13.1 Circles and Circumference p.550

Circle: set of all points in a plane that are the same distance from the center

Radius: the distance from the center to any point on the circle (plural is radii); radius is $\frac{1}{2}$ the diameter

Diameter: the distance across the circle through the center; divides a circle in half; diameter is double the radius

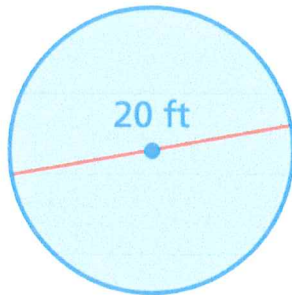**Chord:** distance across the circle that **does not** go through the center
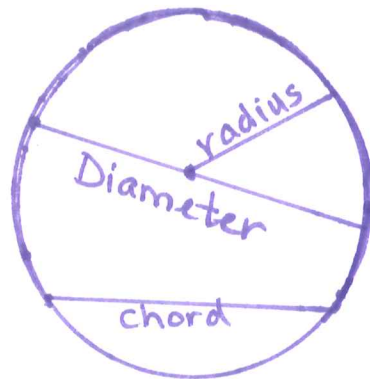
$$D = 2r$$
$$r = \frac{1}{2}d$$
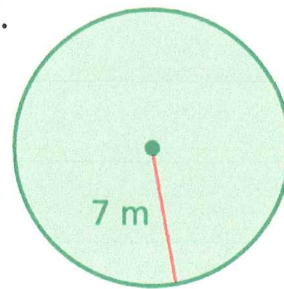
Find the diameter and radius of each circle:

1.

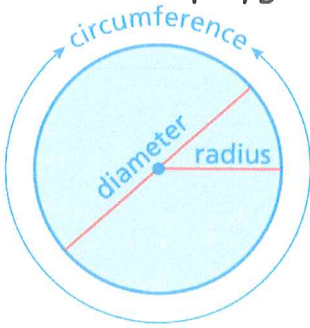

20 ft

$d = 20\,ft$
$r = 10\,ft$

2.

7 m

$d = 14\,m$
$r = 7\,m$

3. The diameter of a circle is 18 cm. Find the radius.

$r = 9\,cm$

4. The radius of a circle is 7 yards. Find the diameter.

$d = 14\,yds$

Circumference: the distance around a circle (like the perimeter of polygons)

The circumference of a circle is equal to pi (π) times the diameter.

$$C = \pi d$$

Pi is a ratio (represented by the Greek letter π) found by dividing the circumference by the diameter of every circle.

$$\pi = \frac{circumference}{diameter}$$

The value of π can be <u>approximated</u> as 3.14 or $\frac{22}{7}$.

==We usually use 3.14 <u>unless</u> the diameter is divisible by 7. If the diameter is divisible by 7, then use $\frac{22}{7}$.==

Find the circumference: πd

1. d = 16 cm
   C = πd
   = 3.14(16)
   C = 50.24 cm

2. r = 10.5 yds   d = 21
   C = πd
   = $\frac{22}{7} \cdot \frac{21^3}{1}$
   C = 66 yds

3. r = 4.5 in   d = 9
   C = πd
   = 3.14(9)
   C = 28.26 in

4. d = 4 mi
   C = πd
   = 3.14(4)
   C = 12.56 mi

5.
14 ft
   C = πd
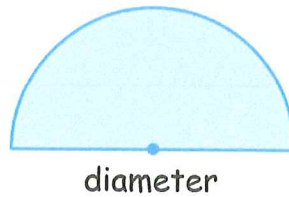   = $\frac{22}{7} \cdot \frac{14^2}{1}$
   C = 44 ft
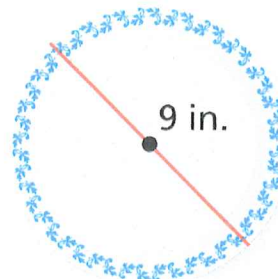
6.
9 in.
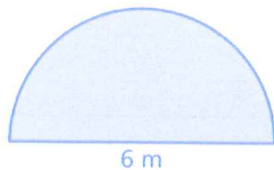   C = πd
   = 3.14(9)
   C = 28.26 in

Semicircle: one-half of a circle

diameter

To find the perimeter of a semicircular region:

1. Find the circumference of the circle and divide by 2
2. Add the diameter to that number for the total perimeter

Example:

6 m

The straight side is 6 meters long. The distance around the curved part is one-half the circumference of a circle with a diameter of 6 meters.

$$\frac{C}{2} = \frac{\pi d}{2}$$ Divide the circumference by 2.

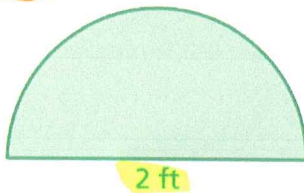$$\approx \frac{3.14 \cdot 6}{2}$$ Substitute 3.14 for π and 6 for d.

$$= 9.42$$ Simplify.

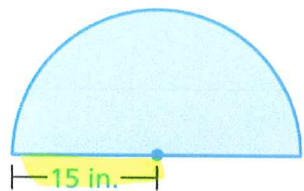∴ So, the perimeter is about 6 + 9.42 = 15.42 meters.
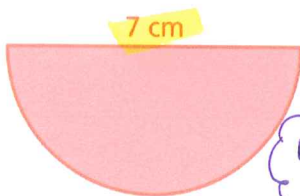
Semicircle

$$\frac{\pi d}{2} + d$$

1.

2 ft

$$\frac{\pi d}{2} + d \rightarrow \frac{3.14\,(2)}{2} + 2 = \boxed{5.14 \text{ ft}}$$

2.

⊢15 in.⊣

$$\frac{\pi d}{2} + d \rightarrow \frac{3.14\,(\overset{15}{\cancel{30}})}{\cancel{2}_{1}} + 30 = 47.1 + 30 = \boxed{77.1 \text{ in}}$$

3.

7 cm

$$\frac{\pi d}{2} + d \rightarrow \frac{\frac{22}{7} \cdot \frac{\overset{1}{\cancel{7}}}{1}}{2} + 7 \quad \frac{22}{2} + 7 = 11 + 7 = \boxed{18 \text{ cm}}$$

use $\frac{22}{7}$

4. Find the circumference of both circles:

Small: d = 10   large: d = 20

C = 3.14 (10)   C = 3.14 (20)

$\boxed{C = 31.4 \text{ cm}}$ $\boxed{C = 62.8 \text{ cm}}$

5 cm

5 cm