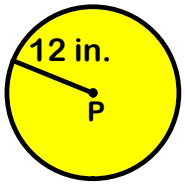
11.2 Areas of Circles and Sectors

Area of a Circle: $A = \pi r^2$

Example 1

Find the area of ⊙P.



$A = \pi(12)^2$

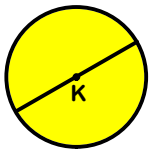
$A = 144\pi \text{ in}^2$

or

452.4 in^2

Example 2 $2r = d$

Find the diameter of ⊙K.



Area of ⊙K is 52 cm²

$A = \pi r^2$

$\frac{52}{\pi} = \frac{\pi r^2}{\pi}$

$\sqrt{\frac{52}{\pi}} = \sqrt{r^2}$

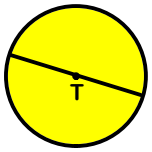
$r \approx 4.07$

$2(4.07)$

$\hookrightarrow$ 8.14 cm → d

Example 3

Find the diameter of ⊙T.



Area of ⊙T is 325 ft²

$A = \pi r^2$

$\frac{325}{\pi} = \frac{\pi r^2}{\pi}$

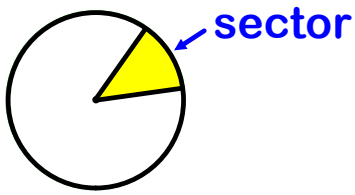
$\sqrt{\frac{325}{\pi}} = \sqrt{r^2}$

$r \approx 10.17$

$2(10.17)$

$\hookrightarrow$ 20.34 ft = d

A sector of a circle is the region bounded by two radii of the circle and their intercepted arc.



Theorem 11.8 Area of a Sector

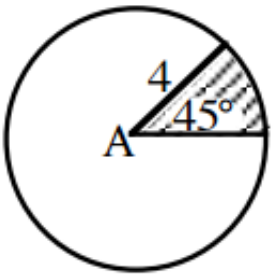
The ratio of the area A of a sector of a circle to the area of the circle is equal to the ratio of the measure of the intercepted arc to 360°.

(part) area of sector $\frac{A}{\pi r^2} = \frac{m\overset{\frown}{AB}}{360^\circ}$ part

(whole) area of circle whole

Example 4

Find the area of the sector shown below.



$\frac{A}{\pi(4)^2} = \frac{45}{360}$

$\frac{A}{16\pi} = \frac{1}{8}$

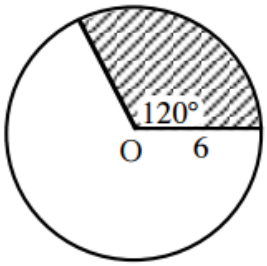
$\frac{8A}{8} = \frac{16\pi}{8}$

$A = 2\pi$ units^2

$A \approx 6.28$ units^2

Example 5

Find the area of the sector shown below.



$$\frac{A}{\pi \cdot 6^2} = \frac{120}{360}$$

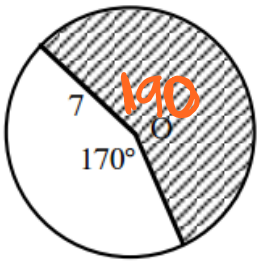
$$\frac{A}{36\pi} = \frac{1}{3}$$

$$\frac{3A}{3} = \frac{36\pi}{3}$$

$$A = 12\pi \text{ units}^2 \approx 37.70 \text{ units}^2$$

Example 6

Find the area of the sector shown below.



$$\frac{A}{\pi \cdot 7^2} = \frac{190}{360}$$

$$\frac{A}{49\pi} = \frac{19}{36}$$

$$\frac{36A}{36} = \frac{931\pi}{36}$$

$$A = \frac{931\pi}{36} \text{ units}^2 \approx 81.15 \text{ units}^2$$

Example 7

Find the area of the sector shown below.

$$\frac{A}{\pi \cdot 11^2} = \frac{270}{360}$$

$$\frac{A}{121\pi} = \frac{3}{4}$$

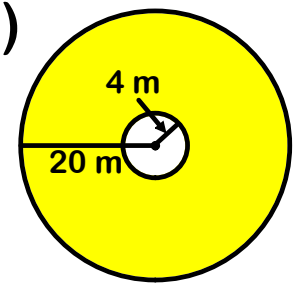
$$\frac{4A}{4} = \frac{363\pi}{4}$$

$$A = \frac{363\pi}{4}\text{ units}^2 \approx 285.10\text{ units}^2$$

Example 8

Find the area of the shaded region.

a)



big ⊙ − sm. ⊙

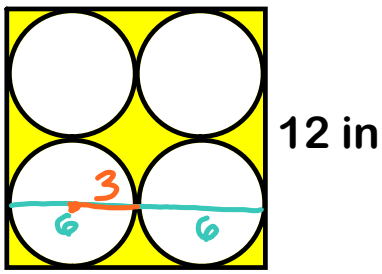
$\pi \cdot 20^2 - \pi \cdot 4^2$

$400\pi - 16\pi$

$384\pi\ m^2$

$1206.37\ m^2$

b)



square − 4 ⊙

$12 \cdot 12 - 4 \cdot (\pi \cdot 3^2)$

$144 - 36\pi\ in^2$

$30.90\ in^2$