

Lesson 6: Solving All Types of Equations

Opening Exercise

Throughout this module you have been solving equations. In this lesson, you'll extend your understanding to include equations with fractions, while practicing with equations that have variables on both sides, using the distributive property and combining like terms. There are four stations for you to work through. In some you'll work with other students and in one you'll be on your own.

Station 1: Envelope Equations

Work with a partner.

You will need: two envelopes of expressions, recording handout

Choose one expression from each envelope and write an equation using both expressions, as shown below. Then solve the equation and check that the solution makes the equation true.

Expression from 1st envelope

=

Expression from 2nd envelope

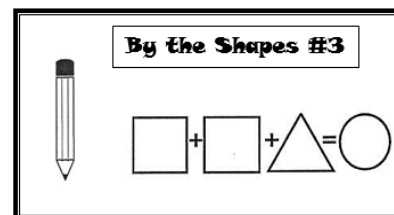
Station 2: By the Shapes

Work with a partner.

You will need: *By the Shapes* cards, recording handout

Use the four cards to determine the value of the shapes (circle, square, triangle) for each puzzle.

When you have finished one set of cards, move on to a different set. There are 8 sets altogether. Be sure to record your answers for each set.



Station 3: Connect Four

Work with a partner.

You will need: Chrome book, recording handout

This activity is similar to Connect Four, and is designed for two players. The goal is to have four pieces of the same color connected either horizontally, vertically, or diagonally. One player uses red pieces, while the other player uses blue pieces. To earn a piece, you need to correctly solve an algebraic equation.

Go to the Shodor Interactivate website at <http://www.shodor.org/interactivate/activities/AlgebraFour/>.

Choose a time limit, difficulty level and problem types. Do **not** choose quadratic for problem type. Then start the game.

Welcome to Algebra Four!
Choose settings and click "Start Game."

Time Limit: 20 seconds
Difficulty: Whole Numbers Only
Problem Type(s):
 Variable on Both Sides
 Distributive Property
 Quadratic
 Two-Step Problems
 One-Step Problems
 Start Game
 Shodor

Question Types
 - Whole Numbers Only -
 Variable on Both Sides
 Distributive Property
 Two-Step Problems
 One-Step Problems

Font Size
 Huge
 Large
 Normal

Solve
 $5x = 4x + 2$
 for x .

Player Red: Answer New Game

Answer to get piece.

Scoring: Active Show Score

Timer

Hit Ready when you are ready to start the timer. You'll see a problem to work on. Write your problem on your recording sheet and then solve it. Enter your answer in the space given. If you are correct you'll be able to choose a column for your token. If you aren't correct, then play goes to your partner.

Station 4: Puzzle It Out

Work alone.

You will need: Puzzle handout, scissors, tape or glue stick, recording handout

Cut apart the puzzle pieces and solve each equation given. Then match the equation to its solution. Tape or glue the puzzle pieces down on your recording sheet. One piece is already on the recording sheet for you.

$$\begin{array}{l} z = x \\ -28 = -4(x+8) \\ 3x - 6(3x-1) = -9 \end{array}$$

Where is the Error?

When you have finished all four stations, identify the error in each problem below. Then determine the correct solution.

<p>1.</p> $\frac{x}{4} + \frac{x}{8} = \frac{3}{8}$ $\frac{2x}{8} = \frac{3}{8}$ $2x = 3$ $x = \frac{3}{2}$ $8\left(\frac{x}{4}\right) + 8\left(\frac{x}{8}\right) = 8\left(\frac{3}{8}\right)$ $2x + x = 3$ $3x = 3$ $x = 1$	<p>2.</p> $\frac{2x}{5} + \frac{x}{2} = \frac{9}{5}$ $\frac{3x}{7} = \frac{9}{5}$ $3x = \frac{63}{5}$ $x = \frac{21}{5}$ $10\left(\frac{2x}{5}\right) + 10\left(\frac{x}{2}\right) = 10\left(\frac{9}{5}\right)$ $4x + 5x = 18$ $9x = 18$ $x = 2$
<p>3.</p> $-\frac{x}{2} + 1 = 7$ $-\frac{x}{2} = 6$ $-x = 3$ $x = -3$ $-x = 12$ $x = -12$	<p>4.</p> $\frac{2x-2}{4} - \frac{x}{4} = 1$ $2x-2-x=4$ $x-2=4$ $x=6$ $3x - 2 = 4$ $3x = 6$ $x = 2$

5. Jackson started to write up the steps to solve equations with one variable. Put Jackson's steps in the correct order and include any other steps you think are missing.

Isolate the variable.

Use the distributive property.

Substitute the value of the unknown into the original equation.

Combine like terms.

Clear all fractions by multiplying by the LCD.

Do the same operation to both sides of the equation.

Homework Problem Set

Solve each equation. Check your answers.

1. $r + 11 + 8r = 29$

2. $-10p + 9p = 12$

3. $18 = 3(3x - 6)$

4. $30 = -5(6n + 6)$

5. $37 = -3 + 5(x + 6)$

6. $-13 = 5(1 + 4m) - 2m$

7. $4(-x + 4) = 12$

8. $-2 = -(n - 8)$

9. $-6(1 - 5v) = 54$

10. $8 = 8v - 4(v + 8)$

11. $10(1+3b)=-20$

12. $-5n-8(1+7n)=-8$

13. $8(4k-4)=-5k-32$

14. $-8(-8x-6)=-6x-22$

15. $8(1+5x)+5=13+5x$

16. $-5(4x-2)=-2(3+6x)$

17. $n-\frac{4}{7}=3$

18. $\frac{26}{33}=-\frac{13}{11}x$

19. $\frac{39}{5}=2m$

20. $\frac{28}{3}=\frac{5}{3}n$