



**G.A.T.E.WAYS**

**invites gifted and talented Year 3 and 4**

**children with a love of science to**

**'SPRUNG!!'**

**G.A.T.E.WAYS** is an independent organisation offering challenging and enriching activities and experiences to develop and extend highly able children. Established in 1994, G.A.T.E.WAYS runs a range of stimulating school programs as well as the Saturday *Brainwaves Club*.

This *JOURNEY* for both girls and boys will run over four sessions. Power a little car with a mouse trap! All we need is some ordinary materials and some know-how to make our cars and learn a lot along the way. Design and build two mouse trap cars as you investigate how energy is stored up in the spring of the mouse trap, how simple machines work and the role of friction. Each lesson will have two parts. In the first part, we will learn about the physics behind our mouse trap car. In the second part, we will work on one car designed to go a long distance and another racer designed to go really fast!

**Requirements:** Students should bring a well stocked pencil case with scissors and a ruler, a snack (no nuts please), a small photograph (of yourself), a stamped, self-addressed DL envelope and a hat (Terms 1 and 4); Equipment for building the mouse trap cars will be provided. Students may choose to bring different wheels / other materials as they work on their design. Each week please bring a bag such as a book bag or shopping bag to keep your mouse-trap car and bits and pieces.

### **Session 1**

How strong do we want the pull, or force, on our mouse trap car to be? We want it to go fast but we don't want it to be pulled apart in the process! We will learn about how simple machines like levers and wheels and axels allow us to adjust the size of forces. We will feel the forces in everyday objects as well as toys like our mousetrap car.

Build your first mousetrap car and find the simple machines within that make it work. Can you find the levers and the wheel and axle machines? Experiment with the simple machines in your car. How can you make it work best?

### **Session 2**

Without friction, our wheels would slip and our mousetrap car wouldn't work at all, but too much internal friction means our car won't go far. Learn about the forces of friction and how increasing entropy means it's hard to get some energy back. Work on making your mousetrap car into a racer tweaked for speed. How fast can your mousetrap dragster go?

### **Session 3**

Where does the car's energy come from, where does it go? How does chemical energy turn into moving or kinetic energy? Learn about the lost energy of entropy and how some kinds of energy are harder to use than others. We never run out of energy, but we can run out of energy we can use.

Work on making a second car. This time you will optimise your car to go as far as it can. What distance will your car be able to go?

### **Session 4**

Stretching the spring – How do springs stretch as they hold more potential energy? We look at the different uses of springs. How far does the spring stretch or coil? What else stretches? Does it always stretch twice as far if you put twice as much weight on it? Start your engines by springing your springs! We finish our Journey with speed and distance races.

### **Work requirements & Assessment**

Children may be asked to complete some homework between sessions. At the end of the program a short, written report will be completed on each student and forwarded home to parents.

### **ABOUT THE PRESENTER**

*Emma Carter has Bachelor Degree in Science, majoring in Physics and Electrical Engineering from the University of Melbourne. She has taught secondary school maths, science and physics and has worked at Scienceworks and the Discovery Science and Technology Museum. She has presented a wide range of science and maths workshops for G.A.T.E.WAYS.*