

Transform Without Breaking Equality

Name: _____

Date: _____

Compare two methods. Solve $2(x + 3) = 18$. Divide first: $x + 3 = 9$, so $x = 6$. Or distribute: $2x + 6 = 18$, then $2x = 12$, so $x = 6$. Check the original equation.

Explore and explain

1. Solve $4(x - 2) = 20$ by dividing first and by distributing first. Check your solution.

2. Expand $-3(x - 4)$ and explain the sign of the constant term.

3. A student writes $\frac{1}{2}x + 4 = 9$, then $\frac{1}{2}x = 13$. Identify the invalid operation and repair the solution.

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Apply and transfer

4. Solve and check $\frac{2}{3}x - 1 = 5$.

5. Simplify $\frac{1}{2}x + 3 + \frac{1}{4}x - 1$. Explain why only some terms combine.

6. A taxi charges \$5 plus \$2.50 per kilometer. The bill is \$20. Write and solve an equation for the distance, assuming no other fees.

Think Like a Mathematician

Optional extension. Choose a strategy and justify why it works. Try a diagram, organized cases, a simpler example, or an equation.

7. Find a number x for which $4(x + 1)$ is 6 greater than $2(x + 3)$. Write an equation, solve, and explain the comparison.

8. Find a value for c so that $3(x + c) = 3x + 18$ is true for every x . Then explain why the equation $3(x + c) = 3x + 17$ cannot be true for any x when that same c is used.