



Grades 6-8

DISCOVERING DENSITY

A helium balloon drifts up into the clouds.



A submarine dives into the sea.



Lumbering

icebergs



float on an ocean of salt



water . . .

Why do swimmers



float more easily in salt water

than in fresh water? Why does a scoop of ice cream



float in root beer?

Why do ice cubes



float in a glass of water? Which is heavier, a



pound of lead or a pound of feathers



? Why do dentists



use lead "aprons" to shield patients from x-rays



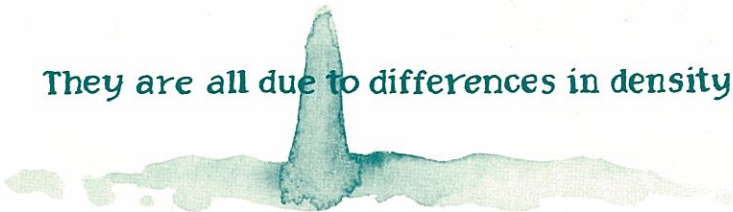
? Why is it that oil and

water



do not mix? What do these phenomena have in common?

They are all due to differences in density.



Session 1: Layering the Unknown

What You Need

For the class:

- 1 sharp knife for slicing potatoes
- 4 different food colors
- 5 tablespoons (about 50 g) of kosher or pickling salt (or table salt)
- 32 oz. (about 1 liter) of water
- 16 oz. (about 1/2 liter) glycerin
- 16 oz. (about 1/2 liter) isopropyl or denatured alcohol
- 4 1 qt. (about 1 liter) bottles or plastic containers with caps (preferably wide-mouthed)
- 1 tablespoon
- a 2-3 cup measuring cup

For each group of 4-6 students:

- 6 clear plastic straws
- 1 medium-sized raw potato
- 4 wide-mouthed, clear, plastic cups, 9 oz. (about 250 ml)
- 4 medicine droppers
- 1 16 oz. (about 1/2 liter) cottage-cheese-style container (to collect waste)
- 2 or 3 paper towels
- 1 cafeteria tray

For each pair of students:

- 1 "Liquid Layers" data sheet (master on page 15)
- 1 pencil

Session 2: Layering Salt Solutions

What You Need

For the class:

- 1 sharp knife for slicing potatoes
- 4 different food colors
- 3 cups (about 750 ml) of kosher salt (or table salt)
- a 1- or 2- cup (250–500 ml) clear measuring cup
- 4 mixing containers with 3 to 4 cup (750–1000 ml) capacity
- 1 tablespoon
- 2 stir sticks
- a source of water
- (*Optional*) a spring or balance scale
- 1 cup sand or gravel
- 1 cup rice puffs or other air-puffed cereal

For each group of 4-6 students:

- 4-6 clear plastic straws
- 1 medium-sized raw potato
- 4 9 oz. (about 250 ml) wide-mouthed, clear plastic cups
- 4 medicine droppers
- 1 16 oz. (about 1/2 liter) cottage-cheese-style container (to use as a waste container)
- 2 or 3 paper towels
- 1 cafeteria tray

For each pair of students:

- 1 "Liquid Layers" data sheet (master on page 15) or continue using the one from Session 1.
- 1 pencil

For the demonstration:

- 8 9 oz. (about 250 ml) wide-mouthed, clear plastic cups
- 1 tablespoon
- 1 stir stick
- 1 container with 3-4 cups (about 1 liter) of water
- 1 of the cups filled with sand or gravel
- 1 of the cups filled with rice puffs or other air-puffed cereal
- a small bag of marbles
- the box of kosher or pickling salt (or table salt)

Session 3: Mixing Secret Formulas

What You Need

For the class:

- 9 cups (about 1.25 liter) kosher or pickling salt (or table salt)
- 3 "Secret Formulas" sheets (masters on pages 33, 34 and 35.)
- 1 roll of masking tape
- 3 envelopes
- water available in classroom

For each group of 8-11 students:

- 4 different food colors
(Squeeze bottles help prevent spilling.)
- 3 9 oz. (about 250 ml) wide-mouthed, clear, plastic cups nearly full of salt
- 3 tablespoons
- 5 stir sticks
- 8 9 oz. (about 250 ml) wide-mouthed, clear, plastic cups
- 2 clear measuring cups, 1- or 2-cup (250-500 ml)
- 1 paper clip
- 5 pencils
- 5 paper towels
- 1 cafeteria tray
- (optional) 1 calculator

Session 4: Testing Your Predictions

What You Need

For the class

- 1 sharp knife for slicing potatoes

For each group of 8–11 students:

- tray with liquids and envelopes from previous session
- 6 or 7 clear plastic straw halves
- 2 medium-sized potato, sliced
- 5 medicine droppers
- 2 16 oz. (about 1/2 liter) cottage-cheese-style containers (to use as waste containers)
- 5 paper towels
- 5 or 6 "Liquid Layers" data sheets (master included on page 15)
- 5 pencils

Session 5: Density in Everyday Life

What You Need

- 1 straw cut in half
- 1 potato slice
- 1 medicine dropper
- 2 different food colorings
- about 1/2 cup ice water
- about 1/2 cup very hot water (hot tap water of approximately 45–50° F is adequate and can be stored in a thermos until ready for use)
- "Puzzling Scenarios" sheet (page 48)
- 1 piece of paper for each group to record their ideas from "Puzzling Scenarios"
- (*optional*) large paper and crayons or markers for groups to illustrate their "Puzzling Scenarios"