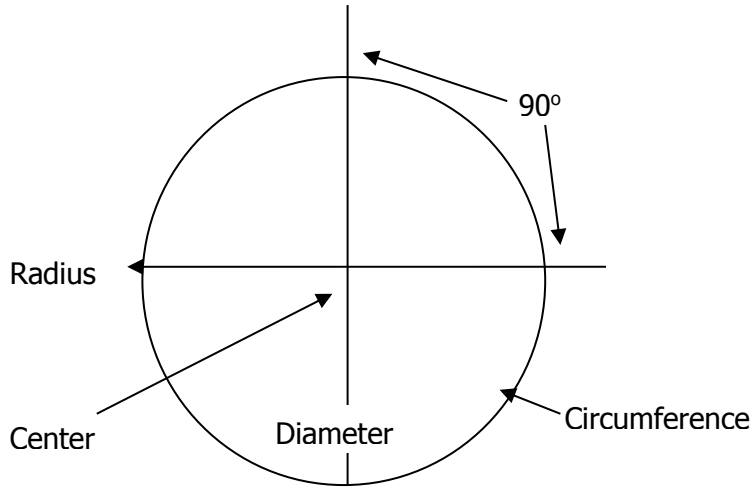
MA 7E	Mathematics Embedded Credit
Cape Career & Technology Center	Last Update: April 2017
Topic: Basic Geometry	Focus: Circle Geometry

Show-Me Standards: MA2	MO Grade Level Expectations: G2A9, G1A8, M2C2, M2C7, M2C8, M2C9	NCTM Standards: 8A, 8B

OBJECTIVE: Students will use basic circle geometry principles to solve inquiries related to circle problems.

Introduction:

A circle is a continuous line, or it is a plane surface bounded by the line. Every point on the line, or the circumference, is always the same distance from a center point that lies in the plane. When a circle is divided into 'pie shaped' pieces these pieces are called 'sectors'. Each 'sector' is a certain percentage of the total circle (the percentage of the circle is equal to the angle of the 'sector' formed by the two radii and the center point). Remember that the radius is the line segment formed by taking a line from the center point of the circle to a point on the circle (on the circumference). An 'arc' is the segment of the circle's curved line that is created by the lines showing the 'sector'. All circles conform to the rules of circles.



SOLIDS: objects with three dimensions.

CYLINDER: (also called "right circular cylinder") is a solid with bases that are equal-sized circles. The sides of the cylinder are at right angles to the bases.

SPHERE: is a solid bounded by a curved surface of which any point on it is equally distant from the center point within the sphere. The radius gives the distance from the center to the surface.

VOLUME: is the capacity of an object, or the amount of space it occupies.

RULES of CIRCLES:

- All points along the circle are the same distance from the center of the circle.
- By definition, there are 360-degrees in a circle.
- The radius, usually represented by the letter 'r', is the distance from the center of the circle to any point on the circle.
- The diameter, usually represented by the letter 'd', is the distance from one point on the circle to a point on the opposite side of the circle that passes through the center point of the circle.
- The diameter is always twice as long as a radius.
- The circumference of a circle, usually represented by the letter 'c', is both the boundary of the circle and the measurement of the distance around the circle (also called 'perimeter').
- The ratio of circumference to diameter (c/d) of any circle is 3.1416, or π (also known as 'pi').
- A radian is an angle, the measure of which is defined by two radii of a circle and an arc joining them, all of the same length. The number of radians in any circle is always 2π (or $[2*\pi]$), or 6.28.
- $(2\pi)radians = 360^{\circ}$

PERIMETER: $p = 2\pi r$ / $p = \pi d$, use the top one when the radius is known and the bottom when the diameter is known.

AREA: $A = \pi r^2$ / $A = \frac{\pi d^2}{4}$, use the top one when the radius is known and the bottom when the diameter is known.

VOLUME (Cylinder): $V = \pi r^2 * h$, where r = radius of a circular base; and h = height (or depth).

VOLUME (Sphere): $V = \frac{4}{3}(\pi r^3)$, where r = radius.

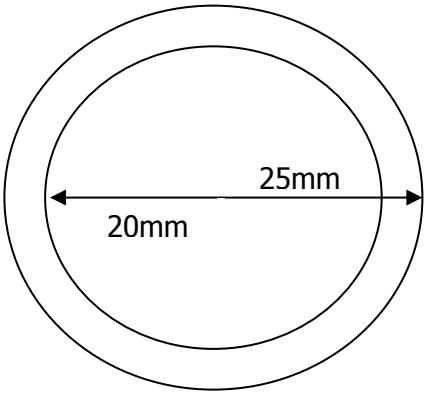
PROBLEMS:

1. Find the perimeter of a circle with a radius of 275 ft.

2. A flower garden is to be formed with bricks in the shape of an 8′ diameter circle. How many 2″ wide bricks are needed to form the circle?

3. Find the perimeter of a circle with a diameter of 100 mm.

4. Use the following diagram (representing a washer) to solve this problem.



a. What is the circumference of the outside of the washer?
b. Subtract circular areas to find the surface area of the washer.

5. On a basketball court, the center circle has a diameter of 48 in. Find the circumference.

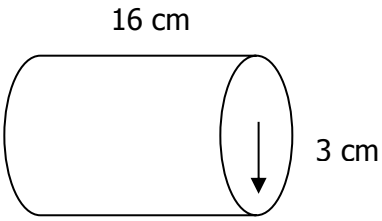
6. The distance around a circular field is 1.2π km. What is the area of the field in terms of π?

7. The sprinkler head for an irrigation system waters a circular area. The maximum distance, r, the spray of water reaches is 100 ft. What is the area covered by the sprinkler?

8. What is the area of a 9 in. pizza?

9. A traffic circle has a diameter of 90 ft. The City Street Department wants to replace the curb around the circle. How many feet of curbing must be constructed?

10. Find the volume of the following.



11. A circular swimming pool has a diameter of 15 ft. and a depth of 6 ft. The water level is 1.5 ft. below the rim of the pool. Find the volume of water in the pool.

12. A storage tank in the shape of a cylinder has a diameter of 24 ft. The height of the tank is 16 ft. A circular walkway 2 ft. wide surrounds the tank.
    a. One gallon of paint covers 300 square feet. How many gallons of paint will it take to cover the lateral area of the tank?
    b. How many gallons of water can the tank hold? ($1gal. \approx 0.1337\, ft^3$)

13. A plastic water-supply pipe is 90 ft. long. The inside diameter of the pipe is 1.25 in. What volume of water can the pipe hold?