LESSON MAKER PRO

Line It Up

Fit a model, explain it, and use it.

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 stay close to a straight line, find the slope with change in y/change in x. Write the model as y = mx + b. The slope is the rate of change, and b is the starting value when x = 0.

WORKED EXAMPLE

Fit a linear model to the points (10, 47), (20, 87), and (30, 127).

1. m = (87 - 47)/(20 - 10) = 40/10 = 4
2. Use y = 4x + b.
3. 47 = 4(10) + b, so b = 7.
4. The model is y = 4x + 7.

Answer: y = 4x + 7

PRACTICE 4 problems

1 Fit a linear model to the points (1, 5), (2, 8), and (3, 11).

ANSWER _____

2 A candle's wax height is modeled by y = -5x + 18, where x is hours and y is centimeters. Interpret the slope and y-intercept.

ANSWER _____

3 The points (1, 8), (2, 11), and (3, 14) show a linear pattern. Write a model and find y when x = 6.

ANSWER _____

4 For the model y = 2x + 1, find x when y = 17.

ANSWER _____

APPLY IT Show your work

1 A student saves money for concert tickets. Use the table to write a model, explain the slope and y-intercept, and predict the savings after 5 weeks.

CONCERT TICKET SAVINGS

Weeks, x	Dollars saved, y
0	11
1	17
2	23
3	29

ANSWER _____

2 A student tracks phone battery percentage while gaming. After 1, 3, and 5 hours, the battery is 49%, 43%, and 37%. Write a model, interpret its slope and y-intercept, and predict the battery after 8 hours.

WORK SPACE

ANSWER _____

CHALLENGE One step up

The points (1, 9), (2, 12), (3, 15), (4, 28), and (5, 21) are mostly linear. Identify the outlier, fit a model to the other points, and predict y when x = 6. Explain why you left out the outlier.

WORK SPACE AND ANSWER

ANSWER KEY

Line It Up

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Fit a linear model to the points (1, 5), (2, 8), and (3, 11).	**y = 3x + 2**
2	A candle's wax height is modeled by y = -5x + 18, where x is hours and y is centimeters. Interpret the slope and y-intercept.	**The wax height decreases 5 cm each hour. The candle starts at 18 cm tall.**
3	The points (1, 8), (2, 11), and (3, 14) show a linear pattern. Write a model and find y when x = 6.	**y = 3x + 5; when x = 6, y = 23.**
4	For the model y = 2x + 1, find x when y = 17.	**x = 8**

PART 2 · APPLY IT

1. **y = 6x + 11. The student saves $6 per week and starts with $11. After 5 weeks, the student has $41.** The savings increase by 6 dollars for each additional week. Use the value at week 0 for the y-intercept.
2. **y = -3x + 52. The battery drops 3 percentage points per hour and starts at 52%. After 8 hours, the battery is 28%.** The battery changes by -6 percentage points over 2 hours, so the slope is -3. Substitute a data point to find the intercept.

CHALLENGE

The outlier is (4, 28). The model is y = 3x + 6, so y = 24 when x = 6. The other four points increase by 3 for each increase of 1 in x, but (4, 28) does not follow that pattern.

Accept equivalent equations in slope-intercept form. For the challenge, accept a clear statement that (4, 28) is far from the pattern formed by the other points.