# Test Review November 2014

Multiple Choice
Identify the choice that best completes the statement or answers the question.

_____ 1. The cost C, in dollars, of a prepaid cell phone call is proportional to the time t, in minutes, that the call lasts. The equation that represents this relationship for carrier A is $C_A = 0.15t$. The table shows the relationship for carrier B. Which carrier has a lower unit rate?

Time (minutes)	Cost (dollars)
2	0.24
5	0.60
10	1.20
30	3.60

a. Carrier A
b. Carrier B
c. Carrier A and carrier B have the same unit rate.
d. The relationship cannot be determined.

_____ 2. The graph shows the distance a boat is traveling over time. Does the boat travel at a constant or variable speed? How fast is the boat traveling?
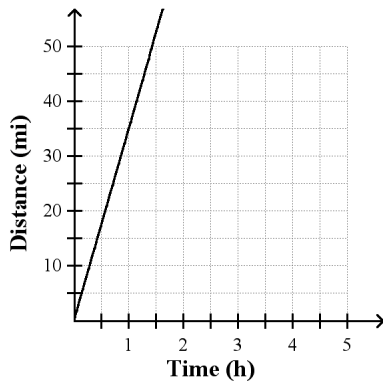
a. constant speed; 17.5 mi/h   c. constant speed; 35 mi/h
b. constant speed; 70 mi/h   d. variable speed; 70 mi/h

____ 3. The graph shows the relationship between the number of hours h Greg has been driving and the total distance d he has traveled, in miles.
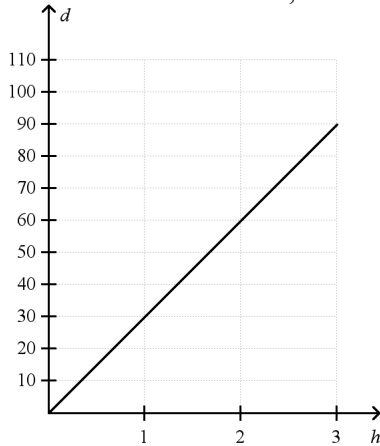
Which statement is true?
a.   Greg is traveling at 90 miles per hour.
b.   Greg is traveling at 30 miles per hour.
c.   To find Greg's rate of speed, multiply the total number of hours driven by the total distance.
d.   To find Greg's rate of speed, divide the total number of hours driven by the total distance.

____ 4. The cost C, in dollars, of a prepaid cell phone call is proportional to the time t, in minutes, that the call lasts. The equation that represents this relationship for carrier A is $C_A = 0.15t$. The table shows the relationship for carrier B. Which carrier has a lower unit rate?

Time (minutes)	Cost (dollars)
2	0.24
5	0.60
10	1.20
30	3.60

a.   Carrier A
b.   Carrier B
c.   Carrier A and carrier B have the same unit rate.
d.   The relationship cannot be determined.

_____ 5. The number of pages *p* that a laser printer prints is proportional to the printing time *t*, in minutes. Printer A prints 104 pages in 4 minutes. The table shows the relationship between the amount of time and the number of pages printed for printer B. Which printer prints more slowly?

Time (minutes)	Pages printed
3	84
5	140
9	252
14	392

    a.   Printer A
    b.   Printer B
    c.   Printer A and printer B have the same unit rate.
    d.   The relationship cannot be determined.

_____ 6. The cost *C*, in dollars, for advertising on a social networking website is proportional to the number *n* of clicks on the advertisement. Suppose a business is charged \$45 for 180 clicks on its advertisements. What is the slope of the line that represents the relationship between cost and clicks?

    a.   4
    b.   1
    c.   0.25
    d.   The slope cannot be determined.

_____ 7. Tell whether the data set represents a direct variation. If so, identify the constant of variation and then write the direct variation equation.

Number of Baskets, *x*	Cost, *y*
2	\$8
5	\$28
8	\$33
9	\$44
14	\$63

    a.   direct variation, $k = 4$; $y = 4x$ c.   not a direct variation

    b.   direct variation; $k = \frac{1}{4}$; $y = \frac{1}{4}x$ d.   direct variation; $k = 6$; $y = 6x$

____ 8. Tell whether the graph represents a direct variation. If so, identify the constant of variation and then write the direct variation equation.
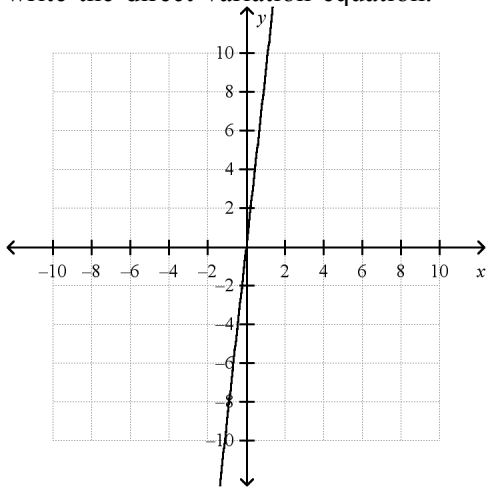

a. The graph represents a direct variation with $k = -9$. The equation is $y = -9x$.
b. The graph represents a direct variation with $k = 9$. The equation is $x = 9y$.
c. The graph does not represent a direct variation.
d. The graph represents a direct variation with $k = 9$. The equation is $y = 9x$.

____ 9. Patrick pays $10 per month for recycling. He expects the cost to increase 90¢ every 3 years. What is the slope that represents his cost change per year?
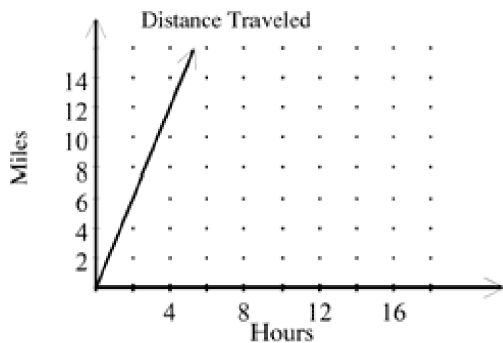a. 90
b. 10
c. 3
d. 0.3

Short Answer

1. Garden soil can be purchased for $9.00 per cubic yard. This situation can be modeled by the equation $y = 9x$. Complete the table of values and graph the equation.

x	0	1	2	3	4	5
y	?	9	?	?	?	?
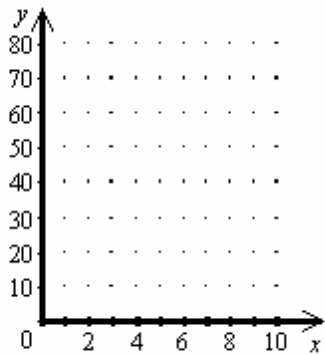
2. The graph below shows the distance traveled by a person walking at a rate of 3 miles per hour. The equation is $d = 3t$ where t is the number of hours and d is the distance traveled.

Sketch a graph that represents the distance traveled by a person who can jog at a rate of 6 miles per hour.

3. A remote-controlled truck travels 108 feet in 6 seconds and always travels at this rate.

   The table shows the proportional relationship between the distance a remote-controlled car travels and the time.

Time (seconds)	Distance (feet)
3	63
5	105
8	168
12	252

   Which remote-controlled vehicle travels faster? Show your work to explain your reasoning.

4. Sally can paint 90 ft² of wall per hour.

   A. Write an equation that describes how many square feet of wall she can paint over time.
   B. Then make a table of values to show how many square feet she can paint over the first 4 hours.
   C. Finally, graph the relationship.
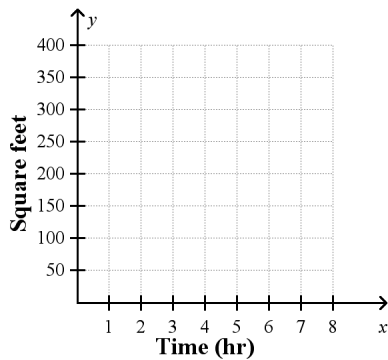
5. **Short Response**
   The following measurements were taken of a tree.

Age	5 months	8 months	13 months	15 months
Height	1.4 feet	2.24 feet	3.64 feet	4.2 feet

   A. Are the age and height proporitonal?

   B. If so, write the equation. If not, explain why not. **Show your work as evidence for your answer.**

Problem

1. Two runners start at the same time from the same point on a track. Runner A
   runs at a constant rate of 5 miles per hour. Runner B runs at a constant rate of 4 miles
   per hour.

   A. Write an equation for each of the two runners.
   B. Make a table of values showing how far each would travel over 5 hours.
   C. On the same set of axes (same coordinate plane), sketch and label a graph of each of the two
   equations.
   D. Be sure to set up the graph with all required componenets.
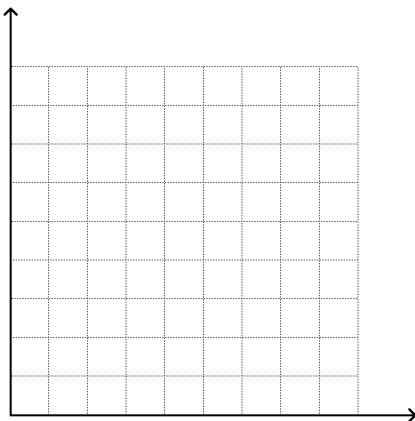
   c. For an arbitrary time t, draw a vertical line segment connecting the two graphs. This segment
       represents the lead, in miles, that runner A has over runner B at time t. Letting ℓ represent this lead,
       write an equation for ℓ. Is ℓ proportional to t? Explain your reasoning.
   d. The distance around the track is 0.25 mile. Using the equation from part c, find an expression for the
       time at which runner A is 1 lap ahead of runner B.
   e. Suppose runner A's rate is 5.5 miles per hour while runner B's rate is 5.0 miles per hour. How much
       time does it take runner A to be 1 lap ahead of runner B?

Test Review November 2014
Answer Section

MULTIPLE CHOICE

1. ANS: B
   The unit rate for carrier A is $0.15 per minute.

   To find the unit rate for carrier B, divide the cost by the time for any data pair in the table.
   $$\frac{\text{Cost}}{\text{Time}} = \frac{0.24}{2} = 0.12$$
   The unit rate for carrier B is $0.12 per minute.

   Carrier B has a lower unit rate than carrier A.

	Feedback
A	You should compare the cost per minute for each carrier.
B	That's correct!
C	Check to see if the equation for carrier A would generate the same table of costs as given for carrier B.
D	You can find the cost per minute for each carrier from the given information.

   PTS: 1   NAT: NT.CCSS.MTH.10.8.8.EE.5
   KEY: proportional relationship | unit rate | comparing proportional relationships
   DOK: DOK 2

2. ANS: C
   The graph is a line, so the boat is traveling at a constant speed.

   The amount of distance is the rise, and the amount of time is the run. You can find the speed by finding the slope of the line.

   To find the speed, use two points on the line such as (0, 0) and (1, 35) to find the slope of the line.
   $$\text{slope} = \frac{\text{rise}}{\text{run}}$$

	Feedback
A	The amount of distance is the rise, and the amount of time is the run.
B	You can find the speed by finding the slope.
C	Correct!
D	The graph of a constant rate of change is a line. The graph of a variable rate of change is not a line.

   PTS: 1   OBJ: Using Rate of Change to Solve Problems
   TOP: Slope and Rates of Change   KEY: rate of change | solving

3. ANS: B   PTS: 1   NAT: NT.CCSS.MTH.10.8.8.EE.5
   KEY: proportional relationships   DOK: DOK 1

1

4. ANS: B
   The unit rate for carrier A is $0.15 per minute.

   To find the unit rate for carrier B, divide the cost by the time for any data pair in the table.
   $$\frac{\text{Cost}}{\text{Time}} = \frac{0.24}{2} = 0.12$$
   The unit rate for carrier B is $0.12 per minute.

   Carrier B has a lower unit rate than carrier A.

	Feedback
A	You should compare the cost per minute for each carrier.
B	That's correct!
C	Check to see if the equation for carrier A would generate the same table of costs as given for carrier B.
D	You can find the cost per minute for each carrier from the given information.

   PTS: 1   NAT: NT.CCSS.MTH.10.8.8.EE.5
   KEY: proportional relationship | unit rate | comparing proportional relationships
   DOK: DOK 2

5. ANS: A
   To find the unit rate for printer A, divide the given number of pages printed by the given time.
   $$\frac{\text{Pages}}{\text{Time}} = \frac{104}{4} = 26$$
   The unit rate for printer A is 26 pages per minute.

   To find the unit rate for printer B, divide the number of pages printed by the time for any data pair in the table.
   $$\frac{\text{Pages}}{\text{Time}} = \frac{84}{3} = 28$$
   The unit rate for printer B is 28 pages per minute.

   Since the unit rate for printer A is less than the unit rate for printer B, printer A prints more slowly than printer B.

	Feedback
A	That's correct!
B	You should compare the pages per minute for each printer.
C	You should compare the pages per minute for each printer.
D	You can find the pages per minute for each printer from the given information.

   PTS: 1   NAT: NT.CCSS.MTH.10.8.8.EE.5
   KEY: proportional relationship | unit rate | comparing proportional relationships
   DOK: DOK 2

6. ANS: C

The slope of the line is the unit rate, which is the cost per click. Divide the given cost by the given number of clicks.

$$\frac{45}{180} = 0.25$$

Since the unit rate is $0.25 per click, the slope of the line representing the relationship between cost and clicks is 0.25.

	Feedback
A	The unit rate is not $4 per click.
B	The unit rate is not $1 per click.
C	That's correct!
D	The unit rate for this relationship can be found from the given information.

PTS: 1   NAT: NT.CCSS.MTH.10.8.8.EE.5
KEY: proportional relationship | unit rate | slope   DOK: DOK 1

7. ANS: C

Find $\frac{y}{x}$ for each ordered pair. If $\frac{y}{x}$ is the same for all ordered pairs in the data set, then the data set represents a direct variation.

	Feedback
A	The data set represents a direct variation if the cost divided by the number of baskets is the same.
B	Compare the ratios of cost to number of baskets.
C	Correct!
D	Divide the cost by the number of baskets to see if this data set represents a direct variation.

PTS: 1   OBJ: Identifying a Direct Variation from a Table
TOP: Direct Variation
KEY: direct variation | linear equation | table | constant of variation
NOT: 978-0-55-402984-9

8. ANS: D

The graph is a line that passes through $(0,0)$. This is a direct variation.

The slope of the line is 9, so $k = 9$.

The equation is $y = 9x$.

	Feedback
A	The slope of the line of direct variation is also the constant of variation, *k*.
B	A direct variation equation is in the form $y = kx$.
C	If the graph is a line that passes through the origin, then it is a direct variation.
D	Correct!

PTS: 1   OBJ: Identifying a Direct Variation from a Graph
TOP: Direct Variation
KEY: direct variation | linear equation | graph | constant of variation
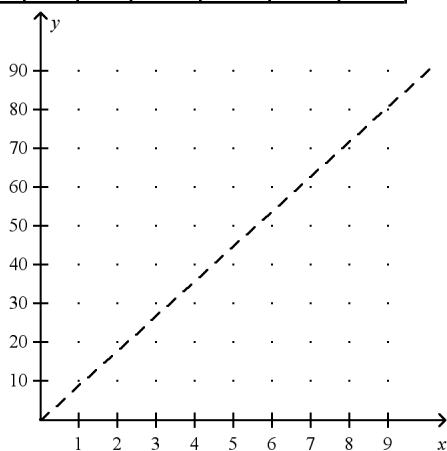NOT: 978-0-55-402984-9

9. ANS: D   PTS: 1   NAT: NT.CCSS.MTH.10.8.8.F.4
DOK: DOK 1

SHORT ANSWER

1. ANS:

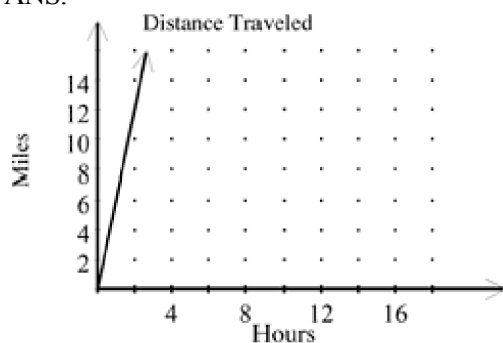| x	0	1	2	3	4	5
y	0	9	18	27	36	45

PTS: 1   REF: MLC30309   NAT: NT.CCSS.MTH.10.8.8.EE.5
TOP: Graphs of Linear Equations   KEY: equation | word | model | linear | graph
DOK: DOK 2

2. ANS:

Distance Traveled

PTS: 1   REF: MMT30321
NAT: NT.CCSS.MTH.10.8.8.F.5 | NT.CCSS.MTH.10.8.8.EE.5
STA: AK.AKGLE.MTH.05.8.F&R-2   TOP: Slope-Intercept Form
KEY: linear | graph | word   DOK: DOK 2

3. ANS:
To determine the unit rate for the remote-controlled truck, divide the given distance by the given time.

$$\frac{Distance}{Time} = \frac{108}{6} = 18$$

The remote-controlled truck has a unit rate of 18 feet per second.

To determine the unit rate for the remote-controlled car, divide the distance by the time for any data pair in the table.

$$\frac{Distance}{Time} = \frac{63}{3} = 21$$

The remote-controlled car has a unit rate of 21 feet per second.

Since the remote-controlled car has a greater unit rate than the remote-controlled truck, the remote-controlled car travels faster.

Rubric
1 point for answer; 2 points for explanation
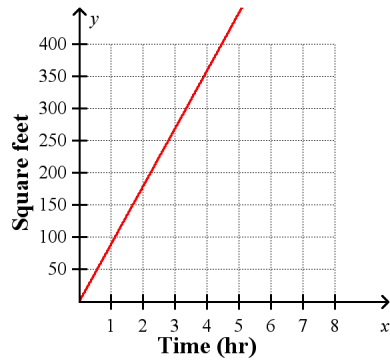
PTS: 3   NAT: NT.CCSS.MTH.10.8.8.EE.5 | NT.CCSS.MTH.10.K-12.MP.3
KEY: proportional relationship | unit rate | comparing proportional relationships
DOK: DOK 2

4. ANS:
$y = 90x$

Input	Rule	Output
x	$90x$	y
0	90(0)	0
2	90(2)	180
4	90(4)	360

PTS: 1   TOP: Graphing Linear Functions
KEY: graph | linear function | Performance Assessment   NOT: 978-0-55-402984-9

5. ANS:
   Yes, the ratio of height to age is constant.

   5 months:
   $y = kx$

   $1.4 = k(5)$

   $k = \frac{1.4}{5} = 0.28$

   8 months:
   $y = kx$

   $2.24 = k(8)$

   $k = \frac{2.24}{8} = 0.28$

   13 months:
   $y = kx$

   $3.64 = k(13)$

   $k = \frac{3.64}{13} = 0.28$

   15 months:
   $y = kx$

   $4.2 = k(15)$

   $k = \frac{4.2}{15} = 0.28$

   The equation is $y = 0.28x$, where x is the age of the tree in months and y is the height of the tree in feet.

   PTS: 1   OBJ: Identifying a Direct Variation from a Table
   TOP: Direct Variation
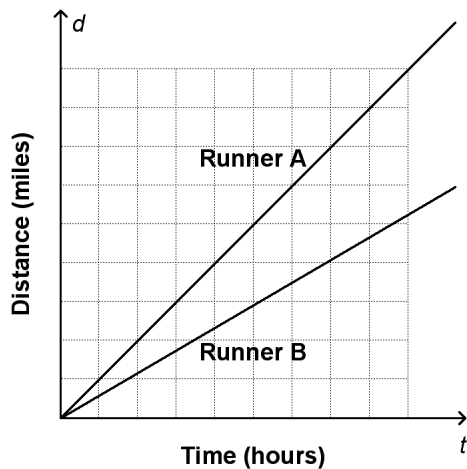   KEY: direct variation | linear equation | table | constant of variation
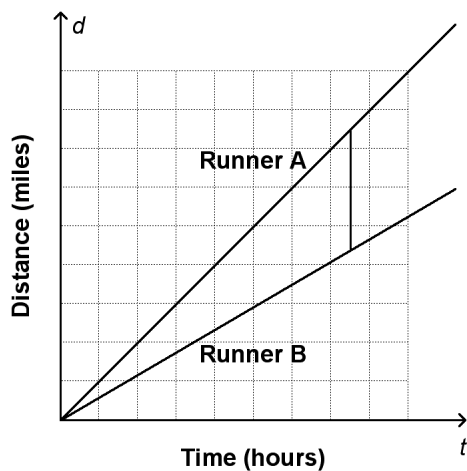   NOT: 978-0-55-402984-9

PROBLEM

1. ANS:
   a. $d_B = r_B t$
   b.

   c.

The lead ℓ that runner A has on runner B after t hours is the difference between d_A and d_B.

$$\ell = d_A - d_B$$

$$= r_A t - r_B t$$

$$= \left(r_A - r_B \right) t$$

ℓ is proportional to t because $\ell = \left(r_A - r_B \right) t$ is in the form $\ell = at$ where a is a nonzero constant.

   d. $\dfrac{0.25}{r_A - r_B}$

   e. $\dfrac{0.25}{r_A - r_B} = \dfrac{0.25}{5.5 - 5.0} = \dfrac{0.25}{0.5} = 0.5$

It takes 0.5 hour for runner A to be 1 lap ahead of runner B.

Rubric

a. 1 point
b. 0.5 point for each line and label; 0.5 point for each set of axis labels
c. 0.5 point for the vertical line segment; 0.5 point for the equation; 1 point for the explanation
d. 1 point
e. 1 point

PTS: 7
NAT: NT.CCSS.MTH.10.8.8.EE.5 | NT.CCSS.MTH.10.K-12.MP.2 | NT.CCSS.MTH.10.K-12.MP.4
KEY: proportional relationship | comparing proportional relationships
DOK: DOK 3