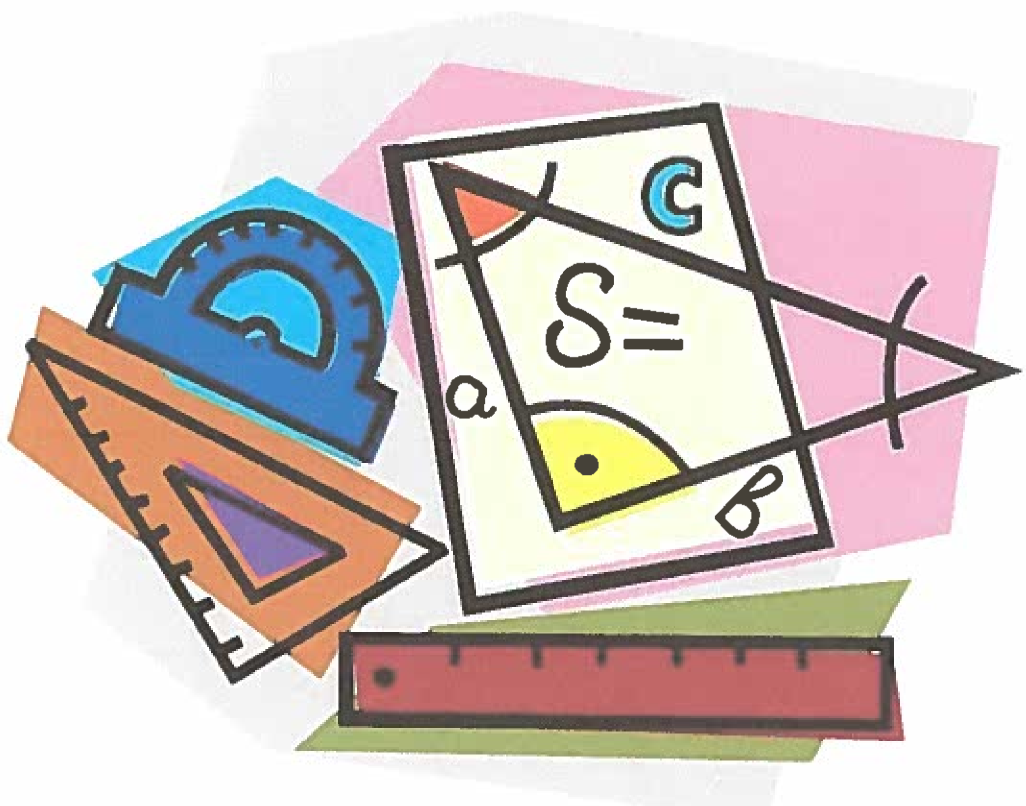
Baker High School

Summer Math Packet

Crunch Geometry

Prerequisite Geometry/Geometry



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

A) The Coordinate Plane

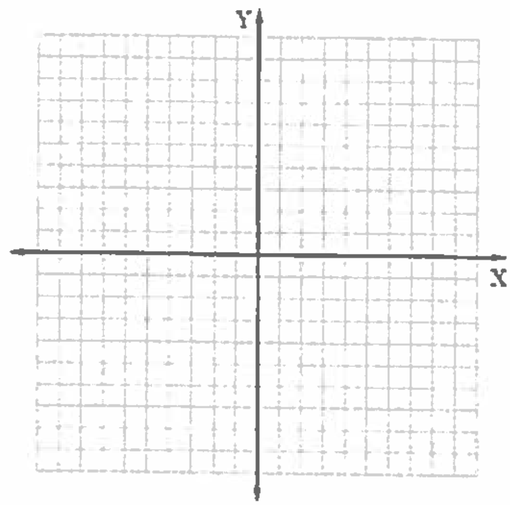
Plot the ordered pair in the coordinate plane. Then identify which quadrant the point is located in on the space provided.

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 → $y = mx + b$ where m is slope and b is the y-intercept Point-slope form → $y - y_1 = m(x - x_1)$ where (x_1, y_1) is a point on the line and m is slope Standard form → $Ax + By = C$ 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) $7x + 8y = 24$
$x - 8y = 8$

34) $x + 3y = 9$
$4x - 2y = -6$

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 $x^2 + 6x - 16 = 0$

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

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

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

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

I) 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 First, Outer, Inner, and Last terms. Then combine like terms. This pattern is called the **FOIL pattern**.

Product of First terms | Product of Outer terms | Product of Inner terms | Product of Last terms

$(3x + 4)(x + 5) = 3x^2 + 15x + 4x + 20$

$= 3x^2 + 19x + 20$ Combine like terms.

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