PowerPlay

POST-VISIT

Water in Your Body 8

Students learn how much water our bodies need each day.

TIME One 45-minute class period

MATERIALS

PER CLASS

- Box of food coloring

PER GROUP OF STUDENTS AND DEMONSTRATION

- 3 one-liter containers
- Dishpan or other similar container with a capacity of at least 3 liters

The Children's Museum of Houston's PowerPlay exhibit is designed to help young people discover new ways to be physically active, and also to reinforce healthy behaviors. Water—a unique substance upon which all life depends—is important to both of these objectives. To practice healthy habits, students must be aware of their own needs for water and the importance of water to all life on Earth.

Water is essential, both inside and outside the body's cells. It transports nutrients and other materials, and is necessary for the removal of waste. Animals lose water through evaporation from lung surfaces and the skin, elimination in feces, and excretion in urine. The water lost must be replaced.

An average human doing light work in a temperate climate loses nearly six pints (three liters) of water daily. Healthy human beings begin to show the effects of water deprivation (dehydration) after about three days. Death is likely when water loss reaches about 20% of the total volume of water in the body. On the other hand, as long as water is available, it is possible to survive for up to two months without food.

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS) OBJECTIVES

SCIENCE

3. 2. A-F; 4. 2. A-F; 5. 2. A-F
Collect and record data by observing and measuring, using the metric system, and using descriptive words and numerals.

3. 4. A; 4. 4. A; 5. 4. A
Students know how to use a variety of tools, materials, equipment, and models to conduct science inquiry by collecting, recording and analyzing information using tools while using appropriate safety equipment.

ENGAGE

1. Ask students, *How much water did you drink in the last 24 hours?*
2. Have students record in their notebooks all sources from which their drinking water comes, along with the approximate amount of water consumed each day.
3. Discuss water consumption as a class. Remind students that most foods contain water. For instance, a glass of milk is about 90% water. Tea and Kool-Aid are mostly water, too, as are the cells and tissues that make up living organisms. A tomato is about 90% water, a tree is about 70% water, and an earthworm is about 80% water.

EXPLORE

1. Explain that the body of each student in the class consists of approximately two-thirds water. Water transports food to every cell in the body, helps carry substances in and out of cells, and carries waste out of the body.
2. Have student groups use beakers to measure 3,000 ml of water into a large container. Ask, *What do you think this amount of water represents?* (It is approximately how much water enters a person's body each day.)
3. Conversely, the average adult removes or loses about three liters of water each day.
4. Ask students to list ways in which water is eliminated from the body. Discuss the list. Most students will list urine, but beyond that, few realize

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that water also is lost through breathing, perspiration and excretion of solid waste.

5. Have students estimate how much of the 3,000 ml of water we lose each day is lost through each process.
6. Direct student groups to fill each of the three, one-liter containers with the amount of water they think is lost each day through breathing, sweating, urination, or excretion of feces. Tell students that they have only three bottles because more than 1,000 ml are lost through one of the four processes listed above. They should estimate how much we lose through that final process and leave that amount in their large dishpan or container.
7. Have students record the amounts they predict are eliminated by each process.

EXPLAIN

1. After students have recorded their estimates, conduct a demonstration. Fill each demonstration container with the amount of water listed below. You may use food coloring to tint the water, if desired.

   - 150 ml (eliminated by the intestines)
   - 1,500 ml (lost in urine)
   - 600 ml (lost through evaporation from breathing)
   - 750 ml (lost through perspiration)

2. Tell students that your containers represent the actual amount of water lost daily from the body through sweating, urination, breathing, and excretion of feces. Hold up one container at a time and ask, *What water elimination process mght be represented by the water in this container?* After students have discussed possible answers, confirm the correct response, and pour the water into a clear tub.
3. Explain that during a typical day, we consume 1,200 ml of water in our foods and another 1,500 ml in our drinks. We gain another 300 ml of water as a by-product of the chemical breakdown of food.

ELABORATE

1. Explain that an average adult human can live up to two months without food, but only about three days without water. Ask, *Why do you think our bodies can live so much longer without food than they can without water?*
2. Have students investigate unique characteristics and strategies that help desert-dwelling organisms to conserve water.
3. Have students investigate water sources used by desert-dwelling people.

EVALUATE

1. Instruct groups to create a strategy to replace the 3,000 ml of water lost by the body each day. Note that about half of the water we need each day can come from food, and that about 300 ml of water per day is produced inside the body, as energy is released from food. Have groups share their ideas with the rest of the class.
2. Ask, *If you went on a trip through the desert and had to survive only on what you could carry, what would you bring, and in what amounts?* Have students explain their answers.

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For more information about PowerPlay and additional classroom activities on other topics, please visit www.bioedonline.org.

Teacher Tips

Follow these guidelines when your students visit the PowerPlay exhibit at the Children's Museum of Houston (CMH).

- Students must wear tennis shoes.
- The CMH's PowerPlay exhibit is on three levels, connected by the Power Tower. Level 2 of the Power Tower is on the main entry level of the Museum. It is suggested that teachers have a chaperone on each level of the Power Tower or have a chaperone accompany each group.
- An elevator for handicapped children is available (CMH guide will have key). It is suggested that you inform CMH officials about any special needs your students may have before you arrive at the museum.
- Before your visit, help students understand the difference between heart rate while resting and after exertion, (see "Activity 3. Heart Rate and Exercise").
- Also before your visit, explain to students that they will rate (on a 1–10 scale) the amount of effort they expend during some of the activities in the exhibit. This is known as "perceived exertion rate."
- Ask the CMH guide for a "Kid Card" (Power Tracker) for each student. To set up a card, each student will need the information below before visiting the Museum (see "Kid Card" video). Please make sure your students are ready to enter the following information (or have a chaperone assist).

  Username (numbers and letters only)
  Password
  Male or female
  Birthday (numerical date)
  E-mail (optional)

  As a final step, have students measure their baseline heart rates.

IDEAS FOR TEACHERS WITHOUT ACCESS TO THE CHILDREN'S MUSEUM OF HOUSTON

- Incorporate any of the lessons into your regular curriculum.
- Plan a special "field day" at your school. Prior to the event, conduct the Pre-visit lessons. After the event, use the Post-visit lessons.
- Create a classroom fitness plan that provides one month of activities. Help students plan a calendar with different fitness activities for each day.
- Participate in the President's Challenge for fitness (www.presidentschallenge.org).

Exhibit Key

	Cardiovascular	Strength	Flexibility	Balance
Power Tower: Climb, leap and jump in a 3-story climbing structure that takes you to other parts of PowerPlay.				
Dance Mania: Listen to music and follow along with different dance moves. Record your heart rate after you play.				
Match My Moves: Capture images of your own body in action and follow the poses you've set through a sequence of quick movements, testing your endurance and raising your heart rate.				
Light Chase: Race around an interactive game board, while increasing your speed and raising your heart rate.				
Jump It Up: Get your heart pumping as you jump over a glowing, virtual rope, which gets faster and faster the more you jump!				
Blast Off: Crank hand pedals as fast as you can to race flying superheroes across the exhibit.				
Adventure Course: Run through a course of climbing and crawling activities along padded, sloping surfaces! Slap each hand whacker along the way and record the level you achieve.				
Mt. Boulder: Face three challenges on a climbing wall and measure how far you've climbed, your grip strength, reach, flexibility and coordination.				
Grip It: Measure your grip strength and record this measurement using your Kid Card.				
Power Course: Grab a scoot and use your upper body strength to push or pull yourself along this wheelchair accessible course.				

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CCIT The Center for Collaborative and Interactive Technologies

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