How Can Work Be Done with Water Power?

Activity A

Can the force of falling water be used to lift a weight?

Introduction

Ancient cultures used water wheels to perform work. In this activity, students will assemble a water wheel and explore how variables such as the amount, rate, and direction of water flow can influence the amount of work being done.

Scientific Learning Goals and Objectives for this Activity:

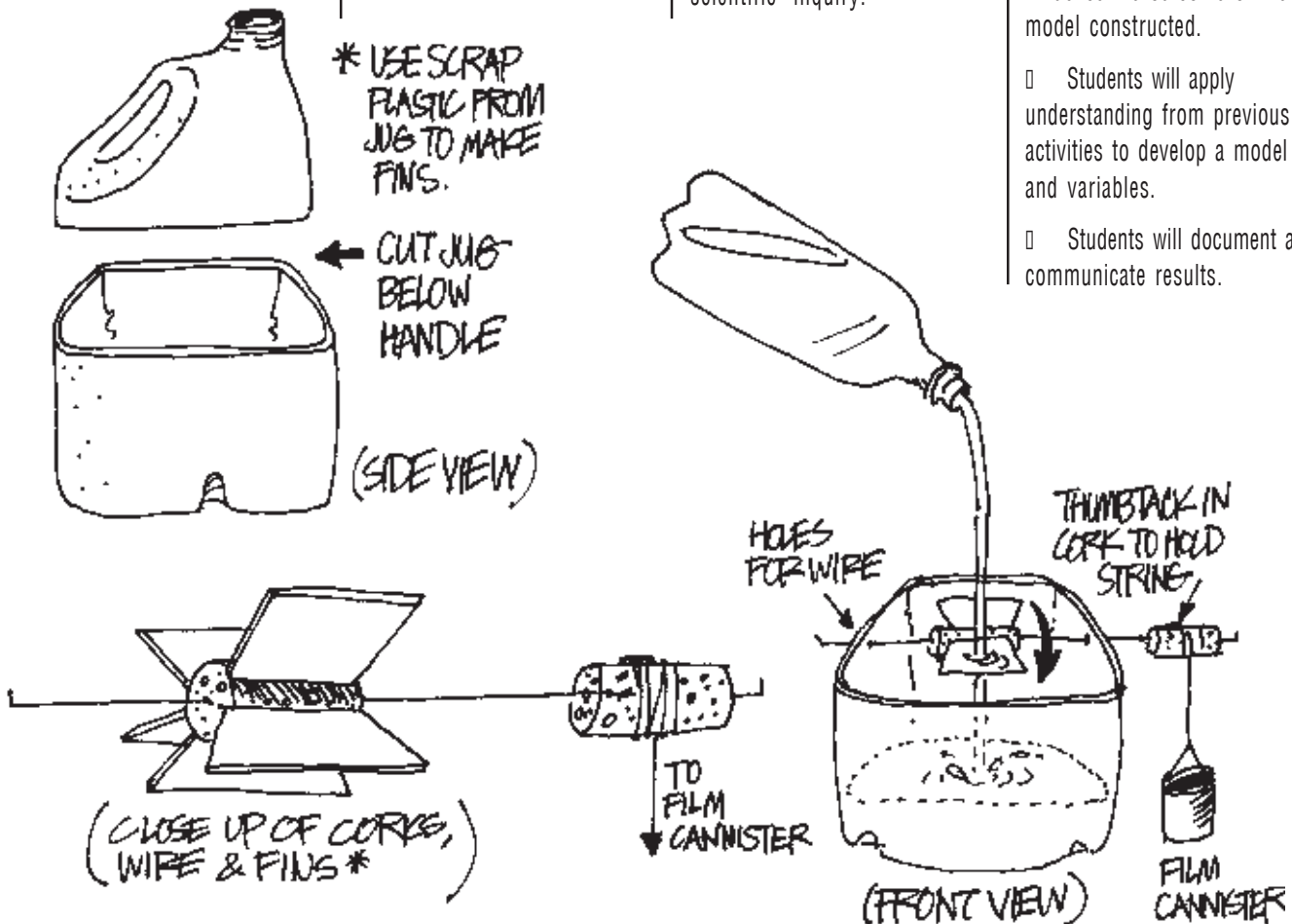Washington Grade Level Expectations (GLE's): 1.1.4; 2.1.1; 2.1.2; 2.1.3; 2.1.4

Goals

 Students will understand and apply scientific concepts and principles.

 Students will understand and apply technological concepts and principles as they relate to science.

 Students will conduct scientific inquiry.

 Students will communicate scientific understanding.

 Students will understand the interdependence among science, technology, and mathematics and their connections to the world beyond the science class.

Objectives

 Students will design, construct and understand a model that converts the force of falling water from potential energy to mechanical energy.

 Students will engage in scientific inquiry by selecting and testing variables that can influence the outcome of the model constructed.

 Students will apply understanding from previous activities to develop a model and variables.

 Students will document and communicate results.

* USE SCRAP PLASTIC FROM JUG TO MAKE FINS.

← CUT JUG BELOW HANDLE

(SIDE VIEW)

(CLOSE UP OF CORKS, WIRE & FINS *)

HOLES FOR WIRE

TO FILM CANNISTER

THUMBTACK IN CORK TO HOLD STRING

(FRONT VIEW)

FILM CANNISTER

Preparation Time:
30 minutes

Materials
Prepare for the Entire Class:
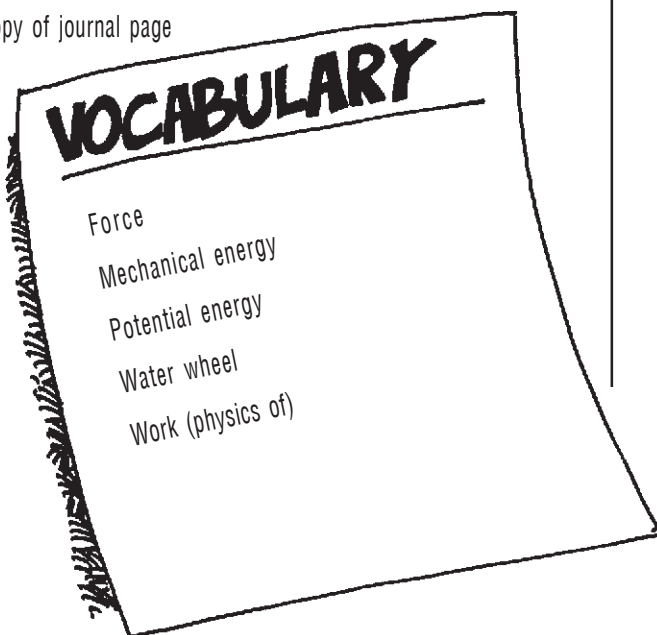
 water

 extra plastic milk cartons

 extra corks

Prepare for Each Team:

 plastic one gallon jug

 coat hanger/knitting needle/ dowel

 X-Acto or utility knife

 1 cork

 hole punch (single)

 pour spout

 string

 object to be lifted (gram weights, fishing sinker, washer, penny, piece of wood,film canister, etc.)

 tape and/or thumb tacks

 scissors

Prepare for Each Student:

 copy of journal page

Activity Time:
2 periods

Activity Processes:
? Can water be used to lift a weight?

Discuss responses.

1. Hand out materials to each team. Each team takes 5 minutes to design a way to lift a weight using water and the available materials. If all teams select the same weight, the class can have a friendly competition to see which team can lift the weight the fastest. Likewise, the class could have a friendly competition to see which team design can lift the most weight. Students draw design in journal.

2. Student teams construct and test model and then share results with class.

? Are there variables that can affect how much weight you can lift or how fast you can lift it?

3. Teams will select, and students will enter in journal, 1 to 3 variables they will use to lift more weight or lift the weight faster, e.g., change fin design or number of fins, increase height of pour, etc.

4. Students test variables. Each team shares results with class and students enter results in journal.

VOCABULARY

Force

Mechanical energy

Potential energy

Water wheel

Work (physics of)

Notes

Step 1:

You may want to initial team drawing before allowing students to use X-Acto knife to make slits for fin placement. Alternative is for teacher to make slits in cork as part of preparation.

From the materials given, cutting fins from plastic milk cartons is easiest. When inserting fins in cork, glue helps hold them in place. An alternative for fins can be plastic spoons or popsicle sticks.

A cork can be added to the end of the rod that is lifting the weight. The result will be that the weight will be lifted faster.

You may wish to build and keep out of view a model as shown in teacher guide. This can be used when results are shared.

Teachers may allow students to design and test different designs over a period of days for independent study or exam credit.

Journal 3A
Can the force of falling water be used to lift a weight?

Name _____

Team Name _____

Date _____

Draw a design of a model to lift weight.

List variables that will be tested to change speed or the amount of weight lifted.

_____

_____

_____

_____

Describe the results of each variable that was tested.

_____

_____

_____