

What is a Septic Tank?

(Adapted from *The Water Sourcebook*)

A post-visit lesson for "Water In, Water Out"

Grade: 2-4th

Learning Objective: Students will gain a deeper understanding of how a septic system works

Summary: Students shall be able to identify, orally or in writing, the septic tank as a method of wastewater treatment; tell or write how a septic tank works; and name the basic parts of a septic tank.

Teaching Time: 1 hour

Vocabulary: drain field, effluent, sludge, septic tank, wastewater

Materials:

- 1 plastic or aluminum container (6-8 inches deep)
- potting soil
- gravel
- 1/2 gallon paper milk carton labeled "House"
- 1 quart paper milk carton labeled "Septic Tank"
- plastic straws
- clay
- chart paper
- cup or container for water
- master for "*How a Septic Tank Works*"
- tack or small nail

Background Information: Septic systems are used to treat sewage in many rural areas that are not served by public sewers. A septic tank is a large container usually made of concrete or plastic. The tank is buried underground at individual homes or buildings. Sewage flows through pipes that connect the septic tank to the building. The solids in the sewage sink towards the bottom of the tank where anaerobic bacteria break them down into carbon dioxide, methane, and water. The undigested residue (sludge) stays on the bottom of the tank and the scum

floats to the top. The effluent from the septic tank containing the remaining liquid waste flows through a piping network to a drainfield. Here, perforated pipes surrounded by gravel or sand slowly release the wastewater into the soil where bacteria and the roots of the vegetation above finish the treatment process. Soil bacteria continue to destroy the remaining organic material in the effluent. Solids (sludge) that remain at the bottom of the septic tank must be periodically pumped out and taken to a sewage treatment plant.

Advance Preparation:

- A. Copy attached picture of a septic system.
- B. Construct a septic tank model. (See diagram.)

1. Fill an aluminum roasting pan or a large plastic storage container 1/2 full of potting soil.
2. House - Place a 1/2 gallon milk carton cut to a height of approximately six inches at one end of the container. Make a hole 2 inches from the base of the carton and insert a drinking straw. Seal the connection with clay or tape to prevent leakage.
3. Septic Tank - Cut a quart-sized milk carton to a height of three inches. On two opposite sides of the carton make a hole 2 inches from the base of the carton. Connect one hole to the straw that is attached to the house.
4. Make field lines as follows:
 - a. Punch a large hole halfway down one straw and seal one end with clay.
 - b. Insert another straw perpendicular through the hole and seal each end of this straw with clay.

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- c. Punch a large hole near each end of this straw. Insert a new straw in each hole. Seal the open ends of these straws with clay.
- d. Using a tack or small nail, punch holes in each straw to allow drainage.
- e. Connect the field lines to the septic tank by inserting the unsealed end of the first straw into the hole in the quart carton.
- f. Test the system by pouring water into the house and checking for leaks as the water moves through the system. Use clay and or tape to seal any leaks.
- g. Put a fine layer of gravel over the soil in the end of the container that represents the drain field.
- h. Place the model in the container.

- b. What is it used for? Explain that it is a septic tank used to treat wastewater.
2. Tell students they are going to learn how a septic tank works.

- C. Display the septic tank model and give the students time to examine it.
- D. Explain each part of the model.
 1. House - Wastewater leaves through a pipe which is connected to the septic tank.
 2. Septic Tank - Explain how solids (sludge) sink to the bottom and that liquids will flow into the field lines.
 3. Field Lines - Field lines are placed on a bed of gravel. The wastewater seeps out of the holes in the field lines and passes through the gravel into the soil. Bacteria in the septic tank and in the soil destroy harmful organic material.
- E. Demonstrate how the septic tank works by pouring water into the house and letting students observe as the water moves through the system.
- F. Give the students a copy of the master, “How a Septic Tank Works.”
 1. Have the students label the parts of the septic tank system.
 2. Use a blue crayon to color the path of wastewater movement through the system.
 3. Use a brown crayon to illustrate sludge that settles in the septic tank.

Procedure:

- A. Ask students to think of places wastewater can be found at school.
 1. Make a list on chart paper.
 2. Show students some drain pipes in school (under sinks).
 3. Remind them that wastewater must be treated to make it safe before it is discharged into the environment.
- B. Show the students a picture of a septic tank.
 1. Ask students:
 - a. What do you think this is?

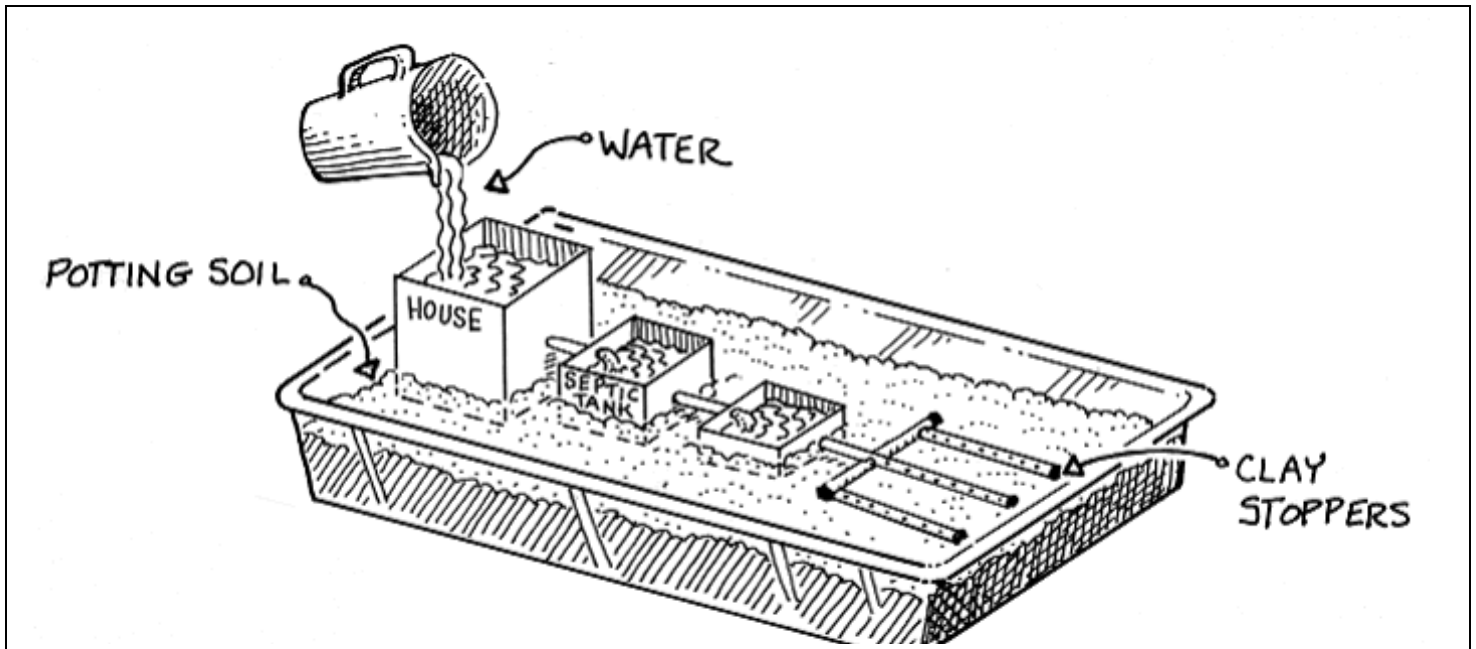
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- G. Divide students into pairs. Ask each student to use the master to tell his/her partner what happens to wastewater in a septic tank system.

Extensions

- A. If possible, visit a site where a septic tank is being installed.
- B. Ask each student to find out if his/her house has a septic tank for treating wastewater.

Graph the results of the survey.



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