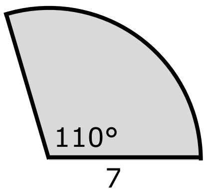
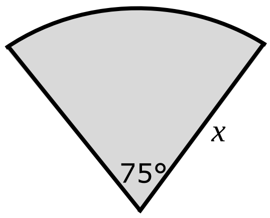
Level 2 Trigonometry Sectors and Segments #1

All curves shown are all parts of circles.

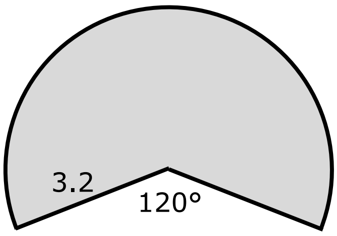
1. Find the perimeter of the sector



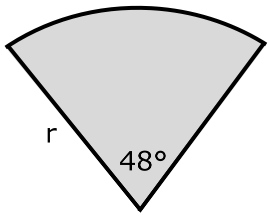
2. Find the shaded area in terms of x



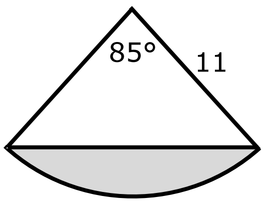
3. Calculate the shaded area



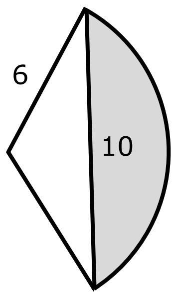
4. The area is 25 m^2. What is the radius?



5. Calculate the shaded area

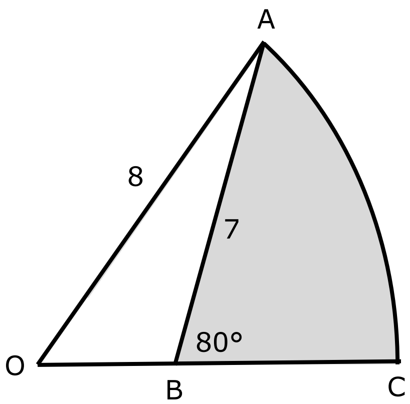


6. Find the perimeter of the segment.



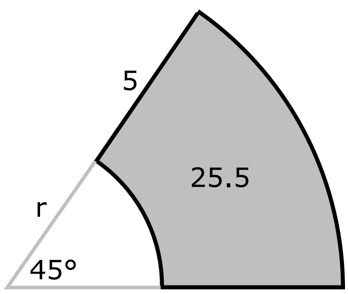
7. OAC is a sector, of radius 8 cm. $\angle ABC = 80°$ and AB = 7 cm

   What is the shaded area?



8. A concrete paving block is shown from above. It is 45° at the "centre" and 5 cm wide.

   What is the length of the inner radius, r, if the shaded area is 25.5 cm^2?



Answers: Level 2 Trigonometry Sectors and Segments #1

Rounding errors will occur unless you carry all the decimal places.

1. $p = [\frac{110}{360} \times \pi \times 2 \times 7] + 7 + 7 = \mathbf{27.44}$

   or

   $110° = 110 \times \frac{2\pi}{360} = 1.92$ rad $\quad$ $p = r\theta + 2r = 7 \times 1.92 + 7 + 7 = 27.44$

2. $A = \frac{75}{360} \times \pi \times x^2 \quad \Rightarrow \quad A = \mathbf{0.6545x^2}$

   or

   $75° = 75 \times \frac{2\pi}{360} = 1.309$ rad $\quad$ $A = \frac{1}{2}\theta r^2 = 0.5 \times 1.309 \times x^2 = 0.6545x^2$

3. The arc's angle is $360 - 120 = 240°$ so the area, $A = \frac{240}{360} \times \pi \times 3.2^2 = \mathbf{21.447}$

   or

   $240° = 240 \times \frac{2\pi}{360} = 4.1888$ radians $\quad A = \frac{1}{2}\theta r^2 = 0.5 \times 4.1888 \times 3.2^2 = 21.447$

4. $A = \frac{48}{360} \times \pi \times r^2 = 25\ r^2 = 59.683$ $\quad$ radius = **7.725**

   or

   $48° = 48 \times \frac{2\pi}{360} = 0.8378$ rad $A = \frac{1}{2}\theta r^2 \Rightarrow 0.5 \times 0.8378 \times r^2 = 25$ $\quad r = 7.725$

5. Area sector $= \frac{85}{360} \times \pi \times 11^2 = 89.75$

   Area triangle $= \frac{1}{2} \times 11 \times 11 \times \sin(85) = 60.27$

   Shaded area = sector – triangle = $89.75 - 60.27 = \mathbf{29.48}$

6. To find the angle: $\cos a° = \frac{6^2 + 6^2 - 10^2}{2 \times 6 \times 6} = \frac{-28}{72}$ $\quad a° = \cos^{-1}(\frac{-153}{72}) = 112.89°$

   Arc length $= \frac{112.89}{360} \times \pi \times 2 \times 6 = 11.82$

   Perimeter $= 11.82 + 10 = \mathbf{21.82}$

7. $\angle ABC = 80°$ so $\angle ABO = 100°$ $\angle AOB = \sin^{-1}\left(\frac{sin100}{8} \times 7\right) = 59.51°$

$\angle OAB = 180 - 100 - 59.51 = 20.49°$

Area $\Delta OAB = ½ \times 8 \times 7 \times \sin(20.49) = 9.801$

(or by calculating the height of $\Delta OAB = 6.893$ and the base $= 2.843$ and using $A = ½hb$)

Area sector $= \frac{59.51}{360} \times \pi \times 8^2 = 33.237$

Shaded area is difference $= 33.237 - 9.801 =$ **23.44 cm²**

8. The outer area is $= \frac{45}{360} \times \pi \times (r + 5)^2 = 0.3927\ r^2 + 3.927\ r + 9.817$

The inner area is $= \frac{45}{360} \times \pi \times r^2 = 0.3927\ r^2$

The difference then is $3.927\ r + 9.817 = 25.5$

$r = 3.99$ so **4 cm**