

All Tied Up

Step 1: Measure the length of the thinner rope without any knots. Then tie a knot and measure the length of the rope again. Continue tying knots until you have about 6 knots. Knots should be of the same kind, size, and tightness. Record the data for number of knots and length of rope in a table.

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| Number of Knots | Length of Thinner Rope | Length of Thicker Rope |
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Step 2: Define the variables in this chart. Write an equation in intercept form to model the data you collected in Step 1. What are the slope and y-intercept, and how do they relate to the rope?

Step 3: Repeat Steps 1 and 2 for the thicker rope.

Step 4: Suppose you have a 9-meter-long thin rope and a 10-meter-long thick rope. Write a system of equations that gives the length of each rope depending on the number of knots tied.

Step 5: Notice that both equations have a single variable on one side. Use substitution to eliminate one of the variables by combining the equations. This is called the substitution method.

Step 6: Select an appropriate window setting and graph this system of equations. Estimate coordinates for the point of intersection to check your solution. Compare this solution with the one from Step 5.

Step 7: Explain the real-world meaning of the solution to the system of equations.

Step 8: What happens to the graph of the system if the two ropes have the same thickness? The same length?