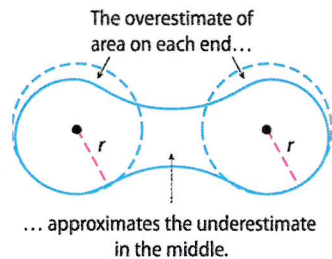
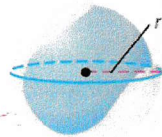
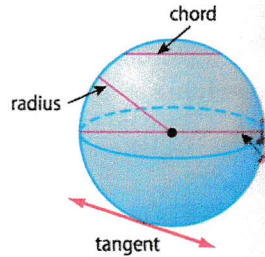


# Surface Area of Spheres

**1 Surface Area of Spheres** Recall that a *sphere* is the locus of all points in space that are a given distance from a given point called the *center* of the sphere.

- A *radius* of a sphere is a segment from the center to a point on the sphere.
- A *chord* of a sphere is a segment that connects any two points on the sphere.
- A *diameter* of a sphere is a chord that contains the center.
- A *tangent* to a sphere is a line that intersects the sphere in exactly one point.



To develop a formula for the surface area of a sphere, consider a tennis ball. The covering of this sphere is comprised of two congruent dumbbell-shaped pieces, each of which can be approximated by two congruent circles with radii equal to that of the sphere. So, the entire covering consists of approximately four congruent circles. The sum of these areas approximates the surface area of the sphere.

$$S \approx 4A$$

Sum of circles with area  $A$

$$\approx 4(\pi r^2) \text{ or } 4\pi r^2$$

$A = \pi r^2$

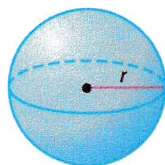
While its derivation is beyond the scope of this course, the exact formula is in fact  $S = 4\pi r^2$ .

## Key Concept Surface Area of a Sphere

**Words** The surface area  $S$  of a sphere is  $S = 4\pi r^2$ , where  $r$  is the radius.

**Symbols**  $S = 4\pi r^2$

**Model**



Find the surface area of the sphere. Round to the nearest tenth.

$$S = 4\pi r^2$$

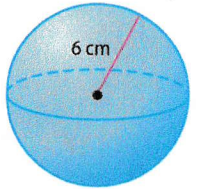
Surface area of a sphere

$$= 4\pi(6)^2$$

Replace  $r$  with 6.

$$\approx 452.4$$

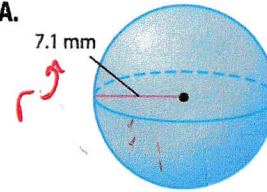
Use a calculator.



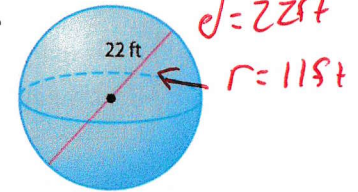
The surface area is about 452.4 square centimeters.

## Guided Practice

1A.



1B.



Surface area uses square units  $\rightarrow u^2$

$$1A. SA = 4\pi r^2$$

$$= 4 \cdot 3.14 \cdot 7.1^2$$

$$SA = 633.15 \text{ mm}^2$$

$$1B. SA = 4\pi r^2$$

$$4 \cdot 3.14 \cdot 11^2$$

$$SA = 1519.76 \text{ ft}^2$$