

Question 1

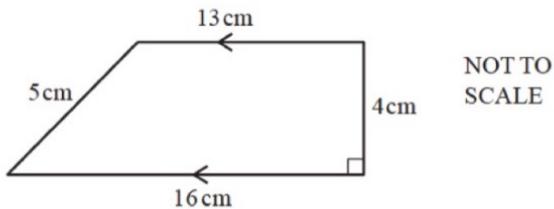
The area of a triangle is 528cm^2 .
The length of its base is 33 cm.

Calculate the perpendicular height of the triangle.

$$\Delta = \frac{1}{2} \times 33 \times h$$
$$h = \frac{2 \times 528}{33} = 32\text{cm}$$

[2]

Question 2



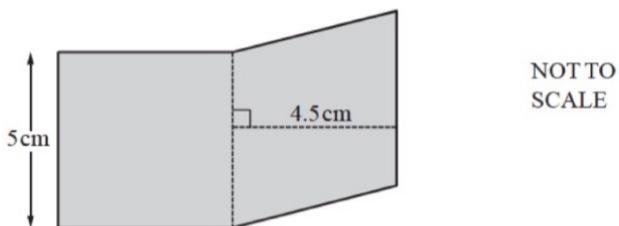
Calculate the area of this trapezium.

$$\text{Area} = \frac{1}{2} \times (a+b) \times h$$
$$= \frac{1}{2} (13 + 16) \times 4$$
$$= 58\text{cm}^2$$

[2]

Question 3

The shaded shape is made by joining a square and a rhombus.



Work out

(a) the perimeter of the shaded shape,

30cm

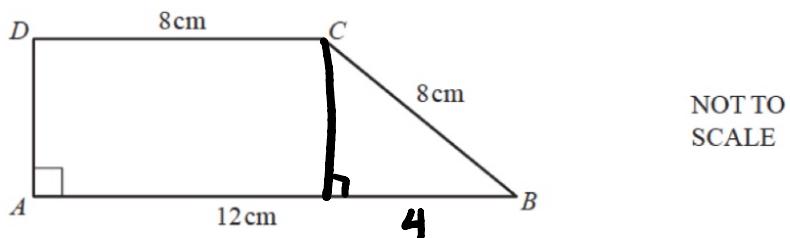
[1]

(b) the area of the shaded shape.

$25 + 22.5 = 47.5\text{cm}^2$

[2]

Question 4



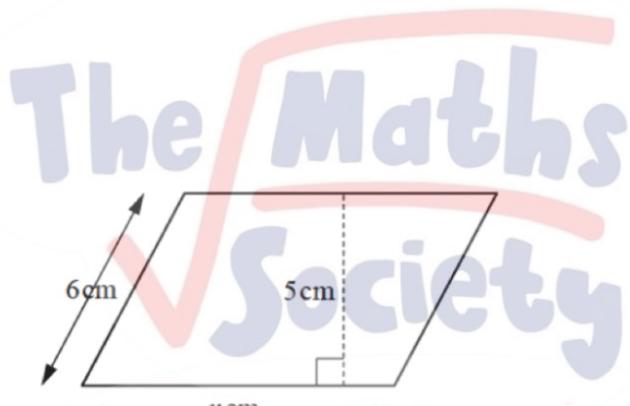
Calculate the area of this trapezium.

[4]

$$\sqrt{64-16} = 6.93 \text{ cm}$$

$$\begin{aligned}\text{Area} &= \frac{1}{2} \times 20 \times 6.93 \\ &= 69.3 \text{ cm}^2\end{aligned}$$

Question 5



The area of this parallelogram is 51.5 cm^2 .

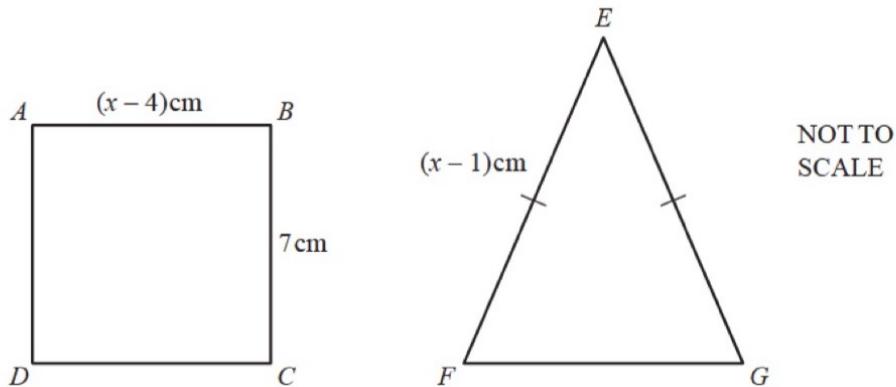
Work out the value of x .

[2]

$$5x = 51.5$$

$$x = 10.3 \text{ cm}$$

Question 6



(a) $ABCD$ is a square.

Find the value of x .

[1]

$$x - 4 = 7$$

$$x = 11\text{ cm}$$

(b) Square $ABCD$ and isosceles triangle EFG have the same perimeter.

Work out the length of FG .

$$28 = 20 + FG$$

$$FG = 8\text{ cm}$$

Question 7

0.1cm

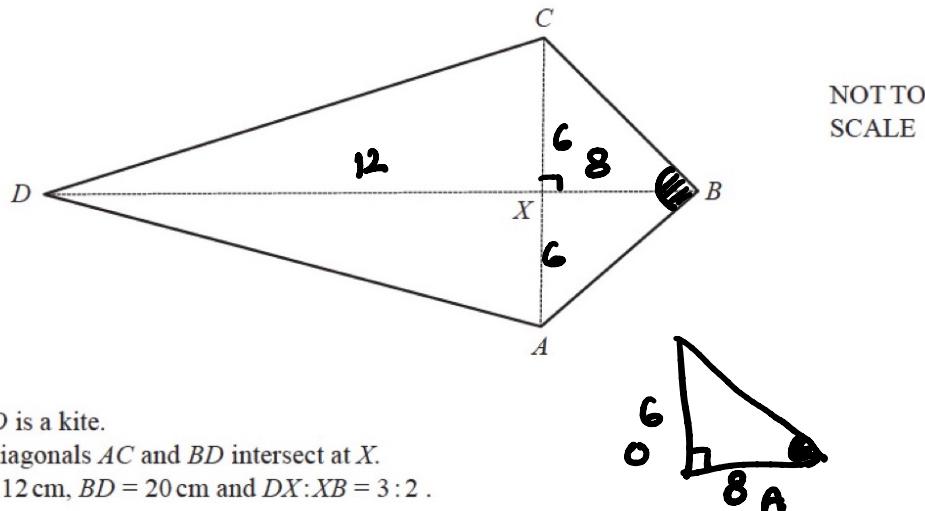
An equilateral triangle has sides of length 6.2 cm, correct to the nearest millimetre.

Complete the statement about the perimeter, P cm, of the triangle.

$$6.15 \leq P < 6.25$$

[2]

Question 8



$ABCD$ is a kite.

The diagonals AC and BD intersect at X .

$AC = 12 \text{ cm}$, $BD = 20 \text{ cm}$ and $DX:XB = 3:2$.

(a) Calculate angle ABC .

[3]

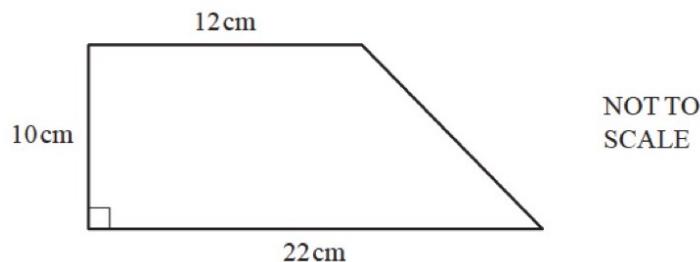
$$\begin{aligned}\tan \theta &= \frac{6}{8} \\ \theta &= 36.9^\circ \\ \angle ABC &= 73.7^\circ\end{aligned}$$

[2]

(b) Calculate the area of the kite.

$$\begin{aligned}2 \times \frac{1}{2} \times 6 \times 8 &= 48 \\ 2 \times \frac{1}{2} \times 6 \times 8 &= 72 \\ &\frac{120}{\text{cm}^2}\end{aligned}$$

Question 1



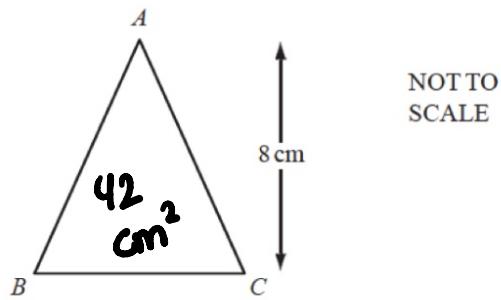
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Find the area of the trapezium.

[2]

$$\begin{aligned}\frac{1}{2} (12 + 22) \times 10 \\ \frac{34 \times 10}{2} = 170 \text{ cm}^2\end{aligned}$$

Question 2



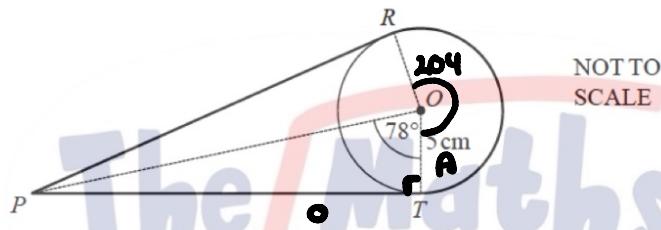
Triangle ABC has a height of 8 cm and an area of 42 cm^2 .

Calculate the length of BC .

$$\frac{1}{2} \times x \times 8 = 42 \quad [2]$$

$$x = \frac{42}{4} = 10\frac{1}{2} \text{ cm}$$

Question 3



R and T are points on a circle, centre O , with radius 5 cm.
 PR and PT are tangents to the circle and angle $POT = 78^\circ$.

A thin rope goes from P to R , around the major arc RT and then from T to P .

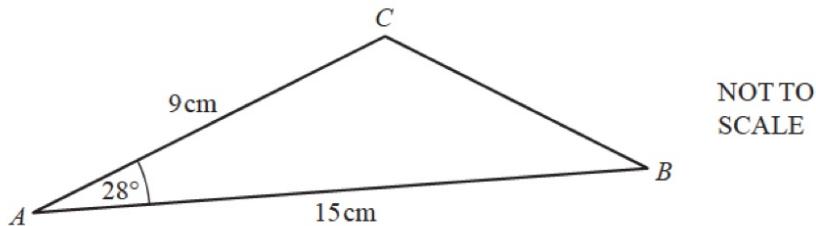
Calculate the length of the rope.

$$\tan 78^\circ = \frac{PT}{5} \quad [6]$$

$$PT = 23.5 \text{ cm} \quad \text{length} = 64.8 \text{ cm}$$

$$\text{Arc} = \frac{204}{360} \times 2\pi \times 5 = 17.8 \text{ cm}$$

Question 4



Calculate the area of triangle ABC .

$$A = \frac{1}{2} \times 9 \times 15 \times \sin 28^\circ \quad [2]$$

$$= 31.7 \text{ cm}^2$$

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Question 5

A large rectangular card measures 80 centimetres by 90 centimetres.

Maria uses all this card to make small rectangular cards measuring 40 millimetres by 15 millimetres. **1.5**

Calculate the number of small cards.

4

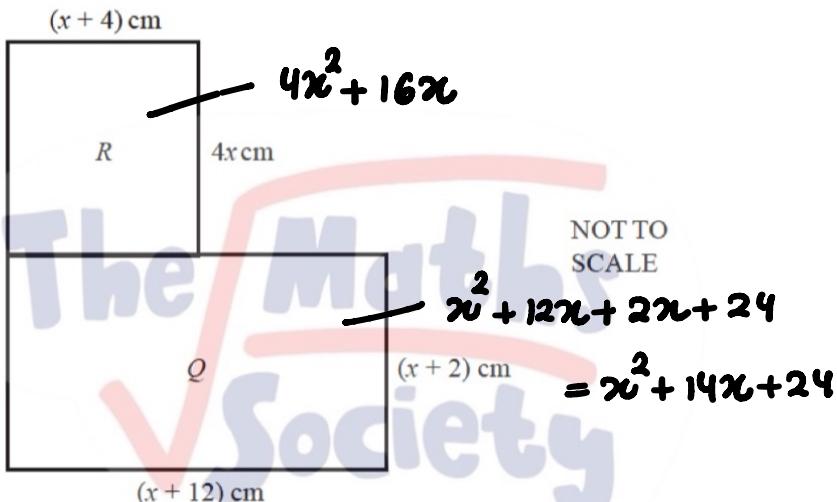
[2]

$$\text{large } \square = 7200 \text{ cm}^2$$

$$\text{small } \square = 6 \text{ cm}^2$$

$$\text{number} = \frac{7200}{6} = 1200$$

Question 6



- (a) (i) Write down an expression for the area of rectangle R .

[1]

$$4x \times (x+4) = 4x^2 + 16x$$

- (ii) Show that the total area of rectangles R and Q is $5x^2 + 30x + 24$ square centimetres.

[1]

$$4x^2 + 16x + x^2 + 14x + 24$$

$$= 5x^2 + 30x + 24 \text{ (shown)}$$

$$\begin{array}{r} 32 \\ + 36 \\ \hline 68 \end{array}$$

- (b) The total area of rectangles R and Q is 64 cm^2 .

Calculate the value of x correct to 1 decimal place.

$$5x^2 + 30x + 24 = 64$$

$$5x^2 + 30x = 40$$

$$5x^2 + 30x - 40 = 0$$

$$x^2 + 6x - 8 = 0$$

$$x = \frac{-6 \pm \sqrt{36 + 4 \times 8}}{2} = \frac{-6 \pm \sqrt{68}}{2}$$

$$\text{The Maths Society} = \frac{-6 + 8.25}{2}$$

$$= \frac{2.25}{2} \text{ or } -\frac{14.25}{2} \text{ (reject)}$$

$$= 1.1$$

Question 1

1cm

The base of a triangle is 9 cm correct to the nearest cm.

The area of this triangle is 40 cm² correct to the nearest 5 cm².

Calculate the upper bound for the perpendicular height of this triangle.

$$A = \frac{1}{2}bh$$

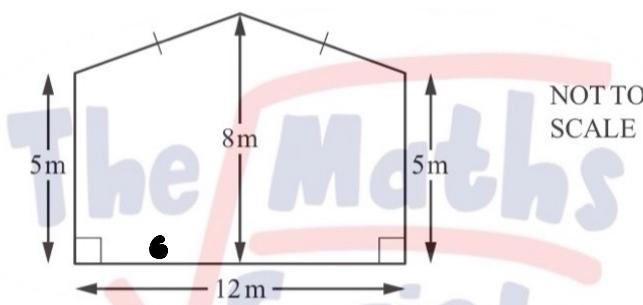
$$h = \frac{2A}{b} \leftarrow \text{UB} = \frac{2 \times 42.5}{8.5} = \frac{85}{8.5}$$

$$\begin{array}{r} 42.5 \\ \times 2 \\ \hline 85.0 \end{array}$$

$$= 10 \text{ cm}$$

[3]

Question 2



The diagram shows the front face of a barn.

The width of the barn is 12 m.

The height of the barn is 8 m.

The sides of the barn are both of height 5 m.

(a) Work out the area of the front face of the barn.

[3]

$$\frac{1}{2}(a+b) \times h = \frac{1}{2}(5+8) \times 6^3$$

$$= 13 \times 3 = 39$$

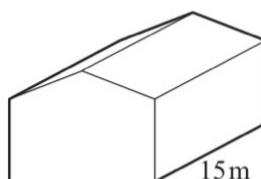
$$\text{total} = 39 \times 2 = 78 \text{ m}^2$$

(b) The length of the barn is 15 m.

Work out the volume of the barn.

$$V = 78 \times 15$$

$$= 1170 \text{ m}^3$$



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[1]

Question 3

The scale on a map is $1 : 20\,000$.

The area of a lake on the map is 1.6 square centimetres.

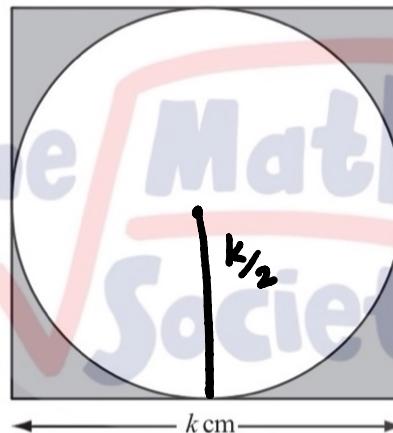
Calculate the actual area of the lake.

Give your answer in square metres.

[3]

$$\begin{aligned}
 1 \text{ cm (map)} &= 20\,000 \text{ (real)} \\
 \text{cm}^2 \rightarrow m^2 & \quad 1 \text{ cm}^2 = 4 \times 10^8 \\
 & \quad 1.6 \text{ cm}^2 = 6.4 \times 10^8 \text{ cm}^2 \\
 & \quad 640000000 \text{ cm}^2 = 64000 \text{ m}^2
 \end{aligned}$$

Question 4



The diagram shows a square of side k cm.

The circle inside the square touches all four sides of the square.

(a) The shaded area is A cm 2 .

$$\text{Show that } 4A = 4k^2 - \pi k^2.$$

[2]

$$\begin{aligned}
 \pi r^2 &= \frac{k^2}{4} \pi & k^2 - \frac{k^2}{4} \pi &= A \\
 4k^2 - k^2 \pi &= 4A \text{ (shown)}
 \end{aligned}$$

(b) Make k the subject of the formula $4A = 4k^2 - \pi k^2$.

[3]

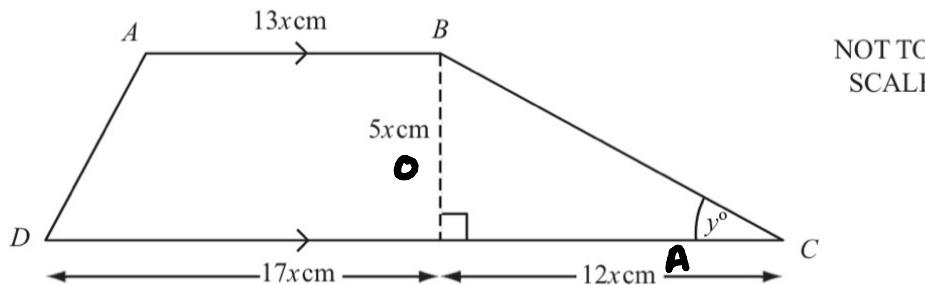
$$k^2(4 - \pi) = 4A$$

$$k^2 = \frac{4A}{4 - \pi}$$

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$$k = \sqrt{\frac{4A}{4 - \pi}}$$

Question 5



$ABCD$ is a trapezium.

(a) Find the area of the trapezium in terms of x and simplify your answer.

[2]

$$\begin{aligned} & \frac{1}{2}(a+b) \times h \\ &= \frac{1}{2}(13x + 17x + 12x) \times 5x \\ &= \frac{1}{2} \times 42x \times 5x = 105x^2 \end{aligned}$$

(b) Angle $BCD = y^\circ$. Calculate the value of y .

[2]

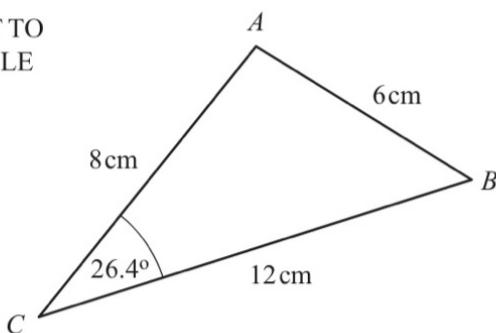
$$\begin{aligned} \tan y^\circ &= \frac{5x}{12x} \\ y^\circ &= \tan^{-1}\left(\frac{5}{12}\right) \\ y^\circ &= 22.6^\circ \end{aligned}$$

Question 6

In triangle ABC , $AB = 6\text{ cm}$, $AC = 8\text{ cm}$ and $BC = 12\text{ cm}$. Angle $ACB = 26.4^\circ$. Calculate the area of the triangle ABC .

[2]

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$$\begin{aligned} A &= \frac{1}{2}ab \sin C \\ &= \frac{1}{2} \times 8 \times 12 \times \sin 26.4^\circ \\ &= 21.3 \text{ cm}^2 \end{aligned}$$