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

JIWI’S ULTIMATE CHALLENGE

There are 6 different types of Simple Machine, most of which Jiwi has used repeatedly in constructing his amazing machines. If you didn’t review all six and their uses in the GOBSTOPPER EPISODE, now is a good time to do this.

In fact you may notice that all the Simple Machines are variations on just two machines – the inclined plane and the lever. A wedge is two inclined planes joined, and a screw is an inclined plane wrapped around a cylinder. A wheel and axle is a round lever and a pulley is a wheel and axle with a groove along its edge.
THE CHALLENGE: Using all your experiences, knowledge and creativity, design and build a complex machine using simple machines.

This could be done individually or in groups.

Provide a lot of suitable materials and challenge children to design and build a machine to achieve one of these tasks (or one of their own):

1: Design a machine combining at least 3 simple machines that will pop an inflated balloon.
2: Design a machine combining at least 3 simple machines that will ring a bell.
3: Design a machine combining at least 3 simple machines that will water a plant.
4: Design a machine combining at least 3 simple machines that will crush an empty can.
5: Design a machine combining at least 3 simple machines that will shut a door.

There are many more suggestions and ideas online.

SUGGESTED POSSIBLE MATERIALS

- Cardboard inner tubes (from wrapping paper, food wrap, hand towels etc – cut to varying lengths)
- Marbles (different sizes)
- Ping pong balls, squash balls
- String
- Wire
- Paper cups
- Tape
- Drawing pins
- Pegs
- Toy cars
- Plastic bottles
- Plastic containers
- Forks / Spoons
- Books / CD and DVD cases (as dominoes), Dominoes
- Books (edges can be used as tracks)
- Books (use stacked under things to make other objects higher)
- Tables, chairs and the floor as different levels for your machine
- Off cuts of scotia molding, PVC piping (from friendly tradespeople)
ASSESSMENT

As they demonstrate their final creation, ask the children to comment on which simple machines it uses, what role they play in the machine and the science behind that simple machine.

Using a template similar to the one below could be a way of assessing children’s understanding of which simple machines they’ve used and how they work (contextual concepts).

Asking questions such as “how does it work?” will give an idea of the types of observations and inferences they are able to make.

Asking “why did you think it would work that way?” will provide a glimpse into how they are able to link evidence from previous activities and investigations and apply it to new situations.

A question such as “how did you change your design as you tested it and why did you make those changes?” will give you an appreciation about how they are able to critique their own design and perhaps their understanding of the need for reliability and validity in the testing done previously.

It would not be appropriate to assess all aspects of the Nature of Science or Capabilities at the same time but rather choose one and focus on that.

<table>
<thead>
<tr>
<th>Demonstration Record Sheet</th>
<th>Which simple machine was it?</th>
<th>What role did it play in the machine?</th>
<th>Was the science behind the simple machine explained?</th>
<th>Nature of Science Capability questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name: Simple Machine 1</td>
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<tr>
<td>Machine:</td>
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<td>Simple Machine 2</td>
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<tr>
<td>Simple Machine 3</td>
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</tbody>
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EXTRA CHALLENGE: The classroom could ultimately design and create a Jiwi (or Rube Goldberg) Machine by combining all of their smaller machines.

FOR EXTRA FUN: Video each of the machines – in slow-motion if possible! Watch back and enjoy.