

## Decimals in Equations

When working with decimals in equations, carefully use the Addition, Subtraction, Multiplication, and Division Properties Equality to isolate the variable. (i.e., whatever you do to one side of the equation, do the same to the other.)

Example: Solve  $x + 1.7 = -5$  for  $x$ .

$x + 1.7 = -5$	Use the subtraction property of equality to subtract 1.7 from both sides.
$x + 1.7 - 1.7 = -5 - 1.7$	Simplify. $x + 1.7 - 1.7 = -5 + -1.7$ ; $x + 0 = -6.7$ ; $x = -6.7$
$x = -6.7$	Check the solution. $-6.7 + 1.7 = -5$ ; $-5 = -5$ is true.

Example: Solve  $4.2x - 8 = 3.4x + 7$  for  $x$ .

$4.2x - 8 = 3.4x + 7$	Use the addition or subtraction property to combine like variables on one side and the constants on the other.
$4.2x - 8 + 8 = 3.4x + 7 + 8$ $4.2x = 3.4x + 15$ $4.2x - 3.4x = 3.4x - 3.4x + 15$ $0.8x = 15$ $\frac{0.8}{0.8}x = \frac{15}{0.8}$	Use the addition property to add 8 to both sides. Combine like terms. Use the subtraction property to subtract $3.4x$ from both sides. Combine like terms. Use the division property to divide both sides by .08
$x = 18.75$	Check the solution. $4.2(18.75) - 8 = 3.4(18.75) + 7$ ; $70.75 = 70.75$ is true.

Sometimes, it is easier to work without decimals. To change a problem with decimals to one without, multiply EVERY TERM in the equation by the same power of 10.

For example, since the above problem involved tenths, one would multiply every term by 10.

The problem would then become:  $42x - 80 = 34x + 70 \rightarrow 8x = 150 \rightarrow x = 18.75$

The answer is still the same.

If the problem involved hundredths, one would multiply every problem by 100.

For example, one would multiply every term in  $2.3x - 4.25 = 3.3x + 2.15$  by 100.

This changes the problem to:  $230x - 425 = 330x + 215$

TRY: Solve this equation both ways – keep the decimals (left) and solve the multiplied problem (right).

$$2.3x - 4.25 = 3.3x + 2.15$$

$$230x - 425 = 330x + 215$$

TRY: Solve for the value of  $x$ .

$$2.4x = 2.16$$

$$2.7x + 5.4x = -16.2$$

$$3.2x - 8.4 = 1.2x - 0.4$$

$$0.8x - 2.1 = 0.3x - 0.1$$

$$0.05(x + 8) - 0.01x = 0.6$$

$$1.2(2x + 5) - 2.1 = 1.5(x + 5)$$