HOW TO USE THIS GUIDE

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).

If you have a videotape of the episodes, play it to see how the DFTV scientists 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!"

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.

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205 / PROPULSION: How do I design the best model rocket?

What's Up?

We're Aren, Jessica and Mary Lynn, and we think model rockets rock! Not only do we love to build and fly model rockets, we put our designs to the test in model rocket contests. For our DragonflyTV investigation, and for an upcoming competition, we asked: *How do we create a rocket that reaches our goal altitude of 1,600 feet (488 meters)?*

HOW WOULD YOU INVESTIGATE THIS QUESTION?
Decide which parts of a model rocket really make it fly (or flop). Is it the rocket's body shape, fins, or nose cone? Is it the weight or length of the rocket? How would you measure the rocket's altitude? Describe your investigation in your notebook, and discuss it with your teacher, or go to www.dragonflytv.org to learn what Aren, Jessica and Mary Lynn did (and how they fared in the model rocket contest!)

When you build a rocket there are several things to think about. How tall can the rocket be? How wide? What shape should the nose cone be? How heavy can it be and still fly? Choose one of these features to investigate. Build a rocket that can use differently-shaped nose cones, for example, and test each one. Record all your results in your notebook.

Do It, Get To It

Everyone loves to blow up a balloon, then let go of it and let it fly all over. Well, make a science experiment out of it! Find four equal size balloons, and blow them up to four different sizes. Before you let the air out, tape a piece of straw to each balloon. Carefully thread some fish line through the straw, and stretch the fish line taut across the room. Bring the balloon to one end of the fish line, then let 'er fly! Measure the distance that each balloon flies. Does more air always mean more distance?

Take It Outside!

You can study the effect of increasing mass on the flight of a stomp rocket. Have one person be the "stomper" for each test. Use a stopwatch to measure the time from launch until landing, or have your teacher show you how to use an inclinometer to measure the height. Use pieces of clay to make the rocket a little bit heavier with each trial. See if it makes a difference where you put the clay (at the tip, or near the fins).

Student Page

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About the DFTV Investigations (for the educator)

MODEL ROCKET

NATIONAL SCIENCE EDUCATION STANDARD

Earth Science Grades K–4:
Understanding About Science and Technology
Physical Science Grades 5–8:
Abilities of Technological Design

Aren tested two body sizes, wide and skinny. Mary Lynn tested two different nose cones, rounded and pointy. Jessica tested two fin sizes, large and small. Each young scientist flew both versions of his or her rocket, checking the onboard altimeter after each flight. They combined the best characteristics from each test into one final rocket design. They used the skinny body, pointy nose cone, and full sized fins to create… The Chosen One. After a misfire on their first launch, the next attempt proved successful, as their rocket flew to 1586 feet (483 meters)!

There are other factors for your students to consider, such as rocket mass, surface coating, etc. For more details about this investigation, visit www.dragonflytv.org.

EXERCISE AND MEMORY

NATIONAL SCIENCE EDUCATION STANDARD

Earth Science Grades K–4:
Personal Health
Physical Science Grades 5–8:
Personal Health

The girls found 20 household items and set them on a tray. They gave their friends one minute to study the tray. Then each friend had to write down as many items as they could remember. Half the group went off to do exercises for 10 minutes, while the other half played board games. Then everybody came back for a new memory test, with 20 new items. The girls found that on average the exercise group improved its memory score by four points, while the resting group's average score decreased by one. The girls concluded that you can't exercise just once and really improve your memory, but exercising can make you feel alert and improve your focus.

Caution your students about the difficulties in conducting experiments to measure human performance. Discuss ways to guard against false data. For more details visit www.dragonflytv.org.

EXTREME SOUNDS

NATIONAL SCIENCE EDUCATION STANDARD

Earth Science Grades K–4:
Changes in Environments
Physical Science Grades 5–8:
Risks and Benefits

The girls borrowed a decibel meter from Tarissa's dad and took it to different places in the city. They visited everything from a "quiet room" in a sound laboratory to a video arcade, even the top of the Empire State Building! They were surprised to learn that even a quiet library is 40 times louder than the quiet room. They also discovered that the arcade was louder than the subway, dangerously loud at over 85 decibels. They also found that the sound intensity depends on how close you are to the source.

One of the most challenging features of sound intensity is the logarithmic nature of the decibel scale. Work with students to help them understand that 60 dB isn't twice as loud as 30 dB, but more than 30 times louder! For more details, visit www.dragonflytv.org.

SAND DUNES

NATIONAL SCIENCE EDUCATION STANDARD

Earth Science Grades K–4:
Changes in the Earth and Sky
Physical Science Grades 5–8:
Populations and Ecosystems

The kids chose dunes in three locations to study: foredunes (at the ocean front); scrub dunes (slightly inland), and active dunes (further inland). At each location they used a soil moisture meter to determine the moisture content in the first 12 inches (30 cm) of sand. They also laid down a 10 foot (3 m) rope and recorded the number and type of plants it touched, and estimated the dune's size. They found that the active dunes had too little moisture to support plants, and the dry sand allowed them to be eroded easily by winds. Foredunes had high moisture, but were battered by ocean winds and water, making it hard for plants to grow there. Scrub dunes supported the greatest number of plants, and are less easily eroded by the winds.

Have your students think about what makes the scrub dunes more permanent than the other dunes. Discuss the relationship of soil moisture and plant growth. For more details visit www.dragonflytv.org.

Teacher Page

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