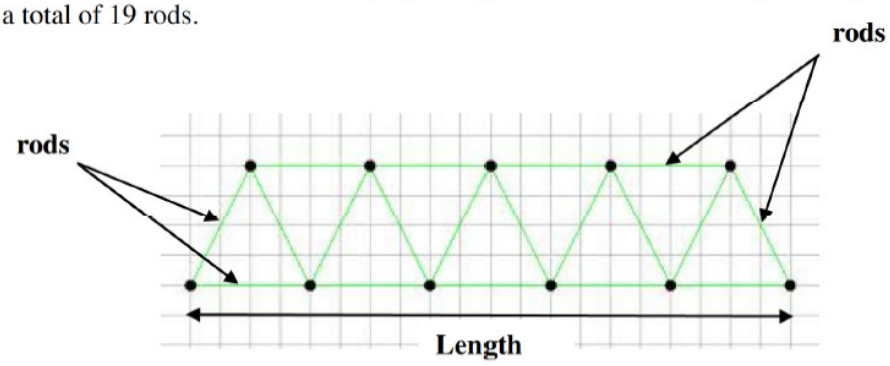
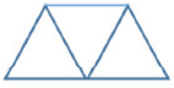
Bridge Construction Activity

Construction work has begun on a large bridge across the Los Angeles River. The bridge is a Truss Bridge whose structure consists of triangular units connected together. Some examples of Truss Bridges are shown below:

The bridge is made up of individual units known as **rods**. The **length** of the bridge is the number of rods along the underside. For example, the figure below shows a bridge of length 5, and made up of a total of 19 rods.



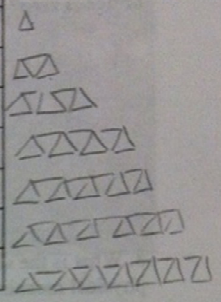
The table below shows the total number of rods required for bridges of different lengths.

	Length	Total Number of Rods Used
	1	3
	2	7

Bridge Construction Activity

1. Complete the table below for the number of rods required for bridges of lengths 1 – 7. You may use the toothpicks and chart paper provided to construct the bridges.

Length of Bridge	Total Number of Rods Used
1	3
2	7
3	11
4	15
5	19
6	23
7	27



2. What do you notice about the relationship between the length of the bridge, and the number of rods required? Explain in words.

for every triangle, you need 3 rods, so you would multiply the length by 3 to get all of the triangles set up. The number of extra rods for support is also 1 less than the length, & that equals the # of rods used

3. Use the information provided in the table to draw a graph. Which quantity (*length*, or *number of rods*) would you choose as the dependent variable, and which as the independent variable? Explain your reasoning. I would say that the length would be the independent variable, & the total number of rods is the dependant variable, as the bridge's length would determine how many rods would be used.

4. From the graph you drew in [3] above, determine an equation that represents the relationship between the length of the bridge and the number of rods required. Show all work.

slope: 4
increasing

$y = 4x - 1$ $y = 4(4) - 1$

$y = 16 - 1 = 15$

$\boxed{y = 4x - 1}$

5. What type of relationship (linear or quadratic) does the equation represent? Explain why.

It's a linear relationship, because the graph isn't a parabola.

6. Using the equation from [4] above, calculate the number of rods required for a bridge of length 75.

$y = 4(75) - 1$

$y = 300 - 1 = 299$

299 rods would be needed

2
15
x 0
300

Bridge Construction Activity

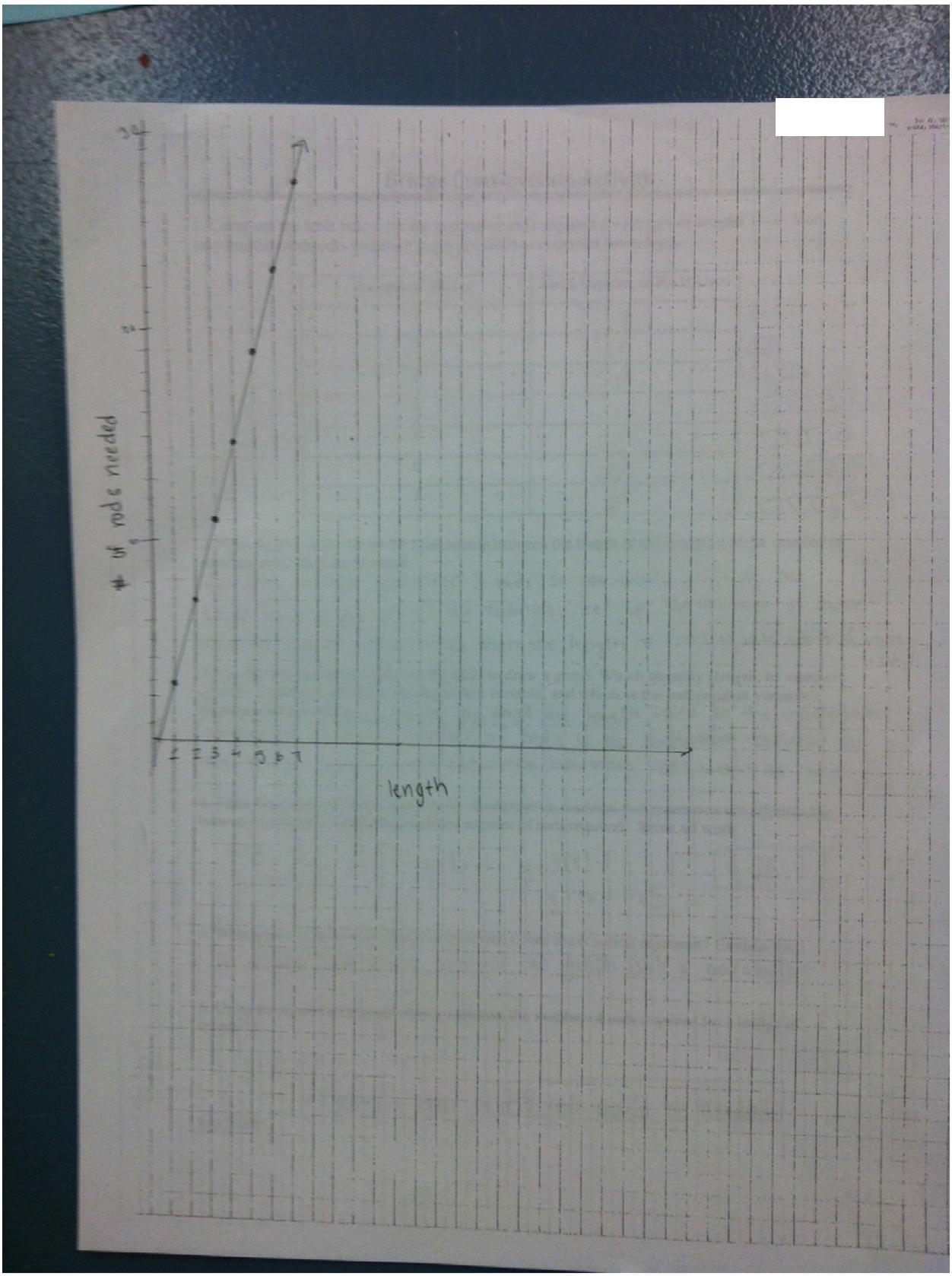
Extended thinking questions:

7. Using either the graph, or the equation, how many rods are required when the length of the bridge is zero? Does this sound reasonable in the context of the problem? Why or why not?

-1 rods would be required if the length is zero, which wouldn't make sense in context because there is no such thing as negative rods, & 0 length means no distance at all.

8. What is the slope, and y-intercept, of the equation you obtained in question [4]? Explain the physical meaning of the slope in the context of the bridge construction activity.

The y-intercept equals the (unreasonable) minimum amount of rods needed for a construction of a Truss Bridge, and represents the number of support rods needed; one less than the length. The slope represents the increasing amount of rods for every length added, and when added to the negative 1, equals your total # of rods.


# of rods needed
length
1 2 3 4 5 6 7