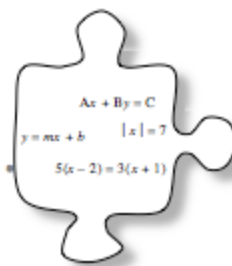


3.3.1 What if an equation has a product?

Solving Equations With Multiplication and Absolute Value



WARM UP. Review what you already know by multiplying each expression below. First decide if you will multiply each expression using the Distributive Property or using a generic rectangle. Remember to simplify your result.

a. $(6x - 11)(2x + 5)$

b. $-2x^2(15x^2 - 3t)$

c. $(6 - y)(y + 2)$

d. $16(3 - m)$

e. $(x + 5)(3x + 2)$

f. $-(3x - 9)$

NOTES to Self: What method do you prefer for simplifying these expressions? How is the first column different than the second column? What do you need to remember when using the distributive property?

REVIEW: Solving a Linear Equation

$$\begin{array}{lcl}
 3x - 2 + 4 = x - 6 & & \\
 3x + 2 = x - 6 & \text{combine like terms} & \\
 \underline{-x} \quad \quad \quad \underline{-x} & \text{subtract } x \text{ on both sides} & \\
 2x + 2 = -6 & & \\
 \underline{-2} \quad \quad \quad \underline{-2} & & \\
 \frac{2x}{2} = \frac{-8}{2} & \text{subtract 2 on both sides} & \\
 x = -4 & \text{divide both sides by 2} &
 \end{array}$$

WHAT STRATEGIES DO WE NEED?

Simplify. Combine like terms and “make zeros” on each side of the equation whenever possible.

Keep equations balanced. The equal sign in an equation indicates that the expressions on the left and right are balanced. Anything done to the equation must keep that balance.

Get x alone. Isolate the variable on one side of the equation and the constants on the other.

Undo operations. Use the fact that addition is the opposite of subtraction and that multiplication is the opposite of division to solve for x . For example, in the equation $2x = -8$, since the 2 and x are multiplied, dividing both sides by 2 will get x alone.

When we solve an algebraic equation we use the above strategies, writing down every step along the way. Fill in what is missing in the explanations and steps for the following equation.

$$28 - (6x - 4) = 3(10 - x)$$

Left expression	Right expression	Explanation
$28 - (6x - 8)$	$3(10 - x)$	Starting expression
$28 - 6x + 8$	$30 - 3x$	
		Combine like terms
36	$30 + 3x$	
		Take 30 from each side
2	x	

YOUR TURN: We have learned how to solve several different types of algebraic equations. As in the previous example, solve the equations below. Show all steps along the way as you **simplify, balance, undo operations** and **get the x alone**.

a. $3x + 13 = 43$	b. $x + 6 = 3x$
c. $-3 + 2x = -x + 6$	d. $2(y - 2) = -6$
e. $7x + 3 = 3x - 6 - 7x$	f. $5x - (x + 1) = 5 - 2x$

So you say you need a challenge! Go ahead -- Skip a, b, c & d. Try these ...

1. $5x^2 + 43 = (x - 1)(5x + 6)$
2. $(x + 3)(x + 4) = (x + 1)(x + 2)$
3. $2(x + 1) + 3 = 3(x - 1)$



ABSOLUTE VALUE EQUATIONS

Work with your team to solve each of these equations.
Find as many solutions to the following equations as you can.

a. $ x = 5$	b. $ x = 133$
c. $ x = -2$	d. $ x - 7 = 10$

Grand Finale: Solve $|3x - 5| = 16$. Work with your team to organize your work so that anyone could follow along to find both solutions.