Circles

Emphasis on Area of a Circle & Sector

Find the exact area of the circle with the given radius or diameter.

1. Radius = 10 inches

$A = \pi r^2$

$A = \pi (10)^2$

$\boxed{A = 100\pi}$

2. Diameter = 42 feet

$d = 2r$

$\frac{42}{2} = \frac{2r}{2}$

$21 = r$

$A = \pi r^2$

$A = \pi (21)^2$

$\boxed{A = 441\pi}$

Find the indicated measure.

3. The area of a circle is 58 in^2. Find the radius.

$A = \pi r^2 \rightarrow \frac{58}{\pi} = \frac{\pi r^2}{\pi} \rightarrow \frac{\sqrt{58}\cdot\sqrt{\pi}}{\sqrt{\pi}\cdot\sqrt{\pi}} = \sqrt{r^2} \rightarrow \boxed{\frac{\sqrt{58\pi}}{\pi} = r}$

4. The area of a circle is 37 m^2. Find the radius.

$A = \pi r^2 \rightarrow \frac{37}{\pi} = \frac{\pi r^2}{\pi} \rightarrow \frac{\sqrt{37}\cdot\sqrt{\pi}}{\sqrt{\pi}\cdot\sqrt{\pi}} = \sqrt{r^2} \rightarrow \boxed{\frac{\sqrt{37\pi}}{\pi} = r}$

5. The area of a circle is 106 cm^2. Find the diameter.

$A = \pi r^2 \rightarrow \frac{106}{\pi} = \frac{\pi r^2}{\pi} \rightarrow \frac{\sqrt{106}\cdot\sqrt{\pi}}{\sqrt{\pi}\cdot\sqrt{\pi}} = \sqrt{r^2} \rightarrow 2\cdot\frac{\sqrt{106\pi}}{\pi} = r\cdot 2 \rightarrow \boxed{\frac{2\sqrt{106\pi}}{\pi} = d}$

6. The area of a circle is 249 ft^2. Find the diameter.

$A = \pi r^2 \rightarrow \frac{249}{\pi} = \frac{\pi r^2}{\pi} \rightarrow \frac{\sqrt{249}\cdot\sqrt{\pi}}{\sqrt{\pi}\cdot\sqrt{\pi}} = \sqrt{r^2} \rightarrow 2\cdot\frac{\sqrt{249\pi}}{\pi} = r\cdot 2 \rightarrow \boxed{\frac{2\sqrt{249\pi}}{\pi} = d}$

Find the area of the sectors formed by the given information.

7. Radius = 6 cm

Central Angle is a right angle.

$A_{sec} = \frac{m\widehat{AB}}{360}\cdot \pi r^2$

$= \frac{90^\circ}{360^\circ}\cdot\frac{\pi (6)^2}{1}$

$= \frac{3240\pi}{360} = \boxed{9\pi}$

8. Diameter = 20 in

Central Angle = 60°

$d = 2r \rightarrow \frac{20}{2} = \frac{2r}{2}$

$\boxed{r = 10}$

$A_{sec} = \frac{m\widehat{AB}}{360}\cdot \pi r^2$

$= \frac{60}{360}\cdot\frac{\pi (10)^2}{1}$

$= \frac{6000\pi}{360} = \boxed{\frac{50}{3}\pi}$

9. Radius = 24 ft

Central Angle = 120°

$A_{sec} = \frac{m\widehat{AB}}{360}\cdot \pi r^2$

$= \frac{120}{360}\cdot\frac{\pi (24)^2}{1}$

$= \frac{69120\pi}{360} = \boxed{192\pi}$

10. Diameter = 8 m

Central Angle = 65°

$d = 2r \rightarrow \frac{8}{2} = \frac{2r}{2}$

$\boxed{r = 4}$

$A_{sec} = \frac{m\widehat{AB}}{360}\cdot \pi r^2$

$= \frac{65}{360}\cdot\frac{\pi (4)^2}{1}$

$= \frac{1040\pi}{360} = \boxed{\frac{26}{9}\pi}$

Find the area of the circle given the central angle and the area of a sector of the triangle.

11. Area of the sector = 17.46 m^2
Central Angle = 100°

$A_{sec} = \frac{m\overset{\frown}{AB}}{360} \cdot A_{circle}$

$\frac{360}{100}\left[17.46 = \frac{100}{360} \cdot A\right]\frac{360}{100}$

$62.856 = A$ OR $A = \frac{7857}{125}$

12. Area of the sector = 39.52 in^2
Central Angle = 175°

$A_{sec} = \frac{m\overset{\frown}{AB}}{360} \cdot A_{circle}$

$\frac{360}{175}\left[39.52 = \frac{175}{360} \cdot A\right]\frac{360}{175}$

$81.29828571 = A$ OR $A = \frac{71136}{875}$

13. Area of the sector = 20.89 ft^2
Central Angle = 282°

$A_{sec} = \frac{m\overset{\frown}{AB}}{360} \cdot A_{circle}$

$\frac{360}{282}\left[20.89 = \frac{282}{360} \cdot A\right]\frac{360}{282}$

$26.66808511 = A$ OR $A = \frac{6267}{235}$

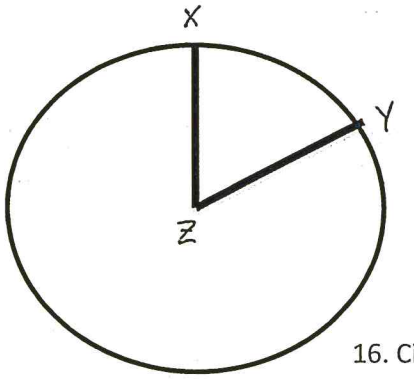
14. Area of the sector = 23.79 cm^2
Central Angle = 80°

$A_{sec} = \frac{m\overset{\frown}{AB}}{360} \cdot A_{circle}$

$\frac{360}{80}\left[23.79 = \frac{80}{360} \cdot A\right]\frac{360}{80}$

$107.055 = A$ OR $A = \frac{21411}{200}$

Mixed Review of Circumference, Arc Length, Area of a Circle, & Area of a Sector:
Given circle Z has an area of 124.44 cm^2. The area of sector XZY is 28 cm^2. Find the indicated measure.



15. Radius of circle Z.

$A = \pi r^2$

$\frac{124.44}{\pi} = \frac{\pi r^2}{\pi} \rightarrow \frac{\sqrt{124.44}\cdot\sqrt{\pi}}{\sqrt{\pi}\cdot\sqrt{\pi}} = \sqrt{r^2}$

$r = \frac{\sqrt{124.44\pi}}{\pi}$

16. Circumference of circle Z.

$C = 2\pi r$

$= \frac{2\pi}{1}\left(\frac{\sqrt{124.44\pi}}{\pi}\right)$

$= 2\sqrt{124.44\pi}$

17. m $\overset{\frown}{XY}$

$A_{sec} = \frac{m\overset{\frown}{XY}}{360} \cdot A_{circle}$

$\frac{360}{124.44}\left[28 = \frac{m\overset{\frown}{XY}}{360} \cdot \frac{124.44}{1}\right]\frac{360}{124.44}$

$81.00289296 = m\overset{\frown}{XY}$

OR $m\overset{\frown}{XY} = \frac{84000}{1037}$

18. Length of $\overset{\frown}{XY}$

$\overset{\frown}{XY} = \frac{m\overset{\frown}{XY}}{360} \cdot C$

$= \frac{\frac{84000}{1037}}{360} \cdot \frac{2\sqrt{124.44\pi}}{1}$

$= \frac{700}{3111} \cdot \frac{2\sqrt{124.44\pi}}{1} = \frac{1400\sqrt{124.44\pi}}{3111}$