

## BIG IDEAS

For Your Notebook

## Big Idea 1

## Solving Equations in One Variable

You can solve equations in one variable by adding, subtracting, multiplying by, or dividing by the same number on each side.

Property	Words	Algebra
Addition Property of Equality	Add the same number to each side.	If $x - a = b$ , then $x - a + a = b + a$ , or $x = b + a$ .
Subtraction Property of Equality	Subtract the same number from each side.	If $x + a = b$ , then $x + a - a = b - a$ , or $x = b - a$ .
Multiplication Property of Equality	Multiply each side by the same nonzero number.	If $\frac{x}{a} = b$ and $a \neq 0$ , then $a \cdot \frac{x}{a} = a \cdot b$ , or $x = ab$ .
Division Property of Equality	Divide each side by the same nonzero number.	If $ax = b$ and $a \neq 0$ , then $\frac{ax}{a} = \frac{b}{a}$ , or $x = \frac{b}{a}$ .

## Big Idea 2

## Solving Proportions

When solving a proportion, you can take the cross products, then use properties of equality.

$$\frac{x - 3}{40} = \frac{4}{5}$$

Original proportion

$$5(x - 3) = 40 \cdot 4$$

Cross products property

$$5x - 15 = 160$$

Simplify.

$$5x = 175$$

Addition property of equality: Add 15 to each side.

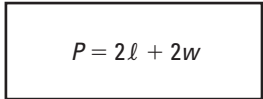
$$x = 35$$

Division property of equality: Divide each side by 5.

## Big Idea 3

## Rewriting Equations in Two or More Variables

If you have an equation in two or more variables, you can solve for one variable in terms of the others using properties of equality. For example, the formula for the perimeter  $P$  of a rectangle can be solved for the length  $\ell$ .

$$P = 2\ell + 2w$$


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Original formula

$$P - 2w = 2\ell$$

Subtraction property of equality:  
Subtract  $2w$  from each side.

$$\frac{P - 2w}{2} = \ell$$

Division property of equality:  
Divide each side by 2.