A **sphere** is essentially a ball. It is similar to a circle in that it has a radius and a diameter. The circumference is the distance around at the widest point, like through the equator of the earth.

The formulas for a sphere use the number pi \((\pi = 3.14)\) just as a circle does. Remember that radius \((r)\) can be calculated by dividing the diameter by 2.

**Volume:**

\[ V = \frac{4}{3} \pi r^3 \]

The easiest way to determine volume on a calculator without any special functions on it is press these buttons:

\[ 4 \times 3.14 \times r \times r \times r \div 3 = \]

**Surface Area:**

\[ SA = 4\pi r^2 \]

**Activity 1:** Determine the volume and surface area of a sphere with a **diameter** of 8 cm. (hint: change diameter to radius)

A **cone** is a special kind of pyramid (we’ll get to these later) where the base is a circle and the sides meet at a single point somewhere above its center. We need to know the radius \((r)\), height \((h)\), and side \((s)\).

**Volume:**

\[ V = \frac{1}{3} \pi r^2 h \]

**Surface Area:**

\[ SA = \pi r^2 + \pi rs \]

This can get to be a little tricky because you may have to calculate the radius, height, or side of the cone if one of those values is missing. You can use the Pythagorean Theorem to do that because the radius, height, and side make a right angle triangle (the side is the hypotenuse).

**Activity 2:** Determine the volume and surface area of a cone with a height of 9 inches and a side of 15 inches. (hint: use \(b^2 = c^2 - a^2\) to determine the radius)
Homework:

1. Determine the surface area and volume of a sphere with a radius of 6 cm. Show all work – formula, substitution, and an answer.

2. Determine the surface area and volume of a sphere with a diameter of 14 inches. Remember to determine radius first.

What is the volume in liters (there are 16.4 ml in 1 cubic inch, and 1000 ml in 1 liter)?

3. A half dome is used to practice tennis in. Determine its area and volume.

If the fabric to cover the dome is $6.50/ft^2, what is the cost of the material?

4. A cone measures 24 inches high. It has a radius of 8 inches and a side of 25.3 inches. What is its volume and surface area?

5. A cone with a diameter of 15 cm has a side that is 30 cm long. Determine its radius and height first, then determine its volume and surface area.

6. A tepee made of canvas is 3.5 m high and has a diameter of 5 meters.

Determine:

a) the volume of the tepee.

b) the amount of canvas needed to cover it (do not include the area of the floor).

c) the cost if canvas is $21.50/m^2.