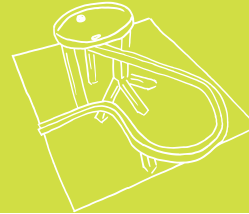


ACTIVITY 1

A SIMPLE ROLLER COASTER



Construct a roller coaster that starts at a height of about five inches and includes two 90-degree turns and a 180-degree turn. It might look something like this:



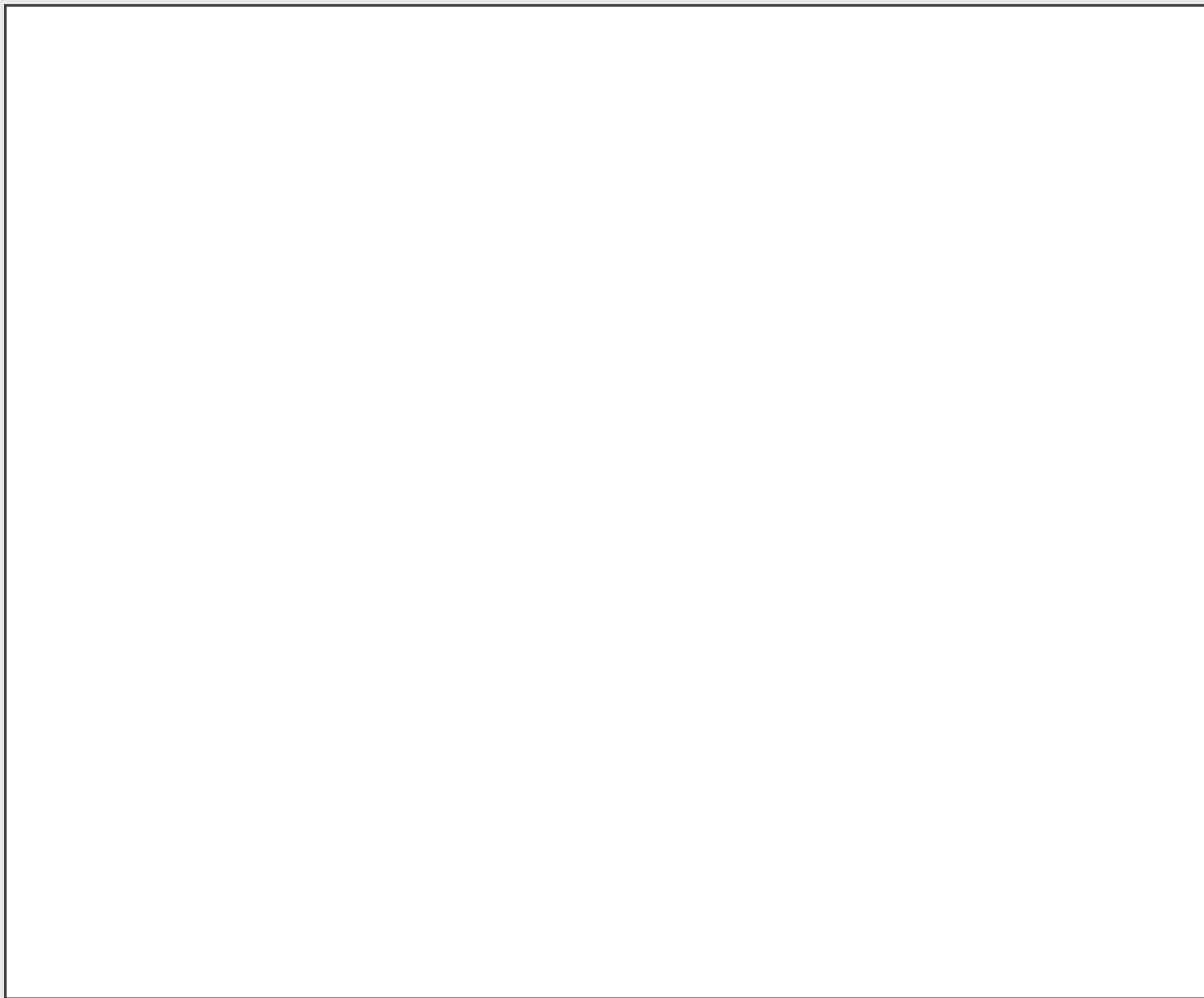
CONSTRUCTION TIPS:

1. Cut support columns to height needed.
2. Add support columns to structure as needed (test runs with marbles will help you determine if more columns are needed).
3. Test your coaster several times to ensure that the marbles travel the length of the coaster and do not get stuck or fly off the coaster at turns.
4. Troubleshoot any parts of the coaster by adjusting the slope of the components, banking the curves, or steadying the components with additional columns or braces.

SKETCH IT!

Draw a simple sketch of your roller coaster and label the following points along the path:

- Maximum potential energy
- Maximum kinetic energy
- Minimum potential energy
- Minimum kinetic energy



THINK ABOUT IT

ASK THE QUESTION

Because understanding the why is important.

Where did the initial energy come from to get the marble to the starting point of the roller coaster?

In a real roller coaster, where does the energy come from to move the roller coaster car to the top of the hill?

LET'S MAKE



GATHER YOUR SUPPLIES

So we can, you know, do this thing!



9" BALLOON



PAPER CLIP



BINDER CLIP



PAPER STRAW



TAPE



KITE STRING

NOT INCLUDED: RULER OR TAPE MEASURE. TIMING DEVICE (STOPWATCH OR SMART PHONE WITH TIMER FUNCTION), SCISSORS, ACTION FIGURE OR SMALL TOY

About Zip Lines

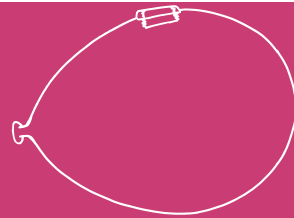
Ordinary zip lines (like the ones in amusement parks) are powered by gravity. One end of the line is higher than the other end, causing the vehicle to move down the line due to the force of gravity acting on the vehicle.

The zip line you are going to build is going to be a rocket-powered zip line. The balloon and attached vehicle on this zip line is going to be powered by the reaction to air escaping from the open mouth of the balloon. This action-reaction pair illustrates Newton's third law of motion: For every action there is an equal and opposite reaction.



ACTIVITY 1

CONSTRUCT THE ROCKET AND ZIP LINE



STEP 1

Blow up one of the balloons until it is about eight to nine inches in diameter.



STEP 2

Hold the mouth of the balloon closed with a binder clip after it is inflated – or have a friend help you hold it while it is inflated.



STEP 3

Cut a two-inch length of straw using scissors. Using two pieces of transparent tape (about two inches long each), attach the straw to the top of the balloon so one end of the straw is pointing the same direction as the mouth of the balloon, making sure the straw is parallel to the central axis of the balloon.

