HOW TO USE THIS GUIDE

Duplicate the student pages on the back of this poster, and distribute them to your students. Read the question posed by the DFTV scientists. Encourage your students to describe how they would investigate the question. Guide them through the steps of developing an inquiry.

If you have a videotape of the episode, play it to see how the DFTV scientists investigated the question, and what their results were. The investigations are also described on the DFTV 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".

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.

Student Page

302 / SPORTS SCIENCE:

How do different hockey sticks affect my shot speed and accuracy?

What's Up?

We're Tess, Alison, and Christina. Since we love hockey, we wanted to check out some slap-shot science. Most hockey sticks are made of wood, but some are made of graphite, even aluminum, and each has its own level of flexibility. The shaft of a hockey stick bends and springs back during a shot…that's called flex. We want to know: how does a hockey stick's flex affect our shooting power and accuracy?

Take the DFTV Challenge!

Come up with your own hockey stick investigation. Decide what kinds of stick to test, and how you'll measure your shot speed and accuracy. Think about how many times to do the test to get a meaningful result. Record your procedure and hypothesis in your science notebook. Go to www.dragonfly-tv.org to see what Tess, Alison, and Christina did for their investigation.

Do It, Get To It

Ever read the printing near the air valve on a basketball: "Inflate to 7 pounds"? What does that mean? What it means is that the pressure inside the ball should be 7 pounds per square inch, not that the ball should weigh 7 pounds. So does pumping up a ball change its weight at all? Get a basketball, football, or volleyball, an inflation needle, a scale from science class that can measure up to 2000 grams, and an air pump. Put the needle in the ball and let most of the air out. Weigh the ball. Pump in 5 strokes of air; weigh the ball again. Add another 5 strokes, re-weigh, and continue until the ball is properly inflated (not too mushy, not too hard). What did you notice about the ball's weight? What does this tell you about air? Write to us at www.dragonflytv.org, and tell us what you found out!

Take It Outside!

Everyone knows a heavier baseball bat sends the ball farther than a light one, right? Better find out for yourself! Set up an experiment to determine which size bat is right for you, and why. Get a variety of bats from your friends, or from your gym teacher. The bats might be as light as 18 ounces (510 grams) or as heavy as 23 ounces (650 grams). Decide whether to hit from a tee, or from a pitching machine. Have your friends help record the landing spot of ten fly balls using each bat. Calculate an average. Which bat is best for you? What about for your friend? How about an older player? Is bat weight really the most important thing, or is it something else? Write to us at **www.dragonflytv.org**, and tell us what you found out!

About the DFTV Investigations

HOCKEY

NATIONAL SCIENCE EDUCATION STANDARD

Physical Science Grades K–4:
Properties of Objects and Materials; Position and Motion of Objects

Science and Technology Grades K–4:
Understandings about Science and Technology

Tess, Alison, and Christina collected wooden hockey sticks with flex numbers of 65, 75, and 95. (These numbers indicate the force in pounds required to put a 3" bow in the shaft of the stick.) The greater the flex number, the more potential energy should be available to add to their shot speed. They each took ten slapshots at the net, using a sports radar gun to measure the puck speed. They found that their own strength was the key factor to getting the "slingshot" effect out of the stick. If they couldn't flex the stick, they couldn't take advantage of its potential energy.

Explore other sports examples where potential energy plays a part, such as tennis racket tension, diving board flex, or basketball inflation. For more details about this investigation, visit **www.dragonflytv.org.**

KITE FLYING

NATIONAL SCIENCE EDUCATION STANDARD

Earth and Space Science Grades K–4:
Objects in the Sky

Physical Science Grades 5–8:
Motions and Forces

Danielle and Jasmine flew three different Delta kites, a two-string variety used in kite ballet and stunt competition. One was wide and short, one was tall and skinny, and the third was in between. The ratio of width to height is referred to as the "aspect ratio". Danielle found that the tall and skinny kite was able to execute maneuvers requiring quick turns, but couldn't "catch air" to do delicate, hovering maneuvers. The wide and short kites couldn't execute sharp turns, but were better for gentle, sweeping movements. The shape of a kite determines how the air pushes on it, and affects its performance in stunts.

Kites are a great tool for exploration of lift and drag forces, and a fantastic way to blend engineering skills with science principles. Observing kite 'behavior' can also be an excellent way to hone students' observation skills. For more details about this investigation, visit **www.dragonflytv.org**.

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