

Part I: Simplifying algebraic Expressions.

Simplify the algebraic expression.

1) $-2(6x + 6)$

Simplify the algebraic expression.

2) $9(10x - 5y) - (6x - 3y)$

Add the polynomials.

3) $(8x^2 - 4x - 8) + (-3x^2 - 4x - 6)$

4) $(5x^3 + 9x + 8) + (9x^2 + 5x - 3)$

Subtract the polynomials.

5) $(2x^6 - 4x^3 - 18) - (-6x^3 + 8x^6 - 17)$

6) $(2x + 6) - (16x - 13)$

Simplify the expression using the products-to-powers rule.

7) $(-2x)^3$

Multiply the monomials.

8) $(-4x^2)(9x^8)$

9) $(5x^7)(-8x^5)$

10) $\left(\frac{1}{4}x^6\right)\left(\frac{1}{7}x^9\right)$

Find the product.

11) $(x^2 - 3x + 1)(5x)$

12) $(4x + 1)(x - 11)$

13) $(7x - 1)(x^2 - 2x + 1)$

14) $(9x + 11)(9x - 11)$

15) $(3x - 11)^2$

Simplify the exponential expression.

16) $(4x^4)^3 x^{-15}$

Divide the monomials.

17) $\frac{56x^{13}y^{10}}{7x^6y^3}$

Divide the polynomial by the monomial.

18) $\frac{36x^9 - 32x^6 - 28x^3}{4x^3}$

Divide as indicated.

19) $\frac{x^2 + 12x + 28}{x + 4}$

Simplify the rational expression. If the rational expression cannot be simplified, so state.

20) $\frac{5 - x}{x - 5}$

21) $\frac{3x + 4}{15x^2 + 26x + 8}$

Multiply. Simplify if possible.

22) $\frac{k^2 + 8k + 12}{k^2 + 9k + 18} \cdot \frac{k^2 + 3k}{k^2 + 7k + 10}$

Divide. Simplify if possible.

23) $\frac{x^2 + 9x + 20}{x^2 + 14x + 45} \div \frac{x^2 + 4x}{x^2 + 6x - 27}$

24) $\frac{x^2 - 7x + 10}{2 - x} \div (x + 5)$

Perform the indicated operation. Simplify if possible.

25) $\frac{9x + 3}{10} + \frac{9x - 3}{10}$

Perform the indicated operation(s). Simplify if possible.

26) $\frac{6x + 16}{x + 3} - \frac{4x + 7}{x + 3}$

$$27) \frac{4}{x} + \frac{8}{x-5}$$

$$39) 15z^2 - 2z - 8$$

$$40) 12x^2 - 17xt + 6t^2$$

Perform the indicated operation. Simplify the result, if possible.

$$28) \frac{7x}{x^2 + 5x + 4} - \frac{2}{x + 4}$$

Part III: Solve the equations.

Solve the equations. Use words or set notation to identify equations that have no solution or equations that are true for all real numbers.

$$41) 2x + 5(3x - 3) = 7 - 5x$$

$$42) 7(x + 3) = 7x + 21$$

$$43) 1.2 - 10x = -82.8 - 1.6x$$

$$44) 5x^2 - 35x + 60 = 0$$

$$45) x^2 - x = 30$$

$$46) \frac{x}{7} + \frac{5x}{8} = \frac{x}{56}$$

$$47) \frac{x+7}{6} + \frac{x-1}{3} = \frac{4}{3}$$

$$48) \frac{5-x}{x} + \frac{3}{4} = \frac{7}{x}$$

$$49) \frac{1}{x-4} = \frac{8}{x^2-16}$$

$$50) \frac{2x}{x+2} - \frac{4}{x-2} = \frac{2x^2+8}{x^2-4}$$

Simplify the complex fraction.

$$29) \frac{\frac{y}{9}}{\frac{5}{y+8}}$$

Simplify the complex rational expression.

$$30) \frac{4 + \frac{2}{x}}{\frac{x}{3} + \frac{1}{6}}$$

Part II: Factoring:

Factor out the GCF from the polynomial.

$$31) 16m^9 - 16m^6 + 8m^3$$

Factor by grouping.

$$32) x^2 + 8x + 16$$

$$33) 4x^2 - 12x - 72$$

Factor completely. If unfactorable, indicate that the polynomial is prime.

$$34) 5x^8 - 80x^6$$

$$35) x^2 + 39x + 40$$

$$36) x^4 - 7x^2 - 144$$

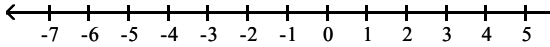
$$37) z^2 - 9$$

$$38) 9k^2 - 25m^2$$

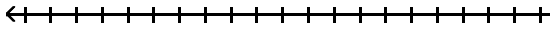
Part IV: Linear Inequalities.

- (a) Solve the inequalities.
- (b) Graph the solution of the inequality on a number line.
- (c) Express the answer in interval notation.
Express solutions for all real numbers or no solution in either set or interval notation.

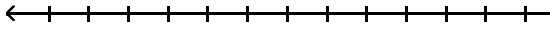
51) $x > -2$



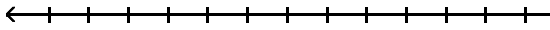
52) $4x + 9 < 29$



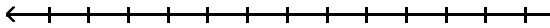
53) $4 - 2x \geq -6$



54) $x + 9 \geq x - 5$



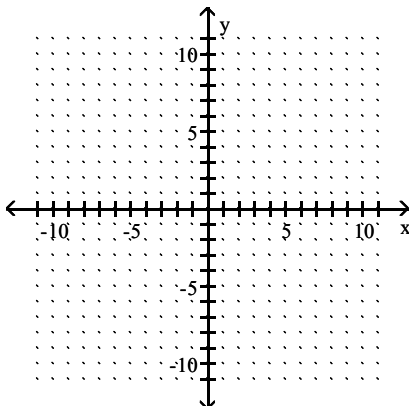
55) $2x + 13 > 2(x + 11)$



Part V: Linear Equations in Two Variables.

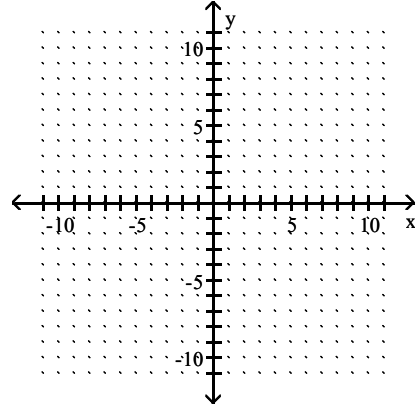
Graph the linear equation using the slope and y-intercept.

56) $y = \frac{3}{4}x - 5$



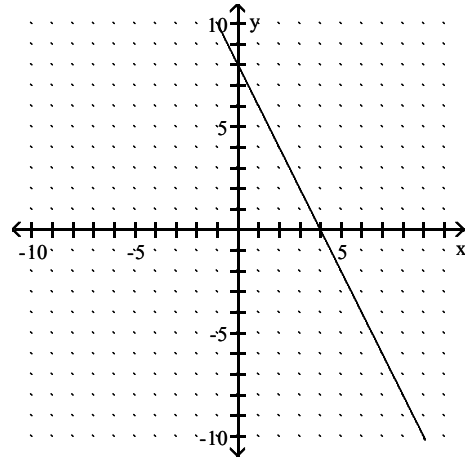
Graph the equation in a rectangular coordinate system.

57) $y = 7$



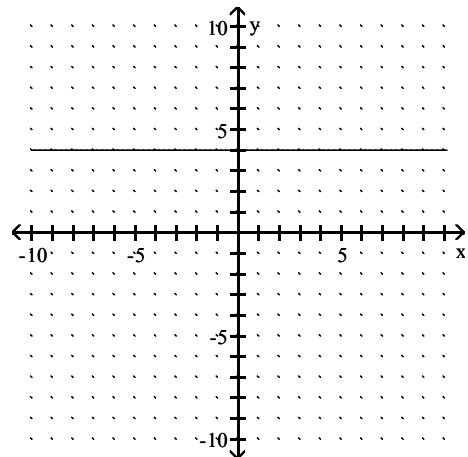
Use the graph to identify the x- and y- intercepts or state that there is no x- or y-intercept.

58)



Write an equation for the graph.

59)



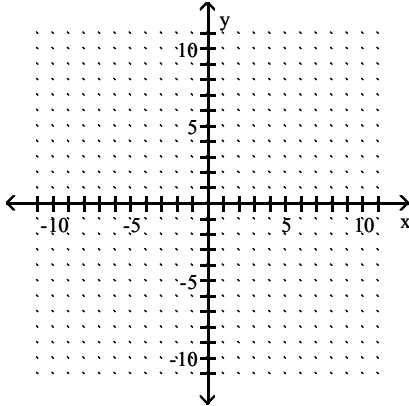
Put the equation in slope-intercept form.
 Identify the slope and y-intercept.
 Use the slope and y-intercept to graph the equation.

60) $7x + 4y = 28$

Slope-Intercept form of equation:

Slope: _____

y-intercept: _____



Find the x-intercept and the y-intercept of the graph of the equation. Do not graph the equation.

61) $5x - 10y = 20$

Determine whether the lines through each pair of points are parallel, perpendicular, or neither.

62) $(-7, -9)$ and $(-1, 11)$; $(7, -9)$ and $(-3, -6)$

63) $(-4, -2)$ and $(-2, 8)$; $(4, 3)$ and $(5, 8)$

Find the point-slope form of the equation of the line satisfying the given conditions and use this to write the slope-intercept form of the equation.

64) Slope = 8, passing through $(-9, 7)$

Use the given conditions to write an equation for the line in slope-intercept form.

65) Passing through $(5, 5)$ and parallel to the line whose equation is $y = -8x + 6$.

Answer the following questions.

66) Given the equation in standard form,

$-9x - 5y = -3$.

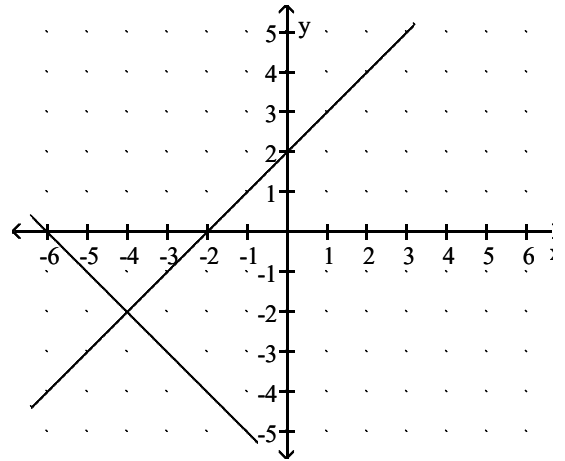
a. Write the equation in slope-intercept form.

b. Find the equation of a line in point-slope form perpendicular to $-9x - 5y = -3$ and going through $(-18, 2)$

c. Write the equation found in part b in slope intercept form

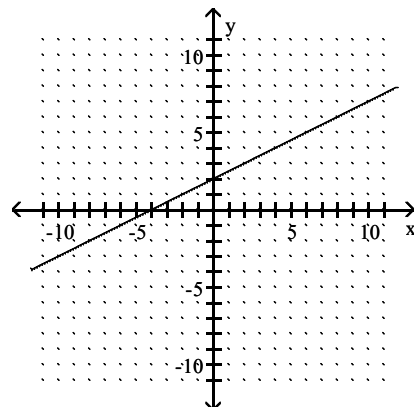
Identify the solution to the equation from the graph

67) $\begin{cases} x + y = -6 \\ x - y = -2 \end{cases}$



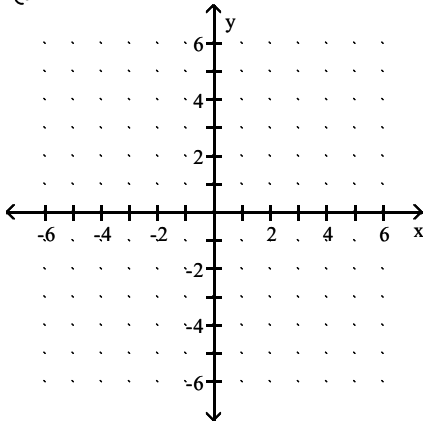
Find the slope of the line, or state that the slope is undefined.

68)



Solve the system by graphing. If there is no solution or an infinite number of solutions, so state. Use set notation to express the solution set.

$$69) \begin{cases} x = -y \\ y + x = 6 \end{cases}$$



Solve by either the substitution method or the addition/elimination method.

If there are either infinitely many or no solutions, use set notation to express your answer.

$$70) \begin{cases} x - 7 = y \\ y + 4 = x \end{cases}$$

$$71) \begin{cases} x + y = -6 \\ y = -3x \end{cases}$$

$$72) \begin{cases} x + 4y = 32 \\ 4x + 5y = 40 \end{cases}$$

$$73) \begin{cases} 8x - 7y = 34 \\ -3x - 3y = 21 \end{cases}$$

$$74) \begin{cases} 6x + 7y = 14 \\ 3x + 2y = 4 \end{cases}$$

$$75) \begin{cases} x + y = 3 \\ x + y = -4 \end{cases}$$

$$76) \begin{cases} -6x + 4y = -6 \\ 12y = -18 + 18x \end{cases}$$

Part VI: Applications.

Let x represent the number. Use the given conditions to write an equation. Solve the equation and find the number.

77) Four times a number added to 9 times the number equals 39. Find the number.

Solve the problem.

78) A promotional deal for long distance phone service charges a \$15 basic fee plus \$0.05 per minute for all calls. If Joe's phone bill was \$70 under this promotional deal, how many minutes of phone calls did he make? Round to the nearest integer, if necessary.

79) Claire received scores of 85, 88, 87, and 95 on her algebra tests. What score must she receive on the fifth test to have an overall test score average of at least 90?

80) A rectangular carpet has a perimeter of 190 inches. The length of the carpet is 61 inches more than the width. What are the dimensions of the carpet?

81) Julie and Eric row their boat (at a constant speed) 27 miles downstream for 3 hours, helped by the current. Rowing at the same rate, the trip back against the current takes 9 hours. Find the rate of the current.

82) A painter can finish painting a house in 5 hours. Her assistant takes 7 hours to finish the same job. How long would it take for them to complete the job if they were working together?

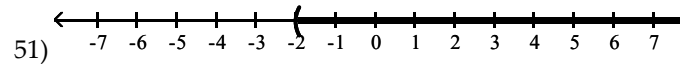
83) An object is thrown upward from the top of a 160-foot building with an initial velocity of 48 feet per second. The height h of the object after t seconds is given by the quadratic equation $h = -16t^2 + 48t + 160$. When will the object reach the ground?

Answer Key

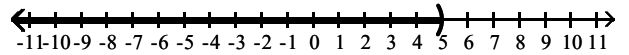
Testname: MATH 81 - FINAL REVIEW (4)

- 1) $-12x - 12$
- 2) $84x - 42y$
- 3) $5x^2 - 8x - 14$
- 4) $5x^3 + 9x^2 + 14x + 5$
- 5) $-6x^6 + 2x^3 - 1$
- 6) $-14x + 19$
- 7) $-8x^3$
- 8) $-36x^{10}$
- 9) $-40x^{12}$
- 10) $\frac{1}{28}x^{15}$
- 11) $5x^3 - 15x^2 + 5x$
- 12) $4x^2 - 43x - 11$
- 13) $7x^3 - 15x^2 + 9x - 1$
- 14) $81x^2 - 121$
- 15) $9x^2 - 66x + 121$
- 16) $\frac{64}{x^3}$
- 17) $8x^7y^7$
- 18) $9x^6 - 8x^3 - 7$
- 19) $x + 8 - \frac{4}{x + 4}$
- 20) -1
- 21) $\frac{1}{5x + 2}$
- 22) $\frac{k}{k + 5}$
- 23) $\frac{x - 3}{x}$
- 24) $-\frac{x - 5}{x + 5}$
- 25) $\frac{9x}{5}$
- 26) $\frac{2x + 9}{x + 3}$
- 27) $\frac{12x - 20}{x(x - 5)}$
- 28) $\frac{5x - 2}{(x + 1)(x + 4)}$
- 29) $\frac{y(y + 8)}{45}$
- 30) $\frac{12}{x}$

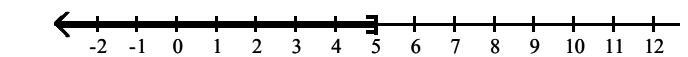
- 31) $8m^3(2m^6 - 2m^3 + 1)$
- 32) $(x + 4)(x + 4)$
- 33) $4(x - 6)(x + 3)$
- 34) $5x^6(x + 4)(x - 4)$
- 35) prime
- 36) $(x + 4)(x - 4)(x^2 + 9)$
- 37) $(z + 3)(z - 3)$
- 38) $(3k + 5m)(3k - 5m)$
- 39) $(3z + 2)(5z - 4)$
- 40) $(3x - 2t)(4x - 3t)$
- 41) $\{1\}$
- 42) $\{x \mid x \text{ is a real number}\}$
- 43) $\{10\}$
- 44) $\{3, 4\}$
- 45) $\{-5, 6\}$
- 46) $\{0\}$
- 47) $\{1\}$
- 48) $\{-8\}$
- 49) \emptyset
- 50) \emptyset



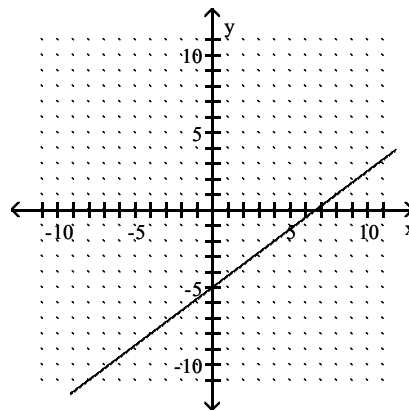
52) $(-\infty, 5)$



54) $(-\infty, \infty)$



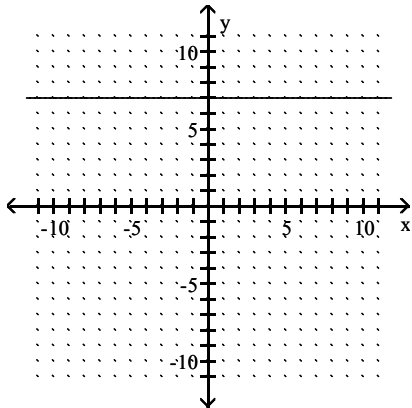
56) \emptyset



Answer Key

Testname: MATH 81 - FINAL REVIEW (4)

57)



58) x-intercept = 4; y-intercept = 8

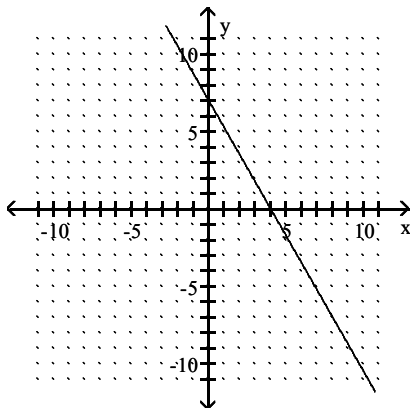
59) $y = 4$

60) slope-intercept form of equation:

$$y = -\frac{7}{4}x + 7$$

Slope: $m = -\frac{7}{4}$

y-intercept: (0,7)



61) x-intercept = 4; y-intercept = -2

62) perpendicular

63) parallel

64) $y = 8x + 79$

65) $y = -8x + 45$

66) $y = -\frac{9}{5}x + \frac{3}{5}$

$$y - 2 = \frac{5}{9}(x+18)$$

$$y = \frac{5}{9}x + 12$$

67) $\{(-4, -2)\}$

68) $\frac{1}{2}$

69) no solution; \emptyset

70) no solution; \emptyset

71) $\{(3, -9)\}$

72) $\{(0, 8)\}$

73) $\{(-1, -6)\}$

74) $\{(0, 2)\}$

75) no solution; \emptyset

76) infinitely many solutions; $\{(x, y) \mid -6x + 4y = -6\}$ or $\{(x, y) \mid 12y = -18 + 18x\}$

77) $4x + 9x = 39$; 3

78) 1100 minutes

79) at least 95

80) length: 78 in.; width: 17 in.

81) 3 mph

82) $2\frac{11}{12}$ hr

83) 5 sec