SPOOL RACER!

In order to move, all vehicles must overcome the forces that hold them in place, especially gravity and friction. They do this by generating forces of their own, pushing and/or pulling against the forces that resist their motion. Most vehicles use some kind of fuel, like gasoline, to generate their power; others use the wind or electricity. Regardless, all vehicles -- in fact, all things that move -- use energy in some form or another to move. Without it, they wouldn't budge an inch.

Energy is the driving force behind all types of change in the physical world. It makes things happen. However, energy can also be stored. Batteries, for example, are designed to store electrical energy, which can be tapped at the flick of a switch. Somewhat surprisingly, all objects have the capacity to store energy. The act of placing a book on a shelf, for instance, increases that book's potential energy. While this energy may not be obvious, it is there, waiting to be released. If, for example, the book fell or the shelf collapsed, the stored energy would be converted into kinetic energy, the energy of motion.

Potential energy comes in many different forms. The book on the shelf, or a rock sitting atop a mountain, holds what scientists call gravitational potential energy. Fuels store chemical potential energy in the bonds that hold their atoms together. The rubber band that powers the spool racer stores the energy required to stretch it or wind it up. This is called elastic potential energy. When the rubber band is released, it returns to its natural state, and its stored energy is converted into kinetic energy, the movement of the mechanism that drives the vehicle forward.

Discussion Questions:

1. What is the role of the rubber band? Why does it help make the spool racer go?

2. Use the terms *kinetic energy* and *potential energy* to describe how the spool racer moves.

3. How would the spool racer's performance change if you put a pencil on each side?

4. Try winding the spool racer different amounts of rotations. What did you find out?

5. Thinking about variables such as size of the spool, weight of the washer, or tension of the rubber band effect how far or how fast the spool will go?

5. How might you redesign the spool racer if you were to build one? Why would you do that? What could you do to make the spool racer go faster?