5.2 Homework - Page 146 All

For Exercises 1–11, use the following information.

The length of a rope was measured and recorded in the table below. Knots were tied in the rope, one at a time. After each knot was added, the length of the rope was measured and recorded. A total of five knots were tied.

Number of Knots	Length of Rope (cm)
0	100
1	92
2	84
3	76
4	68
5	60

1. What is the independent variable in this situation? What is the dependent variable? Explain.
2. Is the independent variable discrete or continuous? Explain.
3. What is the domain for this situation?
4. What is the range for this situation?

5. Create a scatter plot of the length l of the rope versus the number of knots n tied in the rope. Describe your graph.

① IV. # of knots
DV: length of rope
The length of the rope depends on the # of knots making it the dependent var.

or

The # of knots in the rope explains the length of the rope making it the independent var.

② Discrete – doesnt make sense to talk about fractional knots

③ D: {0, 1, 2, 3, 4, 5}

④ R: {60, 68, 76, 84, 92, 100}
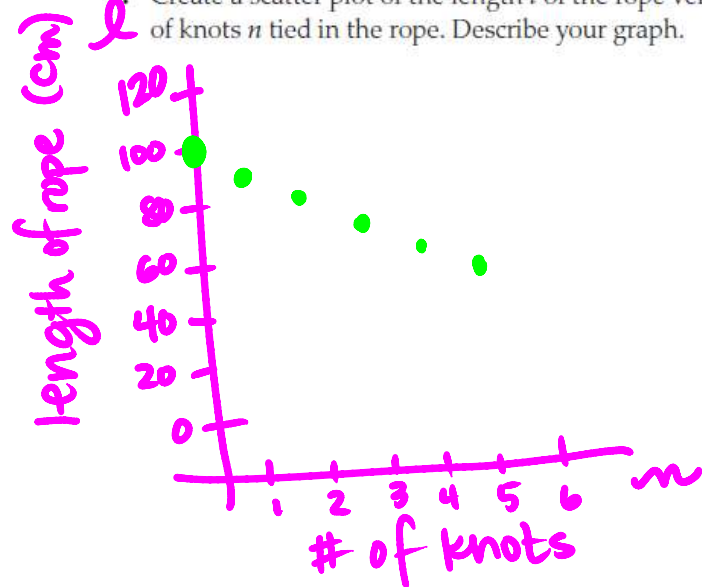
6. Is this a proportional relationship? Explain. $y = kx$ so $k = \frac{y}{x}$

7. Is this relationship a function? How do you know?

8. Do you think this relationship is better described as a "positive relationship" or as a "negative relationship"? Explain.

⑥ Even though this is a *linear* relationship, it is <u>not</u> a proportional relationship, because the ratio of the length of the rope to the # of knots is not constant and the graph does not pass through the origin (0,0).

$\frac{92}{1} \neq \frac{84}{2} \neq \frac{76}{3}$ etc

⑦ Yes. For every input, there is exactly one output

⑧ Negative Relationship — As the independent variable values increase, the dependent variable values decrease.

9. What are the coordinates of the *l*-intercept of your graph? What is the meaning of the *l*-intercept in this situation?

The *l*-intercept is (0, 100) which means the length of the rope is 100 cm when there are 0 knots

10. Find the rate of change for any two pairs of values in your table.

EX: (2, 84)   (3, 76)

$\frac{\Delta l}{\Delta k} = \frac{84-76}{2-3} = \boxed{-8 \text{ cm/knot}}$

11. In symbolic form, this function can be written as $l = -8n + 100$.
   a. Use this equation to predict the length of the rope when 11 knots are tied in it.
   b. Use this equation to predict how many knots will have to be tied in the rope so that its length is 44 cm.

a) $l = -8(11) + 100$
   $l = \boxed{12 \text{ cm}}$

b) $44 = -8n + 100$
   $-56 = -8n$
   $7 = n$ $\boxed{7 \text{ knots}}$