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

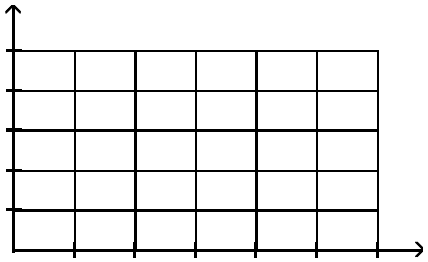
Solve the problem.

1) A computer science major found that the grade he earned on his programs increased with the time he spent working on them in the computer lab. He made a table of the hours spent in the lab and the corresponding program grades. Let g represent the grade earned when h hours are spent in the lab. 1) _____

Hours spent in lab	Program Grade
1	35
1.5	46
2	61
2.5	65
2.5	73
3.5	79
4.5	90
5	96
5	98

a) Sketch a scattergram for the data.

b) Sketch a line that comes close to the data points in the scattergram. Use your linear model to estimate the Program grade when 3 hours are spent in the lab. State whether you used interpolation or extrapolation to obtain your result.



2) Since the end of the Cold War, jobs in defense manufacturing and aerospace have disappeared as the U.S. government spends less on defense. Employments at Lockheed for various years are listed in the table below. 2) _____

Year	Employment (thousands)
1989	27.8
1991	25
1992	21
1994	16
1995	13.5

(Source: Lockheed Missile and Space)

Let L represent the employment (in thousands of people) at Lockheed t years since 1900.

i) Use your graphing calculator to create a scattergram of the Lockheed data. Then use your calculator to sketch the graph of the equation $L = -2.48t + 249.38$. Which data point(s) are above the line?
ii) Use the linear model to estimate when there were 35 thousand employees at Lockheed
iii) Use the linear model to predict the number of employees at Lockheed in 2010. Has model breakdown occurred?
iv) What is the slope of the equation $y = -2.48x + 249.38$? What does the slope tell you in terms of the employment at Lockheed - be as specific and complete as you can be.
v) Find the t-intercept. What does your result mean in terms of Lockheed?
vi) Find the L-intercept. What does your result mean in terms of Lockheed?

3) Although the number of people arrested for arson has remained fairly constant during the 1990s, the percent of arson arrests that have been juveniles has been on the rise. The data is printed in the table below. 3) _____

Year	Percent
1990	44
1991	47
1992	49
1993	49
1994	55
1995	52

(Source: U.S. Justice Department)

Let P represent the percent of arson arrests that are juveniles at t years since 1990. The equation $P = 1.83t + 44.76$ models the data well.

i) Use the linear model to predict when 75 percent of arson arrests will be juveniles.
ii) Use the linear model to estimate the percent of arson arrests that were juveniles in 1985.
iii) Find the t-intercept. What does it mean in terms of arson arrests?
iv) What is the slope of the equation $P = 1.83t + 44.76$? What does the slope represent in terms of arson arrests?
v) Find the P-intercept. What does it mean in terms of arson arrests?
vi) Find P when $t = 10$. What does your result mean in terms of the situation?
vii) Find t when $P = 100$. What does your result mean in term of the situation?

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

Solve.

4) The average value of a certain type of automobile was $13,080 in 1994 and depreciated to $5700 in 1997. Let y be the average value of the automobile in the year x, where x = 0 represents 1994. Write a linear equation that models the value of the automobile in terms of the year x. 4) _____

A) $y = -2460x + 13{,}080$ B) $y = -\frac{1}{2460}x - 5700$

C) $y = -2460x + 5700$ D) $y = -2460x - 1680$

5) An investment is worth $3713 in 1992. By 1995 it has grown to $4346. Let y be the value of the investment in the year x, where x = 0 represents 1992. Write a linear equation that models the value of the investment in the year x. 5) _____

A) $y = \frac{1}{211}x + 3713$ B) $y = -211x + 4979$

C) $y = 211x + 3713$ D) $y = -211x + 3713$

6) A faucet is used to add water to a large bottle that already contained some water. After it has been filling for 5 seconds, the gauge on the bottle indicates that it contains 13 ounces of water. After it has been filling for 11 seconds, the gauge indicates the bottle contains 25 ounces of water. Let y be the amount of water in the bottle x seconds after the faucet was turned on. Write a linear equation that models the amount of water in the bottle in terms of x. 6) _____

A) $y = 2x + 3$ B) $y = 2x + 14$ C) $y = -2x + 23$ D) $y = \frac{1}{2}x + \frac{21}{2}$

7) When making a telephone call using a calling card, a call lasting 3 minutes costs $1.05. A call lasting 13 minutes costs $3.05. Let y be the cost of making a call lasting x minutes using a calling card. Write a linear equation that models the cost of making a call lasting x minutes. 7) _____

A) $y = -0.2x + 1.65$ B) $y = 5x - \frac{279}{20}$ C) $y = 0.2x - 9.95$ D) $y = 0.2x + 0.45$

8) A vendor has learned that, by pricing pretzels at $1.75, sales will reach 82 pretzels per day. Raising the price to $2.50 will cause the sales to fall to 46 pretzels per day. Let y be the number of pretzels the vendor sells at x dollars each. Write a linear equation that models the number of pretzels sold per day when the price is x dollars each. 8) _____

A) $y = -\frac{1}{48}x + \frac{15737}{192}$ B) $y = -48x + 166$

C) $y = -48x - 166$ D) $y = 48x - 2$

9) In 1995, the average annual salary for elementary school teachers was $24,269. In 2000, the average annual salary for elementary school teachers was $28,148. Let y be the average annual salary in the year x, where x = 0 represents the year 1995. 9) _____

a) Write a linear equation that models the average annual salary for elementary school teachers in terms of year x.

b) Use this equation to determine the average annual salary for elementary school teachers in 1999.

A) a) y = 770.8x + 24,269
b) $27,372.20

B) a) y = 770.8x + 24,269
b) $27,352.20

C) a) y = 775.8x + 24,269
b) $27,372.20

D) a) y = 775.8x + 24,269
b) $28,148.00

10) In 1995, the average annual salary for elementary school teachers was $24,269. In 2000, the average annual salary for elementary school teachers was $28,148. Let y be the average annual salary in the year x, where x = 0 represents the year 1995. 10) _____

a) Write a linear equation that models the average annual salary for elementary school teachers in terms of year x.

b) Use this equation to determine the average annual salary for elementary school teachers in 2007.

A) a) y = 770.8x + 24,269
b) $33,518.60

B) a) y = 770.8x - 24,269
b) $33,518.60

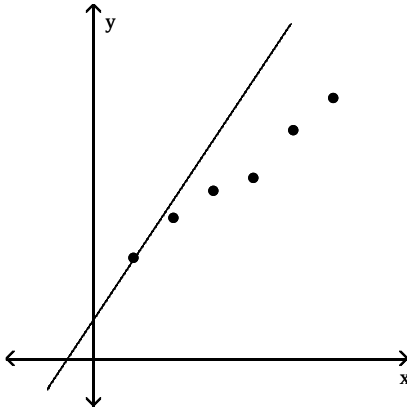
C) a) y = 775.8x + 24,269
b) $33,578.60

D) a) y = 775.8x - 24,269
b) $33,578.60

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

Solve the problem.

11) Consider the graph of the data and the model y = mx + b. Sketch the graph of a linear model that better describes the data and then explain how you would adjust the slope and the y-intercept of the original model so that it would better describe the data. 11) _____



12) The number of people who have committed violent crimes (per 100,000 people) in the U.S. during various years are listed in the table below. 12) _____

Year	Number of Violent Crime Offenders (per 100,000 people)
1960	175
1965	200
1970	360
1975	490
1980	580
1985	550
1990	750

(Source: The American Almanac)

Let N represent the number of people who have committed violent crimes (per 100,000 people) in the U.S. in the year that is t years since 1900. Find an equation of a linear model to describe the data.

13) The percents of male teenagers who have had sex is grouped by age in the table below. 13) _____

Age	Percent
13	9
14	13
15	27
16	41
17	52
18	64

(Source: The Universal Almanac)

Let P represent the percent of male teenagers of age a that have had sex. Find an equation of a linear model to describe the data.

14) Given below are the winning times for the men's 100 meter Olympic freestyle for various years. 14) _____

Year	Winning Times in Olympic 100 Meter Freestyle (in seconds)
1960	55.2
1964	53.4
1968	52.2
1972	51.22
1976	49.99
1980	50.4
1984.	49.8
1988	48.63
1992	49.02
1996	48.74

(Source: The Universal Almanac)

Let W represent the winning time (in seconds) at t years since 1950. Find an equation of a linear model to describe the data.

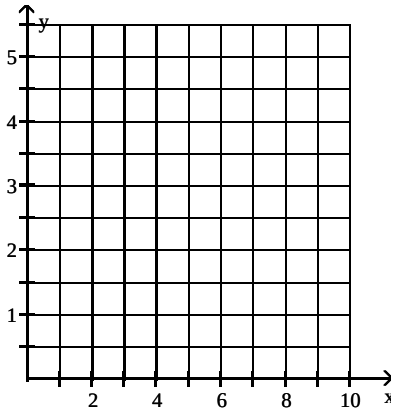
15) Three students are to find a linear model for the data in the table below. Student A uses the points (30, 14.2) and (35, 14.1), student B uses the points (40, 12.1) and (50, 9.7), and student C uses the points (60, 6.8) and (65, 7.2). Which student seems to have made the bes choice of points? Explain. 15) _____

x	y
10	19.1
20	16.9
30	14.2
35	14.1
40	12.1
50	9.7
60	6.8
65	7.2

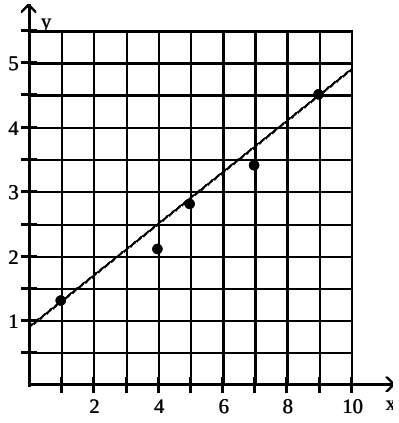
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

16) Draw a scattergram of the given data. Find the equation of the line containing the points (1, 1.3) and (9, 4.5). Graph the line on the scattergram. 16) _____

x	1	4	5	7	9
y	1.3	2.1	2.8	3.4	4.5

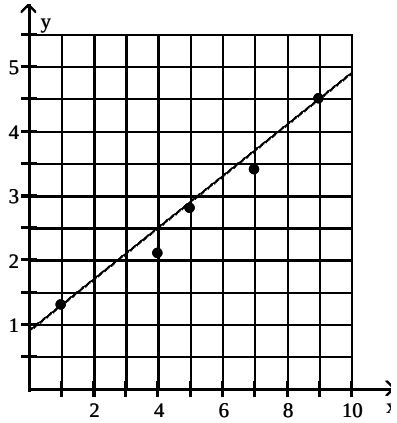


A)



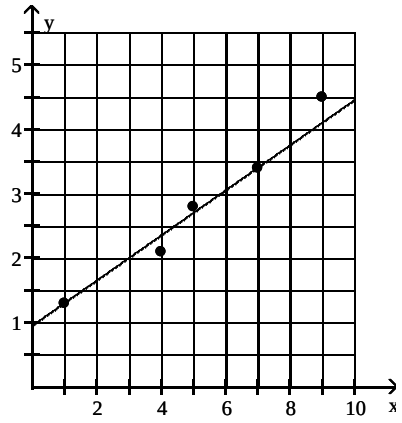
y = 0.4x + 0.9

B)



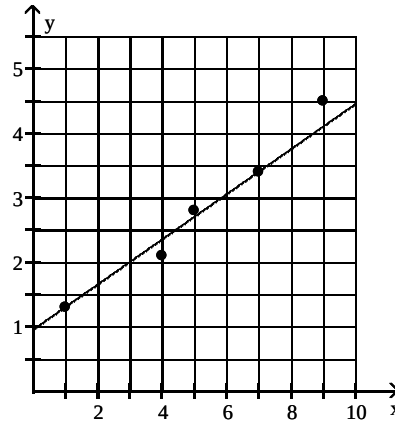
y = 0.44x + 0.9

C)



y = 0.35x + 0.95

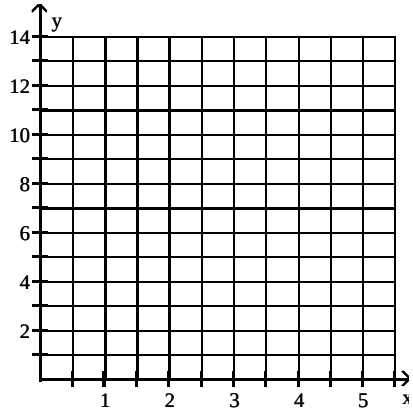
D)



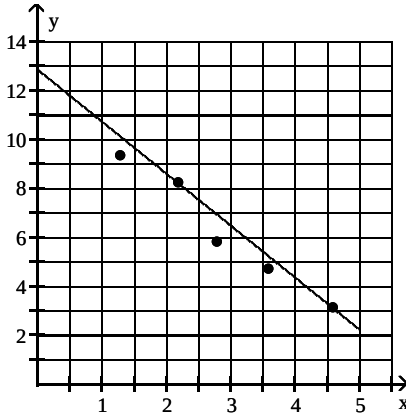
y = 0.42x + 0.85

17) Draw a scattergram of the given data. Find the equation of the line containing the points (2.2, 8.2) and (4.6, 3.1). Graph the line on the scattergram. 17) _____

x	1.3	2.2	2.8	3.6	4.6
y	9.3	8.2	5.8	4.7	3.1

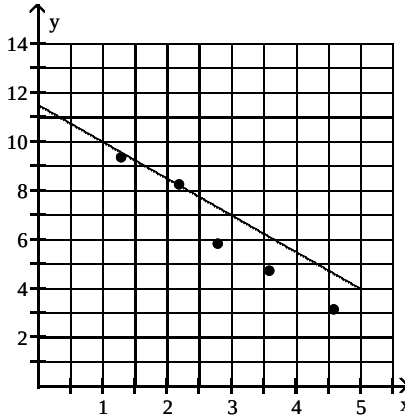


A)



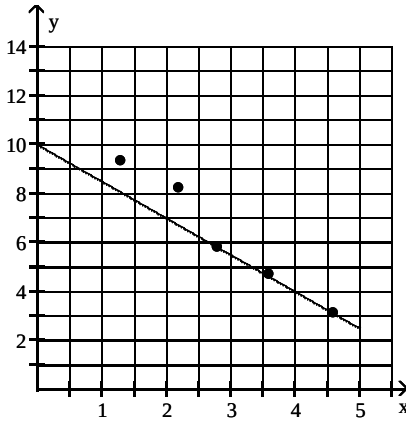
y = -2.125x + 12.88

B)



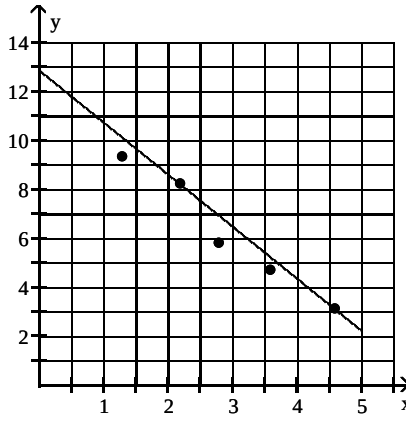
y = -2.34x + 13.38

C)



y = -1.5x + 10

D)



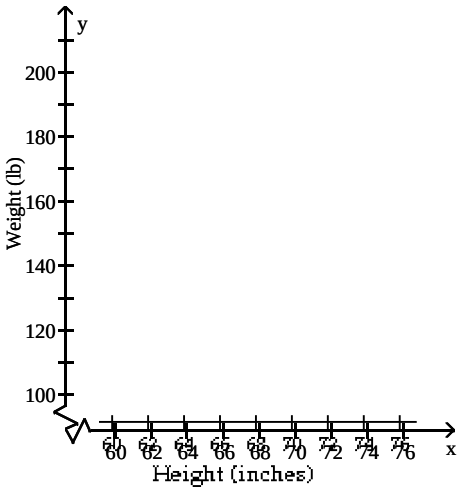
y = 2.13x + 12.88

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

18) The following data represents the height (in inches) and weight (in pounds) of 9 randomly selected adults. 18) _____

Height, x (in.)	Weight, y (lb)
65	142
72	188
61	112
68	156
74	195
66	169
62	127
70	182
67	186

Graph the data on a scattergram treating height as the independent variable. Find an equation of the line containing the points (62, 127) and (70, 182). Graph the line on the scattergram. Interpret the slope of the line. Use the line to predict the weight of a person who is 61.6 inches tall. Round to the nearest pound.



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

Evaluate the function at the given value of x.

19) $f(x) = -5x + 6,\ f(5)$ 19) _____

A) -19 B) -31 C) 1 D) 5

20) $f(x) = 3x + 2,\ f(-\frac{1}{3})$ 20) _____

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

21) $f(x) = 4x + 1,\ g(a + 1)$ 21) _____

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

22) $f(x) = 3 - 8x^2,\ f(6)$ 22) _____

A) -93 B) -285 C) -45 D) 291

23) $f(x) = \frac{x + 3}{6x - 9},\ f(9)$ 23) _____

A) $\frac{4}{15}$ B) $\frac{4}{3}$ C) $-\frac{4}{15}$ D) $\frac{4}{21}$

24) $f(x) = \frac{x - 10}{9x + 14},\ f(-2)$ 24) _____

A) 3 B) 1 C) -3 D) 0

25) $f(x) = \frac{x + 5}{7x - 11},\ f(9)$ 25) _____

A) $-\frac{7}{26}$ B) $\frac{7}{12}$ C) $\frac{7}{26}$ D) $\frac{7}{37}$

26) $f(x) = \frac{x - 8}{2x + 5},\ f(-3)$ 26) _____

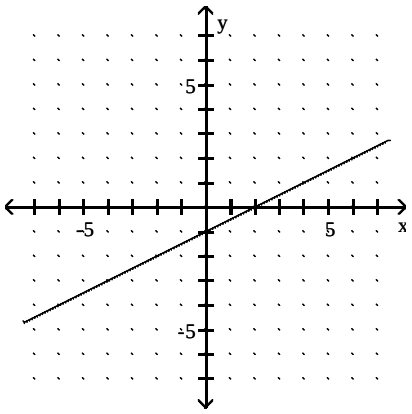
A) 1 B) 11 C) -1 D) -11

For the given function, find the value of x that corresponds to the given value of f(x).

27) $f(x) = 5x - 3,\ f(x) = 19.5$ 27) _____

A) -4.5 B) 4.5 C) -3.5 D) 3.5

A graph of the function f is sketched in the figure below. Use the graph to find the indicated values.



28) Find f(2) 28) _____

A) 0 B) 2 C) 6 D) -1

29) Find x when f(x) = -1 29) _____

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

Find the x-intercept and y-intercept of the function.

30) f(x) = 3x - 6 30) _____

A) x-intercept: (6, 0)
y-intercept: (0, -2)

B) x-intercept: (-2, 0)
y-intercept: (0, 6)

C) x-intercept: (-6, 0)
y-intercept: (0, 2)

D) x-intercept: (2, 0)
y-intercept: (0, -6)

31) f(x) = 5x 31) _____

A) x-intercept: (5, 0)
y-intercept: (0, 5)

B) x-intercept: (5, 0)
y-intercept: (0, 0)

C) x-intercept: (0, 5)
y-intercept: (5, 0)

D) x-intercept: (0, 0)
y-intercept: (0, 0)

32) f(x) = 2 32) _____

A) x-intercept: none
y-intercept: (0, 2)

B) x-intercept: (0, 2)
y-intercept: (2, 0)

C) x-intercept: (2, 0)
y-intercept: (0, 2)

D) x-intercept: (2, 0)
y-intercept: none

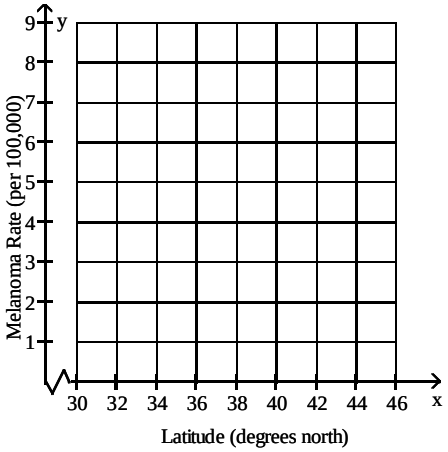
SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Solve the problem.

33) Ultraviolet radiation from the sun is thought to be one factor causing skin cancer. The amount of UV radiation a person receives is a function of the thickness of the earth's ozone layer which depends on the latitude of the area where the person lives. The following data represent the latitudes and melanoma rates for nine randomly selected areas in the United States. The melanoma rates refer to a three-year period. 33) _____

Degrees North Latitude, x	Melanoma Rate (per 100,000), y
32.4	7.2
33.7	6.7
34.4	6.2
36.5	5.5
38.1	4.7
39.9	4.2
41.6	4.1
43.2	3.4
44.0	3.0

Graph the data on a scattergram treating latitude as the independent variable. Find an equation of the line containing the points (32.4, 7.2) and (43.2, 3.4). Express the relationship using the function name f. Graph the line on the scattergram. Interpret the slope of the line. Use the line to predict the melanoma rate of an area with a latitude of 43.1 degrees north.



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

34) The percentage of Americans owning a car with a cassette tape player during particular years is given in the following table: 34) _____

Year	Percent
1980	35
1985	31
1990	26
1995	22
2000	18
2005	15

Let t be the number of years since 1980. Find a linear function, P(t), for the line containing the points (5, 31) and (15, 22).

A) f(t) = -.9t + 39.5 B) f(t) = -.9t + 35.5 C) f(t) = -.8t + 35 D) f(t) = -.8t + 35.5

35) 35) _____

The percentage of Americans owning a car with a cassette tape player during particular years is given in the following table:

Year	Percent
1980	44
1985	40
1990	35
1995	31
2000	27
2005	24

Let t be the number of years since 1980. Find a linear function, f(t), for the line containing the points (5, 40) and (15, 31). Find P(7). What does this situation mean?

A) f(7) = 38.2. In 1987, 38.2% of the population owned a car with a cassette player.
B) f(7) = 38.2. In 1987, 61.8% of the population owned a car with a cassette player.
C) f(7) = 40. In 1987, 40% of the population owned a car without a cassette player.
D) f(7) = 40. In 1987, 40% of the population owned a car with a cassette player.

36) The percentage of Americans owning a car with a cassette tape player during particular years is given in the following table: 36) _____

Year	Percent
1980	48
1985	44
1990	39
1995	34
2000	31
2005	28

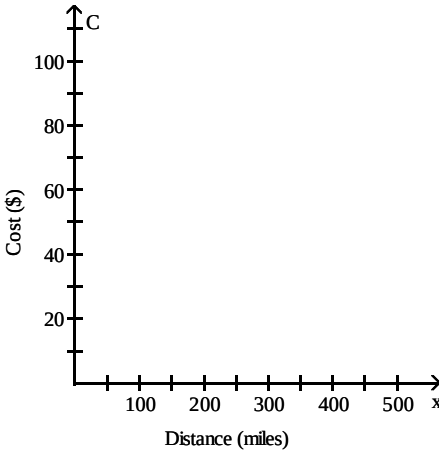
Let t be the number of years since 1980. Find a linear function, f(t), for the line containing the points (5, 44) and (15, 34). Find the t-intercept. What does it mean in this situation?

A) (49, 0) It means that in the year 2029, there will be no cars with cassette players.
B) (49, 0) It means that in the year 2029, there will be 1000 cars with cassette players.
C) (53, 0) It means that in the year 1985, there will be no cars with cassette players.
D) (48, 0) It means that in the year 2028, there will be no cars with cassette players.

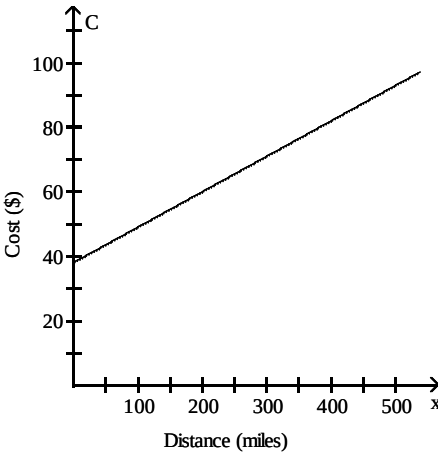
37) The cost of renting a certain type of car is $33 per day plus $0.12 per mile. Find a linear function f(x) that expresses the cost of renting a car for one day as a function of the number of miles driven x. 37) _____

A) f(x) = 33x + 0.12
B) f(x) = 0.12x + 33
C) f(x) = (x + 0.12) + 33
D) f(x) = 0.12x + 33x

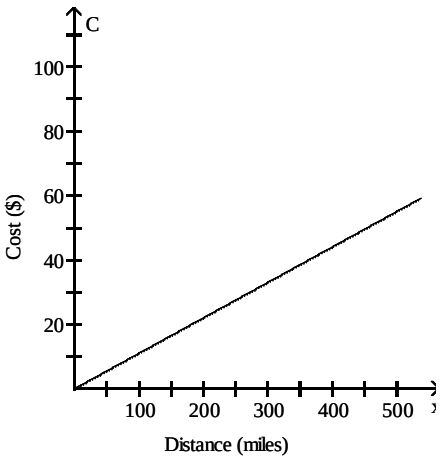
38) The cost of renting a certain type of car is $38 per day plus $0.11 per mile. Find the linear function f(x) that expresses the cost of renting a car for one day as a function of the number of miles driven, x. Graph the linear function. Use a domain of $0 \le x \le 500$. 38) _____



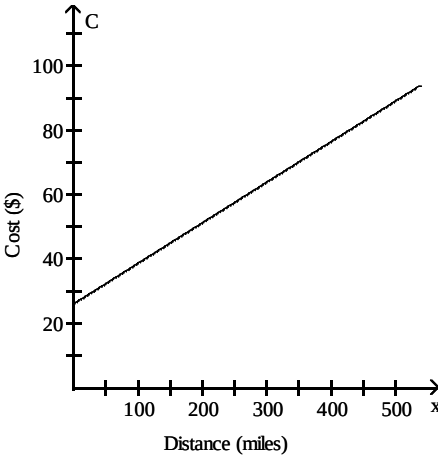
A)



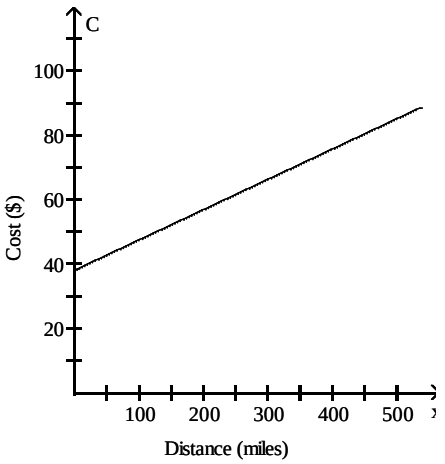
B)



C)



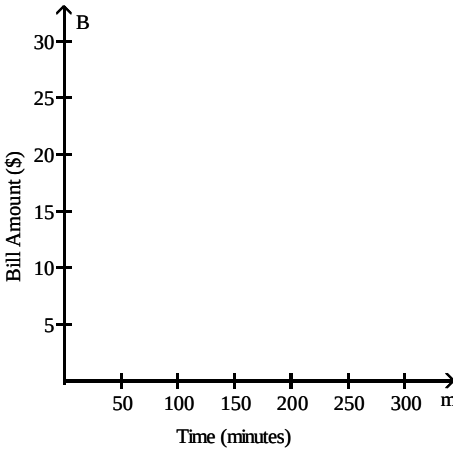
D)



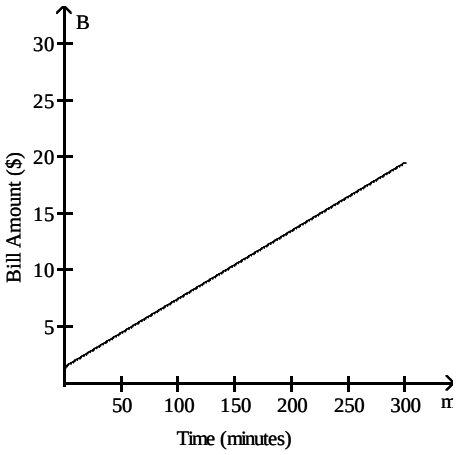
39) David recently switched to a long distance phone company which charges a monthly fee of $5.95 plus $0.06 per minute. Find a linear function f(m) that expresses the monthly bill as a function of minutes used m. 39) _____

A) f(m) = 6.01m
B) f(m) = 0.06m + 5.95m
C) f(m) = 5.95m + 0.06
D) f(m) = 0.06m + 5.95

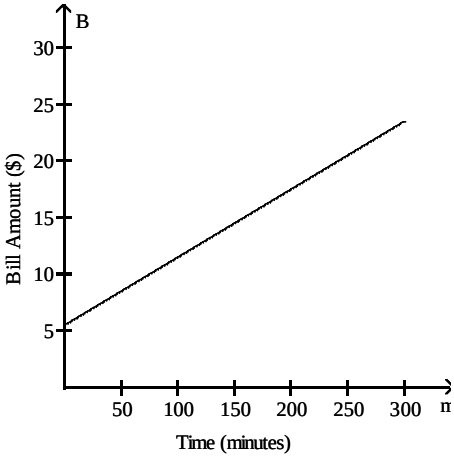
40) David recently switched to a long distance phone company which charges a monthly fee of $5.45 plus $0.06 per minute. Find the linear function f(m) that expresses the monthly bill as a function of minutes used, m. Graph the linear function. Use a domain of $0 \le m \le 300$. 40) _____



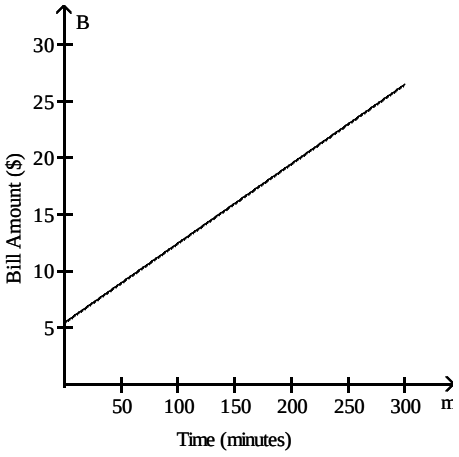
A)



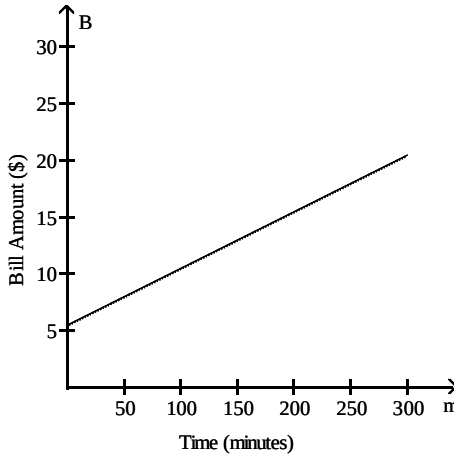
B)



C)



D)



41) A company has just purchased a new computer for $7000. The company chooses to depreciate the computer using the straight-line method over 5 years. A linear function that expresses the book value of the computer as a function of its age x is f(x) = -1400x + 7000. What is the book value of the computer after 2 years? 41) _____

A) 8400.00 B) 9800.00 C) 15,400.00 D) 4200.00

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

42) Sprint charges a flat monthly fee of $16.89 to use their services. You also must pay $0.10 per minute of talking on the telephone. Let f(t) represent the monthly phone bill (in dollars) from talking on the phone for t minutes. 42) _____

i) Find an equation for f.

ii) What is the slope of f? What does it mean in terms of the situation?

43) A basement is flooded with 230 cubic feet of water. Water can be pumped out of the basement at a rate of 47 cubic feet of water per hour. Let f(t) represent the number of cubic feet of water that remains in the basement after t hours of pumping out water. 43) _____

i) Find an equation for f.

ii) Find t when f(t) = 0. What does your result mean in terms of the situation?

iii) What is the domain and range of the model? Explain.

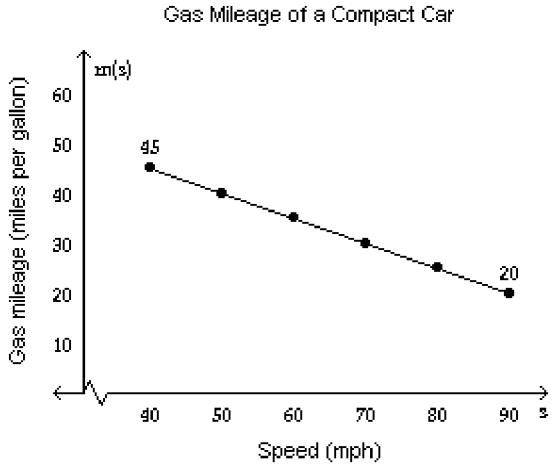
44) In 2000, the enrollment at a college is 20,700 students. Each year the enrollment decreases by 300 students. Let f(t) represent the enrollment at t years since 2000. 44) _____

i) Find an equation for f.

ii) Use f to predict when the enrollment will be 18,000 students.

iii) What is the slope of f? What does it mean in terms of enrollment?

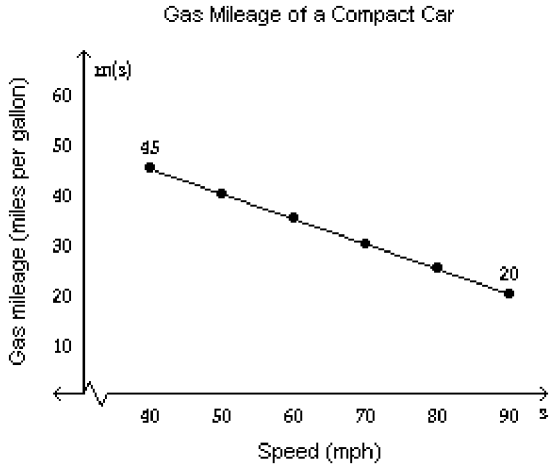
45) The gas mileage, m, of a compact car is a linear function of the speed, s, at which the car is driven, for $40 \le s \le 90$. For example, from the graph we see that the gas mileage for the compact car is 45 miles per gallon if the car is driven at a speed of 40 mph. 45) _____



Find the average rate of change in gas mileage between speeds of 40 mph and 60 mph.
Find the average rate of change in gas mileage between speeds of 50 mph and 70 mph.
Find the average rate of change in gas mileage between speeds of 70 mph and 90 mph.
Based on your results, do you think that gas mileage is linearly related to speed? Explain.

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

46) The gas mileage, m, of a compact car is a linear function of the speed, s, at which the car is driven, for $40 \le s \le 90$. For example, from the graph we see that the gas mileage for the compact car is 45 miles per gallon if the car is driven at a speed of 40 mph. 46) _____



Find and interpret the average rate of change in gas mileage between speeds of 40 mph and 90 mph.

A) -0.75 miles per gallon/mph;
Between speeds of 40 mph and 90 mph, gas mileage decreases at a rate of 0.75 miles per gallon for each 1 mph increase in speed.

B) -0.5 miles per gallon/mph;
Between speeds of 40 and 90 mph, speed decreases at a rate of 0.5 miles per hour for each 1 mpg increase in gas mileage.

C) -0.5 miles per gallon/mph;
Between speeds of 40 mph and 90 mph, gas mileage decreases at a rate of 0.5 miles per gallon for each 1 mph increase in speed.

D) 0.5 miles per gallon/mph;
Between speeds of 40 and 90 mph, gas mileage increases at a rate of 0.5 miles per gallon for each 1 mph increase in speed.

47) When a tow truck is called, the cost of the service is given by the linear function $y = 2x + 50$, where y is in dollars and x is the number of miles the car is towed. Find and interpret the slope of the linear equation. 47) _____

A) m = 50; The number of miles the car is towed increases at a rate of 50 miles per dollar spent on the service.

B) m = 50; The cost of the service increases at a rate of $50 per mile the car is towed.

C) m = 2; The cost of the service increases at a rate of $2 per mile the car is towed.

D) m = 2; The number of miles the car is towed increases at a rate of 2 miles per dollar spent on the service.

Find the slope then describe what it means in the given situation.

48) The linear function f(x) = 3.9x + 31 represents the percentage of people, f(x), who graduated from college x years after 1998. 48) _____

A) m = -3.9; the percentage of people graduating from college has decreased at a rate of 3.9% per year after 1998.

B) m = 31; the percentage of people graduating from college has increased at a rate of 31% per year after 1998.

C) m = 3.9; the percentage of people graduating from college has increased at a rate of 3.9% per year after 1998.

D) m = 3.9; the percentage of people graduating from college has decreased at a rate of 3.9% per year after 1998.

49) The linear function f(x) = -5.7x + 35 models the percentage of people, f(x), who eat at fast food restaurants x years after 1998. 49) _____

A) m = 5.7; the percentage of people eating at fast food restaurants has increased at a rate of 5.7% per year after 1998.

B) m = -5.7; the percentage of people eating at fast food restaurants has decreased at a rate of -5.7% per year after 1998.

C) m = -5.7; the percentage of people eating at fast food restaurants has decreased at a rate of 5.7% since 1998.

D) m = 35; the percentage of people eating at fast food restaurants has increased at a rate of 35% per year after 1998.

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

Solve the problem.

50) The following data represents the Olympic winning time in Women's 100 m Freestyle. 50) _____

year	winning time
1972	58.59
1976	55.65
1980	54.79
1984	55.92
1988	54.93
1992	54.65
1996	54.50

a) Let f(t) represent the winning time in the Women's 100 m Freestyle at t years since 1972. Perform the first three steps of the four-step modeling process to find an equation for f.

b) Find the slope of f. What does it represent in this situation?

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

51) From April through December 2000, the stock price of QRS Company had a roller coaster ride. The chart below indicates the price of the stock at the beginning of each month during that period. Find the monthly average rate of change in price between April, month 1, and December, month 9. 51) _____

Month	Price
April (x = 1)	116
May	109
June	89
July	100
August	94
September	113
October	93
November	86
December	66

A) $6.25 per month
B) $5.56 per month
C) -$6.25 per month
D) -$5.56 per month

52) From April through December 2000, the stock price of QRS Company had a roller coaster ride. The chart below indicates the price of the stock at the beginning of each month during that period. Find the monthly average rate of change in price between June and September. 52) _____

Month	Price
April (x = 1)	114
May	107
June	89
July	99
August	94
September	113
October	92
November	86
December	66

A) -$12.00 per month
B) -$8.00 per month
C) $8.00 per month
D) $12.00 per month

53) The total individual income tax collected by the tax collecting body of a country is a function of the number of people working, their income, and the tax rates. It has increased each year since 1970. The table below shows the individual income tax collected (in billions) for the time period between 1970 and 1995. Find the average annual rate of change between 1980 and 1990. 53) _____

Year	Tax Collected (billions)
1970	$101
1975	$160
1980	$290
1985	$400
1990	$540
1995	$684

A) $25 billion per year
B) $34.9 billion per year
C) $38 billion per year
D) $39.4 billion per year

54) Along with incomes, people's charitable contributions have steadily increased over the past few years. The table below shows the average deduction for charitable contributions reported on individual income tax returns for the period 1993 to 1998. Find the slope of the model between 1995 and 1997. 54) _____

Year	Charitable Contributions
1993	$1980
1994	$2380
1995	$2490
1996	$2760
1997	$3000
1998	$3120

A) 310 B) 510 C) 255 D) 315

55) The price of a certain commodity is a function of supply and demand. The table below shows the price of the commodity per barrel between 1995 and 2000. Find the average annual rate of change between 1996 and 1998. 55) _____

Year	Price/barrel
1995	$21
1996	$26
1997	$18
1998	$10
1999	$25
2000	$34

A) -$16.00 per year B) $8.00 per year
C) $2.00 per year D) -$8.00 per year

56) The price of a certain commodity is a function of supply and demand. The table below shows the price of the commodity per barrel between 1995 and 2000. Find the average annual rate of change between 1998 and 2000. 56) _____

Year	Price/barrel
1995	$21
1996	$25
1997	$18
1998	$12
1999	$24
2000	$36

A) -$12.00 per year B) $12.00 per year
C) $2.75 per year D) $24.00 per year

57) From April through December 2000, the stock price of QRS Company had a roller coaster ride. The chart below indicates the price of the stock at the beginning of each month during that period. The slope of the model between April and December is -$6.25 per month. Interpret this average rate of change. 57) _____

Month	Price
April (x = 1)	115
May	107
June	87
July	100
August	96
September	112
October	93
November	85
December	65

A) In each month between April and December, the price of the stock decreased by $6.25.
B) Between April and December, the price of the stock decreased by $6.25 per month.
C) Between April and December, the price of the stock increased by $6.25 per month.
D) In each month between April and December, the price of the stock increased by $6.25.

58) The total individual income tax collected by the tax collecting body of a country is a function of the number of people working, their income, and the tax rates. It has increased each year since 1970. The table below shows the individual income tax collected (in billions) for the time period between 1970 and 1995. Between 1980 and 1990, the average rate of change in the amount of tax collected is $25.9 billion per year. Interpret this average rate of change. 58) _____

Year	Tax Collected (billions)
1970	$98
1975	$161
1980	$285
1985	$402
1990	$544
1995	$681

A) Between 1980 and 1990, the amount of tax collected decreased at a rate of $25.9 billion per year.
B) Between 1980 and 1990, the amount of tax collected increased by $25.9 billion.
C) In each year between 1980 and 1990, the amount of tax collected increased by $25.9 billion.
D) Between 1980 and 1990, the amount of tax collected increased at a rate of $25.9 billion per year.

59) The total individual income tax collected by the tax collecting body of a country is a function of the number of people working, their income, and the tax rates. It has increased each year since 1970. The table below shows the individual income tax collected (in billions) for the time period between 1970 and 1995. Do you think that the amount of income tax collected is linearly related to the year? Explain your thinking. 59) _____

[Hint: determine the average rate of change in tax collected for different time periods.]

Year	Tax Collected (billions)
1970	$100
1975	$163
1980	$289
1985	$390
1990	$540
1995	$676

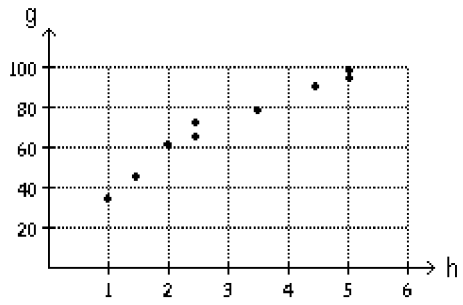
A) No, the amount of tax collected is not linearly related to the year. The average rate of change (slope) is not constant.

B) Yes, the amount of tax collected is linearly related to the year. There is a constant difference of 5 between each of the years listed.

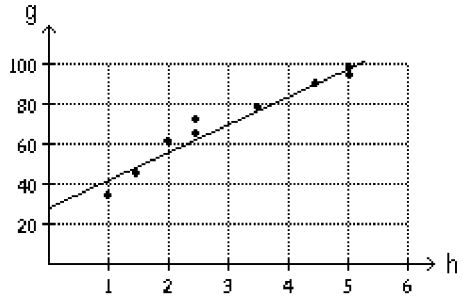
C) No, the amount of tax collected is not linearly related to the year. The average rate of change (slope) is increasing throughout the period 1970 to 1995.

D) Yes, the amount of tax collected is linearly related to the year. The average rate of change (slope) is constant.

1) a)



b)



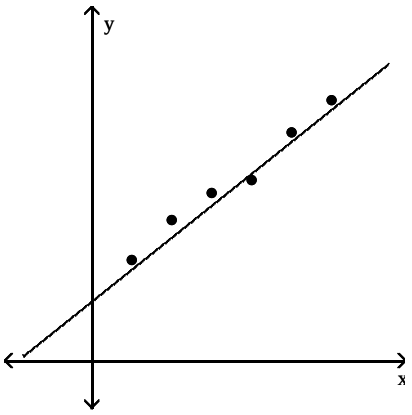
The Program grade should be about 71. Answers may vary slightly.
Interpolation was used to obtain the result.

2) i) (91, 25)
ii) 1986
iii) -23,420 employees; Model breakdown has occurred.
iv) -2.48; Employment decreases by 2480 people each year.
v) (100.56, 0); No one will be employed in 2001.
vi) (0, 249.38); Employment was 249,380 people in 1900.

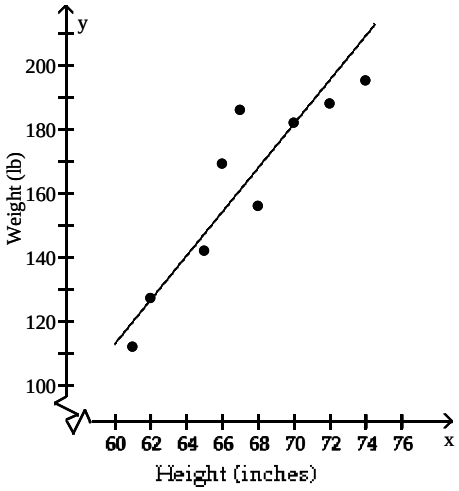
3) i) 2007
ii) 36%
iii) (-24.46, 0); No juveniles were arrested for arson in 1965.
iv) 1.83; The percent of arson arrests that were juveniles increases by 1.83 each year.
v) (0, 44.76); The percent of arson arrests that were juveniles in 1990 was 44.76%.
vi) 63.06; 63% of arson arrests were juveniles in 2000.
vii) 30.19; All arson arrests will be juveniles in 2020.

4) A
5) C
6) A
7) D
8) B
9) C
10) C

11) Decrease the slope and raise the y-intercept. The improved model is sketched in the figure below.



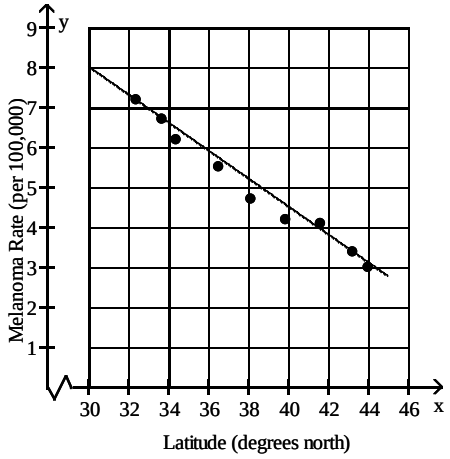
12) N = 18.89t - 973.39; Answers may vary.
13) P = 11.60a - 145.47; Answers may vary.
14) W = -0.17t + 55.55; Answers may vary.
15) Student B
16) A
17) A
18)



y = 6.875x - 299.25
If height is increased by one inch, then weight will increase by 6.875 pounds
124 lb

19) A
20) C
21) B
22) B
23) A
24) A
25) C
26) B
27) B
28) A

29) B
30) D
31) D
32) A
33)



y = -0.35x + 40
f(x) = -0.35x + 40
If latitude is increased by one degree north, then melanoma rate will decrease by 0.35 per 100,000
24.92 per 100,000

34) B
35) A
36) A
37) B
38) A
39) D
40) B
41) D
42) i) f(t) = 0.10t + 16.89
ii) 0.10; The charge per minute is $0.10.
43) i) f(t) = -47t + 230
ii) 4.89; It takes 4.89 hours to pump out all the water.
iii) domain $0 \le x \le 4.89$; range $0 \le x \le 230$
44) i) f(t) = -300t + 20,700
ii) 2009
iii) -300; The enrollment decreases by 300 students each year.
45) -0.5 miles per gallon/mph; -0.5 miles per gallon/mph; -0.5 miles per gallon/mph;
Yes, the average rate of change (slope) is constant.
46) C
47) C
48) C
49) B
50) a) f(t) = -0.13x + 57.09 Answers may vary.
b) The slope is about -0.13 which means that the winning time is decreasing by 0.13 of a second each year.
51) C
52) C
53) A

54) C
55) D
56) B
57) B
58) D
59) A