1. Make a new, empty collection
2. Drag down a slider from the shelf. Label the slider ***Input*** and set the units to ***seconds***.
3. Drag a second slider from the shelf and label it ***Output***. The unit on the slider will be in ***feet***.
4. Double click on the ***Output*** slider to open up the inspector. In the formula box, type the following formula:



1. Press **Play**, or drag the ***Input*** slider. What do you notice as the slider changes values?

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1. Which of the 2 variables (sliders) would you call the independent variable?

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1. Experiment with the sliders, and imagine the flight of a model rocket. What values for the slider ***Input*** make sense? Which do not make sense? Explain your reasoning.

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1. What are the lowest and highest output values produces from the input values in the domain? Do these values make sense for the height of the rocket?

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1. Next you will adjust the values of the slider ***Input*** and ***Output*** to reflect your adjusted values for domain and range.

Double click each slider to open the Inspector, and adjust the *Lower\_* and *Upper\_* values accordingly.

1. Is there a value for ***Input*** that produces two different values for ***Output***? If so, give an example.

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1. Are there two values for ***Input*** that produce the same value for ***Output***? If so, give an example.

At this point, you will be able to visually see which ***Input*** values give the same ***Output*** values by creating a graph.

1. Drag down a case table. Choose ***Collection*** then ***New Cases*** and add one case. Create two attributes, perhaps called *Time* and *Height*. Double-click on the collection’s name and enter a name such as **Rocket\_Heights**.
2. Choose ***Table*** then ***Show formulas*** and click on the formula fields. *For* *Time*, create a formula that is only the name of the slider *Input.* For *Height*, use the simple formula *Output*. Check that the *Height* values match the values on the *Output* slider as you change the *Input* slider in the function machine.
3. Drag a graph from the shelf. Drag the independent variable from the case table onto the horizontal axis.

What did you use for your independent variable? \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Drag the dependent variable onto the vertical axis.

What did you use for your dependent variable? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. As you adjust the *Input* slider, can you always see the plotted point? If not, check the scale of the axes.
2. At what time does the rocket hit the ground? Write your answer in function notation (Ex: *f*(2) if it hits the ground after 2 seconds).
3. With the graph highlighted go to “graph” then “plot function.” Type “40 ft” to plot the function *Height* = *40 ft*.
4. What are the two values for *Time* for which *Height* = 40 ft? Write your answer using function notation.
5. Consider the vocabulary *function*, *independent*, *dependent*, *domain,* and *range*. How do these words relate to each other? How do they relate to this activity? What will you think of to remember their definitions?

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