Name:

Exam Style Questions

Area of a Sector

Corbettmaths

Equipment needed: Calculator, pen

Guidance

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

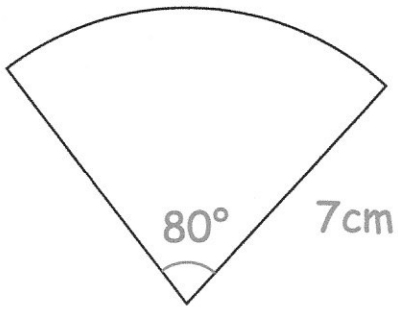
Video Tutorial

www.corbettmaths.com/contents

Video 46

Answers and Video Solutions

1. The diagram shows a sector of a circle with radius 7cm.



Work out the area of the sector.
Give your answer correct to 2 decimal places.

$\frac{80}{360} \times \pi \times 7^2 = 34.2084\ldots$

34.21 ..... cm^2

(3)

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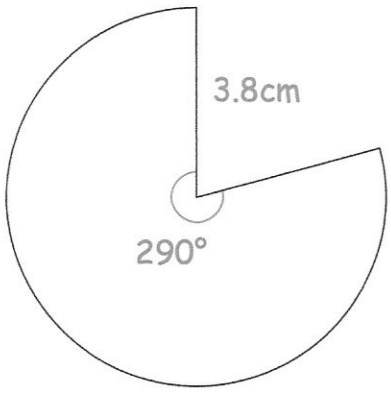
2. The diagram shows a major sector of a circle with radius 3.8cm.



Find the area of the major sector.
Give your answer to 3 significant figures.

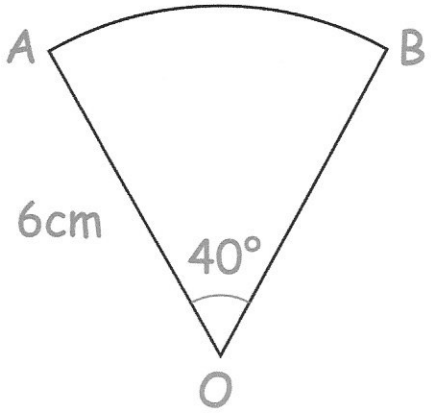
$\frac{290}{360} \times \pi \times 3.8^2$

$= 36.5437\ldots$

36.5 ..... cm^2

(3)

3. OAB is a sector of a circle.



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

$\frac{40}{360} \times \pi \times 6^2$

$\frac{1}{9} \times \pi \times 36 = 4\pi$

4π ..... cm^2

(3)

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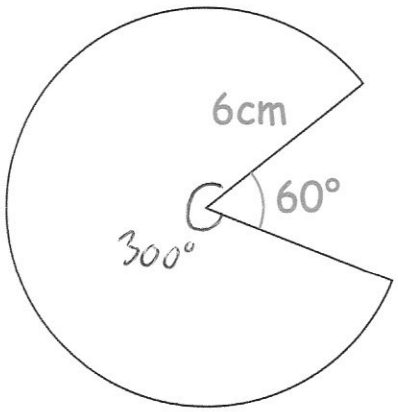
4. Shown is a major sector of a circle.



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

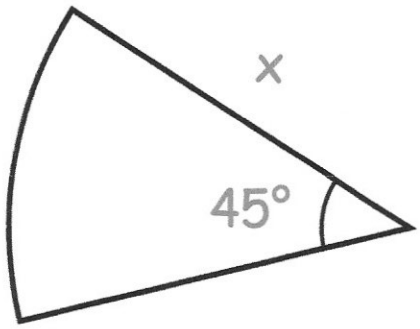
$\frac{300}{360} \times \pi \times 6^2$

$\frac{5}{6} \times \pi \times 36$

30π ..... cm^2

(3)

5. Shown below is a sector of a circle, with radius x cm.



The area of the sector is 18π cm²

Find the length of x.

$\frac{45}{360} \times \pi \times x^2 = 18\pi$

$\frac{1}{8} \times \pi \times x^2 = 18\pi$

$\frac{1}{8} x^2 = 18$

$x^2 = 144$

$x = 12$

12 .....cm

(3)

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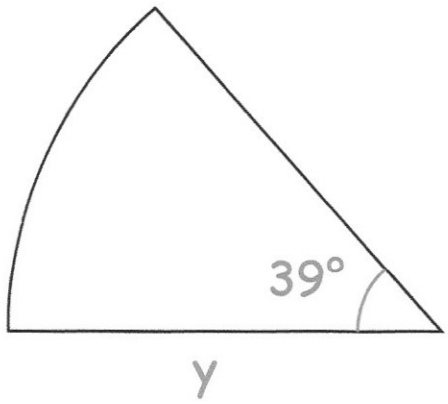
6. The area of the sector below is 2.48cm²



Find the length of y.
Give your answer to 1 decimal place.

$\frac{39}{360} \times \pi \times y^2 = 2.48$

$\div \pi \quad \div \pi$

$\frac{39}{360} y^2 = 0.7894...$

$\times 360 \quad \times 360$

$39y^2 = 284.187...$

$\div 39 \quad \div 39$

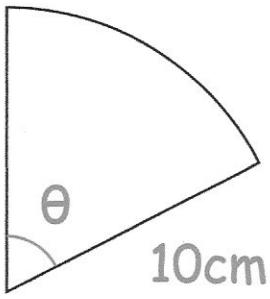
$y^2 = 7.286...$

$y = 2.699...$

2.7 .....cm

(3)

7. Below is a sector of a circle with area 5π cm²



Find the size of angle θ

$\frac{\theta}{360} \times \pi \times 10^2 = 5\pi$

$\frac{\theta}{360} \times 100 = 5$

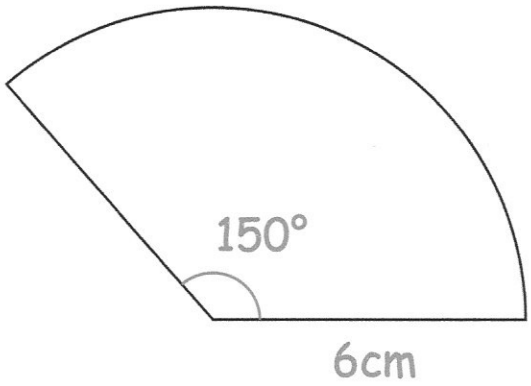
$\theta \times 100 = 1800$

$\theta = 18$

18 .....°

(3)

8. Shown is a sector of a circle.



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

$\frac{150}{360} \times \pi \times 6^2$

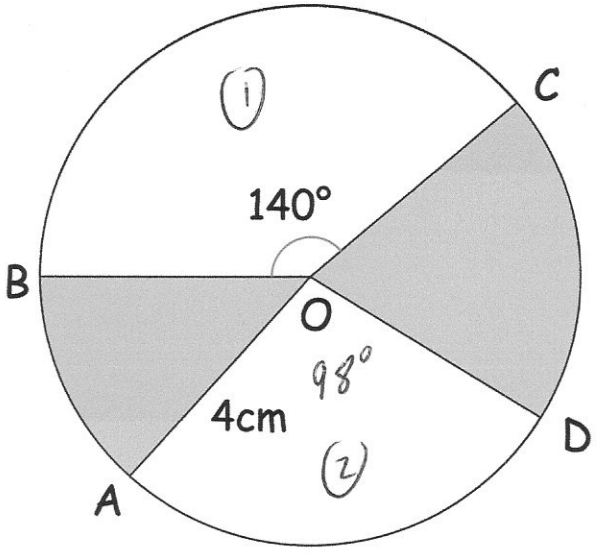
$\frac{15}{36} \times \pi \times 36$

$= 15\pi$

15π .....cm²

(3)

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



OA = 4cm

Angle BOC = 140°

Angle AOD : Angle BOC = 7 : 10

Work out the total area of the shaded regions.

$140 \div 10 = 14$

$14 \times 7 = 98°$

$140 + 98 = 238°$

$360 - 238 = 122°$

Approach 1

$\frac{122}{360} \times \pi \times 4^2 = 17.0344...$

Approach 2

Sector 1

$\frac{140}{360} \times \pi \times 4^2 = 19.54...\ cm^2$

Sector 2

$\frac{98}{360} \times \pi \times 4^2 = 13.68...\ cm^2$

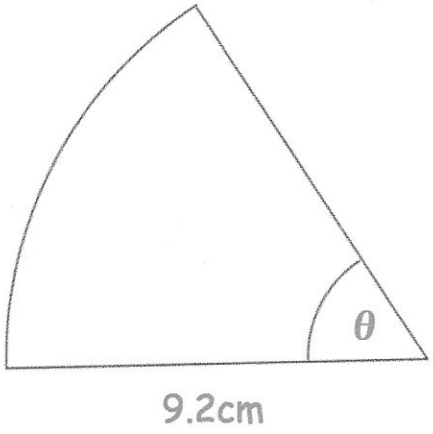
Circle $\pi \times 4^2 = 16\pi\ cm^2$

$16\pi - (19.54... + 13.68...) = 17.034...$

17.034 ..... cm²

(5)

10. Shown is a sector of a circle with radius 9.2cm.



The area of the sector is 38.4cm²

Find the size of angle θ
Give your answer to 2 significant figures.

$\frac{\theta}{360} \times \pi \times 9.2^2 = 38.4$
$\div \pi \qquad\qquad \div \pi$

$\frac{\theta}{360} \times 9.2^2 = 12.223...$

$\frac{\theta}{360} \times 84.64 = 12.223...$

$\frac{\theta}{360} = 0.144412...$

$\theta = 51.9886...$

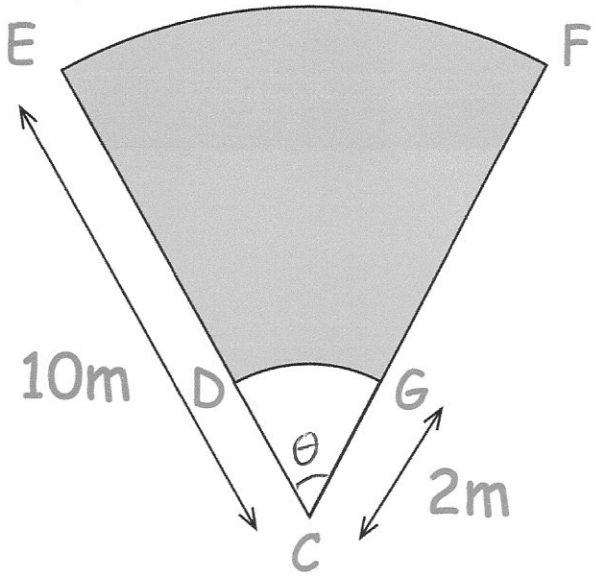
52 .....°

(3)

11. 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 1.2m²



Calculate the area of the grass lawn, the shaded region.
~~Give your answer correct to 2 significant figures.~~

$\frac{\theta}{360} \times \pi \times 2^2 = 1.2$

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

$\theta \times \pi = 108$

$\theta = 34.3774...^{\circ}$

whole garden:

$\frac{34.3774...}{360} \times \pi \times 10^2 = 30$

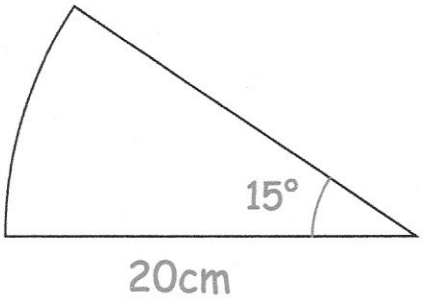
$30 - 1.2 = 28.8$

28.8 m²

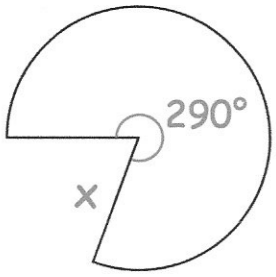
(5)

12. Shown below are two sectors.

Sector A



Sector B



The sectors have the same area.

Find the length of the radius of sector B, x.

$\frac{15}{360} \times \pi \times 20^2 = \frac{50}{3}\pi \text{ cm}^2 \quad (52.359...)$

$\frac{290}{360} \times \pi \times x^2 = \frac{50}{3}\pi$

$\frac{29}{36} x^2 = \frac{50}{3}$

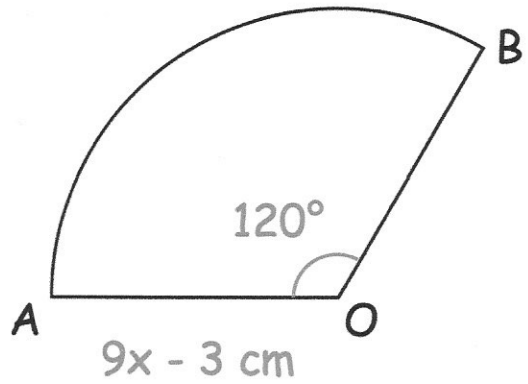
$x^2 = \frac{600}{29}$

$x = 4.54858...$

4.5486 cm

(5)

13. AOB is a sector of a circle, centre O.



Write an expression for the area of the sector AOB.

$\frac{120}{360} \times \pi \times (9x-3)^2$

$\frac{1}{3} \pi \times (9x-3)(9x-3)$

$\frac{1}{3} \pi (81x^2 - 27x - 27x + 9)$

$\frac{1}{3} \pi (81x^2 - 54x + 9)$

$(27x^2 - 18x + 3)\pi$

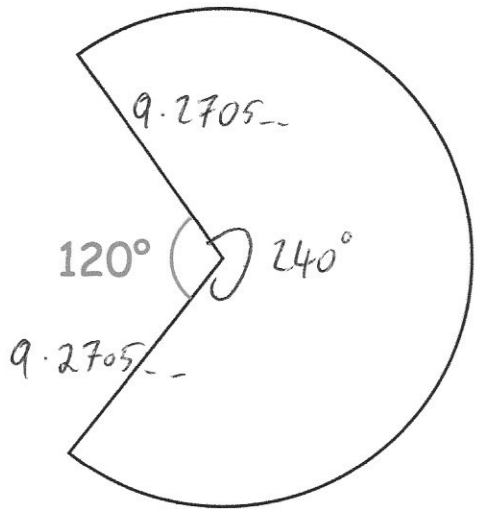
$(27x^2 - 18x + 3)\pi$ cm²

(3)

or

$27\pi x^2 - 18\pi x + 3\pi$

14.



The area of the major sector is 180cm²

Calculator the perimeter of the major sector.
Give your answer to 1 decimal place.

$\frac{240}{360} \times \pi \times r^2 = 180$

$\pi \times r^2 = 270$

$r^2 = 85.94...$

$r = 9.2705...$

Arc length:

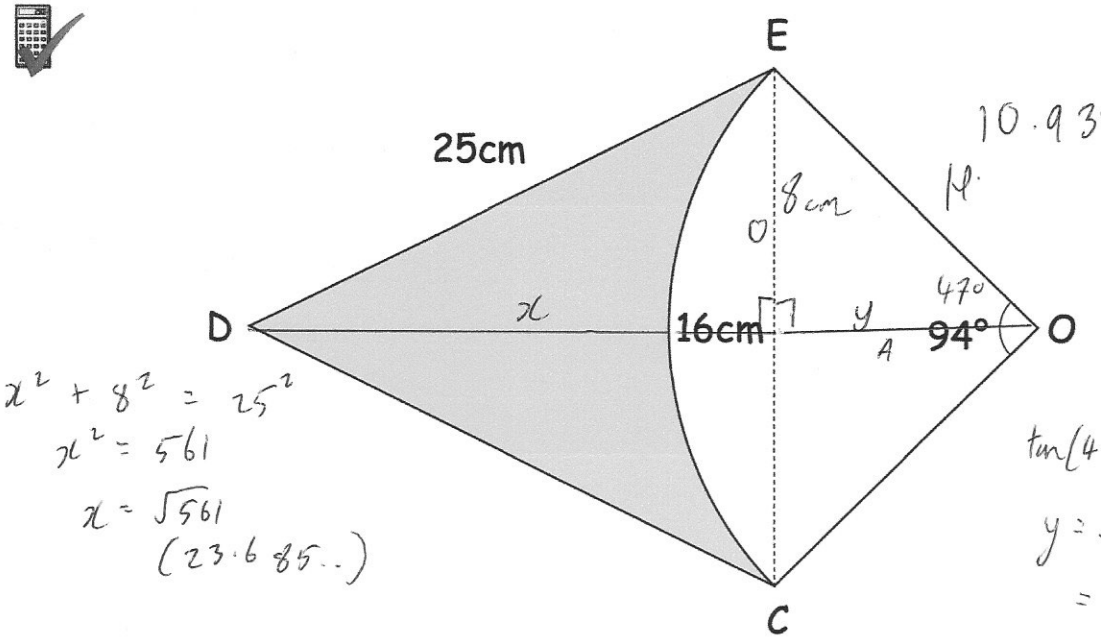
$\frac{240}{360} \times \pi \times (2 \times 9.270...)$

$= 38.8325...$

$9.2705... + 9.2705... + 38.83... = 57.37...$

57.4 .....cm
(5)

15. Shown below is a kite, OCDE.



$x^2 + 8^2 = 25^2$

$x^2 = 561$

$x = \sqrt{561}$

$(23.685..)$

10.9386... cm

M

$\tan(47) = \frac{8}{y}$

$y = \frac{8}{\tan 47}$

$= 7.4601..$

OCE is a sector of a circle, centre O.

CD = DE = 25cm CE = 16cm

Angle COE = 94°

Calculate the area of the shaded region.
Give your answer to 1 decimal places

$\sin(47) = \frac{8}{OE}$

$OE = \frac{8}{\sin(47)}$

$= 10.9386..$

$OD = 31.145559...$

Area of $\triangle ODE = \frac{1}{2} \times 31.14.. \times 8 =$

124.58...

$\triangle ODC = 124.58...$

Area of kite OCDE = 249.164474...cm²

Area of sector OCE =

$\frac{94}{360} \times \pi \times 10.9386..^2$

$= 98.15...$

$249.164.. - 98.15.. =$

151.01

151.01 .....cm²

(6)