

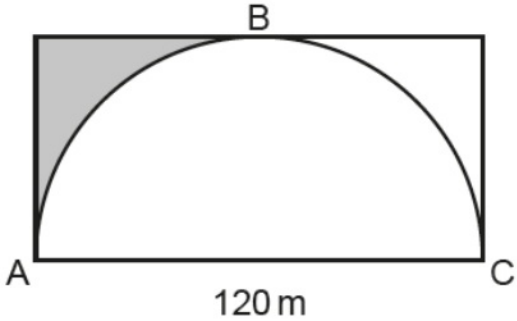
G23 Perimeter of Arcs and Sectors

OCR

Video creator:

21 The diagram shows a semi-circle inside a rectangle of length 120 m. The semi-circle touches the rectangle at A, B and C.

Not to scale



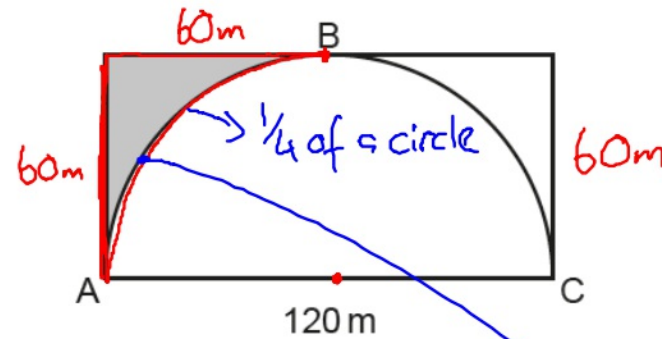
Calculate the **perimeter** of the shaded region.
Give your answer correct to 3 significant figures.

..... m [5]

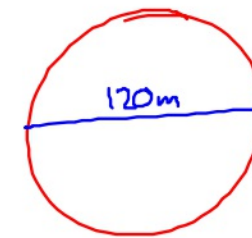
- 21 The diagram shows a semi-circle inside a rectangle of length 120 m. The semi-circle touches the rectangle at A, B and C.

Video creator:

Not to scale



Calculate the **perimeter** of the shaded region.
Give your answer correct to 3 significant figures.



$$\begin{aligned} \text{Perimeter} &= D \times \pi \\ &= 120 \times \pi \\ &= 376.99 \dots \text{ m} \end{aligned}$$

Perimeter...

$$94.247 + 60 + 60 =$$

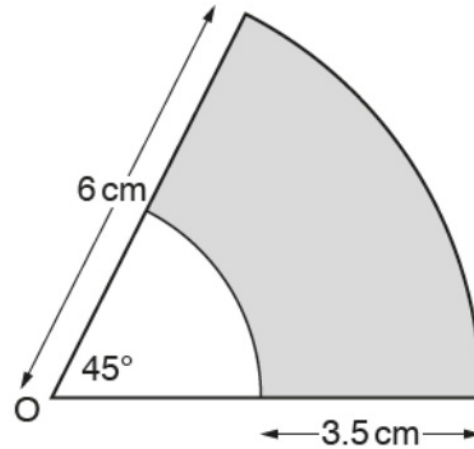
$$= 4 \rightarrow 94.247 \text{ m} \checkmark$$

214

..... m [5]

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8 The design below is made from two sectors of circles, centre O.



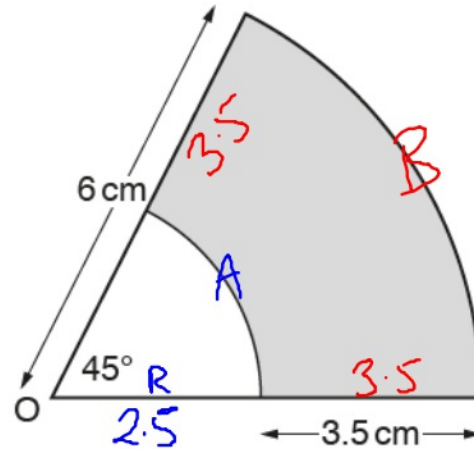
Calculate the perimeter of the shaded part.
Give your answer correct to 3 significant figures.

..... cm [5]

8 The design below is made from two sectors of circles, centre O.

G23

$$\frac{45^\circ}{360^\circ} = \frac{1}{8}$$



Calculate the perimeter of the shaded part.
Give your answer correct to 3 significant figures.

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$$A = \text{full circle} = D \times \pi$$

$$5 \times \pi \div 8 \\ = 1.9634 \text{ cm}$$

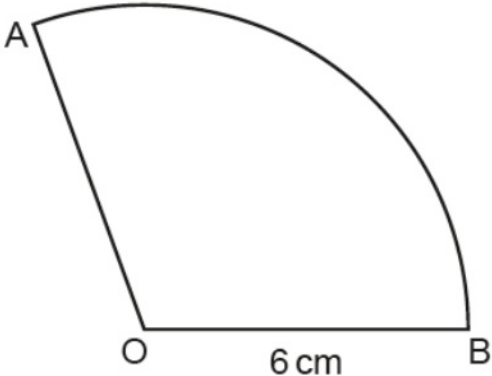
$$B = 12 \times \pi \div 8 \\ = 4.7123 \text{ cm} \\ + 3.5 + 3.5$$

$$= \underline{\hspace{2cm}} 13.7 \checkmark \text{ cm [5]}$$

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

G23

G25

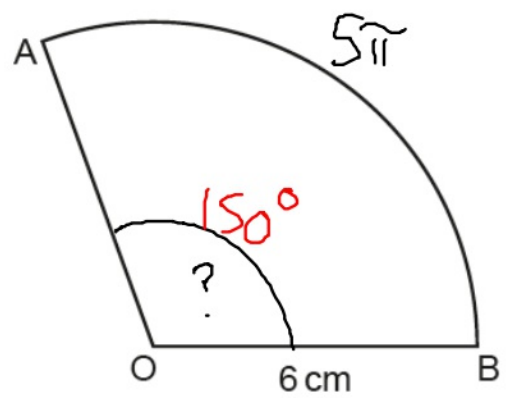


Not to scale

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 .

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

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

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

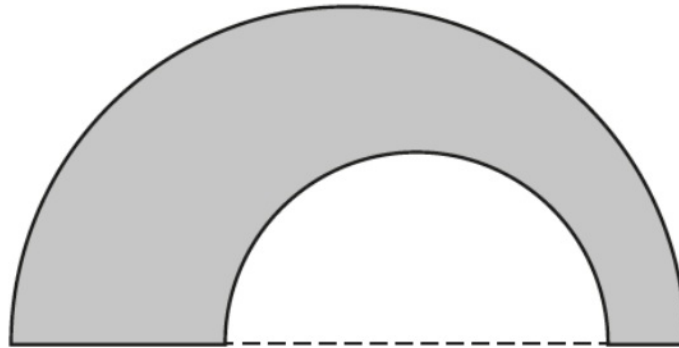
$$\frac{1\pi}{10} \times \frac{150}{1}$$

15π cm² [5] ✓

13 The shape below is formed from two semicircles and a straight line.

Video content

G23



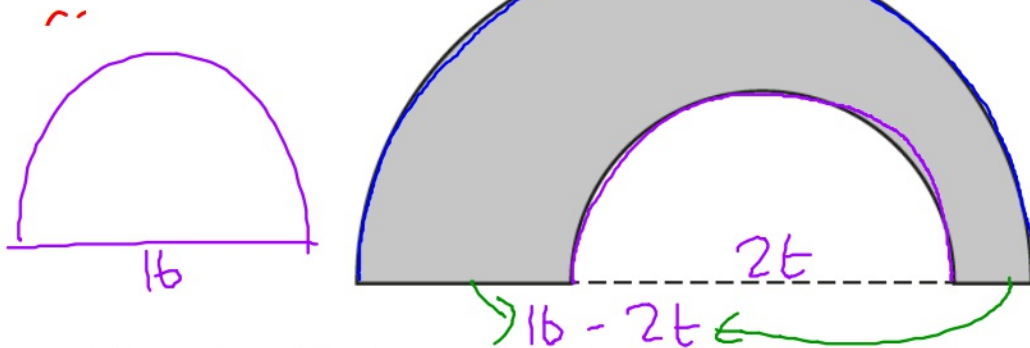
Not to scale

The radius of the large semicircle is 8 cm.
The radius of the small semicircle is t cm.

Find an expression, in terms of t , for the **exact perimeter** of the shaded shape.

..... cm [3]

13 The shape below is formed from two semicircles and a straight line.



The radius of the large semicircle is 8 cm.
The radius of the small semicircle is t cm.

Find an expression, in terms of t , for the exact perimeter of the shaded shape.

Not to scale

$$\frac{D \times \pi}{2} = \frac{16 \times \pi}{2} = 8\pi$$

$$\frac{D \times \pi}{2} = \frac{2t \times \pi}{2} = t\pi$$

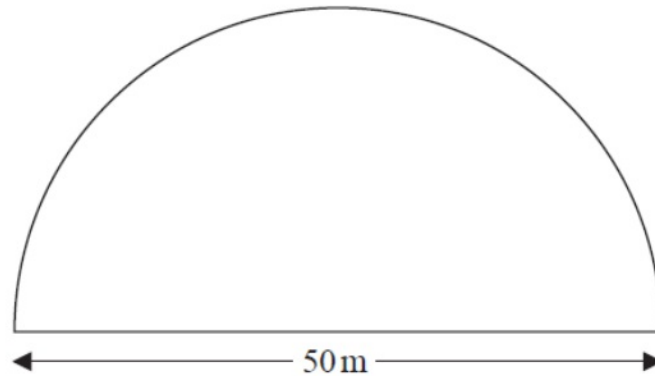
$$\text{Total perimeter} = 8\pi + t\pi + 16 - 2t$$

..... cm [3]

Edexcel

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

G22
G23



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.

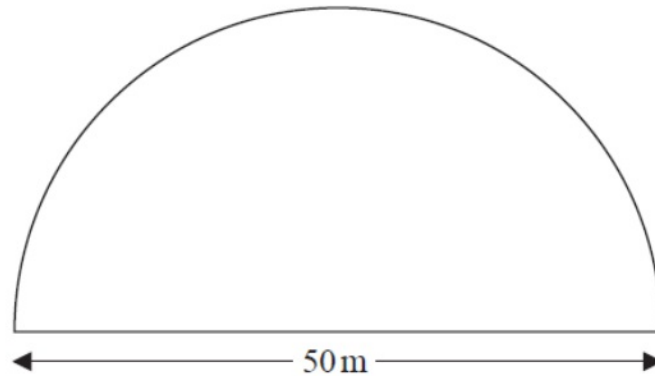
£.....

(Total for Question 19 is 5 marks)

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

Video created by W Neill

G22
G23



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. $178.539\text{m} \times £29.86 = £3838.20$

$£180 \times 3\text{days} = £540$

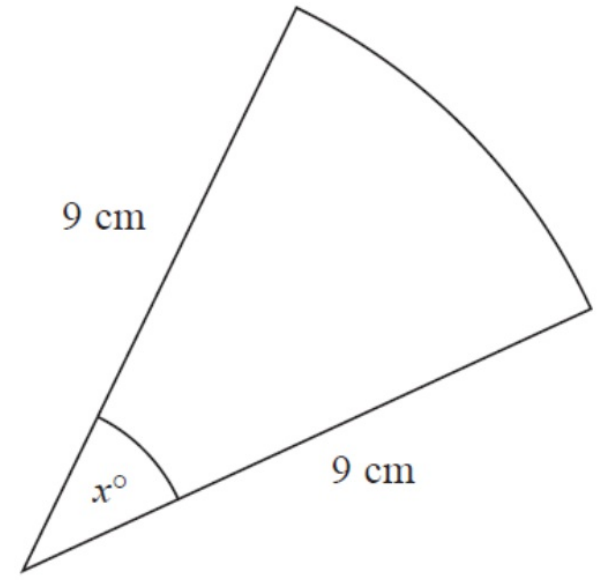
£ 4378.20 ✓

$$\begin{aligned} \text{full circle} &= D \times \pi \\ &= 50 \times \pi \\ &= 157.07\text{m} \\ \text{half circle} &\div 2 \\ &= 78.53\text{m} (25\pi) \\ &+ 50 \\ \hline &= 128.539\text{m} \end{aligned}$$

(Total for Question 19 is 5 marks)

19 The diagram shows a sector of a circle of radius 9 cm.

Created by



The sector has a perimeter of 25 cm.

Work out the value of x .

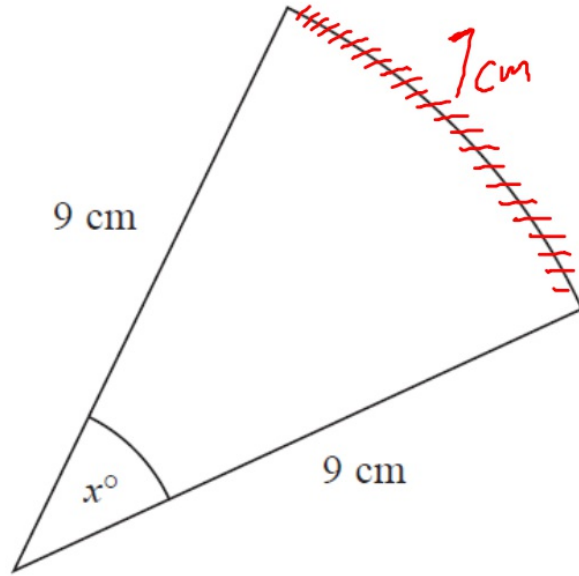
Give your answer correct to 1 decimal place.

.....

(Total for Question 19 is 4 marks)

19 The diagram shows a sector of a circle of radius 9 cm.

Created by



The sector has a perimeter of 25 cm.

Work out the value of x .

Give your answer correct to 1 decimal place.

$$\text{Diameter} \times \pi \div 360 \times x^\circ = 7 \text{ cm}$$

$$18\pi \div 360 \times x^\circ = 7 \text{ cm}$$

$$0.1570796327 \times x^\circ = 7 \text{ cm}$$

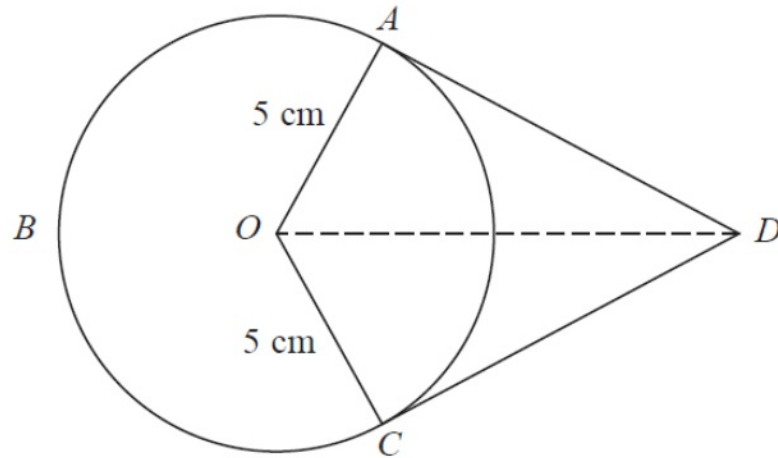
$$\frac{7}{0.157\dots} = x^\circ$$

$$\underline{\underline{44.6^\circ}}$$

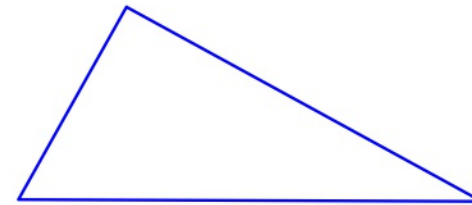
$$3 \times \boxed{4} = 12$$

(Total for Question 19 is 4 marks)

18



Video creator



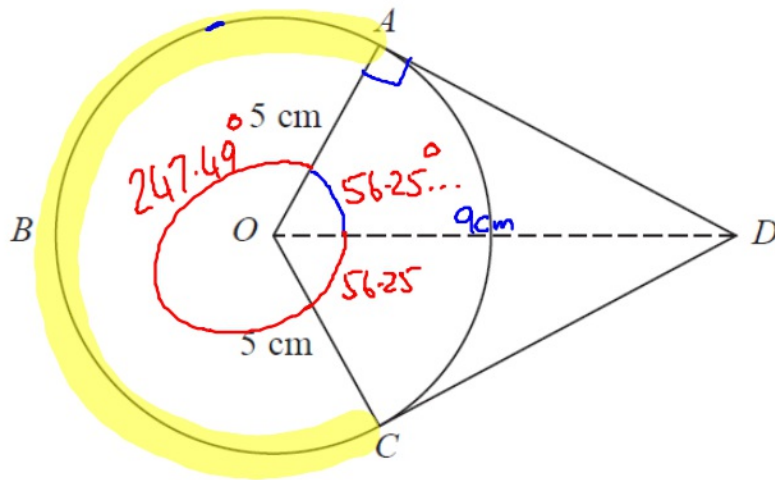
A , B and C are points on a circle of radius 5 cm, centre O .
 DA and DC are tangents to the circle.
 $DO = 9$ cm

Work out the length of arc ABC .
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 18 is 5 marks)

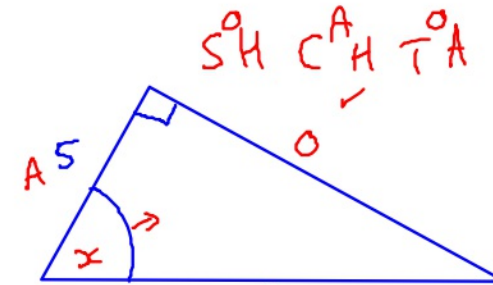
18



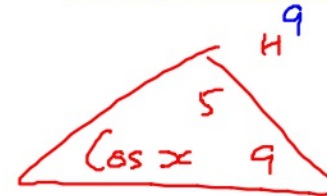
A , B and C are points on a circle of radius 5 cm, centre O .
 DA and DC are tangents to the circle.
 $DO = 9$ cm

Work out the length of arc ABC .
 Give your answer correct to 3 significant figures.

Video creator:



SHCHTA



$$\cos x = \frac{5}{9}$$

$$x = \cos^{-1} \frac{5}{9}$$

$$x = 56.25\dots$$

$$\text{full circle} = D \times \pi$$

$$10 \times \pi \div 360^\circ \times 247.4979772$$

..... 21.6 ✓ cm

(Total for Question 18 is 5 marks)

16 Here is a shaded shape $ABCD$.

The shape is made from a triangle and a sector of a circle, centre O and radius 6 cm.
 OCD is a straight line.

$$AD = 14 \text{ cm}$$

$$\text{Angle } AOD = 140^\circ$$

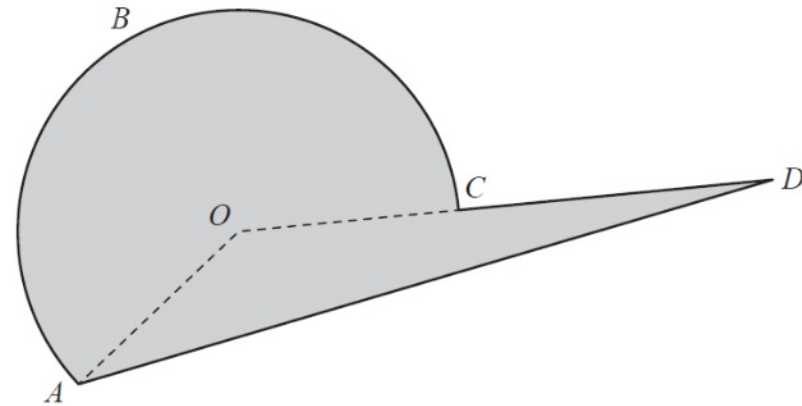
$$\text{Angle } OAD = 24^\circ$$

Calculate the perimeter of the shape.

Give your answer correct to 3 significant figures.

G23

G57



.....cm

(Total for Question 16 is 5 marks)

16 Here is a shaded shape $ABCD$.

The shape is made from a triangle and a sector of a circle, centre O and radius 6 cm.
 OCD is a straight line.

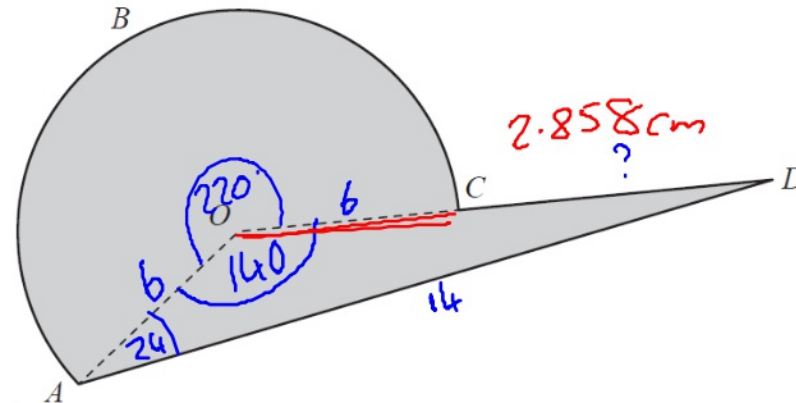
$AD = 14$ cm

Angle $AOD = 140^\circ$

Angle $OAD = 24^\circ$

Calculate the perimeter of the shape.

Give your answer correct to 3 significant figures.

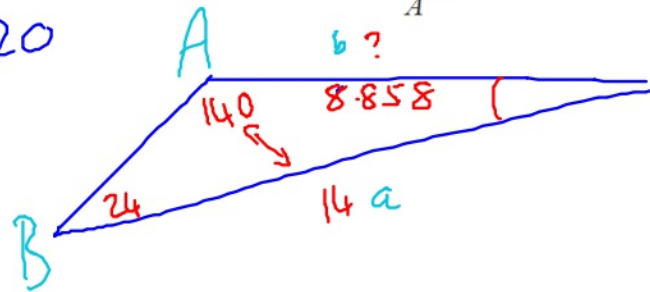


G23

G57 $A \rightarrow C \dots D \times \pi \div 360 \times 220$

$= 12 \times \pi \div 360 \times 220$

$= 23.038$ cm



$\frac{b}{\sin B} = \frac{a}{\sin A}$

$\frac{b}{\sin 24} = \frac{14}{\sin 140}$

$b = 8.858$

39.9 cm

$P = 23.038 + 2.858 + 14$

=

(Total for Question 16 is 5 marks)

AQA

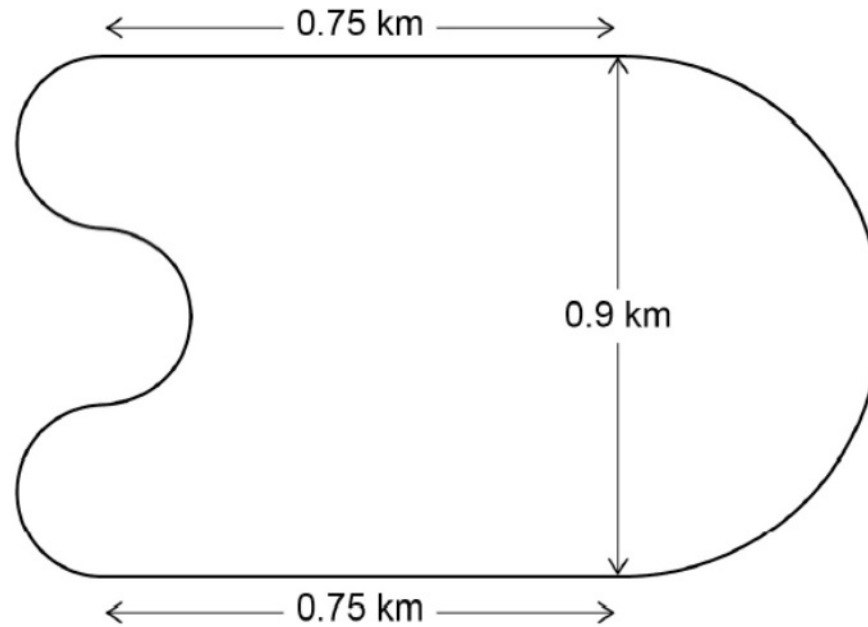
27 A motor racing circuit consists of

two parallel straight sections, each of length 0.75 km

???

a semicircle of diameter 0.9 km

three equal, smaller semicircles.



Video create

The length of a motor race must be greater than 305 km

What is the lowest number of **full** laps needed at this circuit?

You **must** show your working. **[5 marks]**

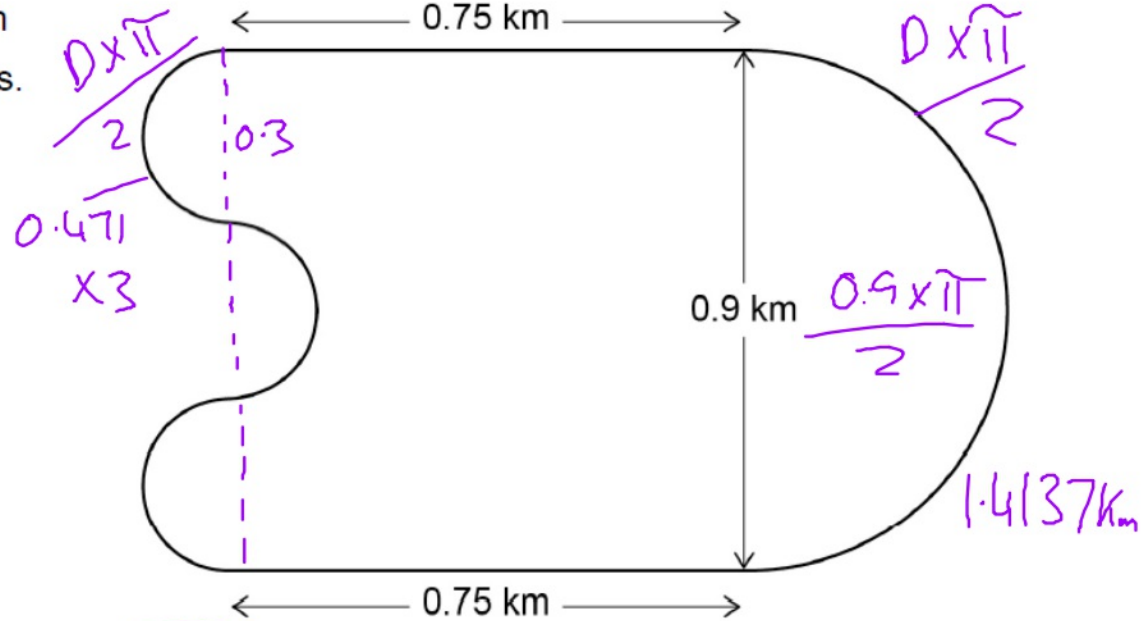
Answer _____

27 A motor racing circuit consists of

G22/23

- two parallel straight sections, each of length 0.75 km
- a semicircle of diameter 0.9 km
- three equal, smaller semicircles.

$$\begin{aligned}
 1 \text{ lap} &= 0.75 \text{ km} \\
 &+ 0.75 \text{ km} \\
 &+ 1.4137 \text{ km} \\
 &+ 1.4137 \text{ km} \\
 \hline
 &4.3274 \text{ km}
 \end{aligned}$$



The length of a motor race must be greater than 305 km

What is the lowest number of full laps needed at this circuit?

You must show your working. [5 marks]

$$\begin{array}{r}
 305 \\
 \hline
 4.3274 \\
 \hline
 \dots 70.48 \text{ laps}
 \end{array}$$

Answer

71 laps ✓