Deepening All Students' Understanding with Algebra Experiments

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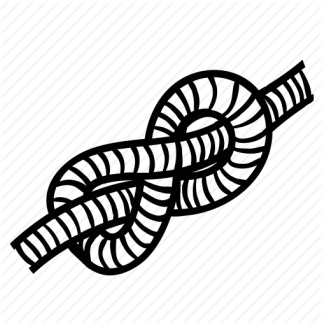

Knot Tying Exploration

What happens to the length of a rope when one or more knots are tied into it? Follow the directions below to explore this question.

Materials:
Two pieces of rope with different diameters about 60 inches long, tape measure or yardstick

Directions:

1. Measure the length of the rope with no knots. Record it in the table.

2. Tie a knot in the rope, measure the length, and record it in the table.

3. Tie a second knot in the rope, measure the length, and record it in the table.

4. Continue tying knots in the rope, measure the length after each new knot, and record the data in the table.

Number of Knots	Length of Rope (inches)

6. Make a graph of your data using the number of knots as the independent variable and the length of the rope as the dependent variable.

7. Find the equation for the line of best fit.

8. Predict the length of the rope if 13 knots were tied.

9. Predict the length of the rope if 15 knots were tied.

10. Predict the number of knots if the length of the rope is 8 inches.

11. Predict the number of knots if the length of the rope is 13 inches.

12. What does the y-intercept represent in this situation?

13. What does the slope represent in this situation?

14. Are there any parts of the graph that have no real-world meaning in this situation? Explain why.

15. Repeat steps 1 – 7 with another rope with a different diameter. Compare your results. Make a conjecture about how different widths of rope affect the representations. Make a conjecture about how different lengths of the rope affect the representations.

Activity adapted from Key Curriculum Press's *Discovering Algebra*

Cereal Investigation

What is the relationship between the diameter of a lid and the amount of cereal needed to cover the inside of the lid? Investigation this question by following the directions below.

Materials: 6 lids of different sizes, cereal, ruler

Directions:

1. Select a lid. Measure its diameter in centimeters. *Make sure the ruler goes through the center of the lid when measuring.*

2. Fill the inside of the lid with a layer of cereal pieces. Count the number of pieces needed.

3. Record this information in the table.

Diameter of Lid (cm)	Number of Pieces of Cereal Needed to Cover the Lid

4. Repeat the steps 1-3 for 5 additional lids.

5. Make a graph of your data. Does the graph appear to be more linear or quadratic? Explain.

6. Find the equation for the curve of best fit.

7. What does the y-intercept represent in this situation?

8. How many pieces of cereal would be needed to cover a lid that measures 20 cm in diameter?

9. How many pieces of cereal would be needed to cover a lid that measures 40 cm in diameter?

10. What happens to the amount of cereal needed when the diameter doubles?

11. If 250 pieces of cereal are needed to cover the inside of a lid, what is the diameter of the lid?

12. Are there any parts of the graph that don't make sense in this situation? Explain.

13. How might the results of this investigation change if a different type of cereal is used?

Basketball Experiment

What happens to a person's shooting success when that person moves away from the basket? Simulate this situation by following the directions below.

Materials:
Paper bag with flat bottom or bucket, 10 pieces of paper, yardstick

Directions:

1. Place basket (paper bag or bucket) on floor.

2. Make 10 pieces of paper into 10 paper balls.

3. Stand 1 yard away from the basket.

4. One by one toss the 10 balls into the basket. Record the number of balls that went into the basket.

Distance from Basket (yards)	Number of Baskets

5. Step back 1 yard and repeat step 4.

6. Continue stepping back, shooting, and collecting data stopping when no baskets are made.

7. Make a graph of your data. Does the graph appear to be more linear, quadratic, or exponential? Explain.

8. Find the equation for the curve of best fit. Explain why your choice of equation makes sense in this situation.

9. What does the y-intercept represent in this situation?

10. What do each of the numbers in your equation represent in this situation?

11. If you stood 5.5 yards away from the basket, approximately how many baskets would you make?

12. If you stood 12 yards away from the basket, approximately how many baskets would you make?

13. If you made 6 baskets, approximately how many yards away from the basket would you be standing?

14. Compare your equation to the equations of others in your group. How are the equations similar? How are the equations different? What do the equations reveal about a person's shooting skills?

15. Are there any parts of the graph that have no real-world meaning in this situation? Explain why.