Exam

Name_____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

1) The total number of reported cases of AIDS in the United States has risen from 372 in 1981   1) _____
to 100,000 in 1989 and 200,000 in 1992. Does a linear equation fit this data? Explain.

Answer: No, the data cannot be modeled by a linear equation because the reported cases are
not increasing at a constant rate. Assume a linear equation, and examine the slope of
the two line segments. The slope of the segment from (0, 372) to (8, 100,000) is
12,453.5 while the slope of the segment from (8, 100,000) to (11, 200,000) is 33,333.
$\overline{3}$.(Explanations will vary.)

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the equation of the least squares line.

2) Two separate tests are designed to measure a student's ability to solve problems. Several students   2) _____
are randomly selected to take both tests and the results are shown below.

Test A (x)	48	52	58	44	43	43	40	51	59
Test B (y)	73	67	73	59	58	56	58	64	74

A) y = 0.930 - 19.4x
B) y = -0.930 + 19.4x
C) y = 19.4 + 0.930x
D) y = -19.4 - 0.930x

Answer: C

Solve the problem.

3) A toilet manufacturer has decided to come out with a new and improved toilet. The fixed cost for   3) _____
the production of this new toilet line is $16,600 and the variable costs are $67 per toilet. The
company expects to sell the toilets for $159. Formulate a function C(x) for the total cost of
producing x new toilets and a function R(x) for the total revenue generated from the sales of x
toilets.

A) C(x) = 16600 + 159x; R(x) = 67x
B) C(x) = 67x; R(x) = 159x
C) C(x) = 16600 + 67x; R(x) = 159x
D) C(x) = 16,667; R(x) = 159

Answer: C

Find the correlation coefficient.

4) The test scores of 6 randomly picked students and the number of hours they prepared are as   4) _____
follows:

Hours	4	10	5	5	3	3
Score	54	99	56	99	70	72

A) -0.2241
B) 0.6039
C) 0.2015
D) -0.6781

Answer: B

5) The following are the temperatures on randomly chosen days and the amount a certain kind of   5) _____
plant grew (in millimeters):

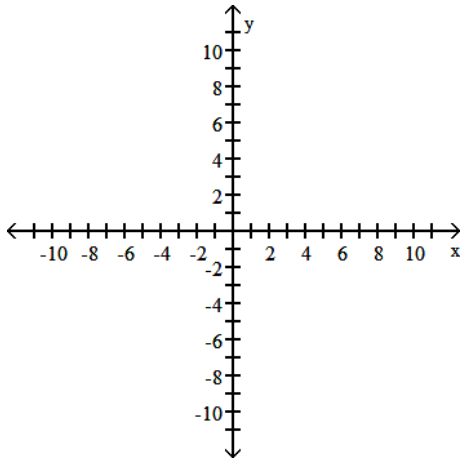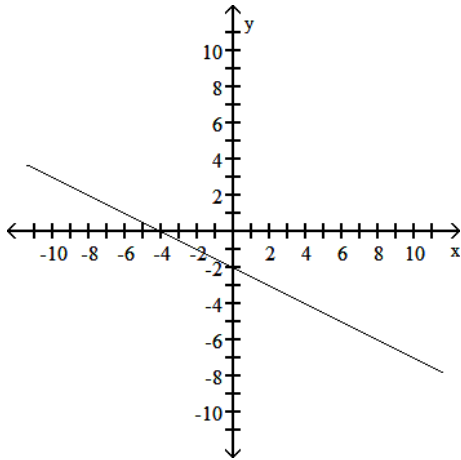| Temp	62	76	50	51	71	46	51	44	79
Growth	36	39	50	13	33	33	17	6	16

A) -0.2105
B) 0.2563
C) 0.1955
D) 0

Answer: C
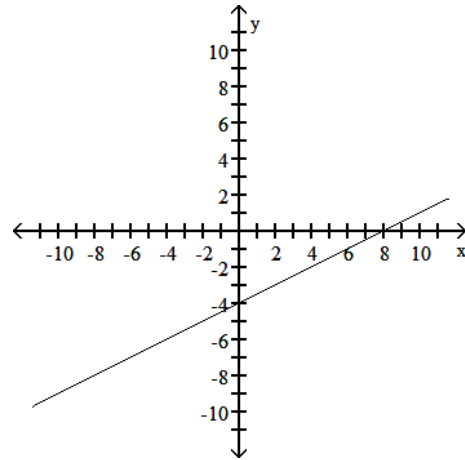
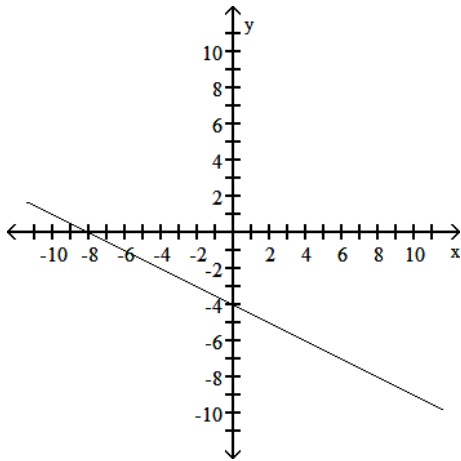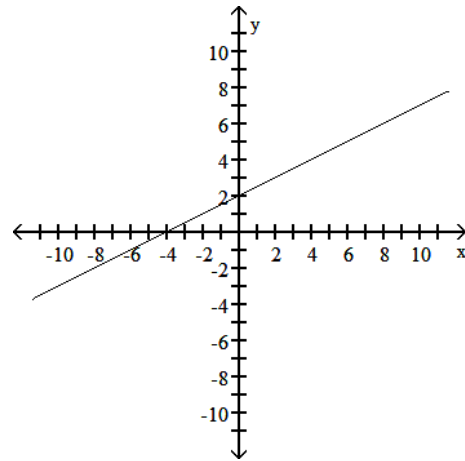1

Graph the equation.

6) $y = -\dfrac{1}{2}x - 4$

6) _____

A)

B)

C)

D)

Answer: C

Solve the problem.

7) A shoe company will make a new type of shoe. The fixed cost for the production will be $24,000. 7) _____
The variable cost will be $31 per pair of shoes. The shoes will sell for $100 for each pair. How
many pairs of shoes will have to be sold for the company to break even on this new line of shoes?
   A) 69 pairs   B) 775 pairs   C) 241 pairs   D) 348 pairs

Answer: D

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

8) Can an equation of a vertical line be written in slope-intercept form? Explain. 8) _____

Answer: No. In the slope-intercept form of the equation of a line, x is multiplied by slope;
however, the slope of a vertical line is undefined. (Explanations will vary.)

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

9) Given the supply and demand functions below, find the demand when p = $12. 9) _____
$S(p) = 5p$
$D(p) = 120 - 4p$
   A) 60   B) 72   C) 48   D) 132

Answer: B

Graph the equation.

10) y = 2 10) _____

A)

B)

3

C)

D)
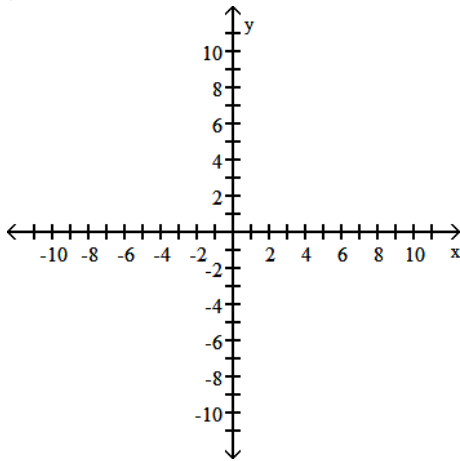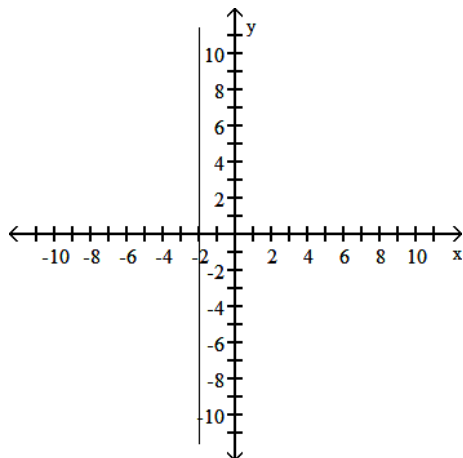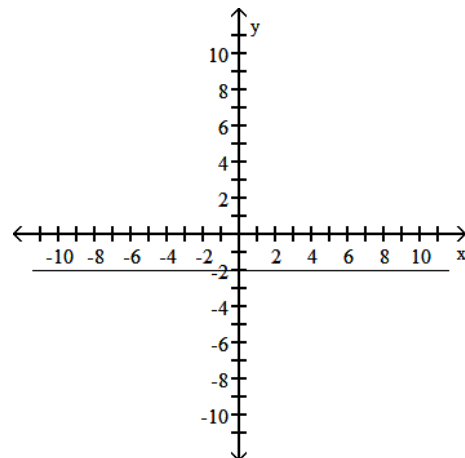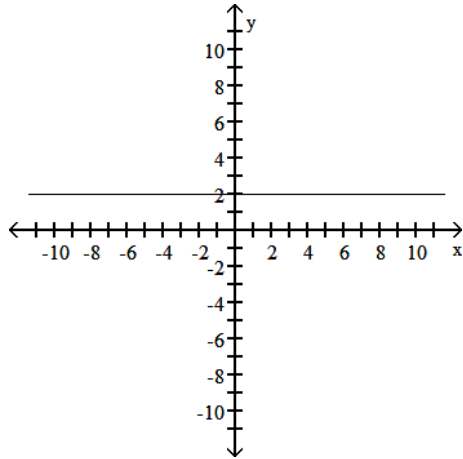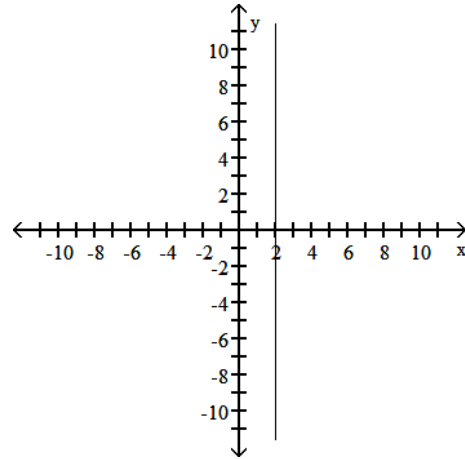
Answer: C

Find the slope of the line.

11) A line parallel to $4y + 3x = 7$

A) $-\frac{4}{3}$ B) $\frac{3}{4}$ C) $\frac{7}{3}$ D) $-\frac{3}{4}$

11) _____

Answer: D

Evaluate the function as indicated.

12) Find $f(-17)$ when $f(x) = 13x - 9$.

A) 212 B) -212 C) -230 D) -221.9

12) _____

Answer: C

Find an equation in slope-intercept form (where possible) for the line.

13) Through $(0, 3)$, $m = \frac{1}{2}$

A) $y = \frac{1}{2}x - 3$ B) $y = \frac{1}{2}x + 3$ C) $y = -\frac{1}{2}x + 3$ D) $y = -\frac{1}{2}x - 3$

13) _____

Answer: B

Solve the problem.

14) The change in a certain engineer's salary over time can be approximated by the linear equation $y = 1500x + 47,500$ where y represents salary in dollars and x represents number of years on the job. According to this equation, after how many years on the job was the engineer's salary $55,000?

A) 4 years B) 7 years C) 6 years D) 5 years

14) _____

Answer: D

Find the slope of the line passing through the given pair of points.

15) $(4, 6)$ and $(8, 7)$

A) 4 B) $\frac{13}{12}$ C) $\frac{1}{4}$ D) $-\frac{1}{4}$

15) _____

Answer: C

Find the slope of the line.

16) $3x - 5y = -40$

A) $-\dfrac{5}{3}$ B) $\dfrac{3}{5}$ C) $-\dfrac{3}{5}$ D) 8

16) _____

Answer: B

Find the equation of the least squares line.

17) The paired data below consist of the costs of advertising (in thousands of dollars) and the number of products sold (in thousands).

17) _____

Cost (x)	9	2	3	4	2	5	9	10
Number (y)	85	52	55	68	67	86	83	73

A) $y = 55.8 - 2.79x$ B) $y = 26.4 + 1.42x$

C) $y = -26.4 - 1.42x$ D) $y = 55.8 + 2.79x$

Answer: D

Find the correlation coefficient.

18) Consider the data points with the following coordinates:

18) _____

x	62	53	64	52	52	54	58
y	158	176	151	164	164	174	162

A) 0   B) 0.7537   C) -0.0810   D) -0.7749

Answer: D

Find the slope of the line.

19)

19) _____
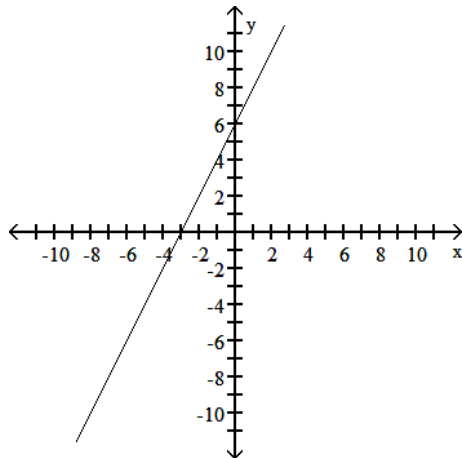
A) 2   B) - 2   C) $-\dfrac{1}{2}$ D) $\dfrac{1}{2}$

Answer: A

20) $4x + 5y = -8$

A) $\dfrac{5}{4}$ B) $\dfrac{4}{5}$ C) $-\dfrac{4}{5}$ D) $-\dfrac{8}{5}$

20) _____

Answer: C

Solve the problem.

21) The information in the chart gives the salary of a person for the stated years. Model the data with a linear function using the points (1, 24,800) and (3, 26,500).

Year, x	Salary, y
1990, 0	$23,500
1991, 1	$24,800
1992, 2	$25,200
1993, 3	$26,500
1994, 4	$27,200

A) y = 28.2x + 23,950
B) y = 850x + 23,950
C) y = -1098x + 23,950
D) y = 850x

21) _____

Answer: B

22) A study was conducted to compare the average time spent in the lab each week versus course grade for computer students. The results are recorded in the table below. Use the equation of the least squares line to predict the grade of a student who spends 7 hours in the lab.

Number of hours spent in lab (x)	Grade (percent) (y)
10	96
11	51
16	62
9	58
7	89
15	81
16	46
10	51

A) 77.0%
B) 75.6%
C) 81.6%
D) 71.6%

22) _____

Answer: B

Find an equation in slope-intercept form (where possible) for the line.

23) Through (0, -1), m = $\frac{3}{4}$

A) $y = \frac{3}{4}x - 1$
B) $y = \frac{3}{4}x + 1$
C) $y = -\frac{3}{4}x - 1$
D) $y = -\frac{3}{4}x + 1$

23) _____

Answer: A

Solve the problem.

24) Northwest Molded molds plastic handles which cost $1.00 per handle to mold. The fixed cost to run the molding machine is $4244 per week. If the company sells the handles for $3.00 each, how many handles must be molded weekly to break even?

A) 1414 handles
B) 4244 handles
C) 1061 handles
D) 2122 handles

24) _____

Answer: D

6

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

25) Why is the slope of a horizontal line equal to zero? Give an example.   25) _____

   Answer: Answers may vary. One possibility: The slope of a horizontal line is equal to zero
           because the y-values do not change as the x-values change. For example, the points
           (3, 4) and (7, 4) are two points on a horizontal line. The slope of this line is zero
           because $m = \dfrac{4 - 4}{7 - 3} = \dfrac{0}{4} = 0$.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

26) Let the demand and supply functions be represented by D(p) and S(p), where p is the price in   26) _____
   dollars. Find the equilibrium price and equilibrium quantity for the given functions.
   D(p) = 4800 - 40p
   S(p) = 160p
      A) $30; 3600   B) $120; 3840   C) $120; 0   D) $24; 3840

   Answer: D

27) A lumber yard has fixed costs of $2682.80 a day and variable costs of $1.00 per board-foot   27) _____
   produced. The company gets $2.90 per board-foot sold. How many board-feet must be produced
   daily to break even?
      A) 1412 board-feet   B) 687 board-feet   C) 941 board-feet   D) 2682 board-feet

   Answer: A

28) On a summer day, the surface water of a lake is at a temperature of 20° Celsius. What is this   28) _____
   temperature in Fahrenheit?
      A) 36°   B) 68°   C) 20°   D) 52°

   Answer: B

Find the slope of the line.

29) A line perpendicular to 6x = 9y - 5   29) _____

   A) $-\dfrac{2}{3}$ B) $\dfrac{3}{2}$ C) $-\dfrac{3}{2}$ D) $-\dfrac{5}{9}$

   Answer: C

Find the correlation coefficient.

30) Consider the data points with the following coordinates: 30) _____

x	121	101	128	160	154	126	134
y	171	152	168	157	164	169	160

      A) -0.0781   B) 0.5370   C) 0.0537   D) 0.2245

   Answer: C

Find an equation in slope-intercept form (where possible) for the line.

31) Through (-4, 4), m = -3   31) _____
      A) y = -3x + 16   B) y = 3x - 8   C) y = 3x + 16   D) y = -3x - 8

   Answer: D

Solve the problem.

32) Suppose that the demand and price for a certain model of graphing calculator are related by $p = D(q) = 99 - 3q$, where p is the price (in dollars) and q is the demand (in hundreds). Find the price if the demand is 300 calculators.

    A) $90.00   B) $108.00   C) $9.00   D) $189.00

32) _____

Answer: A

Find the equation of the least squares line.

33) A study was conducted to compare the average time spent in the lab each week versus course grade for computer students. The results are recorded in the table below.

Number of hours spent in lab (x)	Grade (percent)(y)
10	96
11	51
16	62
9	58
7	89
15	81
16	46
10	51

    A) y = 88.6 - 1.86x   B) y = 1.86 + 88.6x
    C) y = 44.3 + 0.930x   D) y = 0.930 + 44.3x

33) _____

Answer: A

Solve the problem.

34) Let the supply and demand functions for raspberry-flavored licorice be given by

$$p = S(q) = \frac{5}{4}q \quad \text{and} \quad p = D(q) = 60 - \frac{5}{4}q,$$

where p is the price in dollars and q is the number of batches. Graph these functions on the same axes (graph the supply function as a dashed line and the demand function as a solid line). Also, find the equilibrium quantity and the equilibrium price.

34) _____

8

A)
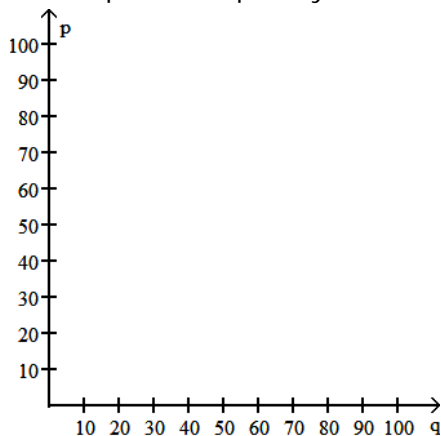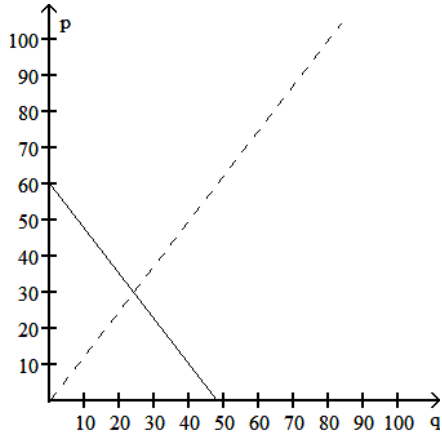
Equilibrium quantity: 24
Equilibrium price: $30.00

B)
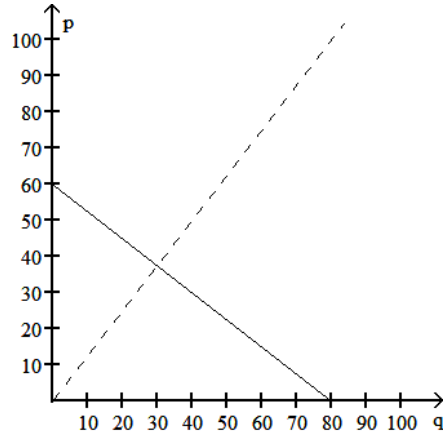
Equilibrium quantity: 37.50
Equilibrium price: $30

C)
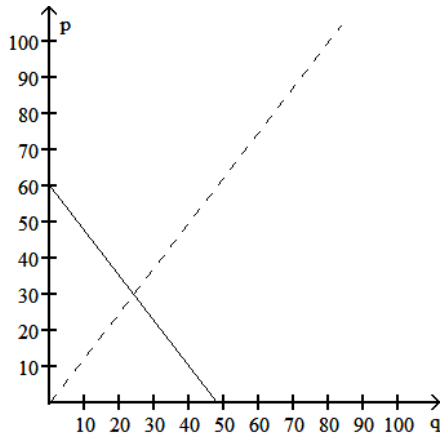
Equilibrium quantity: 30.00
Equilibrium price: $24

D)
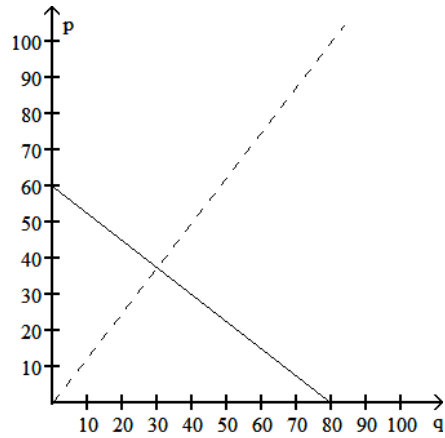
Equilibrium quantity: 30
Equilibrium price: $37.50

Answer: A

Graph the equation.
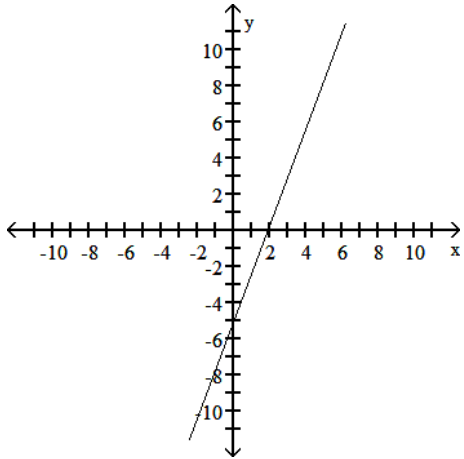
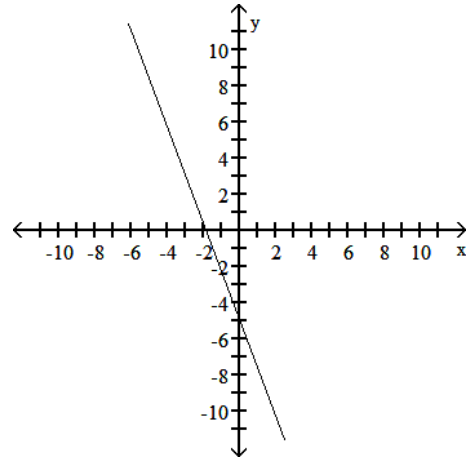35) $3x - 15y = 0$
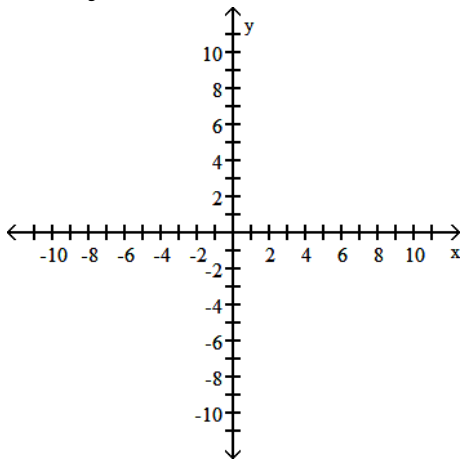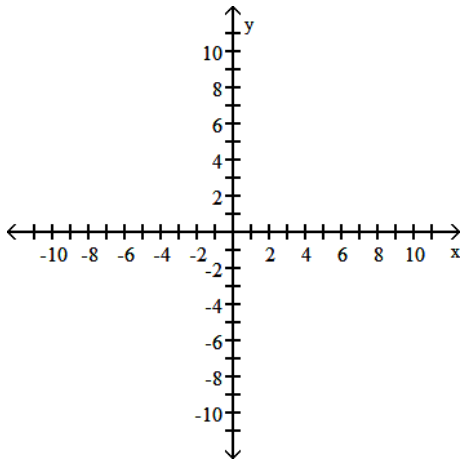

35) _____

A)
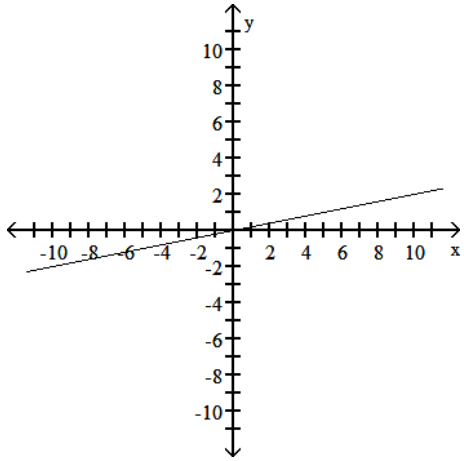
B)
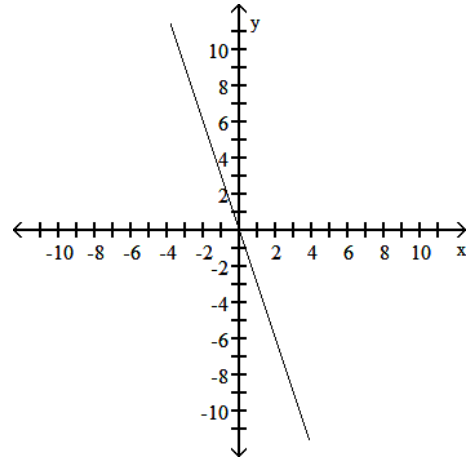
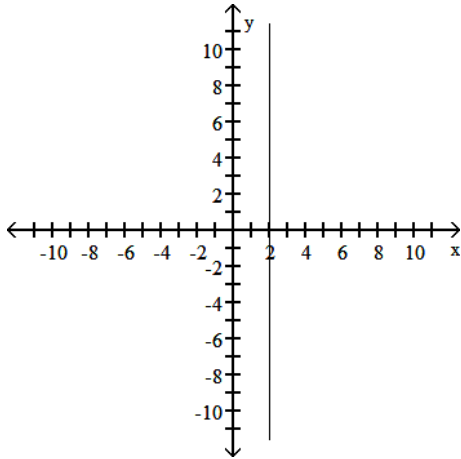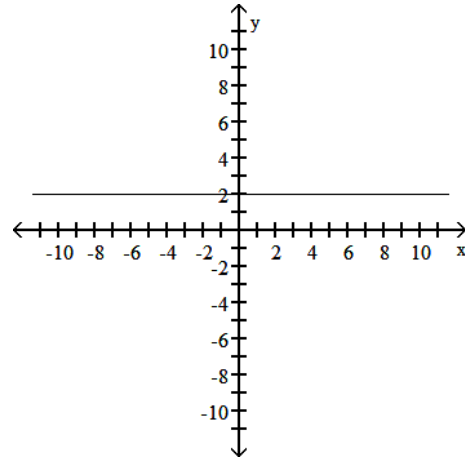C)
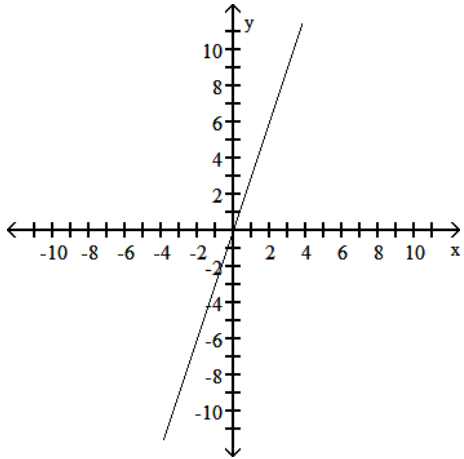
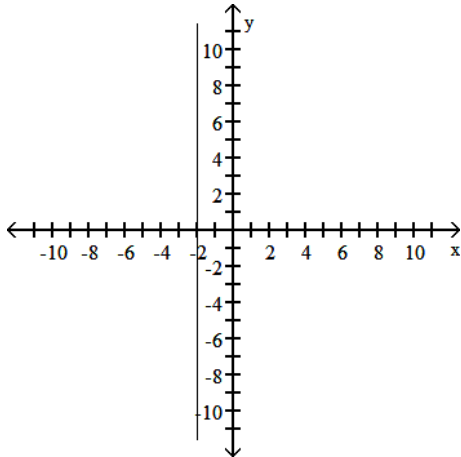D)
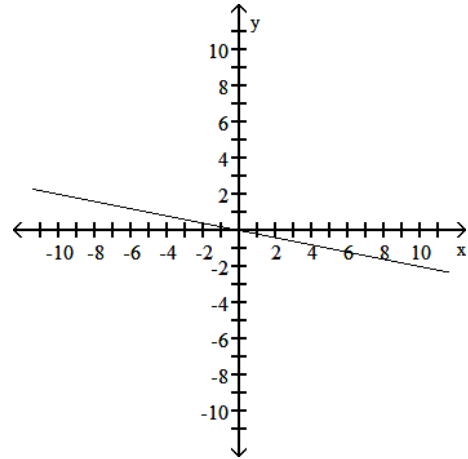
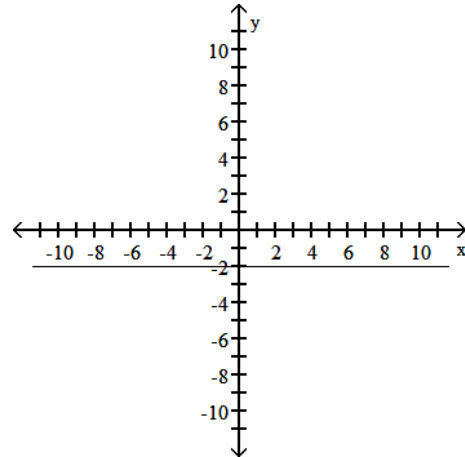Answer: A

36) $3y + 8x = 15$
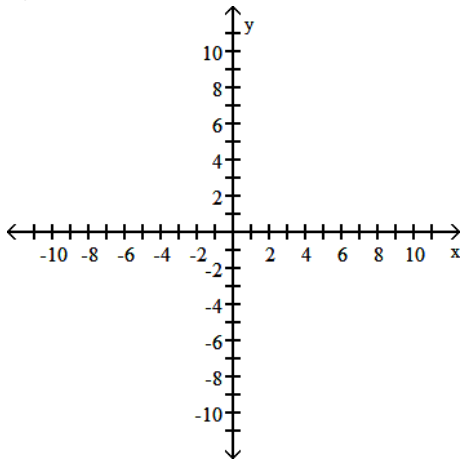
A)
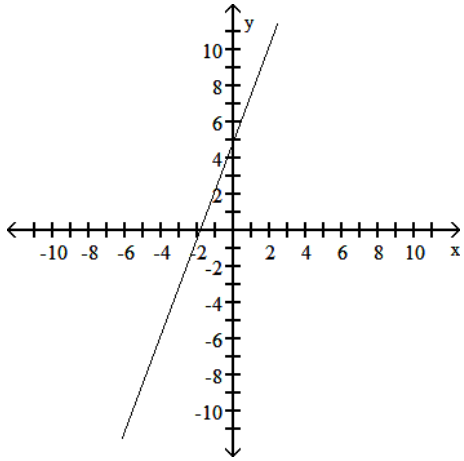
B)

C)

D)

Answer: B

37) x = -2

37) _____

11
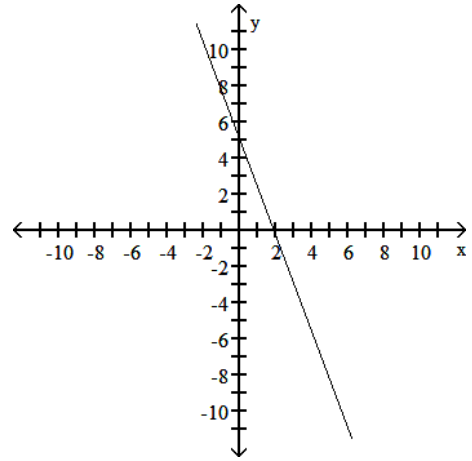
A)

B)

C)

D)

Answer: C

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

38) Give a definition or an example of the word or phrase: Zero slope   38) _____

Answer: An equation such as by + c = 0 has a slope of zero. (Answers may vary.)

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find an equation in slope-intercept form (where possible) for the line.

39) Through (-1, -12), parallel to -5x - 4y = 41   39) _____

A) $y = \frac{5}{4}x + \frac{53}{4}$ B) $y = -\frac{4}{5}x + \frac{12}{5}$ C) $y = -\frac{5}{4}x - \frac{53}{4}$ D) $y = -\frac{1}{4}x - \frac{41}{4}$

Answer: C

12

Solve the problem.

40) For some reason the quality of production decreases as the year progresses at a light bulb   40) _____
manufacturing plant. The following data represent the percentage of defective light bulbs
produced at a light bulb manufacturing plant in the corresponding month of the year.

month (x)	2	3	5	7	8	9	12
% defective (y)	1.3	1.6	2.0	2.4	2.6	2.8	3.1

Use the equation of the least squares line to predict the percentage of defective bulbs in June.
   A) 2.3%   B) 2.0%   C) 2.15%   D) 2.20%

Answer: C

41) A shoe company will make a new type of shoe. The fixed cost for the production will be $24,000.   41) _____
The variable cost will be $38 per pair of shoes. The shoes will sell for $106 for each pair. What is
the profit if 600 pairs are sold?
   A) $62,400   B) $40,800   C) $16,800   D) $64,800

Answer: C

Find the slope of the line passing through the given pair of points.
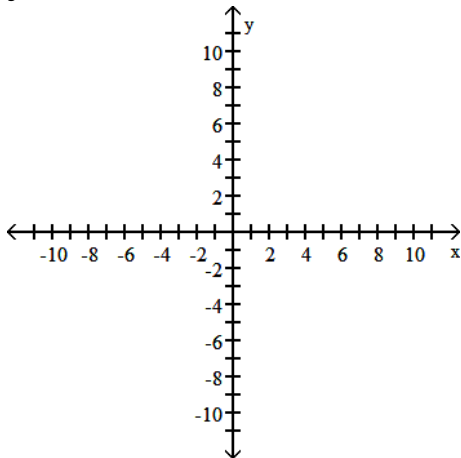
42) (7, -7) and (7, -2)   42) _____

   A) 0   B) $-\dfrac{9}{14}$ C) Not defined   D) $-\dfrac{5}{14}$
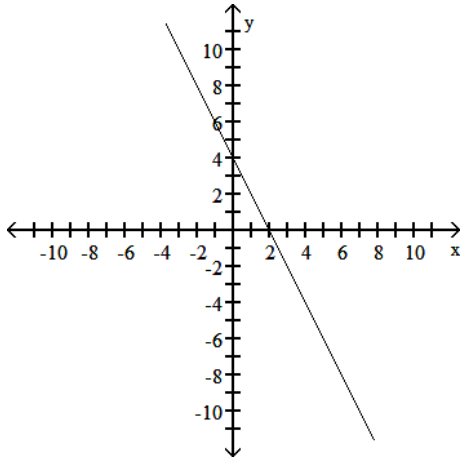
Answer: C

Graph the equation.
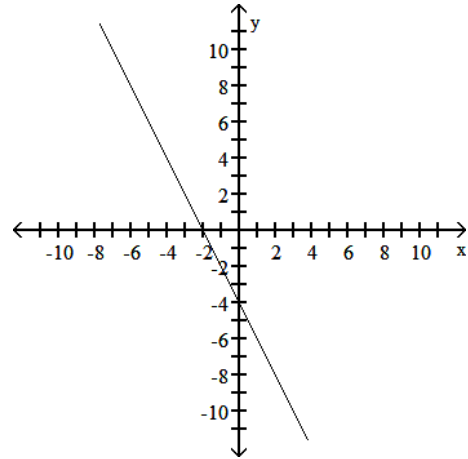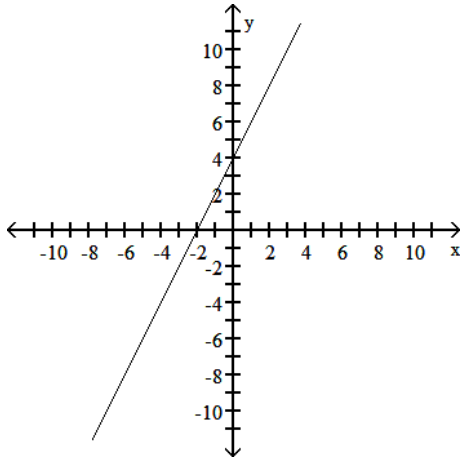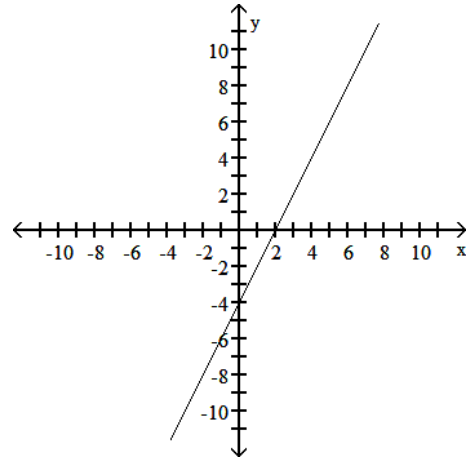
43) $y = -2x - 4$ 43) _____

13

A)

B)

C)

D)

Answer: B

Solve the problem.

44) In a certain city, the cost of a taxi ride is computed as follows: There is a fixed charge of $2.45 as soon as you get in the taxi, to which a charge of $2.30 per mile is added. Find a linear equation that can be used to determine the cost, C, of an x-mile taxi ride.

   A) $C = 2.45x + 2.30$ B) $C = 4.75x$ C) $C = 2.30x + 2.45$ D) $C = 3.25x$

44) _____

Answer: C

45) Let the demand and supply functions be represented by D(p) and S(p), where p is the price in dollars. Find the equilibrium price and equilibrium quantity for the given functions.

$D(p) = 117,250 - 240p$

$S(p) = 430p$

   A) $272; 51,970$ B) $190; 75,250$ C) $190; 71,650$ D) $175; 75,250$

45) _____

Answer: D

46) The outdoor temperature rises to 13° Fahrenheit. What is this temperature in Celsius?

   A) -19°   B) 13°   C) -10.6°   D) 7.2°

46) _____

Answer: C

14

47) In order to receive a B in a course, it is necessary to get an average of 80% correct on two one-hour   47) _____
    exams of 100 points each, on one midterm exam of 200 points, and on one final exam of 500 points.
    If a student scores 92, and 83 on the one-hour exams, and 140 on the midterm exam, what is the
    minimum score on the final exam that the person can get and still earn a B?
    A) 585   B) 450   C) 315   D) 405

Answer: D

Find an equation in slope-intercept form (where possible) for the line.

48) Through (5, 2), m = $-\dfrac{5}{6}$ 48) _____

    A) $y = -\dfrac{5}{6}x + \dfrac{37}{6}$ B) $y = \dfrac{5}{6}x + \dfrac{25}{6}$ C) $y = -\dfrac{5}{6}x + \dfrac{25}{6}$ D) $y = \dfrac{5}{6}x - \dfrac{37}{6}$

Answer: A

49) Through (-2, -8), perpendicular to -8x - 3y = 40   49) _____

    A) $y = -\dfrac{3}{8}x + \dfrac{29}{4}$ B) $y = \dfrac{3}{8}x$ C) $y = \dfrac{3}{8}x - \dfrac{29}{4}$ D) $y = \dfrac{8}{3}x - 58$

Answer: C

Find the equation of the least squares line.

50) Managers rate employees according to job performance and attitude. The results for several   50) _____
    randomly selected employees are given below.

Attitude (x)	59	63	65	69	58	77	76	69	70	64
Performance (y)	72	67	78	82	75	87	92	83	87	78

    A) y = -47.3 + 2.02x   B) y = 92.3 - 0.669x
    C) y = 2.81 + 1.35x   D) y = 11.7 + 1.02x

Answer: D

Find the slope of the line passing through the given pair of points.

51) (-3, 6) and (-5, 6)   51) _____

    A) Not defined   B) $-\dfrac{3}{2}$ C) - 6   D) 0

Answer: D

Solve the problem.

52) The mathematical model C = 600x + 60,000 represents the cost in dollars a company has in   52) _____
    manufacturing x items during a month. Based on this, how much does it cost to produce 500 items?
    A) $360,000   B) $0.20   C) $100.00   D) $300,000

Answer: A

53) In a lab experiment 14 grams of acid were produced in 16 minutes and 19 grams in 23 minutes. Let   53) _____
    y be the grams produced in x minutes. Write a linear equation for grams produced.

    A) $y = \dfrac{5}{7}x + \dfrac{18}{7}$ B) $y = \dfrac{5}{7}x - \dfrac{18}{7}$ C) $y = \dfrac{7}{5}x - \dfrac{18}{7}$ D) $y = -\dfrac{5}{7}x - \dfrac{18}{7}$

Answer: A

Find the equation of the least squares line.

54) Two different tests are designed to measure employee productivity and dexterity. Several employees of a company are randomly selected and asked to complete the tests. The results are below.

54) _____

| Dexterity (x) | 23 | 25 | 28 | 21 | 21 | 25 | 26 | 30 | 34 | 36 |
| Productivity (y) | 49 | 53 | 59 | 42 | 47 | 53 | 55 | 63 | 67 | 75 |

A) y = 75.3 - 0.329x
B) y = 2.36 + 2.03x
C) y = 10.7 + 1.53x
D) y = 5.05 + 1.91x

Answer: D

Solve the problem.

55) The relationship between the list price, x, in thousands of dollars, and the dealer invoice price, y, also in thousands of dollars, for pickup trucks can be approximated by the linear equation y = 0.715x + 2.82. Use this equation to predict the dealer invoice price for a pickup truck with a list price of 19.5 thousand dollars.

55) _____

A) 13.943 thousand dollars
B) 23.329 thousand dollars
C) 16.763 thousand dollars
D) 20.914 thousand dollars

Answer: C

56) Find an equation for the least squares line representing weight, in pounds, as a function of height, in inches, of men. Then, predict the weight of a man who is 68 inches tall to the nearest tenth of a pound. The following data are the (height, weight) pairs for 8 men: (66, 150), (68, 160), (69, 166), (70, 175), (71, 181), (72, 191), (73, 198), (74, 206).

56) _____

A) 151.4 pounds
B) 165.1 pounds
C) 161.2 pounds
D) 160.0 pounds

Answer: C

Write a cost function for the problem. Assume that the relationship is linear.

57) Fixed cost, $30; 5 items cost $4460 to produce

57) _____

A) C(x) = 1772x + 30
B) C(x) = 886x + 30
C) C(x) = 1772x + 4460
D) C(x) = 886x + 4460

Answer: B

Solve the problem.

58) For some reason the quality of production decreases as the year progresses at a light bulb manufacturing plant. The following data represent the percentage of defective light bulbs produced at a light bulb manufacturing plant in the corresponding month of the year.

58) _____

| month (x) | 2 | 3 | 5 | 7 | 8 | 9 | 12 |
| % defective (y) | 1.3 | 1.6 | 2.0 | 2.4 | 2.6 | 2.8 | 3.1 |

Use the equation of the least squares line to predict in which month the percentage of defective light bulbs would be 1.83%.

A) March
B) May
C) April
D) February

Answer: C

Evaluate the function as indicated.

59) Find f(0) when f(x) = -3x + 19.

59) _____

A) 19
B) 16
C) -3
D) 0

Answer: A

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

60) John has been a teacher at West Side High School for the past 12 years. His salary during   60) _____
that time can be modeled by the linear equation y = 800x + 33,000 where x is the number of
years since he began teaching at West Side and y is his salary in dollars. Explain what the
slope, 800, represents in this context.

Answer: The slope of 800 indicates that during his 12 years at the school, John's salary has
increased by approximately $800 per year.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the equation of the least squares line.

61) In the table below, x represents the number of years since 2000 and y represents annual sales (in   61) _____
thousands of dollars) for a clothing company.

Year x	0	1	3	5
Sales y	21	30	35	39

A) y = 3.31x + 23.8   B) y = 2.61x + 25.9   C) y = 5.18x + 20.6   D) y = 4.37x + 21.7

Answer: A

Provide an appropriate response.

62) Find k so that the line through (3, k) and (1, -2) is parallel to 4x - 2y = 5. Find k so that the line is   62) _____
perpendicular to 2x + 3y = 6.

A) 2; - 5   B) 6; 1   C) 2; 1   D) 6; - 5

Answer: C

Find the equation of the least squares line.

63) The paired data below consist of the temperatures on randomly chosen days and the amount a   63) _____
certain kind of plant grew (in millimeters).

Temp (x)	62	76	50	51	71	46	51	44	79
Growth (y)	36	39	50	13	33	33	17	6	16

A) y = 7.30 - 0.112x   B) y = 7.30 + 0.122x
C) y = -14.6 - 0.211x   D) y = 14.6 + 0.211x

Answer: D

Find an equation in slope-intercept form (where possible) for the line.

64) Through (3, 0), m = -1   64) _____

A) y = x - 3   B) y = 3x   C) y = -x + 3   D) y = -3x

Answer: C

Evaluate the function as indicated.

65) Find f(-4) when f(x) = -3x + 6.   65) _____

A) 3   B) 18   C) 6   D) -12

Answer: B

Find the slope of the line.

66) x = 10

    A) Not defined   B) 0   C) 1   D) 10

    Answer: A

66) _____

Solve the problem.

67) Suppose that the price and supply for a certain model of graphing calculator are related by p = S(q) = 2q, where p is the price (in dollars) and q is the supply (in hundreds) of calculators. Find the supply if the price is $105. Round to the nearest whole number if necessary.

    A) 1313 calculators   B) 2625 calculators   C) 525 calculators   D) 5250 calculators

    Answer: D

67) _____

Find an equation in slope-intercept form (where possible) for the line.

68) Through (2, 5), m = 0

    A) x = 2   B) y = 5   C) $y = -\dfrac{5}{2}x$ D) $y = -\dfrac{2}{5}x$

    Answer: B

68) _____

Find the slope of the line.

69)

    A) 1   B) -1   C) -4   D) 4

    Answer: B

69) _____
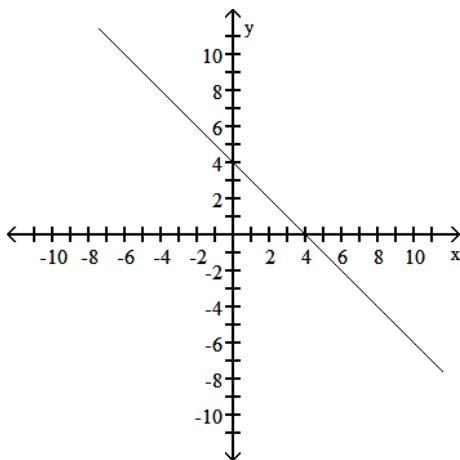
Solve the problem.

70) For the following table of data,

    a. Draw a scatterplot.
    b. Calculate the correlation coefficient.
    c. Calculate the least squares line and graph it on the scatterplot.
    d. Predict the y-value when x is -23.

70) _____

x	-4	-3	-2	-1	0	1	2	3	4
y	-3.5	-2	-1	-1.5	1	0.5	1.5	2	4
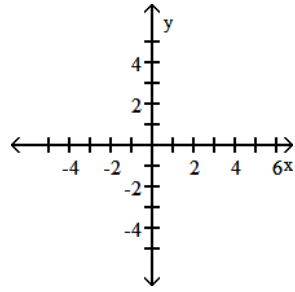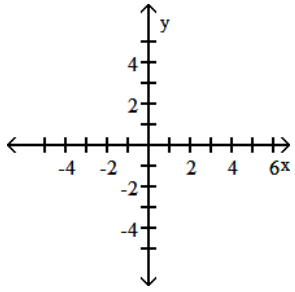
A) a.

b. -0.966
c. Y = -0.82x - 0.11
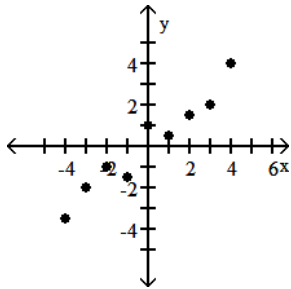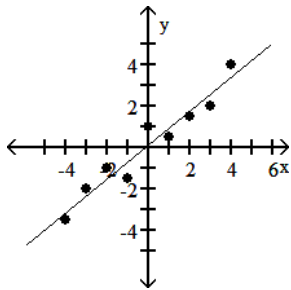
d. 18.75

B) a.

b. 0.966
c. Y = 0.82x - 0.11

d. -18.97

C) a.

b. 0.966
c. Y = 0.82x + 0.11

d. -18.75
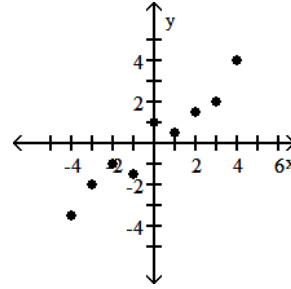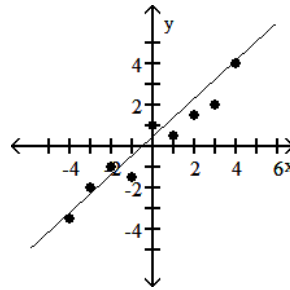
D) a.

b. -0.966
c. Y = 0.82x + 0.11

d. -18.97

Answer: C
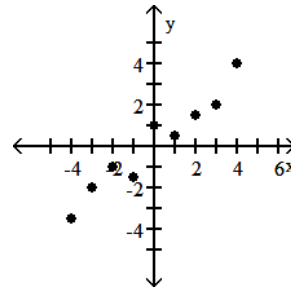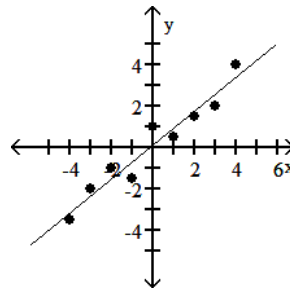
71) When going more than 38 miles per hour, the gas mileage of a certain car fits the model   71) _____
   $y = 43.81 - 0.395x$ where x is the speed of the car in miles per hour and y is the miles per gallon of
   gasoline. Based on this model, at what speed will the car average 15 miles per gallon? (Round to
   nearest whole number.)
   A) 149 miles per hour   B) 98 miles per hour
   C) 73 miles per hour   D) 48 miles per hour

   Answer: C

Graph the equation.
72) y − 5 = 0   72) _____
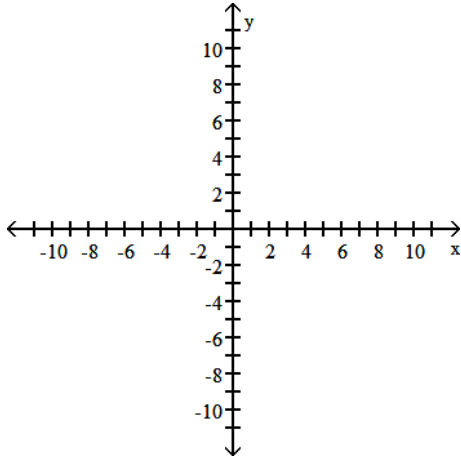
A)
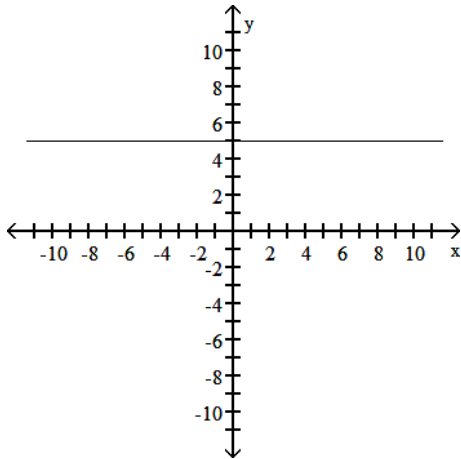
B)
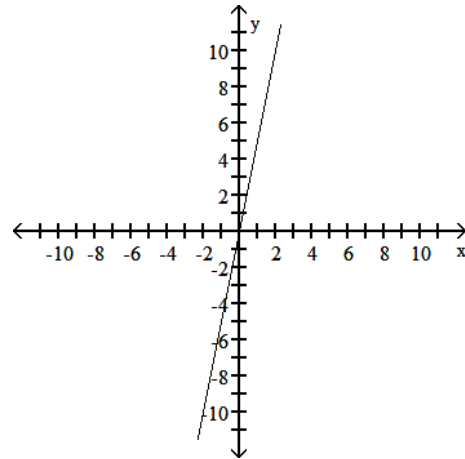
C)
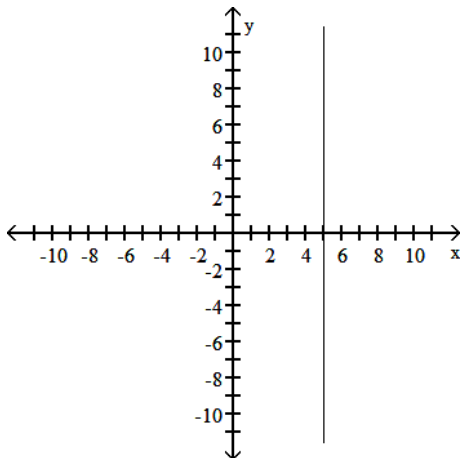
D)
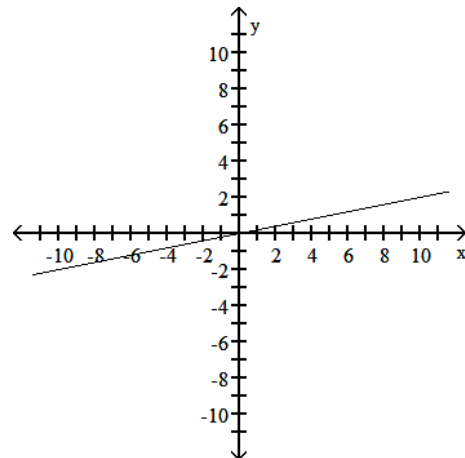
Answer: A

Solve the problem.

73) The temperature of water in a certain lake on a day in October can be determined by using the model $y = 15.2 - 0.537x$ where x is the number of feet down from the surface of the lake and y is the Celsius temperature of the water at that depth. Based on this model, how deep in the lake is the water 13 degrees? (Round to the nearest foot.)
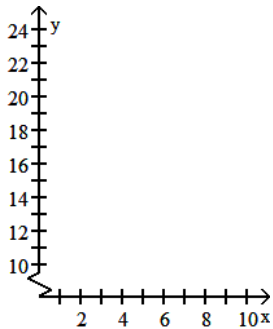
73) _____

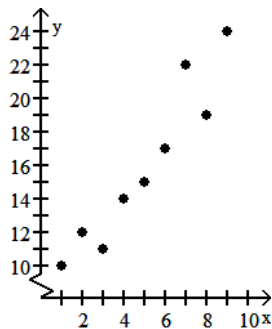   A) 60 feet   B) 53 feet   C) 4 feet   D) 23 feet

Answer: C

74) For the following table of data,
   a. Draw a scatterplot.
   b. Calculate the correlation coefficient.
   c. Calculate the least squares line and graph it on the scatterplot.
   d. Predict the y-value when x is 19.

74) _____

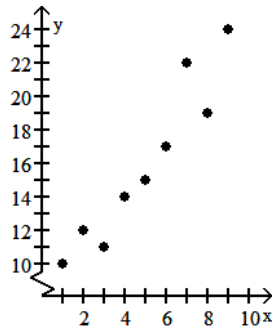| x	1	2	3	4	5	6	7	8	9
y	10	12	11	14	15	17	22	19	24

A) a.

b. 0.950

c. Y = 1.7x + 8.5

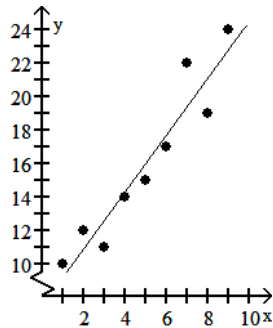d. 40.8

B) a.

b. 0.903
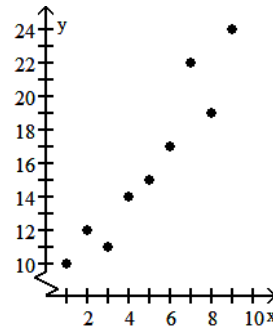
c. Y = 2x + 6.5

d. 44.5

21
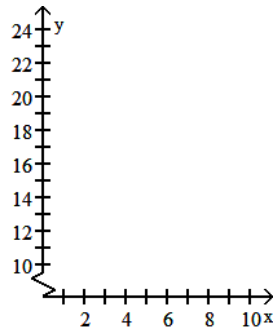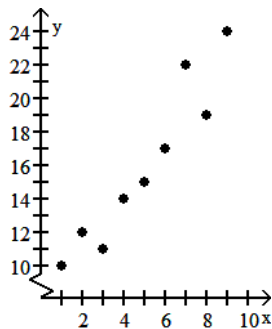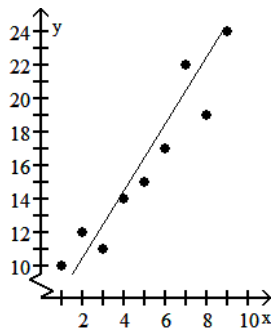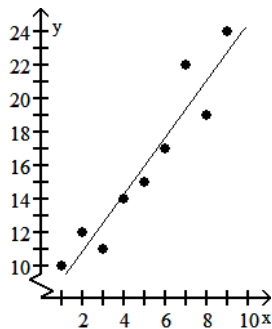
C) a.

b. 0.950

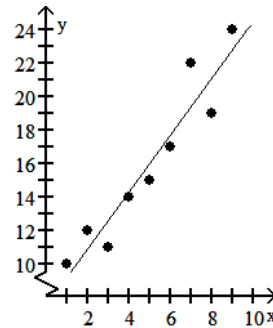c. Y = 1.7x

d. 32.3

D) a.

b. 0.950

c. Y = 1.7x + 7.5

d. 39.8

Answer: D

Evaluate the function as indicated.

75) Find f(-r) when f(x) = 5 - 2x. 75) _____

   A) 5 + 2r   B) 5 + rx   C) r - 2x   D) 5 - 2r

Answer: A

Solve the problem.

76) In deciding whether or not to set up a new manufacturing plant, analysts for a popcorn company 76) _____
have decided that a linear function is a reasonable estimation for the total cost C(x) in dollars to
produce x bags of microwave popcorn. They estimate the cost to produce 10,000 bags as $5430 and
the cost to produce 15,000 bags as $7920. Find the marginal cost of the bags of microwave popcorn
to be produced in this plant.

   A) $49.80   B) $0.50   C) $2490.00   D) $4.98

Answer: B

Write a cost function for the problem. Assume that the relationship is linear.

77) A cable TV company charges $28 for the basic service plus $8 for each movie channel. Let C(x) be 77) _____
the total cost in dollars of subscribing to cable TV, using x movie channels.

   A) C(x) = 8x + 28   B) C(x) = 28x - 8   C) C(x) = 8x - 28   D) C(x) = 28x + 8

Answer: A

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

78) Explain what is wrong with the statement "The line has no slope." 78) _____

     Answer: Answers may vary. One possibility: It is not specific enough. The slope of a
        horizontal line is 0, while the slope of a vertical line is undefined.

22

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Evaluate the function as indicated.

79) Find f(-6.5) when f(x) = -3x - 6.9.   79) _____
    A) 18.81   B) 26.4   C) -26.4   D) 12.6

Answer: D

Solve the problem.

80) A meteorologist in the Upper Peninsula of Michigan predicts an overnight low of -14° Fahrenheit.   80) _____
What would a Canadian meteorologist predict for the same location in Celsius?
    A) -14°   B) -25.6°   C) -46°   D) -7.8°

Answer: B

Find an equation in slope-intercept form (where possible) for the line.

81) y-intercept -5, x-intercept 10   81) _____

    A) $y = \dfrac{1}{2}x - 5$ B) $y = -\dfrac{1}{2}x - 5$ C) $y = 2x + 10$ D) $y = -2x + 10$

Answer: A

Solve the problem.

82) Midtown Delivery Service delivers packages which cost $2.30 per package to deliver. The fixed cost   82) _____
to run the delivery truck is $352 per day. If the company charges $6.30 per package, how many
packages must be delivered daily to make a profit of $64?
    A) 88 packages   B) 40 packages   C) 153 packages   D) 104 packages

Answer: D

83) A car rental company charges $24 per day to rent a particular type of car and $0.15 per mile. Juan is   83) _____
charged $43.80 for a one-day rental. How many miles did he drive?
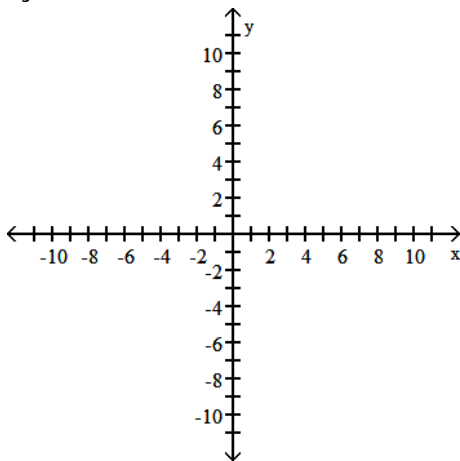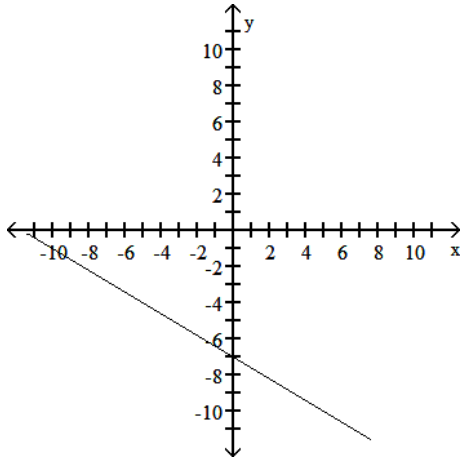   A) 268 mi   B) 292 mi   C) 132 mi   D) 147 mi

Answer: C

Graph the equation.
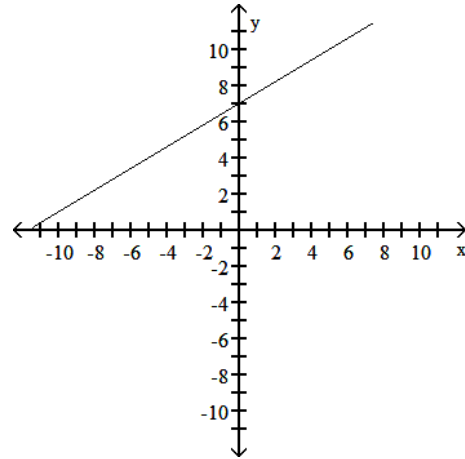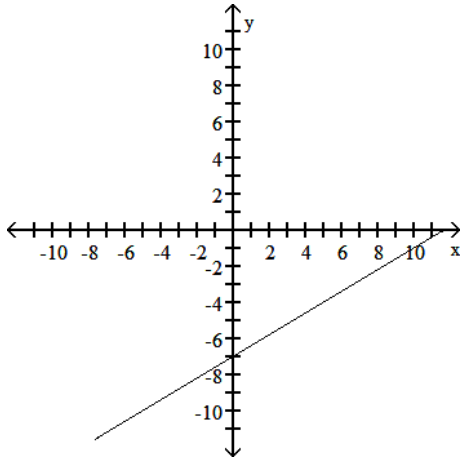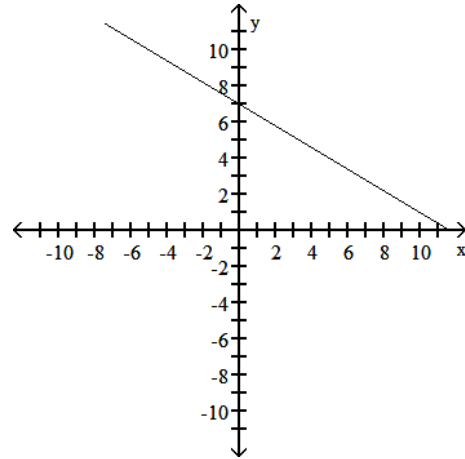
84) 5y - 3x = 35   84) _____

A)

B)

C)

D)

Answer: B

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

85) If a company decides to make a new product, there are fixed costs and variable costs   85) _____
associated with this new product. Explain the differences of the two types of costs and
why they occur. Use an example to illustrate your point.

Answer: Fixed costs occur only once. These costs may be startup costs related to the
production of the new product.   Variable costs depend on how much product is
made.   These costs may consist of labor, material, and maintenance.

For example, a company decided to make oak filing cabinets.   Fixed costs would
include the costs of purchasing and renovating plant space and the cost of
manufacturing equipment. Variable costs would include the cost labor and the cost
of materials.

24

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the correlation coefficient.

86) The test scores of 6 randomly picked students and the number of hours they prepared are as follows:

Hours	5	10	4	6	10	9
Score	64	86	69	86	59	87

A) -0.2242   B) 0.2242   C) 0.6781   D) -0.6781

86) _____

Answer: B

Solve the problem.

87) A biologist recorded 12 snakes on 41 acres in one area and 18 snakes on 45 acres in another area. Let y be the number of snakes in x acres. Write a linear equation for the number of snakes.

A) $y = \frac{2}{3}x + \frac{99}{2}$ B) $y = \frac{3}{2}x - \frac{99}{2}$ C) $y = -\frac{3}{2}x + \frac{99}{2}$ D) $y = \frac{3}{2}x + \frac{99}{2}$

87) _____

Answer: B

Find an equation in slope-intercept form (where possible) for the line.

88) Through (-3, 4), m = 2.5

A) y = -2.5x - 3.5   B) y = 2.5x - 3.5   C) y = -2.5x + 11.5   D) y = 2.5x + 11.5

88) _____

Answer: D

Find the correlation coefficient.

89) The following are costs of advertising (in thousands of dollars) and the number of products sold (in thousands):

Cost	6	3	7	6	10	4	7	7
Number	54	75	91	57	96	52	92	100

A) -0.3707   B) 0.6756   C) 0.2635   D) 0.6112

89) _____

Answer: D

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

90) Why is the slope of a vertical line undefined?

90) _____

Answer: Answers may vary. One possibility: Let (a, b) and (a, c), b ≠ c, be any two different

points on a vertical line. The slope of the line $= \frac{y_1 - y_2}{x_1 - x_2} = \frac{b - c}{a - a} = \frac{b - c}{0}$. Division by

zero is undefined.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find an equation in slope-intercept form (where possible) for the line.

91) Through (5, 7), parallel to -9x + 7y = -31

A) $y = \frac{7}{9}x - \frac{7}{9}$ B) $y = -\frac{5}{7}x - \frac{31}{7}$ C) $y = \frac{9}{7}x + \frac{4}{7}$ D) $y = -\frac{9}{7}x - \frac{4}{7}$

91) _____

Answer: C

92) Through (-4, -3), perpendicular to 9x - 5y = -51

A) $y = \frac{4}{5}x - \frac{51}{5}$ 　　B) $y = -\frac{9}{5}x - \frac{9}{5}$ 　　C) $y = -\frac{5}{9}x - \frac{47}{9}$ 　　D) $y = \frac{5}{9}x - \frac{47}{9}$

Answer: C

93) Through (-3, -8) and (-1, -17)

A) $y = -\frac{9}{2}x - \frac{43}{2}$ 　　B) $y = \frac{9}{2}x + \frac{11}{2}$ 　　C) $y = -\frac{2}{9}x - \frac{26}{3}$ 　　D) $y = -\frac{9}{2}x - \frac{22}{3}$

Answer: A

Solve the problem.

94) The paired data below consist of the costs of advertising (in thousands of dollars) and the number of products sold (in thousands). Use the equation of the least squares line to predict the number of products sold if the cost of advertising is $11,000.

Cost (x)	9	2	3	4	2	5	9	10
Number (y)	85	52	55	68	67	86	83	73

A) 30,745.8 products sold 　　　　　　　B) 86.49 products sold
C) 93.19 products sold 　　　　　　　D) 83.49 products sold

Answer: B

Write a cost function for the problem. Assume that the relationship is linear.

95) Marginal cost, $50; 50 items cost $2900 to produce
A) C(x) = 8x + 400 　　　　　　　B) C(x) = 50x + 400
C) C(x) = 8x + 2900 　　　　　　　D) C(x) = 50x + 2900

Answer: B

Find the equation of the least squares line.

96) The paired data below consist of the test scores of 6 randomly selected students and the number of hours they studied for the test.

Hours (x)	5	10	4	6	10	9
Score (y)	64	86	69	86	59	87

A) y = 33.7 + 2.14x 　　　　　　　B) y = 33.7 - 2.14x
C) y = -67.3 + 1.07x 　　　　　　　D) y = 67.3 + 1.07x

Answer: D

Find the slope of the line passing through the given pair of points.

97) (5, 4) and (3, 8)

A) - 2 　　　　　B) $-\frac{1}{2}$ 　　　　　C) 2 　　　　　D) $\frac{3}{2}$

Answer: A

Write a cost function for the problem. Assume that the relationship is linear.

98) A moving firm charges a flat fee of $45 plus $40 per hour. Let C(x) be the cost in dollars of using the moving firm for x hours.
A) C(x) = 40x - 45 　　B) C(x) = 45x - 40 　　C) C(x) = 40x + 45 　　D) C(x) = 45x + 40

Answer: C

Find the slope of the line.

99) The x-axis

A) 0   B) -1   C) 1   D) Not defined

Answer: A

Find an equation in slope-intercept form (where possible) for the line.

100) Through (2, -4) and (2, -9)

A) x = 2   B) $-\frac{9}{4}x - 4y = 0$ C) $-\frac{4}{9}x - 9y = 0$ D) y = -4

Answer: A

Solve the problem.

101) Midtown Delivery Service delivers packages which cost $1.70 per package to deliver. The fixed cost to run the delivery truck is $84 per day. If the company charges $7.70 per package, how many packages must be delivered daily to break even?

A) 49 packages   B) 14 packages   C) 9 packages   D) 8 packages

Answer: B

102) Find an equation for the least squares line representing weight, in pounds, as a function of height, in inches, of men. Then, predict the height of a man who is 145 pounds to the nearest tenth of an inch. The following data are the (height, weight) pairs for 8 men: (66, 150), (68, 160), (69, 166), (70, 175), (71, 181), (72, 191), (73, 198), (74, 206).

A) 64.6 inches   B) 65.7 inches   C) 68.2 inches   D) 63.2 inches

Answer: B

Find an equation in slope-intercept form (where possible) for the line.

103) Through (3, 2), m = $-\frac{5}{9}$

A) $y = -\frac{5}{9}x + \frac{5}{3}$ B) $y = \frac{5}{9}x - \frac{11}{3}$ C) $y = \frac{5}{9}x + \frac{5}{3}$ D) $y = -\frac{5}{9}x + \frac{11}{3}$

Answer: D

Evaluate the function as indicated.

104) Find g(4) when g(x) = 7 - 7x.

A) 35   B) $-\frac{1}{2}$ C) - 21   D) 21

Answer: C

Solve the problem.

105) Regrind, Inc. regrinds used typewriter platens. The cost per platen is $1.20. The cost to regrind 100 platens is $400. Find the linear cost function to regrind platens. If reground platens sell for $8.80 each, how many must be reground and sold to break even?

A) C(x) = 1.20x + 400
   break-even = 41
B) C(x) = 1.20x + 400
   break-even = 54
C) C(x) = 1.20x + 280
   break-even = 288
D) C(x) = 1.20x + 280
   break-even = 37

Answer: D

106) In the table below, x represents the number of years since 2000 and y represents annual sales (in thousands of dollars) for a clothing company. Use the least squares regression equation to estimate sales in the year 2006. Round to the nearest thousand dollars.
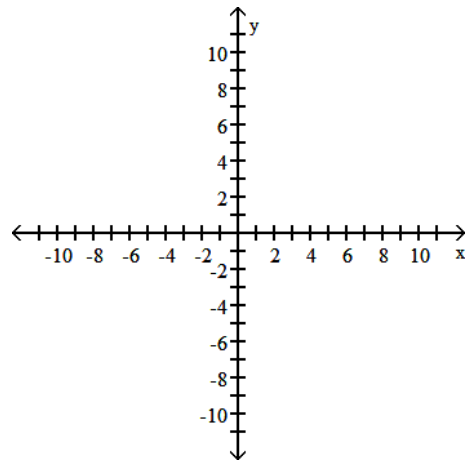
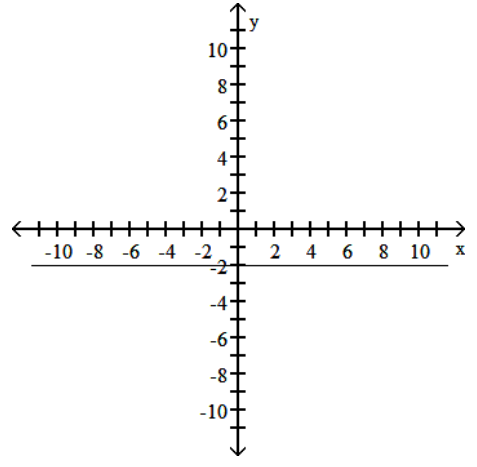| Year (x)	1	2	3	4	5
Sales (y)	30	40	60	90	130

A) $142,000   B) $145,000   C) $140,000   D) $147,000
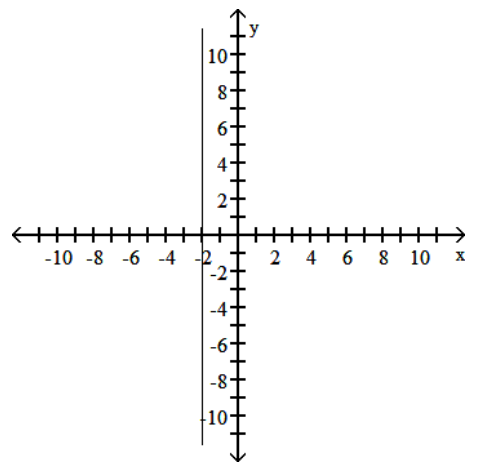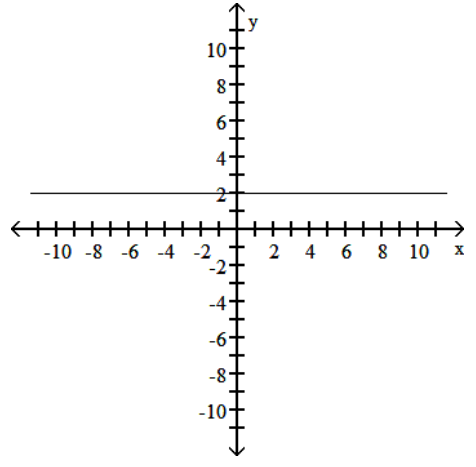
Answer: B

Graph the equation.
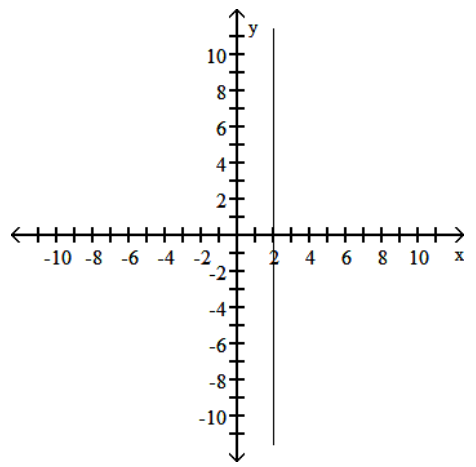
107) x - 2 = 0

A)

B)

C)

D)

28

Answer: D

Solve the problem.

108) On a summer day, the bottom water of a lake is at a temperature of 5° Celsius. What is this temperature in Fahrenheit?

108) _____

  A) 41°   B) 5°   C) 37°   D) 9°

Answer: A

Find an equation in slope-intercept form (where possible) for the line.

109) The line with y-intercept -2 and perpendicular to x + 3y = -4

109) _____

  A) $y = -\frac{1}{3}x + 1$ B) $y = \frac{1}{3}x - 2$ C) $y = -3x - 2$ D) $y = 3x - 2$

Answer: D

Find the slope of the line.

110) A line perpendicular to 8x - 3y = -11

110) _____

  A) 8   B) $-\frac{3}{8}$ C) $-\frac{8}{3}$ D) $\frac{3}{8}$

Answer: B

Solve the problem.

111) A book publisher found that the cost to produce 1000 calculus textbooks is $25,100, while the cost to produce 2000 calculus textbooks is $50,700. Assume that the cost C(x) is a linear function of x, the number of textbooks produced. What is the marginal cost of a calculus textbook?

111) _____

  A) $0.03   B) $25.60   C) $25,600.00   D) $2.56

Answer: B

112) The bank's temperature display shows that it is 36° Celsius. What is the temperature in Fahrenheit?

112) _____

  A) 122.4°   B) 37.8°   C) 96.8°   D) 2.2°

Answer: C

Find an equation in slope-intercept form (where possible) for the line.

113) Through (-8, 6), with undefined slope

113) _____

  A) x = -8   B) $\frac{4}{3}x + 6y = 0$ C) $\frac{3}{4}x - 8y = 0$ D) y = 6

Answer: A

Find the slope of the line.
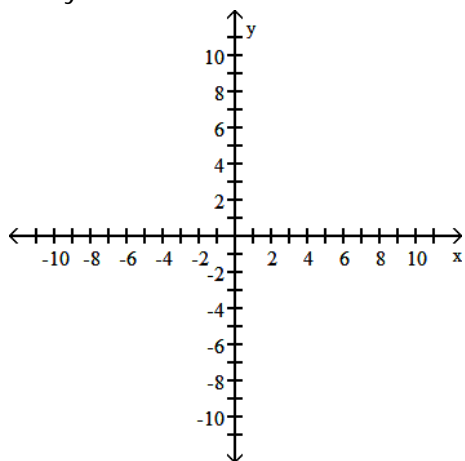
114) $y = \frac{5}{6}x$

114) _____

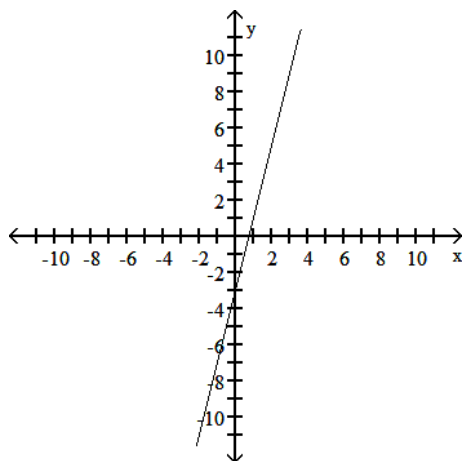 A) 1   B) 0   C) $\frac{6}{5}$ D) $\frac{5}{6}$

Answer: D
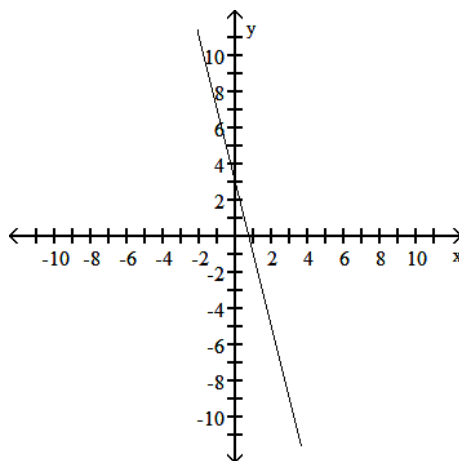
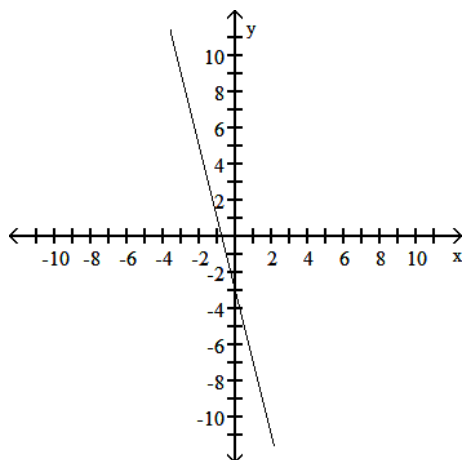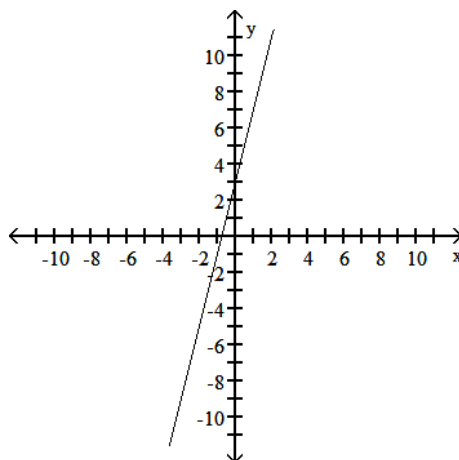Graph the equation.

115) $4x + y = -3$

115) _____

A)

B)

C)

D)

Answer: C

Solve the problem.

116) The information in the chart below gives the salary of a person for the stated years. Model the data with a linear function using the points (1, 24,400) and (3, 26,600). Then use this function to predict the salary for the year 2007.

116) _____

Year, x	Salary, y
1990, 0	$23,500
1991, 1	$24,400
1992, 2	$25,200
1993, 3	$26,600
1994, 4	$27,200

A) $42,180   B) $42,240   C) $42,220   D) $42,200

Answer: D

117) The following data show the list price, x, in thousands of dollars, and the dealer invoice price, y, also in thousands of dollars, for a variety of sport utility vehicles. Find a linear equation that approximates the data, using the points (16.5, 16.1) and (20.0, 18.3).

117) _____

List Price	Dealer Invoice Price
16.5	16.1
17.6	17.0
20.7	18.2
23.1	19.3
20.0	18.3
24.6	21.0

A) y = 0.629x + 6.38   B) y = 0.629x + 5.73
C) y = 1.59x - 9.11   D) y = 1.59x - 10.2

Answer: B

118) If an object is dropped from a tower, then the velocity, V (in feet per second), of the object after t seconds can be obtained by multiplying t by 32 and adding 10 to the result. Write an equation expressing the velocity, V, in terms of the number of seconds, t. Use this function to predict the velocity of the object at time t = 4.5 seconds.

118) _____

A) 154 feet per second   B) 152 feet per second
C) 153.3 feet per second   D) 155.3 feet per second

Answer: A

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

119) Show that the points $P_1(2,4)$, $P_2(5,2)$, and $P_3(7,5)$ are the vertices of a right triangle.

119) _____

Answer: Answers will vary. One possibility: The slope of the line through P_1 and P_2 is -2/3.
The slope of the line through P_2 and P_3 is 3/2. Therefore, since the product of these
slopes is -1, the lines are perpendicular and constitute a right angle in the triangle,
making the triangle formed by these points a right triangle.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.
120) The paired data below consist of the temperatures on randomly chosen days and the amount a   120) _____
certain kind of plant grew (in millimeters). Use the equation of the least squares line to predict the
growth of a plant if the temperature is 72.

Temp (x)	62	76	50	51	71	46	51	44	79
Growth (y)	36	39	50	13	33	33	17	6	16

   A) 28.28 mm   B) 30.37 mm   C) 30.94 mm   D) 29.79 mm

Answer: D

Find an equation in slope-intercept form (where possible) for the line.
121) Through (-1, -7), perpendicular to x = 5   121) _____
   A) y = 5   B) y = 7   C) y = -7   D) x = 5

Answer: C

Find the correlation coefficient.
122) The following are the temperatures on randomly chosen days and the amount a certain kind of   122) _____
plant grew (in millimeters):

Temp	77	88	85	61	64	72	73	63	74
Growth	39	17	12	22	15	29	14	25	43

   A) -0.3105   B) 0   C) -0.0953   D) 0.0396

Answer: C

Find an equation in slope-intercept form (where possible) for the line.
123) Through (-2, 1) and (10, 1)   123) _____

   A) y = 1   B) x = -2   C) 5x - 2y = 0   D) $\frac{1}{5}x + 10y = 0$

Answer: A

Find the equation of the least squares line.

124) Ten students in a graduate program were randomly selected. Their grade point averages (GPAs) when they entered the program were between 3.5 and 4.0. The following data were obtained regarding their GPAs on entering the program versus their current GPAs.

124) _____

Entering GPA (x)	Current GPA (y)
3.5	3.6
3.8	3.7
3.6	3.9
3.6	3.6
3.5	3.9
3.9	3.8
4.0	3.7
3.9	3.9
3.5	3.8
3.7	4.0

A) y = 5.81 + 0.497x B) y = 4.91 + 0.0212x
C) y = 3.67 + 0.0313x D) y = 2.51 + 0.329x

Answer: C

Find the correlation coefficient.

125) Consider the data points with the following coordinates:

125) _____

x	16.8	30.8	20.6	22.4	10.6
y	3	5	10	9	4

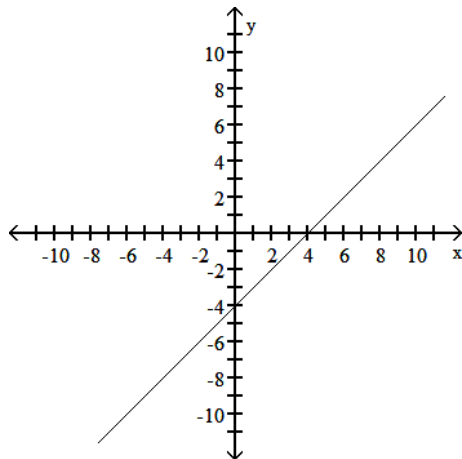A) 0 B) 0.2591 C) 0.2911 D) -0.2911

Answer: C

Find the slope of the line.

126)

126) _____

A) -4 B) 4 C) -1 D) 1

Answer: D

33

Solve the problem.

127) The paired data below consist of the test scores of 6 randomly selected students and the number of hours they studied for the test. Use the equation of the least squares line to predict the score on the test of a student who studies 5 hours.

127) _____

Hours (x)	5	10	4	6	10	9
Score (y)	64	86	69	86	59	87

A) 72.7   B) 77.7   C) 67.7   D) 74.8

Answer: A

128) Find the temperature at which the Celsius and Fahrenheit scales coincide.

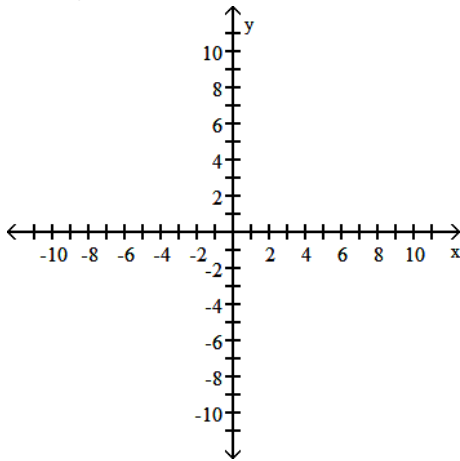128) _____

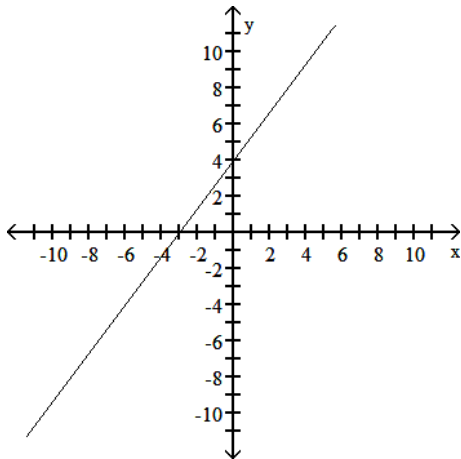A) 39°   B) -40°   C) -25°   D) 0°

Answer: B

Graph the equation.

129) $4x + 3y = 12$
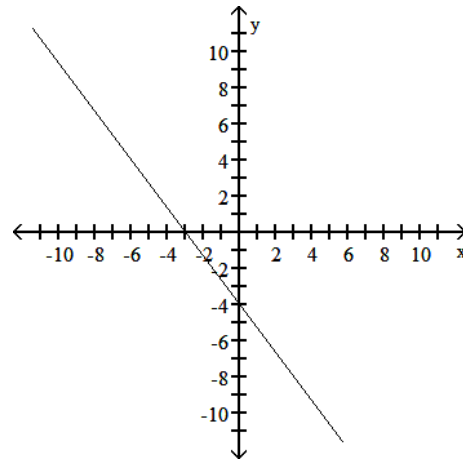
129) _____
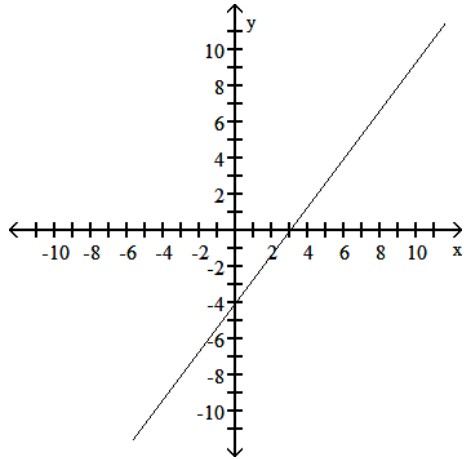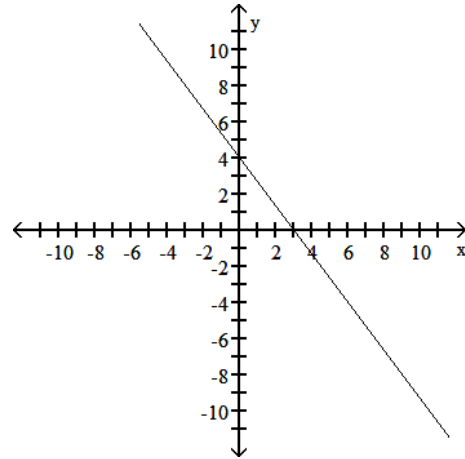
A)

B)

C)

D)

Answer: D

Solve the problem.

130) Suppose that the demand and price for a certain model of graphing calculator are related by   130) _____
p = D(q) = 100 - 4.25q, where p is the price (in dollars) and q is the demand (in hundreds). Find the
demand for the calculator if the price is $32. Round to the nearest whole number if necessary.
   A) 27,200 calculators   B) 1600 calculators
   C) 400 calculators   D) 16 calculators

Answer: B

131) For the following table of data,   131) _____
   a. Draw a scatterplot.
   b. Calculate the correlation coefficient.
   c. Calculate the least squares line and graph it on the scatterplot.
   d. Predict the y-value when x is 15.

x	1	2	3	4	5	6	7	8	9
y	5	4.5	4	4	3	3.5	2.5	2	1
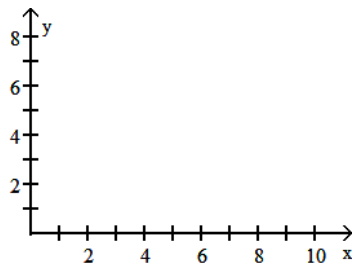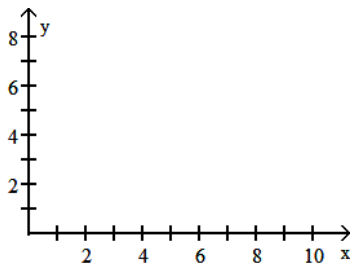
A) a.
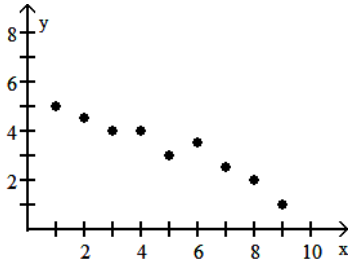
b. 0.965
c. Y = 0.45x - 5.53
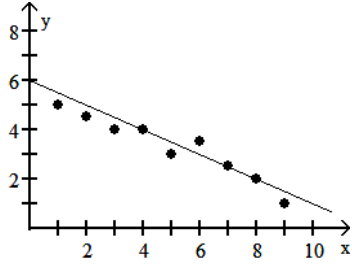
d. 1.22

C) a.
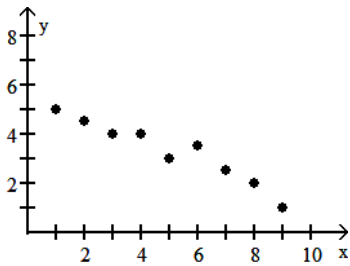
b. -0.965
c. Y = -0.45x + 5.53
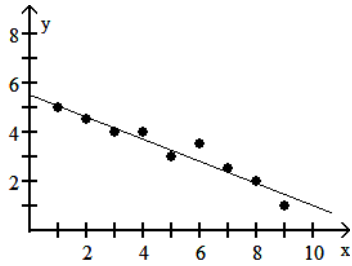
d. -1.22

Answer: C

B) a.
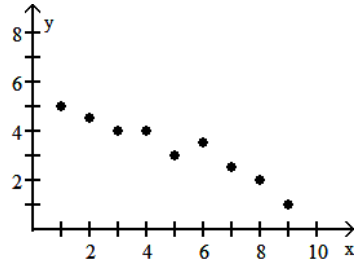
b. -0.965
c. Y = -0.45x - 5.53
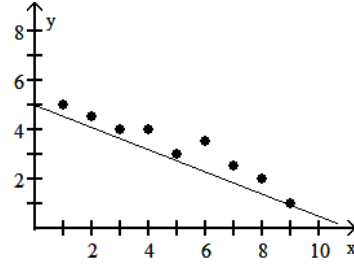
d. -12.28

D) a.
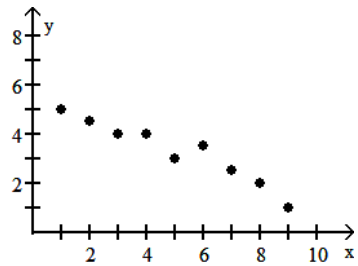
b. 0.965
c. Y = -0.45x + 5.53
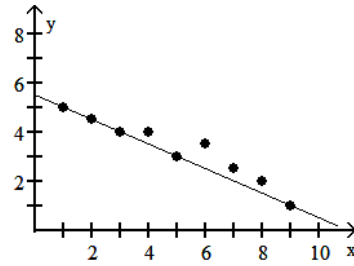
d. -1.22

Find the slope of the line.

132)
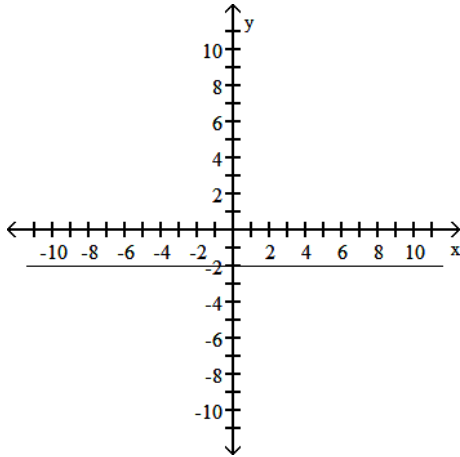
A) 2   B) -2   C) undefined   D) 0

132) _____

Answer: D

Find an equation in slope-intercept form (where possible) for the line.

133) Through (-6, 4.5) and (-4, 8.5)

A) $y = 2x + 16.5$ B) $y = -0.5x + 1.5$ C) $y = -2x - 7.5$ D) $y = 0.5x + 7.5$

133) _____

Answer: A

Solve the problem.

134) Ten students in a graduate program were randomly selected. Their grade point averages (GPAs) when they entered the program were between 3.5 and 4.0. The following data were obtained regarding their GPAs on entering the program versus their current GPAs. Use the equation of the least squares line to predict the current GPA of a student whose entering GPA is 3.2.

Entering GPA (x)	Current GPA(y)
3.5	3.6
3.8	3.7
3.6	3.9
3.6	3.6
3.5	3.9
3.9	3.8
4.0	3.7
3.9	3.9
3.5	3.8
3.7	4.0

A) 3.77   B) 3.57   C) 3.28   D) 3.39

134) _____

Answer: A

135) Given the supply and demand functions below, find the price when the demand is 145.

$S(p) = 9p + 12$

$D(p) = 280 - 9p$

A) $292   B) $15   C) $47   D) $1317

135) _____

Answer: B

Find an equation in slope-intercept form (where possible) for the line.

136) Through (6, 4), perpendicular to $-7x - 4y = -58$ 136) _____

     A) $y = \frac{4}{7}x + \frac{4}{7}$ B) $y = -\frac{4}{7}x - \frac{4}{7}$ C) $y = \frac{7}{4}x + 4$ D) $y = \frac{4}{7}x$

Answer: A

137) Through (5, 2) and (0, -2)   137) _____

     A) $y = -\frac{3}{2}x - 2$ B) $y = \frac{4}{5}x - 2$ C) $y = -\frac{4}{5}x - 2$ D) $y = \frac{3}{2}x - 2$

Answer: B

Find the correlation coefficient.

138) Consider the data points with the following coordinates: 138) _____

x	57	53	59	61	53	56	60
y	156	164	163	177	159	175	151

     A) 0.1085   B) 0.2145   C) -0.0537   D) -0.0783

Answer: A

Evaluate the function as indicated.

139) Find f(3.2) when $f(x) = 1.0x - 9$.   139) _____

     A) 2.3   B) -5.8   C) 12.2   D) -12.2

Answer: B

Find an equation in slope-intercept form (where possible) for the line.

140) Through (-2, 0) and (-8, 5)   140) _____

     A) $y = \frac{2}{13}x + \frac{81}{13}$ B) $y = -\frac{2}{13}x + \frac{81}{13}$ C) $y = -\frac{5}{6}x - \frac{5}{3}$ D) $y = \frac{5}{6}x - \frac{5}{3}$

Answer: C

Solve the problem.

141) Let the demand and supply functions be represented by D(p) and S(p), where p is the price in dollars. Find the equilibrium price and equilibrium quantity for the given functions.   141) _____

$D(p) = 3328 - 50p$

$S(p) = 210p - 832$

     A) $19; 2378   B) $19; 2528   C) $26; 2028   D) $16; 2528

Answer: D

Evaluate the function as indicated.

142) Find f(-2.3) when $f(x) = 12$.   142) _____

     A) -27.6   B) -2.3   C) -12   D) 12

Answer: D

Find the slope of the line passing through the given pair of points.
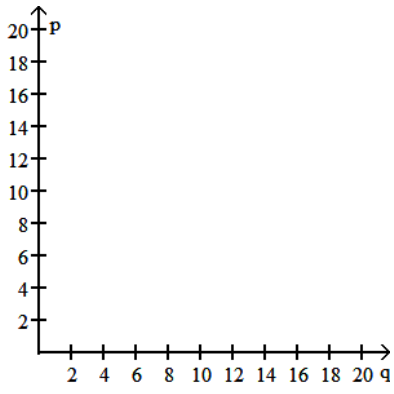
143) (4, -5) and (5, -10)   143) _____
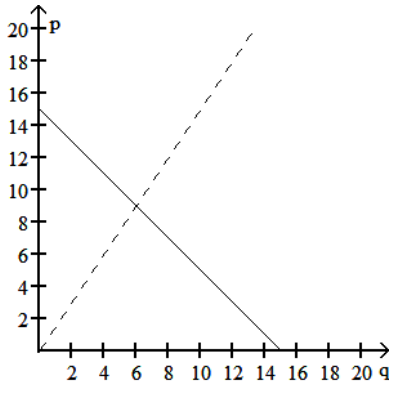
     A) 5   B) - 5   C) $-\frac{5}{3}$ D) $-\frac{1}{5}$

Answer: B

Write a cost function for the problem. Assume that the relationship is linear.

144) A cab company charges a base rate of $1.50 plus 15 cents per minute. Let C(x) be the cost in dollars of using the cab for x minutes.

    A) $C(x) = 0.15x + 1.50$
                               B) $C(x) = 0.15x - 1.50$
    C) $C(x) = 1.50x - 0.15$
                               D) $C(x) = 1.50x + 0.15$

144) _____

Answer: A

Solve the problem.

145) Regrind, Inc. regrinds used typewriter platens. The cost per platen is $1.30. The fixed cost to run the grinding machine is $252 per day. If the company sells the reground platens for $5.30, how many must be reground daily to break even?

    A) 63 platens
            B) 38 platens
            C) 42 platens
            D) 193 platens

145) _____

Answer: A

Find an equation in slope-intercept form (where possible) for the line.

146) Through (-1, 1) and (8, 5)

    A) $y = -\frac{2}{3}x + \frac{31}{3}$
        B) $y = -\frac{4}{9}x + \frac{13}{9}$
        C) $y = \frac{2}{3}x + \frac{31}{3}$
        D) $y = \frac{4}{9}x + \frac{13}{9}$

146) _____

Answer: D

Solve the problem.

147) After two years on the job, an engineer's salary was $45,000. After seven years on the job, her salary was $57,500. Let y represent her salary after x years on the job. Assuming that the change in her salary over time can be approximated by a straight line, give an equation for this line in the form y = mx + b.

    A) $y = 12,500x + 45,000$
                      B) $y = 12,500x + 20,000$
    C) $y = 2500x + 40,000$
                      D) $y = 2500x + 45,000$

147) _____

Answer: C

Find an equation in slope-intercept form (where possible) for the line.

148) Through (-13, -1), m = 2

    A) $y = -2x - 11$
        B) $y = 2x - 1$
        C) $y = -2x - 25$
        D) $y = 2x + 25$

148) _____

Answer: D

Solve the problem.

149) Let the supply and demand functions for a certain model of electric pencil sharpener be given by

$$p = S(q) = \frac{2}{3}q \quad \text{and} \quad p = D(q) = 15 - \frac{2}{3}q,$$

where p is the price in dollars and q is the quantity of pencil sharpeners (in hundreds). Graph these functions on the same axes (graph the supply function as a dashed line and the demand function as a solid line). Also, find the equilibrium quantity and the equilibrium price.
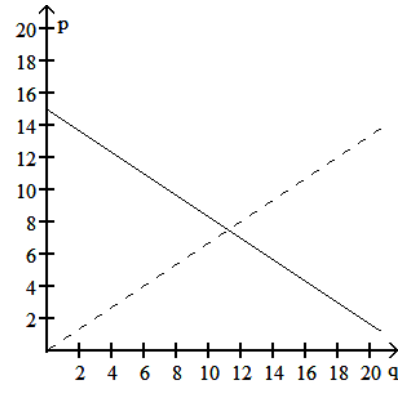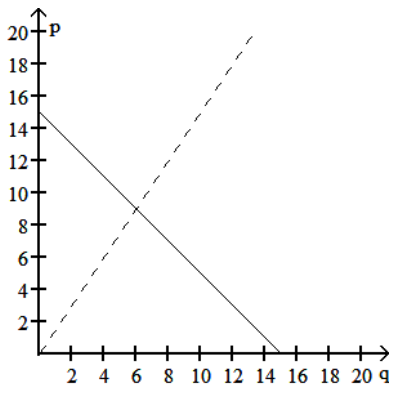
149) _____

A)

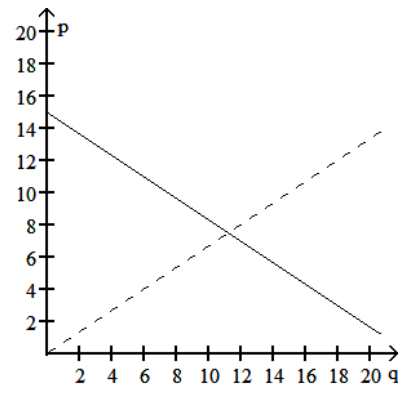Equilibrium quantity: 900
Equilibrium price: $6.00

B)

Equilibrium quantity: 950
Equilibrium price: $7

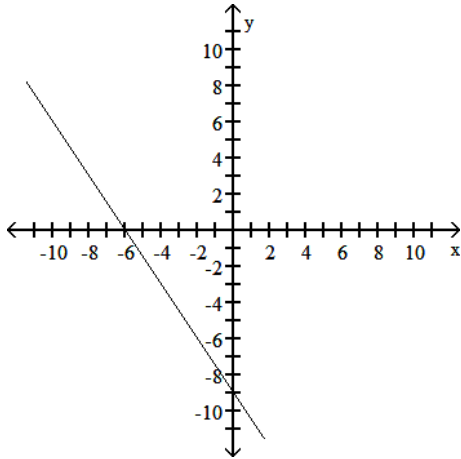C)

Equilibrium quantity: 600
Equilibrium price: $9.00

D)

Equilibrium quantity: 1125
Equilibrium price: $7.5

Answer: D

Find the slope of the line.

150)

A) $-\dfrac{3}{2}$ B) $\dfrac{2}{3}$ C) $\dfrac{3}{2}$ D) $-\dfrac{2}{3}$

150) _____

Answer: A

Solve the problem.

151) Suppose that the population of a certain town, in thousands, was 105 in 1990 and 141 in 2002. Assume that the population growth can be approximated by a straight line. Find the equation of a line which will estimate the population of the town, in thousands, in any given year since 1990.
    A) y = 4.25x + 90 where x is the number of years since 1990
    B) y = -3x + 177 where x is the number of years since 1990
    C) y = 3x + 105 where x is the number of years since 1990
    D) y = 2.5x + 105 where x is the number of years since 1990

151) _____

Answer: C

Find an equation in slope-intercept form (where possible) for the line.

152) The line with x-intercept 5 and perpendicular to 7x - y = 9

    A) $y = \dfrac{1}{7}x + \dfrac{5}{7}$ B) $y = -\dfrac{1}{7}x + \dfrac{5}{7}$ C) $y = -\dfrac{1}{7}x + 5$ D) y = -7x + 35

152) _____

Answer: B

Solve the problem.

153) The cost of owning a home includes both fixed costs and variable utility costs. Assume that it costs $5619 per month for mortgage and insurance payments and it costs an average of $2.96 per unit for natural gas, electricity, and water usage. Determine a linear equation that computes the annual cost of owning this home if x utility units are used.
    A) y = 2.96x + 5619   B) y = 2.96x + 67,428
    C) y = -2.96x + 5619   D) y = -2.96x + 67,428

153) _____

Answer: B

Write a cost function for the problem. Assume that the relationship is linear.

154) An electrician charges a fee of $50 plus $35 per hour. Let C(x) be the cost in dollars of using the electrician for x hours.
    A) C(x) = 50x - 35   B) C(x) = 35x + 50   C) C(x) = 50x + 35   D) C(x) = 35x - 50

154) _____

Answer: B

Find an equation in slope-intercept form (where possible) for the line.

155) Through (-5, 8) and (3, -9)

    A) $y = -\frac{13}{12}x - \frac{23}{4}$ B) $y = \frac{17}{8}x - \frac{21}{8}$ C) $y = \frac{13}{12}x - \frac{23}{4}$ D) $y = -\frac{17}{8}x - \frac{21}{8}$

155) _____

Answer: D

Find the equation of the least squares line.

156) In the table below, x represents the number of years since 2000 and y represents the population (in thousands) of the town Boomville.

156) _____

Year x	1	2	3	4	5
Sales y	30	40	60	90	130

    A) $y = 18x + 8$ B) $y = 25x - 5$ C) $y = 28x - 10$ D) $y = 12x + 20$

Answer: B

Evaluate the function as indicated.

157) Find g(a - 1) when g(x) = 4x - 5.

157) _____

    A) $4a - 9$ B) $\frac{1}{4}a - 5$ C) $4a - 5$ D) $4a + 1$

Answer: A

Solve the problem.

158) Suppose the function y = 1.8t - 3.3 determines the actual time that has elapsed, in minutes, for t minutes of a person's estimate of the elapsed time. Find the actual time that has elapsed for an estimate of t = 60 minutes.

158) _____

    A) 111.3 min   B) 54.06 min   C) 104.7 min   D) 65.94 min

Answer: C

159) Assume that the sales of a certain appliance dealer can be approximated by a straight line. Suppose that sales were $11,500 in 1982 and $87,500 in 1987. Let x = 0 represent 1982. Find the equation giving yearly sales S.
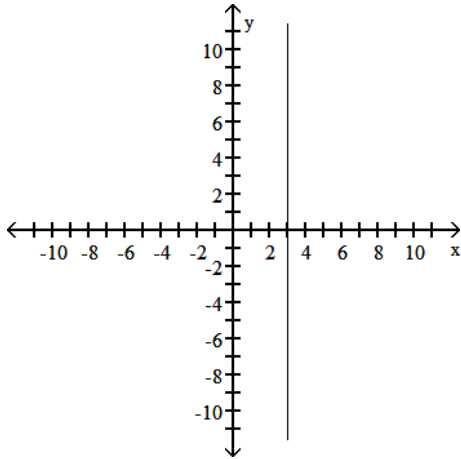
159) _____

    A) S = 15,200x + 11,500   B) S = 76,000x + 87,500
    C) S = 76,000x + 11,500   D) S = 15,200x + 87,500

Answer: A

Find the slope of the line.

160)

A) 3 B) 0 C) $\frac{3}{2}$ D) undefined

Answer: D

Evaluate the function as indicated.

161) Find $g(m^2)$ when $g(x) = -8 - 4x$.

A) $-8 + 4m^2$ B) $-8 + -4m^2$ C) $-8 - 4x^2$ D) $-8 + m^2$

161) _____

Answer: B

Find the correlation coefficient.

162) The following are costs of advertising (in thousands of dollars) and the number of products sold (in thousands):

Cost	9	2	3	4	2	5	9	10
Number	85	52	55	68	67	86	83	73

A) -0.0707 B) 0.2456 C) 0.7077 D) 0.2353

162) _____

Answer: C

Solve the problem.

163) A toilet manufacturer has decided to come out with a new and improved toilet. The fixed cost for the production of this new toilet line is $16,600 and the variable costs are $69 per toilet. The company expects to sell the toilets for $156. Formulate a function P(x) for the total profit from the production and sale of x toilets.

A) P(x) = 156x - 16600 B) P(x) = 87x
C) P(x) = 87x - 16600 D) P(x) = 87x + 16600

163) _____

Answer: C

164) Suppose the sales of a particular brand of appliance satisfy the relationship S = 170x + 5900, where S represents the number of sales in year x, with x = 0 corresponding to 1982. Find the number of sales in 1990.

A) 7260 sales B) 14,520 sales C) 7090 sales D) 14,350 sales

164) _____

Answer: A

Find the slope of the line.

165) $y = 2x - 8$

    A) 2   B) -2   C) 1   D) 0

165) _____

Answer: A

166) A line parallel to $2x = 5y + 9$

    A) $\dfrac{2}{5}$ B) $\dfrac{9}{2}$ C) $\dfrac{5}{2}$ D) $-\dfrac{2}{5}$

166) _____

Answer: A

1) No, the data cannot be modeled by a linear equation because the reported cases are not increasing at a constant rate. Assume a linear equation, and examine the slope of the two line segments. The slope of the segment from (0, 372) to (8, 100,000) is 12,453.5 while the slope of the segment from (8, 100,000) to (11, 200,000) is 33,333.$\overline{3}$.(Explanations will vary.)
2) C
3) C
4) B
5) C
6) C
7) D
8) No. In the slope-intercept form of the equation of a line, x is multiplied by slope; however, the slope of a vertical line is undefined. (Explanations will vary.)
9) B
10) C
11) D
12) C
13) B
14) D
15) C
16) B
17) D
18) D
19) A
20) C
21) B
22) B
23) A
24) D
25) Answers may vary. One possibility: The slope of a horizontal line is equal to zero because the y-values do not change as the x-values change. For example, the points (3, 4) and (7, 4) are two points on a horizontal line. The slope of this line is zero because m = $\frac{4 - 4}{7 - 3} = \frac{0}{4} = 0$.
26) D
27) A
28) B
29) C
30) C
31) D
32) A
33) A
34) A
35) A
36) B
37) C
38) An equation such as by + c = 0 has a slope of zero. (Answers may vary.)
39) C
40) C
41) C
42) C
43) B

44) C
45) D
46) C
47) D
48) A
49) C
50) D
51) D
52) A
53) A
54) D
55) C
56) C
57) B
58) C
59) A
60) The slope of 800 indicates that during his 12 years at the school, John's salary has increased by approximately $800 per year.
61) A
62) C
63) D
64) C
65) B
66) A
67) D
68) B
69) B
70) C
71) C
72) A
73) C
74) D
75) A
76) B
77) A
78) Answers may vary. One possibility: It is not specific enough. The slope of a horizontal line is 0, while the slope of a vertical line is undefined.
79) D
80) B
81) A
82) D
83) C
84) B
85) Fixed costs occur only once. These costs may be startup costs related to the production of the new product.   Variable costs depend on how much product is made.   These costs may consist of labor, material, and maintenance.

For example, a company decided to make oak filing cabinets.   Fixed costs would include the costs of purchasing and renovating plant space and the cost of manufacturing equipment. Variable costs would include the cost labor and the cost of materials.
86) B

87) B
88) D
89) D
90) Answers may vary. One possibility: Let (a, b) and (a, c), b ≠ c, be any two different points on a vertical line. The slope of

the line $= \dfrac{y_1 - y_2}{x_1 - x_2} = \dfrac{b - c}{a - a} = \dfrac{b - c}{0}$. Division by zero is undefined.

91) C
92) C
93) A
94) B
95) B
96) D
97) A
98) C
99) A
100) A
101) B
102) B
103) D
104) C
105) D
106) B
107) D
108) A
109) D
110) B
111) B
112) C
113) A
114) D
115) C
116) D
117) B
118) A
119) Answers will vary. One possibility: The slope of the line through P_1 and P_2 is -2/3. The slope of the line through P_2
and P_3 is 3/2. Therefore, since the product of these slopes is -1, the lines are perpendicular and constitute a right angle
in the triangle, making the triangle formed by these points a right triangle.
120) D
121) C
122) C
123) A
124) C
125) C
126) D
127) A
128) B
129) D
130) B
131) C

132) D
133) A
134) A
135) B
136) A
137) B
138) A
139) B
140) C
141) D
142) D
143) B
144) A
145) A
146) D
147) C
148) D
149) D
150) A
151) C
152) B
153) B
154) B
155) D
156) B
157) A
158) C
159) A
160) D
161) B
162) C
163) C
164) A
165) A
166) A