

SNWA Goal 1 Objective 1.6; Goal 3 Objective 3.2, 3.4

CCSD Curriculum Essentials Framework

Science

It is expected that students will:

- (4) 5.3 model and describe contributions made to scientific thought and design technology
- (4) 5.4 explain that measuring instruments can be used to gather information for making scientific comparisons of objects and events and for designing and constructing things that will work properly [NS 18.4.5]

English Language Arts

It is expected that students will:

- (4) 8.4 follow oral directions to complete a complex task [NS 8.4.4]



Purpose: This activity will introduce the idea of moving water from its source to an area where it is needed (irrigation) and will challenge students to design a system to do that.

Time: Two 75-minute sessions

For each pair of students, you will need:

- a small bedding plant
- ½ liter of water
- basin

You will also need:

- a cup of water
- metric rulers
- a variety of materials for students to use in their irrigation designs, such as:
 - rags
 - masking tape
 - baggies
 - styrofoam cups
 - paper towels
 - duct tape
 - rubber tubing
 - electric tape
 - aluminum foil
 - plastic wrap
 - styrofoam bowls
 - straws
 - cardboard tubes
 - scissors



Teacher note:

You may wish to work outdoors or in a location where water spills will not be of great concern.

Introduction

1. Set a cup of water on a desk or table. Ask one of the students sitting some distance from the cup to have a drink of water. The only rule is that he/she may not move from his/her seat. Discuss with the class possible solutions to this problem.

2. Tell students that when settlers came to the Las Vegas Valley, they had to have a source of water for drinking, for washing and for watering trees and plants. Besides the Colorado River, which was too far away to really help them, there were natural springs coming out of the ground. At first, they were content to carry water from the springs to their homes, but they wanted more water to help trees and plants grow. They realized they needed to design a way to move the water in great quantities to where they wanted it.

Making Discoveries

3. Issue this challenge to the students. “Pretend you are early settlers in Southern Nevada. The plant represents the crops you have planted, and the container of water represents the nearest source of water. You are to design a way to move the water from the container to the plant without lifting or carrying the container of water in any way. You may move the water container and your plant to various locations, but you must keep them at least 30 cm apart. You may use any of the materials that are available. If you think of another tool you would like to use, please ask.”
4. Allow time for students to talk and plan, then collect materials needed and try out their plan. Students should build their entire device before they add water. (They may have a number of failed attempts before achieving success.) Encourage them by asking questions, for example: “What would happen if you used a different material to move the water to the plant?” “What would happen if you placed the plant higher than the water? The water higher than the plant?”
5. Give students time to draw a diagram of their design in their notebooks along with a written explanation of how it should work.

Closing

6. Each group of students should share their initial plan, modifications, and final irrigation design with the class. Ask, “If you could build another device, what materials would you use? Would your design be different if the distance you needed to cross was three feet? 30 feet? 300 feet? Three miles? How do you think early settlers to the Las Vegas Valley might have moved water from its source to their homes and farms?”
7. Share with students the overheads of different systems of irrigation (see Grade 4 - Irrigation 1 and Irrigation 2) and enter into a discussion of how they work. What might be the advantages/disadvantages of each?

Word Bank

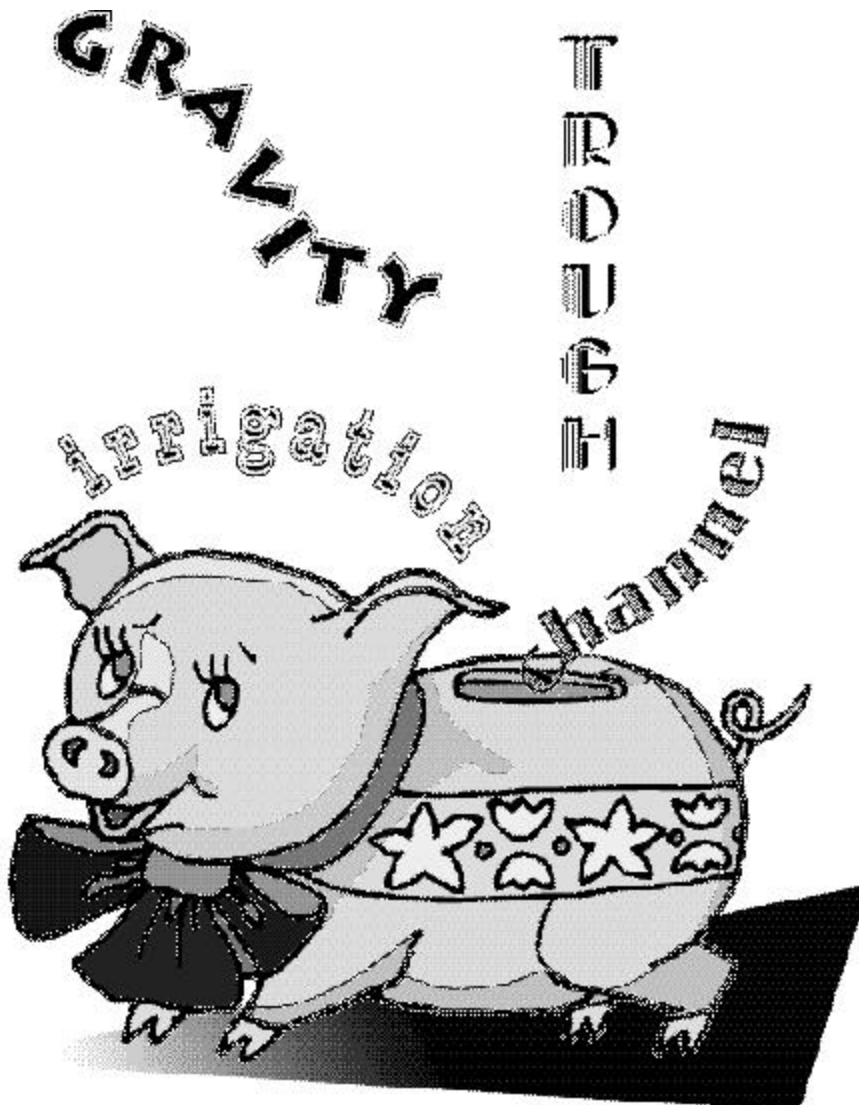
The teacher should introduce or review the following vocabulary with the students within the context of this lesson.

channel: a natural or artificial course for running water

gravity: the gravitational attraction of the earth's mass for bodies at or near its surface

irrigation: a system of pipes or canals used to bring water to places where it is needed

trough: a long open receptacle



IRRIGATION SYSTEMS



PERMANENT SPRINKLERS are installed underground to water lawns and large gardens. They have the advantage of even coverage and convenience when automated with a timer.



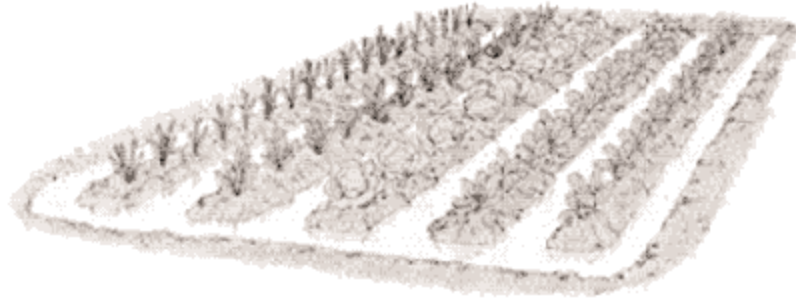
DRIP IRRIGATION systems emit small amounts of water precisely at the plant's root zones to prevent runoff. They require filters and pressure regulators to operate properly.



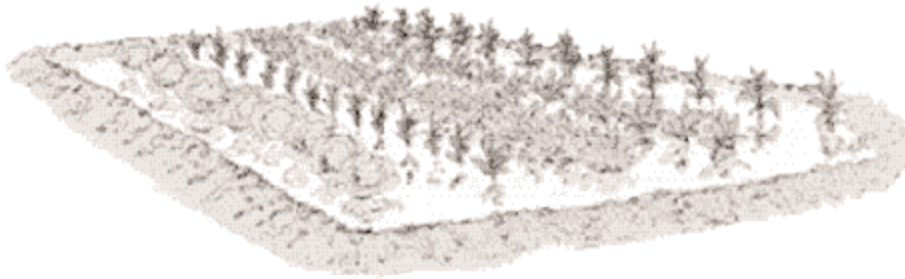
HOSE-END SPRINKLERS come in many shapes and sizes to match the needs of the areas being watered. They are less convenient and less expensive than permanent sprinklers, and they can waste water if left unattended.

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IRRIGATION SYSTEMS



FURROW IRRIGATION waters in rows next to the plant's root zone. This keeps pathways dry and controls weeds in unwatered areas.



FLOOD IRRIGATION covers the entire area with water to completely soak lawns, vegetables and fruit trees.



SOAKER HOSES emit water slowly and do not form a hard crust on the soil, a common problem with overhead sprinklers.

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