

## 62. “Can Am”

**Classroom Activity:** To design and build a racing can using a coffee can, elastic and a weight.

**Grade:** 5 and 7

**Strand (s):** Understanding Earth and Space Systems (Grade 5); Understanding Structures and Mechanisms (Grade 7)

This task addresses the following grade 5 overall expectations:

- investigate energy transformation and conservation;
- demonstrate an understanding of the various forms and sources of energy and the ways in which energy can be transformed and conserved.

and the following grade 5 specific expectations:

- follow established safety procedures for using tools and materials;
- use scientific inquiry/research skills to investigate issues related to energy and resource conservation;
- use technological problem-solving skills to design, build, and test a device that transforms one form of energy into another and examine ways in which energy is being “lost” in the device;
- use appropriate science and technology vocabulary, including energy, heat, light, sound, electrical, mechanical, and chemical, in oral and written communication;
- use a variety of forms (e.g., oral, written, graphic, multimedia) to communicate with different audiences and for a variety of purposes;
- identify a variety of forms of energy and give examples from everyday life of how that energy is used;
- describe how energy is stored and transformed in a given device or system;
- recognize that energy cannot be created or destroyed but can only be changed from one form to another.

This task addresses the following grade 7 overall expectations:



- design and construct a variety of structures, and investigate the relationship between the design and function of these structures and the forces that act on them.

and the following grade 7 specific expectations:

- follow established safety procedures for using tools and handling materials;
- design, construct, and use physical models to investigate the effects of various forces on structures;
- investigate the factors that determine the ability of a structure to support a load;
- use technological problem-solving skills to determine the most efficient way for a structure to support a given load;
- investigate methods used by engineers to ensure structural safety;
- use appropriate science and technology vocabulary, including truss, beam, ergonomics, shear, and torsion, in oral and written communication;
- use a variety of forms (e.g., oral, written, graphic, multimedia) to communicate with different audiences and for a variety of purposes.

### Assessment Categories:

- Knowledge and Understanding
- Thinking and Investigation
- Communication
- Teambuilding skills

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**Type of Activity:** Classroom, Extra-curricular activity

Time needed to plan: 3 hours for the EIR and 2 weeks for the students

Time needed to complete activity: 1 day

### **Materials/Resources for teachers:**

Masking tape

Calculator

Stopwatches

Large sheets of paper and markers

1 or 2 weight scales (in grams)

Weights

### **Materials/Resources for students:**

Coffee can or soft drink can with removable lid

Rubber band

### **Activity Description:**

In this activity, students design and build a moving can. They may work individually or in teams of two - no more. Start the activity with an explanation of what they are building, how it is expected to function and perhaps some pointers on how to complete the task. Provide the students with an instruction sheet so they can build the can at home, or the teacher

may provide some class time. Give students approximately 2 weeks to design, build, decorate and name their can.

### **Can building instructions:**

1. Drill 2 holes in the bottom of the can, about 1cm apart
2. Punch 2 holes in the removable lid
3. Break a rubber band and thread it through the holes in the bottom and the lid. Tie it together (the rubber band needs to be stretched)
4. Attach a weight securely to the rubber band and put the lid on
5. Holding the lid, rotate the can 20 times or so in a counter clockwise motion, so the rubber band is wound up. Place it on the floor and watch it go!

For competition day, have a wide-open area so that 2 cans can race against each other in the best of 3 heats. Draw up a competition schedule to begin. The course should be 5 metres in length, marked off with masking tape. Recruit two students to be timekeeper and one to be a scorekeeper. Before the competition starts, have the teacher weigh each can and record the weight. This will be used for the "most efficient can" contest.

Record times for the cans to cross the finish line. You can figure out the velocity of the can when it crosses the line with the equation  $\text{velocity} = \text{distance} / \text{time}$ . If desired, you can figure out the exact velocity by assuming uniform acceleration and initial velocity of zero (use  $d = \frac{1}{2}at^2$  to figure out acceleration, then  $v^2 = 2ad$  to figure out final velocity). To calculate the can's efficiency, divide the final velocity by the weight.

Continue the competition until a winner is chosen. Now, a fast can may have been eliminated in the first round, so a wild card is chosen by having the loser of the championship final go against the fastest can in the first round (provided it is not the champion). They square off for the best of 3 heats to determine the class wild card. If there is more than one class, each class should select a champion and a wild card, and have the classes compete against each other in a round robin competition. The winner, second and third place are given prizes.

In addition, many cans will not make it to the final rounds but the students still want to be eligible for a prize. Select winners for the best can decoration and best name.

### **Tips:**

Have extra rubber bands on hand in case some break.