Geometry Summer Packet

Due to Mrs. Whorton on the first day of school
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Topic 1: Simplifying Expressions and Combining Like Terms

- Use order of operations to simplify expressions without variables

Examples:

Simplify $4^2 + 7 - 2 \cdot 5 + 3$.

$\mathbf{4^2} + 7 - 2 \cdot 5 + 3$	*Identify powers.*
$\mathbf{16} + 7 - 2 \cdot 5 + 3$	*Evaluate 4^2.*
$16 + 7 - \mathbf{2 \cdot 5} + 3$	*Identify multiplication and division.*
$16 + 7 - \mathbf{10} + 3$	*Evaluate $2 \cdot 5$.*
$\mathbf{23} - 10 + 3$	*Start at the left and perform each addition and subtraction in order.*
$\mathbf{13} + 3$	
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Simplify the expression $6^2 - 3(5 - 1) + 2$.

$6^2 - 3(5 - 1) + 2$

$6^2 - 3 \cdot \mathbf{4} + 2$	*Evaluate $5 - 1$.*
$\mathbf{36} - 3 \cdot 4 + 2$	*Evaluate 6^2.*
$36 - \mathbf{12} + 2$	*Evaluate $3 \cdot 4$.*
$\mathbf{24} + 2$	*Add and subtract from left to right.*
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- Use order of operations AND combining like terms to simplify expressions with variables

Simplify $4(x + y) + 5x - 9$.

$\mathbf{4x} + \mathbf{4y} + 5x - 9$	*Distribute 4.*
$4x + \mathbf{5x} + \mathbf{4y} - 9$	*Use the Commutative Property.*
$\mathbf{9x} + 4y - 9$	*Add the like terms 4x and 5x.*
$9x + 4y - 9$	*No other terms are like terms.*

Simplify the expressions below. Show work and write answers clearly.

1. $1 + 4 \bullet 6 - 3$	2. $\frac{15+3}{9} \bullet 5 - (-2)$
3. $\frac{(-8+3) \bullet 2 - (-2)}{-4}$	4. $-5 \bullet 9 - (10 - (-7)^2)$
5. $7m + 1 + 7m + 4$	6. $6(5x + 7) - 7$
7. $3k - 3(5k + 7)$	8. $7a(1 + 8a) - 8a(a + 9)$
9. $(k + 5k^2) + (k + 4 - 7k^2)$	10. $10 - 7p + p - 5$

Topic 2: Multiplying Polynomials

Sample problem:
3x(4x+2y)

Step 1: Multiply 3x times 4x. Write down the product.

Step 2: Write down a plus sign, since there's addition in the parenthesis and the product of 3x and 2y is positive.

Step 3: Multiply 3x times 2y. Write down the product.

You should have $12x^2 + 6xy$ written down. Since there are no like terms to add together, you're done.

Sample problem:
(x+2) (x+1)
Step 1: Multiply the **first** terms in each binomial. The first terms here are the x from (x+2) and the x from (x+1). Write down the product. (The product of x times x is x^2.)

Step 2: Multiply the **outer** terms in each of the two binomials. The outer terms here are the x from (x+2) and the 1 from (x+1). Write down the product. (The product of x times 1 is 1x, or x.)

Step 3: Multiply the **inner** terms in the two binomials. The inner terms here are the 2 from (x+2) and the x from (x+1). Write down the product. (The product of 2 times x is 2x.)

Step 4: Multiply the **last** terms in each of the two binomials. The last terms here are the 2 from (x+2) and the 1 from (x+1). Write down the product. (The product of 1 times 2 is 2.)

You should have: $x^2 + x + 2x + 2$

Step 5: Combine like terms. There is nothing here with an x^2 attached to it, so x^2 stays as is, x and 2x can be combined to equal 3x, and 2 stays as is because there are no other constants.

Your final answer is: $x^2 + 3x + 2$

For example, if your problem is: $(x^2-11x+6)(x^2+5)$

Rearrange it so it looks like: $(x^2+5)(x^2-11x+6)$

Step 1: Multiply the first term in the polynomial on the left by each term in the polynomial on the right. For the problem above, you would multiply x^2 by each x^2,-11x, and 6.

You should have $x^4-11x^3+6x^2$.

Step 2: Multiply the next term in the polynomial on the left by each term in the polynomial on the right. For the problem above, you would multiply 5 by each x^2,-11x, and 6.

Now, you should have $x^4-11x^3+6x^2+5x^2-55x+30$.

Step 3: Multiply the next term in the polynomial on the left by each term in the polynomial on the right. Since there are no more terms in the left polynomial in our example, you can go ahead and skip to step 4.

Step 4: Combine like terms.

$x^4-11x^3+6x^2+5x^2-55x+30 = x^4-11x^3+11x^2+-55x+30$

Find each Product

1. $3x\,(4x - 2x + 5)$	2. $4x(2x + 1)$
3. $(3x - 2)(4x + 2)$	4. $(x + 2)(x - 7)$
5. $(x + 2)(3x^2 + 2x + 4)$	6. $(x^2 + 2)(x^2 - 3x + 6)$

Topic 3: Equations

Using Inverse Operations with the 4 Basic Operations

Addition	Subtraction	Multiplication	Division
Solve: $x+2=3$.	Solve: $x-2=3$.	Solve: $2x=8$.	Solve: $\frac{x}{2}=8$.
x has 2 added to it, so we subtract 2 from both sides.	*x has 2 subtracted from it, so we add 2 to both sides.*	*x has 2 multiplied to it, so we divide 2 from both sides.*	*x is divided by 2, so we multiply by 2 on both sides.*
$x+2=3$ $-2\ \ -2$	$x-2=3$ $+2\ \ +2$	$\frac{2x}{2}=\frac{8}{2}$	$2\cdot\frac{x}{2}=8\cdot 2$
Solution: $x=1$	Solution: $x=5$	Solution: $x=4$	Solution: $x=16$

Example

Problem **Solve 3y + 2 = 11.**

$$\begin{aligned} 3y+2 &= 11 \\ -2 \quad &-2 \\ \hline 3y \quad &= 9 \end{aligned}$$

Subtract 2 from both sides of the equation to get the term with the variable by itself.

$$\begin{aligned} \frac{3y}{3} &= \frac{9}{3} \\ y &= 3 \end{aligned}$$

Divide both sides of the equation by 3 to get a coefficient of 1 for the variable.

Answer $y = 3$

Example

Problem **Solve $3x + 5x + 4 - x + 7 = 88$.**

$3x + 5x + 4 - x + 7 = 88$ — There are three like terms $3x$, $5x$ and $-x$ involving a variable.

$7x + 4 + 7 = 88$
$7x + 11 = 88$ — Combine these like terms. 4 and 7 are also like terms and can be added. The equation is now in the form $ax + b = c$. So, we can solve as before.

$7x + 11 = 88$
$-11 \quad -11$ — Subtract 11 from both sides.

$\frac{7x}{7} = \frac{77}{7}$ — Divide both sides by 7.

$x = 11$

Answer **$x = 11$**

Example

Problem **Solve $6x + 5 = 10 + 5x$. Check your solution.**

$6x + 5 = 10 + 5x$ — This equation has x terms on both the left and the right. To solve an equation like this, you must first get the variables on the same side of the equal sign.

$6x + 5 = 10 + 5x$
$-5x \qquad -5x$
$x + 5 = 10$ — You can subtract 5x on each side of the equal sign, which gives a new equation: $x + 5 = 10$. This is now a one-step equation!

$x + 5 = 10$
$-5 \quad -5$
$x = 5$ — Subtract 5 from both sides.

Check

$6x + 5 = 10 + 5x$
$6(5) + 5 = 10 + 5(5)$ — Check your solution by substituting 5 for x in the original equation.

$30 + 5 = 10 + 25$
$35 = 35$ — This is a true statement, so the solution is correct.

Answer **$x = 5$**

Solve each equation.

1. $\frac{1}{2}x = 12$	2. $3x + 12 = 42$
3. $4x - 2 + 3x + 10 = 29$	4. $\frac{3}{4}x + 2 - \frac{1}{4}x - 4 = 6$
5. $3x - 10 = 11$	6. $-2x + 3 = 4x - 9$
7. $3(x + 2) = 9$	8. $\frac{x+2}{6} = 10$
9. $\frac{x-4}{3} + 2 = 6$	10. $\frac{2}{3}x - 4 = 12$

Topic 4: Inequalities

Rules for Solving Inequalities:

1. Make the same changes to both sides of the inequality
2. Isolate the variable
3. Combine Like Terms
4. Use the Inverse Operation to remove clutter away from variable
5. BUT, if your Inverse Operation is multiplication or division by a *negative number*, the inequality sign reverses

< becomes >
> becomes <
≤ becomes ≥
≥ becomes ≤

Solving Inequalities

Solving Two-Step Inequalities

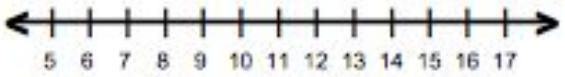
1. Add or subtract to isolate the variable term.
2. Multiply or divide to solve for the variable. If multiply or divide by a negative number then reverse the inequality symbol.

Example:

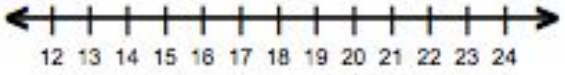
$$-3x+5 \le -16$$
$$-5 \quad -5 \quad \text{Subtract}$$
$$-3x \le -21$$
$$\frac{-3x}{-3} \ge \frac{-21}{-3} \quad \text{Divide by -3, reverse inequality}$$
$$x \ge 7$$

Solve and Graph the Inequalities

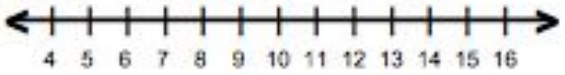
1) $4(3-2g)-6g \leq 4g-168$



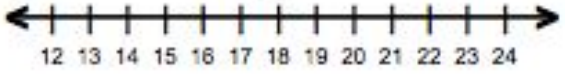
2) $6h+2h < 144$



3) $3(2-6y)-5y > 9y-218$

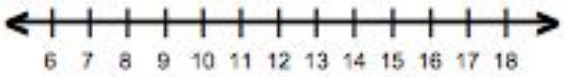


4) $-2r-9+5r \geq 42$

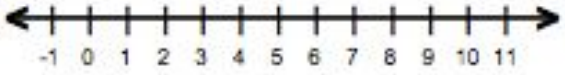


5) $120 \geq 2f-8+6f$

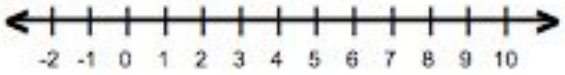
6) $6(3-4b) > 5b-301$



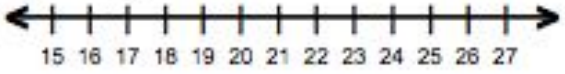
7) $4s-66 \leq 2(3-4s)$



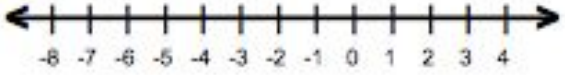
8) $3(2-4x) < 9x-78$



9) $225 \geq 5z+4z$



10) $-35 < 4d+3d$

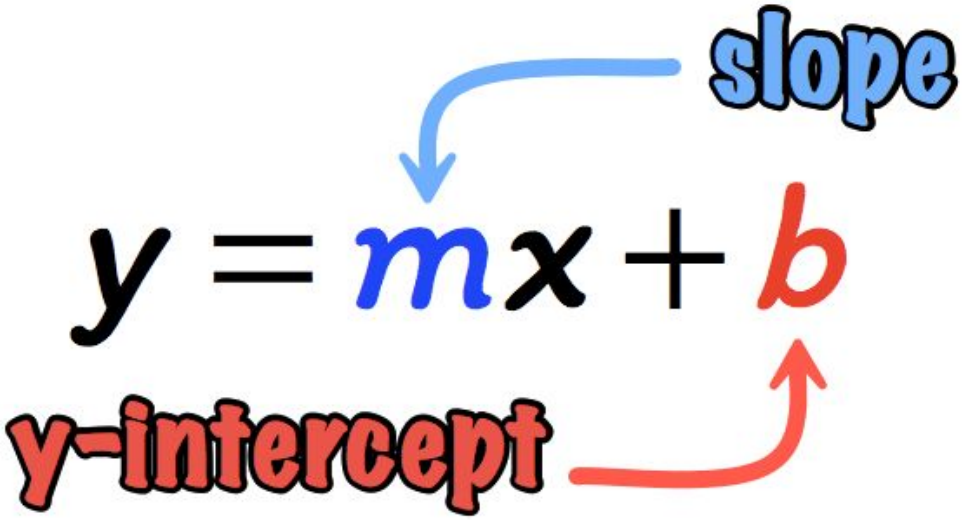


Topic 5: Linear Equations

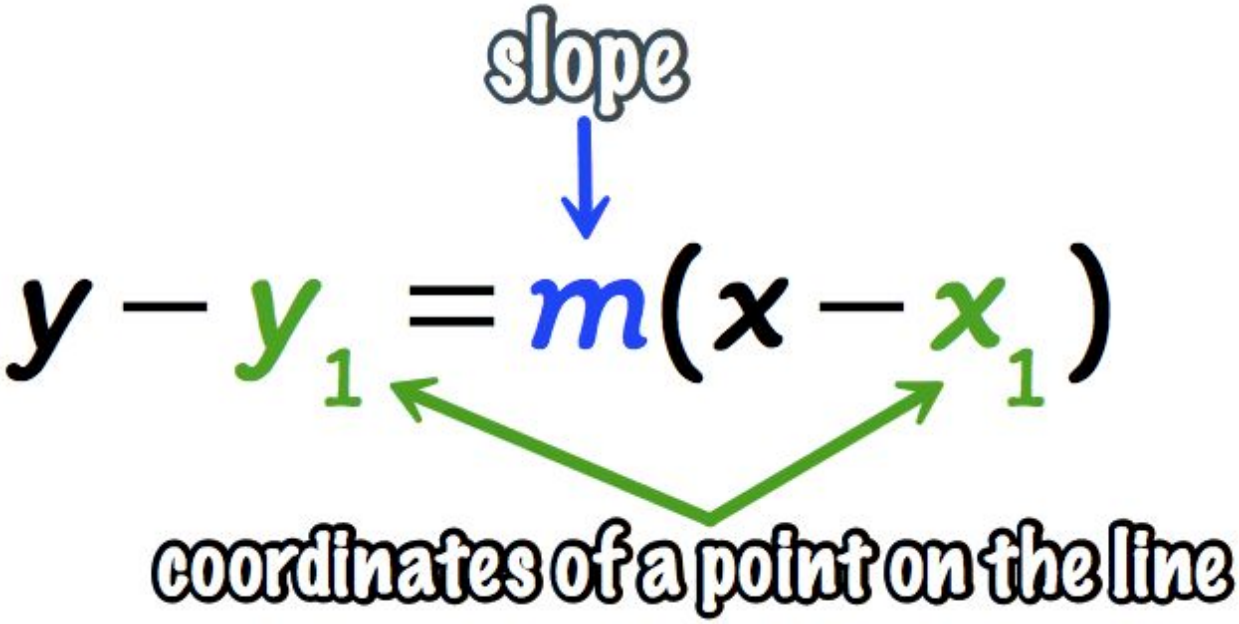
SLOPE

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

SLOPE INTERCEPT FORM



POINT SLOPE FORM



YOU SHOULD BE ABLE TO ……..

- Write equations in each of the forms above
- Graph equations in either form
- Find the slope of a line given two points or either of the equations above
- Find x and y intercepts given a graph or any linear equation

Write the slope-intercept form of the equation of each line given the slope and y-intercept.

1) Slope $= -2$, y-intercept $= -4$

2) Slope $= \frac{2}{5}$, y-intercept $= 1$

Write the slope-intercept form of the equation of each line.

3) $x - 5y = -25$

4) $8x + 3y = -32$

5) $y = -2(x - 5)$

6) $y + 1 = -\frac{1}{4}x$

Write the slope-intercept form of the equation of the line through the given point with the given slope.

7) through: $(-3, -5)$, slope $= \frac{8}{3}$

8) through: $(-3, 2)$, slope $= -\frac{4}{3}$

Write the slope-intercept form of the equation of the line through the given points.

9) through: $(5, -4)$ and $(5, 5)$

10) through: $(-1, -3)$ and $(0, -1)$

Write the point-slope form of the equation of the line through the given points.

11) through: $(0, -1)$ and $(-3, -4)$

12) through: $(-1, -2)$ and $(1, 2)$

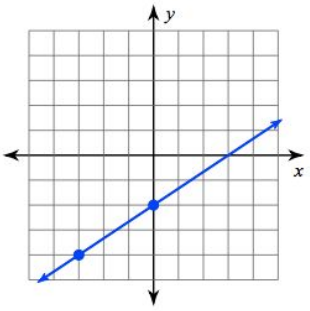
Write the point-slope form of the equation of the line through the given point with the given slope.

13) through: $(-1, -1)$, slope $= \frac{3}{4}$

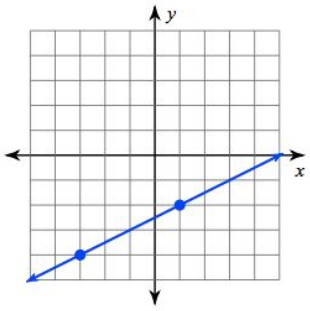
14) through: $(-1, 5)$, slope $= -2$

Find the slope of each line.

15)



16)



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

17) $(12, 0), (-10, 2)$

18) $(-19, 15), (-1, -9)$

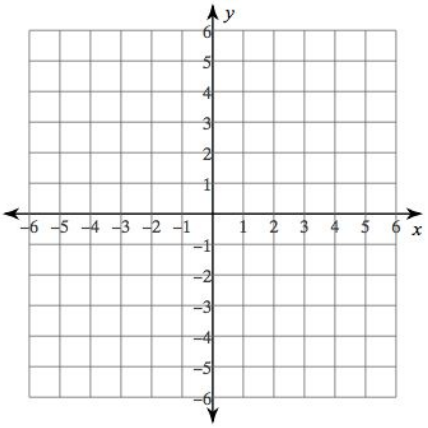
Find the slope of each line.

19) $y = \frac{6}{5}x + 2$

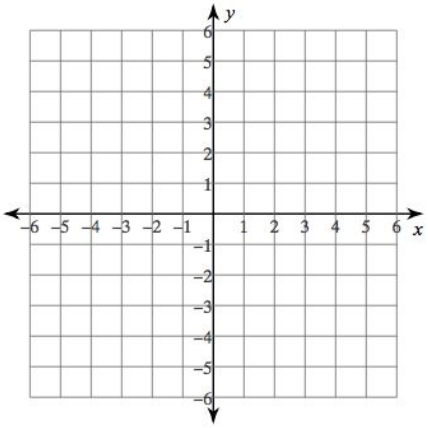
20) $y = \frac{3}{2}x + 5$

Sketch the graph of each line.

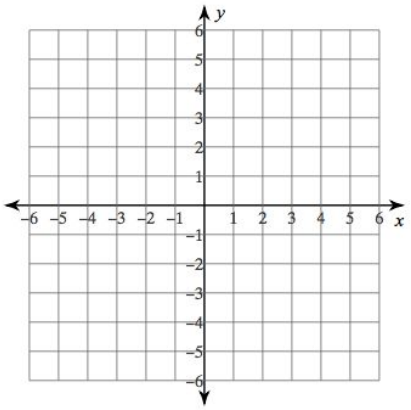
21) x-intercept = –1, y-intercept = –3



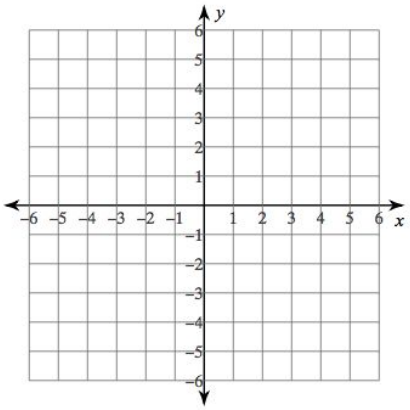
22) x-intercept = 3, y-intercept = –2



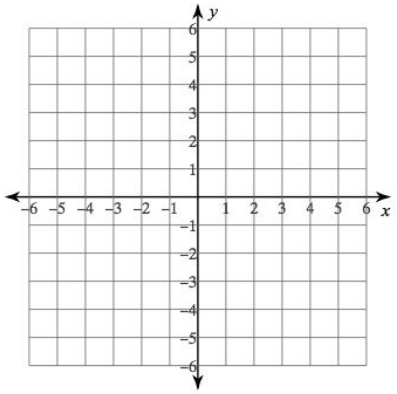
23) $y = -\frac{1}{3}x + 2$



24) $y = \frac{1}{4}x - 4$



25) $x + 4y = 0$



26) $2x - y = -2$