LESSON MAKER PRO

Start and Change

What does each part of a linear relationship mean?

GRADE 8 · 8.AT.D.10.b

8.AT.D.10.b "Interpret the rate of change and initial value in the context of the problem."

NAME _____ DATE _____

THE BIG IDEA

The rate of change tells you how much an amount changes for each increase of 1 in x. The initial value is the amount when x = 0.

WORKED EXAMPLE

A skating rink charges by the hour. Find and interpret the rate of change and initial value.

SKATING RINK COST

Hours	Cost ($)
2	19
6	31

1. Rate = (31 - 19)/(6 - 2) = 12/4 = 3 dollars per hour.
2. At 2 hours, the hourly charge is 3(2) = 6 dollars.
3. Initial fee = 19 - 6 = 13 dollars.

Answer: The cost rises $3 per hour, and the initial fee is $13.

PRACTICE 4 problems

1 Balance in dollars = 15 + 8x, where x is months since opening a game account. Interpret the rate and initial balance.

ANSWER _____

2 Balance in dollars = 40 - 5x, where x is days since buying a gift card. Interpret the rate and initial balance.

ANSWER _____

3 A plant is 18 cm tall on day 0 and 38 cm tall on day 4. Assume constant growth. Interpret the rate and initial height.

ANSWER _____

4 A battery has 76% charge after 1 hour and 60% after 5 hours. Assume a constant change. Interpret the rate and initial charge.

ANSWER _____

APPLY IT Show your work

1 A streamer has 84 followers on day 1 and 112 on day 5. Assume steady growth. Find and interpret the daily rate and the number of followers on day 0.

WORK SPACE

ANSWER _____

2 An arcade card holds $50 when purchased and $30 after 4 games. Each game costs the same amount. Find and interpret the rate and initial value.

WORK SPACE

ANSWER _____

CHALLENGE One step up

The graph shows points remaining after x missed shots. Find and interpret the rate and initial points. Explain how you found the initial value when x = 0 is not shown.



WORK SPACE AND ANSWER

ANSWER KEY

Start and Change

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Balance in dollars = 15 + 8x, where x is months since opening a game account. Interpret the rate and initial balance.	**The balance increases by $8 per month. It started at $15.**
2	Balance in dollars = 40 - 5x, where x is days since buying a gift card. Interpret the rate and initial balance.	**The balance decreases by $5 per day. It started at $40.**
3	A plant is 18 cm tall on day 0 and 38 cm tall on day 4. Assume constant growth. Interpret the rate and initial height.	**The plant grows 5 cm per day. Its initial height is 18 cm.**
4	A battery has 76% charge after 1 hour and 60% after 5 hours. Assume a constant change. Interpret the rate and initial charge.	**The charge drops by 4 percentage points per hour. Its initial charge was 80%.**

PART 2 · APPLY IT

1. **The streamer gains 7 followers per day and had 77 followers on day 0.** (112 - 84)/(5 - 1) = 7 followers per day. On day 0, the streamer had 84 - 7 = 77 followers.
2. **The balance decreases by $5 per game. The card started with $50.** (30 - 50)/4 = -5 dollars per game. The initial value is the $50 balance at purchase.

CHALLENGE

The score drops 1 point per missed shot, and it started at 18 points. From (4, 14), add back 4 points for the 4 missed shots to find the score at x = 0.

Accept a negative rate or words that describe the decrease. For the challenge, accept any valid calculation that extends the constant rate back to x = 0.