

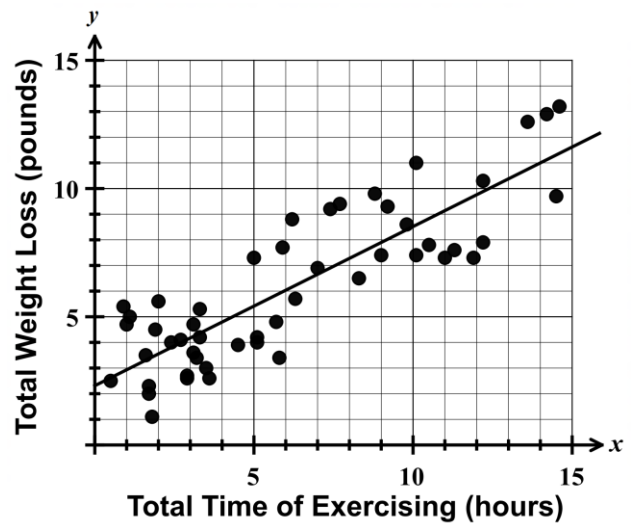


## MORE WORK WITH LINES OF BEST N-GEN MATH<sup>®</sup> 8



In the last lesson we saw how the association between two variables could be displayed on a **scatter plot** and how **lines** and **curves** could be drawn through the data. In this lesson we will look closer at these lines of best fit to see how to **create** and **interpret** their equations.

**Exercise #1:** A company has developed a diet plan that includes exercising. They would like to study the association between the number of hours spent exercising and the weight loss due to the diet. They have 50 test subjects follow the diet and record the number of hours they spend exercising over a three-week period. The scatter plot below shows the results for each of the 50 participants along with the best fit line.



- (a) What does the best fit line **predict** the weight loss of a person who exercises for 14 hours will be?
- (b) Estimate the y-intercept of the best fit line. Give an interpretation of the y-intercept within the context of the problem.
- (c) Circle two points that the best fit line passes through and write their coordinates below. These do not need to be actual data points (and likely aren't).
- (d) Find the slope of the line that passes through the two points in (c). Express your answer as a decimal rounded to the nearest tenth.
- (e) Using proper units, give an interpretation of the answer you found in (d).
- (f) Write the equation of the best fit line in  $y = mx + b$  form.



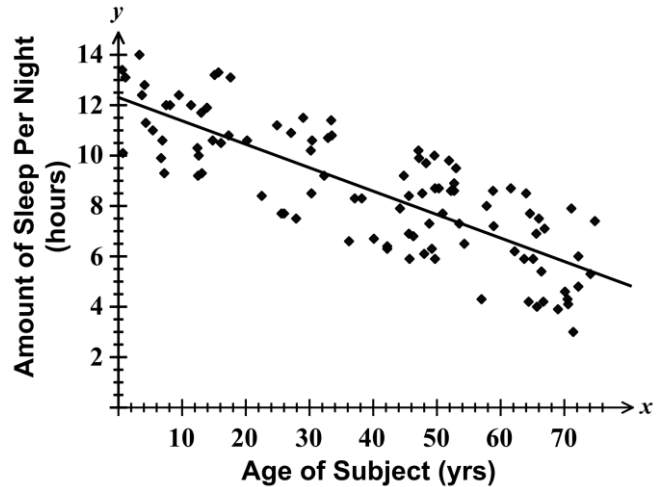
As with **linear functions**, we can interpret the **y-intercept** as the **starting value** of the output and the **slope** as the **unit rate that the output is changing compared to the input**.

**Exercise #2:** Researchers wanted to study the association between a person's age and the number of hours they slept per night. The researchers collected data from 100 subjects, which is shown in the scatter plot below along with the line of best fit.

The researchers found that the line of best fit had the equation:

$$y = -0.08x + 12.25$$

- (a) How many hours of sleep does the model predict a person who is 50 years old will get? Show how you found your answer.

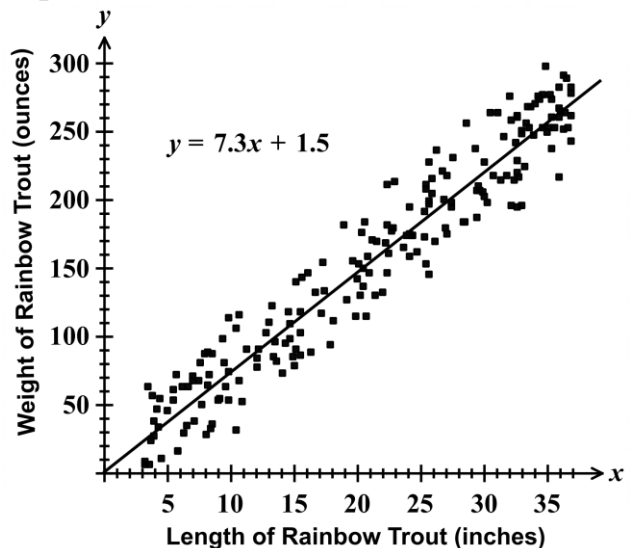


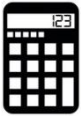
- (b) How do you **interpret** the values  $-0.08$  and  $12.25$  within the context of this problem?

**Exercise #3:** A fishing group wants to see the association between the length of a rainbow trout and its weight. They measure the lengths and weights of 200 trout with the results shown in the scatter plot below along with the line of best fit and its equation.

- (a) If a person catches a rainbow trout that is two feet long, how many ounces should they expect it to be?

- (b) Explain the significance of the  $7.3$  in the model.



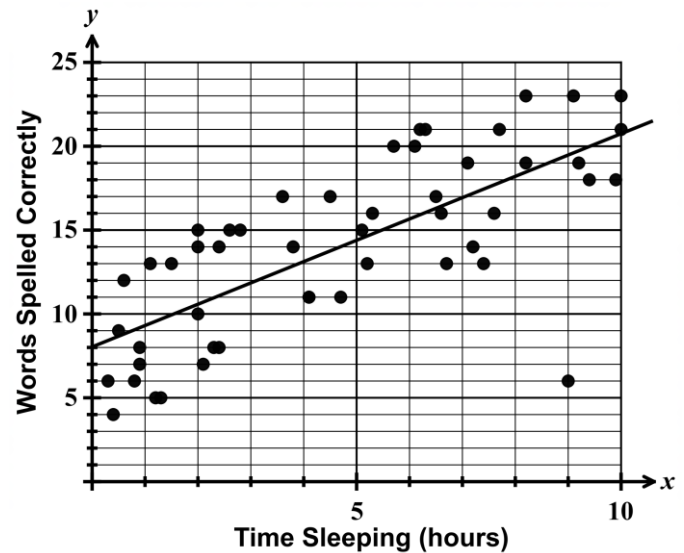


## MORE WORK WITH LINES OF BEST FIT

### N-GEN MATH<sup>®</sup> 8 HOMEWORK

### USING YOUR MATH

1. Researchers are studying the effect of sleep on ability to spell. They have 100 subjects sleep anywhere from 0 to 10 hours and then take a 25-word spelling test. The results are shown below.



(a) What is the  $y$ -intercept of the best fit line?

(b) What does the  $y$ -intercept tell you in the context of this problem?

(c) Circle two points on the line of best fit and state their coordinates below.

(d) Find the slope of the line using the coordinates from (c). Round it to the nearest tenth.

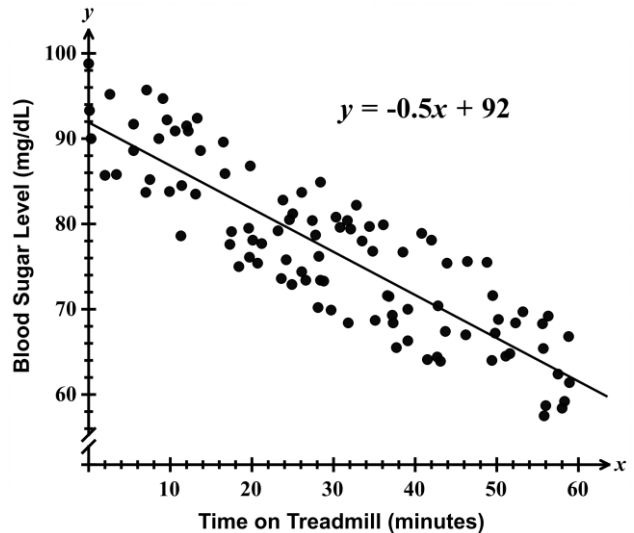
(f) Write the equation of the line of best fit in  $y = mx + b$  form using your slope and  $y$ -intercept.

(e) Give an interpretation of the slope in the context of this problem using proper units.

(g) Use your model to predict the number of words a subject would spell correctly if they got 6 hours of sleep.



2. Doctors wanted to better understand the association between exercise and blood sugar levels. They had 100 participants run on a treadmill for anywhere from 0 to 60 minutes and then had their blood sugar levels checked. The level of sugar in the blood was measured in milligrams of sugar (mg) per deciliter of blood (dL). The results are shown below along with the line of best fit with its equation.



(a) What would the linear model predict the blood sugar level to be of a person who stayed on the treadmill for 30 minutes?

(b) What would be the predicted blood sugar level of someone who doesn't exercise at all?

(c) Explain the meaning of the slope,  $-0.5$ , within the context of this problem.

## REASONING

3. Biologists are studying the growth of a bacteria colony over time. They record its population every two hours for 24 hours. The data is shown below along with the line of best fit.

(a) What does the slope, 53, of the best fit line predict about the rate of population growth?

(b) Why might it be dangerous to use the linear model to predict the population of the bacteria after 24 hours?

