



8.DSP.2 Write and use equations that model linear relationships to make predictions, including interpolation and extrapolation, in real-world situations involving bivariate measurement data. Interpret the slope and y-intercept in context. (E)

Reporting Category: Geometry, Measurement, Data Analysis, Statistics, and Probability

Subdomain: Functions

8.DSP.2 Instructional Framework

Assessed On:

☐ Checkpoint 1

☐ Checkpoint 2

☒ Checkpoint 3

☒ Summative

Content Limits:

- Use of rational numbers is permitted.
- The linear equation must be written in slope-intercept form.
- The line of best fit must be provided on given scatter plots.
- Students are not required to write the equation for the line of best fit for the **assessment** of this standard.

Clarifications:

- Real-world context should be used, but it is not necessary for all items.
- Graphs will be scatter plots.
- The keypad in the ILEARN testing system does not allow students to enter a comma between each period in a multi-digit number. (Example: 13,323 would be entered as 13323.)

Calculator Availability: Allowed

Expected Academic Vocabulary: slope, y-intercept, linear association, interpolation, extrapolation

Examples of Context and Varying Difficulty Levels⁺

Context: Easy

Key values (slope, y-intercept) on a line of best fit are provided.

Context: Medium

Key values are provided in the context of an equation and a graph.

Context: Difficult

Key values may be provided to assist in making predictions.

Proficiency Level Descriptors and Example Items

Looking Back:

This concept is not specifically addressed in the Indiana Academic Standards prior to this grade level.

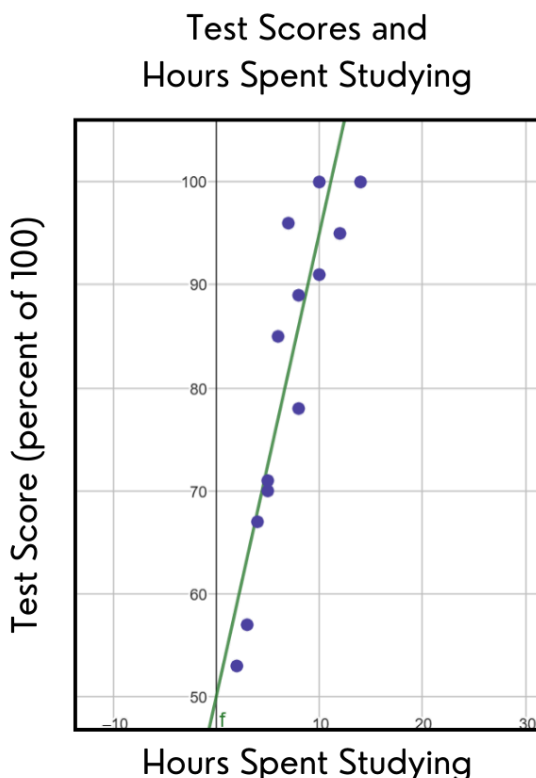
Looking Ahead:

AI.DS.3

Below Proficiency: Interpret the slope and y-intercept of a line of best fit, with slope and/or intercept parameter identified, in terms of the context.



The scatter plot represents the relationship between the test scores a group of students earned, y , in percent out of 100, and the number of hours, x , they spent studying. The line of best fit is given on the scatter plot.



The y-intercept of the line of best fit is $(0, 50)$. What does the 50 represent?

- a. The least number of hours spent studying.
- b. The expected test score with 0 hours studying.**
- c. The number of students in the class.
- d. How many questions a student got correct.

Answer: b

The scatter plot represents the relationship between the test scores a group of students earned, y , in percent out of 100, and the number of hours, x , they spent studying. The line of best fit is given on the scatter plot.

This is a DOK 2 item because students must interpret the meaning of the y-intercept of the line of best fit.

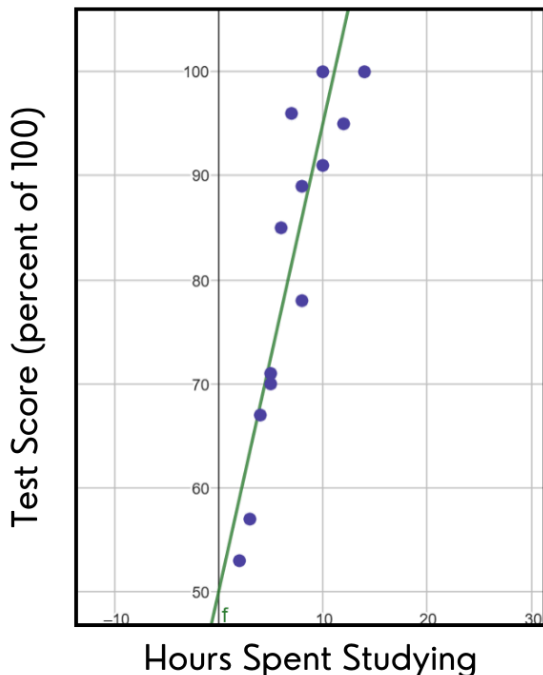
This is an easy item because key values on a line of best fit are given.

This is a DOK 2 item because students must interpret the meaning of the slope of the line of best fit.

This is an easy item because key values on a line of best fit are



Test Scores and
Hours Spent Studying



given.

The slope of the line is $\frac{9}{2}$. What does this value represent?

- The average student's test score increases 2 percentage points for every 9 hours of studying.
- The average student's test score increases 9 percentage points every for every hour of studying
- The average student's test score increases 9 percentage points for every 2 hours of studying.**
- The average student's test score increases 1 percentage point for every 9 hours of studying.

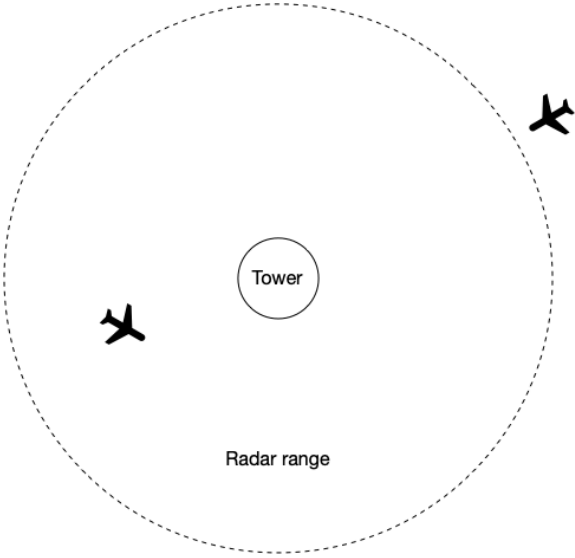
Answer: c.

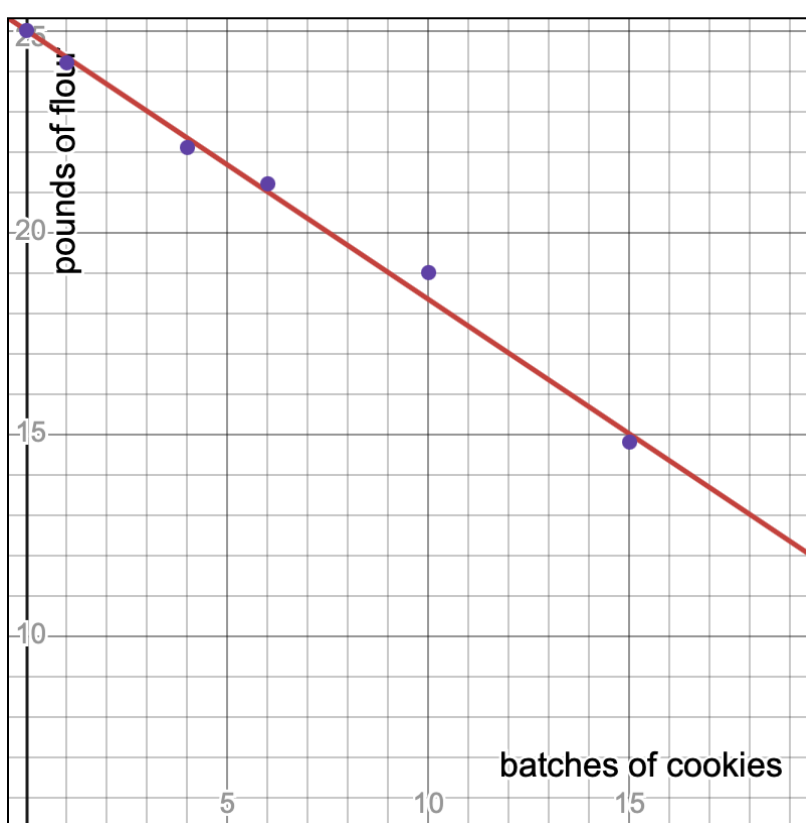
Approaching Proficiency: Interpret the slope and intercept of a modeling equation in terms of the context.

An air-traffic controller records the distance of planes in miles from the tower x minutes after they come onto the radar. The equation given models his data, where y is the distance from the tower.*

This is a DOK 2 item because students must interpret the slope of a modeling equation in context.



 <p>$y = -4x + 50$</p> <p>What does -4 represent?</p> <ol style="list-style-type: none">The average speed of the planes.The number of miles from the radar the plane moves for each minute of travel.The number of miles between the tower and the edge of the radarThe number of miles from the tower when the planes land. <p>Answer: b</p>	<p>This is a medium-difficulty item because students are given the key values in the form of an equation.</p>
<p>A baker tracks the number of pounds of flour used while baking batches of cookies. A scatter plot of the data is given.</p>	<p>This is a DOK 2 item because students must interpret the rate of change modeled by a given equation and graph.</p> <p>This is a medium-difficulty item because students are given the key values in the form of an equation and graph.</p>



The equation of the line of best fit is:

$$y = -2/3x + 25$$

where x represents the number of batches of cookies and y represents the pounds of flour the baker has.

Which statement describes the rate of change modeled by the equation?

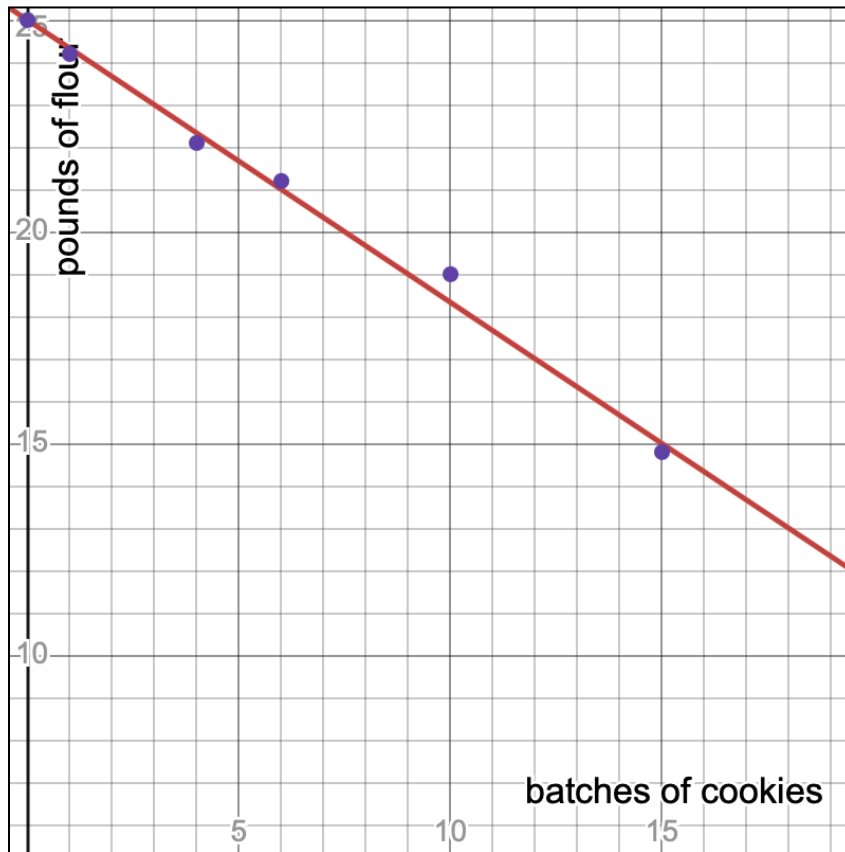
- a. The pounds of flour a baker has decreases by $2/3$ pounds per each batch of cookies made.
- b. The pounds of flour the baker has decreases by a total of $2/3$ pounds.
- c. The pounds of flour the baker has increases by a total of $2/3$ pounds.
- d. The pounds of flour the baker has increases by $2/3$ pounds per each batch of cookies made.

Answer: a

At Proficiency: Solve problems about the slope and intercept of a line of best fit in terms of the context.



A baker tracks the number of pounds of flour used while baking batches of cookies. A scatter plot of the data is given.



Part A: The equation of the line of best fit is:

$$y = -\frac{2}{3}x + 25$$

where x represents the number of batches of cookies and y represents the pounds of flour the baker has.

Which statement describes the rate of change modeled by the equation?

- a. The pounds of flour a baker has decreases by $\frac{2}{3}$ pounds per each batch of cookies made.
- b. The pounds of flour the baker has decreases by a total of $\frac{2}{3}$ pounds.
- c. The pounds of flour the baker has increases by a total of $\frac{2}{3}$ pounds.
- d. The pounds of flour the baker has increases by $\frac{2}{3}$ pounds per each batch of cookies made.

This is a DOK 2 item because students must interpret the rate of change modeled by a given equation and graph and find a solution.

This is a medium-difficulty item because students are given the key values in the form of an equation and graph.



Part B: About how many pounds of flour remain after 12 batches of cookies are made?

lbs.

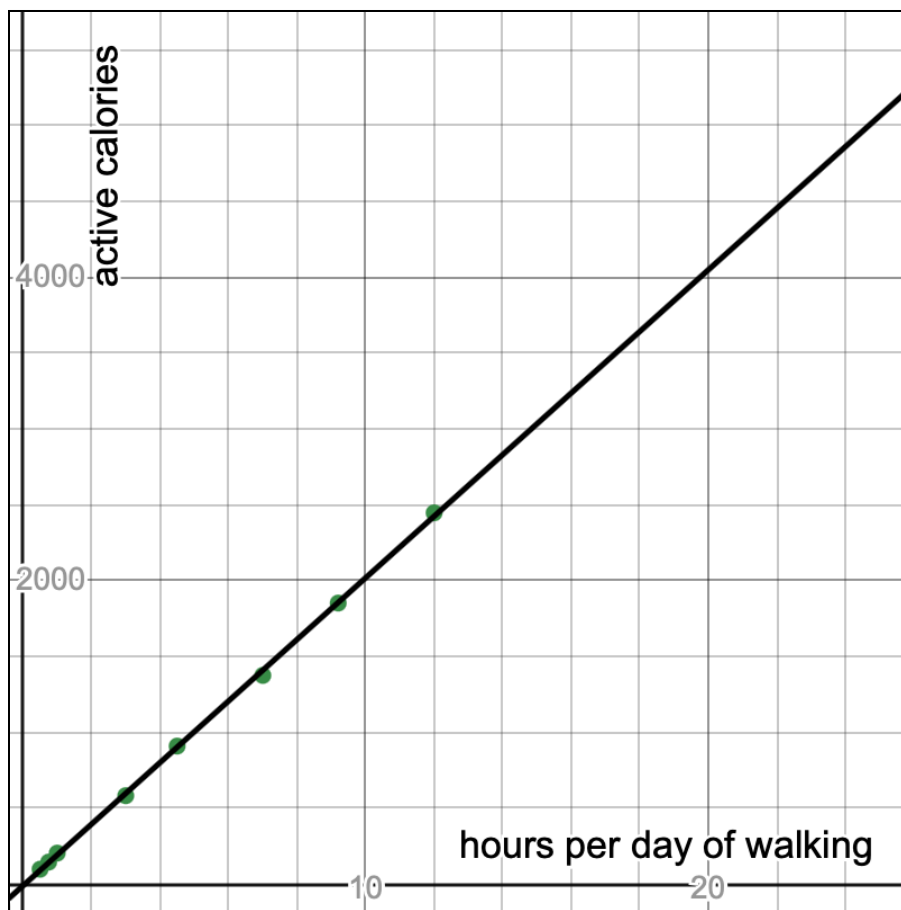
Answers:

Part A: a

Part B: 17

Above Proficiency: Justify the reasonableness of the predictions in the context of the bivariate measurement data.

The scatter plot displays the number of active calories burned through moderate-paced walking in a day. A line of best fit is shown.



The equation of the line of best fit is:

This is a DOK 3 item because students must evaluate data for its usefulness for a given situation and apply data to a specific situation to make a prediction.

This is a medium-difficulty item because students extrapolate reasonable values using a line of best fit.



$$y = 203x - 11$$

Part A: If a person walks for 10 hours, how many calories would they be expected to burn?

Part B: Are there areas of this graph whose values are not useful or reasonable? If so, identify one such point and explain why. If not, explain why not.

Answer:

Part A: 2019

Part B: Students' answers may vary. Students should argue that the number of hours one can walk in a day is most likely less than 16, and certainly would be less than 24. Extrapolating on the graph beyond about 10 may not be reasonable or useful.