LESSON MAKER PRO

Model the Moment

Use linear models to explain change and make predictions.

GRADE 8 · 8.DSP.A.20

8.DSP.A.20 "Use a linear model of a real-world situation to solve problems and make predictions. a. Describe the rate of change and y-intercept in the context of a problem using a linear model of a real-world situation."

NAME _____ **DATE** _____

RATE AND STARTING VALUE

In a linear model y = mx + b, m tells how much y changes each time x increases by one. The value b tells what y is when x is zero. Use the rate and starting value to make predictions that fit the situation.

WORKED EXAMPLE

A video editor charges a $23 setup fee plus $13 per clip. Let x be the number of clips and y be the total cost in dollars. Explain the rate and starting value, then find the cost for 7 clips.

1. The rate is $13 per clip, and the starting value is the $23 setup fee.
2. Write the model: y = 13x + 23.
3. Substitute 7 for x: y = 13(7) + 23 = 114.

Answer: The cost increases by $13 for each clip, and the setup fee is $23. Seven clips cost $114.

PRACTICE 6 problems

1 A skate rental costs y = 5x + 8 dollars for x hours. What do the rate and y-intercept mean?

ANSWER _____

2 A club's total earnings from wristbands are modeled by y = 12x + 6, where x is the number sold and y is dollars. What does the rate mean? Predict the total after 5 wristbands.

ANSWER _____

3 A device's battery level is modeled by y = 80 - 10x, where x is hours of use and y is battery percentage. Describe the rate in context. Predict the battery level after 6 hours.

ANSWER _____

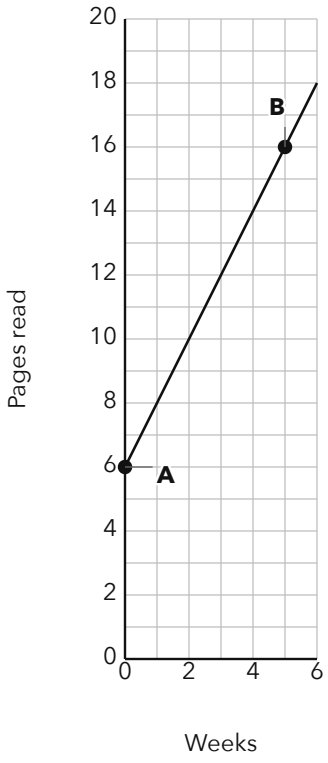
4 The table shows a student's savings after completing chores. Assume the pattern continues at a constant rate. How much is added per chore? Predict the savings after 8 chores.

CHORES AND SAVINGS

Chores	Savings ($)
0	6
1	10
2	14
5	26

ANSWER _____

5 The graph models the total pages a student has read after x weeks. What are the rate of change and y-intercept? Explain both in context.



ANSWER _____

6 The table shows the megabytes (MB) left in a download. Assume the amount changes at a constant rate. How many MB are downloaded each second? How many MB remain after 6 seconds?

DOWNLOAD PROGRESS

Time (seconds)	MB left
0	18
2	14
4	10

ANSWER _____

APPLY IT Show your work

1 A gaming room costs $10 to reserve plus $6 per player. Let x be the number of players and y be the total cost in dollars. Write a linear model, explain its rate and y-intercept, and predict the cost for 8 players.

WORK SPACE

ANSWER _____

2 A phone starts a trip with 96% battery. Each hour of video streaming uses 12 percentage points of battery. Let x be hours streamed and y be battery percentage. Write a linear model, explain its rate and y-intercept, and predict the battery level after 5 hours.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A channel's follower count follows a linear model. It has 120 followers after 2 weeks and 200 followers after 6 weeks. Find the model, explain its rate and y-intercept, and predict when it will reach 300 followers.

WORK SPACE AND ANSWER

ANSWER KEY

Model the Moment

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A skate rental costs y = 5x + 8 dollars for x hours. What do the rate and y-intercept mean?	**The cost increases by $5 per hour. The y-intercept is an $8 starting fee.**
2	A club's total earnings from wristbands are modeled by y = 12x + 6, where x is the number sold and y is dollars. What does the rate mean? Predict the total after 5 wristbands.	**Each wristband adds $12 to the total. After 5 wristbands, the total is $66.**
3	A device's battery level is modeled by y = 80 - 10x, where x is hours of use and y is battery percentage. Describe the rate in context. Predict the battery level after 6 hours.	**The battery level drops by 10 percentage points per hour. After 6 hours, it is 20%.**
4	The table shows a student's savings after completing chores. Assume the pattern continues at a constant rate. How much is added per chore? Predict the savings after 8 chores.	**Savings increase by $4 per chore. After 8 chores, the student has $38.**
5	The graph models the total pages a student has read after x weeks. What are the rate of change and y-intercept? Explain both in context.	**The total increases by 2 pages per week. The student had read 6 pages at the start.**
6	The table shows the megabytes (MB) left in a download. Assume the amount changes at a constant rate. How many MB are downloaded each second? How many MB remain after 6 seconds?	**The download uses 2 MB per second. After 6 seconds, 6 MB remain.**

PART 2 · APPLY IT

1. **y = 6x + 10. The cost increases by $6 per player, and the reservation fee is $10. For 8 players, the cost is $58.** Add the $10 reservation fee to $6 for each player. Substitute 8 for x to get y = 6(8) + 10 = 58.
2. **y = 96 - 12x. The battery level drops by 12 percentage points per hour, and it starts at 96%. After 5 hours, it is 36%.** Subtract 12 percentage points for each hour from the starting level of 96%. Substitute 5 for x to get y = 96 - 12(5) = 36.

CHALLENGE

The rate is (200 - 120)/(6 - 2) = 20 followers per week. The model is y = 20x + 80, so the y-intercept means the channel started with 80 followers. Solving 300 = 20x + 80 gives x = 11 weeks.

Accept equivalent wording for a starting value and a rate in context. For a decreasing quantity, accept a negative rate or a positive amount described as a decrease.