Name:

Exam Style Questions

Arc Length

Corbettmaths

Equipment needed: Pen, Calculator

Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

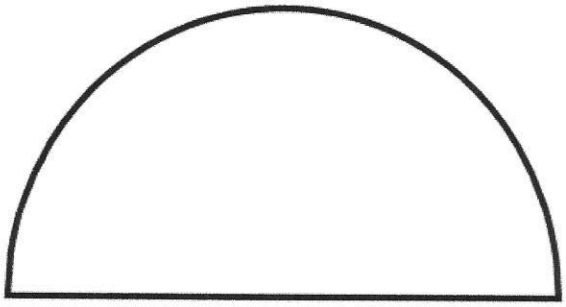
Video Tutorial

www.corbettmaths.com/contents

Video 58

Answers and Video Solutions

1. A semi-circle has diameter 20cm.



Calculate the perimeter of the semi-circle.

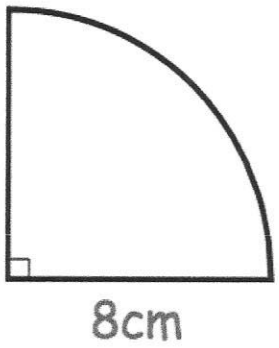
$\frac{1}{2} \times \pi \times 20 = 31.41592...$

$31.4159... + 20 = 51.4159...$

51.416 ..... m

(2)

2.



Calculate the perimeter of the sector.

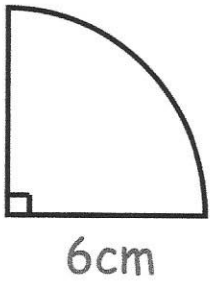
$\frac{1}{4} \times \pi \times 16 = 12.566...$

$12.566... + 8 + 8 = 28.566...$

28.57 ..... cm

(2)

3. Shown below is a quarter circle.



(a) Work out the length of the arc.
Give your answer in terms of π

$\frac{1}{4} \times \pi \times 12 = 3\pi$

3π .....cm
(2)

(b) Work out the perimeter of the quarter circle.
Give your answer in terms of π

$3\pi + 6 + 6$

$3\pi + 12$ .....cm
(1)

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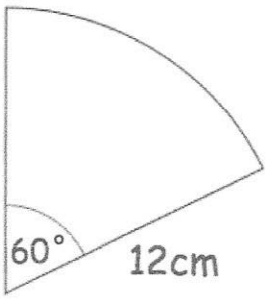
4. Shown is a sector of a circle.



Calculate the length of the arc.

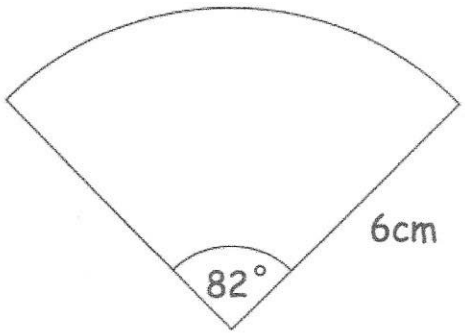
$\frac{60}{360} \times \pi \times 24$

$= \frac{1}{6} \times \pi \times 24$

$= 4\pi$

12.566 .....cm
(3)

5.



Calculate the perimeter of the sector.
Give your answer to 2 decimal places.

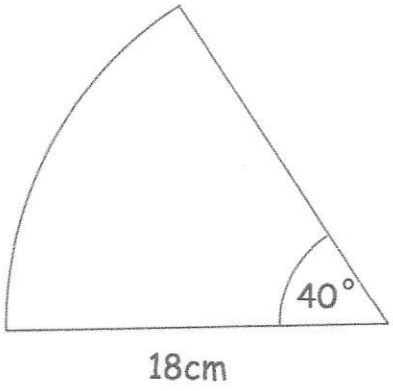
$\frac{82}{360} \times \pi \times 12 = 8.58701...$

$8.58701... + 6 + 6 = 20.587...$

20.59 .....cm

(3)

6.



Find the length of the arc, giving your answer in terms of π

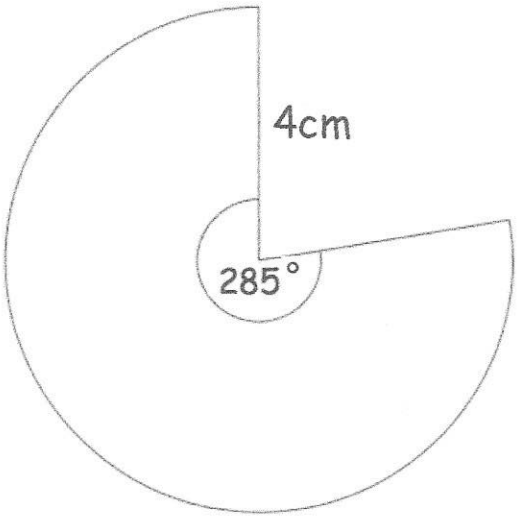
$\frac{40}{360} \times \pi \times 36$

$\frac{1}{9} \times \pi \times 36$

4π .....cm

(3)

7.



Calculate the perimeter of the sector.

$\frac{285}{360} \times \pi \times 8 = 19.896...$

$19.896... + 4 + 4 = 27.8962...$

27.897 .....cm

(3)

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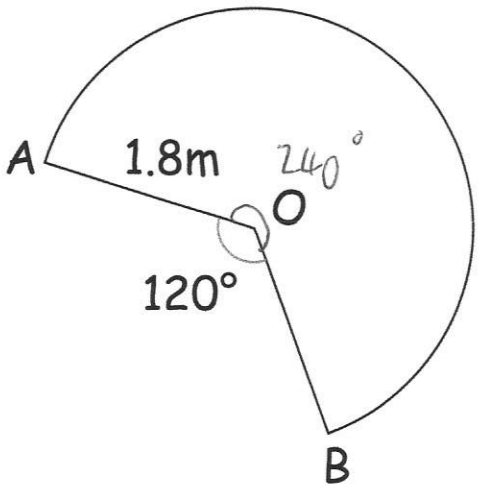
8. AOB is a sector of a circle, centre O and radius 1.8m.



Calculate the perimeter of sector AOB.

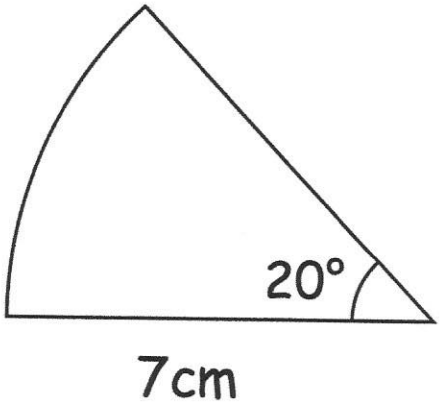
$\frac{240}{360} \times \pi \times 3.6 = 7.5398...$

$7.5398... + 1.8 + 1.8 = 11.1398...$

11.14 .....cm

(3)

9.



Max is calculating the perimeter of the sector.

Here is his method

$$\frac{20}{360} \times \pi \times 14$$

$$= 2.44346\text{cm}$$

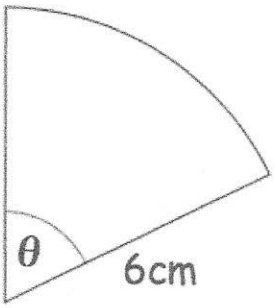
Explain Max's mistake.

Max needs to add the two radii.

2.44346... + 7 + 7 = 16.44... cm

(1)

10. Shown is a sector.



The arc length is 4.4cm.
Calculate the size of the angle.

$\frac{\theta}{360} \times \pi \times 12 = 4.4$ $\theta = 42.0169...$

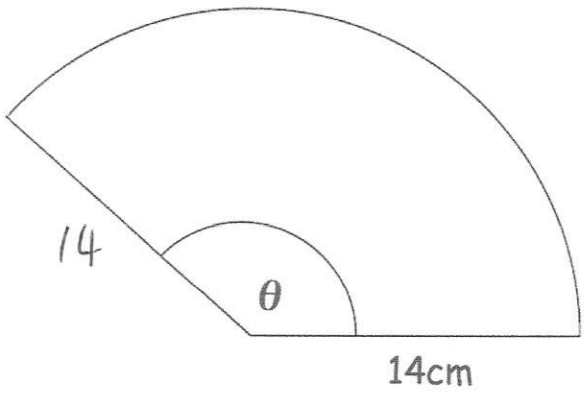
$\frac{\theta}{360} \times \pi = 0.3\dot{6}$

$\frac{\theta}{360} = 0.1167...$

42.017°

(3)

11.



The perimeter of the sector is 57.32cm.
Calculate the size of the angle.

$\theta = 119.9937...$

$57.32 - 14 - 14 = 29.32$

$\frac{\theta}{360} \times \pi \times 28 = 29.32$

$\frac{\theta}{360} \times \pi = 1.047...$

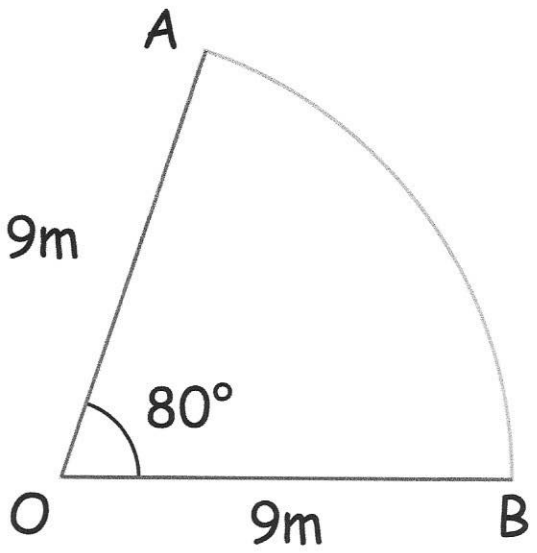
$\frac{\theta}{360} = 0.333159...$

119.994°

or 120.

(3)

12. Maryam's garden is a sector, OAB.
There is a fence going around the outside of the garden.



Maryam paints the straight sections of the fence, OA and OB, blue.
She paints the curved section of the fence, arc AB, green.

Work out the percentage of the fence painted green.
Give your answer to 2 decimal places.

$9 + 9 = 18$m blue.

$\frac{80}{360} \times \pi \times 18 = 4\pi$ (12.566...) green.

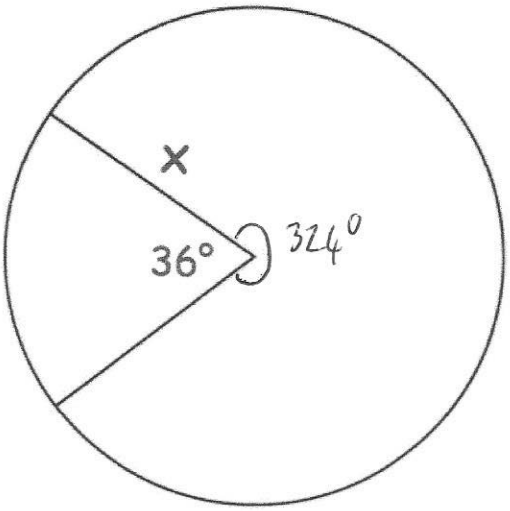
total perimeter = 30.56637... m.

$\frac{12.566...}{30.566...} \times 100 = 41.1117...$

41.11 ..... %

(4)

13.



The major arc length is 31.1cm.
Find the length of x, the radius of the circle.

$\frac{324}{360} \times \pi \times 2x = 31.1$

$\frac{324}{360} \times 2x = 9.899...$

$\frac{9}{10} \times 2x = 9.899...$

$2x = 10.999...$

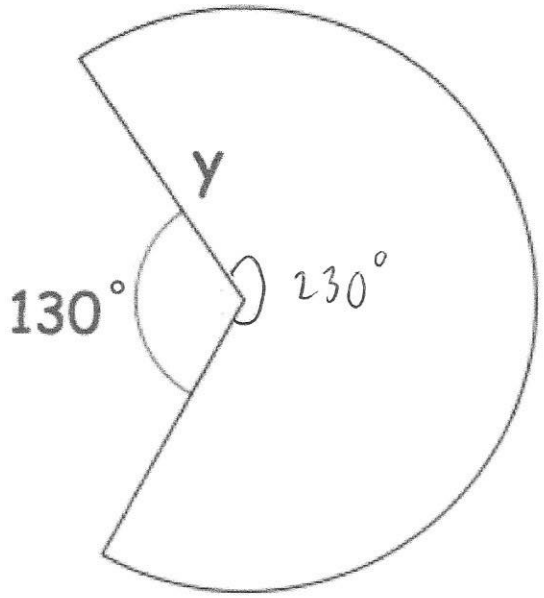
$x = 5.5$cm to 1dp

5.5

.....cm

(3)

14.



The perimeter of the sector is 1m. 100cm
Find the length of y, the radius of the circle.

$\frac{230}{360} \times \pi \times 2y + y + y = 100$

$0.6388.. \times \pi \times 2y + 2y = 100$

$2.00712864 \times 2y + 2y = 100$

$4.01425..y + 2y = 100$

$6.01425..y = 100$

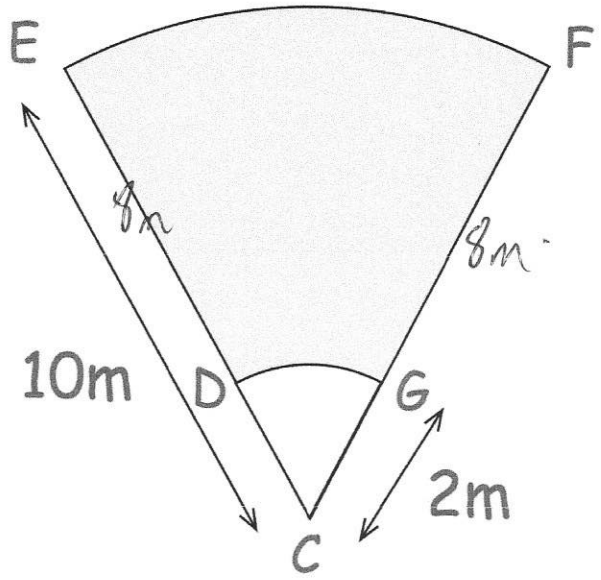
$y = 16.627..$

16.63 .....cm
(4)
to 2dp.

15. Holly has designed a garden which consists of a patio and a grass lawn.

The garden, CEF, is a sector of a circle, centre C.
The patio, CDG, is also a sector of a circle, centre C.
The shaded region, DEFG, is a grass lawn.

~~The area of patio CDG is 12m²~~ Angle ECF is 40°.



Calculate the perimeter of the grass lawn, the shaded region.

DG : $\frac{40}{360} \times \pi \times 4 = \frac{4}{9}\pi$

EF : $\frac{40}{360} \times \pi \times 20 = \frac{20}{9}\pi$

$8 + 8 + \frac{4}{9}\pi + \frac{20}{9}\pi$

24.37758...

24.378 .....m

(4)