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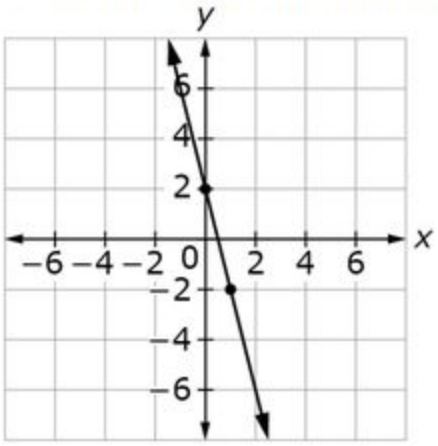
FUNCTIONS: MODELING A

1	**Example Stem 1:** This table of values represents a linear function. | x | y | |---|---| | 2 | −6 | | 3 | −6.5 | | 8 | −9 | Enter an equation in the form $y = mx + b$ that represents the function.	y=-½x-5 or y=-0.5-5
2	**Example Stem 2:** This graph represents a linear function.  Enter an equation in the form $y = mx + b$ that represents the function.	y=-4x+2
3	**Example Stem 3:** A swimming pool with 1600 gallons of water is emptied at a constant rate of 300 gallons every 2 hours. Enter an equation in the form $y = mx + b$ that represents the amount of water y, in gallons, remaining in the pool after x hours.	y=-150x+1600

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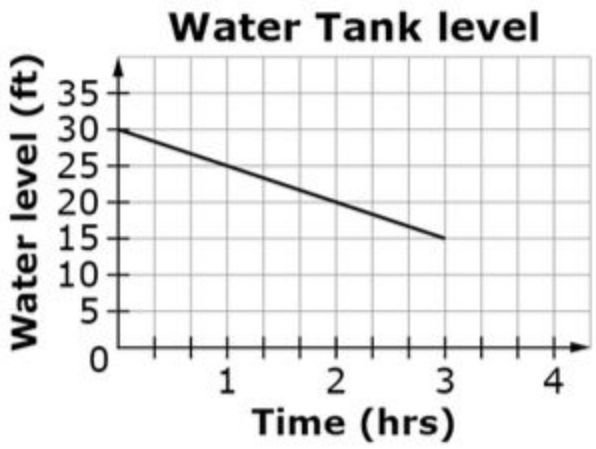
4	**Example Stem 1:** In this table, y is a linear function of x. | x | y | |---|---| | 0 | 50 | | 2 | 40 | | 4 | 30 | | 6 | 20 | Enter the rate of change of this function.	-5
5	**Example Stem 2:** This table shows water level in a tank as a linear function of time. | Time (hr) | Water Level (ft) | |---|---| | 0 | 50 | | 2 | 40 | | 4 | 30 | | 6 | 20 | Enter the rate of change of the water level, in feet per hour.	-5
6	**Example Stem 3:** This graph shows water level in a tank as a linear function of time.  Enter the initial water level, in feet, of the water tank.	30

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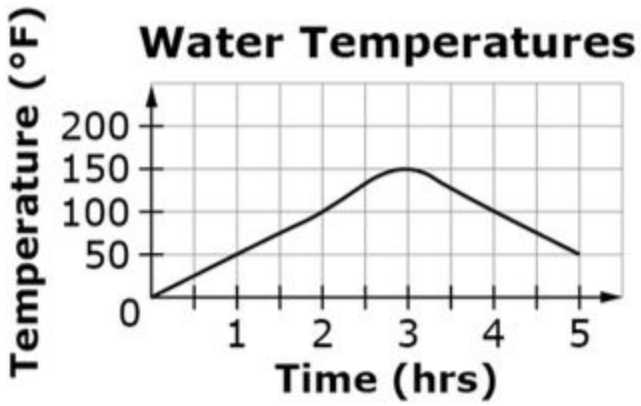
7	**Example Stem:** A swimming pool containing 1600 gallons of water is emptied at a constant rate of 300 gallons every 2 hours. Determine whether each statement about the amount of water in the pool is true. Select True or False for each statement. **Statement** / **True** / **False** The initial amount of water in the pool is 1600 gallons. / / / The amount of water in the pool decreases by 150 gallons every 1 hour. / / / The amount of water in the pool at 3 hours is 450 gallons. / / /	T T F
8	**Example Stem:** This graph shows the water temperature as a function of time.  Based on the graph, determine whether each statement is true. Select True or False for each statement. **Statement** / **True** / **False** The water temperature is increasing between hour 1 and hour 2. / / / The water temperature is increasing between hour 3 and hour 4. / / / The water temperature is constant between hour 0 and hour 1. / / /	T F F

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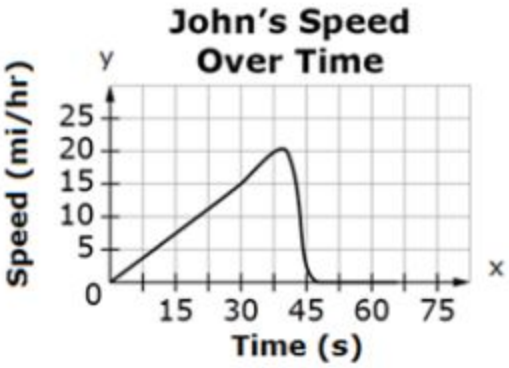
9	**Example Stem:** John is riding his bike. • He increases his speed for 30 seconds. • He stays approximately the same speed for the next 20 seconds. • He slows down to a stop during the last 15 seconds. Select the graph that best represents John's speed over time. A.  B.  	A

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	C.  D.  	
10	**Example Stem:** John is riding his bike. • He increases his speed for 30 seconds. • He stays at the same speed for the next 20 seconds. • He slows down to a stop during the last 15 seconds. Use the Connect Line tool to draw a graph that represents John's speed over time.	Graph

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11 CLAIM 2	**Example Item 2A.3d (Grade 8):** Primary Target 2A (Content Domain F), Secondary Target 1E (CCSS 8.F.A), Tertiary Target 2D Helga wants to have a lot of helium-filled balloons at her party. • The helium tank costs $58 to rent. • Balloons cost $0.29 each. • She wants to have 5 helium-filled balloons for each party guest. Enter an equation that represents the total cost, *C*, in dollars of the helium-filled balloons for *n* party guests.	C=58+1.45n
12 CLAIM 4	**Example Item 4D.1a (Grade 8)** Primary Target 4D (Content Domain F), Secondary Target 1F (CCSS 8.F.B), Tertiary Target 4C This graph shows the average number of words a child can say from birth to 36 months.  Which statement is the **most accurate** description of the growth in the number of words a child speaks based on the graph shown? A. Children learn to say new words at a steady rate starting about 12 months of age. B. Children are constantly learning to say new words from the moment they are born. C. Children learn to say new words more slowly during their second year than during their third year. D. Children begin learning to say words around 24 months and stop learning to say new words at 36 months.	C
13 CLAIM 4	**Example Item 4E.1b (Grade 8)** Primary Target 4E (Content Domain F), Secondary Target 1F (CCSS 8.F.B), Tertiary Target 4F, Quaternary Target 4D Cory is buying copper for a construction project. He pays $1.85 per pound of copper for the first 100 pounds. He pays $1.75 per pound of copper for every pound over 100 pounds. Cory calculated that it would cost $228.75 to purchase 125 pounds of copper. He wrote an equation that allows him to determine the cost of copper for any number of pounds of copper over 100 pounds. His equation is in the form $y = n(x - 100) + p$ where *y* is the amount of money, in dollars, Cory pays for *x* total pounds of copper when *x* is greater than 100. What are his values for n and p? Enter the value of n in the first response box. Enter the value of p in the second response box.	n = 1.75 p = 185

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CLAIM 4

Example Item 4E.2a (Grade 8)
Primary Target 4E (Content Domain F), Secondary Target 1F (CCSS 8.F.B), Tertiary Target 4F, Quaternary Target 4D
(Source: Adapted from Illustrative Mathematics 8-F Modeling with a Linear Function)

Select **all** situations that can be modeled by the linear equation $y = 2x + 5$.

A. There are initially 5 rabbits on a farm. Each month thereafter the number of rabbits is 2 times the number in the mo before. How many rabbits are there after x months?

B. Joe earns $2 for each magazine sale. He also earns $5 for each hour he spends trying to sell magazines. How much money will he earn after selling magazines for x hours?

C. Sandy charges $2 an hour for babysitting. Parents are charged $5 if they arrive home later than scheduled. Assumir the parents arrived home late, how much money does she earn for x hours?

D. The Reader's Club is a members-only audio book rental store. There is a $2 sign-up fee and a $5 per audio book ren fee. How much would Laney owe on her first visit if she becomes a member and rents x audio books?

E. Andre is saving money for a new CD player. He began saving with a $5 gift and will continue to save $2 each week. How much money will he have saved at the end of x weeks?

C and E

15
CLAIM 4

Example Item 4E.2b (Grade 8)
Primary Target 4E (Content Domain F), Secondary Target 1F (CCSS 8.F.B), Tertiary Target 4D

The table shows the relationship between the average number of hours students studied for a mathematics test and their average grade.

Hours Studied	Average Grade
0	62
1	78
2	85
5	74

Which type of function is most likely to model these data?

A. linear function with positive rate of change
B. linear function with negative rate of change
C. non-linear function that decreases then increases
D. non-linear function that increases then decreases

D

16
CLAIM 4

Example Item 4F.1c (Grade 8)
Primary Target 4F (Content Domain F), Secondary Target 1F (CCSS 8.F.B), Tertiary Target 4D

The relationship between Jack's distance from home and the time since he left home is linear, as shown in the table.

Time (hrs)	Distance (mi)
0	7.5
2	17.5
4	27.5

Based on the values in the table, determine whether each statement is true. Select True or False for each statement.

Statement	True	False
Jack's initial distance from home is 7.5 miles.		
Jack's distance increases by 5 miles every 1 hour.		
Jack's distance from home at 3 hours is 23.5 miles.		

T
T
F

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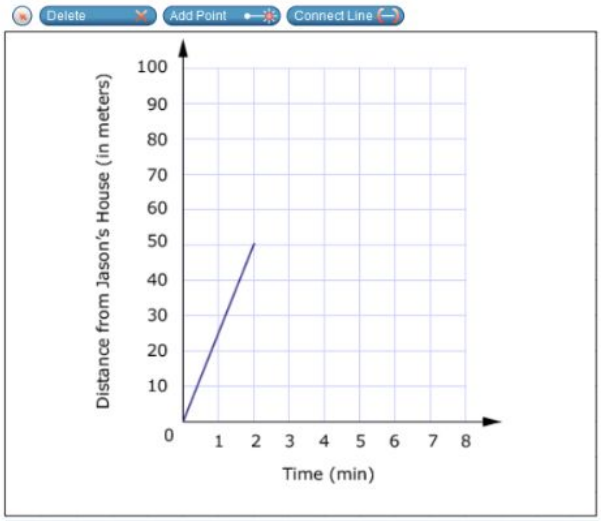
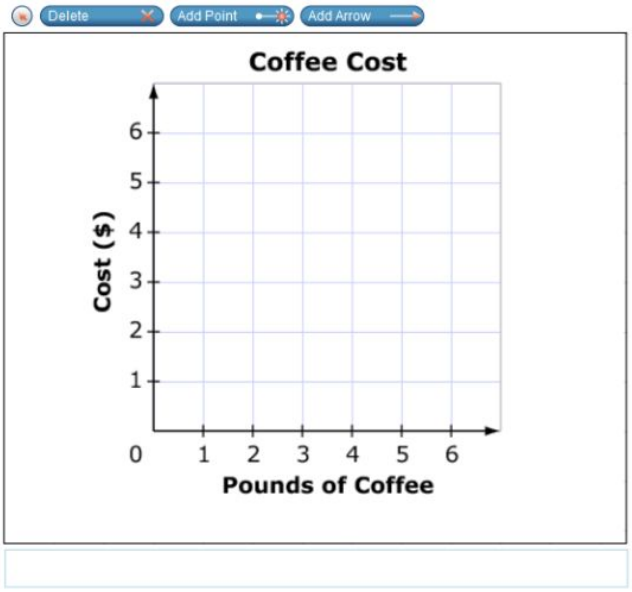
FUNCTIONS: MODELING B

1	**761** The school is 100 meters from Jason's house. The following describes his most recent trip: • He walked 50 meters toward school in 2 minutes. He realized that he left a book at home. • He turned around and walked home at the same speed. • He spent 1 minute looking for his book. • He walked all the way to school at twice his original speed. Use the Line tool to finish a graph that accurately represents Jason's trip. 	Graph
2	**766** Coffee costs $2.00 per pound at a coffee shop. Use the Add Arrow tool to draw a line that shows the proportional relationship between the number of pounds of coffee purchased and the total cost. 	Graph

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3

1847

The table shows the relationship between the average number of hours students study for a mathematics test and their average grade.

Hours Studying	Average Grade
0	62
1	78
2	85
5	74

Which type of function is most likely to model these data?

(A) linear function with positive slope

(B) linear function with negative slope

(C) non-linear function that decreases then increases

(D) non-linear function that increases then decreases

D

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3

2075

Step 3

Kyle was given the following problem to solve.

> A company sells baseball gloves and bats. The gloves regularly cost $30 and the bats regularly cost $90. The gloves are on sale for $4 off, and the bats are on sale for 10% off. The goal is to sell $1200 worth of bats and gloves each week. Last week, the store sold 14 gloves and 9 bats.
>
> Did the store meet its goal?

The steps Kyle used to solve the problem are shown. Select the first step that shows an error.

☐ **Step 1:**

$$\begin{array}{r} \$30 \\ -\ \$4 \\ \hline \$26 \end{array}$$

☐ **Step 2:**

$$\begin{array}{r} \$26 \\ \times\ 14 \\ \hline \$364 \end{array}$$

☐ **Step 3:**

$$\begin{array}{r} \$90 \\ \div\ 0.9 \\ \hline \$100 \end{array}$$

☐ **Step 4:**

$$\begin{array}{r} \$100 \\ \times\ 9 \\ \hline \$900 \end{array}$$

☐ **Step 5:** Yes, the store met its goal.

$$\begin{array}{r} \$900 \\ +\ \$364 \\ \hline \$1264 \end{array}$$

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FUNCTIONS: MODELING C

1	**16** Mary is buying tickets for a movie. • Each adult ticket costs $9. • Each child ticket costs $5. • Mary spends $110 on tickets. • Mary buys 14 total tickets. Enter the total number of adult tickets and total number of child tickets she buys. *Adult tickets* ☐ *Child tickets* ☐	Adult 10 Child 5
2	**18** Simone and Nang read a total of 23 books over the summer. Simone read 5 more books than Nang. Enter the number of books Nang read. ☐	Nang read 9 books
3	**9** A leaf falls 18 feet from a branch to the ground at a rate of 5 feet every 2 seconds. Determine whether each statement about the leaf is true. Select True or False for each statement. The initial height of the leaf is 18 feet. ☐ True ☐ False The leaf falls at a rate of $\frac{2}{5}$ foot every 1 second. ☐ ☐ The leaf is 3 feet above the ground after 6 seconds. ☐ ☐	T F T

SBAC Math & Answers Functions: Modeling Practice C

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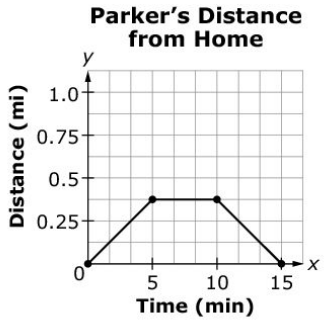
4	**14** David and Karen have a goal to read 10,000 pages together by the end of summer. • David reads 80 pages every day. • Karen reads 25% more pages every day than David reads. David and Karen agree that the model $180d = 10{,}000$ will tell them how many days it will take them to read 10,000 pages, together, by the end of summer. They invite Rick to read with them to get to their goal faster. Rick reads 35% fewer pages per day than Karen. Which equation can be used to find how many days it will take David, Karen, and Rick to read 10,000 pages, together, by the end of summer? Ⓐ $232d = 10{,}000$ Ⓑ $245d = 10{,}000$ Ⓒ $288d = 10{,}000$ Ⓓ $315d = 10{,}000$	B
5	**15** The graph shows Parker's distance from home over time.  Based on the graph, determine whether each statement is true. Select True or False for each statement. Parker's distance from home is increasing between minute 1 and minute 4. ☐ True ☐ False Parker's distance from home is constant between minute 6 and minute 7. ☐ True ☐ False Parker's distance from home is increasing between minute 12 and minute 14. ☐ True ☐ False	T T F

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6

11

Which table of values can be defined by the function $y = 4x - 2$?

Ⓐ

x	y
−4	−18
−2	−10
0	−2
2	6
4	14

Ⓑ

x	y
0	4
1	2
2	0
3	−2
4	−4

Ⓒ

x	y
−10	−2
−6	−1
−2	0
2	1
6	2

Ⓓ

x	y
−2	4
0	2
2	0
4	−2
6	−4

A

SBAC Math & Answers Functions: Modeling Practice C

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