

Notes:

Solving Equations with Variables on Both Sides

8.EE.7

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What does it mean to solve equations with variables on both sides? You now have an equation with variables on both sides of the equal sign.

Basic Equation	Equations with Variables on Both Sides
$2(x - 4) = -26$	$2x - 6 = 5x + 13$

Example 1: Solve for x.

$$\begin{array}{r}
 4 + 2x = 5x + 37 \\
 \underline{-5x - 5x} \\
 4 - 3x = 37 \\
 \underline{-4} \qquad \qquad -4 \\
 -3x = 33 \\
 \underline{-3} \qquad \qquad -3 \\
 x = -11
 \end{array}$$

- Steps:
1. Identify the variable. See which side has the larger variable value.
 2. Bring the smaller variable value to the other side using the inverse operation.
 3. Now you have a 2-step equation. Follow the steps to solving a 2-step equation.

Example 2: Solve for x.

$$\begin{array}{r}
 9(x - 5) = 18 + 3x \\
 9x - 45 = 18 + 3x \\
 \underline{-3x} \qquad \qquad -3x \\
 6x - 45 = 18 \\
 \underline{+45} \quad \underline{+45} \\
 6x = 63 \\
 \underline{6} \qquad \underline{6} \quad \frac{3}{6} \\
 x = 10 \frac{3}{6} = 10 \frac{1}{2}
 \end{array}$$

- Steps:
1. Use the distributive property to clear the parentheses.
 2. Subtract 3x from both sides.
 3. Add 45 to both sides.
 4. Divide 6 to both sides.

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Example 3: Solve for n.

$$7n - 5 = 10n + 13$$

$$\begin{array}{r} -10n \quad -10n \\ -3n - 5 = 13 \\ + 5 \quad + 5 \\ \hline -8n = 18 \\ -3 \quad -3 \\ \hline n = -6 \end{array}$$

$$n = -6$$

Example 4: Solve for d.

$$2d = 36 - 4d$$

$$\begin{array}{r} +4d \quad +4d \\ \hline 6d = 36 \\ \hline d = 6 \end{array}$$

Example 5: Solve for b.

$$3b - 8 = 2(7b - 3) + 12$$

$$\begin{array}{r} 3b - 8 = 14b - 6 + 12 \\ 3b - 8 = 14b + 6 \\ -11b \quad -11b \\ \hline -10 - 8 = 6 \\ +8 \quad +8 \\ \hline -11b = 14 \\ -11 \quad -11 \\ \hline b = -1 \frac{2}{11} \end{array}$$

Steps:

1. Subtract 10n
from both sides.
2. Add 5
to both sides.
3. Divide -3
to both sides.

Example 6: Solve for x.

$$1x + 4 = 10x + 22$$

$$\begin{array}{r} -10x \quad -10x \\ -9x + 4 = 22 \\ -4 \quad -4 \\ \hline -9x = 18 \\ -9 \quad -9 \\ \hline x = -2 \end{array}$$

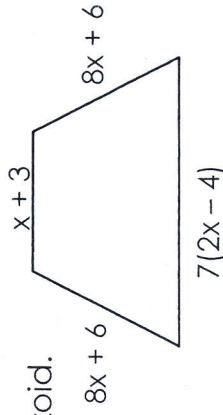
$$x = -2$$

HOMWORK

Directions: Solve for the equations. Show work on pages 48 - 50.

1) $8x + 12 = 5x - 36$	4) $9 + 4(x - 3) = 6x + 5$
2) $7 + 2(w - 4) = 23 - 6w$	5) $6 - (h - 9) = 3(4 - h)$
3) $5(2d - 7) = 3d + 5 + 12d$	6) $6 - 3(2x - 9) = 7(2x - 1) + 5$

7) Find the perimeter of the trapezoid.



8) Evaluate the expression

where $a = -2$ and $b = 4$

$$\frac{3a - 5ba^2}{|a|}$$

9) Compare:

$$\frac{15}{18} \quad \bigcirc \quad 0.8$$

10) Evaluate:

$$0.14(0.3)$$

11) What is the difference between -45°C and 37°C ?

Steps:

1. Use the distributive property to clear the parentheses.
2. Combine like terms.
3. Subtract 14b
from both sides.
4. Add 8
to both sides.
5. Divide -11
to both sides.