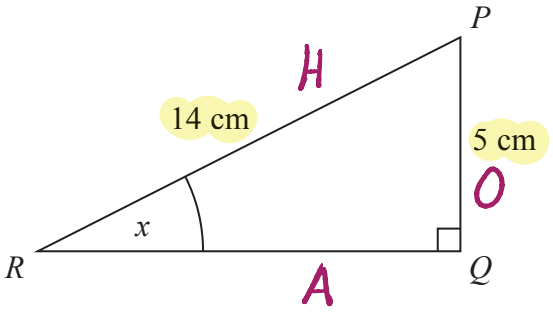
1. *PQR* is a right-angled triangle.



Work out the size of the angle marked *x*.
Give your answer correct to 1 decimal place.

SOH CAH TOA

$\sin\theta = \frac{O}{H}$

$\sin x = \frac{5}{14}$ (1)

$x = \sin^{-1}\left(\frac{5}{14}\right)$ using calculator

$x = 20.92483\ldots$

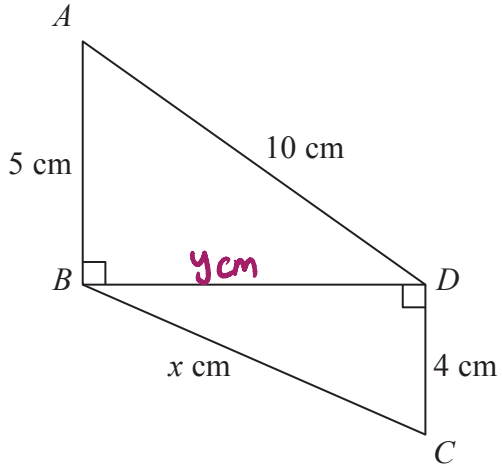
$= 20.9^\circ$ (1dp)

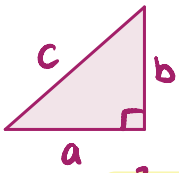
20.9 (1) °

2 marks

2. Triangles *ABD* and *BCD* are right-angled triangles.

→ Pythagoras' theorem





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

Work out the value of x.
Give your answer correct to 2 decimal places.

For triangle ABD

$y^2 + 5^2 = 10^2$

$y^2 = 10^2 - 5^2$

$y^2 = 75$ (1)

For triangle BCD

$y^2 + 4^2 = x^2$

use $y^2 = 75$

$75 + 4^2 = x^2$

$75 + 16 = x^2$ (1)

$x^2 = 91$

$x = \pm\sqrt{91}$ (1)

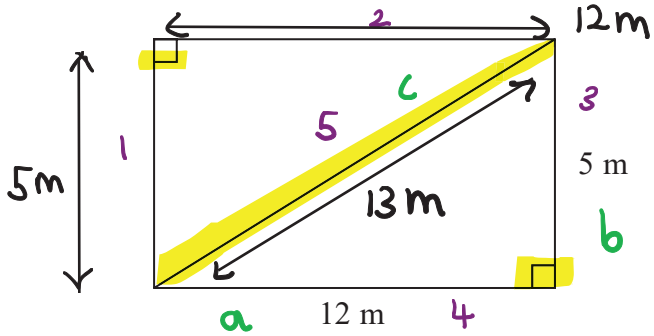
x is a length so reject $-\sqrt{91}$

$x = \sqrt{91} = 9.54$ (2dp) (1)

$x = 9.54$

4 marks

3. This rectangular frame is made from 5 straight pieces of metal.



The weight of the metal is 1.5 kg per metre.

Work out the total weight of the metal in the frame.

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

(1) $12^2 + 5^2 = c^2$. $144 + 25 = c^2$. $169 = c^2$.

$c = \sqrt{169} = 13$ (1)

Total length: $5 + 5 + 12 + 12 + 13 = 47$ m (1)

Weight:

1 metre = 1·5 kg.

×47 ↓

47 metres = 70·5 kg (1) ×47

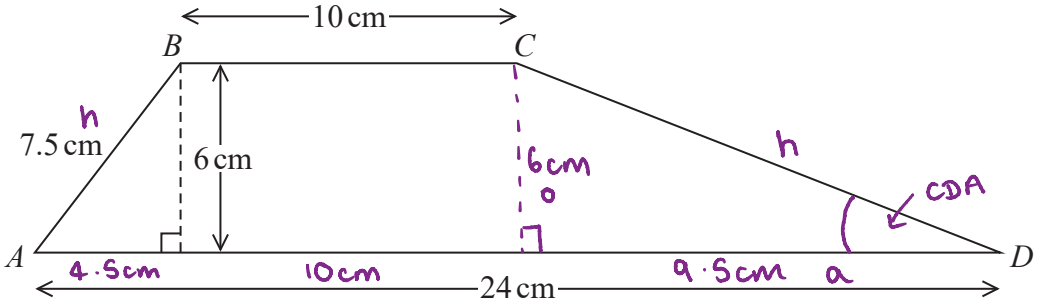
(1)

Answer = 70·5 kg.

..... kg

(Total for Question is 5 marks)

4. *ABCD* is a trapezium.



Work out the size of angle *CDA*.
Give your answer correct to 1 decimal place.

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

$a^2 = c^2 - b^2$

$a^2 = 7.5^2 - 6^2$ ✓

$a^2 = 20.25$

$a = 4.5$ ✓

$24 - 10 - 4.5 = 9.5\text{cm}$ ✓

$\tan x = \frac{o}{a}$

$\tan x = \frac{6}{9.5}$

$x = \tan^{-1}\left(\frac{6}{9.5}\right)$ ✓

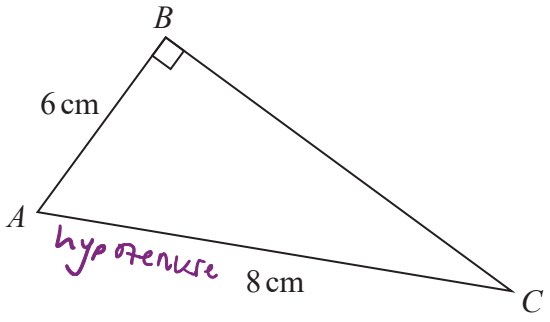
$x = 32.2756\ldots$

$x = 32.3°$

32.3 ✓ °

(Total for Question is 5 marks)

5. ABC is a right-angled triangle.



Here is Sarah's method to find the length of BC.

$$BC^2 = AB^2 + AC^2$$
$$= 6^2 + 8^2$$
$$= 100$$
$$BC = 10$$

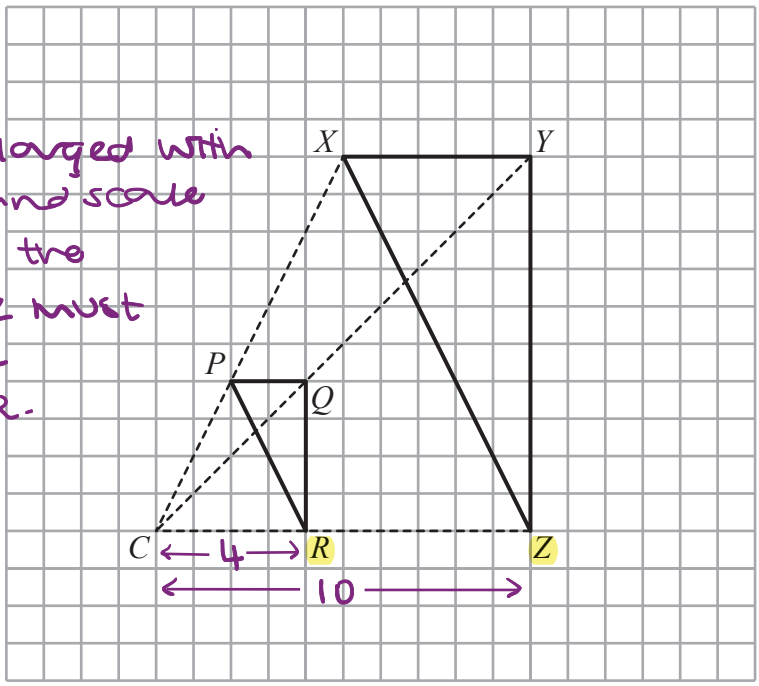
$a^2 + b^2 = c^2$, where c is the hypotenuse.

(a) What mistake has Sarah made in her method?

She thought that BC was the hypotenuse when it was actually AC. (1)

(1)

If PQR is enlarged with centre C and scale factor 1.5, the distance CZ must be 1.5 × the distance CR.



Roy is going to enlarge triangle PQR with centre C and scale factor $1\frac{1}{2}$

He draws triangle XYZ.

(b) Explain why Roy's diagram is **not** correct.

the scale factor that Roy used is not 1.5. (1)

.....

.....

.....

(1)

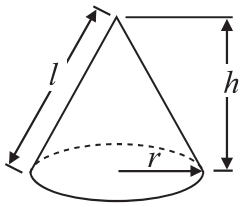
(Total for Question is 2 marks)

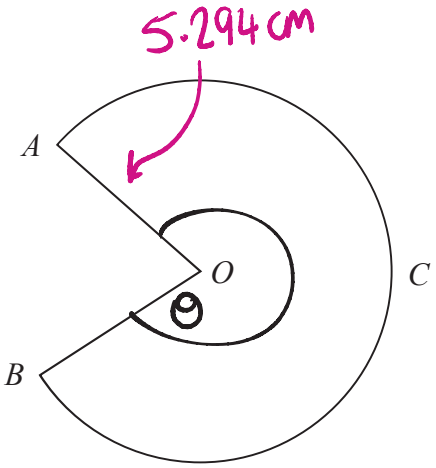
6. The diagram shows a sector $OACB$ of a circle with centre O.
The point C is the midpoint of the arc AB.

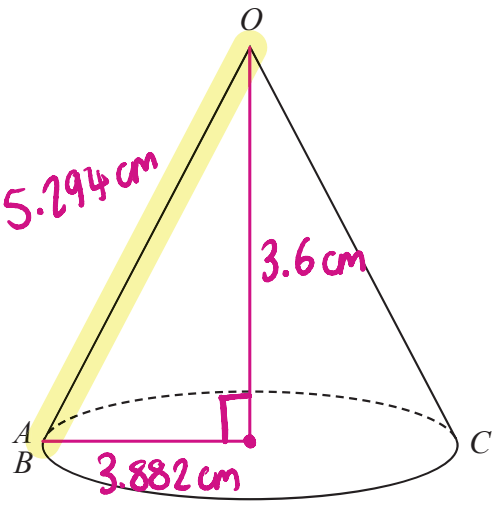
The diagram also shows a hollow cone with vertex O.
The cone is formed by joining OA and OB.

Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi r l$







The cone has volume $56.8\,\text{cm}^3$ and height $3.6\,\text{cm}$.

Calculate the size of angle AOB of sector $OACB$.
Give your answer correct to 3 significant figures.
You must show all your working.

$V = \frac{1}{3}\pi r^2 h$

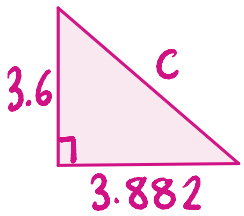
$56.8 = \frac{1}{3}\pi r^2 (3.6)$ (1)

$\frac{56.8}{1.2\pi} = \frac{1.2\pi r^2}{1.2\pi}$

$r^2 = \frac{56.8}{1.2\pi}$ → square root

$r = 3.882$ (3dp) (1)

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



$3.882^2 + 3.6^2 = c^2$

$c^2 = 28.030$ (3dp)

$c = 5.294$ (3dp) → square root (1)

Curved SA cone $= \pi r l$

Curved SA cone

$= \pi \times 3.882 \times 5.294$

$= 20.551\pi$ (3dp)

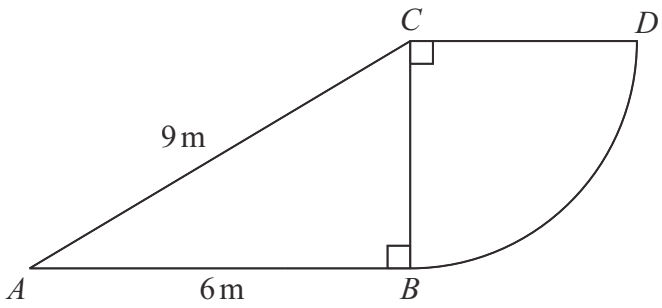
$$\text{Sector Area} = \frac{\theta}{360} \times \pi r^2$$

$$20.551\pi = \frac{\theta}{360} \times \pi (5.294)^2 \quad (1)$$

$$20.551 \times 360 = \theta \times (5.294)^2$$

$$\theta = \frac{20.551 \times 360}{(5.294)^2} = 263.978 \text{ (3dp)} = 264^\circ \text{ (3sf)} \quad (1)$$

7. The diagram shows a right-angled triangle and a quarter circle.



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

$\therefore b^2=c^2-a^2$

$b=\sqrt{c^2-a^2}$

$CB=\sqrt{9^2-6^2}$

$=\sqrt{81-36}=\sqrt{45}$

$=3\sqrt{5}$

The right-angled triangle ABC has angle $ABC = 90°$
The quarter circle has centre C and radius CB.

Work out the area of the quarter circle.
Give your answer correct to 3 significant figures.
You must show all your working.

Area of Circle $= \pi r^2$

Area of quarter circle $= \frac{1}{4}\pi r^2 = \frac{1}{4}\pi(3\sqrt{5})^2$

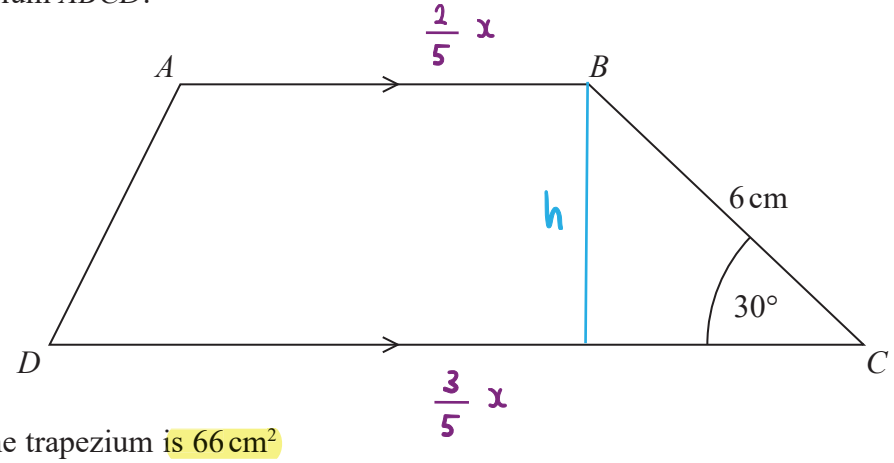
$= 35.342...$

$\approx 35.3\,m^2$

35.3 ..... m^2

(Total for Question is 4 marks)

8. Here is trapezium $ABCD$.



The area of the trapezium is $66\,cm^2$

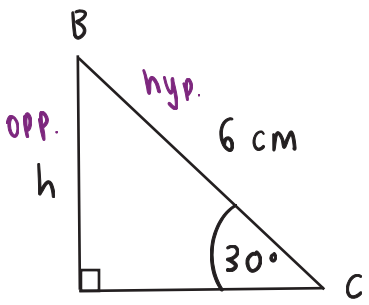
the length of AB : the length of CD = 2 : 3

Find the length of AB.

AB : CD = 2 : 3

5 parts in total.
AB has 2 of these 5 parts.
CD has 3 of these 5 parts.

Find height of trapezium:



$\sin 30 = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{h}{6}$

$\sin 30 = \frac{1}{2}$ (1)

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

$\times 6$ $\times 6$

$3 = h$ (1)

Area of trapezium: (1)

$A = \left(\frac{a+b}{2}\right)h$. $\quad 66 = \left(\frac{\frac{2}{5}x + \frac{3}{5}x}{2}\right)(3)$

Find length AB: (1)

$66 = \left(\frac{x}{2}\right)(3)$

$\div 3$ $\div 3$

$22 = \frac{x}{2}$

$\times 2$ $\times 2$

$44 = x$

$AB = \frac{2}{5}x$

$= \frac{2}{5}(44)$

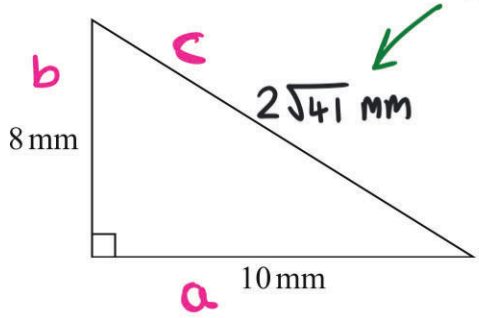
$= 17.6$ cm

(1)

17.6 cm

(Total for Question is 5 marks)

9. Here is a right-angled triangle.



Using Pythagoras Theorem

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

$10^2+8^2=c^2$

$c^2=164$ (1)

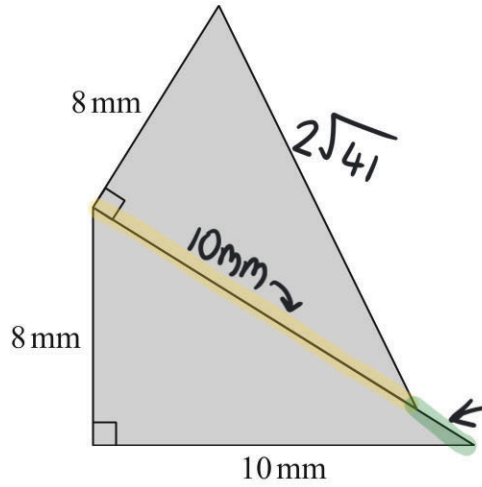
$c=\pm\sqrt{164}$

$=\pm 2\sqrt{41}$

Ignore negative since cannot have negative length

$c=2\sqrt{41}$ (1)

The shaded shape below is made from two of these triangles.



Work out the perimeter of the shaded shape.
Give your answer correct to 3 significant figures.

Perimeter $= 10+8+8+2\sqrt{41}+(2\sqrt{41}-10) = 41.61249... = 41.6$ mm (3sf) (1) (1)

41.6 ..... mm