

**Density**

- 1) The volume of a solid gold statue can be approximated as  $1,000 \text{ cm}^3$ . The density of gold is about  $20 \text{ g/cm}^3$ . What is the mass of the statue?
  
  
  
  
  
  
  
  
  
  
- 2) A tanker filled up with  $2,500 \text{ m}^3$  of steel sank to the bottom of the ocean. The density of steel is about  $8,000 \text{ kg/m}^3$ . What is the mass of the tanker?
  
  
  
  
  
  
  
  
  
  
- 3) Hot air is less dense than cool air, so hot air will rise above cool air. The density of hot air is about  $0.25 \text{ kg/m}^3$  more than cool air. Find the volume to lift a hot air balloon that weighs  $800 \text{ kg}$ .
  
  
  
  
  
  
  
  
  
  
- 4) The density of gold is about  $20 \text{ g/cm}^3$ . The solid gold statue can be modeled as a cylinder with a height of  $15 \text{ cm}$  and a radius of  $4 \text{ cm}$ . The density of sand can be estimated at  $2.5 \text{ g/cm}^3$ .
  - a) What is the volume of the statue?
  
  
  
  
  
  
  
  
  
  
  - b) To swap the sand for the statue, the sand MUST have the same mass. What volume of sand will Indiana Jones need to avoid the triggering mechanism & steal the idol?

5) Beijing has 20.7 million people and an area of 16,400 km<sup>2</sup>. Shanghai has 23.7 million people and an area of 6,300 km<sup>2</sup>.

a) What is the population density of Beijing?

b) What is the population density of Shanghai?

c) How many times as great is the population density of Shanghai as Beijing?

6) Casandra finds a treasure chest with metallic coins. The chest has a volume of 0.25 m<sup>3</sup>. The coins have a combined mass of 4,825 kg. Hoping to find gold, she calculates the density to determine the metal of the coins.

What kind of metal are the coins made of?

a) Bronze – 8,700 kg/m<sup>3</sup>

b) Silver – 10,500 kg/m<sup>3</sup>

c) Lead – 11,300 kg/m<sup>3</sup>

d) Gold – 19,300 kg/m<sup>3</sup>

7) New York City has 8.3 million people and an area of 1,200 km<sup>2</sup>. Tokyo has 13.2 million people and an area of 2,200 km<sup>2</sup>.

a) What is the density of NYC?

b) What is the density of Tokyo?

c) Which city has a greater population density?

8) In a regular soda, about 40g of sugar is dissolved in 12 oz of carbonated water. The density of table sugar is  $1.6 \text{ g/cm}^3$ . Find the volume of the sugar added to the carbonated water.

9) In a diet soda, about 0.21 g of aspartame (artificial sweetener) is dissolved in 12 oz of carbonated water. The density of aspartame is  $1.4 \text{ g/cm}^3$ . What is the volume of the Aspartame added to the carbonated water?

How many times greater is the volume of sugar added as the volume of the aspartame added?