Geometry

8.7: Circumference & Area of Circles

Name:_____

🎯 Students will be able to find the circumference and area of circles. Students will understand how to write answers as exact and approximate. In addition, students will be able to calculate the length of an arc and area of a sector.

☆ A ___Circle___ is the set of all points in a plane that are the same distance from a

given point called the ___center___ of the circle. A circle with center P is called

___circle P___ or ___⊙P___ .

☆**Radius:**

distance from center to a point on the circle.
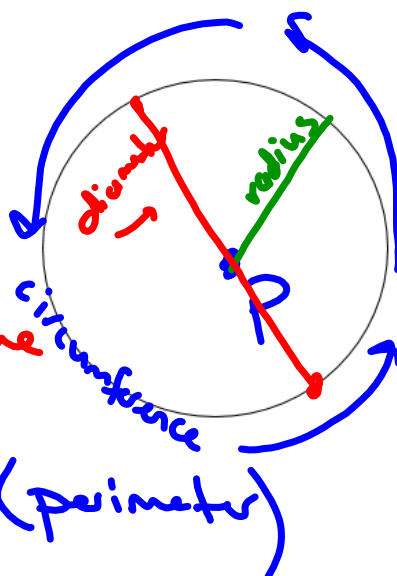
☆**Diameter:**

distance across the circle, through the center.

☆**Circumference:**

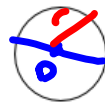distance AROUND the circle (perimeter)

☆ π:

3.14
— ≈
  (irrational number)
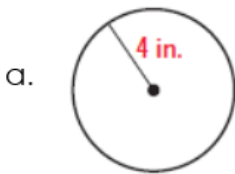
Circumference of a Circle

$$C = \pi \cdot d \qquad \text{or} \qquad C = 2\pi r \quad \ast \, 2r = d$$

d = diameter   r = radius

Example 1: Find the **exact AND approximate** circumference of the circle.

a.   4 in.

Answer still has π in it. NO DECIMALS!

use 3.14 for π. Round... It is a decimal.

b.   16 in.

Exact

$C = 2\pi r$

$C = 2\pi 4$

$C = 8\pi \text{ in}$

Approx

$C = 2\pi r$

$C = 2 \cdot 3.14 \cdot r$

$C = 25.12 \text{ in}$

Exact

$C = \pi d$

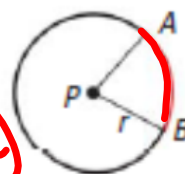$C = 16\pi \text{ in}$

Approx

$C = \pi d$

$C = 3.14 \cdot 16$
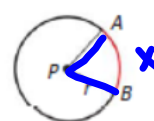
$C = 50.24 \text{ in}$

Arc length of a Circle

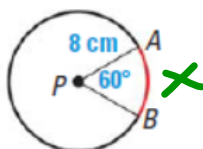☆Arc length: part of the circle (A fraction of the circumference)

Arc Length: $\dfrac{x}{2\pi r} = \dfrac{\text{central angle}}{360°}$
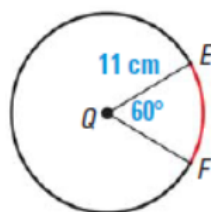
Example 2: Find the length of each red arc.

a.

8 cm, A, P, 60°, x, B

11 cm, E, Q, 60°, F

$r = 11$

central angle $= 60°$

$\dfrac{x}{2\pi r} = \dfrac{60°}{360°} \div 6$

$\dfrac{x}{2\pi \cdot 8} = \dfrac{1}{6}$

$6x = 16\pi$

$\dfrac{6x}{6} = \dfrac{16\pi}{6}$

$x = 8.4 cm$

$\dfrac{x}{2\pi(11)} = \dfrac{60°}{360°}$

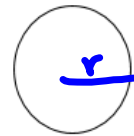$\dfrac{x}{22\pi} = \dfrac{1}{6}$

$\dfrac{6x}{6} = \dfrac{22\pi}{6}$

$x \approx 11.5 cm$

Area of a Circle

$$A = \pi r^2$$
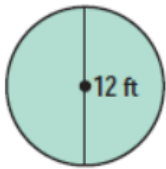
$r = $ radius

Example 3: Find the **exact AND approximate** area of the circle.

a.

12 ft

$d = 12$
$r = 6$

Exact
$A = \pi r^2$
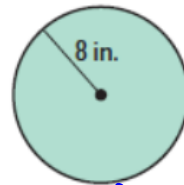$A = \pi \cdot (6)^2$
$\boxed{A = 36\pi \, ft^2}$

Approx
$A = \pi r^2$
$A = 3.14 \cdot (6)^2$
$\boxed{A = 113.04 \, ft^2}$

b.

8 in.

Exact
$A = \pi r^2$
$A = \pi (8)^2$
$\boxed{A = 64\pi \, in^2}$

Approx
$A = \pi r^2$
$A = 3.14(8)^2$
$\boxed{A = 200.96 \, in^2}$

Example 4: Find the radius of the circle with an area of 380 square feet.

$A = 380 \text{ ft}^2$

$$A = \pi r^2$$

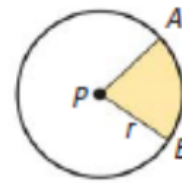$$\frac{380}{3.14} = \frac{3.14 r^2}{3.14}$$

$$\sqrt{121} = \sqrt{r^2}$$

$$11 = r$$
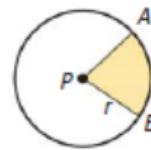
radius

11 ft

Area of a sector

☆Sector:

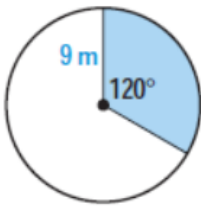Region of circle
determined by 2 radii
and a part of the circle.

(piece of pie)
(fraction of whole area)

Area of a Sector:

$$\frac{x}{\pi r^2} = \frac{central\ angle}{360°}$$
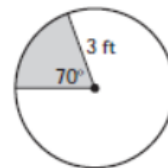
Example 5: Find the area of the shaded sector.

a.

9 m   120°

$$\frac{x}{\pi(9)^2} = \frac{120°}{360°}$$

$$\frac{x}{81\pi} = \frac{1}{3}$$

HW: 8.7 Worksheet

$$\frac{3x}{3} = \frac{81\pi}{3}$$

$$\boxed{x = 84.78\ m^2}$$

b.

3 ft   70°

$$\frac{x}{\pi(3)^2} = \frac{70°}{360°}$$

$$\frac{x}{9\pi} = \frac{7}{36}$$

$$\frac{36x}{36} = \frac{63\pi}{36}$$

$$\boxed{x \approx 5.5\ ft^2}$$