ALBERT

Name _____ Date _____

Interpreting Linear Models Worksheet

Grade 8 · Common Core 8.SP.A.3

> Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.

Practice

Builds the skill step by step.

1. A linear model for a plant's height is $y = 1.5x + 20$, where y is the height in centimeters and x is the number of weeks. What height does the model predict at 10 weeks?

2. A linear model for a plant's height is $y = 1.5x + 20$, where y is the height in centimeters and x is the number of weeks. What does the slope, 1.5, mean?

   A. The plant is 1.5 times as tall each week.

   B. The plant was 1.5 cm tall at the start.

   C. The plant grows about 1.5 cm each week.

   D. The plant grows for 1.5 weeks.

3. A linear model for a plant's height is $y = 1.5x + 20$, where y is the height in centimeters and x is the number of weeks. What does the model predict for the plant's height at week 0?

4. A model for a phone's battery level is $y = -3x + 90$, where y is the percent of charge and x is hours of use. What battery level does the model predict after 12 hours?

5. A model for a phone's battery level is $y = -3x + 90$, where y is the percent of charge and x is hours of use. What does -3 mean?

   A. The battery starts at 3 percent.

   B. The battery gains 3 percentage points each hour.

   C. The battery lasts 3 hours.

   D. The battery loses about 3 percentage points each hour.

6. A model for a parking garage bill is $y = 0.25x + 4$, where y is the cost in dollars and x is the number of minutes parked. What does it predict for 20 minutes?

7. A model for test scores is $y = 4x + 60$, where y is the score and x is hours of study. What score does the model predict for 5 hours of study?

8. A model for test scores is $y = 4x + 60$, where y is the score and x is hours of study. How many hours of study does the model predict for a score of 88?

9. A model for test scores is $y = 4x + 60$, where y is the score and x is hours of study. What does the y-intercept, 60, mean?

   A. The predicted score for a student who studies 0 hours

   B. The number of points gained for each hour of study

   C. The highest possible score

   D. The number of hours needed to pass

10. A model for students' heights is $y = x + 2$, where x is arm span and y is height, both in centimeters. What height does it predict for an arm span of 150 cm?

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On Level

Grade-level practice.

1. A model for taxi fares is $y = 2.4x + 3$, where y is the fare in dollars and x is the number of miles. Explain what 2.4 and 3 mean in this situation.

2. A model for the gas left in a car's tank is $y = -0.04x + 14$, where y is gallons and x is miles driven. How much gas does it predict after 200 miles?

3. A linear model for a savings account passes through (2, 150) and (6, 270), where x is weeks and y is dollars saved. What is the slope, and what does it mean? Give the slope with its units.

4. A model for home prices is $y = 150x + 20{,}000$, where y is the price in dollars and x is the area in square feet. What does 150 mean?

   A. The price rises by 150 percent for each square foot.

   B. Each additional square foot is associated with about 150 dollars more in price.

   C. Homes have about 150 square feet.

   D. Every home costs 150 dollars.

5. A model for a phone's battery level is $y = -3x + 90$, where y is the percent of charge and x is hours of use. After how many hours does the model predict the battery will reach 0 percent?

6. Plant A follows the model $y = 1.5x + 20$ and plant B follows $y = 2x + 14$, where y is height in cm and x is weeks. After how many weeks do the models predict equal heights?

7. A model for snow depth during a storm is $y = 0.6x + 2$, where y is inches of snow and x is hours. What depth does it predict after 5 hours?

8. A model for shoe size is $y = 0.2x - 6$, where x is a person's height in inches. The data came from people 60 to 75 inches tall. What does the y-intercept, -6, tell you?

   A. A person 0 inches tall wears size -6.

   B. Shoe sizes shrink by 6 each inch.

   C. Everyone's shoe size is 6 less than their height.

   D. Nothing real: no one is 0 inches tall, and that is far outside the data.

9. A model for home prices is $y = 150x + 20{,}000$, where y is dollars and x is square feet. What price does it predict for a 1,500-square-foot home?

10. A model for pages read is $y = 2.5x + 10$, where x is minutes of reading. According to the model, how many more pages are read in 30 minutes than in 20 minutes?

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Challenge

Multi-step and word problems that stretch it.

1. A linear model passes through (10, 55) and (30, 85). Write its equation in the form y = mx + b.

2. In a biology experiment, a linear model for mature plant height (y, in cm) against daily hours of sunlight (x) has a slope of 1.5 cm per hour. Explain what the slope means.

3. The plant model y = 1.5x + 20 was made from data for weeks 0 to 10. It predicts a height of 170 cm at 100 weeks. How reliable is that prediction?

   A. Not reliable, because the slope is positive.

   B. Not reliable, because 100 weeks is far outside the data used to build the model.

   C. Reliable, because 170 is a whole number.

   D. Very reliable, because the model is linear.

4. A model for test scores is y = 4x + 60, where y is the score and x is hours of study. A student who studied 5 hours scored 74. How many points below the model's prediction is that?

5. Ava's savings follow $y = 20x + 50$ and Ben's follow $y = 15x + 90$, where y is dollars and x is weeks. After how many weeks do the models predict equal savings?

6. A model predicts $y = 3.2x + 12$ for the height in inches of a bean plant after x days. After how many days does it predict a height of 28 inches?

7. A town had about 500 residents in year 0 and loses about 25 residents each year. Which linear model fits?

   A. $y = -25x + 500$

   B. $y = 25x + 500$

   C. $y = 500x - 25$

   D. $y = -500x + 25$

8. A model for air temperature is $y = -6.5x + 15$, where y is degrees Celsius and x is altitude in kilometers. What does it predict at 4 km?

9. A model for weekly hours of video games (x) and grade average (y) is $y = -2x + 92$. Does the model show that playing video games causes lower grades? Explain.

10. A linear model for the water left in a cooler passes through (0, 18) and (12, 0), where y is gallons and x is hours. By how much does the water decrease each hour?