NAEP Released Items Aligned to the Iowa Core

8.F.1 Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.

Which of the following ordered pairs (x, y) is a solution to the equation 2x - 3y = 6?

A. (6, 3)
B. (3, 0)
C. (3, 2)
D. (2, 3)
E. (0, 3)

1996-8-9-8

Source: National Assessment of Educational Progress, 1996, Grade 8 Mathematics Assessment.

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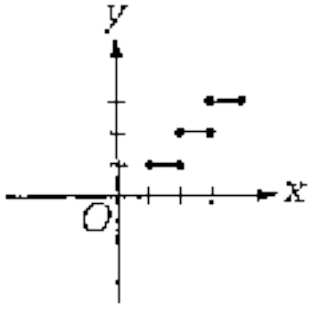
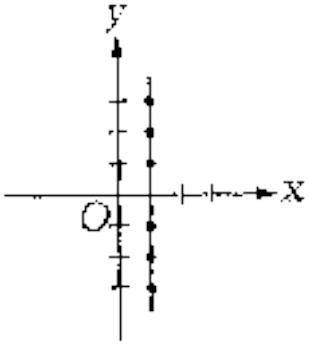
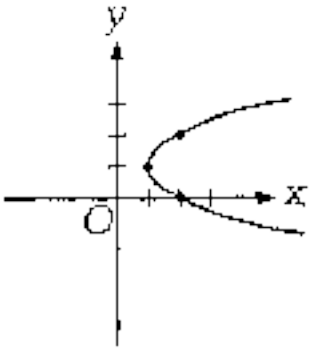
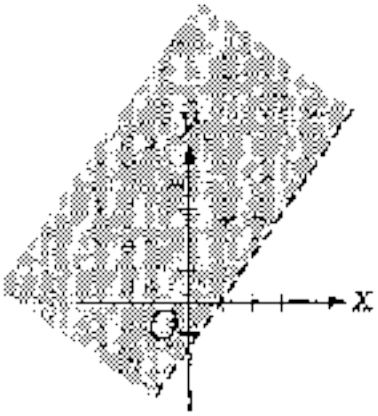
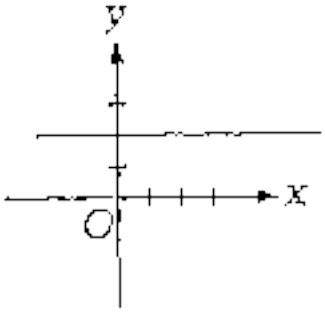
Which of the following could be the graph of a function?

A. 


B. 

C. 


D. 


E. 


1996-12-10-9

Source: National Assessment of Educational Progress, 1996, Grade 12 Mathematics Assessment.

8.F.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.

| x | y |
|---|---|
| 0 | -1 |
| 1 | 2 |
| 2 | 5 |
| 3 | 8 |
| 10 | 29 |

Which of the following equations represents the relationship between *x* and *y* shown in the table above?

A. $y = x + 1$
B. $y = x + 1$
C. $y = 3x - 1$
D. $y = x - 3$
E. $y = 3x - 1$

2005-8-12-17

Source: National Assessment of Educational Progress, 2005, Grade 8 Mathematics Assessment.

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8.F.3 Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function A = s2 giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.

Which of the following is an equation of a line that passes through the point (0, 5) and has a negative slope?

A. y = 5x
B. y = 5x – 5
C. y = 5x + 5
D. y = -5x – 5
E. y = -5x + 5

2011-8-12-7

Source: National Assessment of Educational Progress, 2011, Grade 8 Mathematics Assessment.

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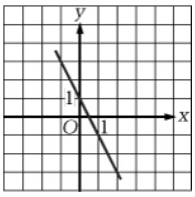
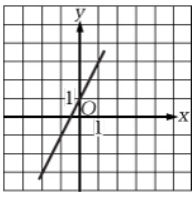
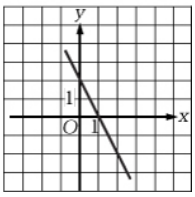
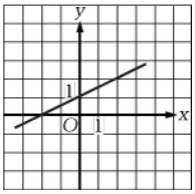
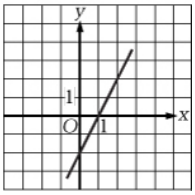
Which of the following is the graph of the line with equation $y = -2x + 1$ ?

A. 


B. 


C. 


D. 


E. 


2007-8-11-11

Source: National Assessment of Educational Progress, 2007, Grade 8 Mathematics Assessment.

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, 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.

The number of gallons of water, y , in a tank after x hours may be modeled by the linear equation y = 800 – 50x. Which of the following statements about the tank is true?

A. It is filling at a rate of 800 gallons per hour.
B. It is filling at a rate of 50 gallons per hour.
C. It is emptying at a rate of 16 gallons per hour.
D. It is emptying at a rate of 50 gallons per hour.
E. It is emptying at a rate of 800 gallons per hour.

2011-8-12-15

Source: National Assessment of Educational Progress, 2011, Grade 8 Mathematics Assessment.

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(2, 5), (4, 9), (6, 13)

Which of the following describes what to do to the first number in each ordered pair shown above to obtain the corresponding second number?

A. Add 3
B. Subtract 3
C. Multiply by 2
D. Multiply by 2 and subtract 1
E. Multiply by 2 and add 1

1990-8-9-8

Source: National Assessment of Educational Progress, 1990, Grade 8 Mathematics Assessment.

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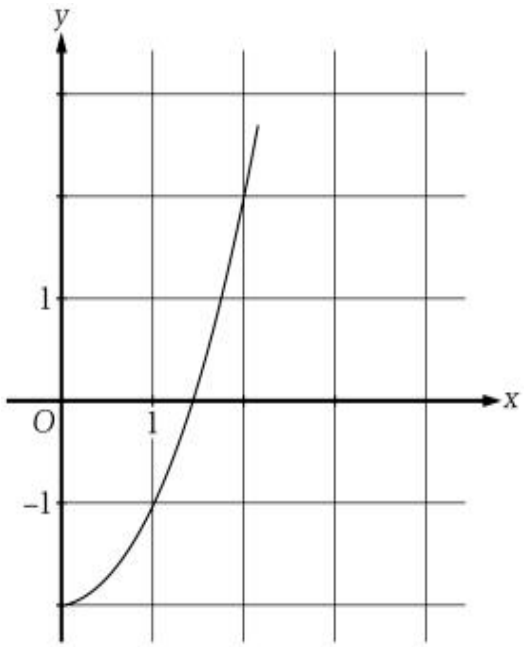


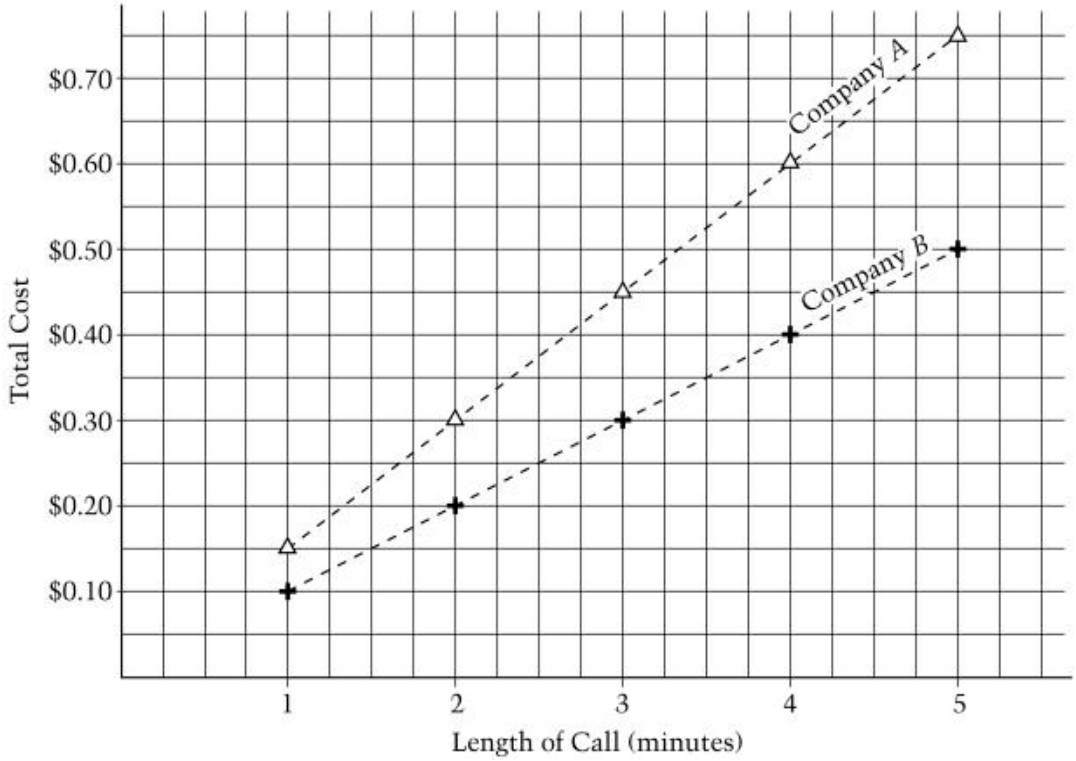

On the curve above, what is the <u>best</u> estimate of the value of $x$ when $y = 0$?

A. -2.0
B. 1.1
C. 1.4
D. 1.7
E. 1.9

2005-8-3-11

Source: National Assessment of Educational Progress, 2005, Grade 8 Mathematics Assessment.

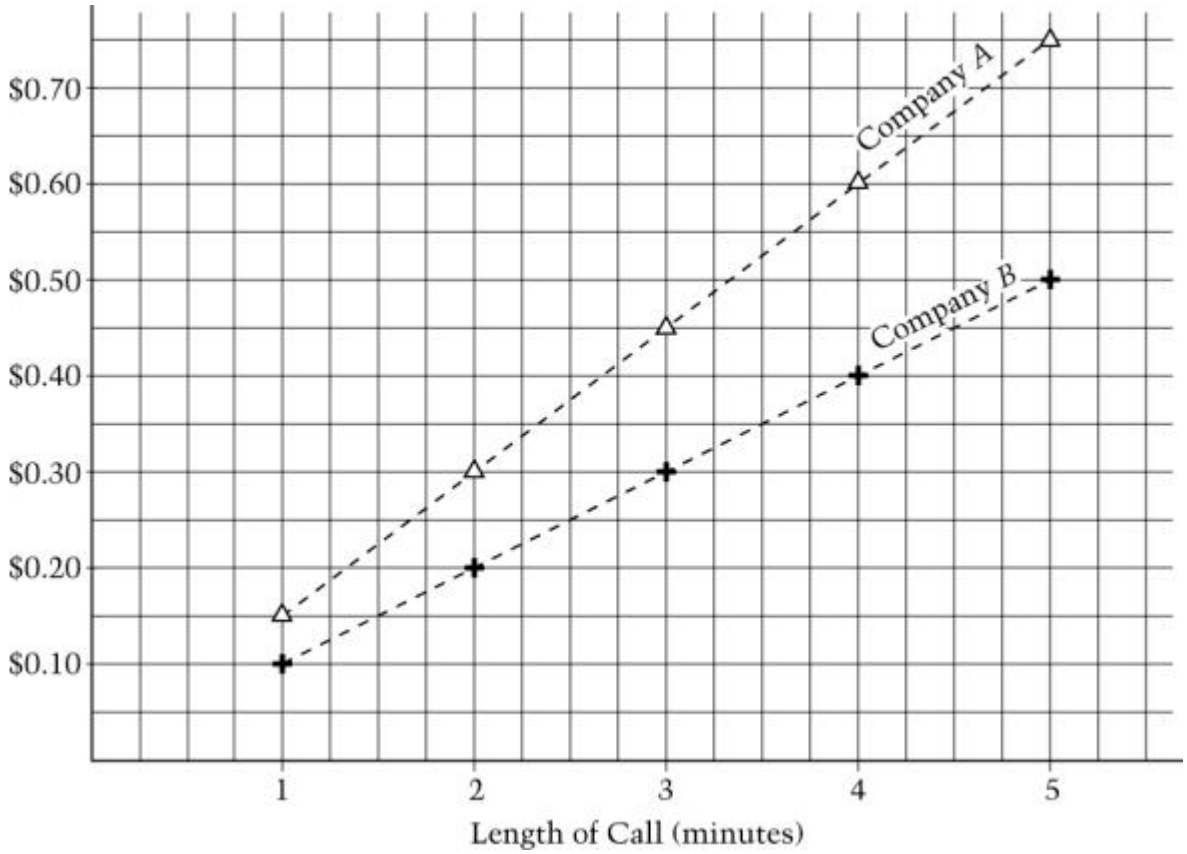
The graph below shows the cost that two long-distance telephone companies each charge for calls of various lengths (in minutes).




a. What is the cost of a 4-minute call using Company *B* ?

b. What is the cost per minute for a call using Company *B* ?

c. Determine the amounts of money saved (in cents) by using Company *B* instead of Company *A* when calls of 1, 2, 3, 4, and 5 minutes are made. Then graph the five points that represent the savings on the grid that follows and connect the points with a dotted line.




2005-8-4-11

Source: National Assessment of Educational Progress, 2005, Grade 8 Mathematics Assessment.

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| $x$ | $y$ |
|---|---|
| 0 | -3 |
| 1 | -1 |
| 2 | 1 |

Which of the following equations is true for the three pairs of $x$ and $y$ values in the table above?

A. $3x + 2 = y$
B. $3x - 2 = y$
C. $2x + 3 = y$
D. $2x - 3 = y$
E. $x - 3 = y$

2003-8-6-27

Source: National Assessment of Educational Progress, 2003, Grade 8 Mathematics Assessment.

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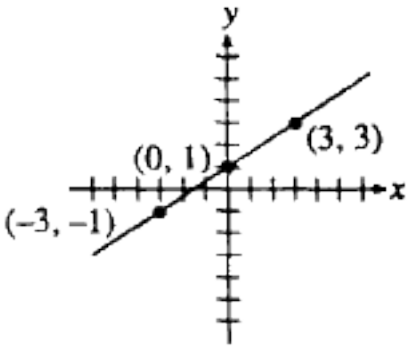


What is the slope of the line shown in the graph above?

A. 1/3
B. 2/3
C. 1
D. 3/2
E. 3

1992-12-5-8

Source: National Assessment of Educational Progress, 1992, Grade 12 Mathematics Assessment.

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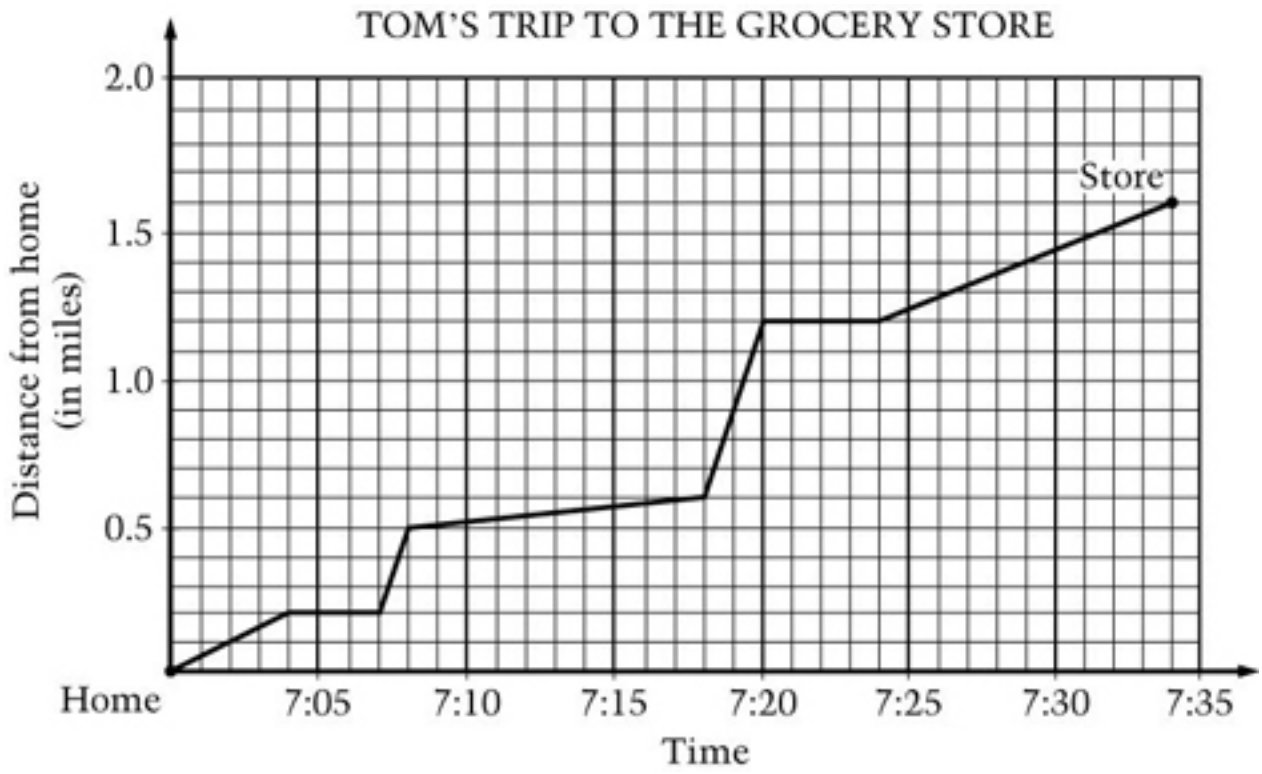
8.F.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

Tom went to the grocery store. The graph below shows Tom's distance from home during his trip.

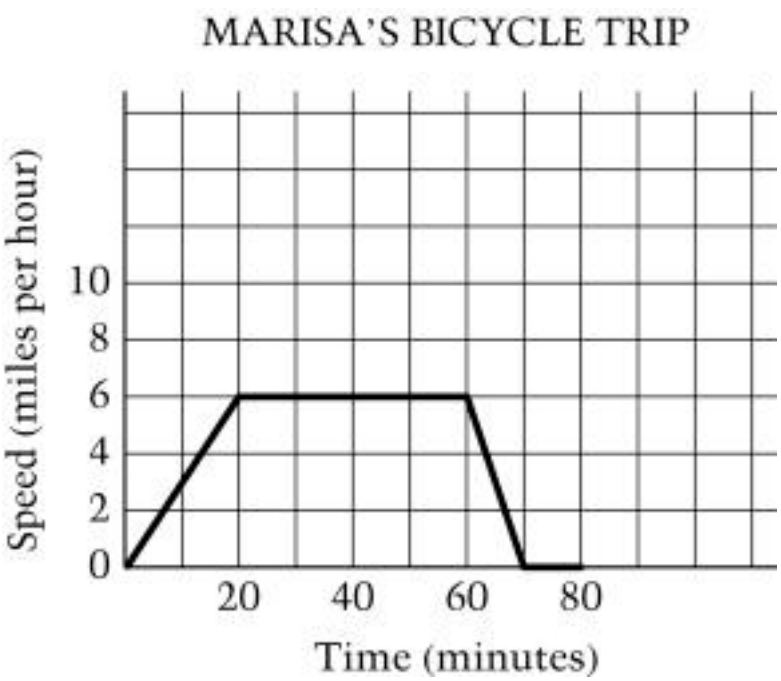



Tom stopped twice to rest on his trip to the store. What is the total amount of time that he spent resting?

A. 5 minutes
B. 7 minutes
C. 8 minutes
D. 10 minutes
E. 25 minutes

2009-8-10-10

Source: National Assessment of Educational Progress, 2009, Grade 8 Mathematics Assessment.




The graph above represents Marisa's riding speed throughout her 80-minute bicycle trip. Use the information in the graph to describe what could have happened on the trip, including her speed throughout the trip.

During the first 20 minutes, Marisa

_____

_____

_____

From 20 minutes to 60 minutes, she

_____

_____

_____

From 60 minutes to 80 minutes, she

_____

_____

_____

2003-8-10-19

Source: National Assessment of Educational Progress, 2003, Grade 8 Mathematics Assessment.

The linear graph below describes Josh's car trip from his grandmother's home directly to his home.

(a) Based on this graph, what is the distance from Josh's grandmother's home to his home?

(b) Based on this graph, how long did it take Josh to make the trip?

(c) What was Josh's average speed for the trip? Explain how you found your answer.

(d) Explain why the graph ends at the x-axis.

2011-8-8-15

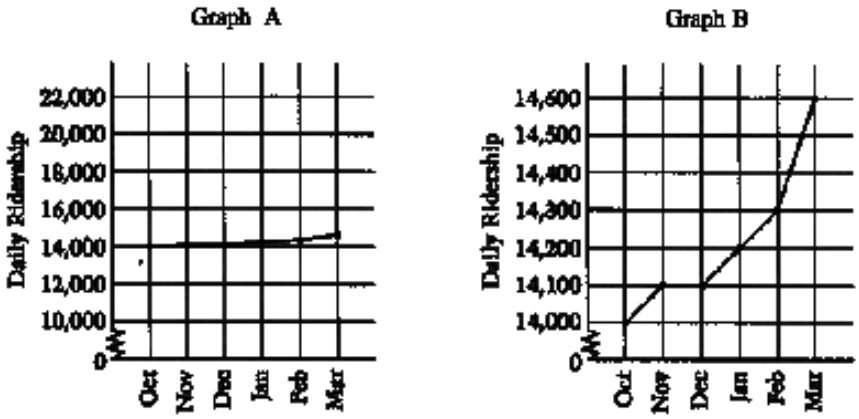
Source: National Assessment of Educational Progress, 2011, Grade 8 Mathematics Assessment.

This question requires you to show your work and explain your reasoning. You may use drawings, words, and numbers in your explanation. Your answer should be clear enough so that another person could read it and understand your thinking. It is important that you show all of your work.

METRO RAIL COMPANY

| Month | Daily Ridership |
|---|---|
| October | 14,000 |
| November | 14,100 |
| December | 14,100 |
| January | 14,200 |
| February | 14,300 |
| March | 14,600 |

The data in the table above has been correctly represented by both graphs shown below.



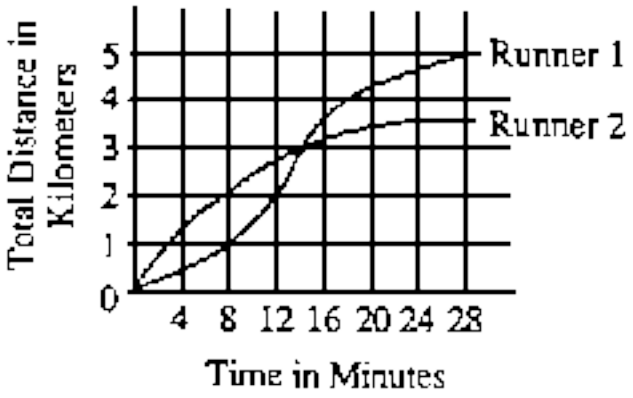

Which graph would be best to help convince others that the Metro Rail Company made a lot more money from ticket sales in March than in October?

Explain your reason for making this selection.

Why might people who thought that there was little difference between October and March ticket sales consider the graph you chose to be misleading?

1996-8-12-9

Source: National Assessment of Educational Progress, 1996, Grade 8 Mathematics Assessment.




The total distances covered by two runners during the first 28 minutes of a race are shown in the graph above. How long after the start of the race did one runner pass the other?

A. 3 minutes
B. 8 minutes
C. 12 minutes
D. 14 minutes
E. 28 minutes

1992-8-5-19
1992-12-5-19

Source: National Assessment of Educational Progress, 1992, Grade 8 and Grade 12 Mathematics Assessments.

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The linear graph below describes Josh's car trip from his grandmother's home directly to his home.

(a) Based on this graph, what is the distance from Josh's grandmother's home to his home?

(b) Based on this graph, how long did it take Josh to make the trip?

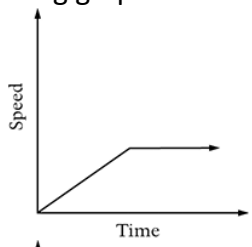
(c) What was Josh's average speed for the trip? Explain how you found your answer.

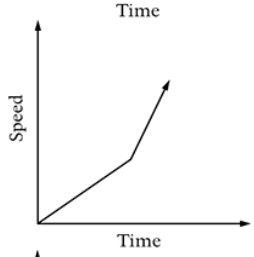
(d) Explain why the graph ends at the x-axis.

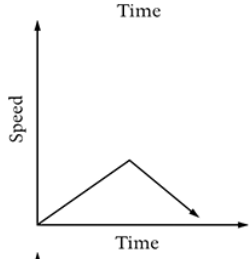
2011-8-8-15

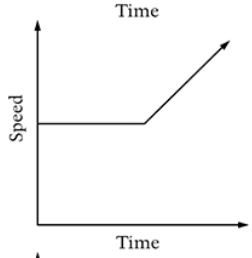
Source: National Assessment of Educational Progress, 2011, Grade 8 Mathematics Assessment.

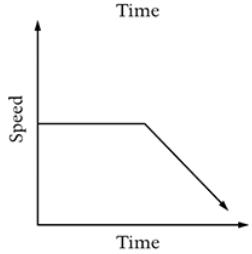
For 2 minutes, Casey runs at a constant speed. Then she gradually increases her speed. Which of the following graphs could show how her speed changed over time?

A.



B.



C.


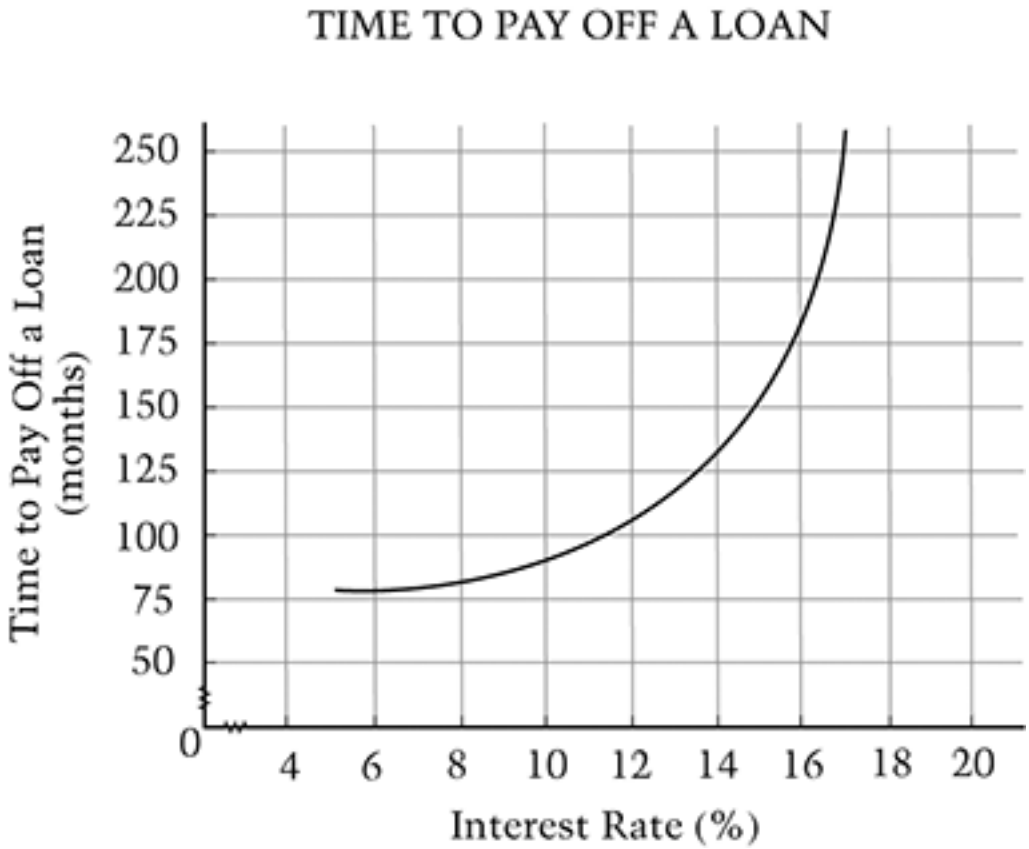

D.



E.



2011-8-9-3

Source: National Assessment of Educational Progress, 2011, Grade 8 Mathematics Assessment.

This question refers to the following graph.



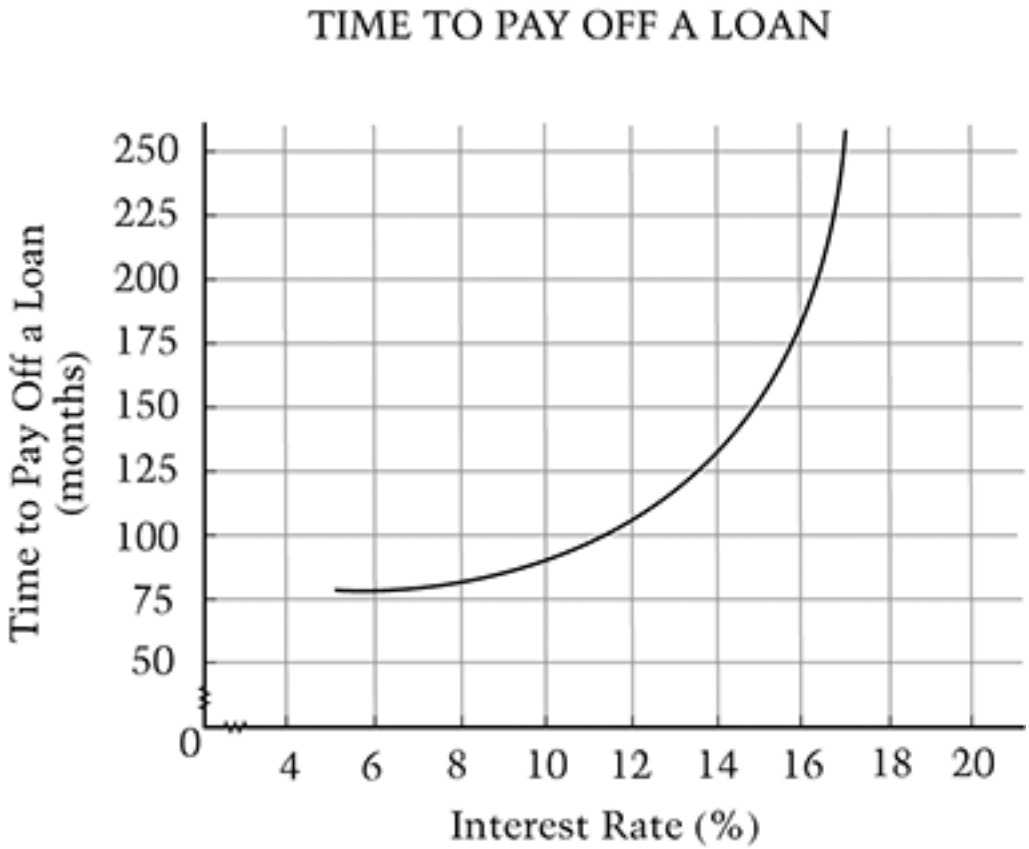

According to the graph, between which of the following pairs of interest rates will the increase in the number of months to pay off a loan be greatest?

A. 7% and 9%
B. 9% and 11%
C. 11% and 13%
D. 13% and 15%
E. 15% and 17%

2011-8-12-9

Source: National Assessment of Educational Progress, 2011, Grade 8 Mathematics Assessment.

This question refers to the following graph.




Mrs. Brown would like to pay off a loan in 180 months. According to the graph, what should be the approximate percent of the interest rate on her loan?

2011-8-12-10

Source: National Assessment of Educational Progress, 2011, Grade 8 Mathematics Assessment.

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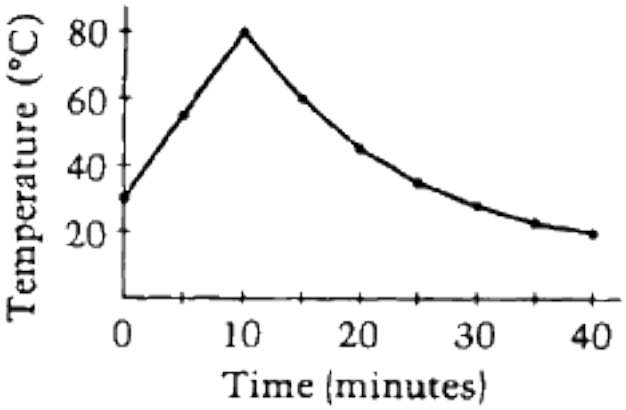


The graph above best conveys information about which of the following situations over a 40-minute period of time?

A. Oven temperature while a cake is being baked
B. Temperature of water that is heated on a stove, then removed and allowed to cool
C. Ocean temperature in February along the coast of Maine
D. Body temperature of a person with a cold
E. Temperature on a July day in Chicago

1992-12-7-2

Source: National Assessment of Educational Progress, 1992, Grade 12 Mathematics Assessment.