

Line Fit Lab

Model data, explain rates, and make predictions.

HIGH SCHOOL • MA.912.DP.2.4

MA.912.DP.2.4 "Fit a linear function to bivariate numerical data that suggests a linear association and interpret the slope and y-intercept of the model. Use the model to solve real-world problems in terms of the context of the data."

NAME _____

DATE _____

BUILD A LINEAR MODEL

When data changes at a steady rate, model it with $y = mx + b$. Find the slope m by dividing the change in y by the change in x , then use a data point to find b . The slope tells the change in y for each 1-unit increase in x , and the y -intercept tells the value of y when $x = 0$.

WORKED EXAMPLE

The data points (4, 9) and (7, 14) suggest a linear relationship. Find a linear model and use it to predict y when $x = 10$.

1. Find the slope: $m = (14 - 9)/(7 - 4) = 5/3$.
2. Use (4, 9): $9 = (5/3)(4) + b$, so $b = 7/3$.
3. Write the model: $y = (5/3)x + 7/3$.
4. Substitute $x = 10$: $y = (5/3)(10) + 7/3 = 19$.

Answer: $y = (5/3)x + 7/3$; when $x = 10$, $y = 19$.

PRACTICE 6 problems

- 1** The table shows a linear relationship. x : 0, 2, 6 y : 8, 12, 20 Write the linear model.

ANSWER _____

- 2** The points (1, 11) and (5, 23) are on a linear trend line. Find the equation of the line.

ANSWER _____

- 3** A phone battery model is $y = -2x + 30$, where y is the battery percent remaining after x minutes using an app. Interpret the slope and y -intercept.

ANSWER _____

- 4** The table shows a linear relationship. x : 0, 3, 6 y : 27, 24, 21 Write a model, then predict y when $x = 12$.

ANSWER _____

- 5** A plant's height is modeled by $y = (1/2)x + 6$, where y is height in centimeters and x is days. Predict the height after 16 days.

ANSWER _____

- 6** A linear trend line for a video game's points remaining has slope -3 and passes through (2, 24). Find the y -intercept and write the equation.

ANSWER _____

APPLY IT Show your work

- 1** A student records a phone's battery percent while streaming a video. The data are shown below. Hours streaming, x : 0, 2, 6 Battery percent, y : 100, 84, 52 Fit a linear model. Use it to predict the battery percent after 5 hours. Then interpret the slope and y -intercept.

WORK SPACE

ANSWER _____

- 2** A student tracks money in a savings account. The data are shown below. Weeks, x : 0, 3, 6 Money saved, y : 18, 30, 42 Fit a linear model. Predict the amount after 8 weeks, and explain what both parameters mean.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A student measures the number of pages left in a book after reading for several hours. Hours, x : 0, 2, 6, 8 Pages left, y : 52, 45, 34, 28 The data are close to linear but not exact. Use the first and last data points to make a linear model. Predict the pages left after 5 hours. Is this prediction interpolation or extrapolation? Explain.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	The table shows a linear relationship. x: 0, 2, 6 y: 8, 12, 20 Write the linear model.	$y = 2x + 8$
2	The points (1, 11) and (5, 23) are on a linear trend line. Find the equation of the line.	$y = 3x + 8$
3	A phone battery model is $y = -2x + 30$, where y is the battery percent remaining after x minutes using an app. Interpret the slope and y-intercept.	The battery decreases by 2 percentage points each minute. The battery is at 30% when x = 0.
4	The table shows a linear relationship. x: 0, 3, 6 y: 27, 24, 21 Write a model, then predict y when x = 12.	$y = -x + 27$; when x = 12, y = 15.
5	A plant's height is modeled by $y = (1/2)x + 6$, where y is height in centimeters and x is days. Predict the height after 16 days.	14 cm
6	A linear trend line for a video game's points remaining has slope -3 and passes through (2, 24). Find the y-intercept and write the equation.	The y-intercept is 30, so $y = -3x + 30$.

PART 2 • APPLY IT

- $y = -8x + 100$. After 5 hours, the predicted battery percent is 60%. The battery decreases by 8 percentage points per hour, and it starts at 100% when streaming begins.** The battery percent changes by -16 over 2 hours and by -32 over 4 hours, so the slope is -8. Since $y = 100$ when $x = 0$, the model is $y = -8x + 100$, and $y = 60$ when $x = 5$.
- $y = 4x + 18$. After 8 weeks, the predicted amount is \$50. The account increases by \$4 each week, and it contained \$18 at week 0.** The savings increase by \$12 every 3 weeks, so the slope is 4 dollars per week. The starting amount is 18, so $y = 4x + 18$ and $y = 50$ when $x = 8$.

CHALLENGE

Using (0, 52) and (8, 28), the slope is $(28 - 52)/(8 - 0) = -3$, so the model is $y = -3x + 52$. After 5 hours, $y = 37$ pages. This is interpolation because 5 is between the measured x-values 0 and 8.

Accept equivalent forms of each linear equation, including point-slope form when it represents the same line. For contextual interpretations, accept equivalent wording that states the correct rate of change and starting value.