

Brackets on Both Sides of the Equation



In the previous tutorial, we explored the solution paths for equations containing brackets or parenthesis.

$$a(x + b) = c$$

In this tutorial, we'll continue by looking at equations that have brackets on both sides.

$$a(bx + c) = d(ex + f)$$

Here's our first example... $4(2x + 5) = 2(3x + 12)$

Our first solution step will be removing the brackets by *distributing multiplication over addition*.

- How would you explain the statement... *distributing multiplication over addition*?
- How would you demonstrate removing the brackets by *distributing multiplication over addition*?

$$4(2x + 5) = 2(3x + 12)$$

Having removed the brackets, how would you describe the remaining equation to be solved?

- Can you predict the type of calculations you'll need to perform to solve the remaining equation?

$$\begin{aligned}4(2x + 5) &= 2(3x + 12) \\8x + 20 &= 6x + 24\end{aligned}$$



How would you explain and demonstrate collecting your terms with the variable to one side of the equation?

$$\begin{aligned}4(2x + 5) &= 2(3x + 12) \\8x + 20 &= 6x + 24\end{aligned}$$

How would you explain and demonstrate isolating the variable by performing the inverse or opposite math operations to what you see in the equation?

$$\begin{aligned}4(2x + 5) &= 2(3x + 12) \\8x + 20 &= 6x + 24 \\2x + 20 &= 24\end{aligned}$$

How would you summarize the key steps of the previous solution path?

$$4(2x + 5) = 2(3x + 12)$$

$$\begin{array}{ccc}8x + 20 & = & 6x + 24 \\-6x & & -6x\end{array}$$

$$\begin{array}{ccc}2x + 20 & = & 24 \\-20 & & -20\end{array}$$

$$2 \div 2x = 4 \div 2$$

$$x = 2$$



Let's consider some things that may influence our thinking as we solve this type of equation.

- Suppose we rewrite one of the terms outside the brackets as a negative term. How will this influence your thinking as you *distribute multiplication over the addition*? What additional concepts will you need to recall?

$$-4(2x + 5) = 2(3x + 12)$$

- Can you predict where distributing the negative value may continue to influence the remainder of the solution to this equation?

$$-4(2x + 5) = 2(3x + 12)$$

$$-8x - 20 = 6x + 24$$



Let's look at one more example of an equation containing brackets on both sides of the equal sign.

- How do you interpret the subtraction sign written in front of the brackets on the left side of the equation?
- How does this influence removing the brackets?

$$-9 - (9x - 6) = 3(4x + 6)$$

Recall how you summarized the key steps for solving the previous equations in this tutorial. Can you use the same key steps to explain and demonstrate solving the remainder of this equation?

$$\begin{aligned} -9 - (9x - 6) &= 3(4x + 6) \\ -9 - 9x + 6 &= 12x + 18 \end{aligned}$$

Brackets on Both Sides of the Equation - Skills Checklist



- I can explain and demonstrate how I remove brackets in an equation using the distributive property
- I can demonstrate distributing a negative value in an equation
- I can explain and demonstrate how I simplify an equation by collecting any like terms
- I can explain and demonstrate how I solve an equation using opposite/inverse operations

$2ab + 6k$
 $2ab + 6k$



Brackets on Both Sides of the Equation - Worksheet

A large, empty rectangular box with a double-line border, intended for students to write their solutions to the worksheet problems.

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