3.1 Solving Equations Using Addition and Subtraction

Goals
- Solve linear equations using addition and subtraction.
- Use linear equations to solve real-life problems.

VOCABULARY

Equivalent equations

Inverse operations

Solution step

Linear equation

TRANSFORMATIONS THAT PRODUCE EQUIVALENT EQUATIONS

	Original Equation		Equivalent Equation
• Add the same number to *each* side.	$x - 3 = 5$	**Add ___.**	$x =$ ___
• Subtract the same number from *each* side.	$x + 6 = 10$	**Subtract ___.**	$x =$ ___
• Simplify one or both sides.	$x = 8 - 3$	**Simplify.**	$x =$ ___
• Interchange the sides.	$7 = x$	**Interchange.**	$x =$ ___

Example 1 *Adding to Each Side*

Solve $x - 9 = -20$.

On the left side of the equation, 9 is subtracted from x. To isolate x, you need to undo the subtraction by applying the inverse operation of adding ___. Remember that you need to add ___ to *each* side.

$x - 9 = -20$	**Write original equation.**
$x - 9 +$ ___ $= -20 +$ ___	**Add ___ to each side.**
$x =$ _____	**Simplify.**

Answer The solution is _____.

You can check your solution by substituting your solution for x in the original equation.

Example 2 *Simplifying First*

Solve $n - (-8) = -2$.

$n - (-8) = -2$	**Write original equation.**
$n + 8 = -2$	**Simplify.**
$n + 8 -$ ___ $= -2 -$ ___	**Subtract ___ from each side.**
$n =$ _____	**Simplify.**

✔ ***Checkpoint*** **Solve the equation. Check your solution in the original equation.**

1. $x - 7 = -15$	**2.** $n - (-6) = 4$	**3.** $-7 = 10 + y$
4. $5 - (-z) = 21$	**5.** $m - \lvert -3 \rvert = 14$	**6.** $-8 = -b + (-2)$