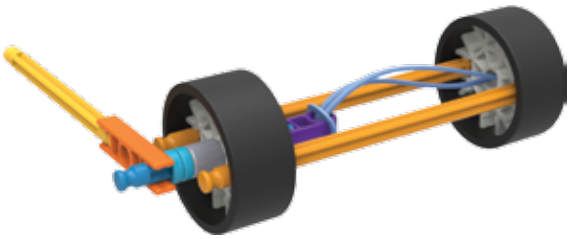
Experiment #2

79320

Rolling with the Rolling Racer



Objectives: Investigate how the elasticity of a rubber band can change with use and alter the potential energy of a device.

Materials You Will Need:

- built **ROLLING RACER** model
- #32 rubber bands
- ramp

PROCESS:

1. Build the **ROLLING RACER** model by following the step-by-step building instructions.

2. Explore your Rolling Racer model. Do you see any differences in the distance that it rolls, depending on how many times you wind the rubber band?

3. Discovering Inertia:

   a. You will find that the device requires a minimum number of twists before it begins moving. The Rolling Racer, like most other objects that move, requires some effort to get started.

   b. This tendency of objects at rest to remain at rest and objects in motion to remain in motion is known as inertia and is Newton's First Law of Motion. The Rolling Racer will remain at rest until the rubber band has stored enough potential energy to overcome the inertia of the Racer.

   c. The amount of inertia of an object is related to its mass. The greater the mass, the more effort is needed to overcome the resting inertia. The same is true of moving inertia – the greater the mass of a moving object, the greater the effort required to stop the object.

4. Use your Rolling Racer model to answer this question:

(a) Does the number of rubber band windings affect the distance the Rolling Racer will travel?

(b) Wind your Rolling Racer five complete turns, place it on the floor and measure how far it travels. Make two more trials and compute the average.

(c) Complete Data Table 1 making sure to skip 15, 30, and 40 windings.

Data Table 1

	Distance Vehicle Travels in Centimeters			
Number of Rubber Band Windings	Trial #1	Trial #2	Trial #3	Average
5				
10				
15 (SKIP)				
20				
25				
30 (SKIP)				
35				
40 (SKIP)				
45				
50				

5. Make up a rule that describes what you found out about the number of rubber band windings and the distance the Rolling Racer traveled.

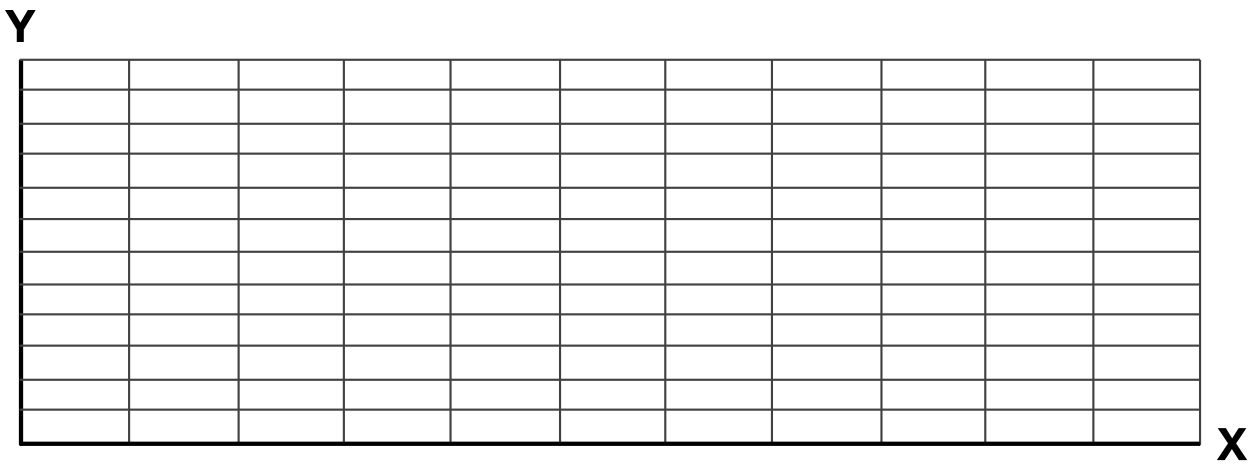
6. On the graph on the next page:

(i) Number the X-axis in increments of 5 (E.G., 0, 5, 10 etc.) and the Y-axis in increments of 1 (E.G., 0, 1, 2, 3 etc.)

(ii) Title the X-axis: Number of Windings and the Y-axis: Distance in Centimeters.

(iii) Transfer your data from Data Table 1 to your graph.

Graph



7. Use your graph to predict the distance you think the Rolling Racer would have traveled if it had been wound up 15, 30, and 40 turns. Record your predictions in Data Table 2.

Data Table 2

	Predicted Distance	Actual Distance
15 turns		
30 turns		
40 turns		

8. Test your predictions and record the actual distances in Data Table 2.