

Name: _____

Date: _____



MORE WORK WITH LINEAR FUNCTIONS N-GEN MATH[®] 8



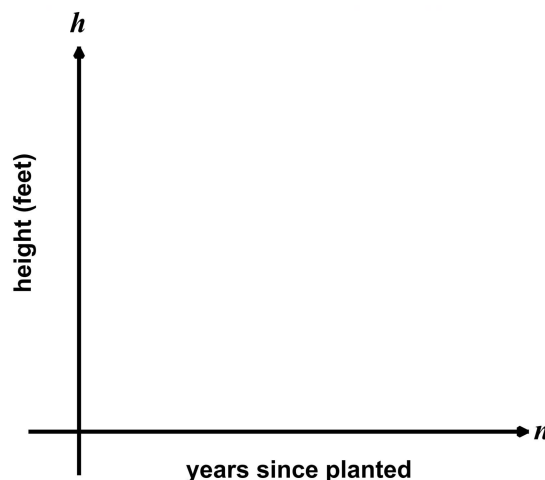
It is important to be able to model situations using **linear functions**. We saw how we could do this if we were told an initial value (the y -intercept) and a rate (the slope). We want to be able to produce these functions given a wide variety of information.

Exercise #1: Jay plants a maple sapling (a young tree) when it is 4.5 feet tall. Three years later he measures its height at 8.25 feet. Jay would like to model the tree's height, h , as a **linear function** of the number of years, n , since he planted it.

(a) Draw a sketch of the function on the axes to the right. Label the information that you already know.

(b) Determine the slope (rate) of this function using the points below:

$$(0, 4.5) \text{ and } (3, 8.25)$$



(c) Give an interpretation of your answer to (b) in the context of this problem.

(d) Write a linear function for h as a function of n .

(e) Does your function predict that the tree will be taller or shorter than 30 feet after 20 years?



Exercise #2: Layla is driving towards Chicago at a constant speed. After driving for 1.5 hours she sees a sign that says she is 342 miles from Chicago. After driving for a total of 4 hours she sees another sign that says she is now only 162 miles from Chicago.

- (a) Write the information given as two (x, y) pairs with the time being the input and the distance from Chicago being the output.
- (b) Find the slope (rate) between the two points in (a). Express using units.
- (c) What is true about Layla's distance from Chicago that makes the slope negative in (b)?
- (d) How far was Layla from Chicago when she started driving? Show how you found your answer.
- (e) Write a linear function for Layla's distance, d , from Chicago as a function of time, t , in hours that she has been driving.
- (f) How far will Layla be from Chicago after driving for 6 hours? Justify using the model from (e).

Context is everything with linear functions. But if we can identify the slope (rate) and y -intercept (initial value) then we can model many situations with them.

Exercise #3: A cell phone company has a texting plan that charges an initial fee plus an additional amount per text sent. They provided the following table to show how prices vary by number of texts sent.

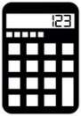
Texts	10	50	100	300
Charge	\$6.55	\$9.75	\$13.75	\$29.75

- (a) What is the charge per text sent?
- (b) What is the initial fee you pay?
- (c) Write a linear function for the charge, c , based on the number of texts, n , sent.



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MORE WORK WITH LINEAR FUNCTIONS N-GEN MATH[®] 8 HOMEWORK

USING YOUR MATH

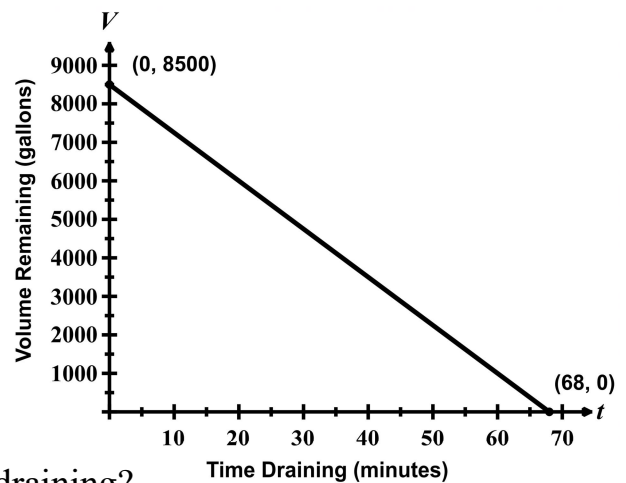
1. Scientists are measuring the thickness of ice on a large lake. When they first measure the ice, it is 3.1 inches thick. Three weeks later the ice was measured to be 5.5 inches thick.

- (a) At what rate is the thickness of the ice growing in inches per week? (b) Write a linear function for the thickness, t , of ice as a function of the number of weeks, w , since they first measured it.

(c) Does your function predict the ice to be less or more than a foot thick 10 weeks after they first measured it? Justify your answer.

2. Water is draining out of a pool. When it started draining, the pool contained 8,500 gallons. After 68 minutes, the pool was empty. The graph below shows the linear relationship between the volume of water still in the pool, V , and the time it has been draining, t .

(a) Using the two points shown on the graph, find the slope of the linear function.



(b) Write a linear function for the graph shown.

(c) How many gallons remain after a half hour of draining?



3. An amusement park charges an entrance fee plus an additional charge per ride that a person goes on. The park would like to model the total amount, a , a person will pay as a function of the number of rides, r , they go on. Amelia went on 7 rides and paid a total of \$49.50. Lucas went on 12 rides and spent a total of \$67.00.
- (a) Write the information given as (x, y) pairs where the input is the number of rides and output is the total amount spent. (b) Find the rate of change between the two points in (a).
- (c) Using appropriate units, explain what your answer in (b) represents in this context. (d) How much was the entrance fee to the park? Show how you found your answer.
- (e) Write a linear function for a as a function of r . (f) If Jessica went on 15 rides, what was the total amount she paid?

4. A bookstore initially has 340 copies of a certain book in stock. They begin to sell the book at a constant rate and keep track of how many books remain in their inventory (how many they can still sell). The table below shows the books they have remaining as a function of the number of days it has been for sale.

Time (days)	0	4	7	12	20
Books Remaining	340	292	256	196	100

Find a linear function for the books remaining, b , as a function of the time, t , in days it has been for sale. Show your work.

