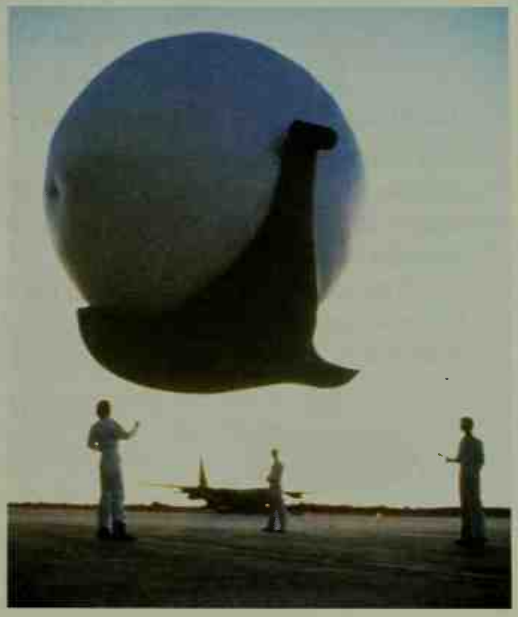
Similar Solids

Objectives

1. Find the area and the volume of a sphere.
2. State and apply the properties of similar solids.

12-4 *Spheres*



Recall (page 329) that a sphere is the set of all points that are a given distance from a given point. The sphere has many useful applications. One recent application is the development of a spherical blimp. An experimental model of the blimp is shown in the photograph. A spherical shape was selected for this blimp because a sphere gives excellent mobility, stability, hovering capabilities, and lift. The rotation of the top of a sphere away from the direction in which the sphere is traveling provides lifting power.

The surface area and the volume of a sphere are given by the formulas below. After some examples showing how these formulas are used, justifications of the formulas will be presented.

Theorem 12-9

The area of a sphere equals 4π times the square of the radius. ($A = 4\pi r^2$)

Theorem 12-10

The volume of a sphere equals $\frac{4}{3}\pi$ times the cube of the radius. ($V = \frac{4}{3}\pi r^3$)

Example 1 Find the area and the volume of a sphere with radius 2 cm.

Solution

$$A = 4\pi r^2 = 4\pi \cdot 2^2 = 16\pi \text{ (cm}^2\text{)}$$

$$V = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi \cdot 2^3 = \frac{32\pi}{3} \text{ (cm}^3\text{)}$$