

Quiz 2 Review: Linear Functions

1. Andy wants to make some money over the summer mowing his parent's lawn. His parents said that they would use the rule $A = 2 + 5m$ to determine the amount of money he will earn A based on the number of times he mows the lawn m .

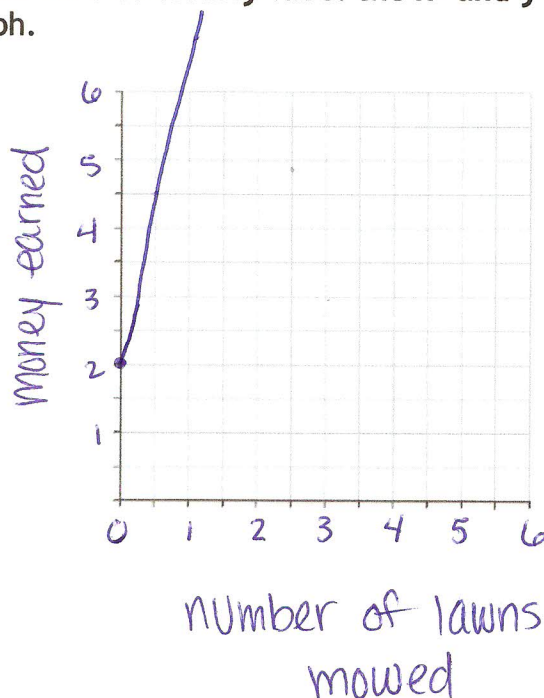
- a. Explain the meaning of the 2 and the 5 in this equation in terms of the amount of money Andy will make mowing lawns.

He automatically earns \$2, and will make another \$5 for every lawn.

- b. What do the coefficient of the variable m and the constant term in the rule $A = 2 + 5m$ tell you about the table of values?

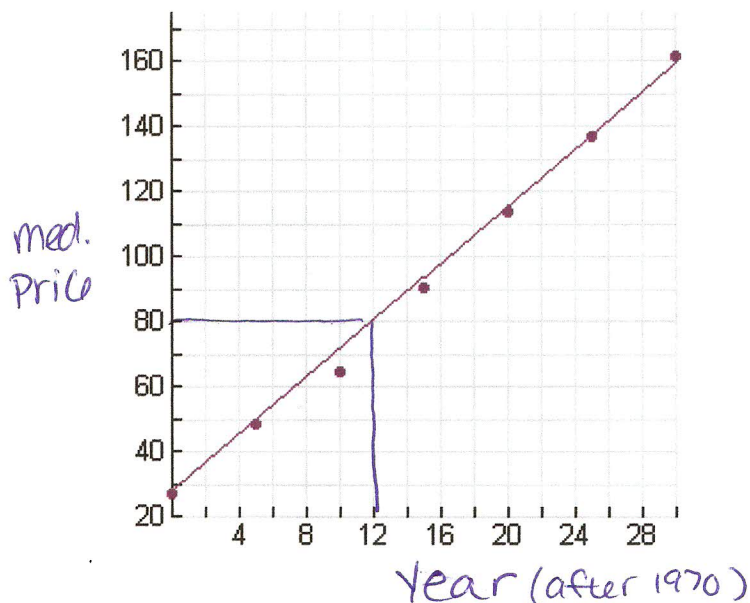
The coefficient, 5, tells you the table has y values increasing by 5 [when x increases by 1]. The constant, 2, means the table will have the pair $(0, 2)$

- c. On the grid below, sketch a graph of the equation $A = 2 + 5m$ without the use of your calculator. **Be sure to clearly label the x - and y -axis.** You must have two points on the graph.



2. The table below gives the median price of a home starting with the year 1970. Below is a scatterplot of the data with a linear model.

Year (since 1970)	Median Price of a House in U.S. (in thousands)
0	27
5	48.7
10	64.6
15	90.4
20	113.5
25	137.2
30	161.5



- a. Using the scatterplot, estimate in what year the median price of a house will be \$80,000. Show your work on the graph.

$$\begin{array}{rcl}
 x=12 & \leadsto & 1970 \\
 & + & 12 \\
 \hline
 & & 1982
 \end{array}$$

In 1982, median house price is \$80,000

- b. The linear model above passes through the points (8, 63) and (24, 133). Find the equation of the linear model. You will need to find both the slope and y-intercept of this line. Show your work below.

$$m = \frac{133 - 63}{24 - 8} = \frac{70}{16} = 4.375$$

$$\begin{aligned}
 y &= mx + b \\
 63 &= 4.375(8) + b \\
 b &= 28
 \end{aligned}$$

$$y = 4.375x + 28$$

- c. Use the linear model (the equation in Part B) to predict the median price of a home in the year 2010. Show your work below.

$$2010 - 1970 = 40$$

$$y = 4.375(40) + 28$$

$$= 203 \quad \leadsto \quad \$203,000$$

In 2010, the median house price is \$203,000

- d. Find the Linear Regression equation for the data in the table. (round to three decimal places).

$$y = \underline{4.496x + 24.407}$$

- e. Identify the slope and the y-intercept of the regression equation. Explain what they *mean in the context of the problem*.

Slope = 4.496

Explanation: Every year, the median house price rises \$ 4.496 thousand [or \$4,496]

y-intercept = 24.407

Explanation:

In 1970 [year "0"], the median house price was 24.407 thousand [or \$24,407]

- f. Use the regression equation to predict the median price of a home in the year 2010.

↳ $2010 - 1970 = 40$

$$\begin{aligned} y &= 4.496(40) + 24.407 \\ &= 204.247 \end{aligned}$$

In 2010, the median house price ~~was~~ is \$204,247.

- g. Which prediction do you think is more likely to be closer to the actual value, the one you found in part (c) or the one you found in part (f)? Explain.

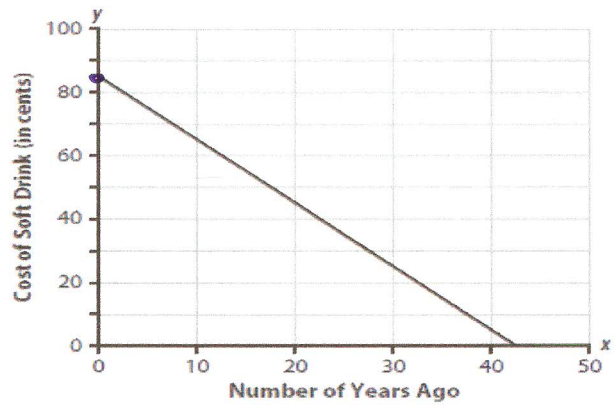
Probably part f since that was the equation for the line of best fit.

4. The graph below displays how the cost of a 12-ounce soft drink changes as year changes.

a. Find the slope of the line.

$$\frac{\Delta y}{\Delta x} \text{ or } \frac{\text{rise}}{\text{run}}$$

$$\frac{-84}{42} = -2 \text{ cents/yr}$$



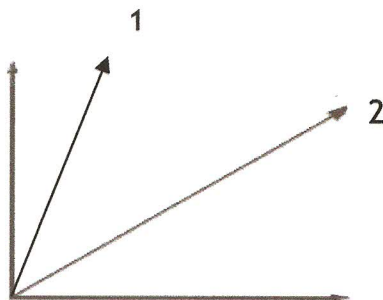
b. Write a Now-Next equation that would model the line. Don't forget a 'starting at' value!

Next = Now - 2 Starting at 84

c. Let x = number of years ago and y = cost of soft drink. Write an equation relating x and y .

$$y = -2x + 84$$

5. Which line has a bigger slope? How do you know?



Line 1 because it is steeper.