Pull-out Section

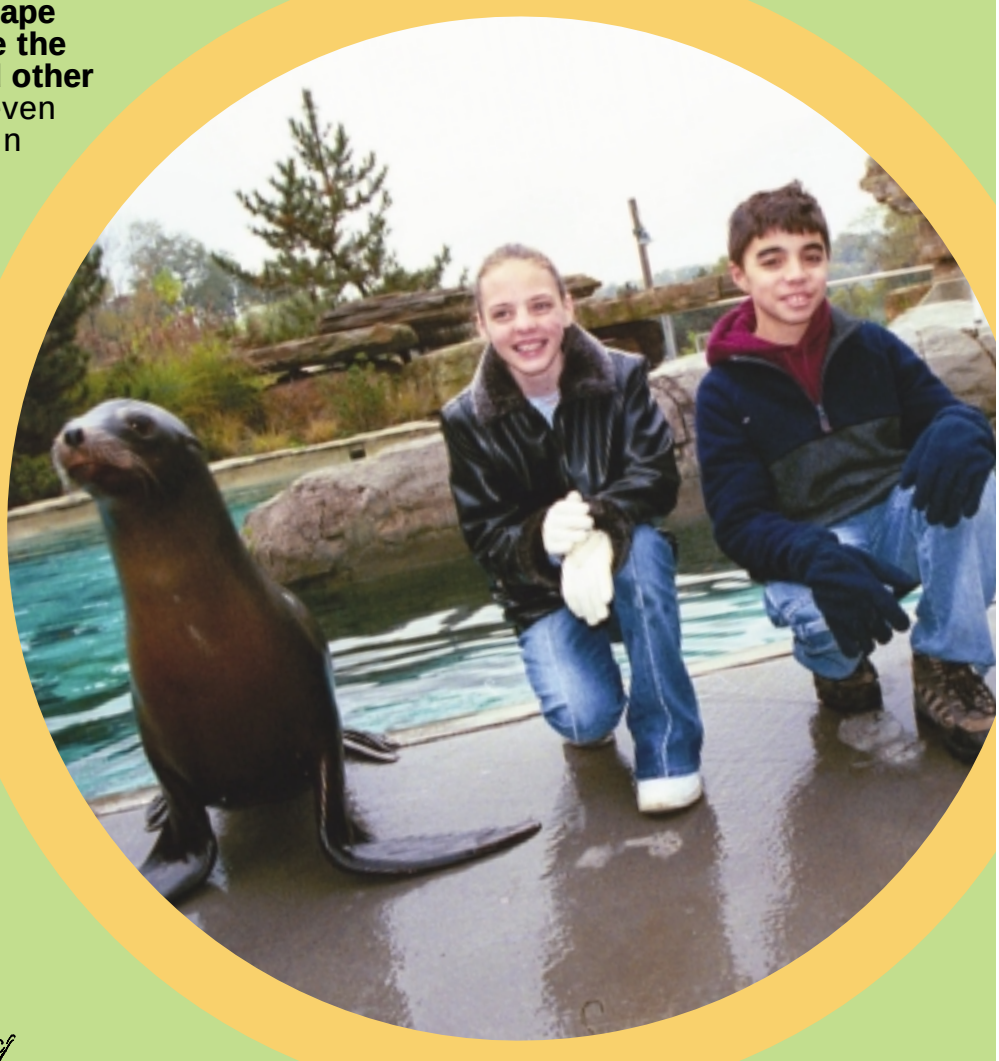
DragonflyTV Educator's Guide

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 TWO, ISSUE TWO

205 / Propulsion: Model Rockets

206 / Human Body: Exercise and Memory

207 / Sound: Extreme Sounds

209 / Ecosystems: Sand Dunes

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.

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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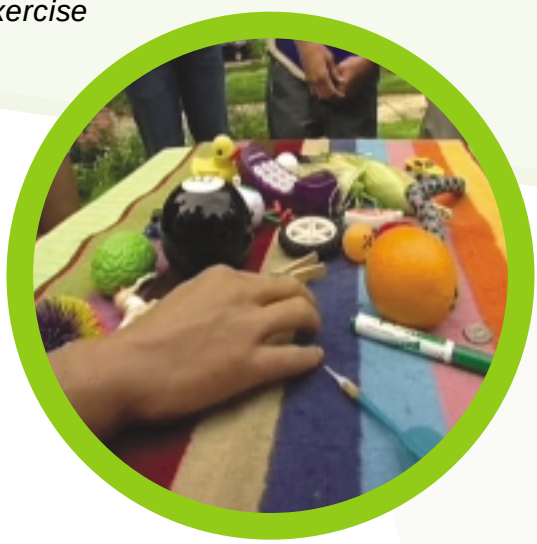
206 / HUMAN BODY: Does exercise improve my memory?

What's Up?

We're Jada and Maurna. We heard that exercise can make your brain work better, but we wanted to know if working out really makes your brain work better. For our DragonflyTV investigation, we asked: *Can exercise sharpen our memories?*



HOW WOULD YOU INVESTIGATE THIS QUESTION?
Plan a memory test. What does it look like, what equipment will you need, and how long will it take? Now think about the exercise component. What kind of physical activity qualifies as "exercise" for your investigation? Do you need to grab some friends to use as subjects, or are you just testing yourself? Why? Track your investigation in your notebook, and include your findings. Discuss them with your teacher, or go to www.dragonflytv.org to learn about Jada and Maurna's discoveries.

Do It, Get To It

Investigate whether exercise affects how you and your classmates do on math speed tests. Ask your teacher for a math facts speed test. Have everybody answer as many questions as they can in one minute. Only count the correct answers. Now have half the class exercise for 5 minutes, while the others read a book. Then take a new speed test. Did your classmates improve their score, or not? Was there a difference between the exercise group and the reading group?

Take It Outside!

Take the DragonflyTV memory challenge. Log on to www.dragonflytv.org and click on Investigate This! Go to the link for What Time of Day is Your Memory the Best? Do an investigation where you keep track of your score at different times of the day. You can also check how kids in your state have done. Do a comparison of eight-year-olds to 14-year-olds. Do kids of different ages seems to have the best results at different times of the day?

Student Page

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207 / SOUND: How noisy is my world?

What's Up?

We're Tarissa and Sabrina and we're living loud in New York City! As one of the world's noisiest places, it's sometimes hard to hear yourself think in our home-town. For our DragonflyTV investigation, we asked: *Just how loud are some of our favorite hang-outs?*

HOW WOULD YOU INVESTIGATE THIS QUESTION?
What locations would you measure? How are you going to measure the decibel level of your chosen spots? Of course, you'll also have to determine just how loud is "loud;" research what noise levels are considered safe and which are actually dangerous. When you examine your measurements, are there any surprises, with some places noisier or quieter than you initially thought? Describe your findings in your investigation notebook, and discuss them with your teacher, or go to www.dragonflytv.org to find out more about the volume of life in the Big Apple.

Do It, Get To It

Investigate loud sounds in your school. Your own hands can be your loudness meter! Make a soft shooshing sound by gently rubbing your palms together. Snap your fingers. Clap your hands. These are your reference sounds. Go to different parts of the school and make these three sounds. If you can hear the shooshing, that place is quiet. If you can't hear the shooshing, but can hear the fingersnaps, that place is moderately loud. If you can't hear fingersnaps but can hear clapping, the place is loud. If you can't hear clapping, the place is DANGEROUSLY loud... you need ear protection!

Take It Outside!

Investigate how sounds fade with distance. Go outside and stand back-to-back with a friend. You'll need two portable radios with speakers, not earphones. Your friend sets her radio to loudness setting of 2 (on a scale of 1 to 4); you set yours to a setting of 1 (quieter than your friend's radio). You walk away until you think your friend's radio sounds as loud as yours. Measure the distance. Now return to your friend. Keep your radio at 1, but have your friend turn her radio to 3. Walk away again until they sound the same. Repeat with your friend's radio at 4. What do you notice about the distance?

Student Page

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208 / ECOSYSTEMS: Why do some sand dunes have plants, and some don't?

What's Up?

We're Victoria and Alejandra. Grab your sunscreen, because we're hitting the Guadalupe-Nipomo Sand Dunes near San Luis Obispo, California! These cool dunes come in all different shapes and sizes. One of the most amazing differences between the sand dunes is the plants that grow on them (or DON'T grow on them, in some cases!). For our DragonflyTV investigation, we asked: *Why are some dunes covered with plants and others aren't?*

HOW WOULD YOU INVESTIGATE THIS QUESTION?
In addition to counting the dunes' plants, what else would you need to observe about each dune? Make a list of potential features that may give you answers to your question, like the size, shape, or location of the dunes. Note what tools you'll need to collect your measurements. Describe your investigation in your notebook, and discuss it with your teacher, or go to www.dragonflytv.org to find out what the DragonflyTV scientists discovered.

Do It, Get To It

Study how moisture affects the ability of sand to make a mountain. Get a large bucket of sandbox sand that is completely dry. Take a tall plastic drinking glass (16 oz, say) and fill it to the top with dry sand. Cover the top with a piece of stiff cardboard, then turn it upside down and set it on a table. Lift the cup, and let the sand tumble into a mound. Measure the mound: its height, circumference, and how steep the sides are. Take the dry sand, and add 60 mL of water (about 1/4 cup) and mix it together well. Put it into the 16 oz cup again, and make a new mound. Measure the mound again. Add another 60 mL of water, and repeat. How does the moisture affect the shape of the sand mound?

Take It Outside!

Different soil types support different kinds of plants. Measure plant diversity in different parts of your schoolyard, or in your own yard or neighboring field. Take an empty picture frame (2 ft. by 3 ft., or 60 cm by 90 cm) and set it on the ground in your yard or field. Count the number of different kinds of plants you find in the frame. Even if you don't know the names of the plants, just look for different kinds. Pay attention to plant height, leaf shape, stalk shape, and flower color. Compare different locations. If you have permission, do some digging to determine what kind of soil is underneath the plants. What do you notice?

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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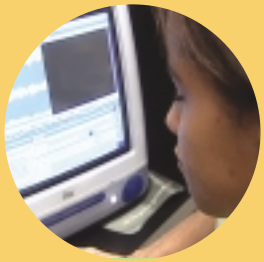
DragonflyTV Season Two Themes

201 - Investigate
202 - Structures
203 - Sports Science
204 - Spinning
205 - Propulsion
206 - Human Body
207 - Sound
208 - Technology
209 - Ecosystems
210 - Mammals
211 - Creepy Crawlies
212 - Underwater
213 - Planet Earth



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 pbskids.org/DragonflyTV 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!

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