

Line Launch

Find the rate, starting value, and rule.

GRADE 8 • NY-8.F.4

NY-8.F.4 "Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values..."

NAME _____

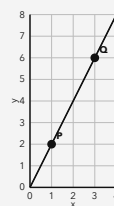
DATE _____

BUILD A LINEAR RULE

The rate of change is $m = \text{change in } y / \text{change in } x$. The initial value is b , the y -value when $x = 0$. Write a linear rule as $y = mx + b$.

WORKED EXAMPLE

Use the graph. Find the rate of change and initial value. Write a rule.



1. From P to Q, y rises 4 while x rises 2.
2. $m = 4/2 = 2$.
3. The line crosses the y -axis at 0, so $y = 2x$.

Answer: Rate: 2. Initial value: 0. Rule: $y = 2x$.

PRACTICE 4 problems

- 1** A line passes through (4, 9) and (6, 13). Find the rate and initial value. Write the rule.

ANSWER _____

- 2** A game card starts with 8 credits. It gains 4 credits each hour. Let x be hours and y be credits. Write the rule.

ANSWER _____

- 3** A line passes through (8, 17) and (10, 23). Find the rate and initial value. Write the rule.

ANSWER _____

- 4** A streaming plan has cost y dollars after x months, where $y = 6x + 12$. What do 6 and 12 mean?

ANSWER _____

APPLY IT Show your work

- 1** The table shows an esports player's reward points after practice sessions. Write a rule. Then interpret the rate and initial value.

REWARD POINTS

Sessions, x	Points, y
0	15
4	23
8	31

ANSWER _____

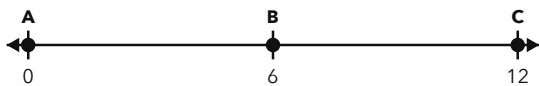
- 2** Maya has \$18 in her concert fund. She adds \$6 each week. Let x be weeks and y be dollars. Write a rule and find the amount after 5 weeks.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A creator has 22 followers on day A and 40 followers on day B. The number line marks days A, B, and C. If the relationship is linear, write a rule for followers y after x days. Predict the followers on day C. Explain briefly.



WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A line passes through (4, 9) and (6, 13). Find the rate and initial value. Write the rule.	Rate: 2. Initial value: 1. Rule: $y = 2x + 1$.
2	A game card starts with 8 credits. It gains 4 credits each hour. Let x be hours and y be credits. Write the rule.	Rate: 4 credits per hour. Initial value: 8 credits. Rule: $y = 4x + 8$.
3	A line passes through (8, 17) and (10, 23). Find the rate and initial value. Write the rule.	Rate: 3. Initial value: -7. Rule: $y = 3x - 7$.
4	A streaming plan has cost y dollars after x months, where $y = 6x + 12$. What do 6 and 12 mean?	6 means the cost increases by \$6 each month. 12 means the starting cost is \$12.

PART 2 • APPLY IT

- $y = 2x + 15$. The player earns 2 points per session and starts with 15 points.** Use two rows: $23 - 15 = 8$ points over 4 sessions, so the rate is 2. At 0 sessions, the total is 15.
- $y = 6x + 18$; \$48** The weekly increase is 6 and the starting amount is 18. Substitute $x = 5$ to get $y = 48$.

CHALLENGE

$y = 3x + 22$; 58 followers. The followers increase 18 in 6 days, so the rate is 3 followers per day. At day 0, there are 22 followers.

Accept equivalent linear forms, such as $y - 15 = 2x$ for the first word problem. For the challenge, accept a correct rate calculation and a clear explanation that the initial value comes from day A.