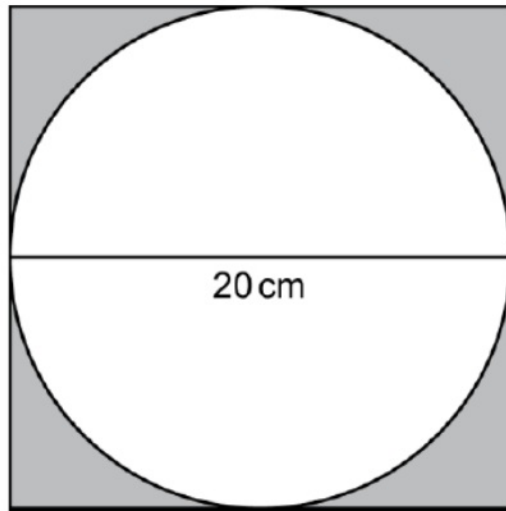


G24 Area of a Circle

OCR

- 13 A circle, diameter 20 cm, is drawn inside a square.
The four sides of the square touch the circle.

Created by

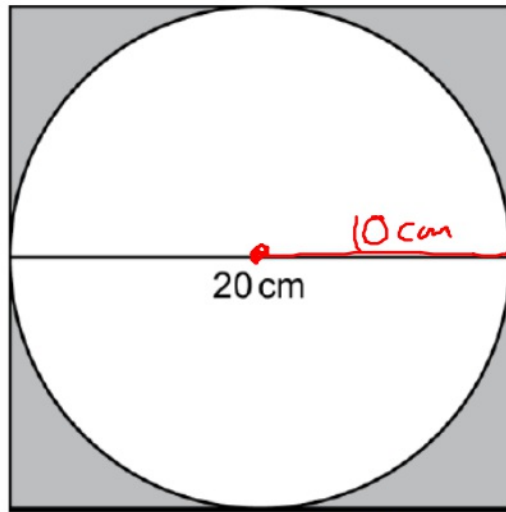


Not to scale

What percentage of the square is shaded?

.....% [5]

- 13 A circle, diameter 20 cm, is drawn inside a square.
The four sides of the square touch the circle.



What percentage of the square is shaded?

full square $\rightarrow 20 \times 20$
 $= 400 \text{ cm}^2$

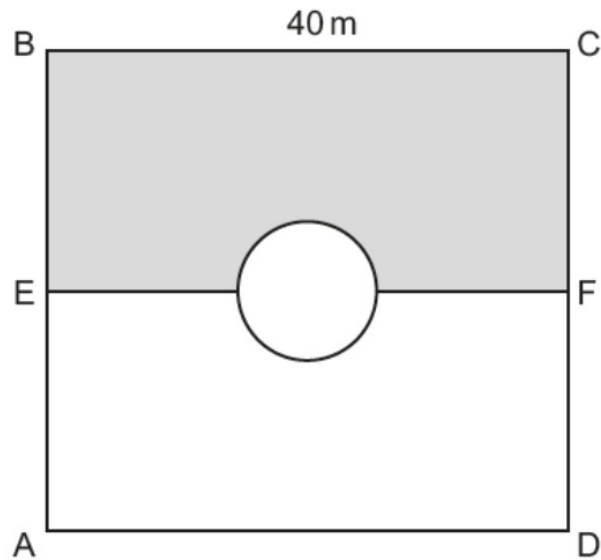
Circle πr^2 or $r^2 \times \pi$
 $\pi \times 10^2$
 $= 314.159$

Shaded $= 400 - 314.159$
 $= 85.84 \dots \text{ cm}^2$

$$\frac{85.84 \dots}{400} = 0.2146 \times 100 \quad \checkmark$$

.....% [5]

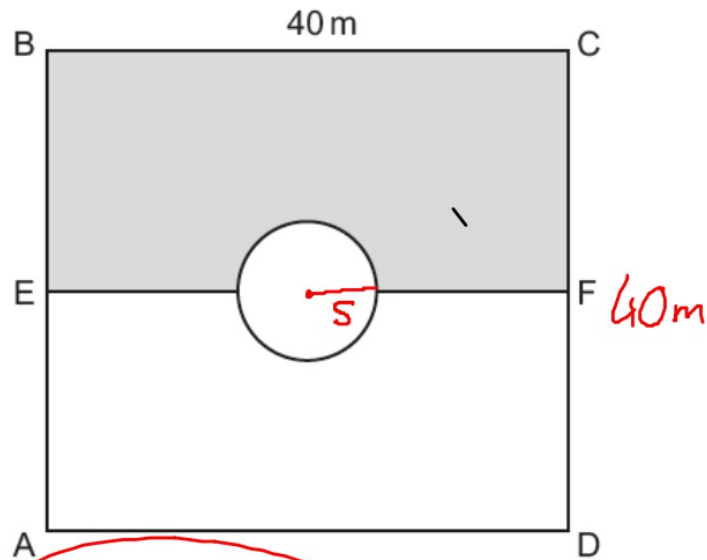
- 18 The diagram shows all the paths in a park. marked by
ABCD is a square of side 40 metres.
E is the midpoint of AB. F is the midpoint of CD.
The circular path is in the centre of the square and has radius 5 metres.



- (a) Work out the percentage of the square ABCD that is shaded.

(a) % [6]

- 18 The diagram shows all the paths in a park.
 ABCD is a square of side 40 metres.
 E is the midpoint of AB. F is the midpoint of CD.
 The circular path is in the centre of the square and has radius 5 metres.



$$\text{full square} = 40 \times 40 = 1600 \text{m}^2$$

$$\text{Circle } r^2 \times \pi \text{ or } \pi r^2$$

$$5^2 \times \pi = 78.5398 \text{m}^2$$

$$1600 - 78.5398 \text{m}^2 = 1521.46 \text{m}^2$$

$$= 1521.46 \text{m}^2$$

$$\div 2 = 760.73 \text{m}^2$$

grey

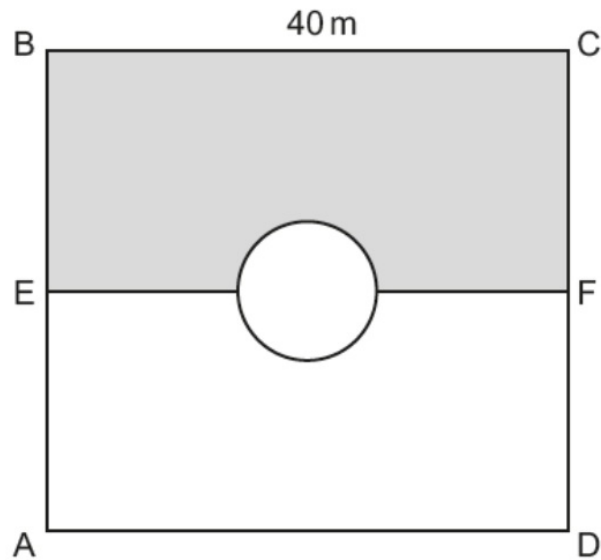
$$47.55$$

- (a) Work out the percentage of the square ABCD that is shaded.

$$\frac{760.73}{1600} \times 100 = 47.55\%$$

(a) 47.55 % [6]

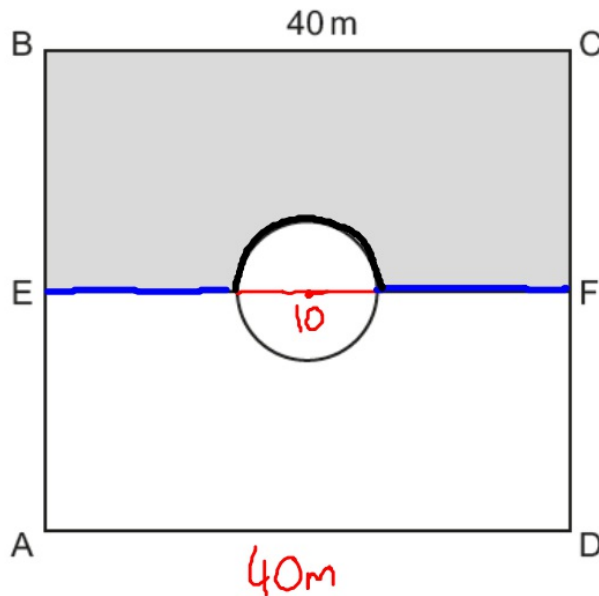
- 18 The diagram shows all the paths in a park. marked by
 ABCD is a square of side 40 metres.
 E is the midpoint of AB. F is the midpoint of CD.
 The circular path is in the centre of the square and has radius 5 metres.



- (b) Work out the shortest distance from E to F across the park, using only the paths shown.

(b) m [4]

- 18 The diagram shows all the paths in a park.
 ABCD is a square of side 40 metres.
 E is the midpoint of AB. F is the midpoint of CD.
 The circular path is in the centre of the square and has radius 5 metres.



$$\text{---} = 30\text{m}$$

$$\begin{aligned} \text{Circumference} &= D \times \pi \\ &= 10 \times \pi \div 2 \\ &= 15.70\text{m} \end{aligned}$$

half a
circle

- (b) Work out the shortest distance from E to F across the park, using only the paths shown.

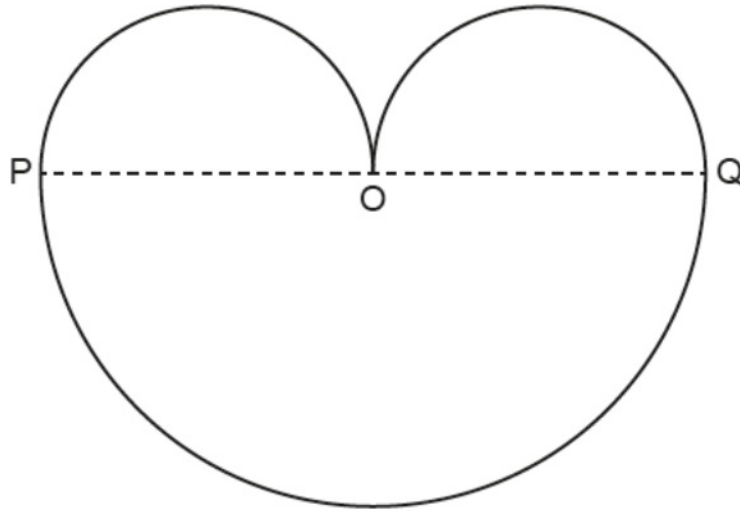
$$\text{Total} = 30\text{m} + 15.7\text{m}$$

$$45.7\text{m}$$

(b) m [4]

21 This shape consists of three semicircles.

Created by



$OP = OQ$.

The length of PQ is $4x$ cm.

Show that the area, in cm^2 , of the whole shape is $3\pi x^2$.

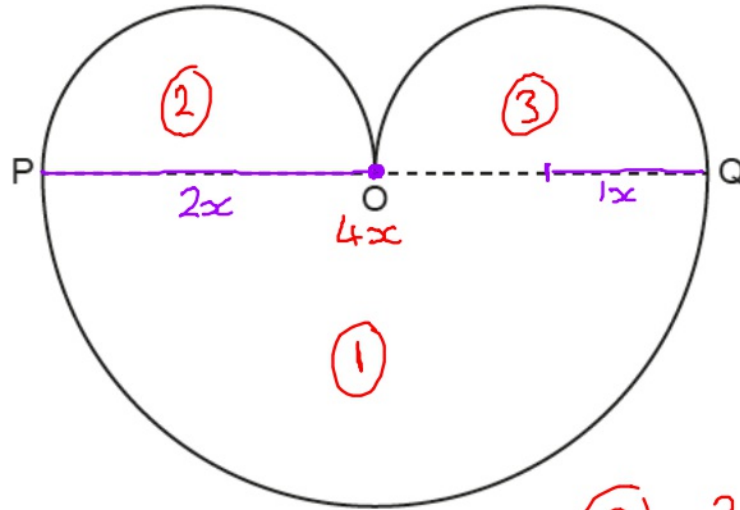
[5]

21 This shape consists of three semicircles.

G24/25 $1x \times 1x = 1x^2$

$2x \times 2x = 4x^2$

Created by
Radius



① $(2x)^2 \times \pi$
 $= 4x^2 \pi$
 $= 4\pi x^2 \div 2$
 $= 2\pi x^2 = \textcircled{1}$

OP = OQ.
 The length of PQ is 4xcm.

② $R^2 \times \pi$
 $1x^2 \times \pi = 1\pi x^2$
 $\frac{1\pi x^2}{2} = \frac{1}{2}\pi x^2$ [5]

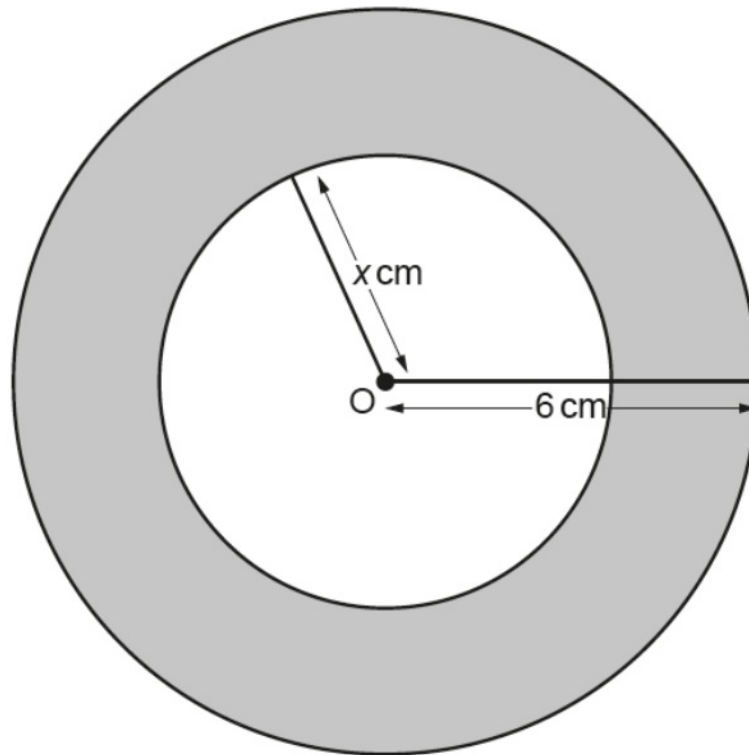
Show that the area, in cm^2 , of the whole shape is $3\pi x^2$.

$R^2 \times \pi$

③ $\frac{1}{2}\pi x^2$
 Total = $2\pi x^2 + \frac{1}{2}\pi x^2 + \frac{1}{2}\pi x^2 = 3\pi x^2 \checkmark$

21 A circle, with centre O and radius 6 cm, contains another circle, with centre O and radius x cm.

G24

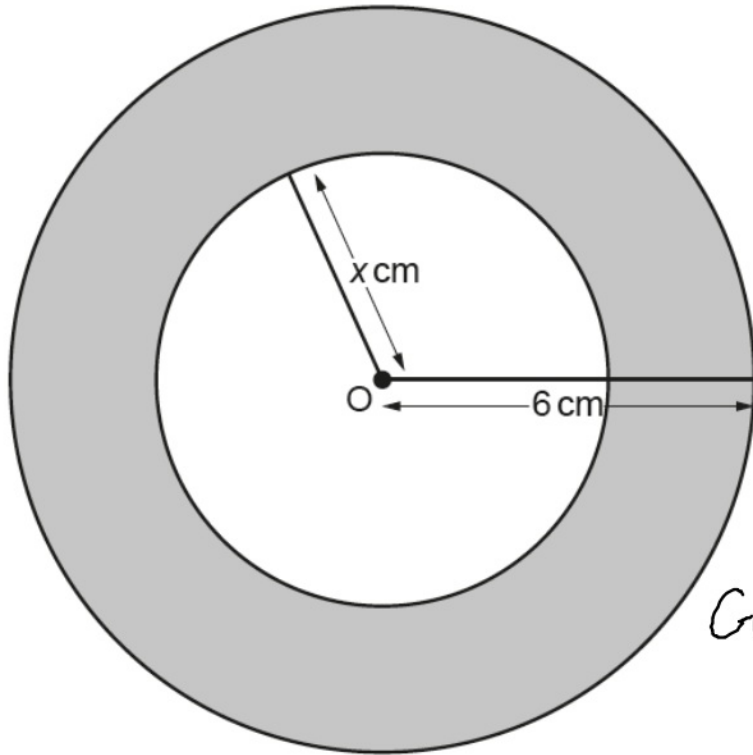


Not to scale

Write down an expression, in terms of π and x , for the shaded area in cm^2 .

..... [2]

21 A circle, with centre O and radius 6 cm, contains another circle, with centre O and radius x cm.



Not to scale

full circle ... $R^2 \times \pi$

$6^2 \times \pi$

36π

white circle $R^2 \times \pi$

$x^2 \times \pi$

$x^2 \pi$

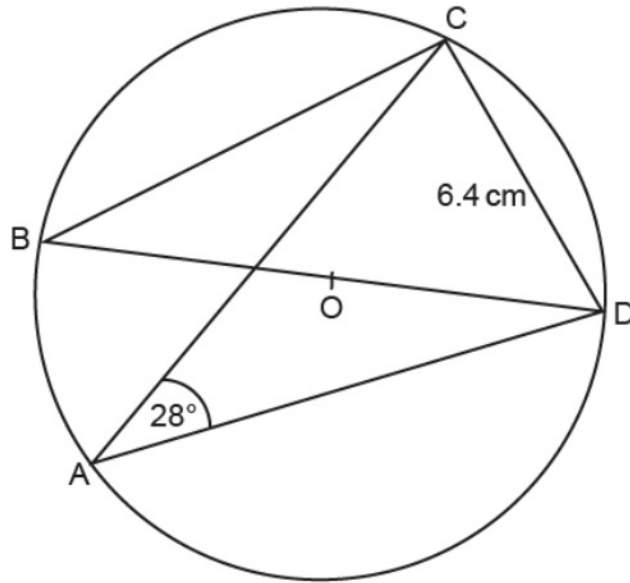
Grey : full - white

Write down an expression, in terms of π and x , for the shaded area in cm^2 .

$36\pi - x^2\pi$ ✓ [2]

8 A, B, C and D are points on the circumference of a circle, centre O.

Created by



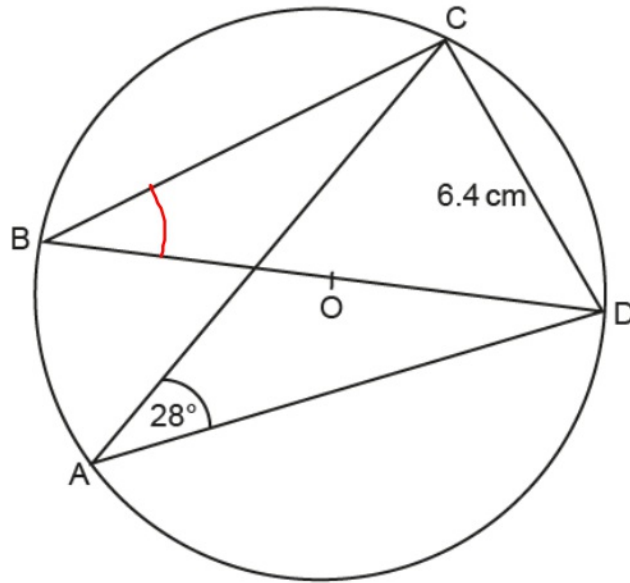
Not to scale

Angle CAD = 28° and CD = 6.4 cm.
BD is a diameter of the circle.

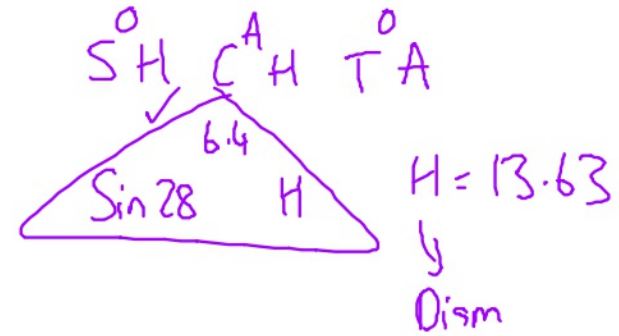
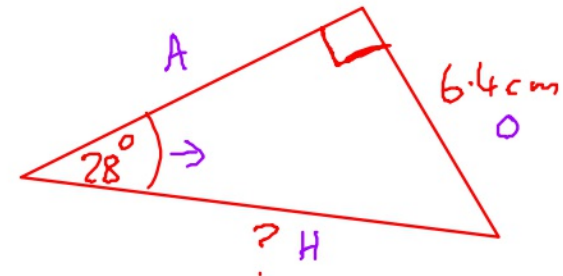
Calculate the area of the circle.

..... cm² [5]

8 A, B, C and D are points on the circumference of a circle, centre O.



Not to scale



Angle CAD = 28° and CD = 6.4 cm.
BD is a diameter of the circle.

Calculate the area of the circle.

$$R^2 \times \pi$$

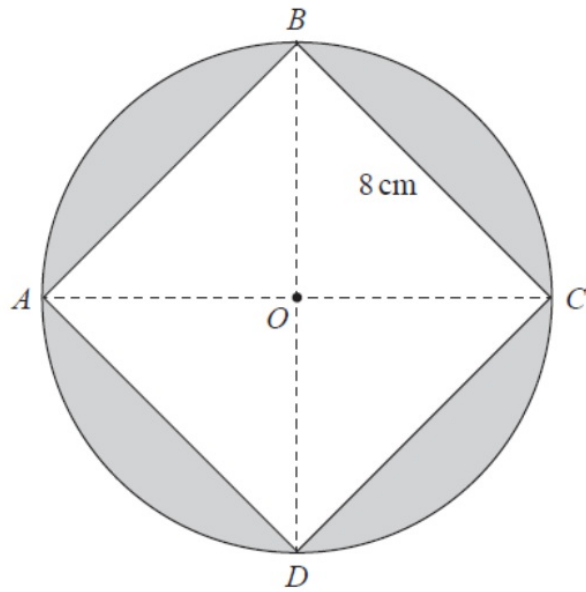
$$\begin{aligned} \text{Area} &= R^2 \times \pi \\ &= 6.186^2 \times \pi \\ &= 146.0 \text{ cm}^2 \end{aligned}$$

..... cm² [5]

Edexcel

26 The diagram shows a square $ABCD$ of side 8 cm inside a circle, centre O .
The vertices of the square lie on the circle.

Created by

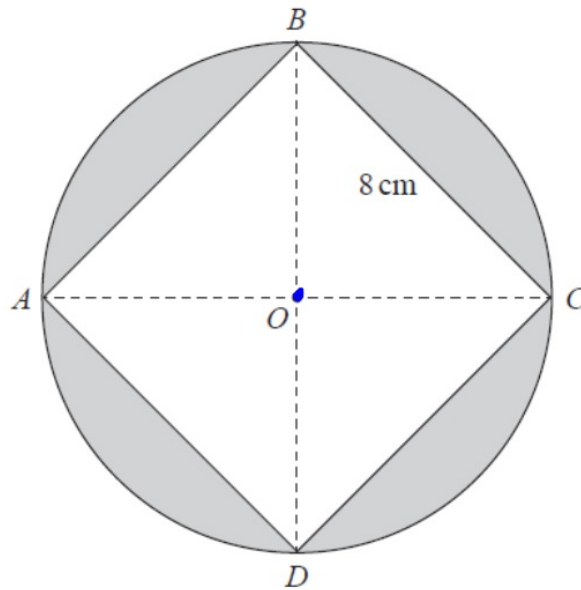


Work out the total area of the four shaded segments.

Give your answer correct to 3 significant figures.

.....cm²

26 The diagram shows a square $ABCD$ of side 8 cm inside a circle, centre O .
The vertices of the square lie on the circle.



Created by

$$\text{Square} = 8\text{cm} \times 8\text{cm} = 64\text{cm}^2$$

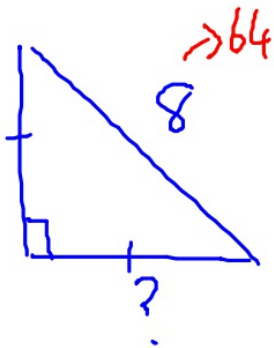
$$\text{Circle} \dots R^2 \times \pi$$

$$\hookrightarrow 5.6568^2 \times \pi$$

$$= 32\pi \text{ or } 100.5309$$

Work out the total area of the four shaded segments.

Give your answer correct to 3 significant figures.



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

$$2a^2 = c^2$$

$$2a^2 = 64$$

$$a^2 = 32$$

$$a = \sqrt{32} = 5.6568 \dots \text{cm}$$

Area of shaded full - white = grey

$$100.53 - 64 =$$

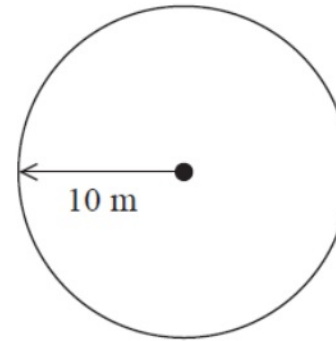
$$= 36.530$$

$$36.5 \text{ cm}^2$$

18 Balena has a garden in the shape of a circle of radius 10 m.
He is going to cover the garden with grass seed to make a lawn.

Grass seed is sold in boxes.
Each box of grass seed will cover 46 m^2 of garden.

Balena wants to cover all the garden with grass seed.



Video creator

- (a) Work out an estimate for the number of boxes of grass seed Balena needs.
You must show your working.

.....
(4)

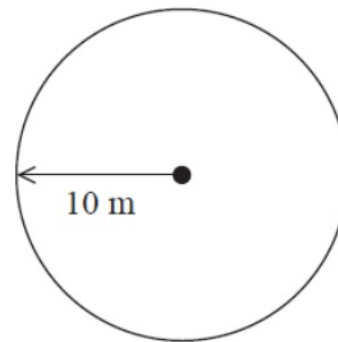
- (b) Is your estimate for part (a) an underestimate or an overestimate?
Give a reason for your answer.

.....
.....

18 Balena has a garden in the shape of a circle of radius 10 m.
He is going to cover the garden with grass seed to make a lawn.

Grass seed is sold in boxes.
Each box of grass seed will cover 46 m² of garden.

Balena wants to cover all the garden with grass seed.



Video creator:

46m²
50m²

(a) Work out an estimate for the number of boxes of grass seed Balena needs.
You must show your working.

Area of circle ... πr^2

3.142
 ≈ 3

3 \times r²
3 \times 10²
3 \times 100 = 300m²

$300\text{m}^2 \div 50\text{m}^2 = 6 \text{ boxes}$

6 boxes

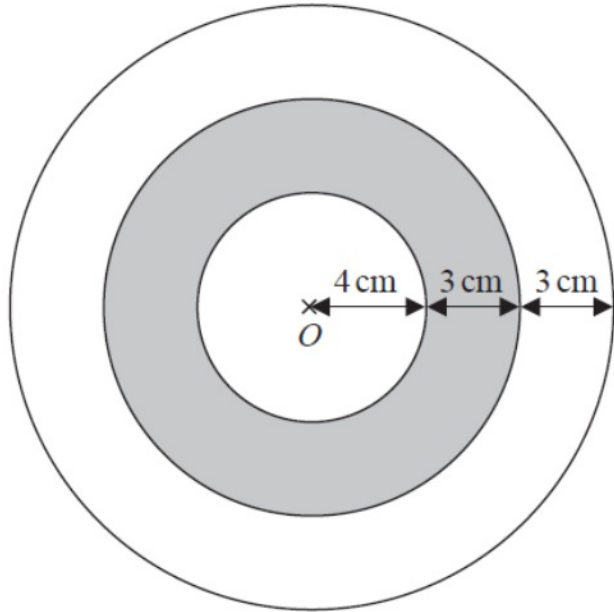
(4)

(b) Is your estimate for part (a) an underestimate or an overestimate?
Give a reason for your answer.

lawn will be bigger ----- need more boxes ... underestimate.

26 The diagram shows a logo made from three circles.

Created by



Each circle has centre O .

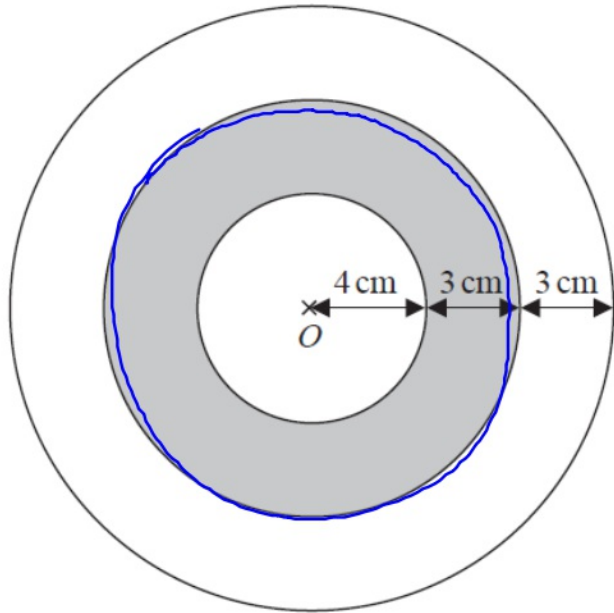
Daisy says that exactly $\frac{1}{3}$ of the logo is shaded.

Is Daisy correct?

You must show all your working.

(Total for Question 26 is 4 marks)

26 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.

πr^2 or $r^2 \times \pi$
 Small circle = $4^2 \times \pi$
 $= 16 \times \pi$
 $= 16\pi$

\Rightarrow No, as $\frac{33}{100}$ is not equal to $\frac{1}{3}$

middle circle = $R^2 \times \pi$
 $7^2 \times \pi$
 $= 49\pi - 16\pi$
 $= 33\pi$

full circle = $r^2 \times \pi$
 $10^2 \times \pi$
 $= 100\pi$

$$\frac{33\pi}{100\pi} = \frac{33}{100} \neq \frac{1}{3}$$

$\div 33$
 $\div 33$

(Total for Question 26 is 4 marks)

Video answer

- 8** A square, with sides of length x cm, is inside a circle.
Each vertex of the square is on the circumference of the circle.

The area of the circle is 49 cm^2 .

Work out the value of x .

Give your answer correct to 3 significant figures.

.....
(Total for Question 8 is 4 marks)

Video creator:

- 8 A square, with sides of length x cm, is inside a circle.
Each vertex of the square is on the circumference of the circle.

The area of the circle is 49 cm^2 .

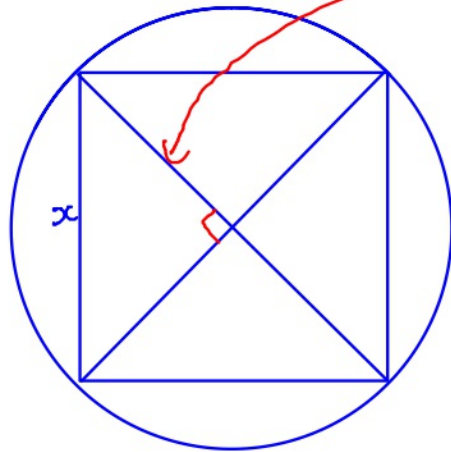
Work out the value of x .
Give your answer correct to 3 significant figures.

$$\pi r^2 = 49 \text{ cm}^2$$

$$r^2 = \frac{49}{\pi} = 15.59\dots$$

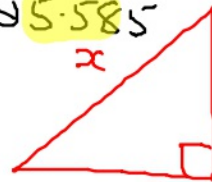
$$r = \sqrt{15.59\dots}$$

$$r = 3.949327085$$



31.14....

5.585
 x



3.949... 15.59...

3.949...

5.59cm

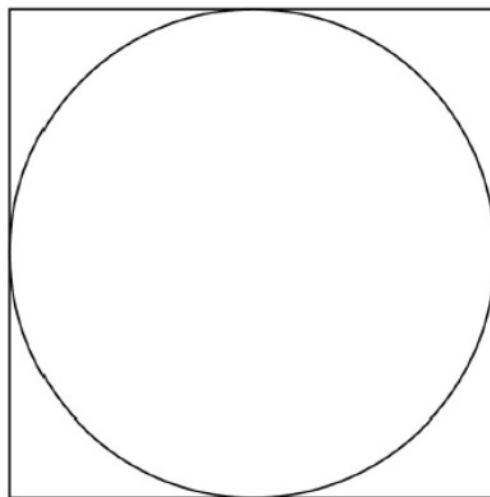
15.59... (Total for Question 8 is 4 marks)

AQA

20

Here is a circle touching a square.

Video content



Not drawn
accurately

The area of the square is 64 cm^2

Work out the area of the circle.

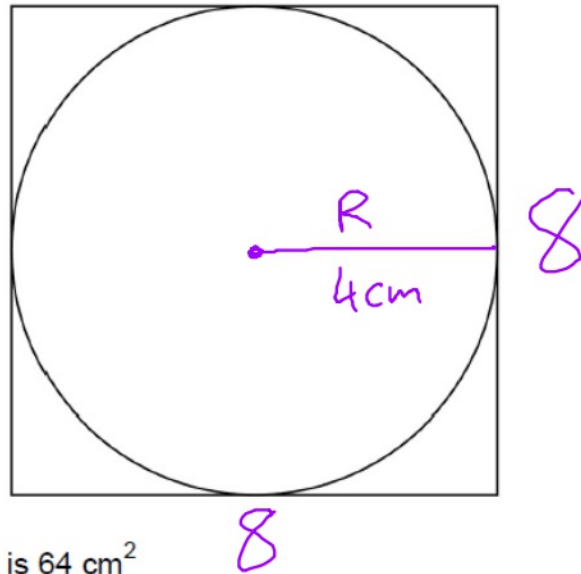
Give your answer in terms of π .

[3 marks]

Answer _____ cm^2

Here is a circle touching a square.

G24



Not drawn accurately

$$8 \times 8 = 64$$

The area of the square is 64 cm^2

Work out the area of the circle.

Give your answer in terms of π .

Area of circle

$$= R^2 \times \pi$$

$$= 4^2 \times \pi$$

[3 marks] $= 16\pi$

Answer

16π ✓ cm^2