

I. Finding Slope

Determine the slope of the line through each pair of points.

1. $(5, 1)$ and $(2, 7)$

2. $(-4, 3)$ and $(2, -3)$

3. $\left(-\frac{1}{2}, -2\right)$ and $\left(-\frac{3}{2}, 1\right)$

4. $(2, -4)$ and $(2, 6)$

Find the slope of each line.

5. $y = -2x + 5$

6. $3x + 6y = 12$

7. Give the slopes of the lines parallel and perpendicular to $y = 32x - 1$.

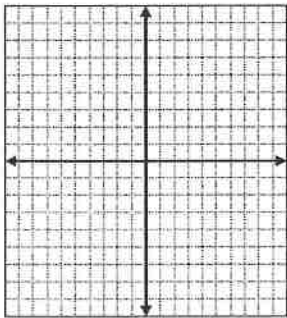
Parallel _____

Perpendicular _____

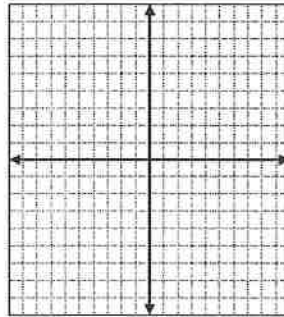
II. Graphing Linear Equations

Graph the following equations on the coordinate plane.

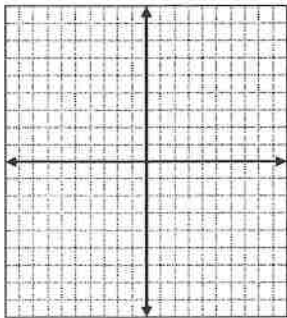
8. $y = 3x - 2$



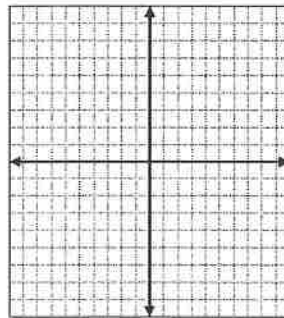
9. $3x - 2y = 12$



10. $x = -4$



11. $y - 2 = 3(x + 4)$



III. Solving for a variable

Solve each equation for x.

12. $5x + 3 = -12$

13. $(6x - 8) - (5x + 9) = 3$

14. $7x - 8x + 4 = 5x - 2$

15. $3(x - 2) = 18$

Solve each proportion for x.

16. $\frac{18}{x} = \frac{6}{5}$

17. $\frac{x+2}{3} = \frac{8}{15}$

18. $\frac{5}{7} = \frac{10}{x-2}$

19. $\frac{12}{x} = 48$

20. The ratio of faculty members to students at a college is 1:15. There are 675. How many faculty members are there?

21. A runner ran at a rate of 6 miles per hour. What is this speed in miles per minute?

IV. Finding Area and Perimeter

Find the area and perimeter of each figure described below.

26. A rectangle with length 11ft and width 4ft.

27. A square with sides of length 21m.

28. A circle with radius 4in.

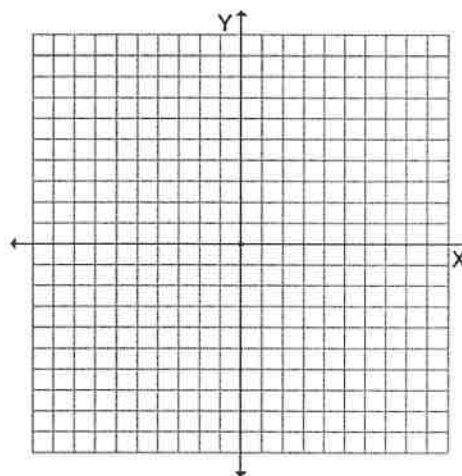
29. A triangle with height 5cm and base length 12cm.

30. A right triangle with a leg 3mi and hypotenuse 5mi.

V. Systems of Equations

Solve the system of equation by graphing.

31. $y = x - 3$
 $y = -x + 1$



Solve the system of equations by substitution.

32. $x + 4y = 6$
 $x + y = 3$

33. $3x - 2y = 12$
 $y = 5 - 4x$

Solve the system of equations by elimination (or combination)

34. $-x + 2y = 11$
 $5x - 2y = 1$

35. $2x + y = 3$
 $-x + 3y = -12$

VI. Polynomials

Add or subtract the polynomials.

36. $(2x^2 - x) + (x^2 + 3x - 1)$

37. $(a^4 - 2a) - (3a^4 - 3a - 1)$

Multiply polynomials.

38. $(3x + 2)(2x + 7)$

39. $(5n + 1)^2$

40. $(2x + 7)(4x^2 - 3x + 2)$

41. $(2x + 3)(3x^2 + 2x - 5)$

VII. Factoring

Factor

42. $4x^2 - 3x$

43. $x^2 + 6x + 8$

44. $x^2 - 10x + 16$

45. $x^2 + 7x - 18$

46. $x^2 + 12x + 36$

47. $25x^2 - 81$

48. $5x^2 - 14x + 8$

49. $4x^2 + 19x - 5$

Solve by factoring.

50. $x^2 - 5x - 6 = 0$

51. $v^2 - 4v = 0$

52. $x^2 + 9 = 10x$

53. $5x^2 = 2x + 3$

VIII. Exponents

Simplify.

54. $2^5 \cdot 2^6$

55. $(2^5)^6$

56. $a^4 \cdot b^2 \cdot a^5$

57. $(4x^2y^6)(-2x^3y^4)^2$

58. $\frac{3^5}{3^2}$

59. $\frac{6a^5b^9}{2a^4b^4}$

60. $\frac{5x^2}{2y^3} \cdot \frac{2y^5}{3y^2}$

61. $\left(\frac{a^4}{b^2}\right)^3$

62. $\frac{6xy^4}{4x^3}$

63. $-4f^{-3}g^4h^0$

64. The function $f(x) = 2(3)^x$ models an insect population after x days. What will the population be on the 5th day?

IX. Radicals

Rewrite each of the following radicals in simple radical form.

65. $\sqrt{24}$

66. $\sqrt{17}$

67. $\sqrt{75}$

68. $\sqrt{50}$

69. $\sqrt{18} + \sqrt{32}$

70. $\sqrt{50} + \sqrt{32} - \sqrt{27}$

Directions: Answer each numbered exercised. Neatly show all work and box/circle final answer.

A) The Coordinate Plane

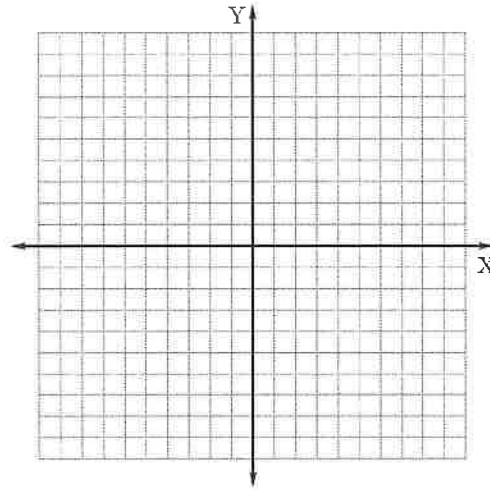
Plot the ordered pair in the coordinate plane. Then identify which quadrant the point is located in on the space provided.

1) (4, 6) Quad: _____

2) (0, - 3) Quad: _____

3) (- 3.5, 5) Quad: _____

4) (- 2, - 2) Quad: _____



B) The Slope of a Line

To find the slope of a line between two points (x_1, y_1) and (x_2, y_2) use the formula:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Example: Let $(x_1, y_1) = (-2, 5)$ and $(x_2, y_2) = (4, -7)$. The slope of the line passing through these points is

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-7 - 5}{4 - (-2)} = \frac{-12}{6} = -2$$

The slope of this line is $m = -2$.

Try these:

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

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

6) (2, 4) and (1, 6)

7) (3, 8) and (7, 7)

8) (- 6, - 7) and (- 4, - 4)

C) Writing an Equation of a Line

There are three forms to write the equation of a line:

Slope-intercept form $\rightarrow y = mx + b$ where m is slope and b is the y-intercept

Point-slope form $\rightarrow y - y_1 = m(x - x_1)$ where (x_1, y_1) is a point on the line and m is slope

Standard form $\rightarrow Ax + By = C$ This is where you rearrange an equation in slope-intercept form so that the x and y terms are on the same side of the equation.

Write the equation of the line using the given information.

9. Slope is - 3, passes through the point $(5, - 2)$ in slope-intercept form.
10. Passes through the given points.
 - a) $(4, - 9)$ and $(- 3, 2)$ slope-intercept form
 - b) $(1, 8)$ and $(- 2, - 1)$ point-slope form
11. Parallel to the line $y = - 2x + 3$, containing the point $(- 2, - 1)$ in slope-intercept form
12. Perpendicular to $y = 3x + \frac{3}{4}$ and passing through $(- 2, 1)$ standard form.

D) Solving Equations in One Variable

Solve for the variable.

13) $3x + 8 = 24$

14) $(5x + 9) - (6x - 8) = -1$

15) $7x - 8x + 4 = 3x + 2$

16) $4(2x + 5) = 24$

17) $(3x + 2) - 2(4 - x) = 7$

18) $25 = \frac{1}{2}(40 + x)$

19) $\frac{24}{x} = 6$

20) $\frac{10}{7} = \frac{5}{x+2}$

E) Simplifying Exponents

Properties of Exponents

$a^m \cdot a^n = a^{m+n}$ Ex: $x^5 \cdot x^2 = x^7$

$\frac{a^m}{a^n} = a^{m-n}$ Ex: $\frac{x^8}{x^5} = x^3$

$a^0 = 1 \quad a \neq 0$

$(a^m)^n = a^{m \cdot n}$ Ex: $(x^5)^2 = x^{10}$

$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$ Ex: $\left(\frac{2}{x}\right)^3 = \frac{8}{x^3}$

$a^{-n} = \frac{1}{a^n}$ Ex: $\frac{x^{-2}}{1} = \frac{1}{x^2}$

$(ab)^m = a^m b^m$ Ex: $(4xy^2)^3 = 64x^3y^6$

$\frac{1}{a^{-n}} = a^n$ Ex: $\frac{1}{x^{-2}} = x^2$

Simplify each expression.

21) x^3x^4

22) $(5x^2)^3$

23) $4x^0$

24) $\frac{4x^5}{2yx^2}$

F) Simplifying Radical Expressions

EXAMPLES

You can use properties of radicals to simplify radical expressions.

a. $\sqrt{28} = \sqrt{4 \cdot 7}$ Factor using perfect square factor.
 $= \sqrt{4} \cdot \sqrt{7}$ Use product property.
 $= 2\sqrt{7}$ Remove perfect square factor from radicand.

b. $\sqrt{\frac{16}{3}} = \frac{\sqrt{16}}{\sqrt{3}}$ Use quotient property.
 $= \frac{4}{\sqrt{3}}$ Remove perfect square factor from radicand.
 $= \frac{4}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$ Multiply by a value of 1: $\frac{\sqrt{3}}{\sqrt{3}} = 1$.
 $= \frac{4\sqrt{3}}{3}$ Simplify.

Simplify each expression.

25) $\sqrt{144}$

26) $-\sqrt{25}$

27) $\sqrt{45}$

28) $\sqrt{\frac{25}{16}}$

29) $3\sqrt{5} \cdot 2\sqrt{6}$

30) $\sqrt{\frac{8}{6}}$

G) Solving Systems of Equations

There are 3 methods used to solve a system of linear equations in two variables: **graphing**, **substitution method**, and **elimination method**.

Solve the system using either the substitution method or elimination method.

31) $2x - y = 0$
 $4x - y = 8$

32) $2x - 3y = -3$
 $x + 6y = -9$

$$33) \begin{cases} 7x + 8y = 24 \\ x - 8y = 8 \end{cases}$$

$$34) \begin{cases} x + 3y = 9 \\ 4x - 2y = -6 \end{cases}$$

H) Solving Quadratic Equations

Quadratic Formula

The solutions of $ax^2 + bx + c = 0$ can be found using the formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Example: Solve $x^2 + 6x - 16 = 0$

$$a = 1, b = 6, c = -16$$

$$x = \frac{-6 \pm \sqrt{(6)^2 - 4(1)(-16)}}{2(1)} = \frac{-6 \pm \sqrt{36 + 64}}{2} = \frac{-6 \pm \sqrt{100}}{2} = \frac{-6 \pm 10}{2}$$

$$x = \frac{-6 + 10}{2} = \frac{4}{2} = 2 \quad \text{and} \quad x = \frac{-6 - 10}{2} = \frac{-16}{2} = -8$$

Solutions: $x = -8, 2$

Try these:

Solve the quadratic equation using the Quadratic Formula

$$35) x^2 + 6x = 0$$

$$36) x^2 + 5x + 4 = 0$$

$$37) 3x^2 + x - 4 = 0$$

$$38) -2x^2 + x + 6 = 0$$

1) Multiplying Binomials & Factoring Quadratic Trinomials

Multiplying Binomials

FOIL PATTERN In using the distributive property for multiplying two binomials, you may have noticed the following pattern. Multiply the **F**irst, **O**uter, **I**nnner, and **L**ast terms. Then combine like terms. This pattern is called the **FOIL pattern**.

$$\begin{array}{ccccccc} & & \text{Product of} & \text{Product of} & \text{Product of} & \text{Product of} & \\ & & \text{First terms} & \text{Outer terms} & \text{Inner terms} & \text{Last terms} & \\ & \swarrow & \downarrow & \downarrow & \swarrow & \swarrow & \\ (3x + 4)(x + 5) & = & 3x^2 & + & 15x & + & 4x & + & 20 \\ & & \text{Combine like terms.} & & & & & & \\ & = & 3x^2 & + & 19x & + & 20 & & \end{array}$$

Factoring Quadratic Trinomials (Reverse FOIL)

$$x^2 + bx + c = (x + p)(x + q) \text{ if } p + q = b \text{ and } pq = c$$

Example: $x^2 + 7x + 12 = (x + 4)(x + 3)$ because $4 + 3 = 7$ and $4(3) = 12$

Find the product.

39) $(x + 2)(x - 3)$

40) $(8x + 2)(2x - 6)$

41) $(2x - 1)(-x + 3)$

Factor the expression

42) $a^2 + 10a + 21$

43) $b^2 - 5b + 6$

44) $y^2 + 5y - 14$

45) $2x^2 - 7x + 3$

J) Geometry and Spatial Reasoning

Determine the area and perimeter of the figure described

46) Rectangle with length 4.6 cm and width 3.8 cm

47) Square with sides of length 7mm

48) Triangle with base 12 ft. long and a height of 8.4 ft.

Use the given information to determine each answer.

49) Area and circumference of a circle with radius 6 in.

50) Area and circumference of a circle with diameter 16 in.

51) Circumference of a circle with radius 9 cm.

52) Circumference of a circle with area 16π square centimeters.

Geometry Prerequisite Skills Practice Problems

Arithmetic Skills: (Perform the indicated operations and simplify completely.)

1. $\frac{7}{6} + \frac{11}{6} =$

2. $\frac{3}{5} - \frac{1}{7} =$

3. $\frac{5}{2} + \frac{11}{9} =$

4. $\frac{3}{5} - \frac{9}{6} =$

5. $\frac{3}{8} \times \frac{5}{2} =$

6. $\frac{3}{4} \div \frac{2}{5} =$

7. $\frac{3}{14} \times \frac{8}{9} =$

8. $\frac{15}{4} \div \frac{25}{18} =$

9. $4.59 + 1.04 =$

10. $7.86 - 1.18 =$

11. $0.51 \cdot 2.6 =$

12. $4.8 \div 0.6 =$

Pre-Algebra Skills: (Perform the indicated operations and simplify completely.)

1. $(8a + 9b + 3c) - (2a - 3b - c) =$

2. $(7x^2 + 3x - 15) + (2x^2 - 2x + 3) =$

3. $(12x^2 - 5x + 1) - (2x^3 + 2x^2 - 3x) =$

4. $5x(2x^2 + 3x + 4) =$

5. $3^4 =$

6. $(-2)^5 =$

7. Write an expression for 7 less than the product of 5 and x .8. Write an expression for the quotient of x and 11.9. Write an expression for 12 more than the product of -2 and the square of x .10. If $x = 2$ and $y = 9$ then compute the quotient $\frac{27x}{y}$.

Basic Algebra Skills: (Perform the indicated operations and simplify completely.)

1. $-15 + 7 =$

2. $2 - 9 =$

3. $(-17)(-3) =$

4. $(24) + (-4) =$

5. $x - 3 = 9$

6. $x + 5 = 14$

7. $5x = 125$

8. $\frac{x}{7} = 9$

9. $-2(5) - 4 =$

10. There are 7 cats for every 2 dogs in Crazytown. If there are 28 cats on some street, then how many dogs are there on the street?

Algebra I skills: (Perform the indicated operations and simplify completely.)

1. Simplify $\sqrt{48}$

2. Factor completely. $x^2 - 4x - 21$

3. Factor completely. $2x^2 + 7x + 5$

4. Solve $3x^2 - 9x - 2 = 0$ using the quadratic equation.

5. Simplify. $\frac{-12xy^7}{9x^4y^3}$

6. Simplify $(2x^3)^4$

7. Solve the system of equations.

8. Solve the system of equations.

$$2x + y = 5$$

$$2x + 3y = -5$$

$$4x - y = 7$$

$$3x - 4y = 1$$

9. Find the slope of a line that passes through $(3, -5)$ and $(-8, -4)$.

10. Write the equation of a line that passes through $(1, -4)$ and $(5, 9)$.

Basic Geometry skills: (Perform the indicated operations and simplify completely.)

1. Solve for the radius, r , in the area formula of circle. $A = \pi r^2$

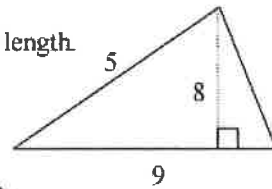
2. Find the area of a circle with a diameter of 8 cm.

3. Find the perimeter of a rectangle with a length of 20 ft. and a width of 3 ft.

4. If the perimeter of a square is 20 inches, find its area.

5. If the perimeter of a rectangle is 52 in. and the width is 7 in., find its length.

6. Find the area of the triangle at the right.



7. Find the length of the hypotenuse for the triangle at the right.

