

Pre-requisite Review Packet to prepare for Accelerated Geometry/Algebra II

This packet is a review of Algebra I and basic Geometry skills. Students should know this material well in order to be successful as more advanced topics are studied in Accelerated Geometry/Algebra II. This packet is mandatory and is to be turned in on the first day of class. You may use a calculator. Show all work on notebook paper or graph paper.

A. Order of Operations—PEMDAS

P-Parentheses, E-exponents, MD multiplication/division in order left to right,
AS addition/subtraction in order left to right.

example: $3(4+2)^2-15\div 5\cdot 4$

$3(6)^2-15\div 5\cdot 4$ Parentheses

$3(36)-15\div 5\cdot 4$ Exponents

$108 - 3\cdot 4$ Multiplication/Division in order left to right

$108 - 12$ same

96

1. $6\div 3\cdot 2^3$ 2. $2(2+3)^2-20\div 4\cdot 3$

Evaluate each expression if $x = 1$, $y = 0$, $z = 8$, $a = 2$, $b = 3$, and $c = 5$.

3. $(z-x)^y-z\div(c-b)a$ 4. $(z-b)^a-acb$

B. Simplifying Algebraic Expressions

example: $8c-4-3(5c-6) = 8c-4-15c+18 = -7c+14$

1. $3xy - 7y - 2(3 - 6y)$ 2. $3r(r - 10s) - 4r(7s + 2r)$ 3. $2a(3 - 4b + 8bc) - 6b(3a - 1 - 4ac)$

C. Properties of Exponents:

$a^m \cdot a^n = a^{m+n}$ $(a^m)^n = a^{mn}$ $\frac{a^m}{a^n} = a^{m-n}$ $a^{-n} = \frac{1}{a^n}$ $a^0=1$ $a^{1/2} = \sqrt{a}$

1. $(3^2x^3y)(4xy^2)$ 2. $(3m^2n^3)(2mn^4)^2$ 3. $-2(-4x^2y^3)^3$ 4. $(4^2)(4^3)$

5. $(-3\cdot 2)^0$ 6. $3x^2y^2(-2x^3y^{-4})$ 7. $25^{1/2}$ 8. $\left(\frac{-2p^5q^{-4}}{q^3}\right)^3$ 9. $x^{-1} \cdot y^{-1}$

D. Solving Equations

1. $4 - 5x = 19$ 2. $\frac{1}{6}x + \frac{3}{2} = 2$ 3. $-\frac{1}{3}x + 1 = \frac{3}{2}x - 1$ 4. $3 - \frac{1}{4}x = 6x$

5. $\frac{4(x+5)}{3} = \frac{-3(x-7)}{5}$ 6. Solve for y. $Ax + By = C$ 7. Solve for b. $\frac{1}{2}bh = A$

8. Solve for b_2 . $A = \frac{1}{2}h(b_1 + b_2)$ 9. Solve for t: $I = P(1 + rt)$

E. Functions.

Example: If $f(x) = 3x + 2$, find $f(4)$ and $f(-3)$ and $f(x+2)$.

To find $f(4)$, substitute 4 where you see x . $f(4) = 3(4) + 2 = 12 + 2 = 14$

To find $f(-3)$, substitute -3 where you see x . $f(-3) = 3(-3) + 2 = -9 + 2 = -7$

To find $f(x+2)$, substitute $x+2$ where you see x . $f(x+2) = 3(x+2) + 2 = 3x + 6 + 2 = 3x + 8$

1. If $g(x) = 5x - 3$, find $g(6)$, $g(-2)$ and $g(x+2)$.
2. If $h(x) = x^2 - 3x + 2$, find $h(-2)$ and $h(4)$.

F. Solving Inequalities.

Example: $3x + 5 > -4$

$$3x > -9$$

$$x > -3$$

Example: $-2x - 5 < 7$

$$-2x < 12$$

$$x > -6$$

Example: $-4 < 2x + 6 < 8$

$$-10 < 2x < 2$$

$$-5 < x < 1$$

When multiplying/dividing by a negative, do not forget to switch the direction of the inequality symbol.

1. $4y - 3 > -11$
2. $-10x + 1 > 11$
3. $-4x - 6 > 7x - 14$
4. $-5 < 3 - 2x < 8$

G. Graphing linear equations.

When graphing linear equations and inequalities, first put the equation in slope-intercept form. $y = mx + b$, where m is the slope and b is the y-intercept.

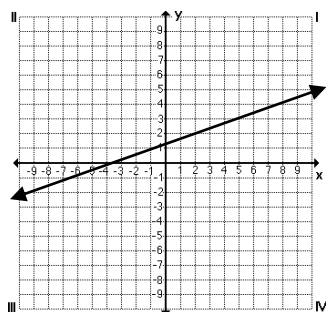
Example: Graph $x - 3y = -6$.

Solve for y : $-3y = -x - 6$

$$y = \frac{1}{3}x + 2$$

- 1) begin by placing the y-intercept (b) on the y axis. In this example, the y-int. is 2.
- 2) move, use the slope (m) to move from this y-intercept to the next point on the line.
In this example, the slope is $1/3$. Since slope = rise/run, so rise 1 and run right 3.
- 3) finish by drawing the line.

Note: $x = \#$ is a vertical line drawn through that number perpendicular to the x-axis.



Note: $y = \#$ is a horizontal line drawn through that number parallel to the x-axis.

Graph the following on your own graph paper. State the slope and y-intercept for each.

1. $3x + y = 4$
2. $3x - 2y = 4$
3. $x = 3$
4. $y = -2$

H. Graphing linear inequalities.

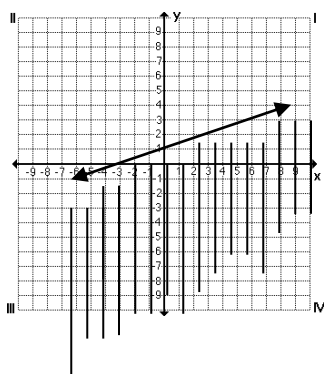
When graphing linear equations and inequalities, first put the equation in slope-intercept form. $y = mx + b$, where m is the slope and b is the y -intercept.

Example: Graph $x - 3y \geq -6$.

Solve for y : $-3y = -x - 6$

$$y = \frac{1}{3}x + 2 \quad \text{step 2) Test } (0, 0) \text{ Is } 0 - 3(0) \geq -6? \text{ yes.}$$

- 1) Put in $y =$ form and graph the line.
- 2) Decide if the line is solid or dotted. ($>$, $<$ dotted, \leq , \geq solid)
- 3) Test a point NOT ON THE LINE into the inequality. If the point satisfies the inequality, (that is, makes it a true inequality) then shade the side of the line containing the point. If the point does not satisfy the inequality, shade the other side of the line.



1. $12x - 6y > -30$

2. $2x + 3y \geq 9$

3. $4 - x > 7$

4. $2 < y - 1 < 4$

I. Finding Equations of Lines.

Use $y = mx + b$ OR

Point-slope form $y - y_1 = m(x - x_1)$

Example: Find the equation of the line parallel to $y = 3x - 4$ containing the point $(2, -3)$.

Step 1: Find the slope. Slopes of parallel lines are =.

In $y = 3x - 4$, the slope is 3. Therefore, the line we need has a slope $m=3$.

Step 2: Plug $(2, -3)$ into one of the forms for a line.

$$y + 3 = 3(x - 2). \text{ Then solve for } y.$$

$$y + 3 = 3x - 6$$

$$y = 3x - 9.$$

Alternate method : Use $y = mx + b$. Plug in 2 for x and -3 for y to find b .

$$y = mx + b$$

$$-3 = 3(2) + b$$

$$-9 = b$$

DON'T FORGET TO PLUG BACK IN AND GIVE THE EQUATION— $y = 3x - 9$

Find the equation of the following lines.

1. Contains $(4, -1)$ and $(3, 5)$.

2. Parallel to $4x + y = 9$ through $(-1, 5)$

3. Perpendicular to $4x + y = 9$ through $(8, 3)$. (Remember: The slopes of perpendicular lines are opposite reciprocals.)

4. Perpendicular to the x -axis through $(2, 5)$.

J. Systems of Equations.

1. To solve a system graphically, put both equations in $y =$ form and graph both equations. The solution to the system is the point of intersection of the two lines.
2. To solve a system by substitution, solve one equation for a single variable, then substitute the expression into the second equation and solve. Solve for the second.
3. To solve a system by elimination, put both equations in standard form $Ax+By=C$. Multiply one or both equations so that the coefficients of one of the variable terms are opposites. Then add the two equations and solve. Solve for the other variable.

Example by substitution:

$$\begin{aligned} x - y &= 5 \\ 2x + y &= 1 \end{aligned}$$

The first equation is easy to solve for x .
 $x = y + 5$ and substitute into the second equation.

$$\begin{aligned} 2(y+5) + y &= 1 \\ 2y + 10 + y &= 1 \\ 3y &= -9 \end{aligned}$$

$$\begin{aligned} y &= -3 \\ \text{Go back and find } x. \\ x &= y + 5 \\ x &= -3 + 5 \\ x &= 2 \end{aligned}$$

Write solution as (x,y) .
 $(2, -3)$

Example by elimination:

$$\begin{aligned} 3x - 2y &= 4 \\ 2x + y &= 5 \end{aligned}$$

It would be easy to get the y 's to be opposites. Multiply the second equation by 2.

$$\begin{aligned} 3x - 2y &= 4 \\ 4x + 2y &= 10 \end{aligned}$$

Now add the equations together.

$$\begin{aligned} 7x &= 14 \\ x &= 2 \end{aligned}$$

Go back and find y by plugging into either equation.

$$\begin{aligned} 3(2) - 2y &= 4 \\ 6 - 2y &= 4 \\ -2y &= -2 \end{aligned}$$

$$y = 1$$

Write solution as (x, y)
 $(2, 1)$

1. Solve by graphing :

$$\begin{aligned} x + y &= 5 \\ 3x - 2y &= 20 \end{aligned}$$

2. Solve by substitution:

$$\begin{aligned} 3x - 2y &= -3 \\ 3x + y &= 3 \end{aligned}$$

3. Use elimination.

$$\begin{aligned} 4a + 3b &= -2 \\ 5a + 7b &= 17 \end{aligned}$$

4. Use either method.

$$\frac{2x}{5} - \frac{3y}{4} = -2$$

$$\frac{x}{2} + \frac{y}{4} = 7$$

5. $3x - 2y = 10$

$$-1.5x + y = 8$$

<p>K. Multiplying polynomials. Example: $(2x - 3)(x+2)$ Use Foil $2x^2 + 4x - 3x - 6$ $2x^2 + x - 6$</p>	<p>Another example: $(2x-3)^2$ $(2x-3)(2x-3)$ $4x^2 - 6x - 6x + 9$ $4x^2 - 12x + 9$</p>
--	--

MULTIPLY:

1. $3x^3(5x^2-2x+1)$
2. $(3x-2)(2x+5)$
3. $(2y-5)(2y+5)$
4. $(3x-5)^2$
5. $(2x+3)(3x^2-4x+5)$

<p>L. Factor the Trinomials Example 1: Greatest Common Factor: $4x^2-2x = 2x(2x-1)$ Example 2: Trial and Error: $x^2-5x+6 = (x-6)(x-1)$ Check by multiplying back together. Example 3: Leading Coefficient not 1: $3x^2-7x-6 = (3x+2)(x-3)$ Example 4: <u>Difference of Two Squares</u>: $9x^2-25 = (3x-5)(3x+5)$</p>
--

FACTOR:

1. c^2-81
2. $15a^2b-10ab$
3. $x^2+9x+20$
4. $x^2-3x-10$
5. $r^2+16r+28$
6. $2x^2+5x+3$
7. $3x^2+x-2$
8. x^3-6x^2+9x Hint: GCF first

<p>M. Solving quadratic equations:</p> <ol style="list-style-type: none"> 1. Set the equation = 0. 2. Factor if possible. If not, use quadratic formula. $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ <ol style="list-style-type: none"> 3. If it factors, set the factors=0. 4. Solve each equation. 	$3x^2-13x = -10$ $3x^2-13x+10=0$ $(3x-10)(x-1)=0$ $4a^2-2 = -3a$ $4a^2+3a-2=0$ $a = \frac{-3 \pm \sqrt{3^2 - 4(4)(-2)}}{2(4)}$ $a = \frac{-3 \pm \sqrt{9+32}}{8}$ $a = \frac{-3 \pm \sqrt{41}}{8}$ $3x-10=0$ $x-1=0$ $x = 10/3$ $x = 1$
--	--

1. $a^2 + 3a = 40$
2. $4x^2 + 8x + 3 = 0$
3. $t^2 + 9t = 0$
4. $3x^2 + 11x + 4 = 0$
5. $y^2 = 81$
6. $n^2 - 24 = 5n$
7. $2a^2 - 7 = 13a$

N. Distance Formula	Midpoint Formula	Slope
---------------------	------------------	-------

$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ <p>Example: For the points,</p> $d = \sqrt{(-5 - 2)^2 + (8 - (-3))^2}$ $d = \sqrt{(-7)^2 + (11)^2}$ $d = \sqrt{49 + 121}$ $d = \sqrt{170}$	$\left(\frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2} \right)$ <p>A(2, -3) and B(-5, 8), find</p> $\text{Midpt.} = \left(\frac{2 + (-5)}{2}, \frac{-3 + 8}{2} \right)$ $= \left(-\frac{3}{2}, \frac{5}{2} \right)$	$m = \frac{y_2 - y_1}{x_2 - x_1}$ <p>each.</p> $m = \frac{8 - (-3)}{-5 - 2}$ $= -\frac{11}{7}$
---	---	--

- Find the distance between the two points.
- Find the midpoint of the segment with these two endpoints.
- Find the slope of the line passing through these 2 points.

1. (-3, 5) (2, 8)

2. (8, -3) (-6, -11)

O. Geometry Topics: Make sure you know what the following geometry terms mean

- Transformations – reflection, rotation, translation, dilation
- Congruent Triangles – SAS, SSS, ASA
- Similar Triangles – AA, SSS, SAS
- Right Triangle Trig Ratios – Sine, Cosine, Tangent