

Equations with variables on both sides of the equal sign

1. Check for parentheses and distribute if necessary
2. Combine like terms on each side of the equal sign
3. Bring variables over to one side of the equation (using addition or subtraction)
4. Bring numbers over to the other side of the equation (using addition or subtraction)
5. Divide both sides by the number in front of the variable


Let's do some examples:

$$\text{Ex 1: } 6x - 7 = x + 23$$

$$\text{Ex 2: } 4(5n - 7) = 10n + 2$$

OK, let's try one more (remember to use your checklist)

$$\text{Ex 3: } 4x + 5(7x - 3) = 9(x - 5)$$

SOLVING EQUATIONS WITH VARIABLES ON BOTH SIDES


To solve multi-step equations with variables on both sides.

Things to Remember:


First eliminate the variable from one side before beginning to solve.

Look at the equation *move* the smaller coefficient. Use INVERSE operations.

Exception- when there is only the variable and its coefficient on one side (ex. $7m - 12 = 3m$).

Practice Together

1. $8x - 13 = 6x + 7$



Check: (Plug In)

$$8x - 13 = 6x + 7$$


2. $2x = 14 - 5x$

Check: (Plug In)

$$2x = 14 - 5x$$

Independent Practice

1. $2n + 5 = 4n - 3$



Check: (Plug In)

$$2n + 5 = 4n - 3$$

2. $6m = 9 + 3m$

Check: (Plug In)

Independent Practice continued...

3. $7k - 4 = 5k + 16$

Check: (Plug In)

$$7k - 4 = 5k + 16$$

4. $6d = d + 15$

Check: (Plug In)

$$6d = d + 15$$

5. $5x - 7 = 4x + 3$

Check: (Plug In)

$$5x - 7 = 4x + 3$$

6. $4n - 8 = 18 + 2n$

Check: (Plug In)

$$4n - 8 = 18 + 2n$$

Name _____

Homework

11/26/18

Things to Remember:

eliminate the variable from one side before beginning to solve.

Look at the equation *move* the **smaller coefficient**. Use INVERSE operations.

****Exception-** when there is only the variable and its coefficient on one side (ex. $7m - 12 = 3m$).

1. $6q - 10 = 3q + 2$

Check: (Plug In)

$$6q - 10 = 3q + 2$$

2. $4p - 7 = 21 - 3p$

Check: (Plug In)

$$4p - 7 = 21 - 3p$$

3. $3n + 4 = 7n - 8$

Check: (Plug In)

$$3n + 4 = 7n - 8$$

4. $8r + 3 = 7r - 4$

Check: (Plug In)

$$8r + 3 = 7r - 4$$

On some equations you have to use the Addition Principle *twice* to get the x -terms on one side and the numbers on the other.

$$5x + 6 = 2x + 24$$

If I add $-2x$ to both sides I'll have just 24 on the right.

$$3x + 6 = 24$$

Now I can get rid of the 6 by adding -6 .

$$3x = 18$$

$$x = 6$$

1

$$10x + 5 = 6x + 49$$

2) $7x + 10 = 2x + 25$

3) $6x + 16 = 3x + 7$

4) $13x + 41 = 4x + 5$

5) $6x + 15 = 2x + 7$

6

6) $4x + 8 = 3x + 17$

7

7) $9x + 40 = 3x + 40$

8) $2a + 8 = 12 - 3a$

9

9) $8m - 15 = 7 - 3m$

10

10) $4y - 10 = 5 - y$

$$5a - 8 = 12$$

$$5a = 20$$

$$a = 4$$

11) $4t - 7 = 14 - 3t$

12

12) $4m - 7 = 18 - m$

13

13) $8y - 9 = 2 - 3y$

Day 3

Name _____ Date _____

Solving Equations – Combining like terms, variables on both sides

1) $4x + 8 + x = 28$	2) $y + 24 + 3y = 52$	3) $6a - 4 + a = 45$
4) $3x + 7 + x = 23$	5) $m + 24 + 5m = 42$	6) $5b - 4 + 3b = 36$
7) $8(a - 3) = 24$	8) $3(x + 4) = 36$	9) $2a + 3(2a + 5) = 31$
10) $6x + 4(3x - 5) = 16$	11) $4x - 7 = 2x + 13$	12) $4m - 7 = 6m + 9$
13) $9p + 8 = 6p - 19$	14) $10g - 22 = 8g - 14$	15) $3x + 5 + x = 17$
16) $8a - 7 = 3a + 13$	17) $\frac{5}{3}x - 7 = 8$	18) $\frac{3}{4}m - 5 = \frac{2}{3}m - 4$

Solving Equations With Variables on Both Sides

1. $5x + 6 = 2x - 9$

2. $15x = 3(x + 7)$

3. $7x + 8 = 4x + 17$

4. $4y - 13 = -12 + 5y$

5. $12 - n = 16 + 3n$

6. $8 - k = k + 4$

7. $4(x + 5) = 3(x - 2)$

8. $3y + 2(y + 2) = 3(y + 2)$

9. $7(x - 1) + 5 = 2(3 - 4x) + 7$

10. $2(2 - 3z) = 8 - 2(4z + 5)$

Proportions

Solve the following ratio for x.

$$\frac{x}{5} = \frac{4}{10} \longrightarrow \text{Take cross products and solve.} \longrightarrow \begin{array}{l} \cancel{x} \cdot 10 = \cancel{4} \cdot 5 \\ 5 \cdot 4 = 20 \\ x \cdot 10 = 10x \end{array}$$

$$10x = 20 \longrightarrow \frac{10x}{10} = \frac{20}{10} \longrightarrow x = 2$$

Solve.

1. $\frac{x}{30} = \frac{3}{10}$

8. $\frac{x}{5} = \frac{12}{6}$

2. $\frac{5}{15} = \frac{x}{9}$

9. $\frac{x-2}{8} = \frac{x}{4}$

3. $\frac{x}{15} = \frac{5}{75}$

10. $\frac{x}{6} = \frac{x-3}{12}$

4. $\frac{2}{x} = \frac{6}{30}$

11. $\frac{x}{3} = \frac{6}{9}$

5. $\frac{5+x}{10} = \frac{5}{2}$

12. $\frac{x+1}{7} = \frac{6}{14}$

6. $\frac{x-1}{10} = \frac{2}{5}$

13. $\frac{6}{x+5} = \frac{18}{24}$

7. $\frac{x}{20} = \frac{2}{10}$

14. $\frac{4}{x-3} = \frac{28}{49}$

Name : _____

Score : _____

Solving Proportions - Algebraic Expressions

L2S1

Solve each proportion.

1) $\frac{x-3}{4} = \frac{x}{2}$

2) $\frac{24+4y}{y} = \frac{11}{2}$

3) $\frac{6}{k} = \frac{9}{7+2k}$

4) $\frac{b}{b-10} = \frac{7}{9}$

5) $\frac{d-5}{d+4} = \frac{2}{3}$

6) $\frac{5}{26-3g} = \frac{1}{2g}$

7) $\frac{c}{7} = \frac{2+c}{21}$

8) $\frac{m-8}{5} = \frac{m-6}{6}$

Homework 11/28/18

Fractional Equations (Continued)

REMEMBER

When a fractional equation has only one fraction equal to another fraction, solve by cross-multiplying.

Example: Solve for x: $\frac{x}{6} = \frac{2}{3}$

$$\frac{x}{6} \times \frac{3}{3} = \frac{2}{3} \times \frac{3}{3}$$

$$3x = 12$$

$$\frac{3x}{3} = \frac{12}{3}$$

$$x = 4$$

<p>1. Solve for x:</p> $\frac{x}{12} = \frac{3}{4}$ <p>_____</p>	<p>6. Solve for a:</p> $\frac{a-2}{10} = \frac{3}{5}$ <p>_____</p>
<p>2. Solve for a:</p> $\frac{4}{5} = \frac{a}{15}$ <p>_____</p>	<p>7. Solve for y:</p> $\frac{2}{3} = \frac{y}{24}$ <p>_____</p>
<p>3. Solve for y:</p> $\frac{y+3}{6} = \frac{4}{3}$ <p>_____</p>	<p>8. Solve for x:</p> $\frac{5x+1}{8} = \frac{3}{4}$ <p>_____</p>
<p>4. Solve for x:</p> $\frac{8}{x} = \frac{16}{6}$ <p>_____</p>	<p>9. Solve for m:</p> $\frac{m}{21} = \frac{6}{7}$ <p>_____</p>
<p>5. Solve for x:</p> $\frac{12}{21} = \frac{4}{x}$ <p>_____</p>	<p>10. Solve for x:</p> $\frac{x+1}{3} = \frac{x+2}{4}$ <p>_____</p>