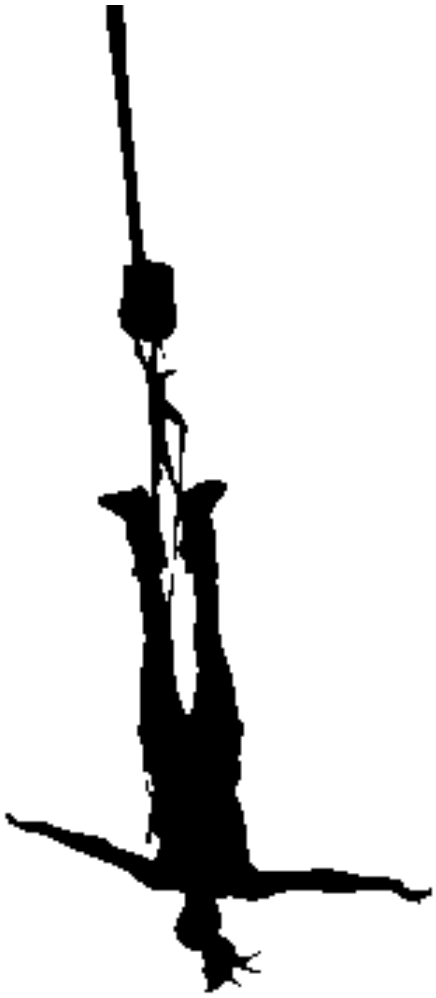
BETTER BUNGEES



1. A rival bungee jumping business, Better Bungees, did their own mathematical research on the safety of bungee cords. They concluded that the rule $L = 100 + 0.5w$ could be used to represent the total stretch of the bungee cord (L, in feet) based on a jumper's weight (w, in pounds).
   - **a.** Have *each* member of your group pick *at least two* different jumper weights and find the total stretch of the bungee cord for each of those jumpers.
   - **b.** Check your results with one another, then use them to complete the table and graph on the Group Report.

2. Use your graph to answer the following questions. Be sure that each member of the group can explain your group's solution.
   - **a.** What will be the total bungee cord stretch for a jumper that weighs 210 lbs?
   - **b.** If the bungee cord stretched to 162 feet, what was the weight of the jumper?
   - **c.** If the jump site has a platform that is 200 feet high, what is a safe range for acceptable jumper weight?
   - **d.** Does a 200 lb jumper fall twice as far as a 100 lb jumper?
   - **e.** (+) Does a 200 lb jumper make the cord stretch twice as much as a 100 lb jumper?
   - **f.** (+) What is a solution to the equation $175 = 100 + 0.5w$?

ACCOUNTABILITY CHECKPOINT
Call your teacher over when you have reached this point.
Your teacher will ask one ***random*** person in your group to explain your reasoning.

3. A third rival bungee business, Best Bungees, also did some of their own research. They found the provided information relating jumper weight to total bungee stretch.
   - **a.** Build a graph for their data.
   - **b.** Does Best Bungees appear to be using a cord that is longer, shorter, or the same length as the cord used by Better Bungees? How do you know?
   - **c.** (+) Build a rule for their data.

Jumper Weight	Total Stretch
50	175
100	200
150	225

ON YOUR OWN

Better Bungees

When given only a table/graph/rule, can I build (and use) the other representations?

1. The table below gives you data from tests of a full-size bungee jump.

Jumper Weight (pounds)	100	125	150	175	200
Stretched Cord Length (feet)	50	55	60	65	70

a. Plot the data to make a graph that shows the relationship between jumper weight (x) and stretched cord length (y).

b. Use the table or the graph to estimate the stretched cord length for a jumper who weighs:

i. 85 pounds
ii. 137 pounds
iii. 236 pounds

c. Describe the overall pattern relating jumper weight and stretched cord length.

d. The safety technicians who did this test concluded that the rule $L = 30 + 0.2w$ could be used to represent this relationship. Does that rule give estimates that match the experimental data sufficiently well? Explain how you decided.

2. The winner of the 100 meter dash in the Olympics is often deemed 'the fastest person in the world.' But just how fast are they running, exactly? The formula $S = \frac{223.2}{t}$ can be used to find a sprinters' speed (S) in miles per hour based on the time, in seconds, it took them to finish the 100m race (t).

a. Over the past 100 years, 100m finishing times have been between 13 seconds and 9 seconds. Make a table that relates finishing time and running speed. Use at least 5 different finishing times in your table.

b. Plot your data to create a graph that shows this relationship.

c. Use your graph to estimate the running speed for the current world record holders in this event:

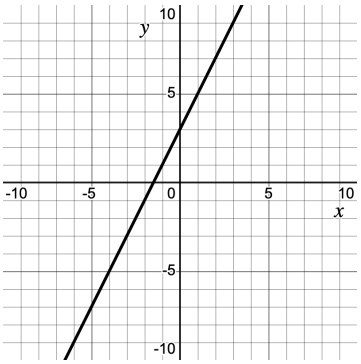
i. Florence Griffith-Joyner ran the 100m in 10.49 seconds (1988)
ii. Usain Bolt ran the 100m in 9.58 seconds (2009)

3. Building tables, graphs, and rules is helpful for reasoning about real-world problems. But, it also is helpful in reasoning about more abstract mathematical relationships. For each problem below, complete the missing representations to complete the 'web' that includes a table, graph, and rule.

a. Create the table and graph for the rule:

$$y = \frac{x^2}{2}$$

b. Create the table and rule for the graph:



c. Create the graph and rule for the table:

x	● y
-3	-9
-2	-4
-1	-1
0	0
1	-1
2	-4
3	-9

4. Below is a table of data from one group who tested jumps that involved changing both the length of the bungee cord **and** the weight of the jumper.

a. Start by looking just at the data from jumpers who 'weighed' 3-washers. What do you think the Total Jump Distance might have been if the bungee cord was only 2-bands long? What if the cord was 1-band long?

b. Create a rule that gives the Total Jump Distance for a 3-washer jumper based on the number of rubber bands in the cord.

c. Now examine the entire table. Try to create a rule that gives Total Jump Distance (**J**) based on both Jumper Weight (**W**) and Bungee Cord Length (**C**).

Jumper Weight (# of washers)	**Cord Length** (# of rubber bands)	**Fall Distance** (in inches)
3	3	25
3	4	35
3	5	45
3	6	55
4	3	35
4	4	45
4	5	55
4	6	65
5	3	45
5	4	55
5	5	65
5	6	75