dragonflytv

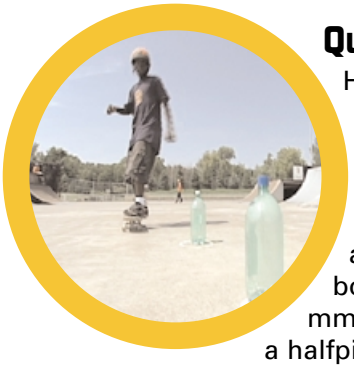
Wheels – Get Rollin'!

Episode 102

Investigations To Explore

Skateboards

Chuck and Jake spend all their spare time skateboarding, and wanted to discover more about their favorite sport.



Question

How does wheel size affect skateboard performance?

Investigation

Chuck and Jake performed speed and maneuverability tests on their boards, using 50 mm wheels and 60 mm wheels. Each boy dropped down a halfpipe, and coasted on the flat for 15 meters, recording the time. Then, they set up a slalom course of empty soda bottles, and recorded the number of bottles they knocked down.

Results

	Chuck	Jake
Coast time		
– 50 mm wheels	2.3 sec.	2.4 sec.
– 60 mm wheels	2.4 sec.	2.4 sec.
Slalom bottles knocked over		
– 50 mm wheels	2	2
– 60 mm wheels	0	3

Conclusion

Chuck and Jake concluded that wheel size was not a factor in their speed test, but it made a big difference in their maneuverability test.

Motocross

Motocross racers Tamera and Tara love the thrill of a breathtaking jump, and wanted to learn more about nailing a safe landing.

Question

How should I position my body to land the perfect jump?

Investigation

The girls tried three body positions: leaning back, leaning forward, and staying centered.

Conclusion

Tamera and Tara found that keeping their bodies centered over the bike so their weight was equally distributed gave them the best landing during the race.

Find out more: pbskids.org/dragonflytv.

Engineers: Bruce Roberts & Rick Solarez

Bruce and Rick are engineers for Harley-Davidson. Their job is to design and test new ideas for motorcycles. They use a lot of math, along with cool computer programs, to come up with the best possible motorcycle design.

tpt TWIN CITIES PUBLIC TELEVISION

SEE IT ON PBS KIDS

NSF

BEST BUY

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. Educational materials developed in association with Miami University of Ohio and with the National Science Teachers Association. Visit pbskids.org/dragonflytv for more information.

dragonflytv

Wheels – Get Rollin'!

Episode 102

Classroom Inquiry

1) Getting Started

- How many of you skateboard? Rollerblade? Have you ever replaced your wheels, or had someone do it for you?
- What properties of a skateboard affect the rider's ability to do stunts (e.g. board size, wheel size, other)?
- If you could pick out your own skateboard from a pro shop, how would you decide what kind to buy? (Collect ideas on a chart or the blackboard.)

2) Going Deeper

- What skateboard features can we observe/measure (e.g. size, length, weight, springiness, wheel characteristics, distance between wheels)?
- Because you choose a skateboard according to how well you can ride it, what performance qualities could we measure (e.g. speed, control, jump height, maneuverability)?
- Which of those features should we select? How will we measure/observe them? How many measurements should we make? Try to select a board characteristic and match it to a performance.
- What will we do with the data we collect (e.g. tabulate, graph, compare, average)?

3) Investigate with DragonflyTV

- Watch the video and see how Chuck and Jake investigated skateboards – OR – give your students data from the video (see opposite page) and have them draw their own conclusions.
- Is it necessary to calculate a speed, or can you just use the stopwatch times? What kind of a stopwatch reading indicates a faster speed?
- What do the boys' results say about wheel size and speed, in their test?
- What does it mean that Chuck's slalom results came out differently from Jake's?

4) Investigate On Your Own

- Using Skateboard or Motocross as a model, ask your students to design their own investigations. These challenge cards for student teams may help!

Challenge Cards

1) Skateboard Geometry

The wheels of a Rollerblade form a line. The wheels of a skateboard form a rectangle. Can you imagine a skateboard where the wheels form a triangle? A circle? Make some predictions about how the position of the wheels and the distance between them affects speed and manueverablitiy.

Build and test different skateboards using identical materials and explore your predictions, changing only the distance between wheels or the position.

2) Inside Scooters

Get two or three different scooters and compare the wheel width and diameter. What are the wheels made of? What type of bearing is used? How do these differences affect the speed or smoothness of the ride? Compare two-wheeled scooters with three-wheeled scooters. Which is faster, easier to stop or steer, more stable? Why?

3) Bike Check

Compare the wheels on a mountain bike with the wheels on a racing bicycle. How are they different and why? Make predictions about why the treads are different. Does the tread affect traction? Speed? Test your ideas. OR, compare the spokes on the two kinds of wheels. Do you think the number of spokes makes any difference in how fast the wheel can spin or how stable it is? Why? Test your ideas. OR, how do the number of gears and the number of teeth on the gears affect speed and power? Gears are wheels, too!

tpt TWIN CITIES PUBLIC TELEVISION

SEE IT ON PBS KIDS

NSF

BEST BUY

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. Educational materials developed in association with Miami University of Ohio and with the National Science Teachers Association. Visit pbskids.org/dragonflytv for more information.

Inquiry Tips

Take the Dragonfly Q.U.E.S.T.

Question and Observe

Ouestions lead to observations, and observations lead to better questions.

Look Closer. Observe, draw, and measure such details as size, texture, and sound.

What is the Same/What's Different? Ask students to observe similarities and differences.

Revealing Patterns. When students observe events in detail, have them look for possible patterns. Can they categorize the objects they observed? For example, after rolling skateboards down a ramp, they might classify the boards by speed: fast, medium, and slow. Do all the slow boards have larger wheels? Harder wheels?

Uncover Comparative Questions

Help students move from careful observations to finding just the right question to investigate. Often the first questions your students ask are purely descriptive. Suppose someone asks, "How many creatures are under that rock?" You look and find four pillbugs. The question is answered, but it doesn't lead to any meaningful information.

Turn descriptive questions into comparative questions. A good comparative question would be: "Which type of rock has more animals under it – big rocks or small ones?" This comparative question leads to others: Do more animals live under big rocks just because of size? Or is there more moisture under big rocks? A wonderful investigation can be launched with just one simple comparative question.

Explore Predictions

Help cultivate solid reasoning behind your students' predictions. The reasoning is as important as the predictions. When asking for predictions, also ask: "Why do you think so?" Challenge them to find more information on their topic and refine their predictions. Some predictions are more testable than others. Is there enough time available to test the prediction? Do you have the right equipment?

Start Action Plan and Gather Data

Have your students create an action plan that shows each step they will take to get the information they need. Action plans help focus investigations. Students should think about what materials they need. What should be measured? How many times? For how long? Have students design a data sheet to record their findings.

Don't be surprised if your students need to change their original plan. Revising is part of every creative endeavor.

Think Hard about Findings and Share Discoveries.

Thinking hard about what it all means is an exciting process. Everyone may not agree on a single interpretation. Your students may change their minds about what the information means after talking with others. Sharing your discoveries is part of the fun. What is the most important information to share? How should it be shown? For example, should skateboard speed be shown in a sketch? A bar chart? A pie chart? A combination? Don't stop there. Be imaginative. For example, a group that investigated skateboards might hold a skateboard demonstration for their classmates and parents.

Going Further. Questions are a renewable resource!

What Makes a Great Dragonfly Inquiry?

Great inquiries arise when students trust their own questions and discover answers for themselves. As a teacher, you don't have to be an expert, all you need is a willingness to join children in the questions they ask.

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

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. Educational materials developed in association with Miami University of Ohio and with the National Science Teachers Association. Visit pbskids.org/dragonflytv for more information.