Warm Up

Simplify the following expression if

a = –5, b = 2, and c = 3

$$\frac{abc - 2a}{b + c}$$

$$\frac{(-5)(2)(3) - 2(-5)}{2+3}$$

$$\frac{(-5)(2)(3)\boxed{-2}(-5)}{5}$$

negative sign always sticks with the # it is in front of

$$\frac{-30+10}{5}$$

Why are we adding the 10?

$$\frac{-20}{5} = -4$$

$$\frac{abc - 2a}{b + c}$$

We can look at this like we are subtracting two "chunks," then dividing by 5.

$$\frac{\star - \heartsuit}{5}$$

Our two "chunks" are ★ and ♡

$$\frac{-30 - -10}{5}$$

★ =(–5)(2)(3)
= –30

♡ = 2(–5)
= –10

$$\frac{-30+10}{5}$$

Subtracting a negative is the same as adding a positive.

$$\frac{-20}{5} = -4$$

Inv. 1.2 Recap

Class Data

Length (in)	4	6	8	9	11
# of pennies Group 1	82	22	11	4	3
# of pennies Group 2	135	34	12	8	4
# of pennies Group 3	157	20	6	7	7
# of pennies Group 4	65	18	15	7	5
# of pennies Group 5	42	16	9	5	4

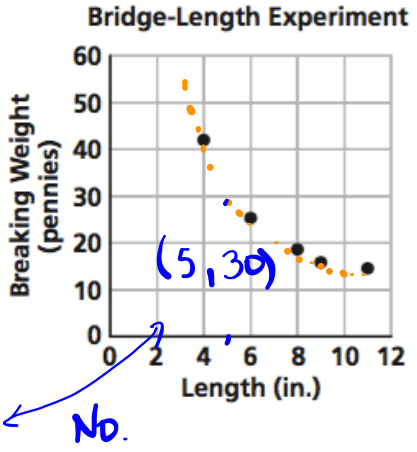
Bridge-Length Experiment

Length (in.)	4	6	8	11
Breaking Weight (pennies)	42	26	19	14

3 5 9 10 12

34

↑ If halfway between



No.

B Describe the relationship between bridge length and breaking weight. How is that relationship shown by patterns in your table and graph?

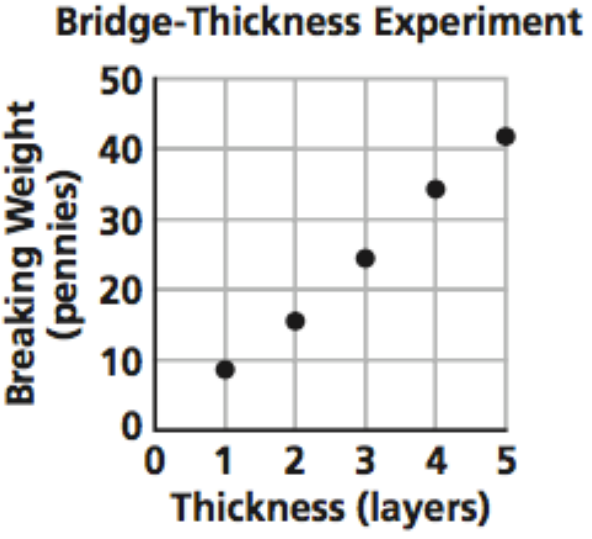
As the length increases the breaking weight ... decreases

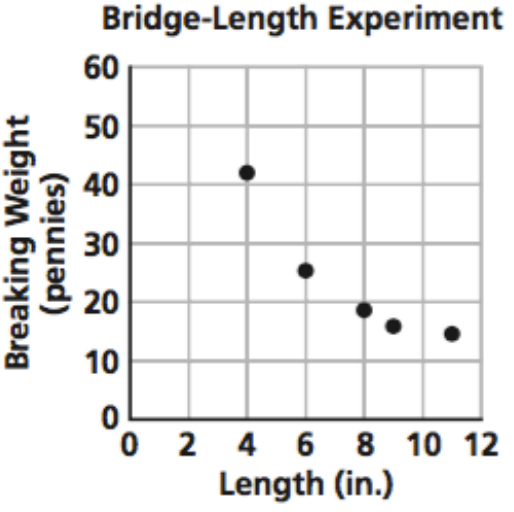
To be more specific: decreasing decreasingly

C Use your data to predict the breaking weights for bridges of lengths 3, 5, 10, and 12 inches. Explain how you made your predictions.

Best to use the graph to make the estimates when the data is not linear.

D Compare your data from this experiment to the data from the experiment on bridges with different numbers of layers. How is the relationship between the number of layers in a bridge and its breaking weight similar to the relationship between bridge length and breaking weight? How is it different?





Increasing linear relationship

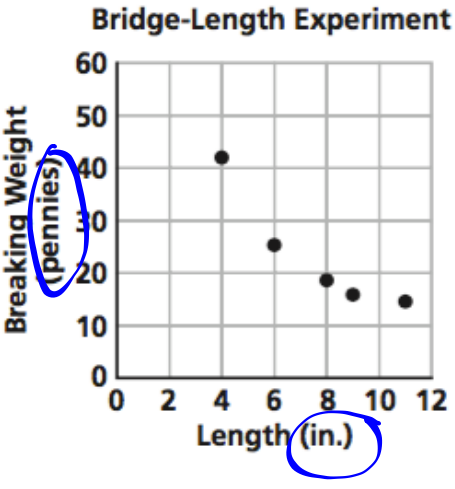
Decreasing nonlinear relationship

Problem 1.2 Wrap Up

Sample data:

Bridge-Length Experiment

Length (in.)	4	6	8	9	11
Breaking Weight (pennies)	42	26	19	16	14



Discrete

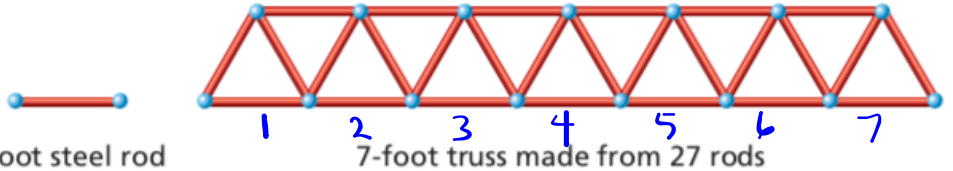
You cannot split pennies.

Discrete or **continuous** has nothing to do with the type of relationship, it has to do with the units,

1.3 Custom Construction Parts

Finding Patterns

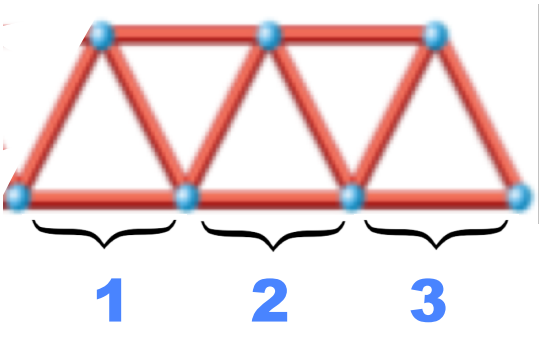
Suppose a company called Custom Steel Products (CSP for short) supplies materials to builders. One common structure that CSP makes is called a *truss*, as shown in the figure below. (You might see a truss holding up the roof of a building.) It is made by fastening together steel rods 1 foot long.



1-foot steel rod

7-foot truss made from 27 rods

This truss has an overall length of 7 feet. The manager at CSP needs to know the number of rods in any length of truss a customer might order.



3 foot truss

Classwork is Problem 1.3 A - B2

Problem 1.3

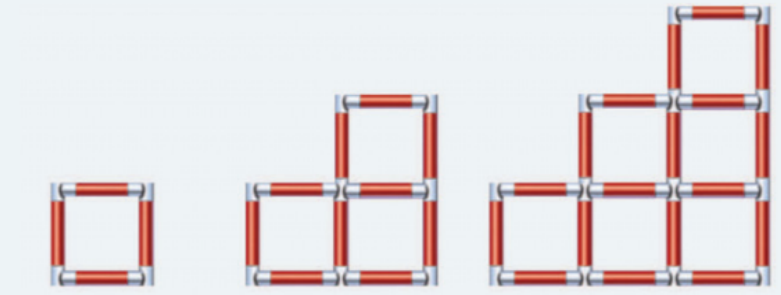
Study the drawing above to see if you can figure out what the manager needs to know. It might help to work out several cases and look for a pattern.

A Copy and complete the table below to show the number of rods in trusses of different overall lengths.

Length of Truss (ft)	2	3	4	5	6	7	8
Number of Rods	7	11	■	■	■	27	■

1. Make a graph of the data in your table.
2. Describe the pattern of change in the number of rods used as the truss length increases.
3. How is the pattern you described shown in the table? How is it shown in the graph?
4. How many steel rods are in a truss 50 feet long overall? Explain how to find this number without drawing the truss.
5. By counting the triangles she could see for any length, Jenna says she figured out a pattern for the number of rods. For overall length 7, she sees 7 triangles and 6 rods connecting these triangles, so she writes $7 \times 3 + 6 = 27$. For length L, she writes $N = 3L + L - 1$. Explain where she gets the $3L$ and the $L - 1$ in her expression.

B Custom Steel Products also makes staircase frames like those shown here.



1 step
made from 4 rods

2 steps
made from 10 rods

3 steps
made from 18 rods

1. Copy and complete the table below to show the number of rods in staircase frames with different numbers of steps.

CSP Staircase Frames

Number of Steps	1	2	3	4	5	6	7	8
Number of Rods	4	10	18	■	■	■	■	■

2. Make a graph of the data in your table.

Homework

Finish classwork.