

## Warm Up

9/5

Simplify the following expression if

$$a = -5, b = 2, \text{ and } c = 3$$

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

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

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

$$\frac{(-10 \cdot 3) + 10}{2 + 3}$$

$$\frac{-30 + 10}{5} = \frac{-20}{5} = -4$$

## Inv. 1.2 Recap

### Class Data

Length (in)	4	6	8	9	11
# of pennies Group 1	129	18	8	6	3
# of pennies Group 2	92	21	5	4	3
# of pennies Group 3	85	25	11	6	5
# of pennies Group 4	155	16	8	6	4
# of pennies Group 5	74	18	7	10	4

Group 6

75 33 20 6 5

What do we notice?

Always the greatest # by a lot

All these values very close

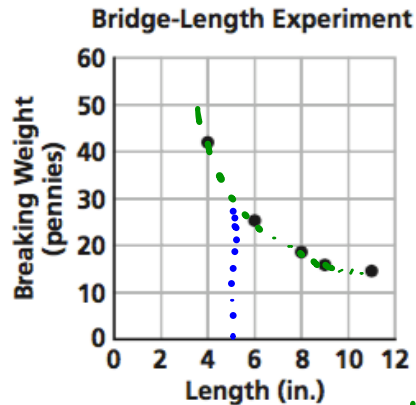
Greatest difference

Smaller difference

- Starts high
- decreases quickly
- levels out

Bridge-Length Experiment

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



- 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... is decreasing by smaller & smaller amounts

- 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.

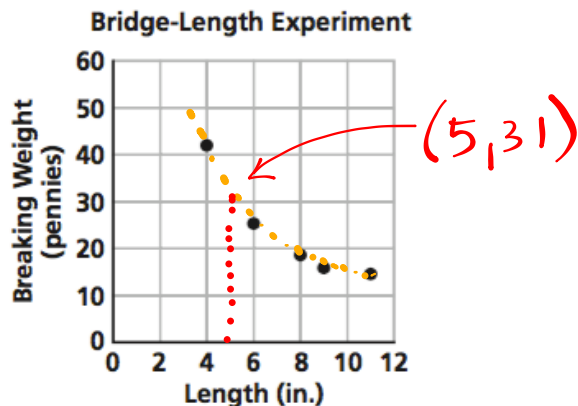
estimate

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

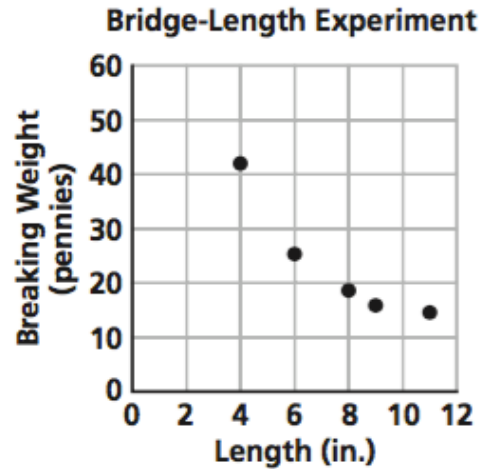
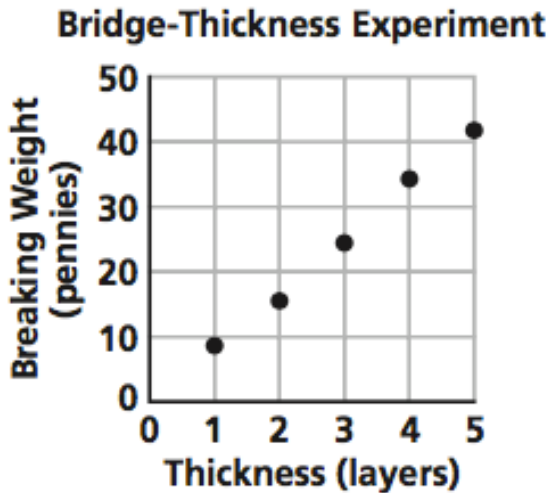
Let's look at 5"

Bridge-Length Experiment

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



**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?



As thickness  $\uparrow$   
breaking weight  $\uparrow$

Increasing  
relationship  
(getting stronger)

Positive relationship

Linear

As length  $\uparrow$   
breaking weight  $\downarrow$

Decreasing  
relationship  
(getting weaker)

Negative relationship

Nonlinear

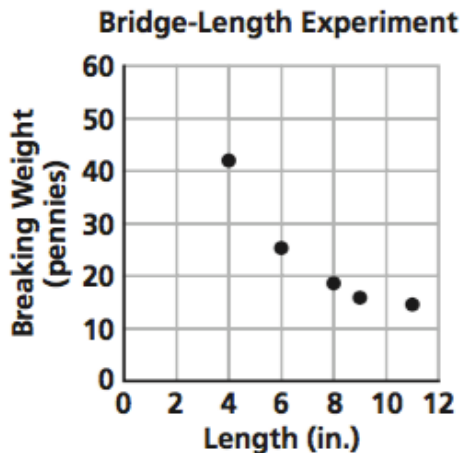
Both discrete data

## 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



You cannot split pennies.

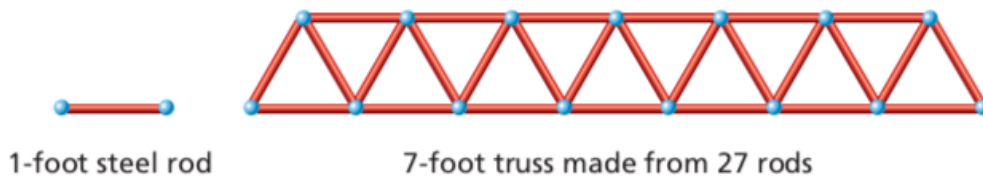
**Discrete** or continuous  
has nothing to do with the  
type of relationship, it has  
to do with the units,



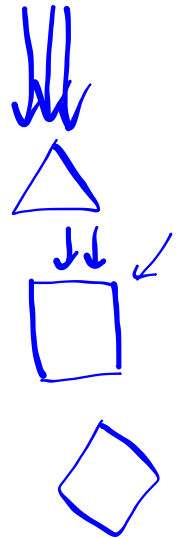
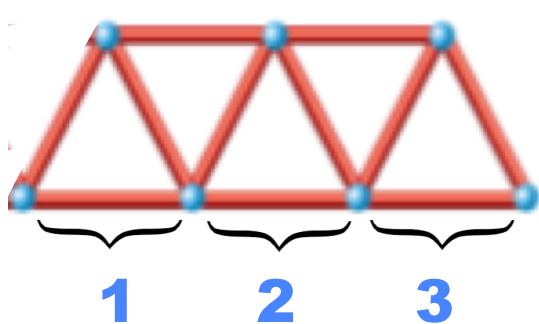
# 1.3 Custom Construction Parts

## 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.



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.

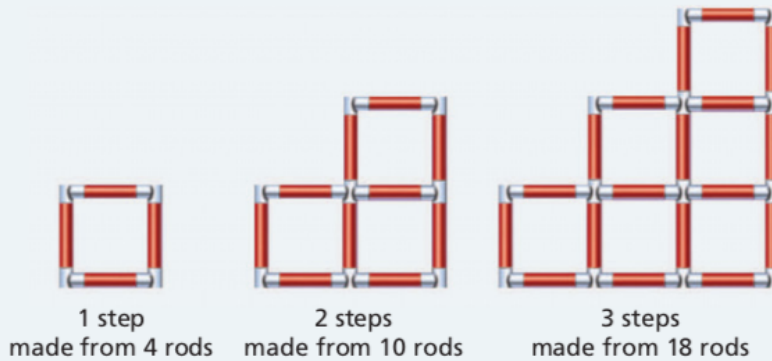
- A** Copy and complete the table below to show the number of rods in trusses of different overall lengths.



Length of Truss (ft)	2	3	4	5	6	7	8
Number of Rods	7	11	15	■	23	27	31

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. 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.