

Experiment #4

79320

Exploring Energy Sources with the Spring Racer

Objectives: Identify the energy sources in different types of devices. Process and interpret data to explain results and make predictions.

Materials You Will Need:

- built **SPRING RACER (either 4 Wheel Spring Racer or 3 Wheel Spring Racer)** model
- measuring tape
- stop watch
- graph paper



PROCESS:

1. What energy sources powered the vehicles that you investigated in the previous experiments?
2. How could the power of each source of energy be increased and what effect would the increase have on the vehicles used?
3. How is the energy transferred from the source to the vehicle?
4. Build the **SPRING RACER (3 wheel or 4 wheel)** model by following the step-by-step building instructions.

5. Explore the Spring Racer that you just built.
 - a. What is the energy source?
 - b. How can the power of the energy source be increased?
 - c. How is the energy transferred to the vehicle?
6. Let's investigate whether increasing the energy in the spring of the racer will increase the distance the racer travels.
7. Come up with a way to count the number of spring windings and partial windings. One suggestion is to use a marker to place a dot on the wheel and then count the number of times that the dot passes the K'NEX connector holding the axle.
8. Using the chart below, measure the distance the racer travels for each spring winding.

DISTANCE TRAVELED BY THE RACER IN CENTIMETERS

Windings of the Spring Motor	Trial #1	Trial #2	Trial #3	Average
1/2				
1				
1 1/2				
2				
2 1/2				
3				

9. Using the data that you gathered in the chart, create your own graph. Remember that the independent variable (in this case, the windings) is placed on the X-axis and the dependent variable (in this case, the distance) is placed on the Y-axis. Include the basic graphing essentials by providing a title for the graph, labeling the axes to match the data table, numbering the axes with a scale, plotting the data, and drawing a line of "best fit".

10. Describe the results of your investigation.

11. Give an example of how you could use your graph to predict the distance your racer will travel for an untested winding distance.

12. Math Challenge

a. Create a formula that can be used to predict the travel distance of the spring racer if the wind-up distance is known. Write your formula down and then test it. Show your results.

b. Conduct an experiment that will enable you to find the spring racer's speed for the shortest and longest wind-up distances (i.e. number of spring motor windings) you tested previously. Show all your work.

$$V=d/t \text{ (} V=\text{speed, } d=\text{distance, } t=\text{time)}$$

	Speed
Shortest Wind-up Distance	
Longest Wind-up Distance	

13. In your own words, explain when your spring racer had the most potential energy. What evidence do you have to support your statement?