Activity Worksheet Answer Key

Scatter Plot for Table 1
Questions
1. What type of a correlation does your data represent between the number of rubber bands and displacement (jump distance)?

   Answer: A positive correlation exists because as the number of rubber bands increases, the displacement increases.

2. Why do you think this type of correlation is present?

   Answer: A positive correlation exists because the more rubber bands that were added onto Washy's bungee cord, the longer the cord and thus the farther the jump distance (displacement).

Slope and Equation of a Line
1. Calculate the slope of the line of best fit.
   Recall:

$$\text{Slope} = m = \frac{rise}{run} = \frac{y_2 - y_1}{x_2 - x_1}$$

   Answer: Answers will vary, depending on students' lines of best fit.

2. Determine the equation of the line of best fit using y = mx + b.

   Answer: Answers will vary based on students' lines of best fit.

3. What does the slope represent in this context?

   Answer: The slope is the displacement over the number of rubber bands. There is a constant increase in the displacement as the rubber bands increase.

4. What is the y-intercept for your line of best fit?

   Answer: Answers will vary based on students' lines of best fit.

5. What does the y-intercept represent in this context?

   Answer: The y-intercept represents the initial position when zero rubber bands are in use.

Interpreting Data
1. Based on your data, what was the maximum number of rubber bands that enabled Washy to bungee jump safely? What was the maximum displacement?

   Answer: Answers will vary based on students' data.

2. Compare your result to your hypothesis. What prior knowledge did you have, or not have, that guided, or hindered, your ability to make a good hypothesis?

   Answer: Answers will vary. Some possible example answers: I did not have a good understanding of how tall 130 cm really is. I did not realize how much rubber bands stretch. I expected the rubber bands would stretch more since when I played with them using my hands they seemed very stretchy (hands exert more force than falling Washy).

3. Based on your line of best fit, predict the maximum number of rubber bands that would enable Washy to bungee jump safely from a height of 300 cm. Show your work.

   Answer: Answers will vary based on students' lines of best fit. Expect students to show their work by using 300 cm as the y-value and then calculating the x-value.

4. Are your predictions reliable? As you justify your answer, consider the methods used to collect, record and plot data.

   Answer: Answers will vary. Some possible example answers: Human error when determining the displacement. The line of best fit focuses on data ranging from approximately 0 cm to 130 cm for the displacement and we predicted a relatively much larger value, which can cause error. We did not run numerous trials to find the average for each number of rubber bands.

5. Do you think the type and/or width of the rubber band affects the results? How would it?

   Answer: Answers will vary. Some possible example answers: Thinner rubber bands might break from the weight. Some rubber bands have more elasticity so fewer rubber bands would be needed for the same displacement. Some rubber bands are less elastic so more rubber bands would be needed for the same displacement.

6. Do you think age of the rubber bands affects the results? That is, what would happen if old rubber bands were used?

   Answer: Answers will vary. Some possible example answers: Rubber bands lose elasticity with age and when exposed to extreme temperatures. Due to safety concerns, students would probably choose not to jump from a bridge if the bungee cord was old and brittle!

Scatter Plot for Table 2
Questions
1. What type of a correlation does your data represent between displacement and the absolute value of the spring constant?

   Answer: A negative correlation exists between displacement and the absolute value of the spring constant, that is, as displacement increases, the absolute value of the spring constant decreases.

2. Why do you think this type of correlation is present? (Note: Consider Hooke's law and the fact that the force did not change in the experiment.)

   Answer: Hooke's law is $F = -kx$. In this experiment, the force in remained the same since we used the same weight. Thus, the absolute value of the spring constant and displacement are inversely proportional, that is, as one increases, the other decreases.