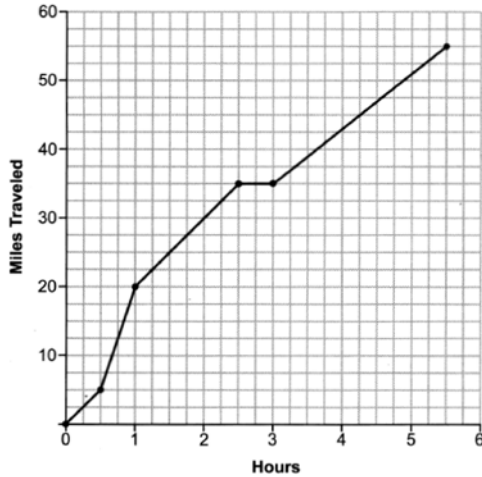


**F.IF.B.6: Rate of Change 1**

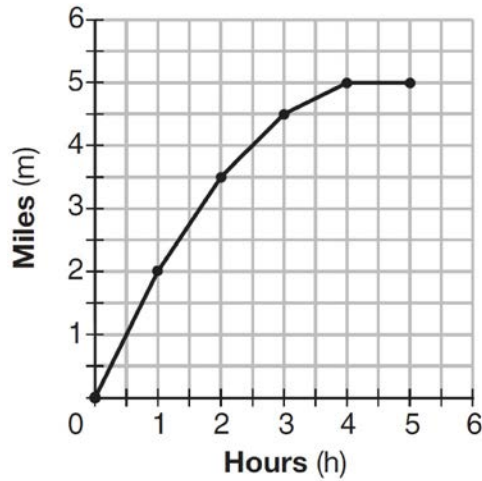
- 1 The value of Tony's investment was \$1140 on January 1st. On this date three years later, his investment was worth \$1824. The average rate of change for this investment was \$19 per
- 1) day
  - 2) month
  - 3) quarter
  - 4) year
- 2 An astronaut drops a rock off the edge of a cliff on the Moon. The distance,  $d(t)$ , in meters, the rock travels after  $t$  seconds can be modeled by the function  $d(t) = 0.8t^2$ . What is the average speed, in meters per second, of the rock between 5 and 10 seconds after it was dropped?
- 1) 12
  - 2) 20
  - 3) 60
  - 4) 80
- 3 One Saturday, Dave took a long bike ride. The graph below models his trip.



What was Dave's average rate of change, in miles per hour, on this trip?

- 1) 10
- 2) 11
- 3) 11.6
- 4) 14.5

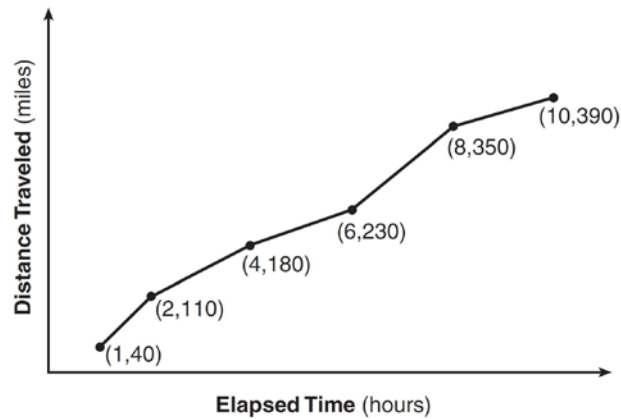
4 The graph below shows the distance in miles,  $m$ , hiked from a camp in  $h$  hours.



Which hourly interval had the greatest rate of change?

- |                     |                     |
|---------------------|---------------------|
| 1) hour 0 to hour 1 | 3) hour 2 to hour 3 |
| 2) hour 1 to hour 2 | 4) hour 3 to hour 4 |

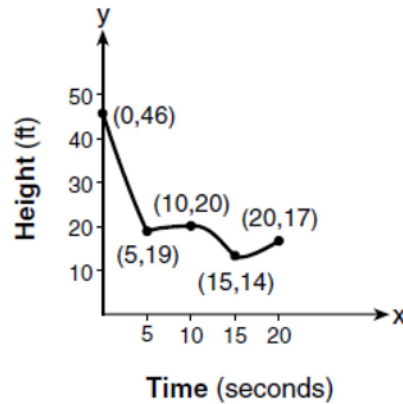
5 The Jamison family kept a log of the distance they traveled during a trip, as represented by the graph below.



During which interval was their average speed the greatest?

- |                                       |                                      |
|---------------------------------------|--------------------------------------|
| 1) the first hour to the second hour  | 3) the sixth hour to the eighth hour |
| 2) the second hour to the fourth hour | 4) the eighth hour to the tenth hour |

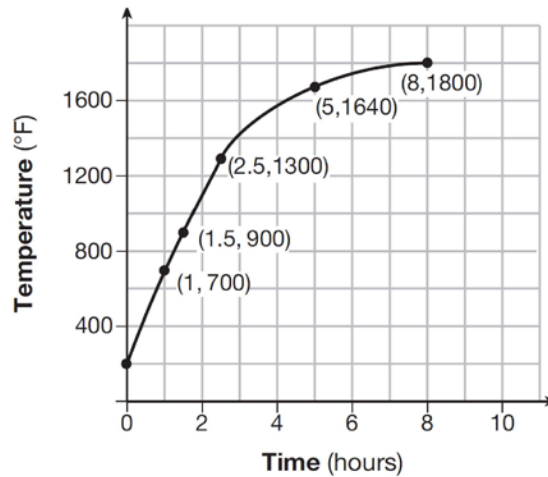
6 The graph below models the height of a remote-control helicopter over 20 seconds during flight.



Over which interval does the helicopter have the *slowest* average rate of change?

- 1) 0 to 5 seconds
- 2) 5 to 10 seconds
- 3) 10 to 15 seconds
- 4) 15 to 20 seconds

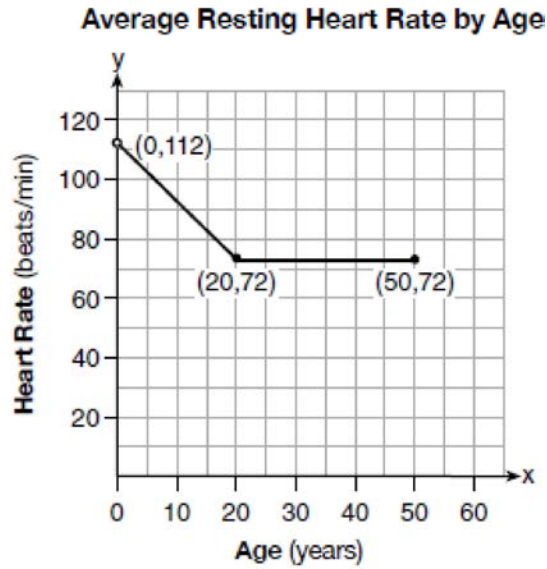
7 Firing a piece of pottery in a kiln takes place at different temperatures for different amounts of time. The graph below shows the temperatures in a kiln while firing a piece of pottery after the kiln is preheated to 200°F.



During which time interval did the temperature in the kiln show the greatest average rate of change?

- 1) 0 to 1 hour
- 2) 1 hour to 1.5 hours
- 3) 2.5 hours to 5 hours
- 4) 5 hours to 8 hours

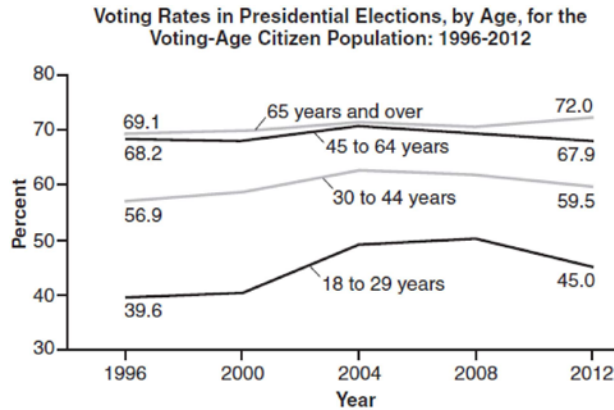
- 8 A graph of average resting heart rates is shown below. The average resting heart rate for adults is 72 beats per minute, but doctors consider resting rates from 60-100 beats per minute within normal range.



Which statement about average resting heart rates is *not* supported by the graph?

- 1) A 10-year-old has the same average resting heart rate as a 20-year-old.
- 2) A 20-year-old has the same average resting heart rate as a 30-year-old.
- 3) A 40-year-old may have the same average resting heart rate for ten years.
- 4) The average resting heart rate for teenagers steadily decreases.

9 Voting rates in presidential elections from 1996-2012 are modeled below.



Which statement does *not* correctly interpret voting rates by age based on the given graph?

- 1) For citizens 18-29 years of age, the rate of change in voting rate was greatest between years 2000-2004.
- 2) From 1996-2012, the average rate of change was positive for only two age groups.
- 3) About 70% of people 45 and older voted in the 2004 election.
- 4) The voting rates of eligible age groups lies between 35 and 75 percent during presidential elections every 4 years from 1996-2012.

10 A bookstore owner recorded the number of books sold and the profit made selling the books.

Books Sold	Profit
100	\$50.00
250	\$275.00
300	\$350.00
350	\$425.00

What is the average rate of change, in dollars per book, between 100 and 350 books sold?

- 1) 0.50
- 2) 0.67
- 3) 1.50
- 4) 2.00

11 Joey enlarged a 3-inch by 5-inch photograph on a copy machine. He enlarged it four times. The table below shows the area of the photograph after each enlargement.

Enlargement	0	1	2	3	4
Area (square inches)	15	18.8	23.4	29.3	36.6

What is the average rate of change of the area from the original photograph to the fourth enlargement, to the nearest tenth?

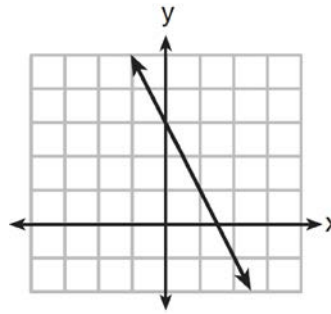
- 1) 4.3
- 2) 4.5
- 3) 5.4
- 4) 6.0



16 Which function has a constant rate of change equal to  $-3$ ?

x	y
0	2
1	5
2	8
3	11

- 1)  
2)  $\{(1,5), (2,2), (3,-5), (4,4)\}$

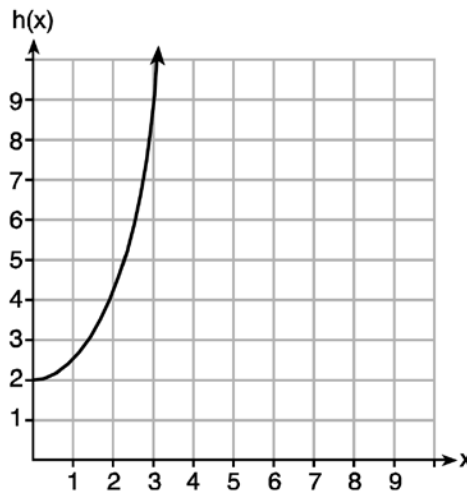


- 3)  
4)  $2y = -6x + 10$

17 Given the functions  $g(x)$ ,  $f(x)$ , and  $h(x)$  shown below:

$$g(x) = x^2 - 2x$$

x	f(x)
0	1
1	2
2	5
3	7



The correct list of functions ordered from greatest to least by average rate of change over the interval  $0 \leq x \leq 3$  is

- 1)  $f(x)$ ,  $g(x)$ ,  $h(x)$                       3)  $g(x)$ ,  $f(x)$ ,  $h(x)$   
2)  $h(x)$ ,  $g(x)$ ,  $f(x)$                       4)  $h(x)$ ,  $f(x)$ ,  $g(x)$

**F.IF.B.6: Rate of Change 1****Answer Section**

1 ANS: 2

$$\left( \frac{\$1824 - 1140}{3 - 0 \text{ yr}} \right) \left( \frac{1 \text{ yr}}{12 \text{ m}} \right) = \frac{\$19}{\text{m}}$$

REF: 062105ai

2 ANS: 1

$$\frac{0.8(10^2) - 0.8(5^2)}{10 - 5} = \frac{80 - 20}{5} = 12$$

REF: 011521ai

3 ANS: 1

$$\frac{55 - 0}{5.5 - 0} = 10$$

REF: 062418ai

4 ANS: 1

The graph is steepest between hour 0 and hour 1.

REF: 081601ai

5 ANS: 1

$$\frac{110 - 40}{2 - 1} > \frac{350 - 230}{8 - 6}$$

$$70 > 60$$

REF: 061418ai

6 ANS: 2

The slope of a line connecting (5,19) and (10,20) is lowest.

REF: 081705ai

7 ANS: 1

REF: 081515ai

8 ANS: 1

REF: 011721ai

9 ANS: 2

From 1996-2012, the average rate of change was positive for three age groups.

REF: 011824ai

10 ANS: 3

$$\frac{425 - 50}{350 - 100} = 1.5$$

REF: 082410ai



11 ANS: 3

$$\frac{36.6 - 15}{4 - 0} = \frac{21.6}{4} = 5.4$$

REF: 061511ai

12 ANS: 4

$$\frac{4.7 - 2.3}{20 - 80} = \frac{2.4}{-60} = -0.04.$$

REF: 081414ai

13 ANS: 4

$$(1) \frac{6 - 1}{1971 - 1898} = \frac{5}{73} \approx .07 \quad (2) \frac{14 - 6}{1985 - 1971} = \frac{8}{14} \approx .57 \quad (3) \frac{24 - 14}{2006 - 1985} = \frac{10}{21} \approx .48 \quad (4) \frac{35 - 24}{2012 - 2006} = \frac{11}{6} \approx 1.83$$

REF: 011613ai

14 ANS: 1

REF: 061603ai

15 ANS: 4

$$\frac{53 - 1129}{2013 - 2006} \approx -153.71$$

REF: 082323ai

16 ANS: 4

$$1) y = 3x + 2; 2) \frac{-5 - 2}{3 - 2} = -7; 3) y = -2x + 3; 4) y = -3x + 5$$

REF: 081615ai

17 ANS: 4

Over the interval  $0 \leq x \leq 3$ , the average rate of change for  $h(x) = \frac{9 - 2}{3 - 0} = \frac{7}{3}$ ,  $f(x) = \frac{7 - 1}{3 - 0} = \frac{6}{3} = 2$ , and

$$g(x) = \frac{3 - 0}{3 - 0} = \frac{3}{3} = 1.$$

REF: spr1301ai