

## Chapter 3

## ENRICHMENT

Use with Section 3

# ● Behavior of Liquids and Gases

## Measuring Body Fat

Physical fitness is an important part of everyone's life. You have probably been told by your parents, teachers, and countless others that getting exercise is good for you. There are several ways of measuring someone's level of physical fitness.

One way to measure physical fitness is to perform a body fat analysis. There are several ways to do this type of analysis. The most popular way is to use a caliper to measure the amount of skin that can be pinched together at several different points on the body. These measurements are then used to determine the amount of body fat. While this is the most popular method, it isn't the most accurate. A more accurate way to measure someone's body fat is to do what is called "under-water weighing." The person is weighed and then enters a special pool. The amount of water the person displaces is then calculated. Using the person's weight before entering the pool and the measured amount of displaced water, experts can determine the level of body fat.

### Materials

- cooking grease
- metric measuring cup
- balance
- water
- wax paper
- tablespoon
- ten pennies

### Procedure

1. Determine the mass of the measuring cup and record its mass.
2. Half-fill the measuring cup with water. Record the water level.
3. Determine the mass of the wax paper and record it.
4. Add a spoonful of cooking grease to the wax paper. (The grease is going to have to fit in the measuring cup without touching the sides.)
5. Weigh the cooking grease and wax paper. Record their mass. Subtract the mass of the wax paper to determine the mass of the grease. Record its mass.
6. Put the grease into the measuring cup. Be careful not to get any of the grease on the sides of the cup.
7. Record the new water level. Subtract the new water level from the original water level. This will give the volume of the displaced water.
8. Since the density of water is 1 g per mL, you can calculate the mass of the displaced water.
9. Dry the measuring cup and repeat steps 1–8 using ten pennies instead of grease.

Apply what you have learned from your activity to describe how the float test is used to determine the level of body fat. What do you think will happen when someone with a high level of body fat enters the pool? What about someone with a low level of body fat? How do you think the density of someone with a high level of body fat will compare to the density of someone with a low level of body fat?

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