Educational Innovations, Inc.®

DEN-350

Steel Sphere Density Kit

Two Steel Spheres

How are they alike?
How are they different?
Which sphere floats in water?

Great for teaching the skills of observation and deduction! Although these two shiny stainless steel spheres have nearly identical mass, one has a diameter of 3.49 cm, and the other a diameter of 12.7 cm. Seeing the large hollow one float in water seems unbelievable! Great for teaching that density depends on BOTH mass and volume.

Suggested Activities:

1. Ask students to observe the two spheres set on a table and predict which one is heavier and by how much. Ask one student to hold a sphere in each hand and estimate which one is heavier and by how much. *The common erroneous answer is that the smaller one is much heavier.* Follow this up by asking a blindfolded student to hold two small identical plastic containers, one in each hand. Place a sphere in each container and ask how the masses compare. *The common answer now is that they both weigh the same.* Discuss how we perceive the mass of an object.

2. Place the large sphere in a container of water. Students are amazed to see it float. What does this tell you about its density?

3. Math Problems:
   a. If both spheres weigh about 150 grams, calculate the density of stainless steel. What assumption did you make?
   b. Using the calculated density of stainless steel, calculate the thickness of the large sphere.
   c. Knowing that the large sphere has a mass of about 150 g, calculate how much additional mass could be placed inside the sphere and still float.
   d. In the last problem, if twice the calculated mass is added to the inside of the sphere, would the resulting object float or sink?
   e. Calculate the mass of the large sphere if it were solid.

   Answers:
   a. 6.7 g/cm^3 – Base the density on the small sphere, assuming that it is solid.
   b. 1.1 mm
   c. Less than 920 g
   d. If placed inside, it sinks. If placed outside, it depends on the density of the additional mass, whether it is more or less dense than water.
   e. 7,190 g or 7.19 kg

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