

Experiment #2

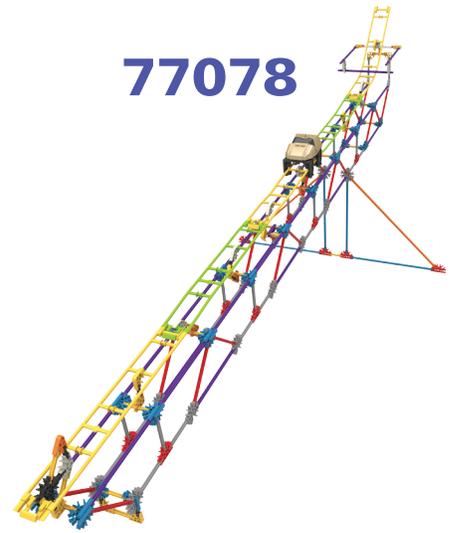
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Speed, Distance and Time Using the Ramp Model

Objectives: Learn about speed by measuring distance and time

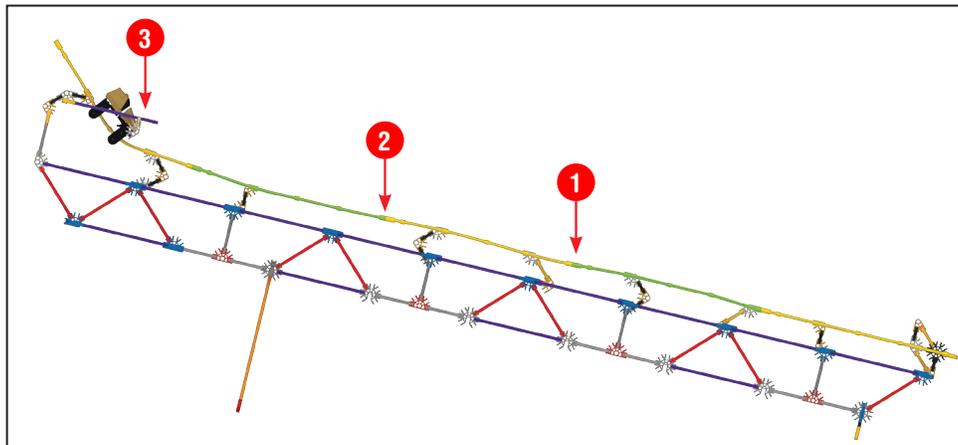
Materials You Will Need:

- built **RAMP** model
- washers, paperclips or any other small item that can be weighed and taped to the coaster car
- stopwatch
- water-based marker
- pen or pencil
- regular paper or journal
- graph paper



PROCESS:

1. Build the **RAMP** model by following the step-by-step building instructions.
2. Once your model is complete, do the following:
 - a. Use a water-based marker to label the following 3 positions on the model:
The area of track directly shown under the numbers below.



- b. Make a prediction about which position will give the coaster car the fastest average speed. Write down your predictions on a sheet of regular paper.

c. Draw a four-column table underneath your predictions. You will use this table to record your data. Here is an example:

Height of labeled position (m)	Distance from labeled position to bottom of ramp (m)	Time taken by coaster car from labeled position to bottom of ramp(sec)	Speed of coaster car from labeled position: distance/time (m/sec)

3. Next you should:

- Measure the distance from each of the labeled points to the bottom of the ramp and record this data in the table.
- Release the coaster car from the lowest position and time how long it takes to travel to the bottom of the ramp. Record the time in the table.
- Repeat steps a and b for each of the remaining positions.
- Calculate the speed of the coaster car for each of the positions.

4. Record and analyze your data by:

- Drawing a line graph. The height should be plotted on the x-axis and the speed on the y-axis.
- Describe the shape of the line that is formed. Did you expect the shape of the line or was it a surprise? What does the shape of the line tell you?

c. Predict whether or not you will get the same shaped line if you increase the weight of the coaster car.

5. Repeat the experiment with a heavier coaster car:

a. Use tape to attach a washer, paperclip or other small, flat object to your coaster car.

b. Repeat steps 3b – 4b with the heavier coaster car.

Height of labeled position (m)	Distance from labeled position to bottom of ramp (m)	Time taken by coaster car from labeled position to bottom of ramp(s)	Speed of coaster car from labeled position: distance/time (m/s)

c. Compare the shapes of the two line graphs. What factors impacted the speed of the coaster car?

6. Conclusion: How do mass and height impact the speed of the coaster car?