

Name: _____

Date: _____

B: _____

Investigation 4.8.1: Knot-tying Investigation

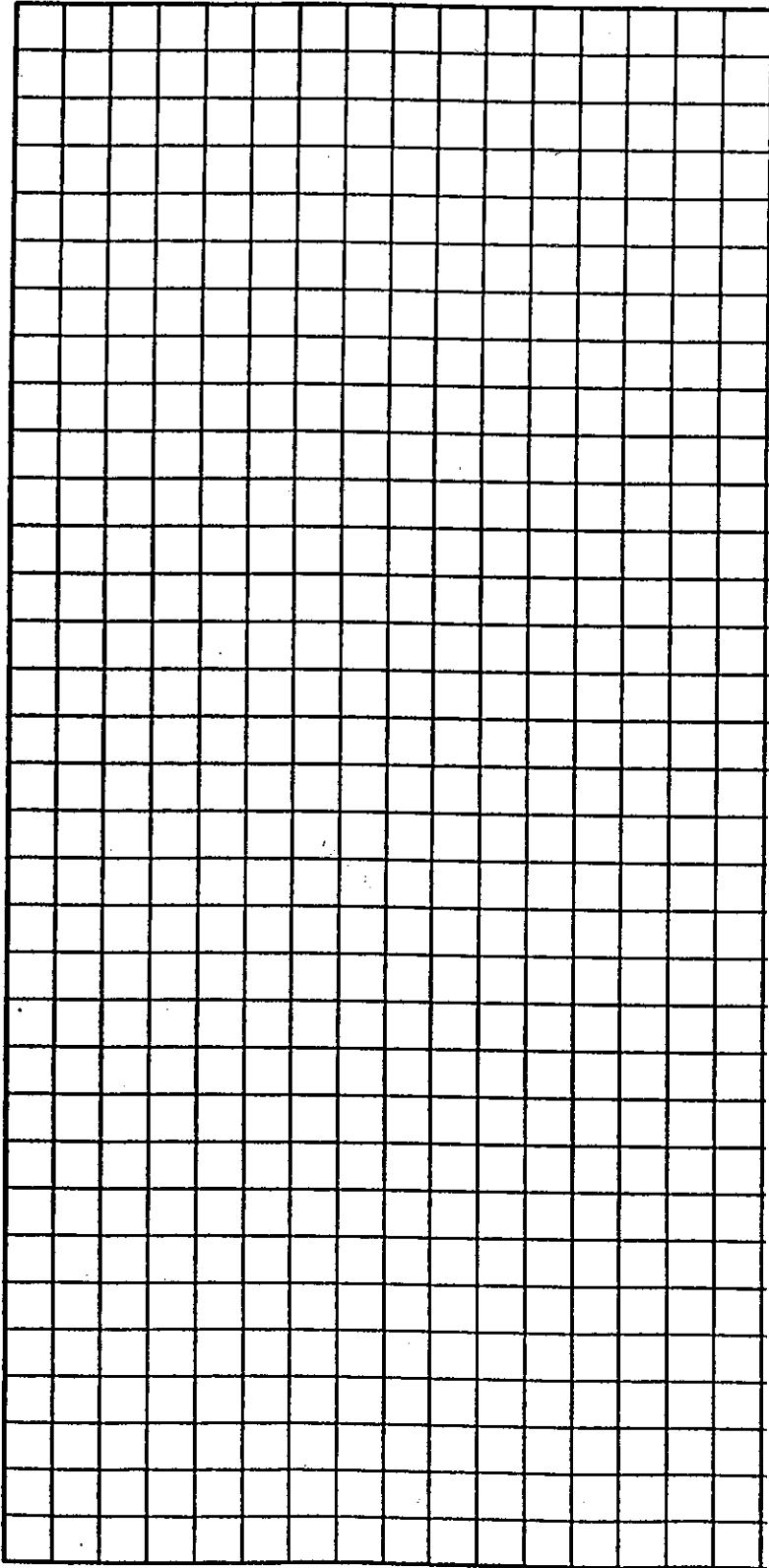
What happens if you do an experiment, gather some data, and then can't find an equation that exactly fits the data? Whenever measuring is involved, you can expect some variation in the pattern. In this investigation you'll explore the relationship between the number of knots in a rope and the length of a rope and write an equation to approximate these data. Before starting the investigation, designate a recorder, a knot maker, and a measurer.



Number of knots	Length of knotted rope (cm)
0	
1	
2	
3	
4	
5	
6	
7	
8	

- 2 a. Complete the table at right by tying knots and remeasuring the length of your rope each time you tie another knot.
- 5 b. Make a scatter plot of (*number of knots*, *length of the knotted rope*).
- 2 c. Determine the approximate rate of change for this set of values. What is the real-world meaning of this rate of change?
- 2 d. What is the *y*-intercept (starting value)? What is the real-world meaning of the *y*-intercept?
- 2 e. Write an equation in the form *length of rope* = *y*-intercept + rate of change · *number of knots* that you think best fits your data. Graph your equation to verify that it's a good fit.
- 3 f. Use your equation to predict the length of a knotted rope with 10 knots. What is the difference between the measured length and the predicted length?
- 2 g. Use your equation to predict the length of a knotted rope with 17 knots. Explain any particular difficulties you might have, if any, with this prediction.
- 1 h. What do you think is the maximum number of knots that you can tie with your rope?
- 2 i. Does the thickness of the rope itself have anything to do with the results? Does the type of knot have anything to do with the results? Explain.
- 2 j. Does your graph cross the *x*-axis? Explain the real-world meaning, if any, of the *x*-value of the intersection point.
-

(b) Label the axes, show your scales



rate of change:

(c) _____
real world: _____

(d) y-intercept = _____
real world: _____

(e) _____

Graph the equation on the scatter plot.

(f) _____
measured length: _____
predicted length: _____

(g) _____

(h) _____

(i) _____

(j) _____
