# Today's Materials

- calculator
- pencil
- notebook
- glue

# Different Options for Solving One Equation

Lesson 10

| CCSS Standards: Addressing | • 7.EE.B.4.a |
| CCSS Standards: Building towards | • 7.EE.B.4.a |

# Let's think about which way is easier when we solve equations with parentheses!

# Today's Goals

❏ For an equation like $3(x + 2) = 15$, I can solve it in <u>two different ways</u>...

❏ For equations with more than one way to solve, I can choose the <u>easier</u> way depending on the numbers in the equation.

# Algebra Talk:
# **Solve Each Equation**

Warm Up

$100(x - 3) = 1{,}000$
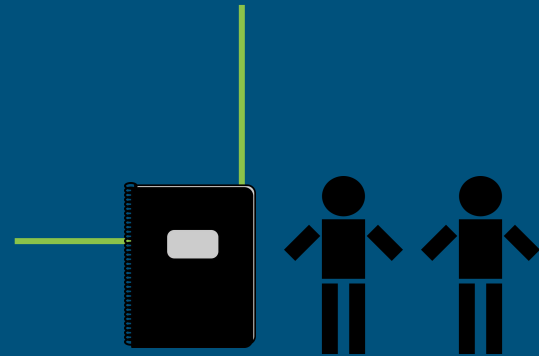
$500(x - 3) = 5{,}000$

$0.03(x - 3) = 0.3$

$0.72(x + 2) = 7.2$

$1/7\ (x + 2) = 10/7$

# Analyzing Solution Methods

Activity 1
- Think Pair Share

Three students each attempted to solve the equation $2(x - 9) = 10$, but got different solutions.

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Let's investigate their thinking.

## Do you agree with Noah?

Noah's method

$$2(x - 9) = 10$$

$$2(x - 9) + 9 = 10 + 9 \quad \text{add 9 to each side}$$

$$2x = 19$$

$$2x \div 2 = 19 \div 2 \quad \text{divide each side by 2}$$

$$x = \frac{19}{2}$$

I disagree with Noah because 2(x-9) + 9 is not 2x. Noah should distribute the 2 before adding a number to each side.

# Do you agree with Elena?

**Elena's method**

$$2(x - 9) = 10$$ apply the distributive property

$$2x - 18 = 10$$

$$2x - 18 - 18 = 10 - 18$$ subtract 18 from each side

$$2x = -8$$

$$2x \div 2 = -8 \div 2$$ divide each side by 2

$$x = -4$$

I disagree with Elena because 2x - 18 - 18 is 2x - 36, not 2x. Instead of subtracting 18, it would be better to add 18.

## Do you agree with Andre?

**Andre's method**

$$2(x - 9) = 10 \qquad \text{apply the distributive property}$$

$$2x - 18 = 10$$

$$2x - 18 + 18 = 10 + 18 \qquad \text{add 18 to each side}$$

$$2x = 28$$

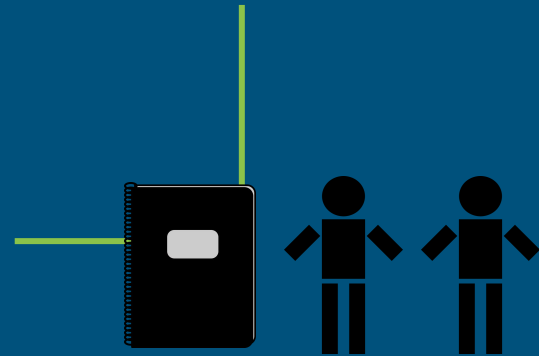$$2x \div 2 = 28 \div 2 \qquad \text{divide each side by 2}$$

$$x = 14$$

I agree with Andre. All of his moves are valid. 14 makes the original equation true when substituted for x.
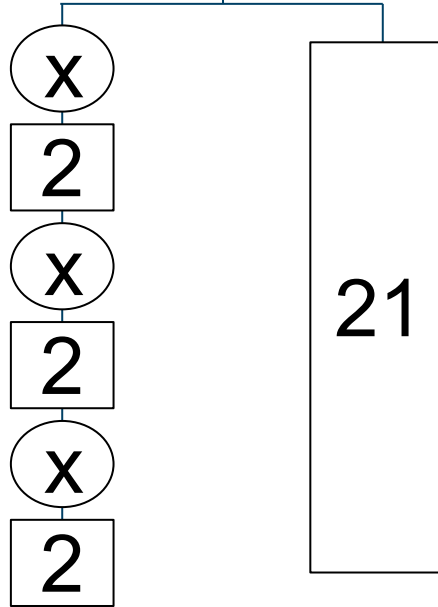
# Solution Pathways

Activity 2

# divide by 3 first

$3(x + 2) = 21$

# distribute the 3 first

$3(x + 2) = 21$

x
2
x
2
x
2

21

Work on the activity on the next slide, beginning on your own.

Check in with your team as you work. (5-10 min.)

For each equation, try to solve the equation using each method:

- dividing each side first
- applying the distributive property

Some equations are easier to solve by one method than the other…

When that's the case, stop doing the harder method and write down the reason you stopped!

$$2{,}000(x - 0.03) = 6{,}000$$

$$2(x + 1.25) = 3.5$$

$$\tfrac{1}{4}(4 + x) = 4/3$$

$$-10(x - 1.7) = -3$$

$$5.4 = 0.3(x + 8)$$

# Let's Check!

$2,000(x - 0.03) = 6,000$     x = 3.03

$2(x + 1.25) = 3.5$     x = 0.5

$\frac{1}{4}(4 + x) = 4/3$     x = 1⅓

$-10(x - 1.7) = -3$     x = 2

$5.4 = 0.3(x + 8)$     x = 10

What are the two main ways we can approach solving equations like the ones we saw today?

1. **divide first**
2. **distribute first**

# What kinds of things do we look for to decide which approach is better?

- **powers of ten**
- **operations that lead to whole numbers**
- **getting rid of fractions or decimals**

How can we check if our answer is a solution to the original equation?

**Substitute the answer for the variable to see if it makes the equation true!**

# Today's Goals

❏ For an equation like 3(x + 2) = 15, I can solve it in two different ways:

    ❏ by first dividing each side by 3

    ❏ by first rewriting 3(x + 2) using the distributive property

❏ For equations with more than one way to solve, I can choose the easier way depending on the numbers in the equation.

# Extra Practice

Let's keep practicing dividing or distributing first!

# Warm Up

# Find the solution. Divide or distribute first!

$$4(x + 5) = 25$$

# All Aboard the Math Train!

Each student will be assigned a problem.

You will need to become an "expert" at solving your problem.

You will be moving around from seat-to-seat today, solving these equations.

- Exchange cards with your new partner.

- Solve the new problem.

- If you're confused, the problem's "expert" is sitting in front of you.
(Use the questions on the back of the card to help your partner.)

- Collect  your card when both partners are finished. Wait to move to the next seat!