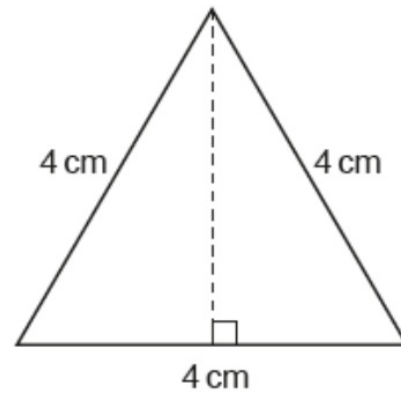


G25 Area of Sectors

OCR

11 The diagram shows an equilateral triangle.

Created by



Not to scale

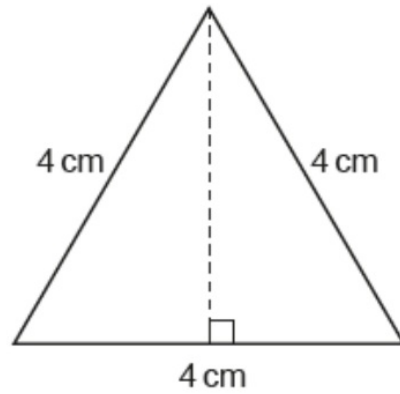
(a) (i) Show that the height of the equilateral triangle is 3.46 cm, correct to 3 significant figures. [3]

(ii) Find the area of the equilateral triangle.

(a)(ii) cm² [2]

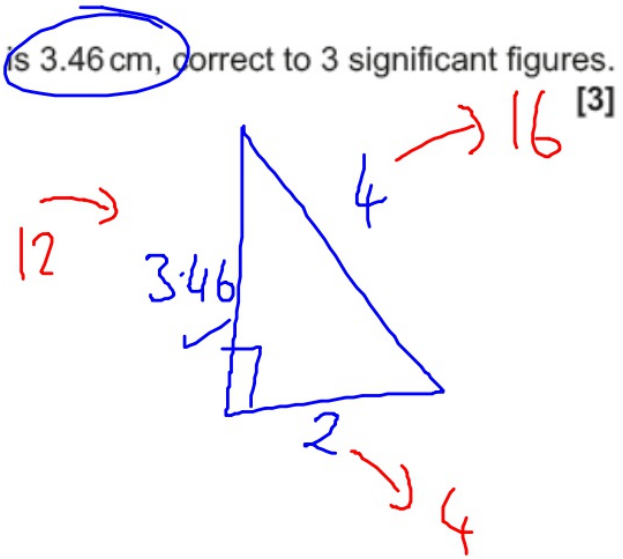
11 The diagram shows an equilateral triangle.

Created by W Neill



Not to scale

(a) (i) Show that the height of the equilateral triangle is 3.46 cm, correct to 3 significant figures.

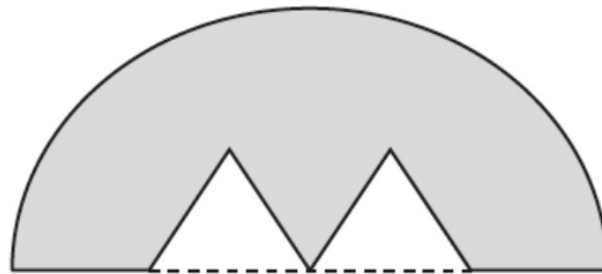


(ii) Find the area of the equilateral triangle.

$$\frac{B \times H}{2} = \frac{4 \times 3.46}{2} = 6.92 \checkmark$$

(a)(ii) cm² [2]

(b) Two of these equilateral triangles are cut from a semi-circle with diameter 16 cm.

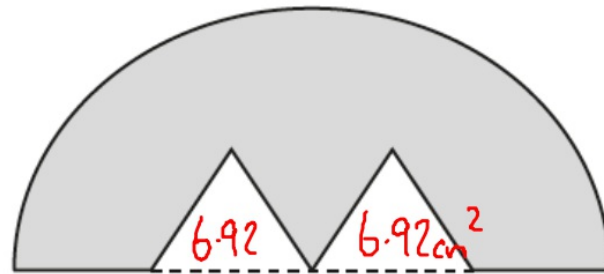


Not to scale

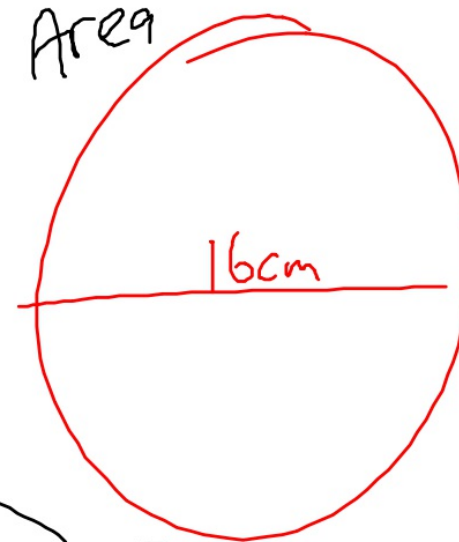
Calculate the shaded area.
Give your answer correct to 3 significant figures.

(b) cm² [4]

(b) Two of these equilateral triangles are cut from a semi-circle with diameter 16 cm.



Not to scale



Calculate the shaded area.
Give your answer correct to 3 significant figures.

→ $8^2 \times \pi$... full circle

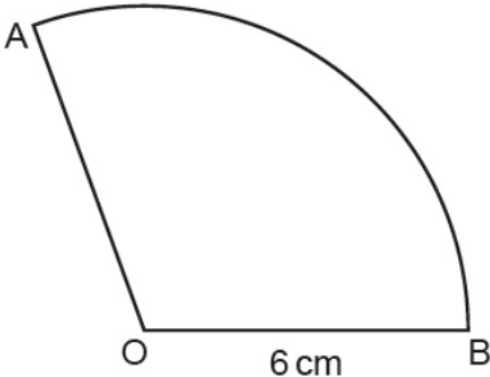
semi-circle $\div 2$
 $= 100.53 \text{ cm}^2$

$R^2 \times \pi$ πR^2

86.7 ✓ cm^2 [4]

(b)

12 AOB is a sector of a circle, centre O and radius 6 cm.
The length of arc AB is 5π cm.

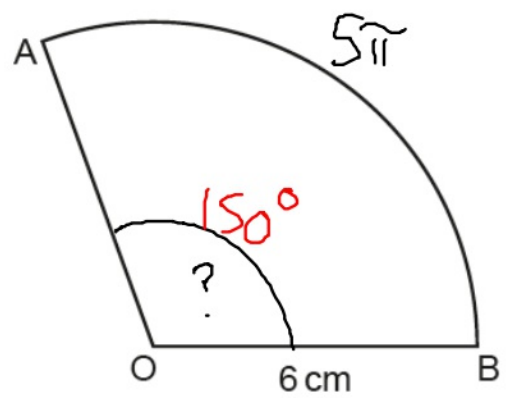


Not to scale

Find the area of the sector.
Give your answer in terms of π .

..... cm^2 [5]

12 AOB is a sector of a circle, centre O and radius 6 cm.
The length of arc AB is 5π cm.



$$\frac{D \times \pi}{360} \times \text{angle} = 5\pi$$

$$\frac{12\pi}{360} \times \square = 5\pi$$

$$\frac{1}{30} \times \square = 5$$

$$5 \div \frac{1}{30} \\ 5 \times \frac{30}{1} \\ = 150^\circ$$

Find the area of the sector.
Give your answer in terms of π .

$$\frac{R^2 \times \pi}{360} \times 150$$

$$\frac{36\pi}{360} \times 150$$

$$\frac{1\pi}{10} \times \frac{150}{1}$$

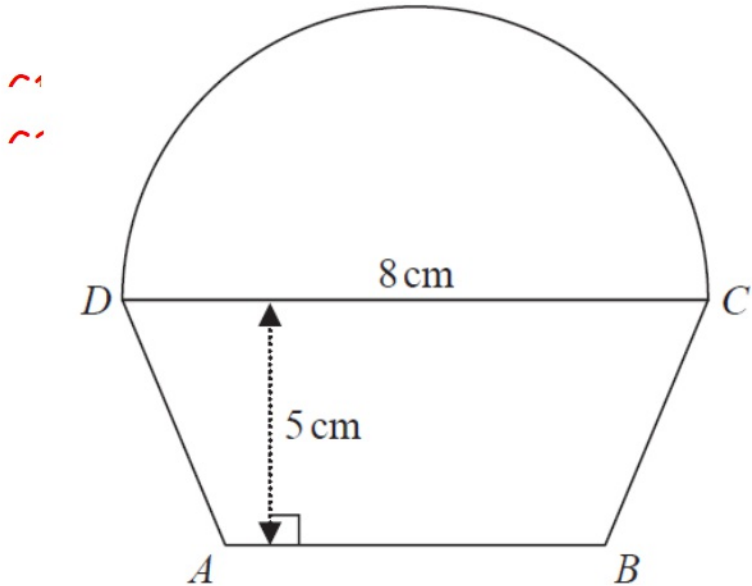
$$\frac{150\pi}{10} = 15\pi$$

$$15\pi$$

..... cm^2 [5] ✓

Edexcel

24 The diagram shows a shape made from a trapezium $ABCD$ and a semicircle with diameter DC .



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

The shape has area 64 cm^2

The height of the trapezium is 5 cm .

Work out the length of AB .

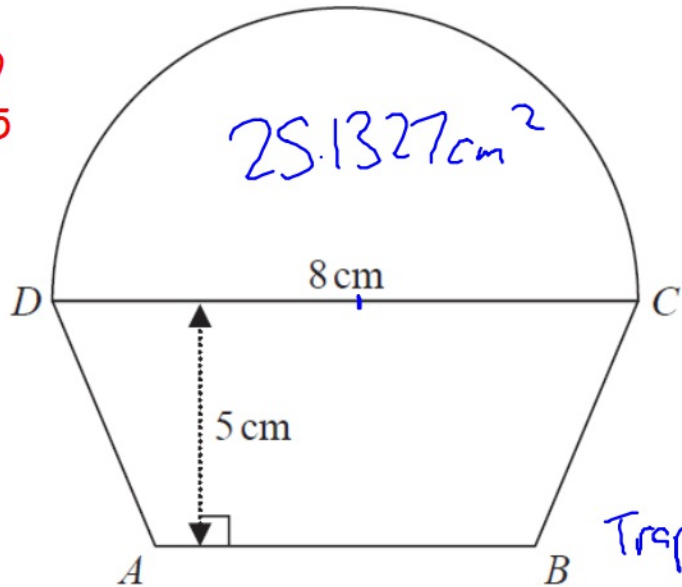
Give your answer correct to 1 decimal place.

..... cm

24 The diagram shows a shape made from a trapezium $ABCD$ and a semicircle with diameter DC .

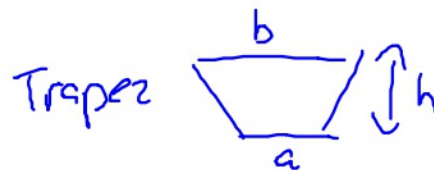
G19

G25



Semi-circle ... $\frac{R^2 \times \pi}{2} = \frac{4^2 \times \pi}{2} = 8\pi$
 25.1327 cm^2

Trapezium Area = $64 - 25.1327 \dots$
 $= 38.867 \text{ cm}^2$



$\frac{1}{2}(a+b)h = 38.867$
 $\frac{1}{2}(a+8)5 = 38.867$

$DC = 8 \text{ cm}$

The shape has area 64 cm^2

The height of the trapezium is 5 cm .

Work out the length of AB .

Give your answer correct to 1 decimal place.

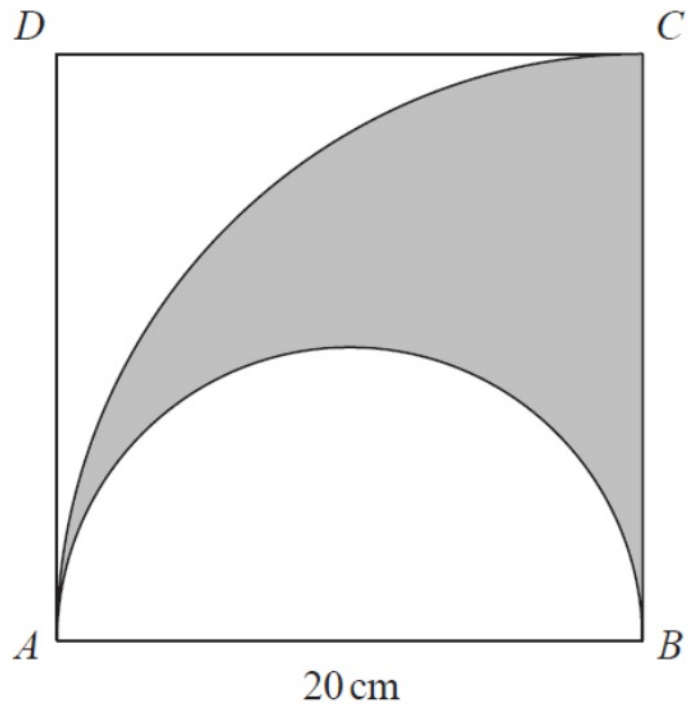
$a \rightarrow (+8) \rightarrow (\times 5) \rightarrow (\times \frac{1}{2}) \rightarrow 38.867$

$7.54 \leftarrow (-8) \leftarrow (\div 5) \leftarrow (\div \frac{1}{2}) \leftarrow 38.867$

7.5 cm ✓ cm

26 The diagram shows a square $ABCD$ with sides of length 20 cm.

G25 It also shows a semicircle and an arc of a circle.



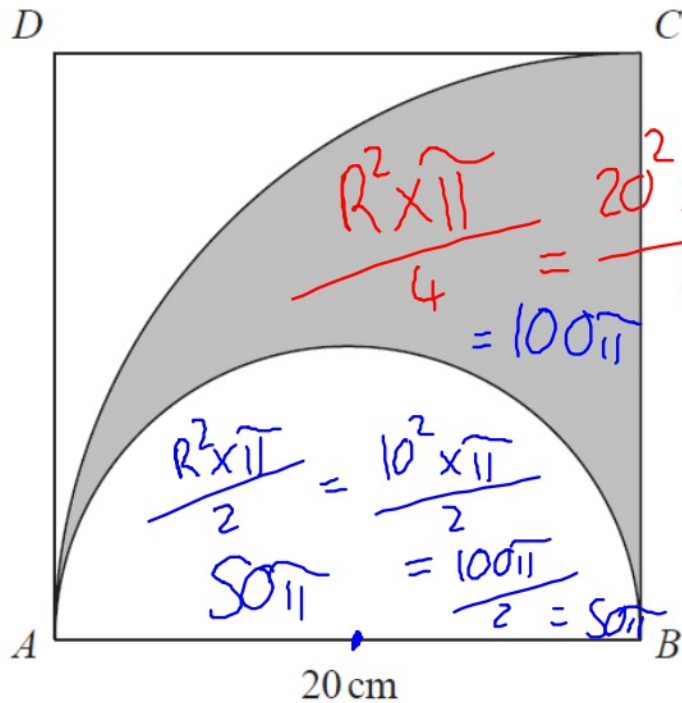
AB is the diameter of the semicircle.

AC is an arc of a circle with centre B .

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

(Total for Question 26 is 4 marks)

- 26 The diagram shows a square $ABCD$ with sides of length 20 cm.
 G25 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 $\frac{\text{area of shaded region}}{\text{area of square}} = \frac{\pi}{8}$

$$\frac{R^2 \times \pi}{4} = \frac{20^2 \times \pi}{4} = \frac{400\pi}{4} = 100\pi$$

$$\frac{R^2 \times \pi}{2} = \frac{10^2 \times \pi}{2} = \frac{100\pi}{2} = 50\pi$$

$$\text{Grey} = 100\pi - 50\pi = 50\pi$$

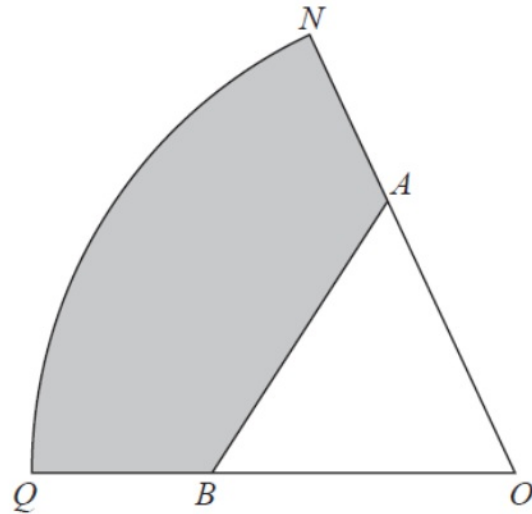
$$\frac{50\pi}{400} = \frac{\pi}{8} \quad \checkmark$$

$$\text{Square} = 20 \times 20 = 400$$

(Total for Question is 4 marks)

17

Video created by W Neill



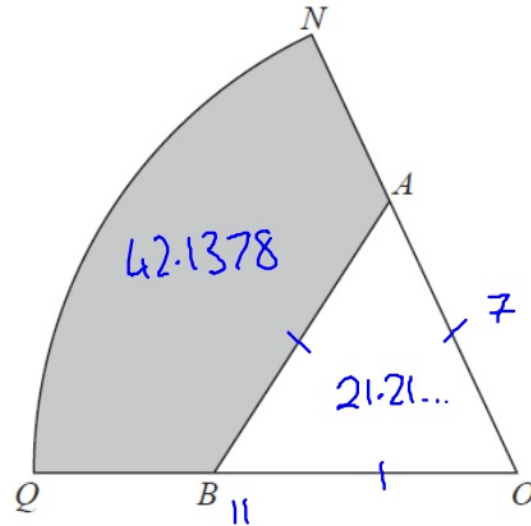
ONQ is a sector of a circle with centre O and radius 11 cm.

A is the point on ON and B is the point on OQ such that AOB is an equilateral triangle of side 7 cm.

Calculate the area of the shaded region as a percentage of the area of the sector ONQ .
Give your answer correct to 1 decimal place.

.....%

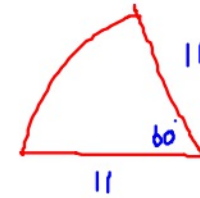
(Total for Question 17 is 5 marks) _____



ONQ is a sector of a circle with centre O and radius 11 cm.

A is the point on ON and B is the point on OQ such that AOB is an equilateral triangle of side 7 cm.

Calculate the area of the shaded region as a percentage of the area of the sector ONQ .
Give your answer correct to 1 decimal place.



$$\begin{aligned} \text{Area} &\dots R^2 \times \pi \\ &11^2 \times \pi \div 6 \\ &= 63.35545185 \text{ cm}^2 \end{aligned}$$

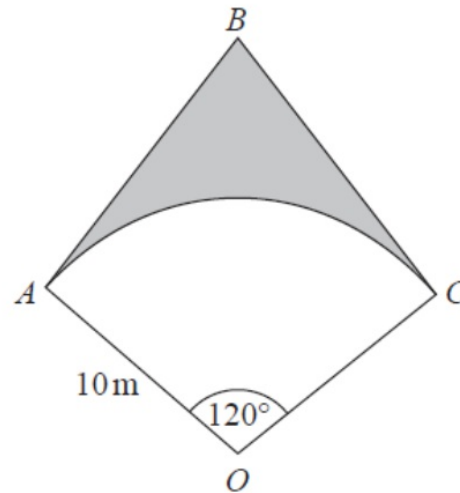
$$\text{Area of } \Delta = \frac{1}{2} ab \sin C$$

$$\begin{aligned} &= \frac{1}{2} (7)(7) \sin 60 \\ &= 21.21762239 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \frac{42.1378}{63.35545} &= 0.6651 \\ &= 66.51\% \end{aligned}$$

.....%

(Total for Question 17 is 5 marks)



OAC is a sector of a circle, centre O , radius 10 m .

BA is the tangent to the circle at point A .

BC is the tangent to the circle at point C .

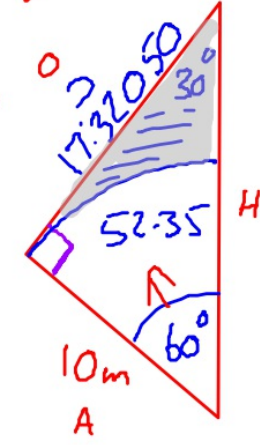
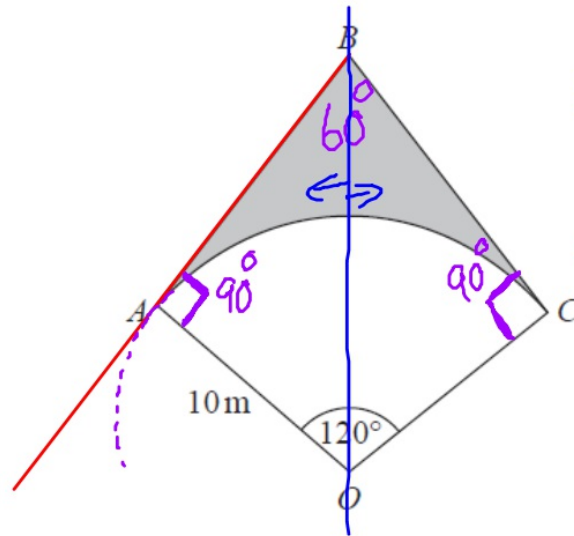
Angle $AOC = 120^\circ$

Calculate the area of the shaded region.

Give your answer correct to 3 significant figures.

..... m^2

(Total for Question 20 is 5 marks)



OAC is a sector of a circle, centre O , radius 10 m .

BA is the tangent to the circle at point A .
 BC is the tangent to the circle at point C .

Angle $AOC = 120^\circ$

Calculate the area of the shaded region. ✓
 Give your answer correct to 3 significant figures.

$$\text{Area of } \Delta = \frac{B \times H}{2} = 86.60254038 \text{ m}^2$$

$$\text{Area of sector} = \frac{R^2 \times \pi}{6} \text{ full circle}$$

$$\text{Shaded} = \text{full - white}$$

$$= 86.602 - 52.35 = 34.24 \times 2$$

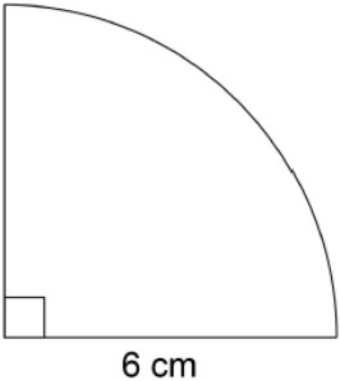
$$\underline{\underline{68.5}} \text{ m}^2$$

(Total for Question 20 is 5 marks)

AQA

27

Here is a quarter circle of radius 6 cm



Not drawn accurately

Work out the area of the quarter circle.
Give your answer in terms of π .

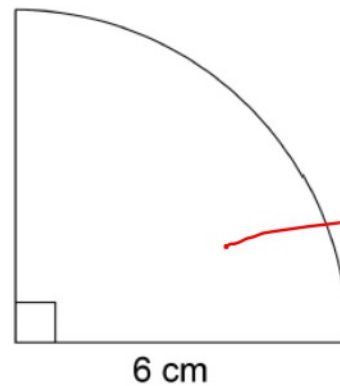
[2 marks]

Answer _____ cm^2

27 Here is a quarter circle of radius 6 cm

G25

$$\begin{aligned} \text{full circle} &= R^2 \times \pi \\ &= 6^2 \times \pi \\ &= 36\pi \end{aligned}$$



Not drawn accurately

$\rightarrow \div 4$

Work out the area of the quarter circle.

Give your answer in terms of π .

$$\frac{36\pi}{4} = 9\pi \quad \text{[2 marks]}$$

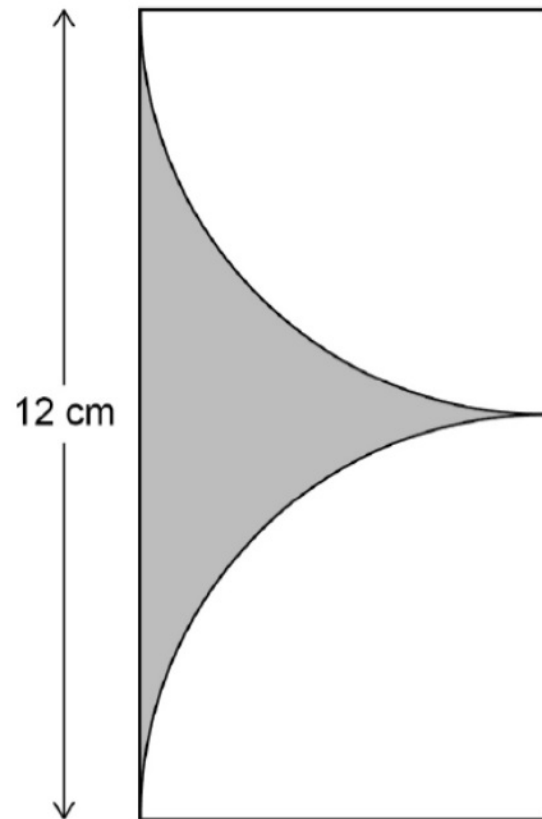
Answer 9π ✓ cm^2

23

Two identical quarter circles are cut from a rectangle as shown.

Video created by W Neill

G25



Work out the shaded area. [4 marks]

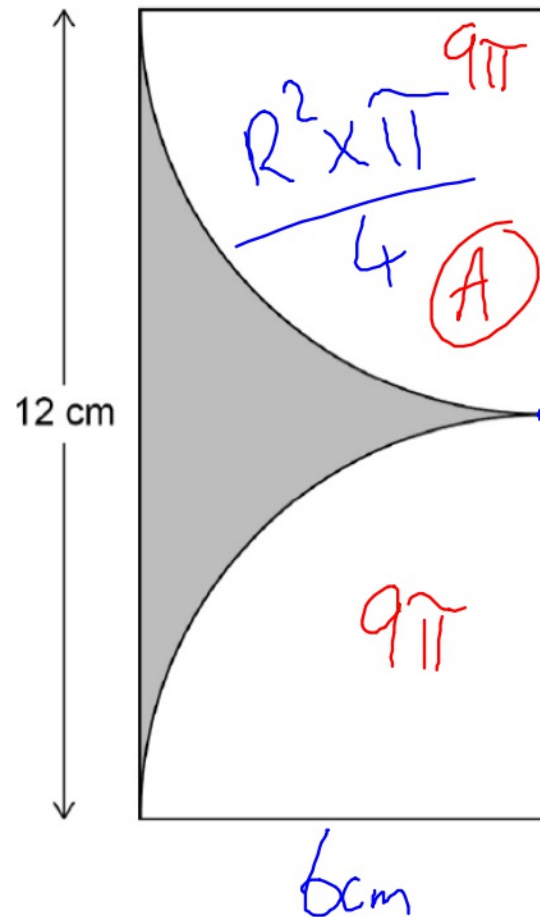
Answer _____ cm^2

23

Two identical quarter circles are cut from a rectangle as shown.

Video created by W Neill

G25



Work out the shaded area.

[4 marks]

$$\text{full shape} = 12 \times 6 = 72 \text{ cm}^2$$

$$(A) = \frac{R^2 \times \pi}{4} = \frac{6^2 \times \pi}{4} = 9\pi$$

$$(B) = 9\pi$$

$$\text{Grey} = 72 - 9\pi - 9\pi$$

$$72 - 18\pi \checkmark$$

$$\text{Answer } \underline{15.45 \text{ cm}^2} \checkmark$$

25

The diagram shows a logo.

Video created by W Neill

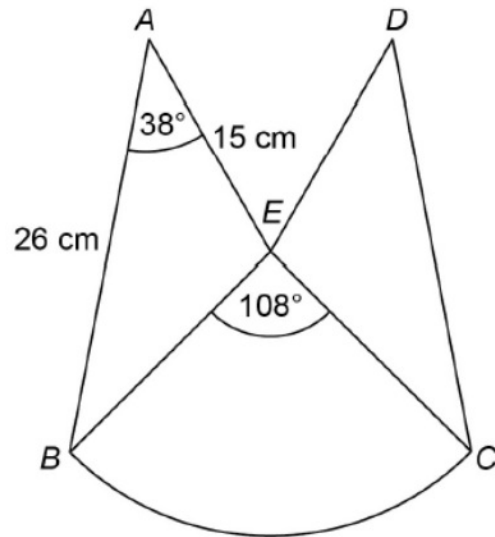
ABE and DCE are congruent triangles.

G58

BCE is a sector of a circle, centre E .

G59

G25



Not drawn
accurately

Show that the area of the logo is 510 cm^2 to 2 significant figures.

[5 marks]

25

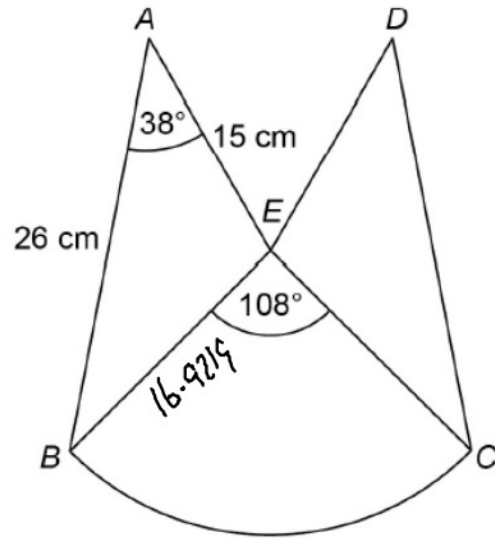
The diagram shows a logo.

 ABE and DCE are congruent triangles. BCE is a sector of a circle, centre E .

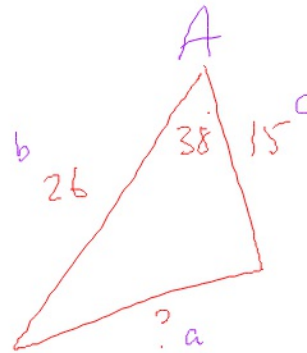
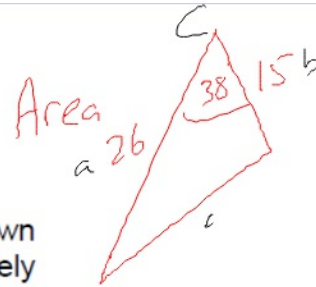
G58

G59

G25



Not drawn accurately



Video created by W Neill

$$= \frac{1}{2} ab \sin C = \frac{1}{2} (26)(15) \sin 38$$

$$120.05 \text{ cm}^2$$

$$2 \text{ triangles} = 120.05 \times 2$$

$$= 240.1079754 \text{ cm}^2$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$a^2 = 26^2 + 15^2 - 2(26)(15) \cos 38$$

$$a^2 = 901 - 614.64$$

$$a^2 = 286.36$$

$$a = \sqrt{286.36}$$

$$a = 16.9219 \text{ cm}$$

$$\text{Total} = 240.1079754 + 269.879$$

$$= 509.9869754 \text{ cm}^2 = 510 \text{ cm}^2$$

Show that the area of the logo is 510 cm^2 to 2 significant figures.

$$\text{Area of sector} = R^2 \times \pi \div 360 \times 108$$

$$= 269.879 \text{ cm}^2$$

22

The cross section of an earring is a semicircle, centre C , radius 25 mm

Video created by W Neill

The earring is black and white.

G25

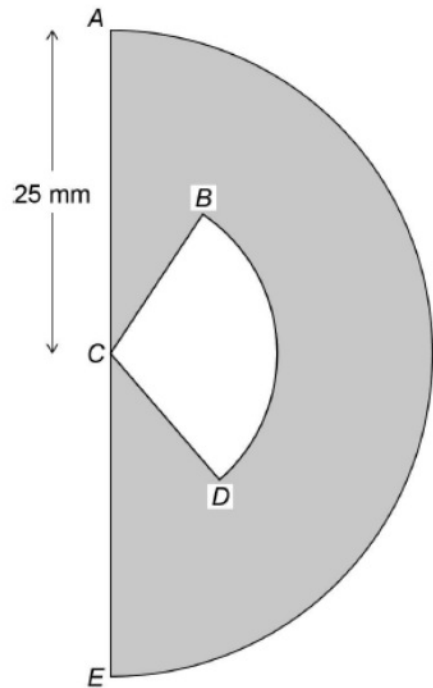
R5

The shaded area is black.

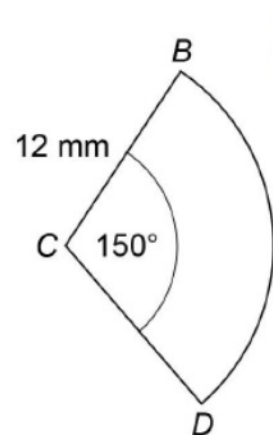
Is more than 20% of the semicircle white?

You **must** show your working.

[5 marks]



Not drawn accurately



Not drawn accurately

Sector BCD is white and has radius 12 mm

22

The cross section of an earring is a semicircle, centre C, radius 25 mm

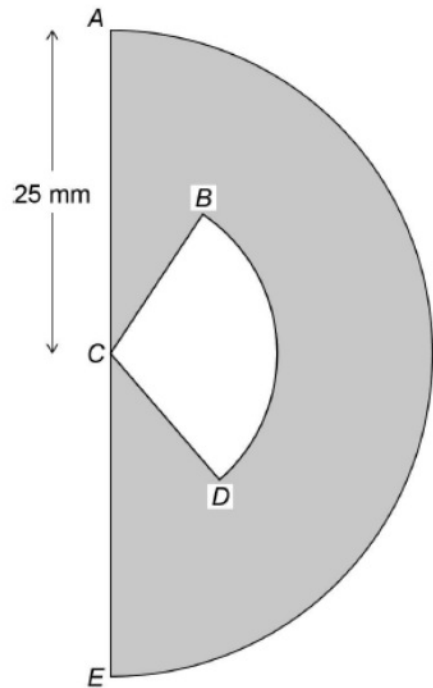
Video created by W Neill

The earring is black and white.

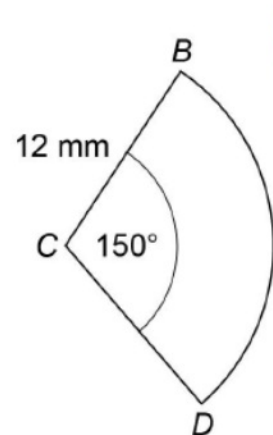
G25

R5

The shaded area is black.



Not drawn accurately



Not drawn accurately

Sector BCD is white and has radius 12 mm

Is more than 20% of the semicircle white?

You **must** show your working.

[5 marks]

full earring ... $R^2 \times \pi \div 2$
 $25^2 \times \pi \div 2 = 981.74777$
 cm^2

white ... $R^2 \times \pi \div 360 \times 150$
 $12^2 \times \pi \div 360 \times 150 = 188.49...$
 cm^2

$\therefore \frac{188.49...}{981.74...} = 0.1919$
 $= 19.19\%$

No, $19.19 < 20\%$.