Pull Out to Share with Your Class

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Teacher's Guides

The National Science Teachers Association and science educators at Miami University of Ohio brought stories of real kids doing real science to classrooms across America with Dragonfly magazine. Originally published by NSTA, Dragonfly showed real kids dreaming, developing and doing their own inquiry-based investigations. The creators of Dragonfly magazine then shared this concept with Twin Cities Public Television, who brought the ideas to a whole new medium: introducing DragonflyTV!

DragonflyTV premiered on PBS stations nationwide in January 2002, and includes off-air recording rights for a full year! (Check with your local PBS station for exact broadcast date and time.)

These Teacher's Guides are based on DragonflyTV investigations. Please enjoy using, modifying, and sharing these guides, which will be featured in upcoming National Science Teachers Association publications.

To learn more about DFTV and Dragonfly magazine, visit our Web site at pbskids.org/dragonflytv.

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Season 1
Issue 3

FREE!

DragonflyTV Summer Science Journal
See back cover for details.

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DragonflyTV is a production of Twin Cities Public Television (TPT), St. Paul/Minneapolis and is made possible by major grants from the National Science Foundation and Best Buy Co., Inc.

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Plants –
Fun Forests!
Episode 109

Investigations To Explore Kelp Forest

Scuba divers Megan and Ian explored an underwater kelp forest, to find out about the animals that lived there.

Question

Do larger animals live at the top of the kelp forest, or at the bottom?

Investigation

Megan and Ian brought a damaged holdfast (kelp roots) from the bottom of the forest to the surface so they could see what animals were hiding in it. They counted the number of creatures, and identified them using a picture book. They returned these creatures to the sea, and gathered part of a kelp frond (leaf) from the top of the kelp forest, and examined it also.

Results

- At the bottom of the kelp, they found many small creatures.
- At the top of the kelp, they found fewer animals, all of them small.

Conclusion

Their original hypothesis was that larger animals lived at the bottom and smaller ones lived at the top. They found small creatures in both locations, and more at the bottom, perhaps because there are better hiding places.

Scientist: Liz Stryjewski

Liz is a scientist at the Kennedy Space Center. She is exploring the possibility of growing plants in space. If she is able to cultivate agricultural crops in this gravity-reduced atmosphere, future space travelers will have a reliable source of food while exploring!

Leaves

Maddie, Mia, Mikki and Ally spend a lot of time outdoors and especially enjoy autumn's vibrant colors.

Question

Why do some trees turn colors sooner than others?

Investigation

The girls read that sunlight is one factor affecting a tree's color change. They found maples and oaks in both sunny and shaded locations, and watched them to see when they changed colors.

Conclusion

They found that many factors affect when a tree changes color. Their sunny oak changed sooner than the shaded oak, but the two maples turned at about the same time.

Find out more: pbskids.org/dragonflytv.

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Plants – Fun Forests!

Episode 109

Classroom Inquiry

1) Getting Started

- Have you ever explored a field or forest to see what kinds of creatures live there? What did you find?
- In what ways do those creatures depend on the plants where they live? For food, or for shelter? Compare the kinds of creatures that live in a grassy field to those that live in the woods.

2) Going Deeper

- What's living in a pond or stream near your house? Take an adult with you, and use a small fish net to look for small fish, tadpoles, and even freshwater shrimp! See what lurks in that stand of cattails!
- Look for animal nests in different trees in your neighborhood. Why do some animals choose pine trees, while others choose oak trees for their nests? What kind of protection do different trees offer?

3) Investigate with DragonflyTV

- Watch the video and see how Megan and Ian investigated kelp forests – OR – give your students the results from the video (see opposite page) and have them draw their own conclusions.
- What was Megan and Ian's starting hypothesis about the kinds of animals living in the kelp forest?
- Did they find evidence to support their hypothesis? What do you do if your data do not support your hypothesis? Is that good science?

4) Investigate On Your Own

- Using Kelp Forest or Leaves as a model, ask your students to design their own plant investigation. Here are some challenge cards to hand to student teams to get things rolling.

Challenge Cards

1) Time Lapse Study

Create a picture of spring! As warm weather approaches, choose four branches, and draw them. Draw these same branches on 6 different days, noting the time and date of each drawing. Do all the buds on the same tree leaf out at the same time? Does it matter if the tree is on the north or south side of a building? How does weather affect budding/leafing? Is there a relationship between the length of the day and budding/leafing? How about rainfall?

2) Plants Rule

Find some friends and see who can last four hours without touching any plants or anything made from plants. Keep track of all of the unexpected places you find plant-based products, such as paper products, foods, clothing, etc.

3) Plant Partner Mystery

Ask a parent or a teacher to locate a partner in a mystery location. Exchange information via e-mail, phone, or traditional mail with your partner, but only about the plants in your areas. How high are the daffodils? Has your partner started mowing the lawn or planting vegetables in the garden? Exchange budding, flowering, or leafing out information on a common plant in both areas such as sugar maple, lilac, forsythia, or redbud. Take photos or make drawings of the common plant on the same day. Can you guess each other's location based only on what you find out about the plants?

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Air – Sail Away!
Episode 110

Investigations To Explore

Sailing

Emmanuel and GiGi love to sail their toy boats in Central Park, and noticed that their boats seem to travel faster in some directions than in others.

Question

What is the fastest sailing direction, and why?

Investigation

They sailed their model boat in three directions: with the wind (called "running"), with the wind, but at an angle (called "broad reach"), and into the wind at an angle (called "close hauled"). Once they found the fastest direction, they tried the same experiment on a real boat.

Results

	Model Boat Speed	Real Boat Speed
Running	0.22 m/sec	5 Knots
Broad Reach	0.33 m/sec	7 Knots
Close Hauled	0.24 m/sec	6 Knots

Conclusion

Emmanuel and GiGi found that broad reach was the fastest sailing direction for the model boat and the real boat. On the real boat they also used an anemometer and discovered that the wind speed was different on the two sides of the sail.

Scientist: Lonnie Johnson

Lonnie has been winning awards for his creative inventions. His most popular invention is the Supersoaker™, everyone's favorite squirt gun, which uses air under pressure to make the best spray anywhere.

Balloons

Masha and Patsy were fascinated by the grace and speed of colorful, gigantic hot air balloons, and wondered how something bigger than a house can float through the air.

Question

How does hot air lift things?

Investigation

The girls booked a ride in a hot air balloon and recorded the temperature and the variometer (changing altitude) reading.

Conclusion

They learned that the hotter the temperature, the faster the balloon rose, and that even hovering required a high temperature.

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Air – Sail Away!

Episode 110

Classroom Inquiry

1) Getting Started

- Have you ever been sailing? Have you been to a lake, river, or ocean where boats were sailing? Try to describe the shapes of the sails you remember.
- What makes a sailboat go fast? Think of all possible answers.
- Think about the direction the sailboats were going. If the wind blows your boat along in one direction, how do you get back?

2) Going Deeper

- Can you make your own anemometer? Use it on a real or model sailboat, and see what it tells you.
- Investigate other kinds of wind-powered vehicles, like wind cars or ice sailboats. What direction of travel gives you the fastest speed?
- Look at pictures of different models of sail boat (catamaran, ketch, sloop, schooner). What are the features of each design (number of sails, sail shape, sail position)?

3) Investigate With DragonflyTV

- Watch the video and see how Emmanuel and GiGi investigated sailing – OR – give you students data from the video (see opposite page) and have them draw their own conclusions.
- How did GiGi and Emmanuel figure out the boat speed at the sailing pond?
- Emmanuel tells GiGi about the Bernoulli Principle. How does the Bernoulli Principle work when GiGi blows over the sheet of paper?
- They found that the wind speed was different on the two sides of the sail when they were on the big boat, which means the Bernoulli Principle was working. So does the air push harder against the inside of the sail, or against the outside of the sail when this happens? Make a picture showing your answer.

4) Investigate On Your Own

- Using Sailing or Balloons as an example, ask your students to design their own investigations. Here are some challenge cards to hand to student teams to get things rolling.

Challenge Cards

1) To Fly or Flop

Why do some kites fly better than others? Try drawing and building four kites using only triangular pieces of material; two you think will soar like an eagle; and two you think will drop like a rock. Make sure all your kites weigh about the same.

2) Seed Ships

The seeds of some plants, like milkweed or sugar maple "helicopters," float through the air. Catch some seeds with a net, or collect them directly from a plant. Design a test to see if differences in seeds on the same plant (size, weight, shape) makes some seeds fly better than others. Try changing some seeds in a way that makes them better fliers than before.

3) How's the Air Up There?

The air quality index, tracked by meteorologists, measures the levels of impurities and pollution in the air. For five days, follow the air quality index in your local newspaper or newscast. Does weather influence air quality? How? Communicate with a friend in another city, and compare air quality indexes. What are the differences between these two locations? What creates these differences?

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Human Behavior – Eyes Open!

Episode III

Investigations To Explore Perception

Maddy and Martina think that the human brain is the most fascinating "machine" of all. They were especially curious about how much humans remember when their minds are focused on conversations or activities.

Question

How well can people pay attention to two things at once?

Investigation

The girls gathered six of their friends to play a game of soccer. They told their friends to form a circle and keep passing the ball around. The girls DIDN'T tell their friends that a juggler was going to come out from behind some trees during the game. Maddy and Martina wanted to find out if their friends would notice the juggler and be able to describe her accurately. They wrote a list of interview questions to ask each friend about what they saw.

Results

They found that most of their friends didn't even mention the juggler when they asked how the soccer game went. But when Maddy and Martina asked if the soccer players saw the juggler, they all insisted that they had. However, almost nobody described the juggler's hair and clothes correctly, even though they were sure they had it right.

Conclusion

The girls concluded that when you are focused on one activity and something unusual happens, you don't notice all the details of the unusual event.

Scientist: Idit Harel

Web developer Idit founded MaMaMedia.com, a Web site where kids can write online stories, create digital art, make their own animated characters, and more. MaMaMedia.com now serves 4.5 million kids in 36 countries!

Roller Coasters

Christopher and Zohabiya love to go to the amusement park with their friends, and were curious about why some rides are more scary than others.

Question

How does your pulse rate correspond to the scariness of a thrill ride?

Investigation

Christopher and Zohabiya gathered a bunch of their friends and went on three different rides: Supreme Scream, Ghostrider, and Boomerang. They found out how much each person's pulse rate changed before and after the ride, and compared that to how scary each person thought the ride was.

Conclusion

Christopher and Zohabiya learned that there was a direct relationship between increase in heart rate and a ride's "scariness." The scariest ride, Supreme Scream, gave the greatest increase in pulse rate.

Find out more: pbskids.org/dragonflytv.

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Human Behavior – Eyes Open!

Episode III

Classroom Inquiry

1) Getting Started

- What activities do you do that really grab your attention? Why is it easy to focus on them?
- When do you have a hard time paying attention? If you say, "When I'm bored," then what's the difference between a boring activity and an exciting one?
- Have you heard the phrase, "Time flies when you're having fun"? Why is that? Why is it easy to lose track of time when you are having fun?

2) Going Deeper

- Try listening to two conversations at once and then recount as much as you can about each conversation. How many details can you remember accurately?
- How often do you see people driving while putting on make-up, or talking on a cell phone? Call your local police department and ask if there has been an increase in accidents among cell phone users.

3) Investigate with DragonflyTV

- Watch the video and see how Maddy and Martina investigated perception – OR – give your students results from the video (see opposite page) and have them draw their own conclusions.
- Were the girls interested in how well their friends played soccer? What was their real interest?
- What did the girls conclude about "eyewitness" testimony? Is it always reliable?

4) Investigate On Your Own

- Using Perception or Roller Coasters as a model, ask your students to design their own investigations. Here are some challenge cards to hand to student teams to get things rolling.

Challenge Cards

1) The Human Compass

Different animals have been known to navigate using the sun, stars, and natural landmarks. Some animals can even detect magnetic fields to tell North from South. Test if humans have an internal compass. If not, how do we find our way when we don't have a map?

2) A Closer Look

Try an experiment with your family or friends where some of you change your looks only slightly. You might change the color of your shoelaces or part your hair differently. Predict which changes are the easiest to spot. The most difficult? You might test your predictions using lineups.

3) Test Your Memory

Some kids are ready to rock the minute they jump out of bed, while others don't hit their stride until later in the day. For example, do you crank in the a.m., and crash after lunch? Or maybe your brain is at its sharpest after sundown. Visit the DragonflyTV Web site to take a cool memory test that will indicate your memory's "peak time." Go to **pbskids.org/cgi-registry/dragonflytv/investigate3.pl** to get started; you can even share and compare your data with kids across the nation!

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Send a DragonflyTV Science Journal home with your students this summer!

Your students can explore science all summer long with their own DragonflyTV Summer Science Journal. Jam-packed with model investigations from DragonflyTV, this notebook-sized, take-anywhere journal will offer hands-on activities to keep students learning, discovering, and having fun with science. The Journal also features tips on how to ask questions, make observations, and gather data that will lead to real discovery. Plus, there are plenty of science games and puzzles to keep every student having fun with science all summer long...

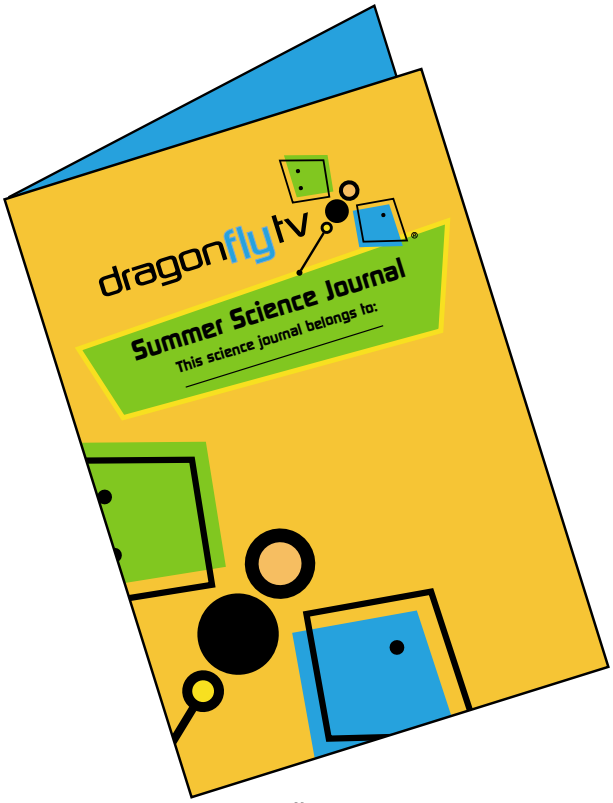
IT'S FREE, but quantities are limited. Order yours today!

To order sets of 30, send your name and address to:

Twin Cities Public Television
Attn: DragonflyTV Summer Science Journal
172 East Fourth Street
St. Paul, Minnesota 55101

– OR –

E-mail your request to dragonflyTV@tpt.org.



DragonflyTV Season One Themes

All three issues of the Teacher's Guides are available at **pbskids.org/dragonflytv**.

101: Investigate
102: Wheels*
103: Animal Behavior*
104: Water*
105: Rocks*
106: Flight*
107: Weather*
108:Technology
109: Plants*
110: Air*
111: Human Behavior*
112: Space
113: Human Body

*Denotes shows with accompanying Teacher's Guide lessons

If your students have great investigations, visit our Web site at pbskids.org/dragonflytv and tell us about them. Your students could be on DFTV!

For graduate-credit teacher workshops, visit www.DragonflyWorkshops.org

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