



- * two sections of 2 m. pipe insulation cut down the middle
- * a roll a masking tape
- * 2 or more cardboard tubes (paper towel, toilet paper, or wrapping paper rolls)
- * sheet of white paper
- * 1 or more paper cups
- * crayons or markers
- * 1 small marble
- * supports to create hills and turns (books, chairs, and/or cardboard boxes)

What You Do

Part I:

1. Divide into groups of 3 or 4.
2. Each group will design a roller coaster of their own design using materials listed above.
3. Each coaster will require a loop, turn and one hill.
4. Test your design by sending the marble along the track.
5. Revise and test again if marble gained too much speed and flew off track or lost momentum around a turn and stalled.
6. Name your roller coaster and write it on the sheet of white paper.
7. After all groups have completed testing, each group will demonstrate their coaster one at a time.

Part II:

1. One half of the groups will continue to explore by building a coaster with two hills.
2. The other half will design a coaster so that the marble causes an action to occur. For example: knocking over a stack of paper cups, starting a domino effect chain reaction, or popping a balloon with a pin.

What Happens

This activity introduces the ideas of potential energy and the transformation of energy from potential to kinetic. The marbles energy comes by lifting the marble to its starting height at the beginning of the coaster. The work done to lift the marble is then stored as energy of position or *potential energy*.

As the marble rolls down the track, its potential energy is converted to energy of motion or *kinetic energy*. When a marble goes up a hill, the kinetic energy is transformed back into potential energy, but some of the energy is lost due to friction and is converted to heat.

At Home

Construct another roller coaster at home using materials you can find around the house. Explore different designs that will cause an action to occur and impress your family and friends!

Source:

Jones, Linda Cronin and Jones, T. Griffith (1995). The World's Best Roller Coasters. Science and Children. Nov./Dec., 12-15.

PREPARED BY SHERRY ALBERTSON

Science Grabber **World's Best Roller Coaster**

What you need:

- * two or three 2-m sections of pipe insulation that has been cut down the middle
- * a roll of masking tape
- * two or more cardboard tubes
- * some poster board or construction paper
- * one or more paper cups
- * crayons or markers
- * one small marble
- * supports to create hills , such as books, chairs, tables, or cardboard boxes

What you do:

1. Set the stage for the activity. One way is to have the students role-play members of a design engineering team for a new amusement park. Have them think about how they would create the worlds best roller coaster.
2. Leave the designing up to the students. Give briefly standards to follow. For example hills, turns, or how long it needs to be.
3. Let students design with given materials.

What happens:

When you place the marble at the top of the track it has potential energy. While the marble is racing down the track it's potential energy is converted to kinetic energy.

Extension:

Connect some of the tracks together to make an even longer roller coaster. Also have group discussions about what might happen if the starting point was move or changed. The standards could be change by saying the marble must go to the end and stop before going off the coaster.

Bibliography:

Jones, T. G. & Jones, L. C. (1995). "The World's Best Roller Coaster." Science and Children. November/December. Page 12-15.

Roller Coasters Science Grabber

Grade levels: 3-6

Materials Needed for each group:

- * two 2-m sections of pipe insulation that we had cut down the middle in advance (2-cm in diameter, thin wall, available at hardware stores for about \$1 per 2-m section)
- * roll of masking tape
- * two or more cardboard tubes, such as paper towel, toilet paper, or wrapping paper rolls
- * 15x50-cm piece of poster board or construction or butcher paper
- * one or more 240-mL paper cups
- * crayons or markers
- * one small marble
- * and supports to create hills and turns, such as books, chairs, and cardboard boxes

Procedure:

The roller coaster designs will be left to the students' imaginations. The guidelines the students must follow are that each coaster contain a loop, turn, and hills. Each group will name its roller coaster and produce a labeled sketch of the final design.

Questions for discussion:

1. Where does the marble get the initial energy it uses to travel through the coaster?
2. What happens to the marble's energy as it goes up a hill and slows down?
3. Would a marble ever be able to get over a hill higher than its initial starting height?
4. What happens to the marble's potential energy as it moves along the track?
5. At what point on the coaster does the marble have the greatest potential energy?
6. At what point on the coaster does the marble have the greatest potential energy?

Extensions:

1. Students could watch a video on the construction of a roller coaster.
2. To incorporate scientific literacy, the teacher could read a book about roller coasters to the students.

Bibliography:

Jones, T. G. & Jones L. C. (1995, November/December). The world's best roller coasters. *Science and Children*. 12-15.