



DragonflyTV Educator's Guide

For use in classrooms,
afterschool clubs,
youth groups, museums,
zoos, and more.

DragonflyTV is the PBS show for kids interested in the science behind their favorite activities. What's unique about DragonflyTV? It features real kids **doing** their own science inquiries. In fact, any child who is exploring a science question or creating a science project has a chance to be on the show.

DragonflyTV is an ideal catalyst for inquiry in your classroom. **Educators can tape DragonflyTV broadcasts and use the videos in classrooms, clubs, and other institutions for a full year.** And even without the video, the activities in this guide will still show how much fun inquiry can be!

To learn more about DragonflyTV, go to www.dragonflytv.org.



SEASON THREE,
ISSUE TWO

306/Earth Systems:
Whitewater Rafting

307/Animal Behavior:
Horse Ears

308/Speed:
Speedskating

309/Health:
Pet Therapy





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.

306 / Earth Systems:

How do rapids affect our river ride?



Student Page

What's Up?

We're Scotty, Kohner, Rasheed, and JB, and we're taking our first rafting trip down the American River. We know that parts of the river are calm, but other parts have some rockin' rapids with crazy names like Satan's Cesspool. We want to figure out how the river is going to push our raft around, so we can get through safely. Our question: How does the elevation change in the river relate to the difficulty of the rapids, and how should we paddle in those tough spots?

How Would You Investigate This Question?

Decide how to measure river properties such as elevation, elevation change, and flow rate. What about special features in the river, such as large boulders, or places where the river narrows or widens? How does the water flow in each of these places? Devise a way to test your ideas with a model. Describe your ideas in your notebook. Then discuss them with your teacher, or go to www.dragonflytv.org to learn how Scotty, Kohner, Rasheed, and JB did their river investigation.



Do It, Get To It

When rivers carve out a path, they tend to meander, which means that they snake back and forth. Make a river model with sand in a jelly roll pan. Lift one end of the pan and pour water slowly at the top. Watch how the water carves out a meandering river. Try the experiment several times, and even put obstacles like rocks on the tray, to see how they affect the "river's" path.

Take It Outside!

Find a stream near where you live, and determine its elevation change. Walk off a certain distance along the stream, say, 20 meters. Determine the amount the stream level drops over that distance. You may need to use stakes and a string to make a horizontal reference line, then measure how much below the reference line the stream surface drops. How does the elevation change compare between two different parts of the stream? What else do you notice about how deep the stream is there, or how quickly the water runs?

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



Student Page

307 / Animal Behavior: How do horses use their ears to communicate?

What's Up?

We're Ting and Mallory, and we're all about horsing around! We've heard that our equine friends actually communicate with their ears, and we wanted to find out whether putting on fake horse ears will allow us to communicate with the animals!

How Would You Investigate This Question?

Learn what you can about horse behavior. What sort of horse behaviors are "friendly" ones, and which ones indicate "agitated" or "aggressive." Think about whether working with one horse is enough, or whether you should test several horses. Also be sure to consider small details, like which way the ears should face...forward, or backward. Describe your ideas in your notebook. Then discuss them with your teacher, or go to www.dragonflytv.org to learn how Ting and Mallory did their horse investigation.

Do It, Get To It

Some pets aren't quite sure what to do when they see their reflection in a mirror. Bring a mirror up to your pet bird, gerbil, or fish, and see how it responds. Does it seem to be acting aggressively, or in a friendly way? Does the age of your pet make a difference?

Take It Outside!

Have you noticed how your dog's or cat's ears indicate their mood? What will your pet do if you suddenly sprout animal ears? Make some ears you can wear that look like dog or cat ears, and see how your pet responds. Or, try the same investigation with a tail. Decide ahead of time what sorts of behaviors you are going to look for, and how you will evaluate them. Prepare to make the observations over several days.

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



308 / Speed:

How can my skating turns be speedy, steady and in control?

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 $33 \frac{1}{3}$ 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!



Student Page

308 / Health: Do therapy dogs reduce a kid's experience of pain?

What's Up?

I'm Jeff, and I'm doggone crazy about my two pooches, Jasmine and Nova. From my own experience with cancer, I know that they always make me smile, even on my toughest days. Now I want to know if pets can help other kids who have to fight off pain and stress. My question: Can interacting with a furry friend help lessen or eliminate pain in kids undergoing a medical procedure?

How Would You Investigate This Question?

Conducting investigations with human subjects can be tricky. Where would you find a number of kids who you know are facing pain? At the doctor or dentist office, perhaps? How would you get permission to have them participate in your study? Decide what sorts of variables you would keep constant, such as age of the test subject, or what kind of therapy animal you are going to use. Come up with a way to "measure" the amount of pain the subjects are feeling. Describe your ideas in your notebook. Then discuss them with your teacher, or go to www.dragonflytv.org to learn how Jeff did his pet therapy investigation.

Do It, Get To It

Study how music affects people. Learn to take a person's pulse rate. Put headphones on your test subject, and take your subject's pulse rate with no music in the headphones, then play the first style of music through the headphones for a minute, and take the person's pulse rate again. Try several styles of music.

Take It Outside!

Collect pictures out of magazines or off the Internet of all kinds of different animals. Make up a "faces scale" that has these four faces: mad, sad, glad, and scared. Have your friends take turns looking at each of your collected pictures. Then ask them to point to the face on the scale that best represents how they feel when they look at each picture.

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



About the DFTV Investigations

(for the educator)

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.



DragonflyTV Season Three Themes

- 301 Investigate III
- 302 Sports Science
- 303 Wind
- 304 Forensics
- 305 Engineering
- 306 Earth Systems
- 307 Animal Behavior
- 308 Speed
- 309 Health
- 310 Habitats
- 311 Games
- 312 Space/Astronomy
- 313 Dogs



TIME TO START PREPARING FOR SCIENCE FAIRS!

Science fair projects do not have to be a last-minute, "Yikes, it's due on Monday," panic-filled affair. Nor do kids have to show how to split an atom in their school gymnasium. Instead, science fair investigations offer students a chance to explore, dream, show off a little, and learn a lot, just like DragonflyTV!

Educators, students, and parents can find great science fair pointers by surfing over to DFTV's new online Science Fair Source! It's the ultimate guide for project ideas, tips, and frequently-asked questions about science fairs. Visit www.dragonflytv.org to begin investigating. And while you're online, click on "Be On DFTV" to find out how sharing your students' science projects could land them on DFTV!



To purchase DragonflyTV on VHS or DVD, visit Great Plains National Educational Media at www.gpn.unl.edu



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