

Lesson: Science, Grades 2-3
Topic: Observation, charting and evaluation



River Rafting with Tom Sawyer and Huck Finn

Overview

How can we travel down a river? Students create boats to carry Tom Sawyer and Huck Finn down a “riverbed” with obstacles. They make observations and add the data to a chart that is used to facilitate a discussion that compares the results from each group’s boat and its journey down the river. Each student evaluates the data from their peers and decides which boat they would want to be river rafting on if they were Tom and Huck.

Learning Outcomes

National Standards

Science as Inquiry

- Abilities necessary to do scientific inquiry
- Understanding about scientific inquiry
- Physical Science
- Properties of objects and materials
- Position and motion of objects

Science and Technology

- Abilities of technical design

Ohio Outcomes

Physical Science

- Identify contact/non contact forces that affect motion of an object (e.g., gravity, magnetism, and collision)
- Predict the changes when an object experiences a force (e.g., a push or pull, weight, friction)

Science and technology

- Use a simple design process to solve a problem (e.g., identify a problem, identify possible solutions and design a solution)
- Describe possible solutions to a design problem (e.g., how to hold down paper in the wind)

Scientific Inquiry

- Select appropriate tools and use relevant safety procedures to measure and record length and weight in metric and English units
- Communicate scientific findings to others through a variety of methods (e.g., pictures, written, oral and recorded observations)

Scientific Ways of Knowing

- Keep records of investigations and observations and do not change records that are different from someone else's work.

Materials

- A variety of materials of different size and mass for construction of boats (open and cleaned cat/dog food and/or tuna cans plastic and Styrofoam cups, Styrofoam meat trays, egg carton - tops and bottoms, pieces of 2 by 4 wood, sections of balsa wood, bubble wrap, lids from spray cans, baggies, paper, match box, cigar tube, film canister, small Tupperware containers, foil, popsicle/craft sticks, string)
- A variety of materials of different size and mass to represent Tom Sawyer and Huck Finn (marbles, coins, clay, cotton balls, legos, army men, corks, fishing weights, dice, unifix cubes)
- Chart paper with data collection chart for the class
- A section of furnace ductwork about 18 inches wide, 8 foot long, and cut so the sides are 8 to 10 inches high, cover the cut edges with multiple layers of duct tape. One end of the ductwork needs to be blocked (about 5 inches high) so water will cascade over it.
- Objects to float and or fasten firmly into the duct work to represent items in a river (stones/rocks. Floral oasis with plastic plants in it, sections of sticks, leaves, other natural debris) Use hotglue or superglue to connect the item in the ductwork so stay is one place. The items should be connected so that they alter the natural flow of the water. The debris could be fastened or floating freely in the water (caution with free floating: You will need to start it at the beginning of the ductwork for each trial since the "current" will carry it down river.)
- Hose with steady stream of running water
- Balances and weights (metric and/or teddy bear counters) for each group
- Glue, scissors, markers, pencils

- Student evaluation sheet
- Individual data collection sheets

Technology

- Videotape each group as they move their boat along the river route. Replay if needed to make additional observations.
- Take digital pictures and use them to identify the boat from each group on the class data collection chart.

Vocabulary

- Mass
- Current
- Movement
- Observations
- Compare
- Force
- Push
- Pull

Lesson

Orientation activity

1. Ask: Who has traveled on a river? What means of transportation did you use? How did it move in the water?
Allow students to orally share their experiences.
2. Talk about river travel in the time of Huck Finn and Tom Sawyer. What do you think would be different today than in the time of Tom and Huck? Get a feel for the amount of prior knowledge the students have. You may need to add some details as to the type of boats they used and why the river was so important.

Learning activity

1. Take students outside to the “river bed”. Ask: What do you think we will do today with these materials? Accept predictions and review as such. Ask students to imagine the gutter as a river bed. Ask: How can we travel from one end of the river to the other? Return to the classroom to begin work.
2. Brainstorm ideas with the entire class. What characteristics should your boat have to help it travel on the river? How will it move? What might you do to help it move easier? As students answer, accept all ideas and allow the students to evaluate on

their own the validity of the statements. This will serve as a foundation for the discussion in the small groups as to how the boat will be constructed.

3. Students work in groups of 4 (assign a number or letter to each group for identification purposes) to construct a boat that will carry Huck and Tom down the river. They may use any of the materials you select to “build” their boat. Provide ample time for the group to handle the different materials and make group decisions about design and the materials to use. Move around the classroom observing activities and listening to the conversations within the groups. If needed, interject questions that might lead the group to making a decision or settling disagreements about the boat. (Susie, why do you think you should use that material? What characteristics does it have that would make it a good boat? How do you know? Lou, what do you think about Susie’s idea? What might you add or change?) Remind students that they also need to have a plan as to how the boat will move once it’s in the water.
4. Students select 2 objects to represent Huck and Tom. Have them place the objects in their boat and try it out in a bucket or tub of water. Allow ample time for the group to make minor changes to their boat if needed. Follow up with the group(s) that does this to get an understanding of why they are changing their original plan.
5. Each group measures the mass of their final boat and of their 2 boys. They record this information on the class chart. They also add the 2 masses to find the total mass of the boat and boys. Again, record this on the chart. Review the information on the chart with the class. Make predictions about which boat/boys will travel the easiest down the river. Why? Record this on a prediction/ statement chart.
6. Time to test the boats! OUTSIDE!!!! Be sure that your ductwork “riverbed” has items attached that will alter the course of the current in the river. The flow of water should be swift enough that the boats will move but not so strong that it dunks them or floods them along too quickly. When setting up the “riverbed”, elevate one end slightly so that the water runs down hill gently and excess water flows over the enclosed end. You may need to experiment on your own before working with the students. This will help with the placement of the objects in the water. The idea is for the students to use a force of some kind to help the boat along.
7. Ask the students again: How can we travel from one end of the river to another? This time, they may refer to their individual boat and/or another group’s boat. Allow each group to send their boat on its journey as they stay on one side of the riverbed. They may help it along by blowing it, wiggling the water behind it, beside it, or in front of it, or they might have a “towline” attached to it to pull it, but should not pick it up and move it forward. The remainder of the class is standing on one side of the riverbed recording observations on their individual data collection page as the boat travels along the river. Guide them toward what happens when it encounters an obstacle in the water, what the group needs to do to get the boat to continue moving, or how the boys are doing on the boat. If the boat capsizes or sinks, that becomes part of the observation as well as a record that it did not finish its journey and the boys are “lost at sea”.

8. Once all groups have traveled the river, record the observations on the class chart. Conduct a discussion about the observations. Guide students to make comparisons between the boats and how they moved in the water. Use questions with *How do you know?* To pull out facts and observations that can be proven. Focus on the materials used, the shape and size of the boat, how the student helped it move, what happened when the boat encountered an obstacle in the water, what contact and/ or non-contact forces helped the raft move through the water, the objects used to represent Huck and Tom, and how the “boys” in the boat affected its movement. Ask: What do you think about the how the groups moved the rafts? Do you think there was a force used? What kind? How do you know? Decide if the movement the group used was a push or a pull. Record that on the chart.
9. Hand out the student evaluation sheet. Students evaluate the boats from each group and draw a picture of the boat that they would want to travel down the river on if they were the boys. They write a couple sentences that explain why they chose that raft. Also, the students explain how it was working in a group and why or why not a team was helpful in this investigation.

Handouts

- River Rafting Student Evaluation Page with Tom Sawyer and Huck Finn
- River Rafting Data Collection Chart

Evaluation and follow-up

Assessment tools and methods

Record observations of each student’s ability

- to follow safety precautions
- to use materials appropriately
- measurement skills
- to follow directions

Interdisciplinary connections

Math

Measurement of mass using the balance (metric weights and or Teddy bear counters), addition of 2 figures charting information.

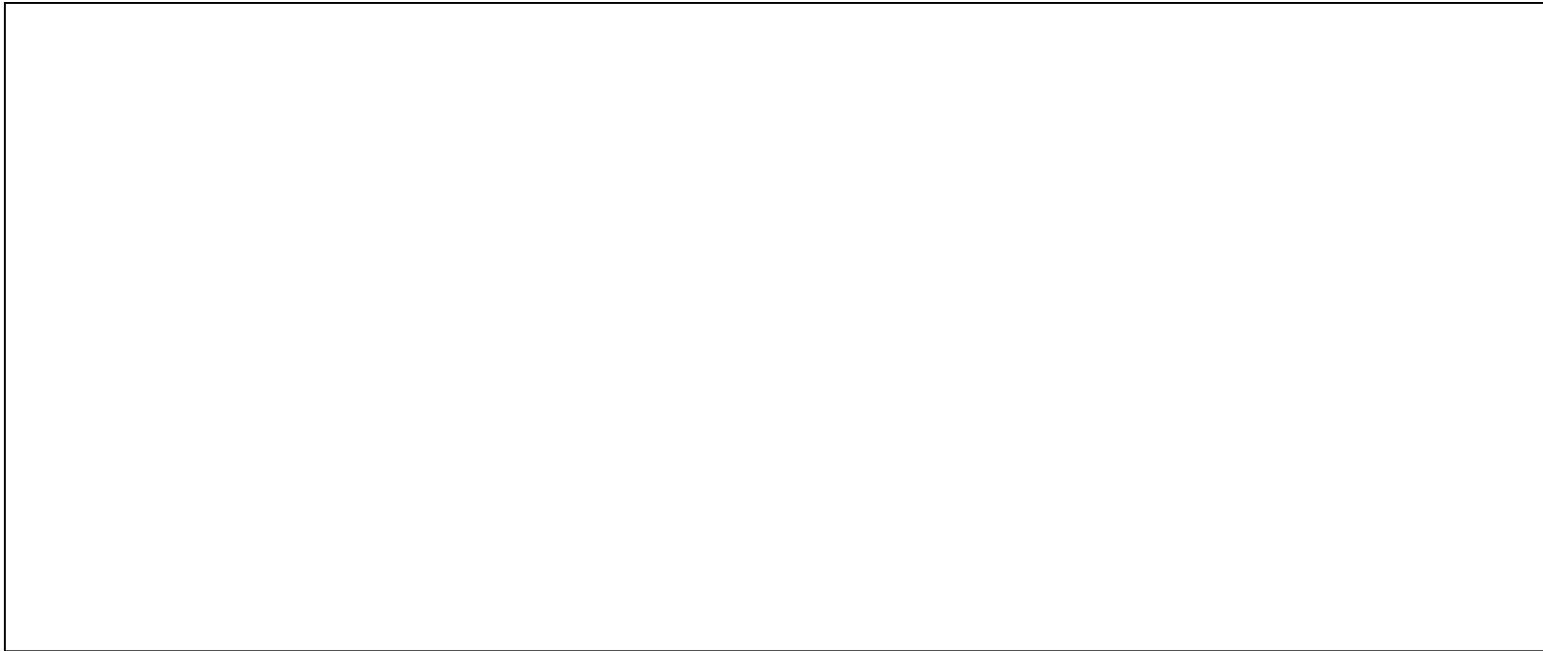
Language Arts

Written expression of observations and evaluations of data, oral explanations of observations, answering questions, evaluation of data collected by peers to form individual opinion.

**River Rafting Student Evaluation Page
with Tom Sawyer and Huck Finn**

Name _____

Draw a picture of the raft that you would want to ride in. Label the parts and materials.



Write a sentence that tells why you want to ride on this raft.

How did you like working in a team? Tell why you did or did not like it.

River Rafting Data Collection Chart

Name _____

Group	Mass of boat (grams)	Mass of riders (grams)	Total mass (grams)	Force used	What happened?
1					
2					
3					
4					
5					
6					
7					
8					