HOW TO USE THIS GUIDE

1. Duplicate the DFTV student pages (pp. 3–6), and distribute them 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 them 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, www.dragonflytv.org. On the link titled "Be On DFTV" they can describe their investigation and they'll be considered for the next season of DragonflyTV!

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.

DragonflyTV is a production of Twin Cities Public Television (TPT), St. Paul/Minneapolis, and is made possible by major grants from Best Buy Children's Foundation and the National Science Foundation.

308 / Speed:
How can my skating turns be speedy, steady and in control?

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Student Page

What's Up?

We're Sarah, Lisa, Ned, and Eric, and we're short-track speedskaters who want to melt the competition! We know that every fraction of a second counts, so we can't slow down at all while racing. That's why we're investigating how we should perform our turns: Should we enter the turn in a tight, medium, or wide radius to maintain speed?

How Would You Investigate This Question?

What equipment will you need to measure a skater's speed around a turn? Develop a way to set up a test area on an ice rink. Think about the number of trials you should have the skaters do in order to get a meaningful result. Describe your ideas in your notebook. Then discuss them with your teacher, or go to www.dragonflytv.org to learn how Sarah, Lisa, Ned, and Eric did their speedskating investigation.

Do It, Get To It

Get an old-style record turntable, and make a cardboard "record" to put on it. Make it about 30-35 cm across, or as big as will fit. Choose a speed (either 33 1/3 or 45 rpm), and set a coin on the record, some distance from the spindle. How far out on the spinning disk can you set the penny before it slides away? Friction is necessary to hold the coin in place. At what point is friction not enough? Try it with other coins or objects, too.

Take It Outside!

Can you run faster than you skate? Design a test to find out whether you can run faster than you can skate a distance of 20 meters, always from a standing start. Get a friend to operate a stopwatch, and have yourself timed sprinting that distance on the ground. Then, move to a skating rink, get your skates on, and have yourself timed again, this time skating the 20 meters from a standing start. Think about the difference between the top speed you can run or skate, compared to what it takes to reach that speed!

Go to www.dragonflytv.org, "**Be On DFTV**," and tell us what happened!

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SEE IT ON PBS KIDS
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About the DFTV Investigations
(for the educator)

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Educator Page

WHITEWATER RAFTING
NATIONAL SCIENCE EDUCATION STANDARD

Earth Science Grades K–4:
Changes in Earth and Sky
Earth Science Grades 5–8:
Earth's History

The four boys took a guided raft ride down the American River. They walked off 100 paces along the river bank in a calm stretch, and along a rapids. They estimated the elevation change over that stretch by comparing GPS readings at the beginning and end points with information on a topographical map. They also dropped a flotation device into the water and timed its run through that stretch of river. They found a much greater elevation change in the rapids compared to the clam area. They also looked at water flow direction around eddies, tongues, and holes (three river rapid features), to learn what forces would be acting on them as they rafted through.

A river investigation like this is difficult to set up, but look for smaller scale versions using a nearby stream or creek. For more details on this investigation, visit www.dragonflytv.org.

HORSE EARS
NATIONAL SCIENCE EDUCATION STANDARD

Life Science Grades K–4:
The Characteristics of Organisms
Life Science Grades 5–8:
Regulation and Behavior

Ting and Mallory studied the behaviors of more than a dozen horses, after Ting approached each wearing some horse ears she made. She approached the horses with no horse ears, then with ears facing forward, and finally with ears facing backward. She observed the horse's own ear position, and whether the horse was friendly or agitated. She found that the horses were generally more agitated when she wore the ears. Further, wearing them in the back position, the horses were particularly uneasy. Horses put their own ears back to symbolize aggression, and Ting's horse ears seemed to convey the same thing.

Invite your students to spend some time carefully observing animal behavior in a controlled setting, whether it's a dog, cat, gerbil, or goldfish. Talk with your students about resisting the temptation to assign human attributes to animals. For more details on this investigation, visit www.dragonflytv.org.

SPEEDSKATING
NATIONAL SCIENCE EDUCATION STANDARD

Physical Science Grades K–4:
Position and Motion of Objects
Physical Science Grades 5–8:
Motions and Forces

The four kids laid out a regulation short track turn on the rink (8 meter radius), then marked lanes at radii of 8.5, 9.5, and 10.5 meters. They each skated the three turns three times, while others recorded their time to complete the half-circle turn. Each skater reported his or her feeling of control. Their results varied, but generally they found that even though the "tight" radius is a shorter distance around the turn, skating that turn did not give them their fastest times. Moreover, they agreed it was difficult to "hold the turn', meaning, the forces on the skate blades necessary to stay in the tight radius were high, and they felt their blades might slip out at any moment. They found their best performance by skating the medium radius turn, balancing speed with control.

Circular motion can be a difficult concept for students to grasp. Give particular attention to distinguish centripetal from centrifugal forces. For more details on this investigation, visit www.dragonflytv.org.

PET THERAPY
NATIONAL SCIENCE EDUCATION STANDARD

Life Science Grades K–4:
Organisms and Their Environments
Science in Personal and Social Perspectives Grades 5–8:
Personal Health

Jeff received permission from parents of six young patients to participate in his study. Each child was facing a painful medical procedure that day. After receiving the procedure, Jeff assessed each child's pain level using a "faces" scale. Half of the patients then spent four minutes with Marley, the pet therapy dog, while the other four simply relaxed alone for four minutes. Jeff assessed their pain levels again. He found that the therapy dog patients demonstrated a greater reduction in pain than those who rested alone. Afterward, all the kids had the chance to spend time with Marley!

Jeff's project received a national award from the Discovery Channel Young Scientist Challenge. For more details on this investigation, visit www.dragonflytv.org.

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