Solving Linear Equations NOTES

NAME_____ DATE_____ Period A B C D E F

I can solve one and two-step equations

vocabulary	When solving equations, you will need to use <u>inverse,</u> or opposite operations to <u>isolate</u> the variable. Inverses: • Addition is_____ • Subtraction is_____ • Multiplication is _____ • Division is _____ $-3x + 6 = 21$

One-Step Equations

1. $p + 12 = 10$	**2.** $5 = m - 8$
3. $-3a = 12$	**4.** $\dfrac{t}{3} = -6$

Two-Step Equations

When soling equations, remember it's all about keeping BALANCE

5. $2q + 4 = 6$	**6.** $6 = 3p + 3$
7. 3a + 1 = 10	**8.** $9 = 4m + 1$

To solve a Two-Step Equitation:
1. Draw a line through the equal sign to show balance.
2. Undo the Addition/Subtraction (to remove the constant term)
3. Undo the Multiplication/Division (to remove the coefficient)

Two-Step Equations

$4x - 8 = 16$	$\dfrac{y}{12} - 5 = 11$
$-61 = 7y - 26$	$4 - 3n = 43$
$\dfrac{x}{3} + 5 = -4$	$23 - x = 13$
$3x + 6 = -18$	$12 = -2x + 10$
$14 = 6 - 2x$	$14 = 3 - x$
$\dfrac{x}{4} + 10 = 1$	$\dfrac{-x}{2} = -6$

I can solve multi-step equations with variables on one side of the equation.

| Combining Like Terms

(see Slide-Share presentation)	**"Like terms"** are terms that contain the same letter variables which are raised to the same exact powers. Only the first number "coefficients" of the terms are different.

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Combining Like Terms

(see Slide-Share presentation)

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Example:	**Non-Example**
3**h** and ⁻**h** YES – letters the same (⁻h = ⁻1h)	4**g** and 4**h** NO – letter variables are different.

5**p**²**q**³ and -4**p**²**q**³ **YES** – letters & powers same
2**x**²**y**³ and 2**x**²**y**⁵ **NO** – y powers are different.

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Consider the following take-away meal:

Write an equation to show your meal order, and then combine like terms.

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$7x + 2x - 5 + x - 2x + 9$

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$x - 5 - 9x - 3$

</td></tr>
<tr><td colspan="2">Solve for the variable in each of the following equations</td></tr>
<tr><td>

$7x + 2x - 5 + x - 2x + 9 = 45$

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$x - 5 - 9x - 3 = -48$

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<tr><td>

$12 = -2x + 10 + 8x - 10$

</td><td>

$9x + 12 - 2x - 5 + 7x = -21$

</td></tr>
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Distributive Property	You can use the distributive property to simplify expressions. To distribute, multiply the term on the outside of the parentheses to both terms on the inside of parentheses.

	$4(x + 2)$	$3(x - 5)$	$-7(2x - 5)$	$8(2x - 5)$

Multi- Step Equations with variables on ONE SIDE	$2(5-x)=9$	$3x-7x-8=24$
	$12=-2x-(x+3)$	$8(2x-5)-9x=-33$
	$2(3x+5)-4=18$	$13=12x-5-3x$
	$x+4(x+3)=17$	$12x-(4x+10)=54$
	$5(2+x)+5(3+7x)=25$	$2(-7x+5)+2+12x=3$

Application to Supplementary Angles

$a+b=180$

a b

Supplementary angle

Solve for x and then find the measure of each missing angle.

$5x°$ $(3x+12)°$
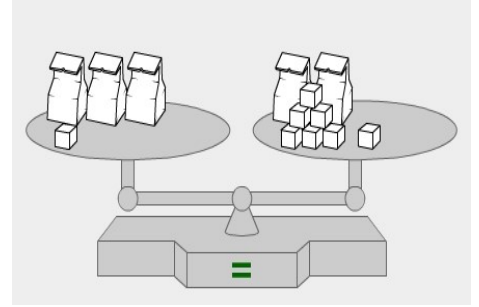
$(4+5x)°$

$(x+2)°$
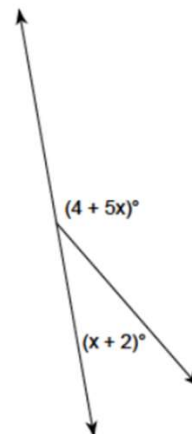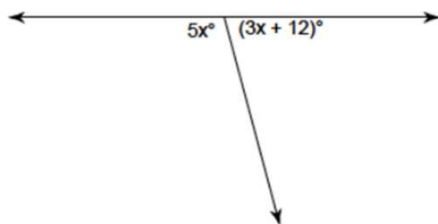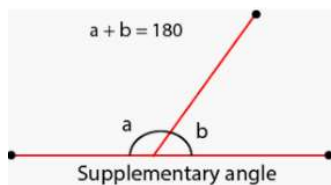
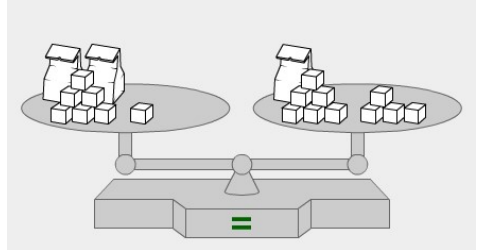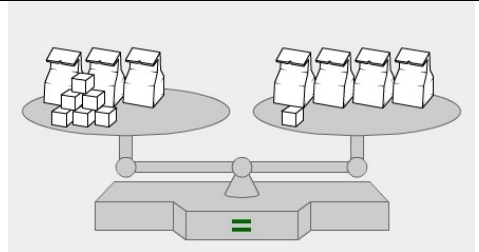| I can solve equations with variables on both sides of the equal sign.		
<u>Activity OnE</u> Solving Equations with Variables on Both Sides Exploration	• How many blocks are in one bag? • Write the original problem as an equation, using a variable. • Solve the equation you wrote algebraically.	
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SOLVING MULTI- STEP EQUATIONS	**STEPS:** 1. **Move all of the variables to the same side (inverse operations)** 2. **Add or subtract the constant to get the term with the variable alone.** 3. **Multiply or divide to finish solving.**	
	$x - 6 = 5x + 10$	$2x - 7 = -5x + 14$

How are Teddy and Topher's solution strategies the same? How are they Different? _____ _____ _____ _____ _____ Which strategy do you prefer? Why? _____ _____ _____ _____ _____	Consider the equation: $5x + 3 = 2x + 5$ Teddy and Topher each solved the equation in a different way. Analyze their solution strategies.

Teddy 👍

$$5x + 3 = 2x + 5$$
$$\underline{-5x \qquad -5x}$$
$$3 = -3x + 5$$
$$\underline{-5 \qquad\qquad -5}$$
$$\frac{-2}{-3} = \frac{-3x}{-3}$$
$$\frac{2}{3} = x$$
$$x = \frac{2}{3}$$

Topher 👍

$$5x + 3 = 2x + 5$$
$$\underline{-2x \qquad -2x}$$
$$3x + 3 = 5$$
$$\underline{-3 \qquad\qquad -3}$$
$$3x = 2$$
$$x = \frac{2}{3}$$

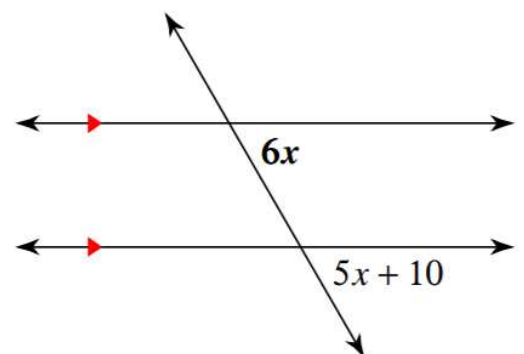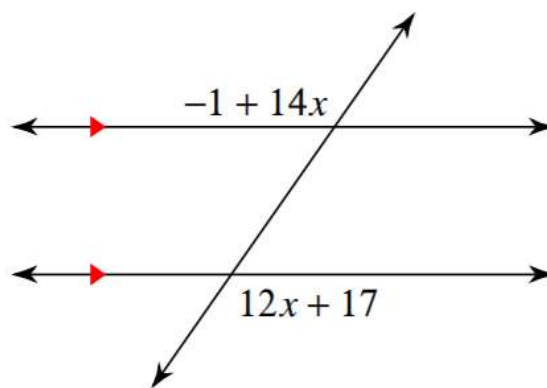| $5x + 15 = 75 - 25x$	$4x = 20x - 24$
$-4x - 8 = 2x + 10$	$-42x = -4x - 1$

Use multi-step equations to solve for the variable. What is the value of the missing angle?

Application to Angles on a Transversal DON'T FORGET… Alternate Interior Angles are Congruent Corresponding Angles are Congruent	$-1 + 14x$ $12x + 17$	$6x$ $5x + 10$

SOLVING Complex MULTI-STEP EQUATIONS

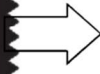**DO I HAVE TO DISTRIBUTE?**
$2+5(x+3)-3(x-4)=x+2(2x+4)$
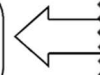
DO I HAVE TO CLEAN UP?
$2+5x+15-3x+12 = x+4x+8$

DO I HAVE VARIABLES ON BOTH SIDES?
$2x+29 = 5x+8$

IS THE VARIABLE ISOLATED?
$29=3x+8$

IS THE VARIABLE MULTIPLIED?
$21 = 3x$

$2x-3(x+10)+1=-1+2(x+7)$	$x-6(x-5)=2x+4(x-20)$
$1+5(7+3x) = 12x+5x$	$x+2(2x+3)-1 = \frac{1}{2}(4x+28)$