

Lesson Summary

- A line can be used to represent the trend in a scatter plot.
- Evaluating the equation of the line for a value of the independent variable determines a value predicted by the line.
- A good line for prediction is one that goes through the middle of the points in a scatter plot and for which the points tend to fall close to the line.

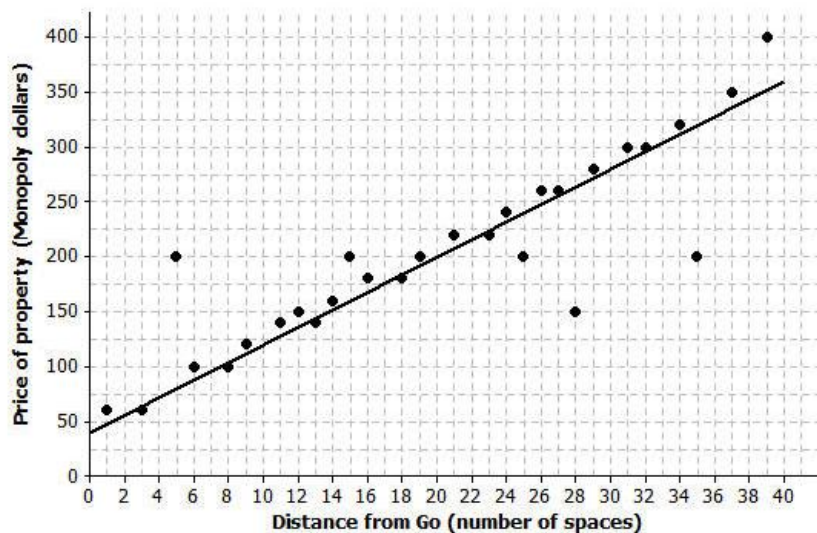
Problem Set

1. The Monopoly board game is popular in many countries. The scatter plot below shows the distance from “Go” to a property (in number of spaces moving from “Go” in a clockwise direction) and the price of the properties on the Monopoly board. The equation of the line is $P = 8x + 40$, where P represents the price (in Monopoly dollars) and x represents the distance (in number of spaces).

| Distance from “Go” (number of spaces) | Price of Property (Monopoly dollars) |
|--|---|
| 1 | 60 |
| 3 | 60 |
| 5 | 200 |
| 6 | 100 |
| 8 | 100 |
| 9 | 120 |
| 11 | 140 |
| 12 | 150 |
| 13 | 140 |
| 14 | 160 |
| 15 | 200 |
| 16 | 180 |
| 18 | 180 |
| 19 | 200 |

| Distance from “Go” (number of spaces) | Price of Property (Monopoly dollars) |
|--|---|
| 21 | 220 |
| 23 | 220 |
| 24 | 240 |
| 25 | 200 |
| 26 | 260 |
| 27 | 260 |
| 28 | 150 |
| 29 | 280 |
| 31 | 300 |
| 32 | 300 |
| 34 | 320 |
| 35 | 200 |
| 37 | 350 |
| 39 | 400 |

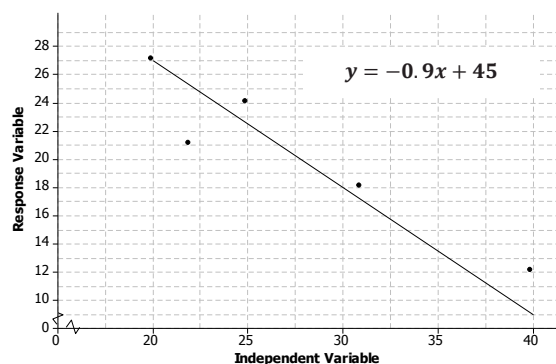
Price of Property Versus Distance from “Go” in Monopoly



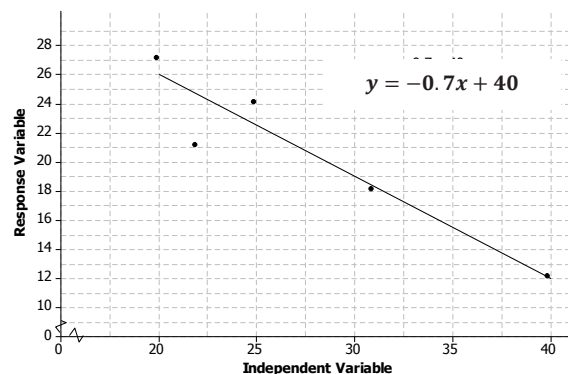
- Use the equation to find the difference (observed value—predicted value) for the most expensive property and for the property that is 35 spaces from “Go.”
 - Five of the points seem to lie in a horizontal line. What do these points have in common? What is the equation of the line containing those five points?
 - Four of the five points described in part (b) are the railroads. If you were fitting a line to predict price with distance from “Go,” would you use those four points? Why or why not?
2. The table below gives the coordinates of the five points shown in the scatter plots that follow. The scatter plots show two different lines.

| Data Point | Independent Variable | Response Variable |
|------------|----------------------|-------------------|
| <i>A</i> | 20 | 27 |
| <i>B</i> | 22 | 21 |
| <i>C</i> | 25 | 24 |
| <i>D</i> | 31 | 18 |
| <i>E</i> | 40 | 12 |

Line 1



Line 2



- a. Find the predicted response values for each of the two lines.

| Independent | Observed Response | Response Predicted by Line 1 | Response Predicted by Line 2 |
|-------------|-------------------|------------------------------|------------------------------|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

- b. For which data points is the prediction based on Line 1 closer to the actual value than the prediction based on Line 2?
- c. Which line (Line 1 or Line 2) would you select as a better fit? Explain.

3. The scatter plots below show different lines that students used to model the relationship between body mass (in pounds) and bite force (in pounds) for crocodilians.
- a. Match each graph to one of the equations below, and explain your reasoning. Let B represent bite force (in pounds) and W represent body mass (in pounds).

Equation 1

$$B = 3.28W + 126$$

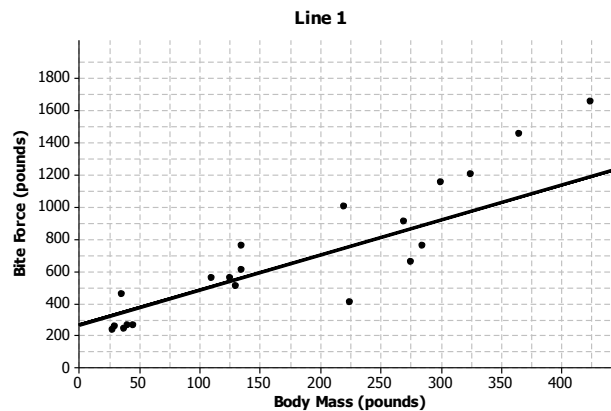
Equation 2

$$B = 3.04W + 351$$

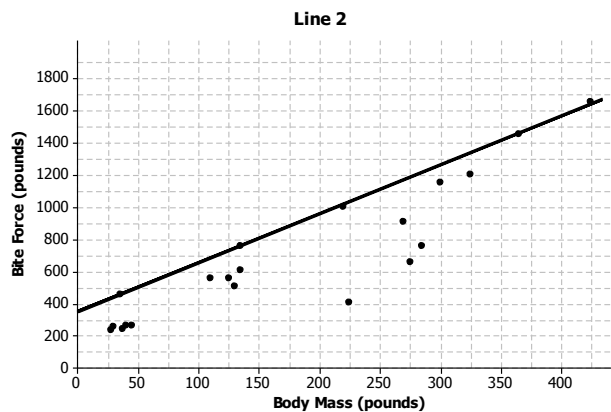
Equation 3

$$B = 2.16W + 267$$

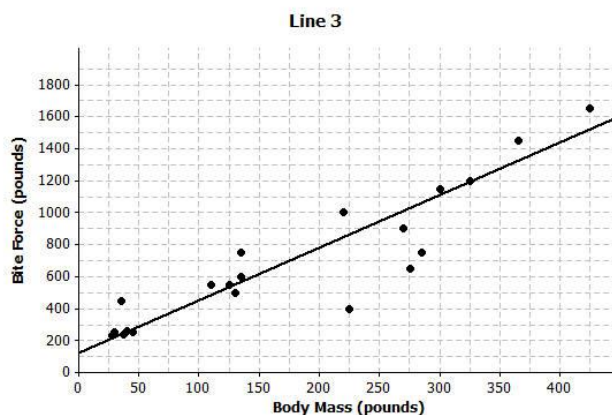
Equation:



Equation:



Equation:



- b. Which of the lines would best fit the trend in the data? Explain your thinking.
4. Comment on the following statements:
- A line modeling a trend in a scatter plot always goes through the origin.
 - If the response variable increases as the independent variable decreases, the slope of a line modeling the trend is negative.