LESSON MAKER PRO

Find the Start

Read how a linear relationship changes and where it begins.

GRADE 8 · 8.AF.E.16.a

8.AF.E.16.a "Interpret the rate of change (slope) and initial value of the linear function from a description of a relationship or from two points in a table or graph."

NAME _____ DATE _____

RATE AND INITIAL VALUE

For a linear relationship, divide the change in output by the change in input to find the rate of change. The initial value is the output when the input is 0. If 0 is not shown, use the rate to work backward.

WORKED EXAMPLE

Use the table to find the rate of change and initial value. What does each mean?

GAME POINTS

Rounds played	Total points
4	29
8	49

1. The number of rounds increases by 8 - 4 = 4.
2. The points increase by 49 - 29 = 20, so the rate is 20/4 = 5 points per round.
3. Work back to 0 rounds: 29 - 5(4) = 9 points.

Answer: The rate of change is 5 points per round. The initial value is 9 points before any rounds are played.

PRACTICE 6 problems

1 Use the table to find the rate of change and initial value. Include units.

PAGES READ

Days	Pages read
0	6
2	12

ANSWER _____

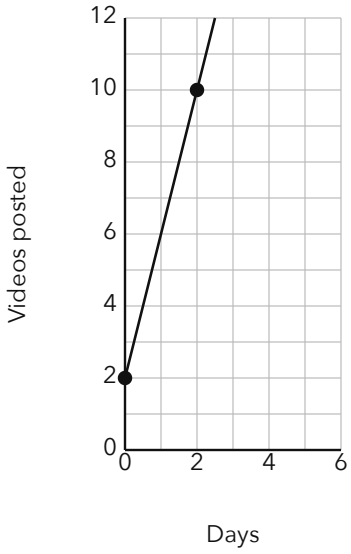
2 Use the table to find the rate of change and initial value. Include units.

STICKERS COLLECTED

Weeks	Stickers
1	13
3	25

ANSWER _____

3 Use the graph to find the rate of change and initial value. Include units.



ANSWER _____

4 A digital art account has 18 followers when tracking begins and gains 3 followers each day. State the rate of change and initial value, including units.

ANSWER _____

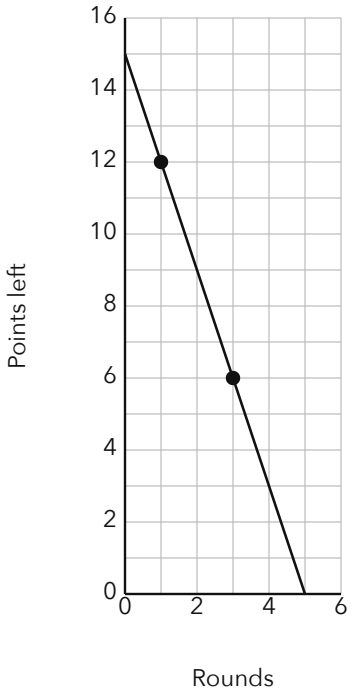
5 Use the table to find the rate of change and initial value. Include units.

TICKETS REMAINING

Hours	Tickets
1	24
3	16

ANSWER _____

6 Use the graph to find the rate of change and initial value. Include units.



ANSWER _____

APPLY IT Show your work

1 A playlist has 54 songs after 2 weeks and 78 songs after 6 weeks. Assume the number of songs grows at a constant rate. How many songs are added each week? How many songs were on the playlist at week 0?

WORK SPACE

ANSWER _____

2 A scooter rental costs $13 for 1 hour and $27 for 3 hours. Assume the total cost changes at a constant rate. What is the cost per hour, and what is the fee before any hours are used?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A game shows 18 points left after 2 rounds and 10 points left after 6 rounds. The points drop at a constant rate. A teammate says the initial value is 18 points because it is the first amount given. Find the rate of change and the initial value. Explain why the teammate is wrong.

WORK SPACE AND ANSWER

ANSWER KEY

Find the Start

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Use the table to find the rate of change and initial value. Include units.	**3 pages per day; 6 pages at day 0**
2	Use the table to find the rate of change and initial value. Include units.	**6 stickers per week; 7 stickers at week 0**
3	Use the graph to find the rate of change and initial value. Include units.	**4 videos per day; 2 videos at day 0**
4	A digital art account has 18 followers when tracking begins and gains 3 followers each day. State the rate of change and initial value, including units.	**3 followers per day; 18 followers when tracking begins**
5	Use the table to find the rate of change and initial value. Include units.	**-4 tickets per hour; 28 tickets at hour 0**
6	Use the graph to find the rate of change and initial value. Include units.	**-3 points per round; 15 points at round 0**

PART 2 · APPLY IT

1. **6 songs per week; 42 songs at week 0** The rate is (78 - 54)/(6 - 2) = 6 songs per week. Work back 2 weeks: 54 - 6(2) = 42 songs.
2. **$7 per hour; $6 initial fee** The hourly rate is ($27 - $13)/(3 - 1) = $7 per hour. Subtract one hour of cost from $13 to get the $6 initial fee.

CHALLENGE

The rate is (10 - 18)/(6 - 2) = -2 points per round. The initial value is 18 - (-2)(2) = 22 points. The 18 points are left after 2 rounds, not at round 0.

Accept equivalent wording that identifies the rate with its input unit and the initial value at input 0. For decreasing amounts, accept either a negative rate or a statement that the amount decreases by that many units.