TOPIC: THE ADDITION AND SUBTRACTION PROPERTIES OF EQUALITY

Introduction to Linear Equations

◆ Recall: An **equation** is a statement that two algebraic **expressions** are equal.

New **Linear Equations in One Variable**

expression *expression*

$2x + 6$ 0

_____

$ax + b = c$

a, b, c are _____ numbers

a_____ 0

◆ The **solution** to an equation is the value of the variable that makes the statement _____ when plugged in.

EXAMPLE Determine whether the given value is a solution to the equation.

(A) $2x + 6 = 0\,;\ x = -3$

(B) $5 = 8w - 3\,;\ w = -1$

◆ For a linear equation, write the **solution set** by putting the solution in set brackets { }.

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EXAMPLE Determine whether each of the following is a linear equation in one variable.

$(\boldsymbol{A})$ $4x - 7 + 3$

$(\boldsymbol{B})$ $5y - y = 2$

$(\boldsymbol{C})$ $6x + 1 = 2t^2$

PRACTICE Identify the following as either an expression or equation.

$(\boldsymbol{A})$ $\frac{2m}{3} + 8$

[EXPRESSION | EQUATION]

$(\boldsymbol{B})$ $4(a - 2) = 21$

[EXPRESSION | EQUATION]

PRACTICE Which of the following is a linear equation in one variable?

A. $x + 5 = 12$

B. $x^2 = 25$

C. $y + z = 10$

D. $x - 3 < 7$

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PRACTICE Which of the following is a linear equation in one variable?

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

B. $x(x+4)=0$

C. $4(x+3)=2x+18$

D. $x^2+5x=10$

PRACTICE Verify that the given value is a solution to the equation.

$(\boldsymbol{A})$ $y=-2; 5y+4=14$

[SOLUTION | NOT A SOLUTION]

$(\boldsymbol{B})$ $a=2; 4a+3=2a+9$

[SOLUTION | NOT A SOLUTION]

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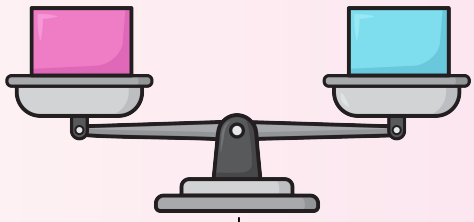
Addition and Subtraction Properties of Equality

◆ To **solve** an equation, _____ the variable using operations like **addition** and **subtraction**.

► Operations must ***ALWAYS*** be done to _____ sides of an equation to create *equivalent equations*.

Addition **Property of Equality**	***Subtraction*** **Property of Equality**
If $a = b$, then a ____ $= b$ ____	If $a = b$, then a ____ $= b$ ____
Use when eqn has **[ADDITION | SUBTRACTION]**	*Use when eqn has* **[ADDITION | SUBTRACTION]**
$x - 6 = 0$	$0 = x + 2$
$x - 6$ _____ $= 0$ _____	0 _____ $= x + 2$ _____
____ $=$ _____	____ $=$ _____



◆ Check your solution by replacing variable in original equation & verifying that it makes the statement **true**.

EXAMPLE Solve the linear equation, then check your solution.

$y - 1.2 = 5.8$

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PRACTICE Solve the given linear equation using addition and subtraction properties of equality.

$(\boldsymbol{A})$ $m - 9 = -6$

$(\boldsymbol{B})$ $x - (-5) = 12$

PRACTICE Solve the given linear equation using addition and subtraction properties of equality.

$(\boldsymbol{A})$ $x + \frac{2}{8} = -\frac{3}{8}$

$(\boldsymbol{B})$ $-5.4 + c = 1.6$

EXAMPLE Solve the linear equation, then check your solution.

$4x + 7 = 3x + 10$

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PRACTICE Solve the given linear equation using addition and subtraction properties of equality.

$(\boldsymbol{A})$ $6h - (-12) = 5 + 5h$

$(\boldsymbol{B})$ $2(x + 5) = 3(x - 1)$

$(\boldsymbol{C})$ $3(y + 3) + (1 - y) = 3y + 14$

EXAMPLE Translate the following statement into a linear equation and solve.

A number decreased by 7 is equal to 15. What is the number?