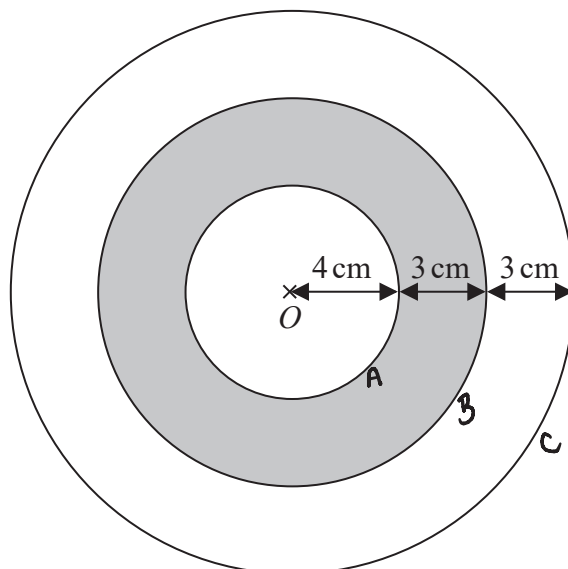


1. The diagram shows a logo made from three circles.



Each circle has centre O .

Daisy says that exactly $\frac{1}{3}$ of the logo is shaded.

Is Daisy correct?

You must show all your working.

$$\text{Area of circle} = \pi r^2$$

$$\begin{aligned} A & \pi \times 4^2 \\ & = 16\pi \end{aligned}$$

$$\begin{aligned} B & \pi \times 7^2 \\ & = 49\pi \end{aligned}$$

$$\begin{aligned} C & \pi \times 10^2 \\ & 100\pi \end{aligned}$$

$$B - A$$

$$\begin{aligned} \text{Shaded Area} & \\ & = 49\pi - 16\pi \\ & = 33\pi \end{aligned}$$

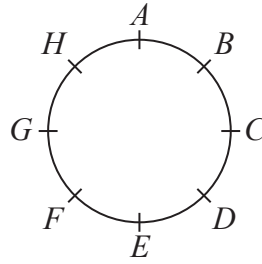
$$\frac{33\pi}{100\pi}$$

$$= \frac{33}{100}$$

Daisy is not correct because $\frac{33}{100} \neq \frac{1}{3}$

(Total for Question is 4 marks)

2. Hasmeet walks once round a circle with diameter 80 metres.



There are 8 points equally spaced on the circumference of the circle.

- (a) Find the distance Hasmeet walks between one point and the next point.

$$\text{circumference of circle} = \pi \times d$$

$$= \pi \times 80$$

$$= 80\pi \quad \checkmark$$

$$(\div 8)$$

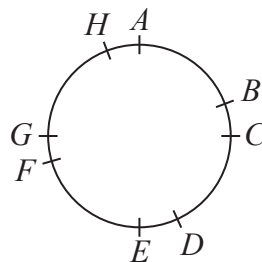
$$= 10\pi$$

$$= 31.42 \quad (2.d.p)$$

$$\underline{\quad 31.42 \quad \checkmark \quad} \text{ m}$$

(2)

Four of the points are moved, as shown in the diagram below.



Hasmeet walks once round the circle again.

- (b) Has the mean distance that Hasmeet walks between one point and the next point changed? You must give a reason for your answer.

No, because the number of points and circumference of the circle has stayed the same

(1)

(Total for Question is 3 marks)

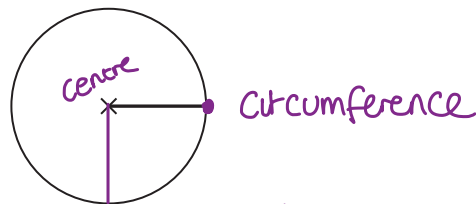
Scale down to work out the cost of 1kg, then multiply up to find the cost for 2kg

$3 \text{ kg} = \text{£}54$
 $\div 3$
 $1 \text{ kg} = \text{£}18$
 $\times 2$
 $2 \text{ kg} = \text{£}36$

This could be done in one step, simply by multiplying each side by $\frac{2}{3}$ to reach an answer for 2kg in one calculation

36

3. The centre of this circle is marked with a cross (x).



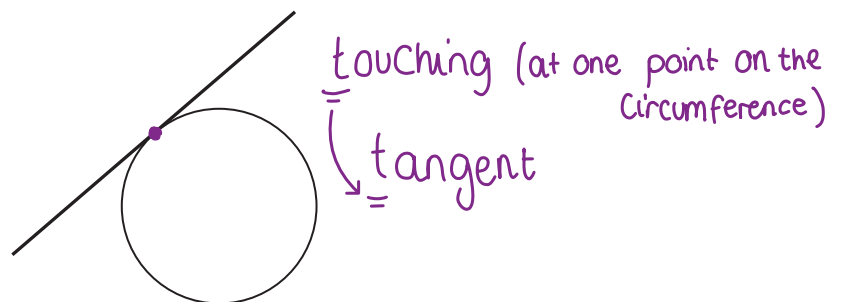
radius can be drawn at any point from the centre to a point on the circumference.

(a) Write down the mathematical name of the straight line shown in the circle.

radius

(1)

(b) Write down the mathematical name of the straight line that is touching the circle.

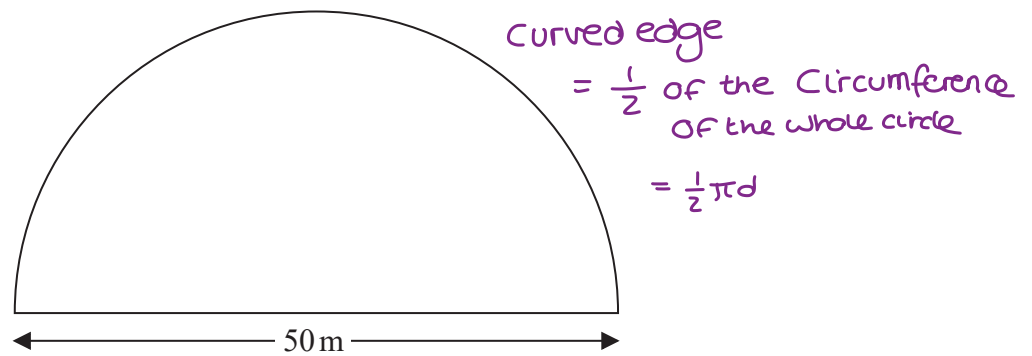


tangent

(1)

(Total for Question is 2 marks)

4. A farmer has a field in the shape of a semicircle of diameter 50 m.



The farmer asks Jim to build a fence around the edge of the field.
 Jim tells him how much it will cost.

Total cost = £29.86 per metre of fence plus £180 for each day's work

Jim takes three days to build the fence.

Work out the total cost.

Whole circle
 Circumference: $\pi d = \pi \times 50$
 $= 50\pi \text{ m}$ (1)

Curved edge: $\frac{1}{2} \times 50\pi = 25\pi \text{ m}$

Semicircle perimeter: $= 25\pi + 50$
 $= 128.54 \text{ m}$ (1)

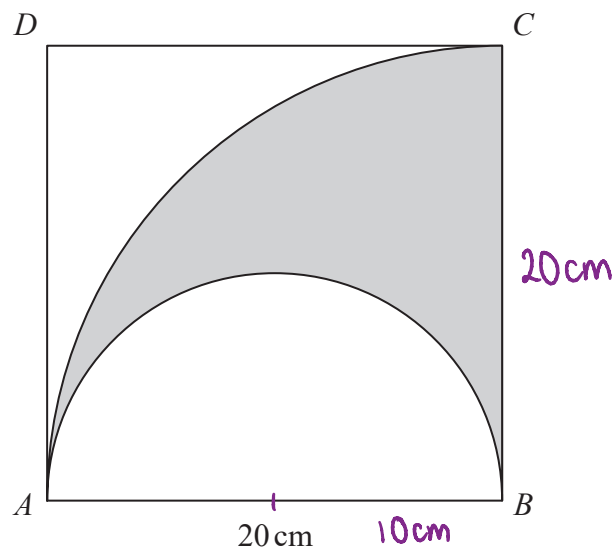
Fence cost: length (m) \times cost per m
 $128.54 \text{ m} \times \text{£}29.86 = \text{£}3838.20$

Work cost: days \times cost per day
 $3 \times \text{£}180 = \text{£}540$ (1)

Total cost: fence cost + work cost
 $= \text{£}3838.20 + \text{£}540$ (1)
 $= \text{£}4378.20$ £ 4,378.20 (1)

(Total for Question is 5 marks)

5. The diagram shows a square $ABCD$ with sides of length 20 cm. It also shows a semicircle and an arc of a circle.



AB is the diameter of the semicircle.
 AC is an arc of a circle with centre B .

Show that $\frac{\text{area of shaded region}}{\text{area of square}} = \frac{\pi}{8}$

$$\text{Area of circle} = \pi r^2$$

$$\begin{aligned} \text{Area of } ACB &= \frac{\pi (20)^2}{4} \\ &= \frac{\pi \times 400}{4} \\ &= 100\pi \end{aligned}$$

$$100\pi - 50\pi = 50\pi$$

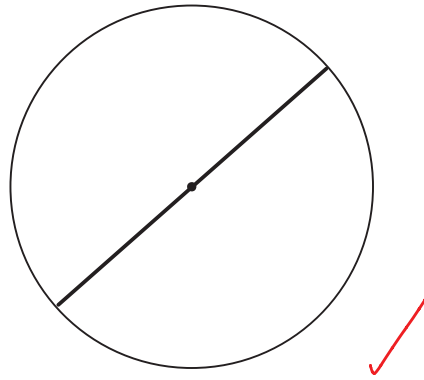
$$\begin{aligned} \text{Area of square} &= b \times h \\ &= 20 \times 20 \\ &= 400 \end{aligned}$$

$$\begin{aligned} \text{Area of semi-circle} &= \frac{\pi (10)^2}{2} \\ &= \frac{\pi \times 100}{2} \\ &= 50\pi \end{aligned}$$

$$\begin{aligned} \frac{\text{Area of shaded region}}{\text{Area of square}} &= \frac{50\pi}{400} \\ &= \frac{5\pi}{40} \\ &= \frac{\pi}{8} \end{aligned}$$

(Total for Question is 4 marks)

6.

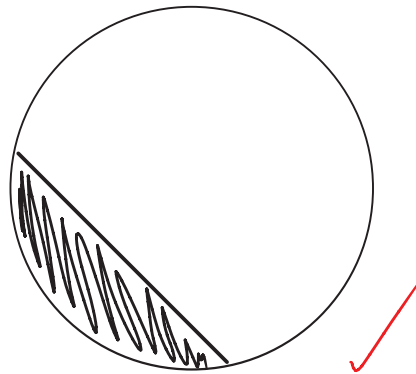


(a) On the diagram above, draw a diameter of the circle.

(1)

(b) On the diagram below, draw a segment of the circle.

Shade the segment.



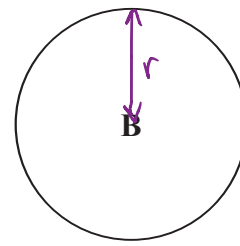
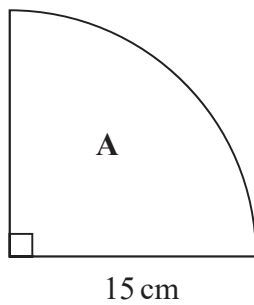
(1)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

7. **A** is in the shape of a **quarter circle** of radius 15 cm.
B is in the shape of a circle.



The area of **A** is **9 times** the area of **B**.

Show that the radius of **B** is 2.5 cm.

$$\text{Area} = \pi \times r^2$$

$$\text{Area of shape A} = \frac{\pi r^2}{4}$$

$$\text{Area of A} = 9 \times \text{Area of B}$$

$$\text{Area of A} = \frac{\pi \times 15^2}{4}$$

$$= \frac{225\pi}{4}$$

$$= 56.25\pi \quad \checkmark$$

$$56.25\pi = 9 \times \pi r^2$$

$$(\div \pi) \quad (\div \pi)$$

$$56.25 = 9r^2$$

$$(\div 9) \quad (\div 9)$$

$$6.25 = r^2 \quad \checkmark$$

$$(\sqrt{\quad}) \quad (\sqrt{\quad})$$

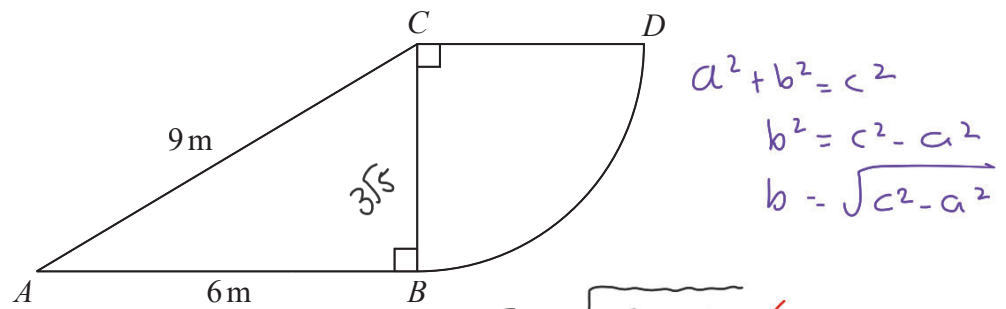
$$\pm 2.5 = r$$

(r must be positive)

$$r = 2.5 \quad \checkmark$$

(Total for Question 7 is 3 marks)

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



The right-angled triangle ABC has angle $ABC = 90^\circ$

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.

$$\text{area of circle} = \pi r^2$$

$$\text{quarter of circle} = \frac{1}{4} \times \pi \times r^2$$

$$= \frac{1}{4} \times \pi \times (3\sqrt{5})^2 = 35.342\dots$$

$$= 35.3 \checkmark_4$$

..... 35.3 m²

(Total for Question is 4 marks)