



## HOW TO USE THIS GUIDE

- 1** Duplicate the DFTV student page of your choice (pp. 3–6) and distribute it to your students. Read the questions posed by the young scientists. Encourage your students to describe how they would investigate the questions. Guide them through the steps of developing an inquiry (see below).
- 2** If you have videotapes of the episodes featured in this guide, play the video segment to see how the DFTV kids investigated the questions and what their results were. The investigations are also described on page 7 of this guide and on the DragonflyTV Web site. Apply the ideas learned in the DFTV example to the classroom activity “Do It, Get To It,” or encourage students to do the investigation described in “Take It Outside!”
- 3** If your students develop investigations of their own, encourage them to visit the DragonflyTV Web site, [pbskids.org/dragonflytv](http://pbskids.org/dragonflytv), and click on DFTV Boards. Kids can describe their investigations and share their ideas with others.

### OBSERVATIONAL

- 1.** Write the question: How does A compare to B? Make a hypothesis.
- 2.** Decide what to measure or observe for both A and B and how to do it.
- 3.** Make multiple observations when possible. Record all results.
- 4.** Organize the data in a table or chart, looking for differences or similarities.
- 5.** Write an answer to the original question. Also write down any new questions that come up during this investigation.

### EXPERIMENTAL

- 1.** Write the question: If I change A, what happens to B? Make a hypothesis.
- 2.** Choose the independent variable (the thing you change) and dependent variable (the thing that is affected) and how to measure them.
- 3.** Do multiple trials when possible.
- 4.** Organize the data into a table and prepare a graph. Look for patterns or trends.
- 5.** Write an answer to the original question. Also write down any new questions that come up during this investigation.

# 408 / Earth Systems: Rivers



Student Page

## What's Up?

We're Margaret and Elizabeth, and we're hitting the links...at the Science Museum of Minnesota! This science museum actually has a mini-golf course that was designed so kids can learn about rivers while putting. As we played on this specialized course, our minds wandered from holes-in-one to how real rivers work. Our DragonflyTV question: **What do rivers do to the land?**

## How Would You Investigate This Question?

To dive into this river investigation, start brainstorming what you already know about rivers, or think about a river in your community. How are rivers formed, and how do they differ from other bodies of water, like a lake or ocean? How do they change over time or with the season? What are the "contents" of a typical river? Once you've gathered information about rivers, think about what river features would really affect the land, what types of impact these features might cause, and why. Write your ideas in your notebook and discuss them with your classmates and your teacher. Then watch the video segment, or go to [pbskids.org/dragonflytv](http://pbskids.org/dragonflytv) to learn how Margaret and Elizabeth's day of golf turned into a load of learning about rivers.



## Do It, Get To It

Collect some sand and pebbles, and do a sediment investigation. Make sure you have pebbles and sand grains of various shapes and sizes. Mix them all up. Get a clear jar or bucket with water in it. Pour in the mixture of sand and pebbles. Watch them settle to the bottom. Which grain size settles farthest down? Why? Stir up the sand and pebbles with a stick and let them settle again. Do the same size grains always settle farthest down?

## Take It Outside!

Study how water meanders on your driveway. This works best if your driveway isn't perfectly level but has a slope to it. Stand at the top of the driveway, then slo-o-o-wly pour water from a small bucket onto the driveway, letting it run down the slope. Watch the path the water takes. The water won't carve a path in the driveway, of course, but it will "choose" a path to follow. Watch the leading edge of the water as it runs into obstacles (cracks, dips, or pebbles) and see how it moves left or right to get past the obstacles. Draw a picture of the path the water leaves behind.

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# About the DFTV Investigations

(for the educator)

## WOLVES

### NATIONAL SCIENCE EDUCATION STANDARD

#### Life Science Grades K–4:

*Organisms and their Environments*

#### Life Science Grades 5–8:

*Regulation and Behavior*

The boys received permission to throw chunks of meat into the wolf pen, then observed how the wolves competed for the meat. The pen contained three females and three males, including a young female and male. The boys threw out several pieces of meat, one at a time, looking for behaviors or gestures such as fighting, growling, chasing, or tail position. They concluded that the leader, or “alpha” in this pack was actually an older female wolf. It’s not always the largest or oldest wolf, nor always a male who is the top wolf.

Discuss with students how animals compete in their social groups for their status. Also point out how pets, especially dogs, live in a kind of pack... with their human owners. A dog’s ear position can tell a lot about its status in the family.

## DOUBLE DUTCH

### NATIONAL SCIENCE EDUCATION STANDARD

#### Life Science Grades K–4:

*The Characteristics of Organisms*

#### History and Nature of Science Grades 5–8:

*Nature of Science*

The girls used a popular technology ‘a personal mp3 player’ to provide a musical distraction for the jumpers. They played a highly rhythmic piece of music in the jumpers headphones, which played at a beat which did not match the rhythm of the jump rope. They conducted a similar test using a strobe light as a visual distraction. They found that for some jumpers, auditory distractions were harder to ignore than visual ones. Still, their results showed that they couldn’t make a general conclusion. They learned that each jumper on their team handles distractions differently.

Discuss with students the difficulties in controlling variables when conducting human performance investigations. In this case, how can you be sure the jumpers are trying equally hard in each circumstance?

## RIVERS

### NATIONAL SCIENCE EDUCATION STANDARD

#### Earth and Space Science Grades K–4:

*Changes in Earth and Sky*

#### Physical Science Grades 5–8:

*Structure of the Earth System*

The girls spent time at the museum exhibit on rivers and found three things there that made them want to learn more. They left the museum and headed for a local river to learn about a) how rivers meander; b) how sediment layers develop in water; c) how humans change river flow with dams. For example, they canoed down a meandering river, noticing how the water deposits rocks and pebbles on the inside of each curve.

On your next field trip to a science museum or nature center, ask your students to consider the exhibits more carefully. Look for some exhibits that encourage them to go into the field and investigate things for themselves.

## TIGERS AND OTTERS

### NATIONAL SCIENCE EDUCATION STANDARD

#### Life Science Grades K–4:

*Organisms and Environments*

#### Life Science Grades 5–8:

*Regulations and Behavior*

The girls received permission from their local zoo to develop play objects for two animals: river otters and tigers. For the otters, they make a six-sided hoop out of bamboo and inserted food into holes drilled in the hexagon. For the tigers, they made a papier-mache warthog and again put meat inside to make it attractive to the animals. The zookeepers put each plaything into the appropriate exhibit, while the girls observed the animals’ responses. Each object seemed to occupy the animal’s attention for several minutes, bringing out natural behaviors and keeping the animals active.

Discuss with students the challenges of keeping zoo animals physically active and mentally challenged.

For more details on these investigations, visit [pbskids.org/dragonflytv](http://pbskids.org/dragonflytv).  
Use the search option to quickly find the specific segment.