

Area and Volume

Section 6.2

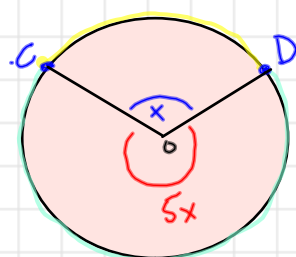


Example 2

A minor arc CD of a circle, centre O and radius 20 cm, subtends an angle x radians at O. The major arc CD of the circle subtends an angle $5x$ radians at O. Find, in terms of π , the length of the minor arc.

$$\pi = \pi$$

$$Arc = \frac{\theta}{360} (2\pi R)$$



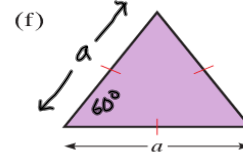
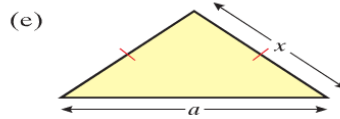
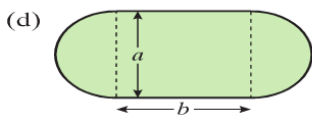
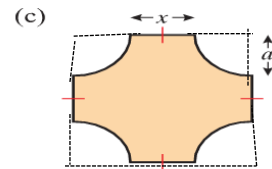
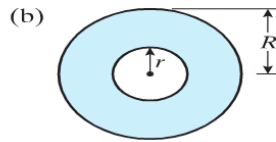
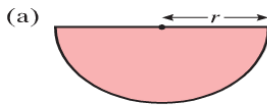
$$6x = 360^\circ$$

$$x = 60^\circ$$

$$Arc = \frac{60}{360} (2\pi 20)$$

$$= \frac{1}{6} (40\pi) = \frac{20\pi}{3}$$

3. Write a formula for each of the following shaded areas.



Area = πR^2
Circle

Area = $\frac{\theta}{360} (\pi R^2)$
Sector

side of square = $2a+x$
Radius circle = a

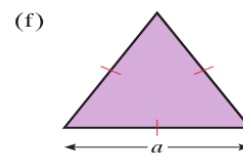
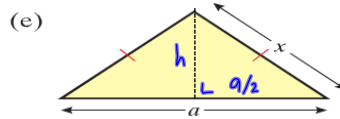
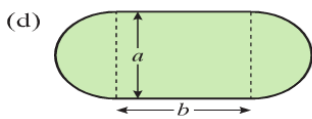
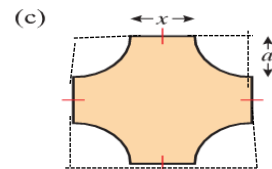
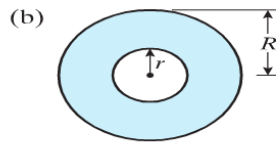
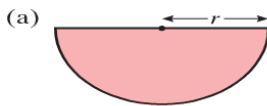
a) $A = \frac{\pi R^2}{2}$

b) $A = \pi R^2 - \pi r^2$

c) $A = \text{Square} - 4(\frac{1}{4} \text{ circle})$
 $= (2a+x)^2 - \pi a^2$

d) $A = \text{rectangle} + 2(\frac{1}{2} \text{ circle})$
 $= ab + \pi(\frac{a}{2})^2$

3. Write a formula for each of the following shaded areas.



$A = \frac{Bh}{2}$ (e)

$a^2 = b^2 + c^2$
Base = a

$x^2 = (\frac{a}{2})^2 + h^2 \Rightarrow h^2 = x^2 - \frac{a^2}{4}$

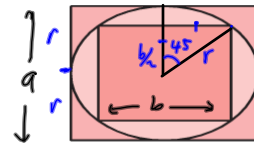
$h = \sqrt{x^2 - \frac{a^2}{4}}$

$\Rightarrow A = \frac{a\sqrt{x^2 - \frac{a^2}{4}}}{2}$

$A = \frac{1}{2} ab \sin c$ (f)

$A = \frac{a^2 \sin 60^\circ}{2} = \frac{a^2 (\frac{\sqrt{3}}{2})}{2} = \frac{\sqrt{3}}{4} a^2$

8. (i) A circle is shown with both an inscribed and a circumscribed square.
Find the ratio of the area of the inner square to the area of the outer square.



let a = side of outer square
and b = side of inner square

let r = radius circle

Pythagoras:

$$a^2 = b^2 + c^2$$

$$\text{Area}_{\text{outer}} = a^2$$

$$\text{Area}_{\text{inner}} = b^2$$

$$\text{Ratio} = b^2 : a^2$$

$$r^2 = \left(\frac{b}{2}\right)^2 + \left(\frac{b}{2}\right)^2 = \frac{2b^2}{4} = \frac{b^2}{2}$$

$$\Rightarrow b^2 = 2r^2$$

$$a = 2r \Rightarrow a^2 = 4r^2$$

$$\Rightarrow b^2 : a^2 = 2r^2 : 4r^2 = 1 : 2$$

Ratio