

How can the properties of equality be used to solve linear equations in one-variable?

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What does it mean to solve?

Find all values that make the sentence true!

### Mathematical Sentences

Equations

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Inequalities

$<, >, \leq, \geq$

### Properties of Equality

If you add, subtract, multiply, or divide both sides of an equation by the same value, you get an equivalent equation.

Equivalent equations have the same solution.

**Main Idea:** Isolate the variable by using inverse operations.

Solve and check. Show all steps and circle your solution.

Ex 1:  $m + 36 = -18$

$$+(-36) \quad +(-36)$$

$$m = -54$$

Check:

$$-54 + 36 = -18 \checkmark$$

Ex 2:  $-6 + y = 5$

$$+6 \quad +6$$

$$y = 11$$

Check:

$$-6 + 11 = 5 \checkmark$$

Ex 3:  $-\frac{x}{3} = 15$

$$(-3) \left(-\frac{1}{3}x\right) = 15 (-3)$$

$$x = -45$$

Check:

$$-\frac{(-45)}{3} = 15$$

$$\frac{45}{3} = 15 \checkmark$$

Ex 4:  $4x - 9 = 15$

$$4x + (-9) = 15$$

$$+9 \quad +9$$

$$\frac{4x}{4} = \frac{24}{4}$$

$$x = 6$$

Check:

$$4(6) - 9 = 15$$

$$24 - 9 = 15 \checkmark$$

$$\text{Ex 5: } \frac{x}{5} + 8 = -17$$

$$\quad \quad \quad \underline{+(-8)} \quad \underline{+(-8)}$$

$$(5) \frac{1}{5}x = -25(5)$$

$$\boxed{x = -125}$$

Check:

$$\frac{-125}{5} + 8 = -17$$

$$-25 + 8 = -17 \checkmark$$

$$\text{Ex 6: } \frac{2x}{3} + 8 = -10$$

$$\quad \quad \quad \underline{+(-8)} \quad \underline{+(-8)}$$

$$\left(\frac{3}{2}\right) \frac{2}{3}x = -18\left(\frac{3}{2}\right)$$

$$\boxed{x = -27}$$

check

$$\frac{-54}{3} + 8 = -10$$

$$-18 + 8 = -10 \checkmark$$

$$\text{Ex 7: } 24 = -3 - 15m$$

$$24 = -3 + (-15m)$$

$$\underline{+3} \quad \underline{+3}$$

$$27 = -15m$$

$$\underline{-15} \quad \underline{-15}$$

$$\boxed{m = -\frac{9}{5}}$$

$$\text{check: } 24 = -3 - 15\left(-\frac{9}{5}\right)$$

$$24 = -3 - (-27)$$

$$24 = -3 + 27 \checkmark$$

## Solving Equations Continued - Multi-Step Equations

Recommendation: Use the distributive property and combine like terms before you use inverse operations.

Ex 8:  $-2(x-3) + 5x = 36$

$$-2(x+(-3)) + 5x = 36$$

$$-2x + 6 + 5x = 36$$

$$3x + 6 = 36$$

$$\underline{+(-6)} \quad \underline{+(-6)}$$

$$\frac{3x}{3} = \frac{30}{3}$$

$$\boxed{x=10}$$

check:

$$\underline{-14} + \underline{50} = 36 \checkmark$$

Ex 9:  $37 = 3(2x-4) + 5(x+1)$

$$37 = 3(2x+(-4)) + 5(x+1)$$

$$37 = 6x + (-12) + 5x + 5$$

$$37 = 11x + (-7)$$

$$\underline{+7} \quad \quad \quad \underline{+7}$$

$$\frac{44}{11} = \frac{11x}{11}$$

$$\boxed{x=4}$$

check:

$$37 = 12 + 25 \checkmark$$

$$\text{Ex 10: } 125 = \frac{5}{6}(x-18)$$

$$125 = \frac{5}{6}(x + (-18))$$

$$125 = \frac{5}{6}x + (-15)$$

$$\begin{array}{r} +15 \\ \hline \end{array} \qquad \begin{array}{r} +15 \\ \hline \end{array}$$

$$\left(\frac{6}{5}\right)140 = \frac{5}{6}x \left(\frac{6}{5}\right)$$

$$\boxed{x = 168}$$

$$\left(\frac{6}{5}\right)125 = \left(\frac{6}{5}\right)\frac{5}{6}(x + (-18))$$

$$150 = x + (-18)$$

$$\begin{array}{r} +18 \\ \hline \end{array} \qquad \begin{array}{r} +18 \\ \hline \end{array}$$

$$\boxed{x = 168}$$

$$\text{Ex 11: } 8x - 3(2x - 9) = -5$$

$$8x + (-3)(2x + (-9)) = -5$$

$$8x + (-6x) + 27 = -5$$

$$2x + 27 = -5$$

$$\begin{array}{r} +(-27) \\ \hline \end{array} \qquad \begin{array}{r} +(-27) \\ \hline \end{array}$$

$$\frac{2x}{2} = \frac{-32}{2}$$

$$\boxed{x = -16}$$

Ex 12:  $-\frac{4}{5}(2h-1) = 28$

$$\left(\frac{-5}{4}\right)\left(-\frac{4}{5}\right)(2h-1) = 28\left(\frac{-5}{4}\right)$$

$$2h-1 = -35$$
$$\begin{array}{r} +1 \\ \hline \end{array} \quad \begin{array}{r} +1 \\ \hline \end{array}$$

$$\frac{2h}{2} = \frac{-34}{2}$$

$$\boxed{h = -17}$$

## Assignment #9

Part I: p. 144-145 #3-13 odd, 27-35 odd

Part II: p. 151 #12-18, 19-23 odd, 33-34