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.

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Student Page

305 / ENGINEERING:

How can we improve the glide of our hovercraft?

What's Up?

Who doesn't love to rise above it all? We're Rachel and Sara, and we're into engineering. We wanted to build our own hovercraft. We bought a few things from the hardware store, and grabbed stuff laying around in the garage, and made a hovercraft that we could ride! It worked well on concrete, but it didn't work very well on grass. Our question: how can we make our hovercraft glide over uneven surfaces?

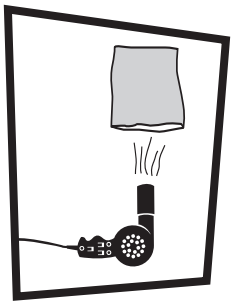
Take the DFTV Challenge!

A hovercraft uses air to lift itself slightly off the ground. If you can't build a hovercraft large enough to ride on, then try making a smaller one. Use a blow dryer, cardboard, plastic garbage bag, and a can lid, to make a miniature hovercraft. Pick a feature to vary, such as changing the surface area of the hovercraft base, or increasing/decreasing the weight of the craft. Decide what surface to test your hovercraft on. Write down your design ideas in your notebook. Go to www.dragonflytv.org to see how Rachel and Sara investigated this question.

Do It, Get To It

If you've ever played air hockey, then you've seen a kind of hovercraft: the air hockey puck! Use an air hockey table for a science investigation. Find other things around the house that might work as hovercrafts on an air hockey table. How does the amount of surface area relate to the amount of weight it can carry and still hover? Write to us at www.dragonflytv.org, and tell us what you found out!

Take It Outside!



Make your own hot air balloon, from a lightweight plastic bag, paper band, thread, cellophane tape, and paper clips. Have a thermometer handy to measure the outside air temperature. Inflate the bag with hot air from a hair dryer. (Don't use flames to heat the air for this experiment!) When it's full, release it, and try to measure how high the balloon flies, and time how long it stays in the air before returning. Do you get different results in the cool morning air, compared to the heat of the afternoon? What other changes in your balloon design give it a long-lasting flight? Write to us at **www.dragonflytv.org**, and tell us what you found out!

About the DFTV Investigations

FORENSICS

NATIONAL SCIENCE EDUCATION STANDARD

Science in Personal and Social Perspectives Grades K–4:
Science and Technology in Local Challenges

Physical Science Grades 5-8:
Transfer of Energy (light scattering)

Carolyn and Kalia examined fingerprint and handwriting evidence, even sequenced DNA with the help of their local high school science lab. To characterize the fiber sample, they used a standard laser pen to generate a diffraction pattern for the crime scene fiber and the hair samples from the suspects. They found that the diffraction pattern of the crime sample didn't match the human hair samples they collected, which got them thinking about non-human suspects. In combination with the other evidence and eyewitness testimony, they concluded that Lizzy tampered with her own presents, but the family dog, Sammy, crashed the party and ate the cake!

Laser diffraction is a simple technique to compare the dimensions of small things like hair thickness, or spacing of grooves in the surface of a CD. With a little algebra, you can determine an actual measurement value. For more details about this investigation, visit **www.dragonflytv.org**.

HOVERCRAFT

NATIONAL SCIENCE EDUCATION STANDARD

Science and Technology K–4:
Understanding about Science and Technology

Physical Science Grades 5–8:
Motions and Forces

Rachel and Sara built two hovercrafts to ride, one with a billowy "skirt", the other with a "tight" skirt. They ran each hovercraft through an obstacle course, and evaluated the performance of each. They found the billowy skirt gave them a better performance. To understand why, they set each hovercraft over a pile of glitter, and measured the scatter of the glitter. The billowy skirt allowed air to build up a better film of air between craft and the ground, even allowing the hovercraft to float over rough surfaces.

Work with students to help them grasp the multiple roles that air plays in the function of a hovercraft: air pressure inflates the skirt; air that leaks out of the skirt provides a near frictionless film for the craft to ride on. For more details about this investigation, visit **www.dragonflytv.org**.