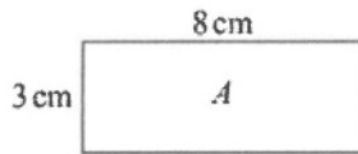


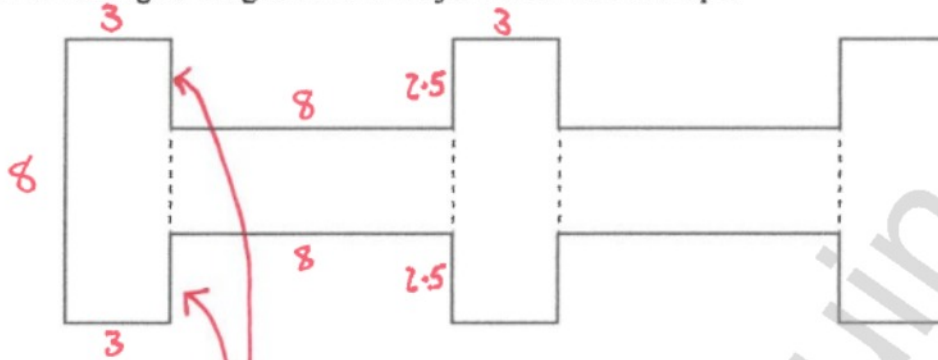
A Basic Area, Perimeter, Pythagoras and SOHCAHTOA

- 1 Rectangle A measures 3 cm by 8 cm.



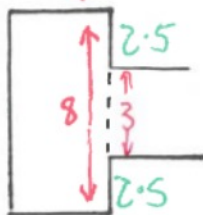
NOT TO SCALE

Five rectangles congruent to A are joined to make a shape.



NOT TO SCALE

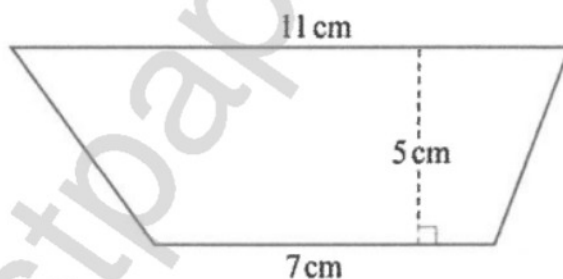
Work out the perimeter of this shape.



$$\begin{aligned} \text{Perimeter} &= 6 \times 8 + 6 \times 3 + 8 \times 2.5 \\ &= 48 + 18 + 20 \end{aligned}$$

86 cm [2]

6

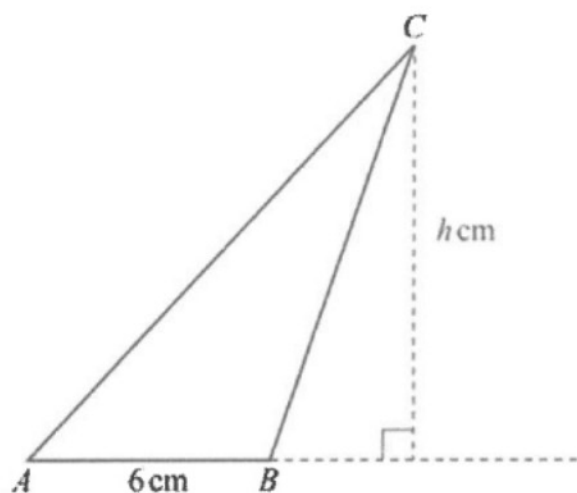


NOT TO SCALE

Calculate the area of the trapezium.

$$\begin{aligned} \text{Area} &= \frac{1}{2} (a+b) \times h \\ &= \frac{1}{2} (11+7) \times 5 \\ &= \frac{1}{2} \times 18 \times 5 \\ &= 9 \times 5 \\ &= 45 \text{ cm}^2 \end{aligned}$$

45 cm² [2]



NOT TO
SCALE

The area of triangle ABC is 27 cm^2 and $AB = 6 \text{ cm}$.

Calculate the value of h .

$$\text{Area} = \frac{1}{2} \times b \times h$$

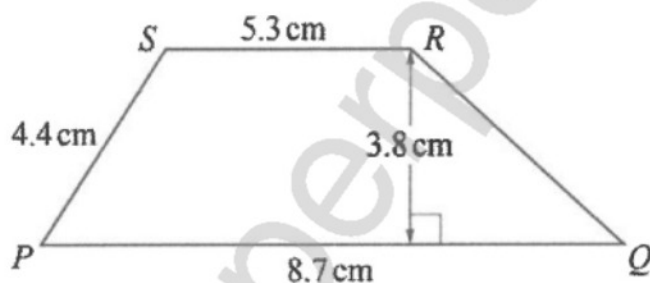
$$27 = \frac{1}{2} \times 6 \times h$$

$$27 = 3h$$

$$h = 9 \text{ cm}$$

$$h = \underline{9 \text{ cm}} \quad [2]$$

10



NOT TO
SCALE

The diagram shows a trapezium $PQRS$.

Calculate the area of the trapezium.

$$\text{Area} = \frac{1}{2} (a + b) \times h$$

$$= \frac{1}{2} (5.3 + 8.7) \times 3.8$$

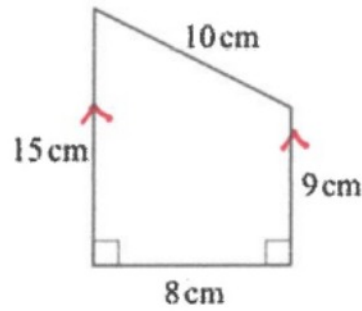
$$= \frac{1}{2} \times 14 \times 3.8$$

$$= 7 \times 3.8$$

$$= 26.6 \text{ cm}^2$$

$$\underline{26.6} \text{ cm}^2 \quad [2]$$

6

NOT TO
SCALE

Work out the area of the trapezium.

$$\begin{aligned}
 \text{Area} &= \frac{1}{2}(a+b) \times h \\
 &= \frac{1}{2}(15+9) \times 8 \\
 &= \frac{1}{2} \times 24 \times 8
 \end{aligned}$$

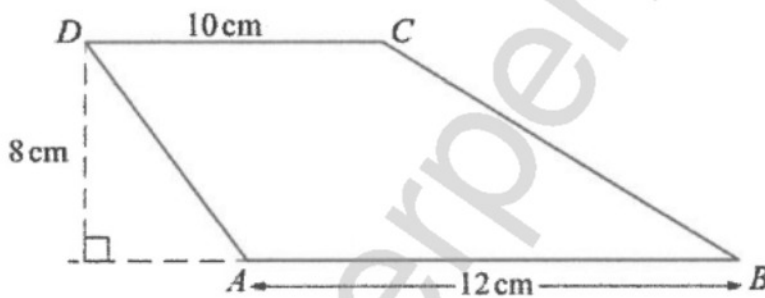
$$= 12 \times 8$$

$$= 96 \text{ cm}^2$$

96

..... cm² [2]

4

NOT TO
SCALE*ABCD* is a trapezium.

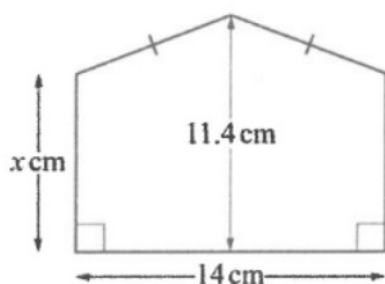
Work out the area of the trapezium.

$$\begin{aligned}
 \text{Area} &= \frac{1}{2}(a+b) \times h \\
 &= \frac{1}{2}(10+12) \times 8 \\
 &= \frac{1}{2} \times 22 \times 8 \\
 &= 11 \times 8 \\
 &= 88 \text{ cm}^2
 \end{aligned}$$

88

..... cm² [2]

- 4 The diagram shows a pentagon made from two congruent trapeziums.



NOT TO
SCALE

The area of the pentagon is 130.2 cm^2 .

Calculate the value of x .

Pentagon is two trapezia stuck together:



$$\begin{aligned} \text{Area} &= \frac{130.2}{2} \\ &= 65.1 \text{ cm}^2 \end{aligned}$$

$$\text{Area} = \frac{1}{2}(a+b) \times h$$

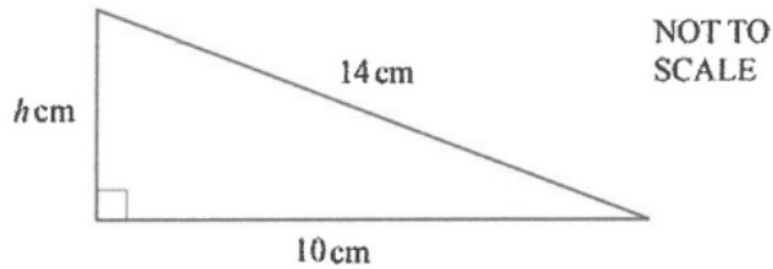
$$65.1 = \frac{1}{2}(x + 11.4) \times 7$$

$$130.2 = 7(x + 11.4)$$

$$\begin{aligned} 130.2 &= 7x + 79.8 \\ -79.8 &\quad -79.8 \end{aligned}$$

$$\begin{aligned} 50.4 &= 7x \\ \div 7 &\quad \div 7 \end{aligned}$$

$$\underline{\underline{x = 7.2 \text{ cm}}}$$



The diagram shows a right-angled triangle.

- (a) Calculate the value of h .

$$a^2 + b^2 = c^2 :$$

$$h^2 + 10^2 = 14^2$$

$$h^2 + 100 = 196$$

$$\begin{array}{r} -100 \quad -100 \\ h^2 = 96 \end{array}$$

$$h^2 = 96$$

$$h = \sqrt{96}$$

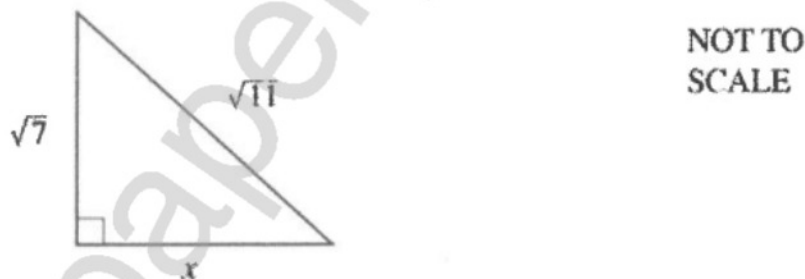
$$= 9.80$$

$$h = 9.80 \text{ cm} \quad [3]$$

- (b) Find the perimeter of this triangle.

$$10 + 14 + 9.80 = 33.8$$

$$33.8 \text{ cm} \quad [1]$$



Find the value of x .

$$a^2 + b^2 = c^2 :$$

$$x^2 + (\sqrt{7})^2 = (\sqrt{11})^2$$

$$x^2 + 7 = 11$$

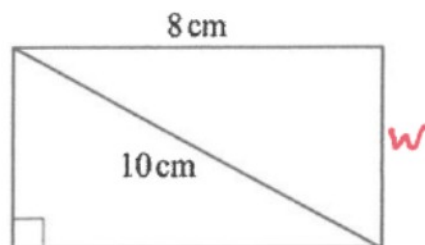
$$\begin{array}{r} -7 \quad -7 \\ x^2 = 4 \end{array}$$

$$x^2 = 4$$

$$x = \sqrt{4}$$

$$= 2$$

$$x = 2 \quad [2]$$



NOT TO
SCALE

The length of the diagonal of the rectangle is 10 cm.
The length of the rectangle is 8 cm.

Work out the width of the rectangle.

$$a^2 + b^2 = c^2 :$$

$$w^2 + 8^2 = 10^2$$

$$\begin{array}{rcl} w^2 + 64 & = & 100 \\ -64 & -64 & \end{array}$$

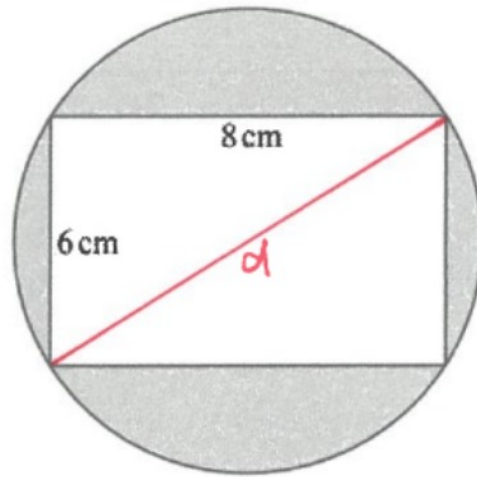
$$w^2 = 36$$

$$w = \sqrt{36}$$

$$w = 6 \text{ cm}$$

6

..... cm [3]



NOT TO
SCALE

The four vertices of the rectangle each lie on the circle.

Find the shaded area.

Give your answer, in terms of π , in its simplest form.

$$6^2 + 8^2 = d^2$$

$$36 + 64 = d^2$$

$$100 = d^2$$

$$d = \sqrt{100}$$

$$= 10 \text{ cm}$$

radius: $r = \frac{10}{2} = 5 \text{ cm}$

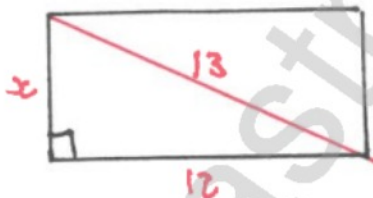
Area of circle: $A = \pi \times r^2$
 $= 25\pi$

Area of rectangle: $A = 6 \times 8$
 $= 48$

$25\pi - 48$ cm^2 [4]

- 13 The length of one side of a rectangle is 12 cm.
 The length of the diagonal of the rectangle is 13 cm.

Calculate the area of the rectangle.



$$x^2 + 12^2 = 13^2$$

$$x^2 + 144 = 169$$

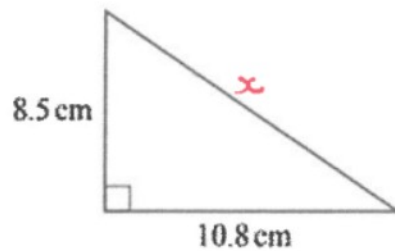
$$\quad \quad -144 \quad \quad -144$$

$$x^2 = 25$$

$$x = 5 \text{ cm}$$

Area = 12×5
 $= 60 \text{ cm}^2$

60 cm^2 [3]



NOT TO
SCALE

The diagram shows a right-angled triangle.

(a) Calculate the area.

$$\begin{aligned} \text{Area} &= \frac{1}{2} \times 10.8 \times 8.5 \\ &= \underline{45.9 \text{ cm}^2} \end{aligned}$$

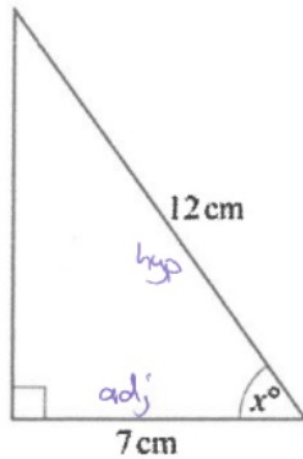
$$\underline{45.9} \text{ cm}^2 [2]$$

(b) Calculate the perimeter.

$$\begin{aligned} 8.5^2 + 10.8^2 &= x^2 \\ 72.25 + 116.64 &= x^2 \\ 188.89 &= x^2 \\ x &= \sqrt{188.89} \\ &= \underline{13.7 \text{ cm}} \end{aligned}$$

$$\begin{aligned} \text{perimeter} &= 8.5 + 10.8 + 13.7 \\ &= \underline{33.0 \text{ cm}} \end{aligned}$$

$$\underline{33.0} \text{ cm [3]}$$

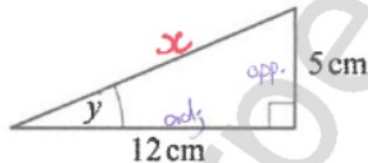
NOT TO
SCALECalculate the value of x . S^oH C^AH T^oA

$$\cos(x) = \frac{7}{12}$$

$$x = \cos^{-1}\left(\frac{7}{12}\right)$$

$$= 54.3^\circ$$

$$x = 54.3^\circ \quad [2]$$

7 Find, as a fraction, the value of $\sin y$.NOT TO
SCALES^oH C^AH T^oA

$$5^2 + 12^2 = x^2$$

$$25 + 144 = x^2$$

$$169 = x^2$$

$$x = 13 \text{ cm}$$

$$\sin y = \frac{\text{opp}}{\text{hyp}}$$

$$\sin y = \frac{5}{13}$$

$$\sin y = \frac{5}{13} \quad [3]$$

12 The lengths of the sides of a triangle are 3 cm, 4 cm and 5 cm.

Find the sine of the smallest angle.

↳ right-angled because $3^2 + 4^2 = 5^2$
 $9 + 16 = 25$

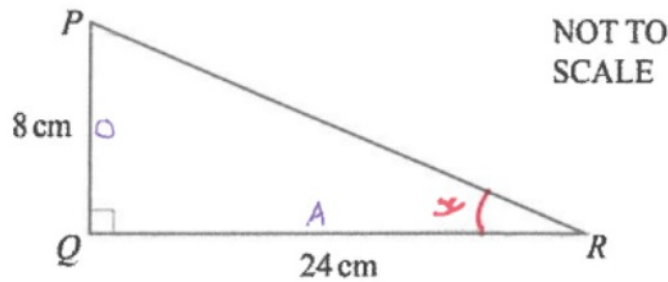


$$\sin x = \frac{3}{5}$$

↑ smallest angle is
opposite shortest side

$$\frac{3}{5} \quad [1]$$

4 (a)



(i) Calculate the area of triangle PQR.

$$\begin{aligned} \text{Area} &= \frac{1}{2} \times b \times h \\ &= \frac{1}{2} \times 24 \times 8 \\ &= 12 \times 8 \\ &= 96 \text{ cm}^2 \end{aligned}$$

96 cm² [2]

(ii) Calculate angle PRQ.

S^o H C^A H T^o A

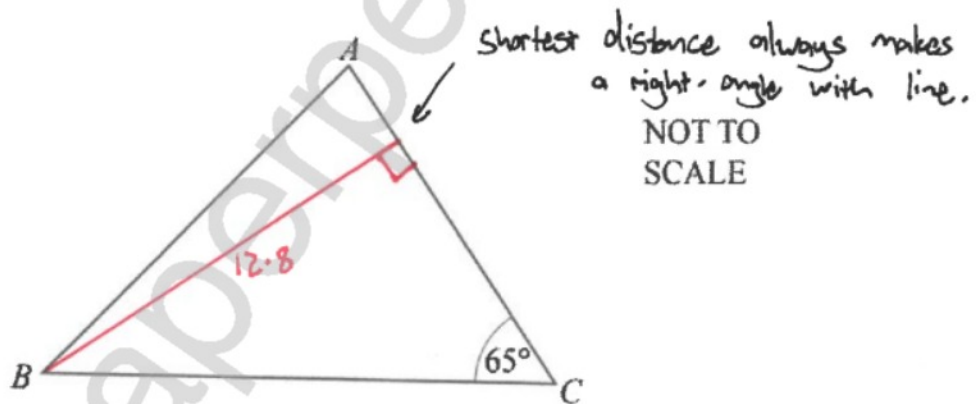
$$\tan x = \frac{8}{24}$$

$$x = 18.4^\circ$$

$$x = \tan^{-1}\left(\frac{8}{24}\right)$$

Angle PRQ = 18.4° [2]

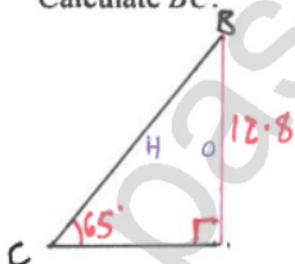
21



The shortest distance from B to AC is 12.8 cm.

S^o H C^A H T^o A

Calculate BC.

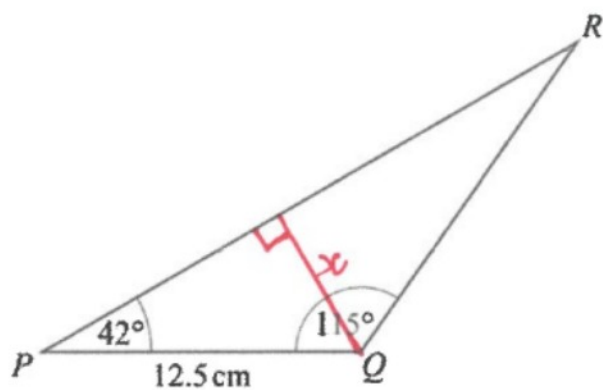


$$\sin 65 = \frac{12.8}{BC}$$

$$BC = \frac{12.8}{\sin 65}$$

$$BC \sin 65 = 12.8$$

BC = 14.1 cm [3]

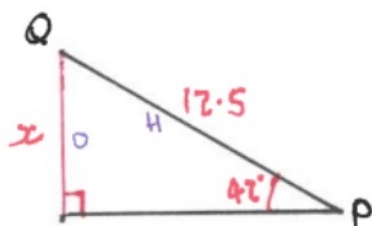


NOT TO
SCALE

The diagram shows triangle PQR .

Calculate the shortest distance from Q to PR .

SINCE



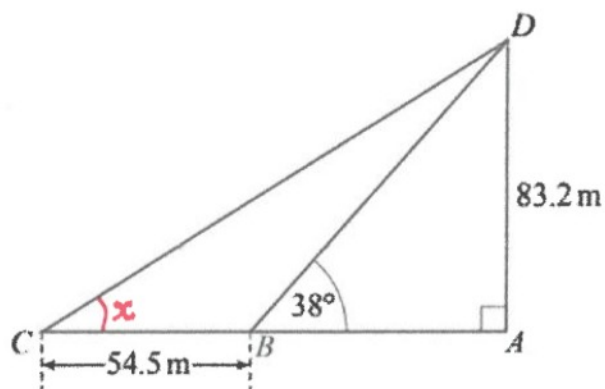
$$\sin 42^\circ = \frac{x}{12.5}$$

$$x = 12.5 \sin 42^\circ$$

$$= 8.36$$

$$\underline{\underline{8.36}} \text{ cm [3]}$$

5 (a)

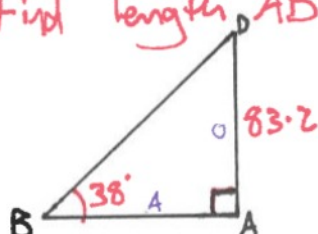


NOT TO SCALE

ACD is a right-angled triangle.
 B is on AC and $BC = 54.5$ m.
 $AD = 83.2$ m and angle $ABD = 38^\circ$.

Calculate angle ACD .

Find length AB :



S^o H C^A H T^o A

$$\tan 38 = \frac{83.2}{AB}$$

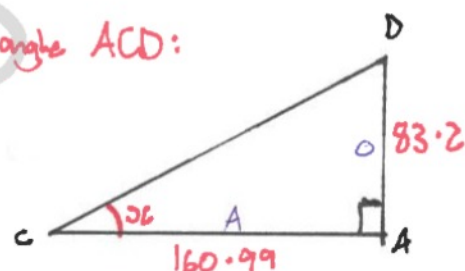
$$AB \tan 38 = 83.2$$

$$AB = \frac{83.2}{\tan 38} = 106.49 \text{ m}$$

Length AC :

$$AC = 106.49 + 54.5 = 160.99$$

Triangle ACD :

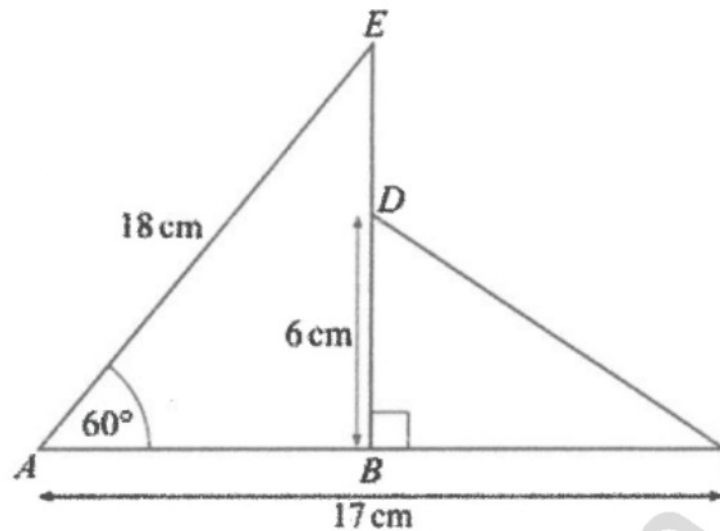


S^o H C^A H T^o A

$$\tan x = \frac{83.2}{160.99}$$

$$x = \tan^{-1} \left(\frac{83.2}{160.99} \right)$$

$$= 27.3^\circ$$



The quadrilateral $ACDE$ is formed by two right-angled triangles ABE and BCD .
 $AC = 17$ cm, $AE = 18$ cm and $BD = 6$ cm.

(a) Show that $CD = 10$ cm.

ABE: Find AB: SOHCAHTOA

$\cos 60 = \frac{AB}{18}$

$AB = 18 \cos 60$

$= 9 \text{ cm}$

$BC = 17 - 9 = 8 \text{ cm}$

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

$36 + 64 = x^2$

$x^2 = 100$

$x = 10 \text{ cm}$

[5]

(b) Find the perimeter of the quadrilateral $ACDE$.
 Give your answer in the form $p + k\sqrt{q}$.

Need to find length DE: SOHCAHTOA

$\sin 60 = \frac{BE}{18}$

$BE = 18 \sin 60$

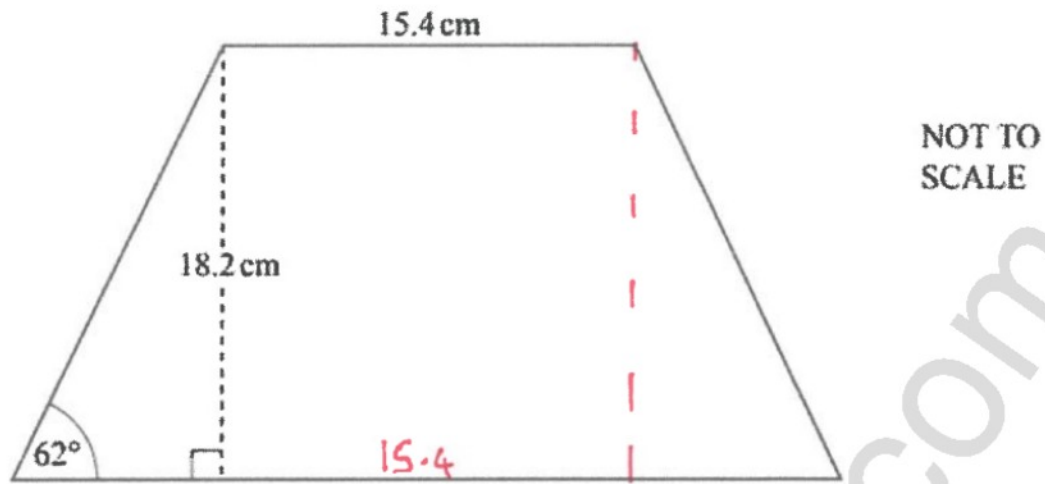
$= 9\sqrt{3}$

$DE = 9\sqrt{3} - 6$

Perimeter: $10 + 17 + 18 + 9\sqrt{3} - 6$

$= 39 + 9\sqrt{3}$

$39 + 9\sqrt{3}$ cm [4]



The diagram shows a trapezium.
The trapezium has one line of symmetry.

Work out the area of the trapezium.

Need to know the base of the trapezium.



S^oH C^A H T^oA

$$\tan 62^\circ = \frac{18.2}{x}$$

$$x \tan 62^\circ = 18.2$$

$$x = \frac{18.2}{\tan 62^\circ}$$

$$= \frac{18.2}{1.8807} = 9.677..$$

STO

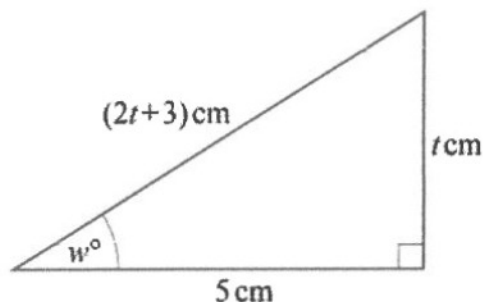
$$\text{base} = 9.677.. \times 2 + 15.4$$

$$= 34.754..$$

$$\text{Area} = \frac{1}{2} (15.4 + 34.754) \times 18.2$$

$$= \frac{1}{2} \times 50.154 \times 18.2$$

$$= 456 \text{ cm}^2 \text{ [4]}$$



NOT TO
SCALE

The diagram shows a right-angled triangle.

Find the value of w .

$$a^2 + b^2 = c^2 :$$

$$5^2 + t^2 = (2t+3)^2$$

$$25 + t^2 = (2t+3)(2t+3)$$

$$25 + t^2 = 4t^2 + 12t + 9$$

$$t^2 = 4t^2 + 12t - 16$$

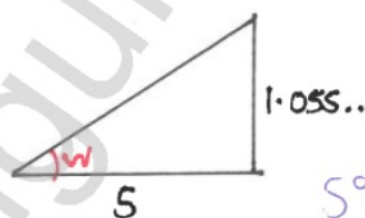
$$3t^2 + 12t - 16 = 0$$

$$t = \frac{-12 \pm \sqrt{12^2 - 4(3)(-16)}}{2(3)}$$

$$= \frac{-12 \pm \sqrt{336}}{6}$$

$$t = \frac{1.055..}{5} \text{ or } t = -5.055..$$

X
can't be negative



$$\tan w = \frac{1.055..}{5}$$

$$w = \tan^{-1}\left(\frac{1.055..}{5}\right)$$

$$= 11.9^\circ$$

$$w = 11.9^\circ \quad [7]$$