3.1 Solve One-Step Equations

Goal • Solve one-step equations using algebra.

Your Notes

VOCABULARY

Inverse operations

Equivalent equations

ADDITION PROPERTY OF EQUALITY

Words Adding the same number to each side of an equation produces an _____.

Algebra If $x - a = b$, then $x - a + a =$ ___ + ___ or $x =$ ___ + ___.

SUBTRACTION PROPERTY OF EQUALITY

Words Subtracting the same number from each side of an equation produces an _____ _____.

Algebra If $x + a = b$, then $x + a - a =$ ___ − ___ or $x =$ ___ − ___.

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Your Notes

Example 1 ***Solve an equation using subtraction***

Solve $y + 3 = 10$.

Solution

$y + 3 = 10$	**Write original equation.**
$y + 3 - \_\_\_ = 10 - \_\_\_$	**Use subtraction property of equality: Subtract ___ from each side.**
$y = \_\_\_$	**Simplify.**

The solution is ___.

CHECK

$y + 3 = 10$	**Write original equation.**
$\_\_\_ + 3 \stackrel{?}{=} 10$	**Substitute ___ for y.**
$\_\_\_\_ = 10$ ✓	**Solution checks.**

Remember to check your solution in the original equation for accuracy.

Example 2 ***Solve an equation using addition***

Solve $t - 9 = 11$.

Solution

$t - 9 = 11$	**Write original equation.**
$t - 9 + \_\_\_ = 11 + \_\_\_$	**Use addition property of equality: Add ___ to each side.**
$t = \_\_\_\_$	**Simplify.**

The solution is ____.

CHECK

$t - 9 = 11$	**Write original equation.**
$\_\_\_\_ - 9 \stackrel{?}{=} 11$	**Substitute ____ for t.**
$\_\_\_\_ = 11$ ✓	**Solution checks.**

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Your Notes

✔ ***Checkpoint*** **Solve each equation. Check your solution.**

1. $a + 6 = 17$	**2.** $b - 17 = 12$
3. $-3 = x + 2$	**4.** $y - 4 = -6$

MULTIPLICATION PROPERTY OF EQUALITY

Words Multiplying each side of an equation by the same non-zero number produces an _____.

Algebra If $\frac{x}{a} = b$ and $a \neq 0$, then $a \cdot \frac{x}{a} =$ ___ • ___ or $x =$ _____.

DIVISION PROPERTY OF EQUALITY

Words Dividing each side of an equation by the same non-zero number produces an _____ _____.

Algebra If $ax = b$, and $a \neq 0$, then $\frac{ax}{a} = \frac{\square}{\square}$ or $x = \frac{\square}{\square}$.

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Your Notes

Example 3 ***Solve an equation using division***

Solve $8x = 56$.

Solution

$8x = 56$ **Write original equation.**

$\frac{8x}{\square} = \frac{56}{\square}$ **Use division property of equality: Divide each side by ___.**

$x =$ ___ **Simplify.**

The solution is ___.

CHECK

$8x = 56$ **Write original equation.**

$8($___$) \stackrel{?}{=} 56$ **Substitute ___ for x.**

___ $= 56$ ✓ **Solution checks.**

The *division property of equality* can be used to solve equations involving multiplication.

Example 4 ***Solve an equation using multiplication***

Solve $\frac{a}{5} = 12$.

Solution

$\frac{a}{5} = 12$ **Write original equation.**

___ $\cdot \frac{a}{5} =$ ___ $\cdot 12$ **Use multiplication property of equality: Multiply each side by ___.**

$a =$ ___ **Simplify.**

The solution is ___.

CHECK

$\frac{a}{5} = 12$ **Write original equation.**

$\frac{\square}{5} \stackrel{?}{=} 12$ **Substitute ___ for a.**

___ $= 12$ ✓ **Solution checks.**

The *multiplication property of equality* can be used to solve equations involving division.

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Your Notes

Example 5 ***Solve an equation by multiplying by a reciprocal***

Solve $\frac{3}{5}t = 6$.

Solution

The coefficient of t is $\frac{3}{5}$. The reciprocal of $\frac{3}{5}$ is ____.

$\frac{3}{5}t = 6$	**Write original equation.**
$\cdot \frac{3}{5}t = \quad \cdot 6$	**Multiply each side by the reciprocal ____.**
$t =$ ____	**Simplify.**

The solution is ____.

CHECK

$\frac{3}{5}t = 6$	**Write original equation.**
$\frac{3}{5}($____$) \stackrel{?}{=} 6$	**Substitute ____ for t.**
____ $= 6$ ✓	**Solution checks.**

✔ ***Checkpoint*** **Solve each equation. Check your solution.**

5. $3x = 39$	**6.** $\frac{b}{4} = 13$
7. $-24 = 4x$	**8.** $-\frac{3}{8}m = 21$

Homework

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