Solving Two-Step Equations and Inequalities

Objectives:

…to solve two-step equations involving integers, decimals, and fractions
...to solve two-step inequalities involving integers, decimals, and fractions
...to check possible solutions for two-step equations and inequalities

Assessment Anchor:

8.D.2.1 – Select and/or use a strategy to simplify an expression, solve an equation or inequality and/or check the solution for accuracy.

NOTES

***EQUATIONS ARE LIKE BALANCED SEE-SAWS…AND MUST REMAIN BALANCED!!

To solve a two step equation:

1. **Locate the variable in the equation**
2. **Use the inverse (opposite) operation on both sides of the equation**
   a) **FIRST use addition or subtraction to isolate the variable part**
   b) **SECOND use multiplication or division to isolate the variable**
3. **Show your answer**

EXAMPLES

1) $2x - 7 = -15$ ……original problem

$2x - 7 = -15$ ……locate the variable term
$+7 \quad +7$ ……add 7 to both sides
$\frac{2x}{2} = \frac{-8}{2}$ ……simplify the equation
……divide both sides by 2

$x = -4$ ……final answer!

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2) $-4x + 10 = -34$ ……original problem

$-4x + 10 = -34$ ……locate the variable term

$\underline{\quad -10 \quad -10}$ ……subtract 10 from both sides

$\frac{-4x}{-4} = \frac{-44}{-4}$ ……simplify the equation

……divide both sides by -4

$x = 11$ ……final answer!

3) $\frac{x}{7} + 19 = 4$ ……original problem

$\frac{x}{7} + 19 = 4$ ……locate the variable term

$\underline{\quad -19 \quad -19}$ ……subtract 19 from both sides

$7 \cdot \frac{x}{7} = -15 \cdot 7$ ……simplify the equation, then multiply by 7 on both sides

$x = -105$ ……final answer!

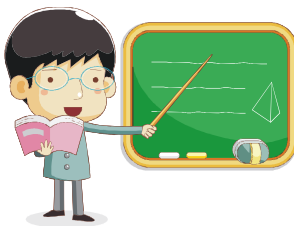
4) $-24 = \frac{x}{-5} - 9$ ……original problem

$-24 = \frac{x}{-5} - 9$ ……locate the variable term

$\underline{+9 \quad +9}$ ……add 9 to both sides

$-5 \cdot -15 = \frac{x}{-5} \cdot -5$ ……simplify the equation, then multiply by -5 on both sides

$75 = x$ ……final answer!



"Showing your work on both sides is just as important as finding the correct answer. Don't try to calculate ANYTHING before writing down the work!"

Solving Two-Step Equations and Inequalities

5) $-3x + 11 = -34$

6) $-9 = 12 + 5y$

7) $45 = \frac{x}{8} + 51$

8) $\frac{y}{-4} - 20 = -12$

EVEN MORE EXAMPLES – *Careful Here!!*

9) $22 - 5k = -18$

10) $-9 = 30 - 2y$

11) $-7 = -21 - \frac{x}{4}$

12) $23 - \frac{x}{5} = 32$

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STILL MORE EXAMPLES – *Decimals and Fractions!!*

13) $2x + 4.5 = -2.9$

14) $\frac{2}{9}y + 21 = -11$

15) $0.4y + 5.6 = 2.4$

16) $\frac{3}{4}k - 17 = -11$

NOTES (for inequalities)

1. **Follow the same procedure for solving equations.**
2. *****IF YOU MULTIPLY OR DIVIDE BY A NEGATIVE NUMBER ON BOTH SIDES, YOU MUST SWITCH THE INEQUALITY SYMBOL.**

EXAMPLES (for inequalities)

17) $3x - 11 \geq -20$ ……original problem

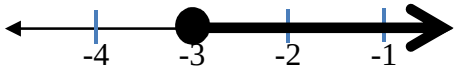
$3x - 11 \geq -20$ ……locate the variable term

$+11 \quad +11$ ……add 11 to both sides

$\frac{3x}{3} \geq \frac{-9}{3}$ ……simplify the inequality

$x \geq -3$ ……divide both sides by 3

……simplify the inequality



……graph solutions on a number line

Solving Two-Step Equations and Inequalities

18) $-2x + 14 \geq -18$ ……original problem

$-2x + 14 \geq -18$ ……locate the variable term

$-14 \quad -14$ ……subtract 14 from both sides

$\frac{-2x}{-2} \geq \frac{-32}{-2}$ ……simplify the inequality

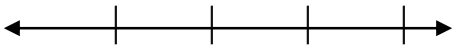
……divide both sides by -2

$x \leq 16$ ……simplify the inequality

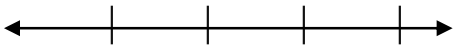
Switch symbol after dividing by a negative #

……graph solutions on a number line

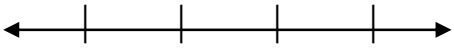
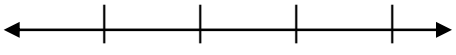
19) $-3x + 31 < 25$



20) $43 \geq 8 + 5y$



21) $30 \leq \frac{x}{-3} + 33$



22) $\frac{y}{2} - 20 < -23$