CUMULATIVE REVIEW
INTERMEDIATE ALGEBRA
MA115

PART A

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

Answer the following.

1) When simplifying $-8 - 13^2 + 8(3) + (-17)^2$,which operation is performed first ?

    A) Addition   B) Exponent   C) Parenthesis   D) Multiplication

Factor the polynomial completely.

2) $27c^3 + 8$

    A) $(3c - 2)(9c^2 + 6c + 4)$ B) $(3c + 2)(9c^2 + 4)$

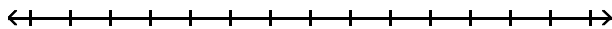   C) $(27c + 2)(c^2 - 6c + 4)$ D) $(3c + 2)(9c^2 - 6c + 4)$

Decide whether the relation is a function.
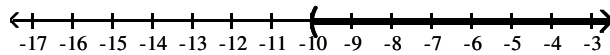
3) $\{(-3, 3), (-2, -1), (-1, -8), (6, 9)\}$

    A) Yes, with domain$\{-3,-2,-1,6\}$,range $\{3,-1,-8, 9 \}$,

    B) Yes,with domain$\{3,-1,-8, 9 \}$ range $\{ -3,-2,-1,6\}$

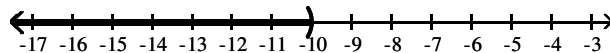**Solve the inequality. Give the solution set in both interval and graph forms.**

4) $-2(4x + 10) < -10x - 6$
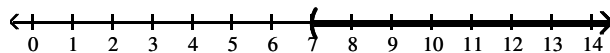

    A) $(-10, \infty)$
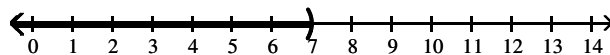

    B) $(-\infty, -10)$

    C) $(7, \infty)$

    D) $(-\infty, 7)$

Solve for the indicated variable.

5) $A = \dfrac{h(B + b)}{2}$ for b

    A) $b = 2A - Bh$ B) $b = \dfrac{2A - Bh}{h}$ C) $b = \dfrac{2A + Bh}{h}$ D) $b = \dfrac{A - Bh}{h}$

Simplify the expression so that no negative exponents appear in the final result. Assume all variables represent nonzero numbers.

6) $\left(\dfrac{2x^3y^{-3}}{x^{-4}y^2}\right)^{-5}$

    A) $\dfrac{y^{25}}{2x^7}$ B) $\dfrac{2x^{35}}{y^{25}}$ C) $\dfrac{y^{25}}{32x^{35}}$ D) $\dfrac{y^{25}}{2x^{35}}$

Find all numbers that are not in the domain of the function. Then give the domain using set notation.

7) $f(x) = \dfrac{2x + 18}{5x^2 - 3x - 8}$

    A) $-9,-1,\dfrac{8}{5}; \left\{x \mid x \neq -9,-1,\dfrac{8}{5}\right\}$ B) $\dfrac{5}{8}, -1; \left\{x \mid x \neq \dfrac{5}{8}, -1\right\}$

    C) $\dfrac{8}{5}, -1; \left\{x \mid x \neq \dfrac{8}{5}, -1\right\}$ D) $-\dfrac{8}{5}, 1; \left\{x \mid x \neq -\dfrac{8}{5}, 1\right\}$

Simplify. Assume that all variables represent positive real numbers.

8) $\sqrt{80k^7q^8}$

    A) $4k^2q^4\sqrt{5k}$ B) $4k^3q^4\sqrt{5k}$ C) $4k^7q^8\sqrt{5k}$ D) $4k^3q^4\sqrt{5}$

Determine whether the equation represents direct, inverse, joint, or combined variation.

9) $y = \dfrac{11}{x}$

    A) A direct variation such that x increases ,y decreases

    B) A direct variation such that x increases ,y increases

    C) A inverse variation such that x increases ,y decreases

    D) A inverse variation such that x increases ,y increases

List the elements from A that belong to the set.

10) $A = \left\{-\sqrt{7}, -1, -0.49, 0, \sqrt{4}, \dfrac{14}{2}, 18, \sqrt{-8}\right\}$

    Whole numbers

    A) $0, \sqrt{4}$ (or 2), $\dfrac{14}{2}$ (or 7), 18   B) $\sqrt{4}$ (or 2), $\dfrac{14}{2}$ (or 7), 18

    C) 0, 18   D) $0, \sqrt{4}$ (or 2), 18

Multiply or divide as indicated.

11) $\sqrt{-64} \cdot \sqrt{25}$

    A) 40i   B) –40i   C) –40   D) 40

Answer the question.

12) For the expression $\sqrt{-a}$, under what conditions will its value real?

    A) a must be positive   B) a must be a n integer   C) a must be negative

Find the term that should be added to the expression to form a perfect square trinomial. Write the resulting perfect square trinomial in factored form.

13) $x^2 - 10x + $

A) $25; (x - 10)^2$ 　　　B) $25; (x + 5)^2$ 　　　C) $25; (x - 5)^2$ 　　　D) $0; (x - 5)^2$

Decide whether the pair of lines is parallel, perpendicular, or neither.

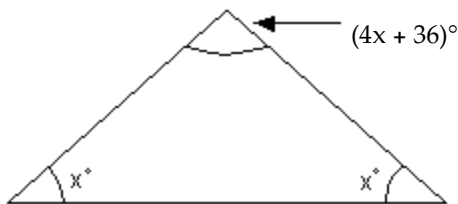14) The line through (3, –5) and (–1, 7) and the line through (6, –13) and (–2, 11)

A) Parallel 　　　B) Perpendicular 　　　C) Neither

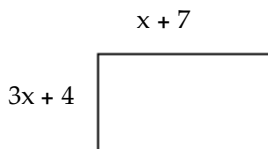**Solve the problem.**

15) Find the measure of each angle.

A) $34°, 34°, 112°$ 　　　B) $20°, 20°, 140°$ 　　　C) $26°, 26°, 128°$ 　　　D) $24°, 24°, 132°$

16) The area of the rectangle shown is 56 in.^{2}. Find the length and the width of the rectangle.

A) length: 19 in.; width 1 in. 　　　　　　B) length: 8 in.; width 7 in.
C) length: 8 in.; width 6 in. 　　　　　　D) length: 24.5 in.; width 24.5 in.

Answer the question.

17) How is the graph of a line with zero slope situated in a rectangular coordinate system?

A) It is a horizontal line. 　　　　　　B) It is a vertical line.
C) It is not a line. 　　　　　　　　　D) It is an oblique line.

Rationalize the denominator. Assume that all variables represent positive real numbers.

18) $\sqrt{\dfrac{72}{x}}$

A) $6\sqrt{2x}$ 　　　B) $\dfrac{6\sqrt{2x}}{x}$ 　　　C) $6\sqrt{\dfrac{2}{x}}$ 　　　D) $\dfrac{\sqrt{6x}}{x}$

Solve the problem.

19) Which one of the following inequalities is equivalent to $b \geq 3$?

A) $-3b \geq -9$ 　　　B) $-3b \leq 9$ 　　　C) $-3b \leq -9$ 　　　D) $-3b \geq 9$

PART B
SHORT ANSWER

Express the number in scientific notation.

20) 0.000097819

For the given pair of functions, find the requested function.

21) $f(x) = 4x - 4$, $g(x) = -9x^2 - 15x + 8$; $(f - g)(x)$

Express the radical in simplified form. Assume that all variables represent positive real numbers.

22) $\sqrt{486z^2}$

Solve the equation by completing the square.

23) $4x^2 - 3x = 7$

Express the radical in simplified form. Assume that all variables represent positive real numbers.

24) $-\sqrt{12k^7q^8}$

Simplify the expression. Assume that all variables represent positive real numbers.

25) $\left(\dfrac{x^{-6}y^{-4}}{x^{-3}y^5} \right)^{-3/5}$

Rationalize the denominator. Assume that all variables represent positive real numbers.

26) $\dfrac{-3a}{\sqrt{2}}$

Provide an appropriate response.

27) What is the discriminant for $v^2 + 7v - 2 = 0$? How many and what type of solutions does this equation have?

Multiply and express in lowest terms.

28) $\dfrac{k^2 + 12k + 35}{k^2 + 14k + 49} \cdot \dfrac{k^2 + 7k}{k^2 - 3k - 40}$

Factor the trinomial completely.

29) $22xym^2 + 133xymn + 66xyn^2$

Solve the problem.

30) The force required to keep a 2000 pound car going 30 mph from skidding on a curve, where r is the radius of the curve in feet, is given by $F = \dfrac{225000}{r}$. What radius must a curve have if a force, F, of 450 pounds is needed to keep the car from skidding?

Solve for the indicated variable.

31) $y = \dfrac{m(a + p)}{2}$ for p

Use the Pythagorean formula to find the exact length of side a in the figure.

32)

b=12 c = 19 90° a = ?
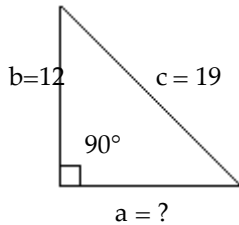
Factor.

33) $4x^3 + 4x^2y - 80xy^2$

34) $36r^2 + 45ry - 4xr - 5xy$

35) $4n + 4x - n^2 - nx$

Solve.

36) Suppose the velocity of an automobile starting from rest is given by

$$v = \dfrac{200t}{2t + 4}$$

where v is the velocity in miles per hour and t is the time in seconds. Find the number of seconds when the velocity is 60 miles per hour.

Simplify.

37) $\dfrac{5}{x + 2} + \dfrac{2}{x^2 - 2x + 4} - \dfrac{60}{x^3 + 8}$

Solve the equation.

38) $24x^2 = 48x$

Decide whether the pair of lines is parallel, perpendicular, or neither.

39) $18x = -6y - 45$ and $-21x - 7y = 92$

Solve the equation.

40) $7\sqrt{x} = \sqrt{9x + 9} + 3\sqrt{x}$

Find an equation of the line satisfying the conditions. Write the equation in slope–intercept form.

41) Through (–5, –2); perpendicular to $-5x - 2y = 27$

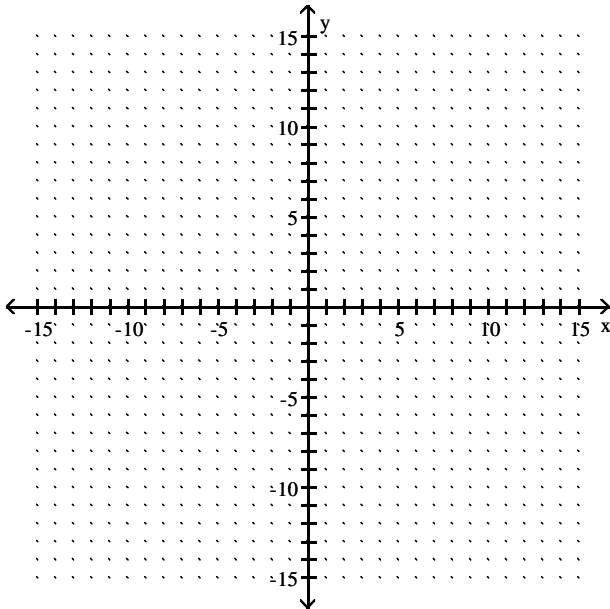**Solve the problem. Round your answer to the nearest tenth, when appropriate.**

42) The position of an object moving in a straight line is given by $s(t) = t^2 - 8t$, where s is in feet and t is the time in seconds the object has been in motion. How long will it take the object to move 7 ft?

Solve the system by elimination.

43) $8y - 8 = -x$
$7x - 4y = -4$

Find the slope of the line and sketch the graph.

44) $2x - 5y = -16$

Solve the system . If a system is inconsistent or has dependent equations, say so.

45) $5x - 2y = 3$
$-20x + 8y = -12$

46) $2x - 3y = -2$
$6x - 9y = 6$

Solve the system by substitution.

47) $x - 4y = -4$
$-4x - 3y = -3$

Simplify the complex fraction.

48) $\dfrac{4 + \dfrac{2}{x}}{\dfrac{x}{3} + \dfrac{1}{6}}$

Solve the problem.

49) Jim has gotten scores of 71 and 87 on his first two tests. What score must he get on his third test to keep an average of 80 or greater?

Find the value of k so that the equation will have exactly one rational solution.

50) $64x^2 + kx + 49 = 0$

Solve the equation by factoring, using *i* notation if necessary.

Hint: You should find four solutions

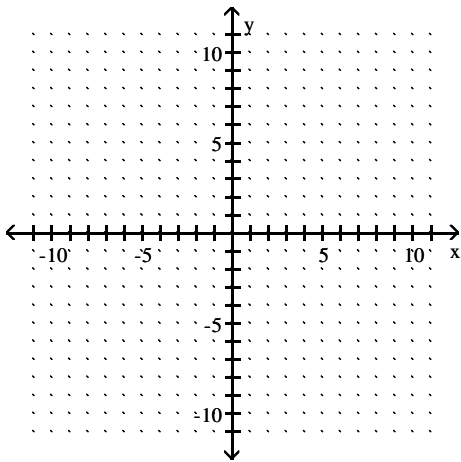51) $4y^4 - 12y^2 - 16 = 0$

Solve the investment problem.

52) Walt made an extra $10,000 last year from a part–time job. He invested part of the money at 10% and the rest at 9%. He made a total of $970 in interest. How much did he invest at each rate?

Solve the problem.

53) If x varies inversely as y^2, and $x = 6$ when $y = 10$, find x when $y = 2$.

Find the x– and y–intercepts and slope. Then graph the equation.

54) $8y - 2x = -4$

Solve the problem.

55) A truck rental company charges $35, plus $0.13 per mile to rent a moving truck for a day. If x represents the number of miles driven and f(x) represents the total cost to rent the truck for a day, write a linear function that models the situation.

56) The speed of a stream is 6 mph. If a boat travels 88 miles downstream in the same time that it takes to travel 44 miles upstream, what is the speed of the boat in still water?

Solve the problem. Round your answer to the nearest tenth, if necessary.

57) Two pipes together can fill a large tank in 10 hr. One of the pipes, used alone, takes 15 hr longer than the other to fill the tank. How long would each pipe take to fill the tank alone?

Solve the problem.

58) In 1980, there were 108,000 farms in a state. As of 2005, there were 86,000. Find the average rate of change in the number of farms per year.

Solve the problem. Round your answer, as needed.

59) The rate of return of certain investments increases as the risk factor of the investment increases. An investment with a risk factor of 2 has a rate of return of 5.0%. An investment with a risk factor of 21 has a rate of return of 19.0%. What is the average rate of return per unit of risk?

Solve the problem.

60) The length of the diagonal of a box is given by $D = \sqrt{L^2 + W^2 + H^2}$ where L, W, and H are the length, width, and height of the box. Find the length of the diagonal, D, of a box that is 3 ft long, 2 ft high, and 3 ft wide. Give the exact value.

Find an equation of the line, and write it in (a) slope–intercept form if possible and (b) standard form.

61) Through (–5, 1) and (0, 8)

Solve the problem. Round your answer to the nearest tenth, when appropriate.

62) The position of an object moving in a straight line is given by $s(t) = 2t^2 - 3t$, where s is in meters and t is the time in seconds the object has been in motion. How long will it take the object to move 10 m?

PART C

LONG ANSWER

Solve the follwing equation.

63) $\dfrac{x}{2x + 2} = \dfrac{-2x}{4x + 4} + \dfrac{2x - 3}{x + 1}$

Solve the problem.

64) How many liters (L) of a 10% alcohol solution must be mixed with 50 L of a 90% solution to get a 50% solution?

Divide by Long Division .S

65) $\dfrac{-20x^3 - 13x^2 - 14x - 3}{-4x - 1}$

66) $\dfrac{y^2 + 14y + 49}{y + 7}$

Find the product.

67) $(2x - 3)(5x^3 - 2x^2 - 4x + 4)$

Find the requested value.

68) If $p(x) = 8x^3 + 6x^2 + 14x - 45$ and $q(x) = 4x + 7$,

a. find $(\dfrac{p}{q})(-3)$.

b. find $(\dfrac{p}{q})(\dfrac{-7}{4})$ If not possible, explain.

Solve the problem.

69) A cruise boat travels 36 miles downstream in 3 hours and returns to its starting point upstream in 12 hours. Find the speed of the stream.

70) A test has twenty questions worth 100 points. The test consists of True/False questions worth 3 points each and multiple choice questions worth 11 points each. How many multiple choice questions are on the test?

71) A plane flies 400 miles with the wind and 300 miles against the wind in the same length of time. If the speed of the wind is 24 mph, what is the speed of the plane in still air?

Solve the problem, if possible. Round your answer to the nearest tenth, when appropriate.

72) A rectangular garden has an area of 12 ft by 5 ft. A gravel path of equal width is to be built around outside the garden. How wide can the path be if there is enough gravel for 138 ft^2?

Solve the problem. Round your answer to the nearest tenth, when appropriate.

73) The function defined by $D(t) = 13t^2 - 73t$ gives the distance in feet that a car going approximately 50 mph will skid in t seconds. Find the time it would take for the car to skid 290 ft.

74) i) It costs $17 flat fee to rent a power drill, plus $4 a day starting with the first day. Let x represent the number of days rented, and y represent the charge to the user (in dollars). Write an equation in the form $y = mx + b$ that represents this situation.

ii) Mr. Fix rents the drill for 6 days. How much will he pay?
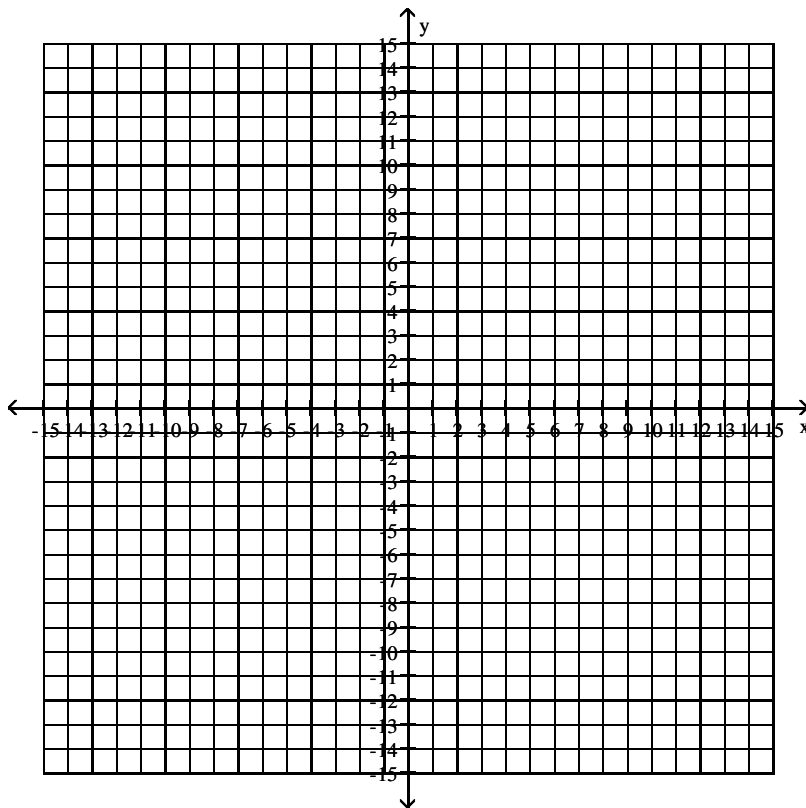
75) **Consider the system**
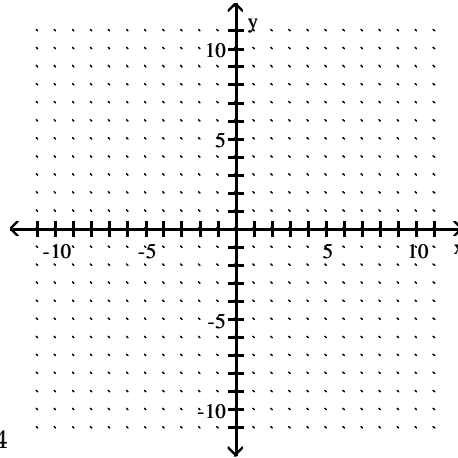 5x + 3y = 15
  a..**Find x intercept and y intercept**

   x +y = 5
  b. **Find x intercept and y intercept**

  c. **Solve the system by graphing**

76)

Consider the Equation: $-4x - 24y = 24$

a. Find the x– and y–intercepts.
b. Graph the equation
c. Let O be the point $(0, 0)$. Label the x–intercept P and the y–intercept Q. Use the Pythagorean Theorem and your graph from part b to find the length of the line–segment PQ. Write your answer in radical form. *(Note: POQ forms a right triangle…)*

Solve the equation using Quadratic formula .[Hint: You should find four solutions]
77) $36x^4 - 85x^2 + 49 = 0$

Solve the problem. Round your answer, as needed.
78) A deep sea diving bell is being lowered at a constant rate. After 8 minutes, the bell is at a depth of 300 ft. After 40 minutes the bell is at a depth of 1900 ft.
a. What is the average rate of lowering per minute?
b. Write a linear function that models the data.Change the model into Slope–intercept form.
c.Use your model to predict the depth of the bell after 20 minutes.

Solve the problem.
79) A study on the number of babies born out of wedlock was conducted by the Center for Disease Control and Prevention. The study found that in 2002, approximately 14% of babies born to women in their thirties were non–marital while in 2007, the percentage was nearly 20%.

a.Write a linear function that models this data.

b.Use your model to predict the percentage of babies born out of wedlock

to women in their thirties in 2012.

80) The information in the chart gives the salary of a person for the stated years. Use the information for the years 2001 and 2003 to find an equation that models the data. Let x = 1 represent 2001, x = 3 represent 2003, and y represent the salary.

a.Write the equation in slope–intercept form.

b.Use this equation to approximate the salary for 2004 to the nearest dollar.

Year	Salary
2000	$23,500
2001	$24,800
2002	$25,200
2003	$26,600
2004	$27,200

Solve the equations.

81) a. $\dfrac{1}{w + 11} + \dfrac{1}{3w - 8} = \dfrac{-41}{3w^2 + 25w - 88}$

b. $\dfrac{9}{y + 5} - \dfrac{3}{y - 5} = \dfrac{6}{y^2 - 25}$
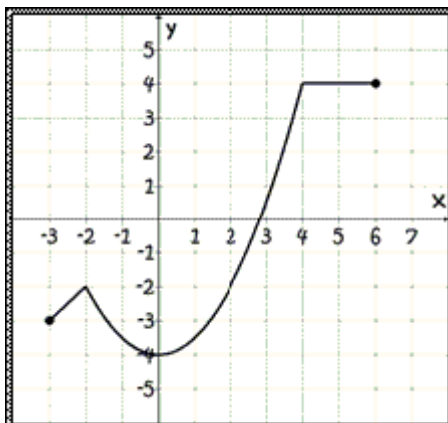
Solve the problem.

82) A ladder is resting against a wall. The top of the ladder touches the wall at a height of 18 ft. Find the length of the ladder if the length is 6 ft more than its distance from the wall.

83) Newlyweds Bryce and Lauren Tomlin need to rent a truck to move their belongings to their new apartment which is 550 miles away from their town.They can rent a truck of size they need from U–Haul for 29.95 a day plus 28 cents per mile or from Budget Truck Rentals for $34.95 a day plus 25 cents per mile.After how many miles would the budget rental be a better deal than U–Haul one?

Consider the relation graphed to the right.

84)

a. Is the relation a function?

b. State the domain of the relation.

c. State the range of the relation

Solve the problem.

85) a. A bank teller has some five–dollar bills and some twenty–dollar bills. The teller has 5 more of the twenties. The total value of the money is $800. Find the number of five–dollar bills that the teller has.

b. If the first and third of three consecutive odd integers are added, the result is 57 less than five times the second integer. Find the third integer.

86) a. **Solve the problem using a system of equations.**
Best Rentals charges a daily fee plus a mileage fee for renting its cars. Barney was charged $111.00 for 3 days and 300 miles, while Mary was charged $198.00 for 5 days and 600 miles. What does Best Rentals charge per day and per mile?

b. **For the given pair of functions, find the requested function.**

i) If $f(x) = 49x^3 - 28x^2 + 28x - 12$ and $g(x) = 7x + 3$, find $\left(\dfrac{f}{g}\right)(-5)$.

ii) Is it possible to find $\left(\dfrac{f}{g}\right)(-\dfrac{3}{7})$? If not, explain.

Perform the indicated operation and express in lowest terms.

87) $\dfrac{10s^2 + 7st + t^2}{3s^2 - 5st - 2t^2} \cdot \dfrac{4s^2 - 9st + 2t^2}{t^2 + 4st - 5s^2} \div \dfrac{8s^2 + 2st - t^2}{3s^2 + 4st + t^2}$
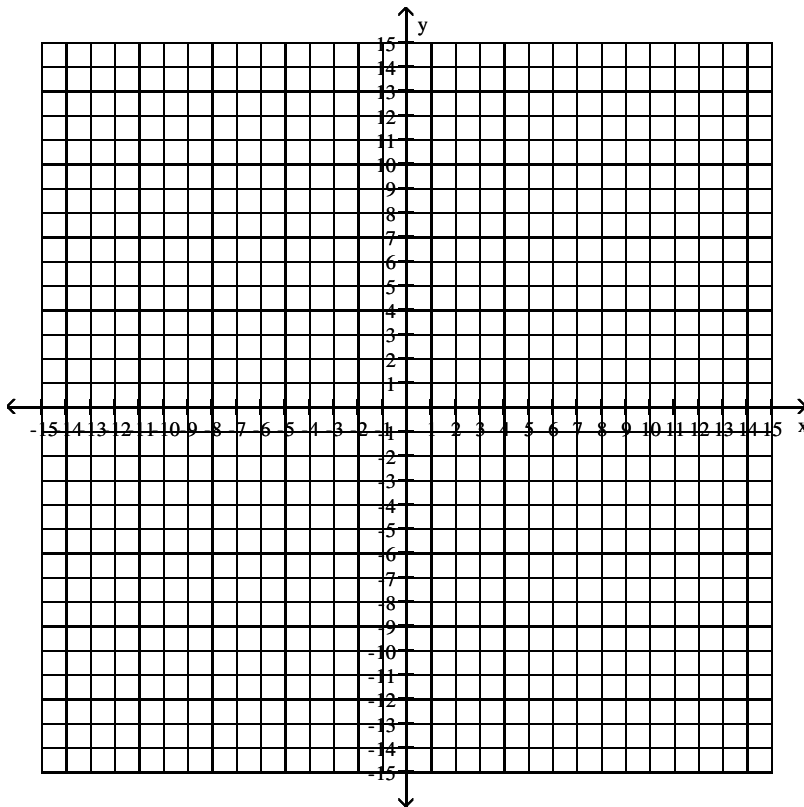
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88) a) Graph the following three lines on the coordinate system below:

$x = -2$, $y = 3$, and $y = -\dfrac{1}{2}x + 6$

b) Find the area, in square units, of the triangle formed by the three lines that were graphed.
(Note: The area of a triangle is given by the formula $A = \frac{1}{2}$ bh)

c) Find the length of the longest side of the triangle using the Pythagorean Theorem. Write your answer in simplest radical form.

Solve the problem.

89) There were 510 people at a play. The admission price was $3 for adults and $1 for children. The admission receipts were $1070. How many adults and how many children attended?

Consider the graph

90)
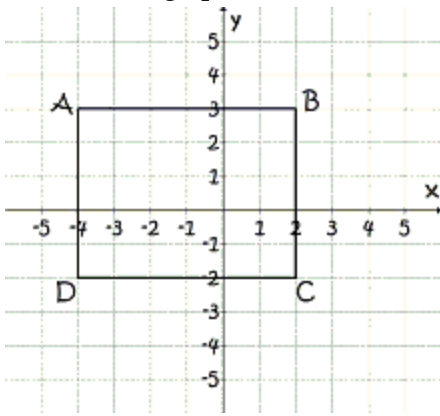
    a. Find the area of the rectangle ABCD.

    b. Write an equation of the line that passes through the points A and D.

    c. Write an equation of the line that passes through points B and D.

    d. Write an equation of the line that passes through the points C and D. Write your Equation in Standard Form.

    e. Find the length of the line segment BD. Round your answer to tenth place. *Hint: BCD forms a right triangle.*

GOOD LUCK!!!!

1) C
2) D
3) A
4) D
5) B
6) C
7) C
8) B
9) C
10) A
11) A
12) C
13) C
14) A
15) D
16) B
17) A
18) B
19) C
20) 9.7819×10^{-5}
21) $9x^2 + 19x - 12$
22) $9z\sqrt{6}$
23) $\left\{\dfrac{7}{4}, -1\right\}$
24) $-2k^3q^4\sqrt{3k}$
25) $x^{9/5}y^{27/5}$
26) $-\dfrac{3a\sqrt{2}}{2}$
27) Discriminant: 57 ; Two real irrational solutions
28) $\dfrac{k}{k-8}$
29) $xy(2m + 11n)(11m + 6n)$
30) 500 feet
31) $p = \dfrac{2y - am}{m}$
32) $a = \sqrt{217}$
33) $4x(x - 4y)(x + 5y)$
34) $(4r + 5y)(9r - x)$
35) $(n + x)(4 - n)$
36) 3 sec
37) $\dfrac{5x - 18}{x^2 - 2x + 4}$
38) $\{0, 2\}$
39) Parallel
40) $\left\{\dfrac{9}{7}\right\}$

41) $y = \dfrac{2}{5}x$
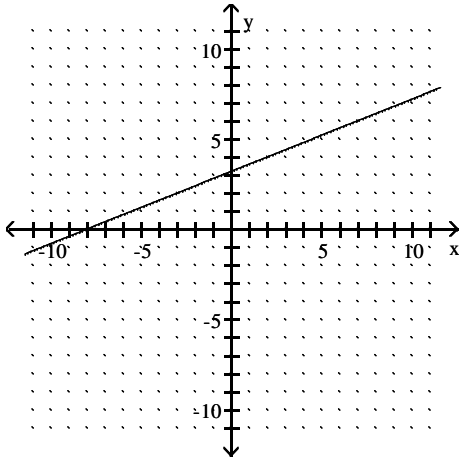
42) 8.8 sec

43) {(0, 1)}

44) Slope: $\dfrac{2}{5}$

45) Infinite number of solutions; dependent equations

46) ∅; inconsistent system

47) {(0, 1)}

48) $\dfrac{12}{x}$

49) At least 82

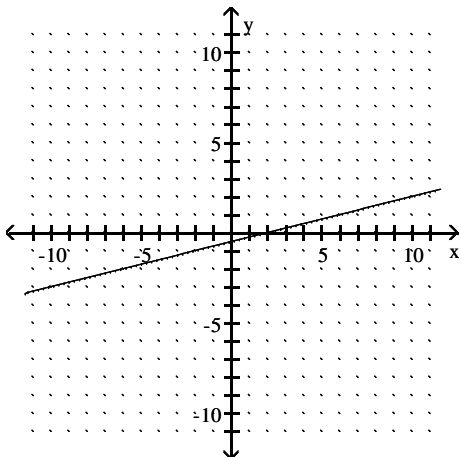50) 112 or –112

51) {2, –2, i, –i}

52) $3000 at 9%; $7000 at 10%

53) 150

54) $(2, 0); \left(0, -\dfrac{1}{2}\right)$; $\dfrac{1}{4}$

55) $f(x) = 0.13x + 35$

56) 18 mph

57) 15 hr; 30 hr

58) –880 farms per yr

59) 0.74% per unit risk

60) $\sqrt{22}$ ft

61) (a) $y = \dfrac{7}{5}x + 8$

(b) $7x - 5y = -40$

62) 3.1 sec

63) {3}

64) 50 L

65) $5x^2 + 2x + 3$

66) $y + 7$

67) $10x^4 - 19x^3 - 2x^2 + 20x - 12$

68) a. $\dfrac{249}{5}$

b. undefined

69) 4.5 mph

70) 5

71) 168 mph

72) 3 ft

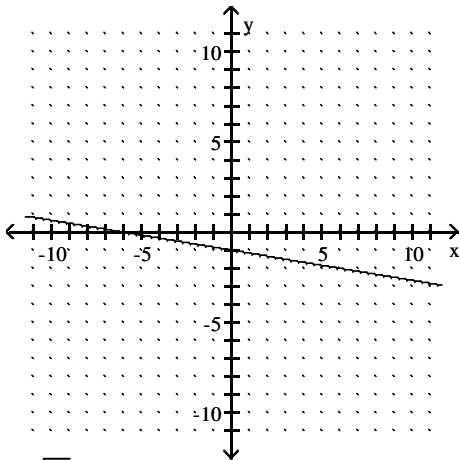73) 8.3 sec

74) i) $y = 4x + 17$

ii) $41

75) a. {(3, 0)};{(0, 5)}

b. {(0, 5)};{(5, 0)}

c. {(0, 5)}

76) a. (−6, 0); (0, −1)

b.

c. $\sqrt{37}$

77) $\left\{ -\dfrac{7}{6}, -1,\ 1, \dfrac{7}{6} \right\}$

78) a. 50.0 ft per minute

b. y=50x−100

c. 900 ft

79) a. y = .012x −23.884

b. 26%

80) a.$y = 900x + 23,500$;
 b.$27,100
81) a.∅
 b. { 11 }
82) 30 ft
83) 167 miles
84) a.Yes
 b. domain : [–3,6]
 c.Range : [–4, 4]
85) a. 28
 b. 21
86) a.$24 per day; 13¢ per mile
 b. $\dfrac{6977}{32}$

87) $\dfrac{t + s}{t - s}$

88) b)16 square units
 c) $4\sqrt{5}$ units
89) 280 adults and 230 children
90) a. 30 square units
 b. $x = -4$
 c. $5x - 6y = -8$
 d. $y = -2$
 e. 7.8 units