ALBERT

Name _____ Date _____

Rate of Change and Initial Value Worksheet

Grade 8 · Common Core 8.F.B.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, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

Practice

Builds the skill step by step.

1. A plumber charges a 60-dollar visit fee plus 45 dollars per hour. Write a function for the total cost y, in dollars, for x hours of work.

2. A pool holds 200 gallons of water when a hose starts filling it at 25 gallons per minute. What is the initial value of the function that gives the gallons in the pool?

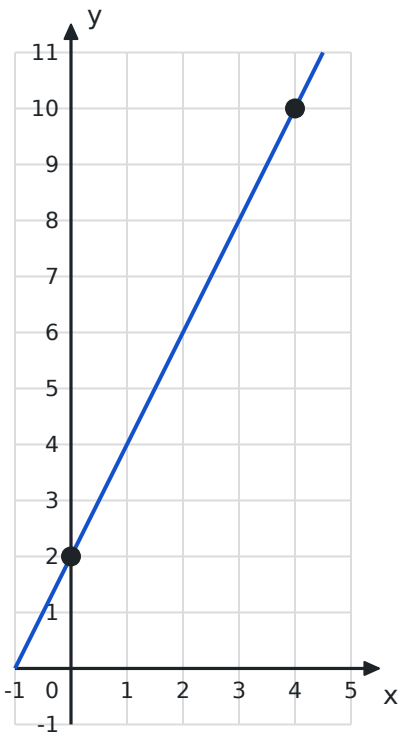
3. The table shows a linear function. What is its rate of change?

x	0	1	2	3
y	8	11	14	17

4. The table shows a linear function. What is its initial value?

x	1	2	3
y	9	13	17

5. Write the equation of the linear function shown on the graph in the form y = mx + b.



6. The function y = 15x + 40 gives the dollars Rosa has saved after x weeks. What does the 40 mean?

   A. Rosa saves 40 dollars each week.

   B. Rosa will have 40 dollars after 15 weeks.

   C. Rosa had 40 dollars saved at the start.

   D. Rosa saves for 40 weeks.

7. A linear function passes through (2, 9) and (5, 18). What is its rate of change?

8. A taxi fare is y = 2.25x + 3.50 dollars for a ride of x miles. What does 2.25 represent?

   A. The number of miles driven

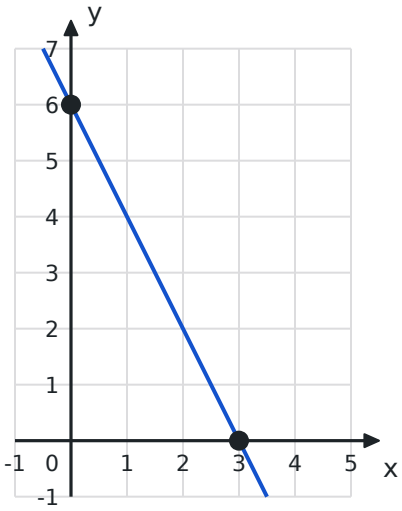
   B. The cost for each mile

   C. The starting fee

   D. The total cost of the ride

9. A candle is 30 cm tall and burns down 2 cm each hour. Write a function for its height y, in centimeters, after x hours.

10. What is the rate of change of the linear function shown on the graph?



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On Level

Grade-level practice.

1. A linear function passes through (3, 14) and (7, 26). Write its equation in the form $y = mx + b$.

2. The table shows the total cost of renting a party tent. Write a function for the cost y, in dollars, for x hours.

Hours	2	4	6
Cost (dollars)	70	110	150

3. A phone's battery level is $y = -8x + 100$ percent after x hours of use. What does -8 tell you?

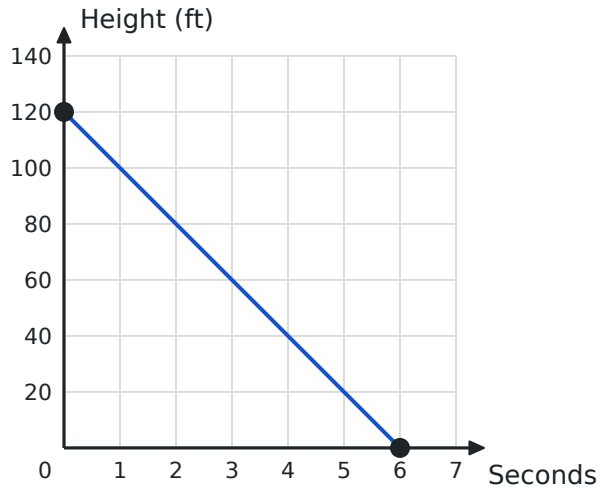
   A. The battery dies after 8 hours.

   B. The battery gains 8 percentage points each hour.

   C. The battery starts at 8 percent.

   D. The battery loses 8 percentage points each hour.

4. The graph shows an elevator's height above the ground as it goes down. What is the rate of change? Include units.

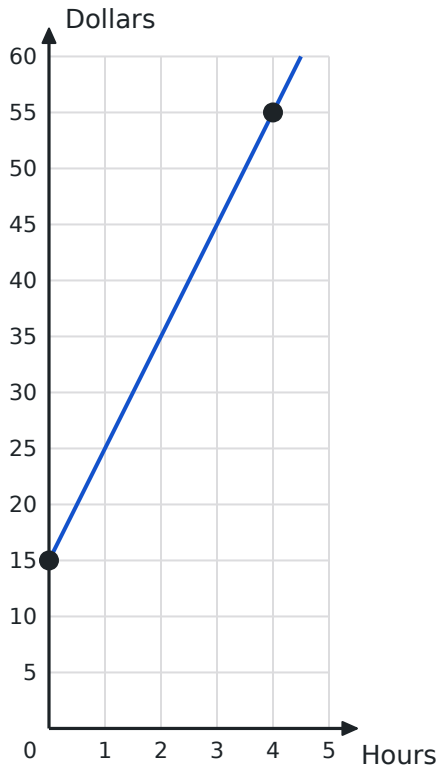


5. A plant is 4 cm tall on day 0 and 13 cm tall on day 6. It grows at a steady rate. What is its rate of change?

6. A tank drains at a steady rate. It holds 340 liters after 4 minutes and 220 liters after 10 minutes. How many liters were in the tank at the start?

7. A club's total cost was 255 dollars after 6 months and 395 dollars after 10 months, with a one-time fee at sign-up. Write a function for the total cost y after x months.

8. The graph shows the total charge for a bike rental. Which statement describes it?



A. It starts at 15 dollars and goes up 10 dollars per hour.

B. It starts at 10 dollars and goes up 15 dollars per hour.

C. It starts at 0 dollars and goes up 13.75 dollars per hour.

D. It starts at 15 dollars and goes up 55 dollars per hour.

9. The table shows a linear function. Write its equation in the form y = mx + b.

x	**−1**	**1**	**3**
y	7	3	−1

10. The cost of a party is y = 12x + 30 dollars for x guests. Explain what 12 and 30 mean in this situation.

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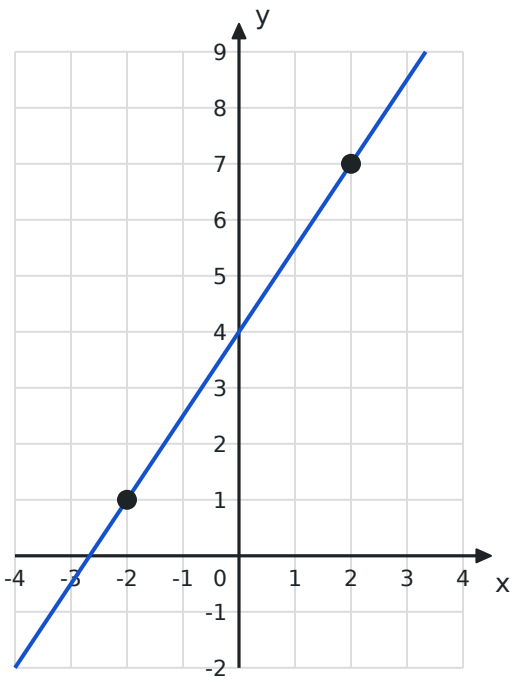
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Challenge

Multi-step and word problems that stretch it.

1. Sam and Tia joined the same gym plan, which has a one-time joining fee and a monthly charge. Sam has paid 175 dollars in total for 5 months, and Tia has paid 295 dollars for 11 months. What is the joining fee?

2. Write the equation of the linear function shown on the graph in the form y = mx + b.



3. Lee wrote y = 4x + 10 for the function in the table. What is his error?

x	2	4	6
y	10	18	26

   A. There is no error.

   B. The rate should be 2, so the function is y = 2x + 10.

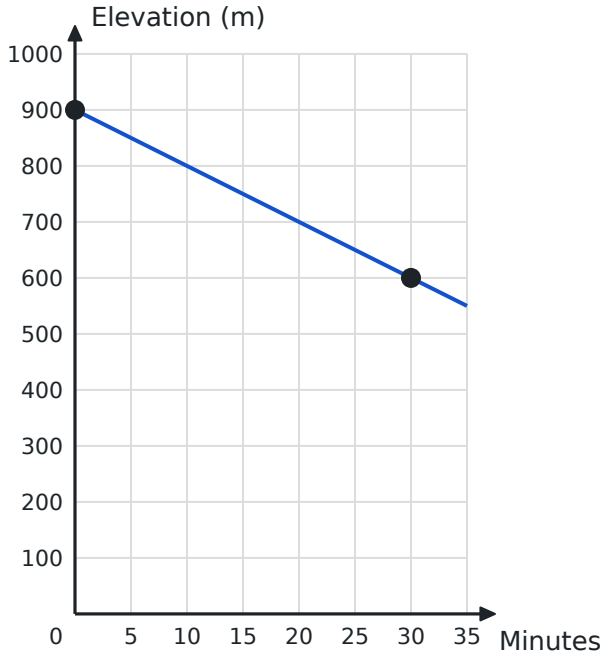
   C. He used the output at x = 2 as the initial value. The function is y = 4x + 2.

   D. The rate should be 8, so the function is y = 8x + 10.

4. A car rental costs 165 dollars for 3 days and 305 dollars for 7 days, with a fixed fee plus a daily rate. How much does a 10-day rental cost?

5. At 6 a.m. the temperature is −4°F. It rises 3°F each hour. How many hours after 6 a.m. will it reach 11°F?

6. The graph shows a hiker's elevation as she walks down a trail. Find the rate of change and the initial value, and explain what each means.



7. A linear function has a rate of change of -3 and passes through $(4, 2)$. What is its initial value?

8. A 12-meter rope gets shorter by 0.4 meter for each knot tied in it. After how many knots will 8 meters of rope be left?

9. A savings account starts with 300 dollars, and 25 dollars is withdrawn each week. Which function gives the balance y after x weeks?

   A. $y = -25x + 300$

   B. $y = 25x + 300$

   C. $y = 300x - 25$

   D. $y = -300x + 25$

10. The table shows a linear function. What is y when x = 22?

x	0	5	10
y	2	4.5	7