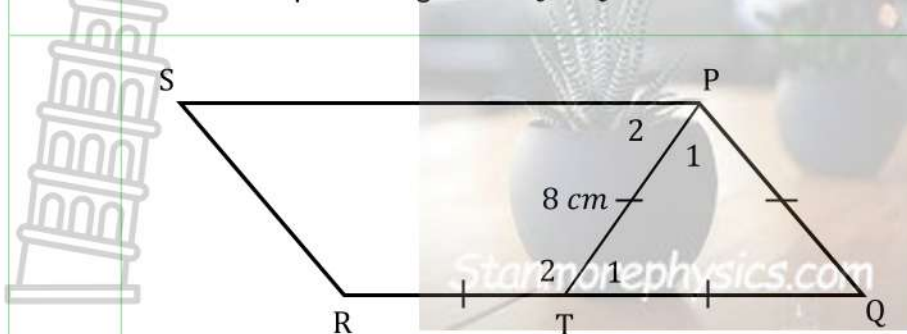
(5)

Statement	Reason

3.3.2 Find the length of EC.

(5)

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



3.4.1 Calculate $\hat{Q}$

(2)

Statement	Reason

3.4.2 Calculate $\hat{R}$

(2)

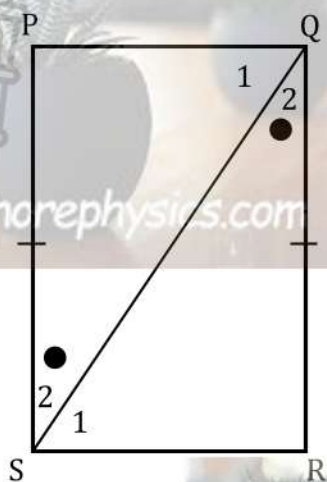
Statement	Reason

3.4.3 Calculate $\hat{S}$

Statement	Reason

3.5 Consider $\triangle PQS$ and $\triangle RSQ$. Prove that $\triangle PQS \equiv \triangle RSQ$

(5)

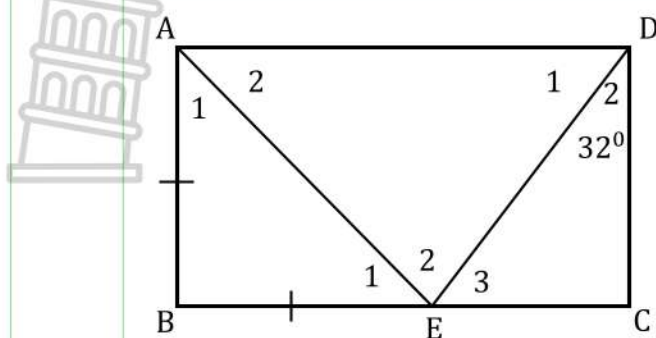


Statement	Reason

[30]

QUESTION 4

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



4.1.1 Find the length of the unknown side DC.

(1)

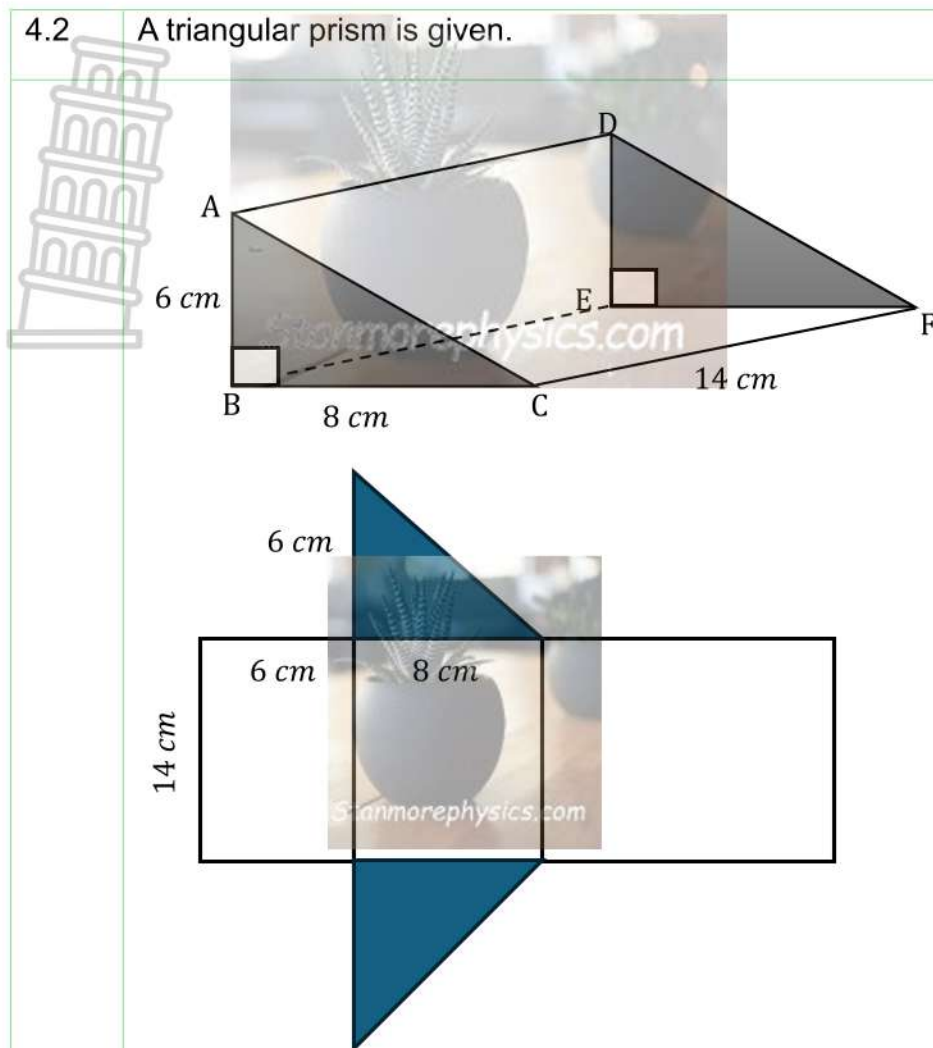
Statement	Reason

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

(1)

Statement	Reason

4.2 A triangular prism is given.



4.2.1 Find the length of AC .

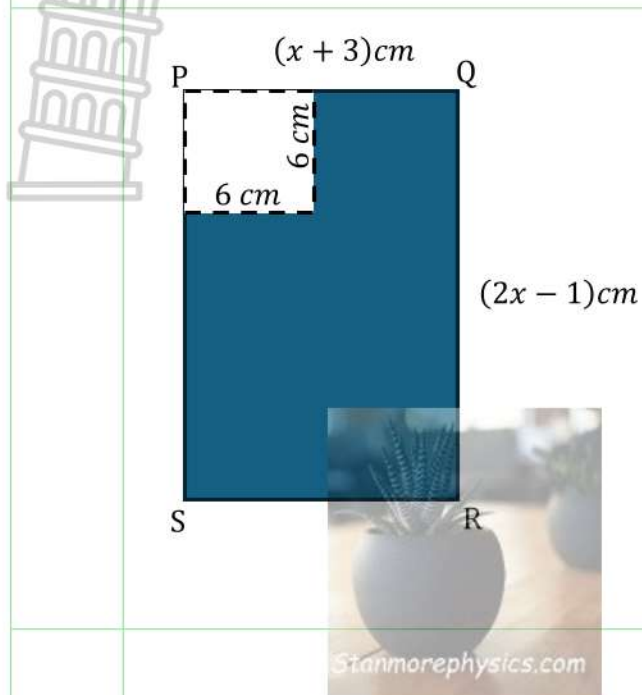
(1)

Statement	Reason

4.2.1 Calculate the surface area of the triangular prism.

(2)

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

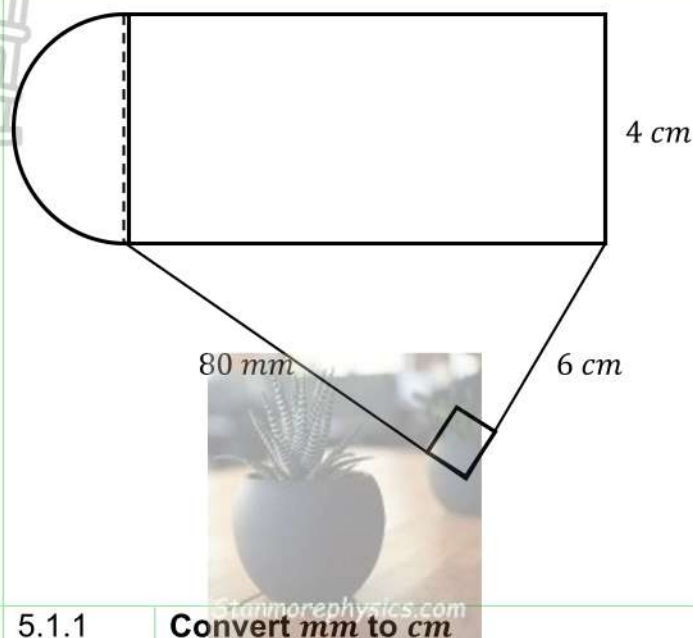


[9]

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)



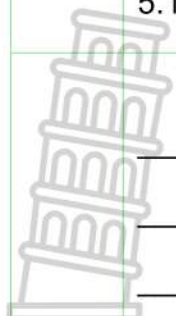
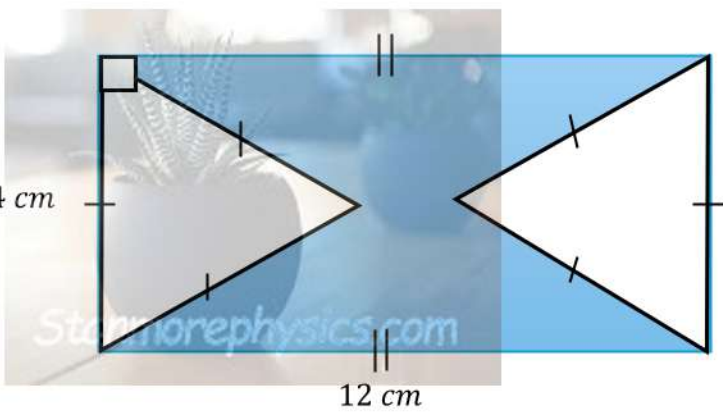
5.1.1

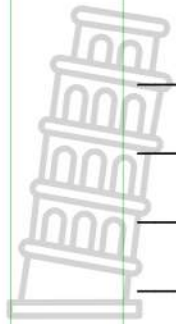
Convert mm to cm

5.1.2

Determine the perimeter of the shape

Statement	Reason

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: $h = 6\text{ cm}$]	(3)
		



[8]

TOTAL [75]

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]

QUESTION 1

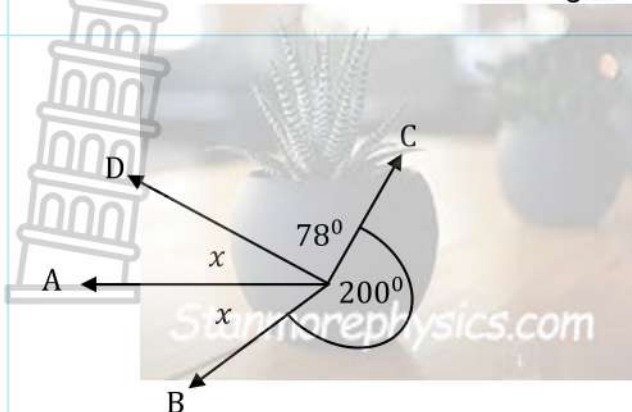
2.1 In the diagram below, AB is perpendicular to BC and $\widehat{ABD} = 60^\circ$. Calculate, with reasons, the value of an angle indicated by the small letter (m) in the diagram.

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

Statement: 1 mark
Reason: 1 mark

(2)

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

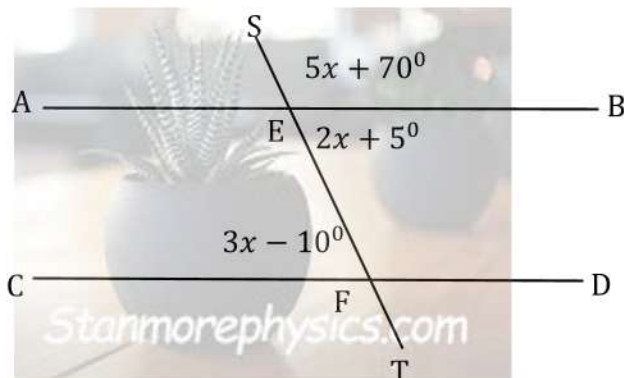


Statement	Reason
$x = \frac{360^\circ - 278^\circ}{2}$ ✓ $= 41^\circ$ ✓	Rev / $\angle$ s around a point ✓

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.

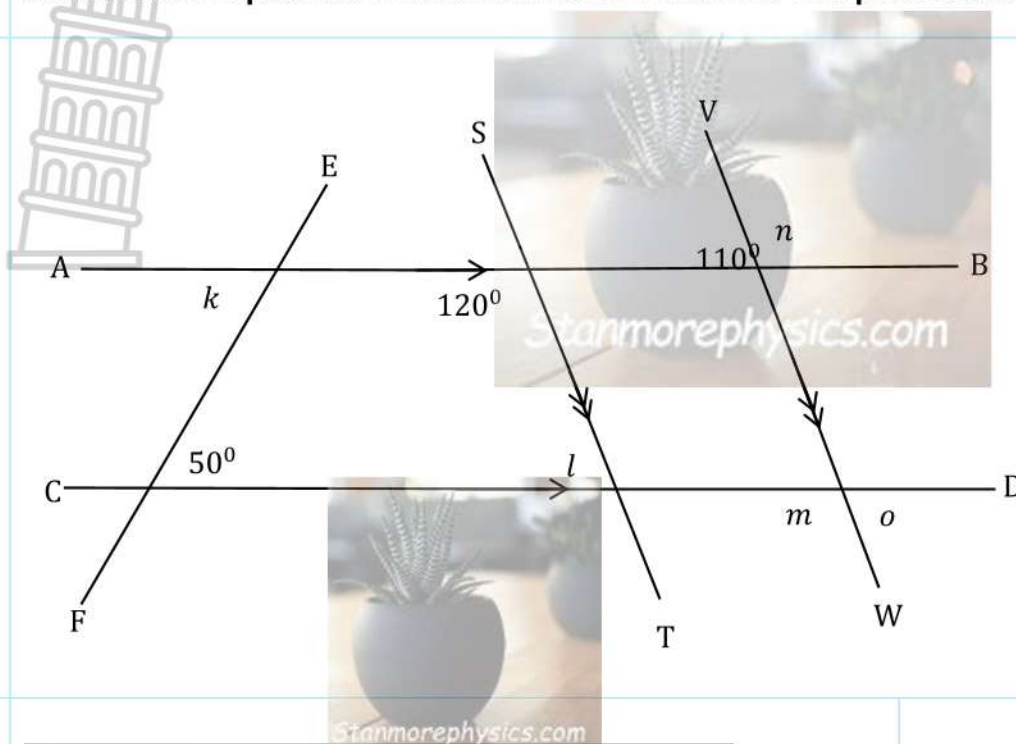


Statement	Reason
$2x + 5^\circ = 3x - 10^\circ$ ✓	Alt. $\angle$ s AB CD. ✓
$\therefore x = 15^\circ$ ✓	
OR	
$x = \frac{180^\circ - 75^\circ}{7}$ ✓	Adj. suppl $\angle$ s ✓
$\therefore x = 15^\circ$ ✓	

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

(3)

- 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
$k = 50^\circ$ ✓	alt. $\angle$ s $AB \parallel CD$. ✓
$l = 180^\circ - 120^\circ$ $= 60^\circ$ ✓	co-int. $\angle$ s $AB \parallel CD$. ✓
$m = 110^\circ$ ✓	corres. $\angle$ s $AB \parallel CD$. ✓
$n = 110^\circ$ ✓	vert. opp $\angle$ s ✓
$o = 70^\circ$ ✓	adj. suppl $\angle$ s ✓

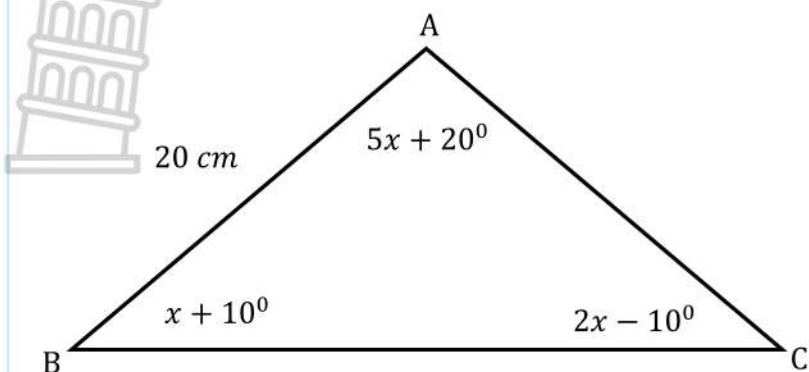
Statement: 1 mark
 Reason: 1 mark
 Statement: 1 mark
 Reason: 1 mark
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 Reason: 1 mark
 Statement: 1 mark
 Reason: 1 mark
 Statement: 1 mark
 Reason: 1 mark

(10)

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

QUESTION 3

3.1 In $\triangle ABC$, calculate, with reasons:



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

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

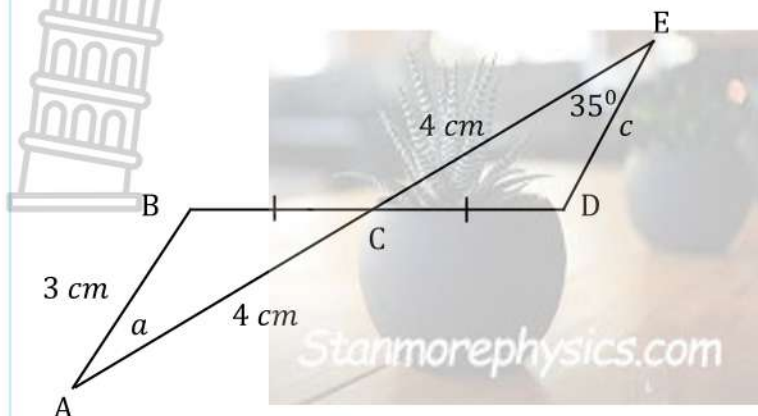
Statement: 2 marks
Reason: 1 mark
Answer: 1 mark

3.1.2 The length of AC

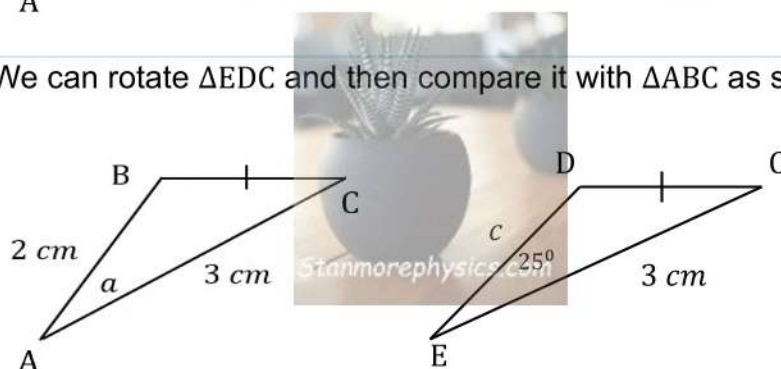
$\hat{B} = x + 10^\circ$ $= 20^\circ + 10^\circ$ $= 30^\circ$	$\hat{C} = 2x - 10^\circ$ $= 2(20^\circ) - 10^\circ$ $= 30^\circ$	$\hat{A} = 5x + 20^\circ$ $= 5(20^\circ) + 20^\circ$ $= 120^\circ$
Statement		Reason
The length of AC = 20 cm		Isosceles Δ ✓

Statement & reason: (1)
1 mark

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



We can rotate $\triangle EDC$ and then compare it with $\triangle ABC$ as shown below

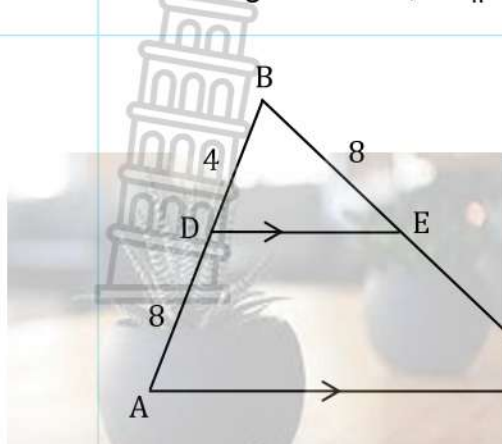


Statement	Reason
$\hat{A} = \hat{E}$ ✓ $= 35^\circ$ ✓	$\triangle ABC \equiv \triangle EDC$ ✓
Since $ED = AB$ $\therefore c = 2 \text{ cm}$ ✓	SAS ✓

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

(5)

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



3.3.1 Prove that $\triangle BAC \parallel \triangle BDE$

Statement	Reason
In $\triangle BAC$ and $\triangle BDE$	
$\widehat{BAC} = \widehat{BDE} \checkmark$	Corres $\angle$ s; $DE \parallel AC \checkmark$
$\widehat{ACB} = \widehat{BED} \checkmark$	Corres $\angle$ s; $DE \parallel AC \checkmark$
$\therefore \triangle BAC \parallel \triangle BDE$	AA $\checkmark$
Similarly $\widehat{ABC} = \widehat{DBE}$	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

$$\frac{BE}{EC} = \frac{BD}{DA} \checkmark \checkmark$$

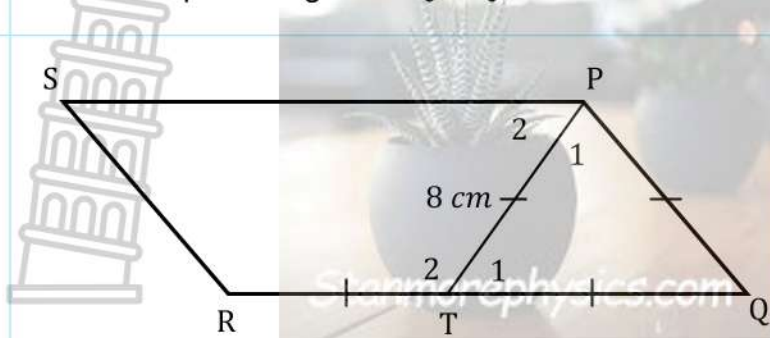
$$\frac{8}{EC} = \frac{4}{8} \checkmark$$

$$EC = \frac{8 \times 8}{4} \checkmark$$

$$= 16 \checkmark$$

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

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



3.4.1 Calculate $\hat{Q}$

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

Statement: 1 mark
Reason: 1 mark

(2)

3.4.2 Calculate $\hat{R}$

Statement	Reason
$\hat{R} = 120^\circ$ ✓	Co-int $\angle$ s $PQ \parallel SR$ ✓

Statement: 1 mark
Reason: 1 mark

(2)

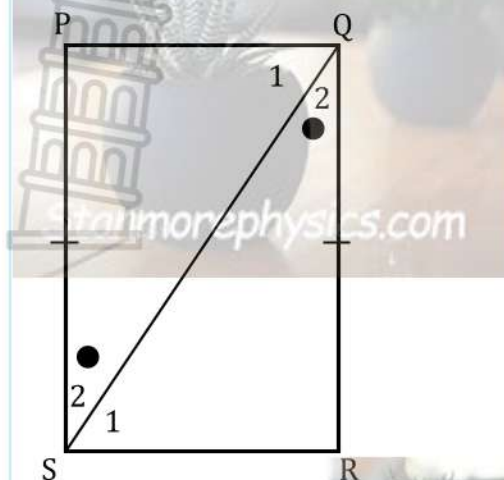
3.4.3

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

Statement: 1 mark
Reason: 1 mark

(2)

3.5 Consider $\triangle PQS$ and $\triangle RSQ$. Prove that $\triangle PQS \equiv \triangle RSQ$



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

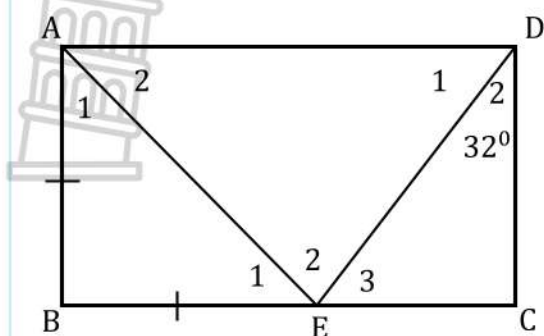
Statement: 1 mark
 Reason: 1 mark
 Statement: 1 mark
 Reason: 1 mark
 Condition: 1 mark

(5)

[30]

QUESTION 4

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



4.1.1 Find the length of the unknown side DC.

Statement	Reason
$AB = DE = 5 \text{ cm}$	opp sides of rectangle are = ✓

Statement & Reason: 1 mark

(1)

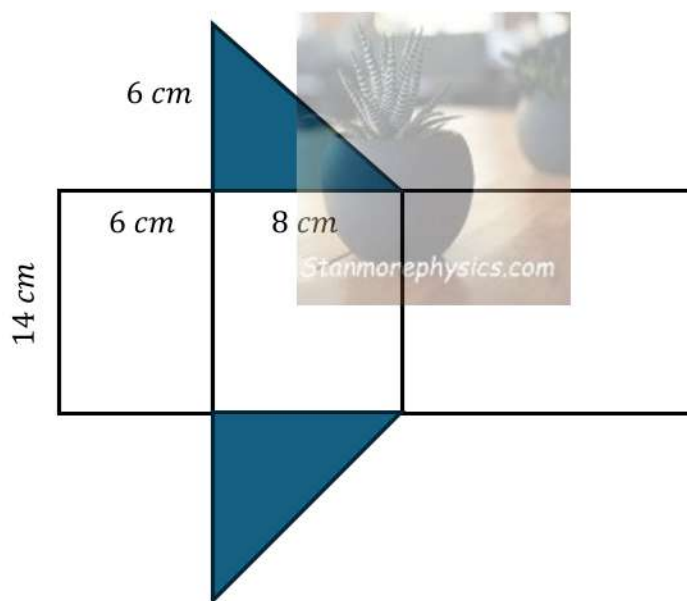
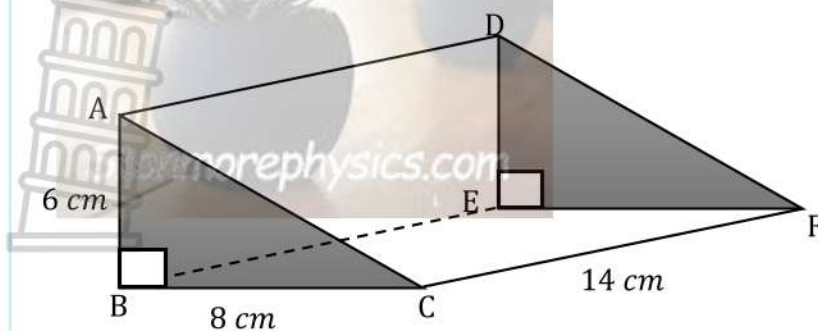
4.1.2 Calculate the value of the unknown $\hat{E}_3$

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

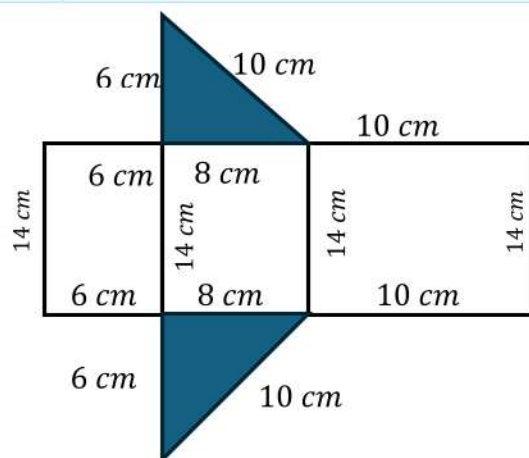
Statement & Reason: 1 mark

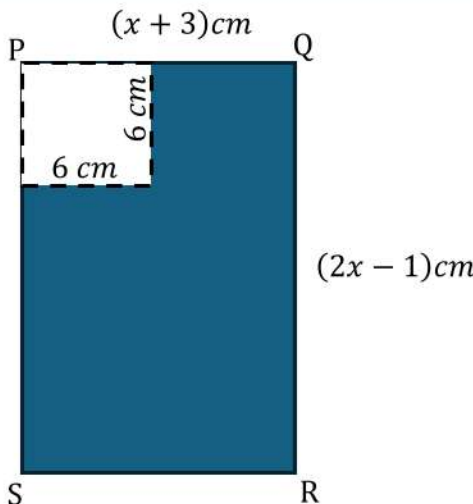
(1)

4.2 A triangular prism is given.



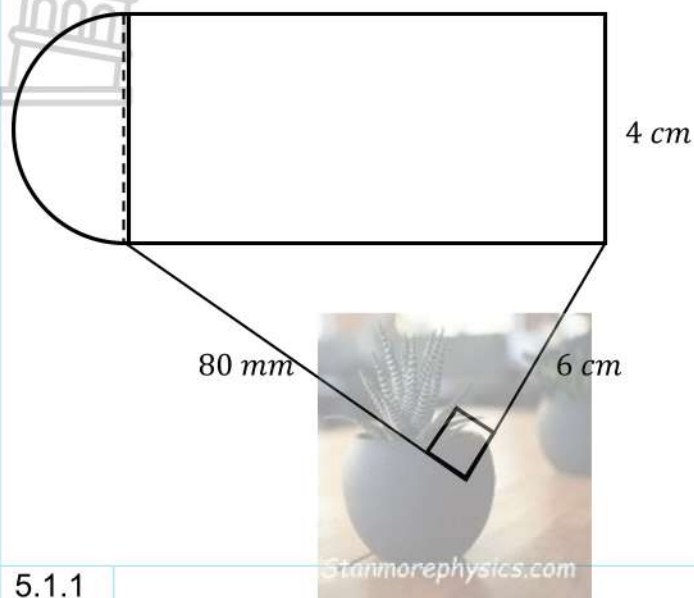
4.2.1 Find the length of AC



	<table> <tr> <th>Statement</th> <th>Reason</th> </tr> <tr> <td> $AC^2 = (6)^2 + (8)^2$ $= \sqrt{36 + 64}$ $= \sqrt{100}$ $\sqrt{AC^2} = 10 \text{ cm}$ $AC = 10 \text{ cm} \checkmark$ </td> <td>Pythagoras</td> </tr> </table>	Statement	Reason	$AC^2 = (6)^2 + (8)^2$ $= \sqrt{36 + 64}$ $= \sqrt{100}$ $\sqrt{AC^2} = 10 \text{ cm}$ $AC = 10 \text{ cm} \checkmark$	Pythagoras	Length of AC: 1 mark	(1)
Statement	Reason						
$AC^2 = (6)^2 + (8)^2$ $= \sqrt{36 + 64}$ $= \sqrt{100}$ $\sqrt{AC^2} = 10 \text{ cm}$ $AC = 10 \text{ cm} \checkmark$	Pythagoras						
4.2.2	Calculate the surface area of the triangular prism.						
	Area of $\triangle ABC = \frac{1}{2}(8 \text{ cm})(6 \text{ cm}) = 24 \text{ cm}^2$ Area of $\triangle DEF = \frac{1}{2}(8 \text{ cm})(6 \text{ cm}) = 24 \text{ cm}^2$ Area of BCDE = $(14 \text{ cm})(8 \text{ cm}) = 112 \text{ cm}^2$ Area of ABED = $(14 \text{ cm})(6 \text{ cm}) = 112 \text{ cm}^2$ Area of ACFD = $(14 \text{ cm})(10 \text{ cm}) = 112 \text{ cm}^2$ Surface area of triangular prism: $= 24 + 24 + 112 + 112 + 112$ $= 384 \text{ cm}^2 \checkmark$	Calculation: 1 mark Answer: 1 mark	(2)				
4.3	PQRS is a rectangle of length $(2x - 1) \text{ cm}$ and width $(x + 2) \text{ cm}$. If a square of side 6 cm is cut from the corner P, show that the area of the shaded region is $(2x^2 + 3x - 38) \text{ cm}$						
							
	Area shaded region = area of rectangle – area of square $= (2x - 1)(x + 2) - (6 \times 6) \checkmark \checkmark$ $= 2x^2 + 3x - 2 - 36 \checkmark$ $= (2x^2 + 3x - 38) \text{ cm} \checkmark$	Sust: 2 marks Simpl: 1 mark Answer: 1 mark	(4)				
			[9]				

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

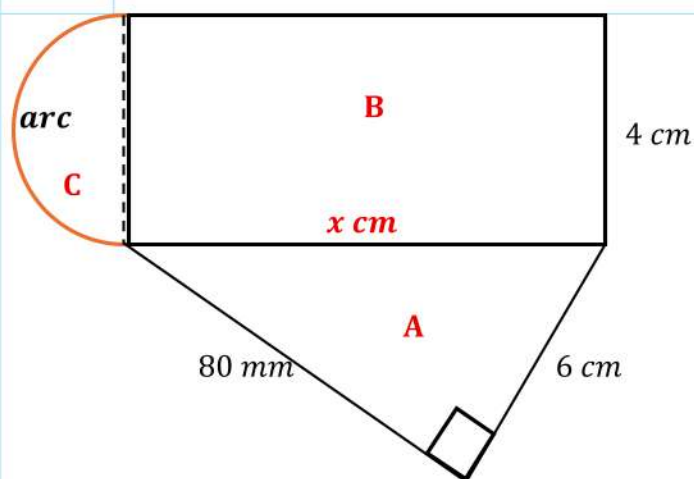
Convert mm to cm

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

Conv: 1 mark

(1)

5.1.2 Determine the perimeter of the shape

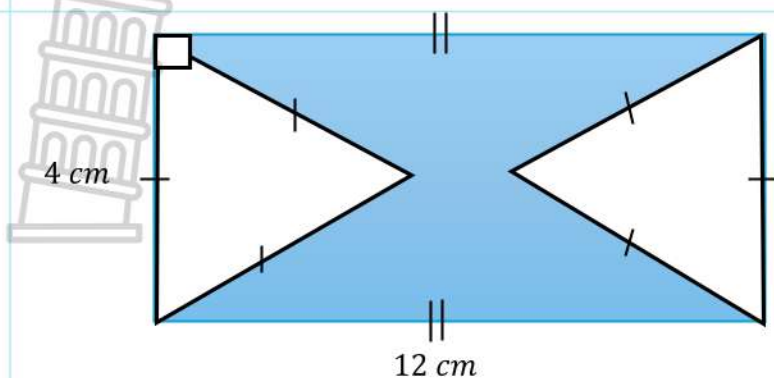


Statement	Reason
Length of the rectangle $x = 10 \text{ cm}$	Pythagoras ✓

Value of x : 1 mark

(1)

5.2 Study the diagram below and calculate, correct to two decimal places where necessary the area of the shaded region. [Hint: $h = 6\text{ cm}$]



Area of 2 Δ s = $2\left[\left(\frac{1}{2} 4 \times 6\right)\right] = 24\text{ cm}^2$ ✓
 Area of rectangle = $12 \times 4 = 48\text{ cm}^2$ ✓
 Area of the shaded region = $48 - 24 = 24\text{ cm}^2$ ✓

24 cm^2 : 1 mark
 48 cm^2 : 1 mark
 Total area: 1 mark

(3)

[9]

Total

[75]