EPISODE 2: **IT HAS A VIRUS!**

JIWI'S MACHINES

CENTRE OF GRAVITY

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

CENTRE OF GRAVITY

Gravity is an invisible force that pulls objects toward the earth. This is why things fall to the floor or ground and why we have the saying "what goes up must come down". **The Centre of Gravity** is what keeps these objects balanced and prevents things from toppling over.

The observation that when you jump you always come back down demonstrates that gravity exists. The centre of gravity is the point within an object on which it balances. A baby when learning to sit or walk often leans too far in one direction and topples over. They are still learning where their centre of gravity is and how to keep it balanced. In Jiwi's CENTRE OF GRAVITY clip we see him demonstrating the centre of gravity with books and a vase. It then moves on to show us how to control and redirect motion by using centre of gravity knowledge to purposefully topple books.

INVESTIGATION:
HOW CAN WE FIND THE CENTRE OF GRAVITY?
(30 minutes – 1 hour)

BIG SCIENCE IDEA: All objects have a centre of gravity

- Have the children try to find the centre of gravity of their pencil, pen or ruler by balancing it on one finger.
- Provide a range of classroom / household items (that won't break) and let the children explore where the centre of gravity is for a range of objects. Discuss and share their findings / techniques.
- Using stiff card (A5 sized) have the children draw any shape they choose and cut it out. Where do you think the centre of gravity may be? Is there a better way than trial and error to find out? Make a plumb line out of a length of string with a small weight attached to one end (eg: eraser, pencil sharpener) and a pin at the other end. This next part may best be done in pairs so children can help each other. Poke the pin end through anywhere near the outside edge of the shape. By holding the pin let the shape and plumb line hang freely. Draw a line along where the string falls. Turn the shape around and do the same again. The place where the lines intersect should be the centre of gravity. Can you now balance the entire shape on the tip of a pen or pencil at that point?
- Using your cut out shape, with the marks facing up, put it flat on a desk and start pushing it over the edge. At what point does it fall off? Why is that?
- There are many more centre of gravity ideas online. Maybe try balancing two intertwined forks and a toothpick on the edge of a glass.

UNDERSTANDING ABOUT SCIENCE

APPRECIATE THAT SCIENCE IS A WAY OF EXPLAINING OUR WORLD

What questions does this activity raise for the children? What would they like to test next?

JIWI WONDERS

- Do I have a centre of gravity? Where?
- How do people control their centre of gravity?
- What else would you like to try?

ACTIVITY:
(10 minutes for one person, more for a whole class!)

BIG SCIENCE IDEA: All objects have a centre of gravity.

1. Put a soft gym mat on the floor.

2. Ask for a volunteer and have them kneel on the mat with their knees together.

3. Ask them to bend down and place their elbows in front of their knees, stretching their arms forward.

4. Place a domino on end at the very tip of their outstretched fingers.

5. Now ask them to place their hands behind their backs and clasp their hands.

6. The challenge: can you bend forward and knock over the domino with your nose? Why do you topple over? Why can't you do this?

There are many more centre of gravity activities online that you could try.

CENTRE OF GRAVITY CHALLENGE
(20 minutes + discussion)

How far out from the edge of your desk can you overhang (cantilever) a pile of books?

Can you explain how this is possible?

JIWI WONDERS

- How does this work?
- Could I do this with playing cards?
- What factors are involved?
- How could I explain this?
- Is there a pattern or formula involved?

MATERIALS

Activity	**Investigation**
Pens, pencils, rulers Classroom or household items Stiff cardboard Scissors Pin, string and small weight	Gym mat Domino Volunteer(s)

NZ CURRICULUM PLANNING SUMMARY

Contextual Achievement Objective: PHYSICAL WORLD; Explore and investigate physical phenomena in everyday situations	**Nature of Science Achievement Objective:** UNDERSTANDING ABOUT SCIENCE; Appreciate that science is a way of explaining the world.
Big Science Idea: All objects have a centre of gravity.	**Big Nature of Science Idea:** Scientists develop ways to test their ideas when trying to explain their world.
Weblinks: http://scienceonline.tki.org.nz/Nature-of-science/What-is-the-Nature-of-Science/Teacher-suggestions-Understanding-about-science http://scienceonline.tki.org.nz/Introducing-five-science-capabilities/Use-evidence	**Capability focus:** USE EVIDENCE; In science, we try to make meaning from our observations.