



## EPISODE 2: IT HAS A VIRUS!

# JIWI'S MACHINES



## CUP FRICTION

### TO TEACHERS AND PARENTS

A large focus in teaching science is around encouraging both curiosity and the skills and dispositions to be able to find out or test things for yourself. This includes developing an understanding about how science itself works. The New Zealand Curriculum calls this the Nature of Science.

Tips about how to encourage these aspects are given in a



Use these to get your children talking, discussing, testing and thinking about the science involved in Jiwi's Machines. Have fun! The science content involved in Jiwi's Machines relates to the Physical World Achievement Aims of the New Zealand Curriculum.

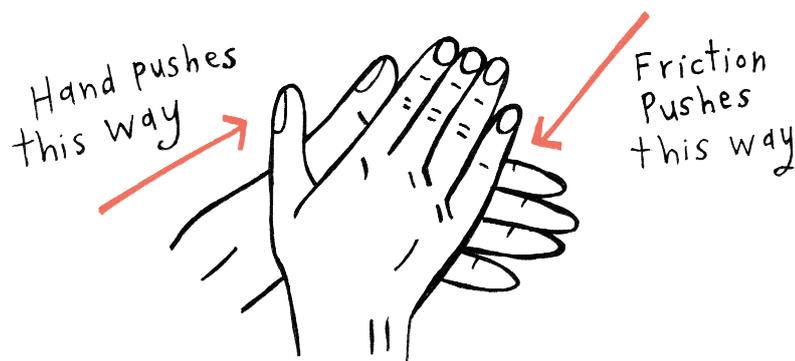
<http://nzcurriculum.tki.org.nz/The-New-Zealand-Curriculum/Learning-areas/Science/Achievement-objectives>

## CUP FRICTION

Jiwi's clip about CUP FRICTION explains and models that friction is a force between objects that we feel clearly when one object moves over another object. As Luke shows, this can easily be felt as you rub your hands together. The action of them moving against each other creates a resistance called **friction**. It can be described as a force in the opposite to an object moving.

**BRAINSTORM:** Where do we find other examples of friction?

First watch the EPISODE 2 - FRICTION clip again and focus on the way in which Jiwi uses the plastic cup over the rolling ball. Why not just let the ball roll by itself? What is the purpose of the plastic cup? The cup is used to slow the ball down and control its direction.



## EXPLORATION ACTIVITY:

### FRICION STACK

(20 minutes + discussion)

**BIG SCIENCE IDEA:** Greater surface area contact means more friction.

Put 4 or 5 books in a pile. Lift them with one hand underneath and one hand on top. Now turn the pile so that the books are upright.

-  Why don't the books fall to the floor?
-  What is holding the books together?
-  Wrap the books' covers and backs in baking paper or other materials and try this again.
-  Do the books stay together with the same amount of push?
-  Describe the differences and try to explain why they are different.



## JIMI WONDERS

-  What is the effect on the speed of the sliding cup if the surface is changed?
-  Would a sliding cup travel faster on carpet, tinfoil, sandpaper, glass, baking paper? What if the surface was covered in soap or oil?
-  How has evidence from these investigations helped us explain friction?

## INVESTIGATION:

Which cup will move faster down an inclined plane? (30 minutes – 1 hour)

**BIG SCIENCE IDEA:** Friction slows motion down

**BIG SCIENCE IDEA:** Heavy things create more friction

Watch Jiwi's CUP FRICTION clip again and make a class list of the things you would need to try this for yourselves. Check they have noted the start and finish line and the towel to catch the glass at the bottom! Have the children in small groups set up a ramp to try this themselves.

Can both cups be made to travel at the same speed by adding blu tack or another weight to the top of one?

### USE EVIDENCE

Students should be encouraged to ask and answer questions such as:

- How do you know that?
- What makes you think so?
- How could you check that?
- So an example of this would be...
- Can you think of an example when this wouldn't work?

**BRAINSTORM:** Friction can be both a useful thing and a non-useful thing to our lives. Draw up two columns on a piece of paper and think of as many instances as you can when friction is useful or not at all useful. Share with a partner, group or the class. There is a similar activity for thinking about useful and non-useful friction at <http://www.collaborativelearning.org/sciencephysics.html>

### MATERIALS

Investigation	Activity
Ramps	Carpet offcut
Plastic Cups	Tinfoil
Glasses	Glass
Large Marbles	Sandpaper
Tape (for start / finish line)	Newspaper
Towels (for a soft landing)	Fabric

### NZ CURRICULUM PLANNING SUMMARY

<p><b>Contextual Achievement Objective:</b> PHYSICAL WORLD; Explore and investigate physical phenomena in everyday situations.</p>	<p><b>Nature of Science Achievement Objective:</b> INVESTIGATING IN SCIENCE; Any student investigation may involve a variety of skills (pattern seeking).</p>
<p><b>Big Science Idea:</b> Greater surface area contact means more friction.</p> <p>Friction slows motion down.</p> <p>Heavy things create more friction.</p>	<p><b>Big Nature of Science Idea:</b> Scientists look for patterns in their investigations.</p>
<p><b>Weblinks:</b> <a href="http://scienceonline.tki.org.nz/Nature-of-science/What-is-the-Nature-of-Science/Teacher-suggestions-Investigating-in-science">http://scienceonline.tki.org.nz/Nature-of-science/What-is-the-Nature-of-Science/Teacher-suggestions-Investigating-in-science</a></p> <p><a href="http://scienceonline.tki.org.nz/Introducing-five-science-capabilities/Use-evidence">http://scienceonline.tki.org.nz/Introducing-five-science-capabilities/Use-evidence</a></p>	<p><b>Capability focus:</b> USE EVIDENCE In science, explanations need to be supported by evidence.</p>