FILL IT UP: WATER STORAGE TANKS

K-2

OBJECTIVES

At the end of this lesson, the students shall be able to do the following:

1. Discuss the purpose of water storage tank in water systems;
2. Conduct an experiment with water pressure and gravity flow; and
3. Create a water quality logo to be used on water tanks.

SUBJECTS:
Science, Language Arts, Art

TIME:
45 minutes

MATERIALS:
coffee can
3 rulers
nail (large)
hammer
water pitcher
dish pan
crayons or markers
posterboard

BACKGROUND INFORMATION

Almost all public water systems use water tanks for storage. Water is usually supplied by wells or a surface water treatment plant and pumped into the network of pipes carrying water to customers, called the distribution system. Storage tanks are present in the distribution systems of water systems to hold water for use by customers. Water use can be supplied by storage tanks and as these tanks become partially empty, pumps from the water source turn on to provide water. Water not used by the customers is available to refill the storage tanks. Therefore the water changes out in the tanks almost daily and stays fresh. The height of the tanks and, thus, the level of water in the tank provides pressure to move the water through pipes to customers and provides the pressure needed at each household. Ground tanks are more economical to construct than elevated tanks but must be located on a high hill to provide the elevation to provide pressure. For each 2.3 feet of elevation, one pound of pressure is available and thus a tank 120 feet tall when full can provide 52 pounds pressure (120/2.3 = 52 psig) which is sufficient to operate a dishwasher or allow a good shower.

Standpipes are tall tanks capable of holding more water than an elevated tank of the same diameter. When the level of water is low in a standpipe, the pressure is low and thus the water level must remain high. The water in the bottom is available for emergencies such as fire fighting.

Elevated and standpipe water tanks are made of welded steel while ground tanks can be constructed of steel or concrete. Steel tanks can rust and must be protected by special paint systems. In the past, red lead paint was used as a primer paint and, as the coating wore off, the lead paint could contaminate the water inside the tank. Today, no lead paint is allowed and special precautions are taken when the outside paint is sand-blasted off to prevent the lead paint chips from contaminating air or food in the area.

ADVANCE PREPARATION

A. Contact the local water utility manager to find out the location and types of water tanks in your area.

B. Take photographs of these tanks.

PROCEDURE

I. Setting the stage

A. Look at the photographs of the local water tanks. Find their locations on a city map.

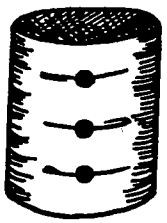
B. Share the background information.

C. Classify the local water tanks as elevated, ground, or standpipe.

II. Activities

A. Experiment to demonstrate water pressure and gravity flow.

1. Make three holes in the coffee can and plug them with paper plugs that can be easily removed. Fill the can with water.



2. Have students hold a ruler out beside each hole. Simultaneously remove the plugs and allow the water to spray into the dish pan. Measure the greatest projection from each hole.

3. Compare the measurements and hypothesize about why this happened.

4. Run a second test to check your results. How is this knowledge important to designers of water tanks?

B. Create a design and a logo for the sides of a water tank. The message should convey an environmental message. Choose any of the water tank designs. These could be made poster board size and used as a hall display.

III. Follow-Up

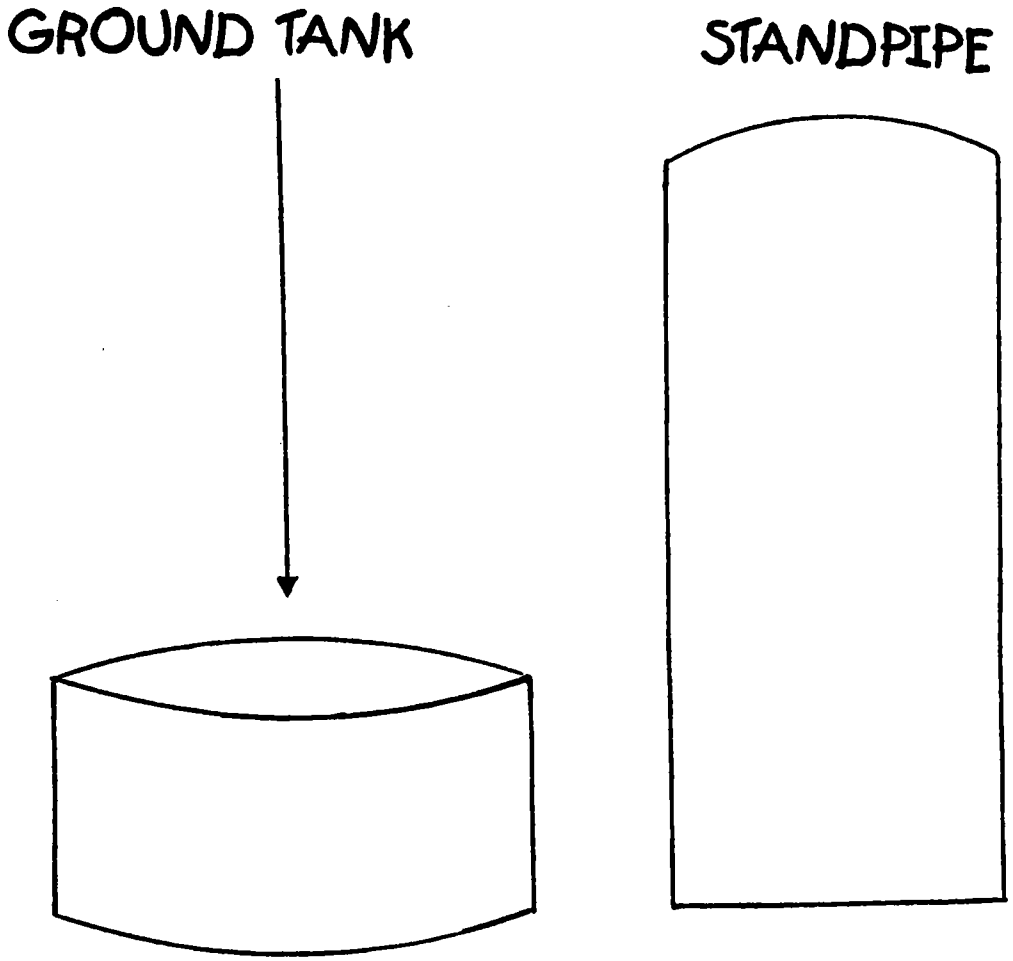
A. Invite the local water utility manager to your classroom to talk about local water tanks. Ask questions about how they are cleaned and how long the water is stored.

IV. Extension

A. Investigate how large water tanks are used to train astronauts for working in weightlessness.

RESOURCE

Waste Not!, Eco Amigos Issue 2,, National Resource Division of International Paper, Palatine, IL, 1995.


GROUND TANK
STANDPIPE

ELEVATED TANKS