

## 71. Rubber-Band Powered Car (RPC)

**Classroom Activity:** To build an elastic band powered car made only from materials found in a household recycling bin.

**Grade(s):** 5 and 7

**Strand(s):** Understanding Structures and Mechanisms (Grades 5 and 7)

This task addresses the following grade 5 overall expectations:

- investigate forces that act on structures and mechanisms;
- identify forces that act on and within structures and mechanisms, and describe the effects of these forces on structures and mechanisms.

and the following grade 5 specific expectations:

- follow established safety procedures for working with tools and materials;
- use scientific inquiry/research skills to investigate how structures are built to withstand forces;
- use technological problem-solving skills to design, build, and test a frame structure that will withstand the application of an external force or a mechanical system that performs a specific function;
- use appropriate science and technology vocabulary, including tension, compression, torque, system, and load, 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 internal forces acting on a structure, and describe their effects on the structure;
- identify external forces acting on a structure, and describe their effects on the structure, using diagrams.

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;

- demonstrate an understanding of the relationship between structural forms and the forces that act on and within them.

and the following 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;
- 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;
- describe ways in which the centre of gravity of a structure affects the structure's stability;
- identify the magnitude, direction, point of application, and plane of application of the forces applied to a structure;
- distinguish between external forces and internal forces acting on a structure;

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- identify and describe factors that can cause a structure to fail.

### Assessment Categories:

- Knowledge and Understanding
- Thinking and Investigation
- Communication

**Type of Activity:** Classroom/science lab

Planning Time: EIR = 5 hours, Teacher = 3 hours

Time needed to complete activity: 4 weeks

### Material/Resources for Teachers:

- Various materials collected that could be found in a recycling bin
- Elastics
- Scissors
- Tennis balls
- Glue
- Tape

### Activity Description:

The RPC must be designed and built using only materials found in a recycling bin. The car must be able to carry a tennis ball as its cargo while it traverses a straight test track 60 cm wide and pass under a bridge 25 cm high. Only friction, glue or tape can be used to hold the car together, and when finished, it must fit inside a standard box of photocopy paper. The RPCs will be tested for time required to pass under the bridge, maximum distance traveled, and creativity.

### ACCEPTED:

paper and cardboard  
string ,yarn, rope, fabric  
glue  
tape  
popsicle sticks, tongue depressors  
wooden pencils  
plastics, styrofoam, rubber  
paper clips  
straws, rubber bands  
CDs  
spools  
bottle caps (plastic)

### EXCLUDED:

glass  
metal (except paper clips)  
mousetraps  
lumber/wood (except Popsicle sticks, tongue depressors, pencils, spools)  
construction kits (Lego, Meccano, K'nex, etc.)

### Suggestions for Addition Activity

- Build rubber band powered car using cardboard boxes, etc.
- Suggestion: There are two fundamental ways of storing energy in the rubber band; twisting and stretching. Most designs focus on stretching
- This approach leads to a car that can travel ~ 5m max.