Name: _____ **Class:** _____ **Date:** _____ **ID: A**

MSA REVIEW

Short Answer

1. **a.** Jason is participating in a walkathon. He writes the equation $m = 2d + 50$ to represent the amount of money he collects from each sponsor for walking d kilometers. What number represents the rate of change?

   b. Cierra is keeping track of the amount of money in her lunch account each week. She writes the equation $A = -6w + 40$. What number represents the rate of change?

2. Mark opens a bank account with $20. Each week he plans to put in $5.

   a. Make a table to show the ***total*** amount of money Mark has in his bank account. Show the amount he has in his account from 0 to 10 weeks.

   b. Make a graph that matches the table.

Table	Graph
	

   c. Write an equation to represent the ***total*** money Mark has in his account over time.

   d. In which week will Mark have a total of $60. Explain your reasoning.

3. **Multiple Choice**
   Which of the following expressions is not equivalent to the others? Explain.

   A. $6(x - 1) + 5$ **B.** $6x - 1$ **C.** $6(1 - x) + 5$ **D.** $5 + 6x - 6$

4. Solve each equation for x. Show your work.
   a. $3x + 8 = 35$ **b.** $12 + 5x = 7x + 3$ **c.** $3(x + 1) = 12$

5. Solve each equation to find the value of x.

   a. $4x + 10 = 22$

   b. $3x + 9 = 6x$

   c. $2(x + 3) = 18$

   d. $2x + 15 = 27 - 4x$

6. Rachael's backyard swimming pool is being emptied by a pump. The amount of water in the pool (W, measured in gallons) at any time (t, measured in hours) is given by the following equation:

   $$W = 9{,}000 - 250t$$

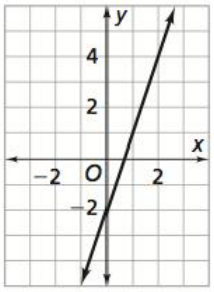
   a. How many gallons of water are being pumped out each hour? Explain how you got your answer.

   b. After 11 hours, how much water is left in the pool? Explain.

   c. How much water was in the pool at the start? Explain.

   d. How long will it take the pool to empty? Explain.

7. Use the graph at the right.



   a. Find the slope of the line.

   b. Find the equation of the line.

8. Does the table below represent a linear relationship? If so, write an equation for that relationship. If not, explain.

Time (s)	Distance (m)
0	11
3	17
7	25
9	29
10	31

9. Does the table below represent a linear relationship? Explain how you know.

x	*y*
0	0
1	15
2	30
3	45
4	60

10. The pep club is going to sell bouquets of flowers during the homecoming game. They represent their sales, R, and costs, C, with the following equations.

    $R = 5.50x$ $C = 250 + 1.25x$ x is the number of bouquets.

    a. When is the pep club's sales equal to their costs? Explain how you got your answer.

    b. What is the y-intercept for the line of each equation? What does it mean in this context?

    c. What is the constant rate of change for each relationship? What does it mean in this context?

11. Find the slope and y-intercept of the line represented by each equation.

    a. $y = 2x - 10$ **b**. $y = 4x + 3$ **c**. $y = 4x - 4.5$

    d. $y = 2.6x$ **e**. $y = 7x + 1$

12. To encourage customers, a new movie theater is offering different ways to pay for a movie.
    - Members: \$75 a year plus \$2 per movie.
    - Nonmembers: \$5.75 to see a movie.

a. Make one table that shows the number of movies n and the cost for members C_1. Make another table that shows the number of movies n and the cost for nonmembers C_2. For both tables, include values of n from 0 to 50 movies, in increments of 10.

b. On the same set of axes, graph the relationship of cost and number of movies for members and for nonmembers.

c. Write equations that you can use to calculate the cost for members C_1 and non-members C_2, for any number of movies n.

Equation for members: _____

Equation for nonmembers: _____

d. What is the sllope of each line in part (c)?

Slope of equation for members: _____

Slope of equation for nonmembers: _____

e. What information does the slope of each line represent about the member and nonmember costs?

f. Explain how you could find slope from a table, a graph, and an equation.

g. What information does the y-intercept of each line represent about the member and nonmember costs?

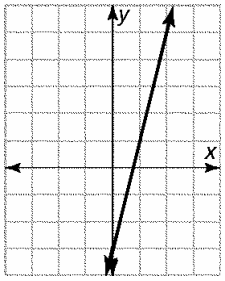
h. For what number of movies will the cost be the same for both members and nonmembers? Explain how you found your answer.

13. **a**. This table shows two points that are on the same straight line. Complete the table to show three other points on the same line.

x	−3				1
y	−2				6

b. Find the slope and the y-intercept of this line that represents the data.

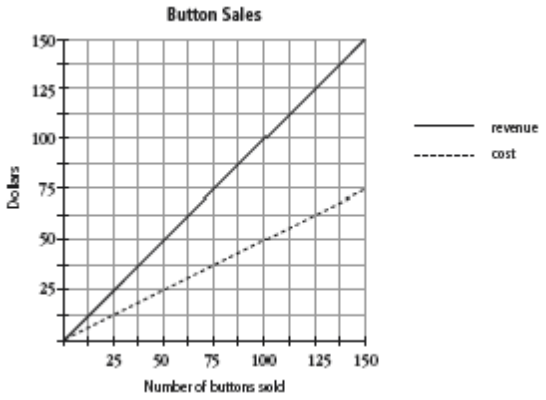
14. Given one of the representations below, find the other two.

Table	x | y −2 | 14 0 | 8 1 | 5 2 | 2 3 | −1		
Graph			
Equation			$y = \frac{1}{3}x + 1$

a. Find the y-intercept for each representation above.

b. Find the slope for each representation above.

15. The volleyball team decided to raise money for an end-of-season party by selling school buttons. The costs and the revenue of selling the buttons are shown on the graph below.



a. If the team sells 50 buttons, what will be their cost? What will be the revenue?

b. If the team sells 50 buttons, how much profit will they make? (Remember that the profit is the revenue minus the cost.)

c. If the team sells 100 buttons, how much profit will they make?

16. The equations below represent the distances in meters traveled after t seconds by three cyclists.

a. For which equation does the point (10, 74) lie on the graph? Explain.

i. $D = 2.4t + 32$ **ii**. $D = 4.2t + 32$ **iii**. $D = 6t + 32$

b. For each equation, give the coordinates of a point on the graph of the equation.

17. If $y = \frac{2}{3}x + 4$, find y if

a. $x = 0$ **b.** $x = 3$ **c.** $x = 9$

d. $x = -9$ **e.** $x = 10$ **f.** $x = \frac{1}{2}$

18. On Saturdays, Jim likes to go to the mall to play video games or pinball. Round-trip bus fare to and from the mall is $1.80. Jim spends $0.50 for each video or pinball game.

a. Write an equation for the amount of money, M, it costs Jim to go to the mall and play n video or pinball games. Explain your reasoning.

b. What is the slope of the line your equation represents? What does the slope tell you about this situation?

c. What is the y-intercept of the line? What does the y-intercept tell you about the situation?

d. How much will it cost Jim to travel to the mall and play 8 video or pinball games?

e. If Jim has $6.75, how many video or pinball games can he play at the mall?

19. In (a) – (f), write an equation for the line that satisfies the given conditions.
    a. The slope is 7 and the y-intercept is -2.
    b. The slope is 0 and the y-intercept is 9.18.
    c. The line passes through the points (3, 1) and (6, 4).
    d. The line passes through the points (–24, –11) and (–8, –3).
    e. The line passes through the points (–4.5, 2) and (6.3, 5.8).
    f. The slope is $-\frac{2}{3}$ and the line passes through the point (5, 0).

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

____ 1. Which of the following data sets is linear?

A.

x	3	4	5	6
y	5	7	10	15

B.

x	3	4	5	6
y	6	9	12	15

C.

x	3	4	5	6
y	9	16	25	36

D.

x	3	4	5	6
y	3	9	27	81

____ 2. Which of the following is linear?
A. $y = 2 + 3x$ B. $y = 2x(x + 5)$ C. $y = 4x^2$ D. $y = 2^x$

____ 3. What is the equation of the line that contains the points (2, 13) and (6, 33)?
A. $y = \frac{1}{5}x + 3$ C. $y = \frac{1}{5}x + 5$
B. $y = 5x + 5$ D. $y = 5x + 3$

____ 4. The rate of change is constant in the table. Find the rate of change. Explain what the rate of change means for the situation.

Time (hours)	Distance (miles)
4	260
6	390
8	520
10	650

A. 10; Your car travels for 10 hours.

B. 260; Your car travels 260 miles.

C. $\frac{65}{1}$; Your car travels 65 miles every 1 hour.

D. $\frac{1}{65}$; Your car travels 65 miles every 1 hour.

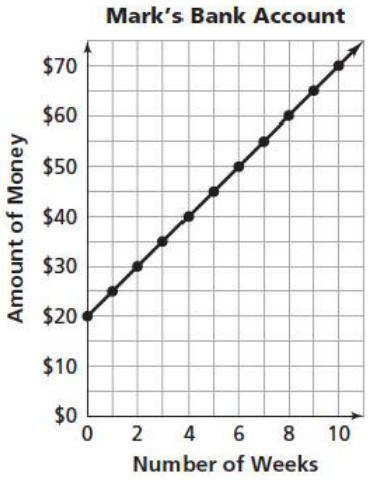
MSA REVIEW
Answer Section

SHORT ANSWER

1. **a.** The coefficient of d is the rate of change, so Jason collects \$2 per kilometer.
   b. The equation can be written as $A = 40 + (-6w)$, so the rate of change is –6 dollars per week.
2. **a.**

Week	Money in Account
0	\$20
1	\$25
2	\$30
3	\$35
4	\$40
5	\$45
6	\$50
7	\$55
8	\$60
9	\$65
10	\$70

   b.



   c. $y = 20 + 5x$
   d. Week 8; If you use the table, you can look to see where \$60 appears in the Money in Account column, which is Week 8. If you use the graph, find 60 on the y-axis and see where that intersects with the line, then follow it down to see which week goes with that value. If you use the equation, substitute \$60 in for y (which represents the total amount of money in the account) and solve the equation for x (which represents the week).
3. C; When simplified, the other three expressions are equivalent to $6x - 1$. When choice C is simplified, the expression is $-6x + 11$.
4. **a.** $x = 9$
   b. $x = 4.5$
   c. $x = 3$

5. **a.** $x = 3$
   b. $x = 3$
   c. $x = 6$
   d. $x = 2$
6. **a.** 250 gallons are being pumped out of Rachel's pool per hour. The coefficient of t is –250, so as 1 hour passes, W decreases by 250. Students could also make a table of values or a graph and see the same rate of change.

   b. After 11 hours, there are 9000 – 250(11) = 6250 gallons left in the pool. Students may use a table, a graph, or numeric reasoning.

   c. When $t = 0$, $W = 9{,}000$, so 9,000 gallons were in the pool at the start.

   d. It takes 36 hours to empty the pool. Students should first find the value of t when $W = 0$. They can use a table, a graph, or an equation. If they use an equation, they should set $W = 0$ and solve for t: $9{,}000 - 250t = 0$

   $$t = 36$$

7. **a.** The slope is 3. Encourage students to check several points on the line. For example, the slope using (0, 2) and (1, 1) is 3, as is the slope between (1, 1) and (2, 4).
   b. $y = 3x - 2$
8. Yes. The equation is $y = 2x + 11$.
9. Yes; Since as x increases by one y increases by 15. There is a constant rate of change.
10. **a.** To find out when the revenue (income) and cost are equal, we find x so that $5.50x = 250 + 1.25x$. We can solve this by graphing or by using tables or by using a symbolic method. To solve by graphing, draw the two linear graphs and find their point of intersection (student would have to estimate the actual intersection point). To solve symbolically:

    $$4.25x = 250$$
    $$x \approx 58.8, \text{ so about 59 bouquets.}$$

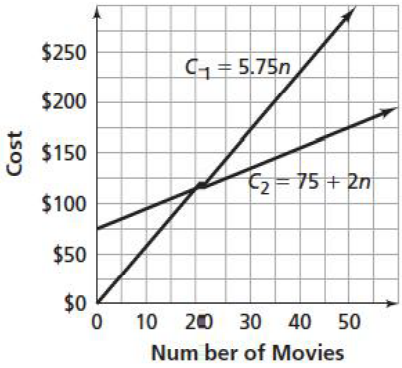
    When they sell 59 bouquets, the cost and revenue will both be approximately \$324. Students may also write that if they sell 58 bouquets, they will have a slight loss, and if they sell 59 bouquets, they will make a slight profit.
    b. The y-intercept for the revenue equation is (0, 0) because if the store sells no bouquets, they will make no money. The y-intercept for the cost equation is (0, 250) because even if the store does not sell a single bouquet, the operation will cost them \$250.
    c. The constant rate of change for the revenue function is 5.5. This means that for each bouquet they sell, they will bring in \$5.50. The constant rate of change for cost is 1.25, which means that each bouquet will cost an additional \$1.25 over the original start-up cost.
11. **a.** slope is 2; y-intercept is –10
    b. slope is 4; y-intercept is 3
    c. slope is 4; y-intercept is –4.5
    d. slope is 2.6; y-intercept is 0
    e. slope is 7; y-intercept is 1

12. **a.**

n	C_1
0	75
10	95
20	115
30	135
40	155
50	175

n	C_2
0	0
10	57.50
20	115.00
30	172.50
40	230.00
50	287.50

b.



c. $C_1 = 75 + 2n$

$C_2 = 5.75n$

d. The slope of the line for members is 2.
The slope of the other line for nonmembers is 5.75.

e. The slope of each line represents the constant rate of change, or the cost per movie.

f. From the table, you can compare the quantities in any two rows. The slope is the ratio of the change in cost to the change in number of movies. From the graph, you can find the slope using any two points on the line. The slope is the ratio of the vertical change to the horizontal change. From the equations, the slope is the coefficient of n in each equation.

g. The y-intercept represents the cost if a person does not go to the movies at all. For a member, the y-intercept is 75. For a nonmember, the y-intercept is 0.

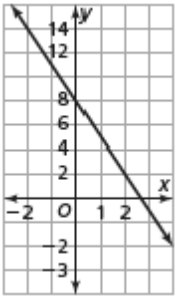
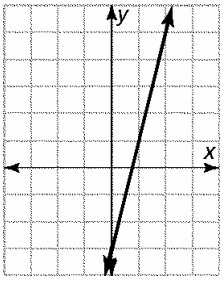
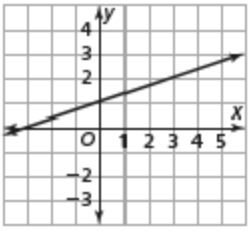
h. 20 movies
$75 + 2x = 5.75x$
$75 = 3.75\ x$
$20 = x$

13. **a.**

x	-3	-2	-1	0	1
y	-2	0	2	4	6

b. slope $= \frac{2}{1} = 2$, y-intercept $= 4$

14.

Table	x | y −2 | 14 0 | 8 1 | 5 2 | 2 3 | −1	x | y 0 | −3 1 | 1 2 | 5	x | y −2 | $\frac{1}{3}$ −1 | $\frac{2}{3}$ 0 | 1 1 | $1\frac{1}{3}$ 2 | $1\frac{2}{3}$
Graph			
Equation	$y = -3x + 8$	$y = 4x - 3$	$y = \frac{1}{3}x + 1$

a. The y-intercepts are 8, –3, and 1.

b. The slopes are –3, 4, and $\frac{1}{3}$.

15. **a**. \$25; \$50
b. \$25
c. \$100 - \$50 = \$50

16. **a**. Equation ii because the point satisfies the equation: 74 = 4.2(10) + 32.
b. Answers will vary.

17. **a**. $y = 4$ **b.** $y = 6$ **c.** $y = 10$
d. $y = -2$ **e.** $y = 10\frac{2}{3}$ **f.** $y = 4\frac{1}{3}$

18. **a**. $M = 0.5n + 1.80$
b. 0.5 is slope; It is the cost of each game.
c. 1.80 is the y-intercept; It is the bus fare.
d. \$5.80
e. Jim can play 9 games, and he will have \$0.45 left over.

19. **a**. $y = 7x - 2$
b. $y = 9.18$
c. $y = x - 2$
d. $y = 0.5x + 1$
e. $y = \frac{19}{54}x + \frac{43}{12}$
f. $y = \frac{10}{3} - \frac{2}{3}x$

MULTIPLE CHOICE

1. B
2. A
3. D
4. C