

Equations with parentheses

If an equation you need to solve has parentheses, simplify the parentheses (most often using distribution) and then solve as you normally would.

Solving Equations

1. Simplify both sides of the equation as much as possible using the order of operations (distribute, combine like terms, etc.).
2. If the variable (letter) you're trying to solve for appears on both sides of the equation, move all the terms containing that variable to the same side. Get all your " x 's to Texas" or get all the x 's to one side of the equation.
3. Move all constant values to the other side of the equation (opposite the variable) by "un-doing" each operation. Use inverse operations until the variable is alone, and remember to do the same thing to both sides of the equation so that it stays balanced.

Example

Solve for the variable.

$$-(3x + 4) = 6(2x - 7) + 8$$

Start by simplifying both sides of the equation. You'll need to distribute the coefficients in front of the parentheses.



$$-3x - 4 = 12x - 42 + 8$$

Simplify the right side of the equation by combining like terms.

$$-3x - 4 = 12x - 34$$

Move all of the x terms to one side of the equation by adding $3x$ to both sides.

$$-3x + 3x - 4 = 12x + 3x - 34$$

$$-4 = 15x - 34$$

Undo the -34 by adding 34 to both sides.

$$-4 + 34 = 15x - 34 + 34$$

$$30 = 15x$$

Undo the multiplication by 15 , by dividing both sides by 15 .

$$\frac{30}{15} = \frac{15x}{15}$$

$$2 = x$$

Let's try another example of solving equations with parentheses.

Example

Solve for the variable, remembering that any quantity (other than 0) which is raised to the 0th power is equal to 1.



$$-(b - 2^0) = 7^0(b^0 - 4) - 4(b + 8)$$

Start by simplifying every quantity that's raised to the 0th power (2, 7, and b). Since 2 and 7 are nonzero, we know that $2^0 = 1$ and $7^0 = 1$. We don't yet know if b is nonzero, but we'll proceed as though it is.

$$-(b - 1) = 1(1 - 4) - 4(b + 8)$$

Simplify both sides of the equation by distributing.

$$-b + 1 = 1 - 4 - 4b - 32$$

Combine like terms on the right side. Following the order of operations, we get $1 - 4 - 32 = -3 - 32 = -35$.

$$-b + 1 = -35 - 4b$$

Move all of the b terms to one side of the equation by adding $4b$ to both sides.

$$-b + 4b + 1 = -35 - 4b + 4b$$

$$3b + 1 = -35$$

Undo the +1 by subtracting 1 from both sides.

$$3b + 1 - 1 = -35 - 1$$

$$3b = -36$$

Undo the multiplication by 3, by dividing both sides by 3.



$$\frac{3b}{3} = \frac{-36}{3}$$

$$b = -12$$

