

Challenge: Skills and Applications

For use with pages 766–772

- Suppose sand is being poured onto a cone-shaped pile, beginning at time $t = 0$, at the rate of 29.4 cubic inches per minute. At $t = 2$ minutes, the resulting cone has a diameter of 7 in. As the sand continues to be poured, the cone is always similar to its original shape, but it grows in size. Find the height and surface area of the cone at $t = 2$ minutes. (Remember to include the base of the pile.) Round your answers to the nearest hundredth.

In Exercises 2–5, use the information about a pair of similar solids to find all possible values of x .

- Volume ratio is 8:27; surface area ratio is 12: x .
- Surface area ratio is 16:25; volume ratio is x :125.
- Scale factor is $3x:x + 5$; surface area ratio is $7x:x + 9$.
- Scale factor is 1:2; volume ratio is $x - 2$: $x^2 - 1$.

In Exercises 6 and 7, use the following information.

The *density* of a material is the mass of the material per unit volume. The densities of some common materials are given at the right.

To find the mass of an object, multiply the volume by the density. For example, the mass of 4 cm³ of copper is $4 \text{ cm}^3 \cdot 9.0 \text{ g/cm}^3 = 36 \text{ g}$.

To find the volume of an object, divide the mass by the density. For example, the volume of 386 g of gold is $386 \text{ g} \div (19.3 \text{ g/cm}^3) = 20 \text{ cm}^3$.

<i>Material</i>	<i>Density</i>
Glass	2.5 g/cm ³
Aluminum	2.7 g/cm ³
Iron	7.8 g/cm ³
Copper	9.0 g/cm ³
Silver	10.5 g/cm ³
Gold	19.3 g/cm ³

- The scale factor of a silver figurine to a similar glass figurine is 2:5. If the mass of the silver figurine is 50.4 g, what is the mass of the glass figurine?
- The mass of an iron frying pan is 499.2 g. A similar aluminum frying pan has mass 337.5 g. The surface area of the iron pan is 320 cm².
 - Find the scale factor of the iron pan to the aluminum pan.
 - What is the surface area of the aluminum pan?