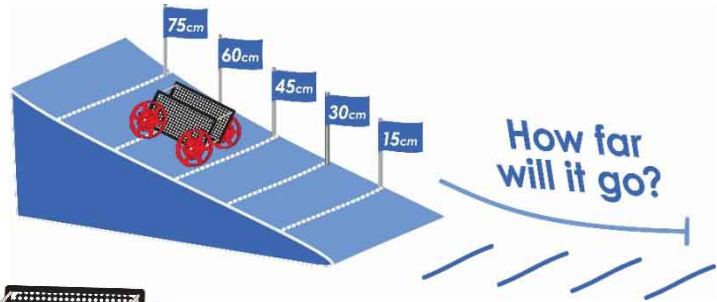


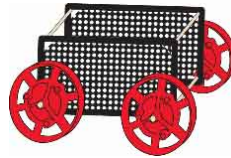
Name: \_\_\_\_\_ Set: \_\_\_\_\_ Date: \_\_\_\_\_

**How does the height that a car starts at on a ramp affect the distance it rolls? Let's find out...**



What will you need to do this lab?

- Racer (Rolling Car)
- Ramp
- Tape measure.



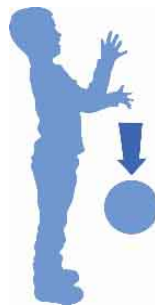
Need help building a ramp?  
Check out the [Ramp Build](http://teachergeek.com/rubberband) at [teachergeek.com/rubberband](http://teachergeek.com/rubberband)

### TYPES OF ENERGY



← This ball has potential energy because of its height. If it is lifted higher, it will have more potential energy.

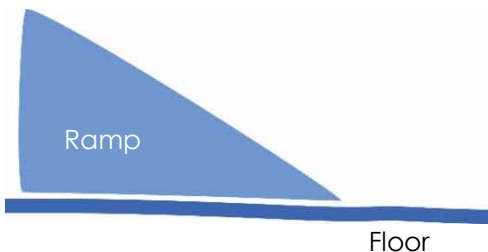
**Potential Energy** is stored energy. It's ready to be released into kinetic energy.

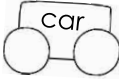



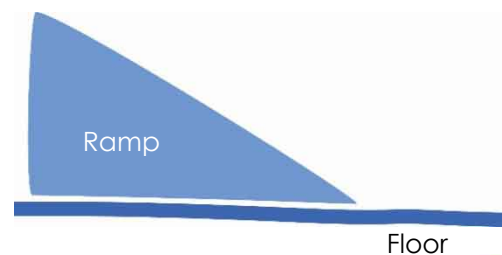
**Kinetic Energy** is the energy of an object's motion. It's doing work.

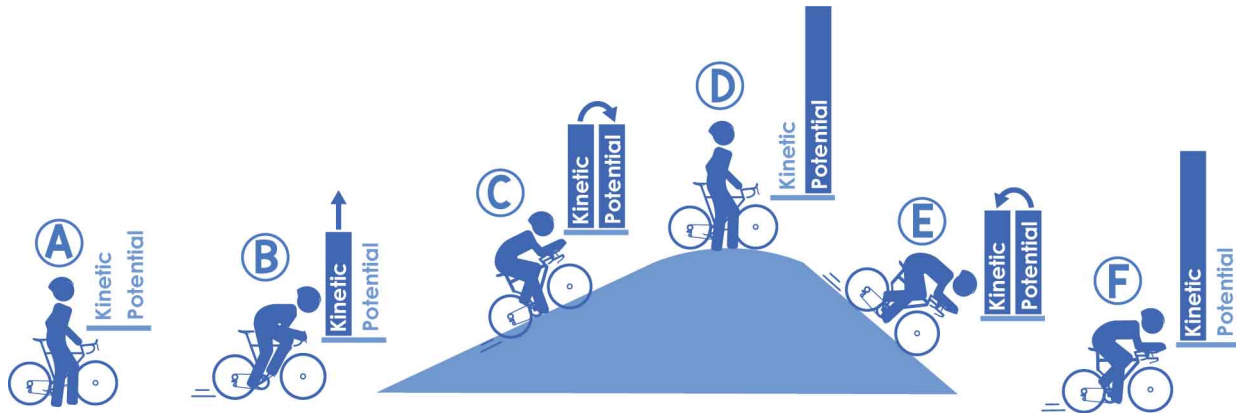
← This ball has kinetic energy as it falls.

**1** Draw a  on the picture below, where it would have the most **potential** energy.



**2** Draw a  on the picture below, where it would have the most **kinetic** energy. Use an  if you need to show that the car is moving.



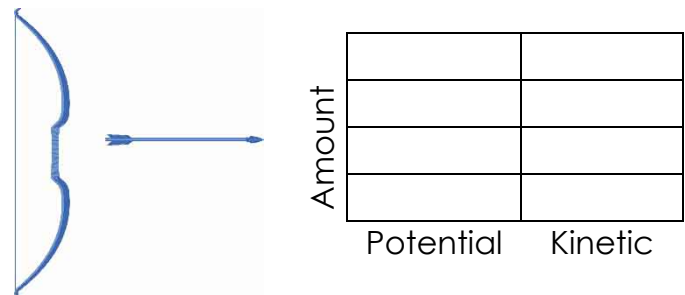
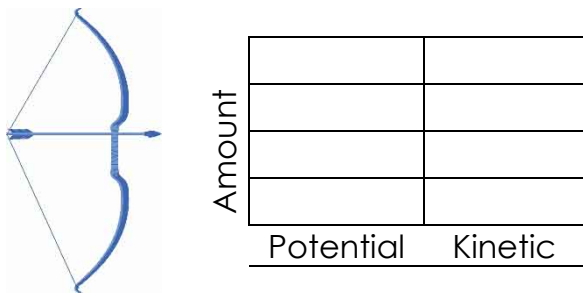


3 Write the letters on the lines below that correspond to the bike on the hill.

- \_\_\_\_\_ **Get Ready to Roll...** The bike now has the most potential energy
- \_\_\_\_\_ **Peddle Hard...** The rider pedals, giving the bike more kinetic energy
- \_\_\_\_\_ **Hold On...** Potential energy has completely changed into kinetic energy
- \_\_\_\_\_ **Get Ready...** There is no potential or kinetic energy
- \_\_\_\_\_ **Faster & Faster...** Potential is being converted into kinetic energy
- \_\_\_\_\_ **Coast Up...** Kinetic energy is changed into potential energy

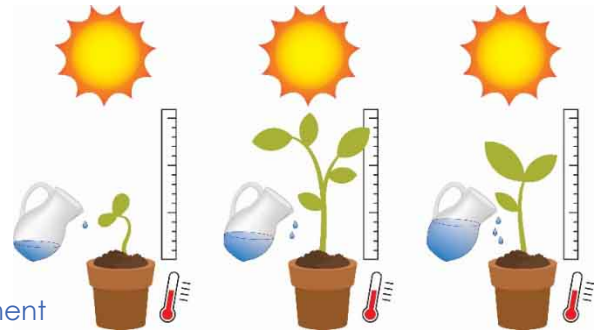
4 Draw a bar graph to show the potential and kinetic energy when the bow is **pulled back**.

5 Draw a bar graph to show the potential and kinetic energy when the arrow **has been shot**.



### VARIABLES

**Variables:** The things that change in an experiment.



Example Experiment

**Independent Variable:** The thing you change in the experiment, to test how it affects the dependent variable.  
*Only have one independent variable in your experiment.*



Example: Amount of water given to the plant

**Dependent Variable:** The variable being tested and measured.  
*Only have one dependent variable in your experiment.*



Example: Height of plant

**Controlled Variables:** The things that should not change in an experiment.



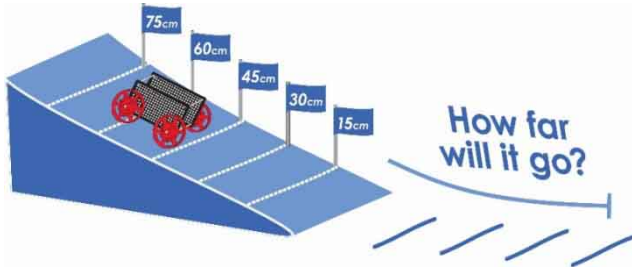
Example: amount of sun, soil, temperature

6 Below are variables that will be part of your ramp roll experiment. Indicate what type they are by placing a letter in the box.

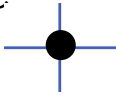
**I** = Independent    **D** = Dependent    **C** = Control

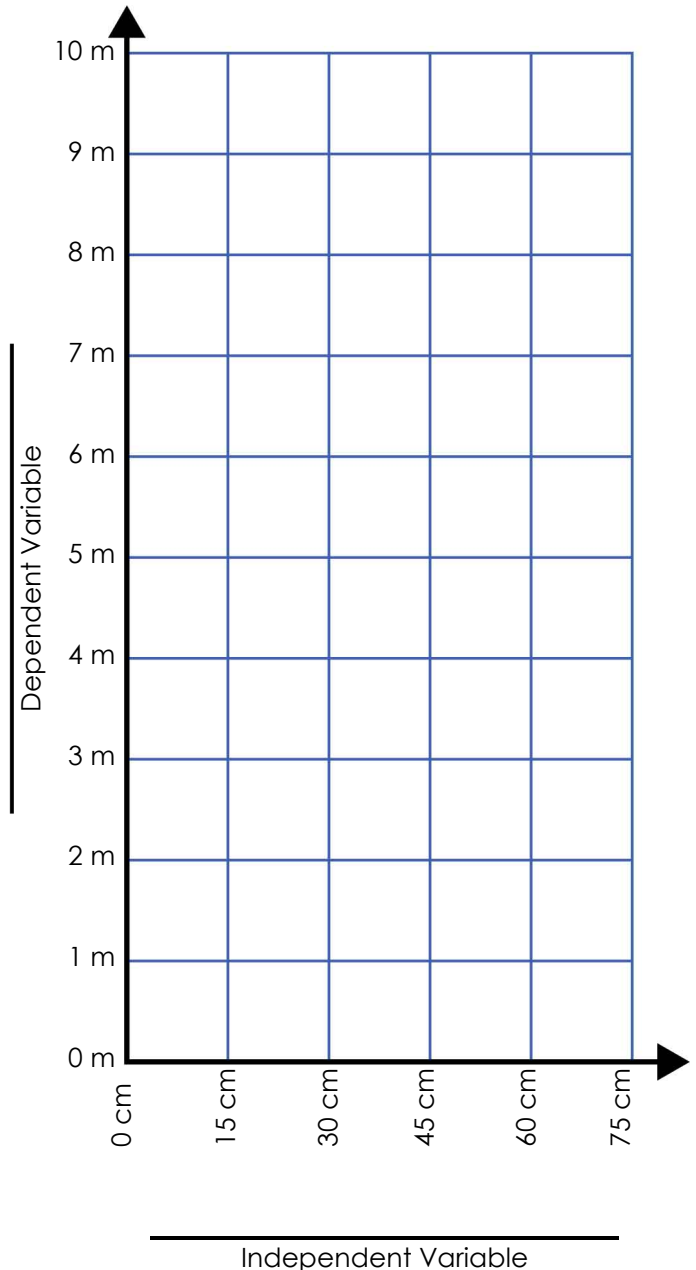
- |  |  |
|--|--|
| <input type="checkbox"/> <b>Height</b> car starts on ramp                  | <input checked="" type="checkbox"/> <b>Angle</b> of the ramp |
| <input type="checkbox"/> <b>Mass</b> (weight) of car                       | <input type="checkbox"/> <b>Distance</b> the car travels     |
| <input type="checkbox"/> <b>Friction</b> from the surface the car rolls on | <input type="checkbox"/> Car <b>Design</b>                   |

### ROLL IT!

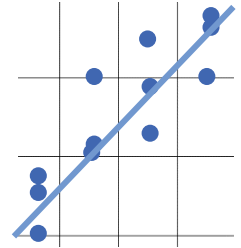


Question: How does the **height** that a car starts at on a ramp affect the distance it rolls?

- 7 **Label** the graph with the **independent** and **dependent** variables for the experiment.
- 8 Test your car at different heights on the ramp.
  - a) Start with the car wheels behind a mark
  - b) Let the car go, without a push
  - c) Measure how far it rolls
  - d) Record the distance traveled on the graph using a dot 
  - e) Test your car at each height, up to 3 times. Put a new dot on the graph for each test. Only use data from good tests (don't use it if car hits a wall or runs over a foot)



9 Create a line of best fit on your graph. This is a straight line that best represents your scattered dots. The line may pass through some of the dots, none of the dots, or all of the dots.



10 Was the car's starting height and the distance it rolled, linear? Linear means: to take the shape of a straight line, or nearly straight line.

11 How did the **height** that your car started at on the ramp affect the **distance** it rolled? Properly use the terms "**potential energy**" and "**kinetic energy**" in your answer.

12 In this experiment you changed "**height**" as the independent variable. What other variables could you change to make your car go farther?

**Bonus:** Why did your racer stop rolling? Where did the energy go?