ALGEBRA

Summer Assignment 2017

Name:____________________

Due Date: Friday, August 18, 2017
Order of Operations

Objective: To evaluate expressions using the order of operations.

Example 1

Simplify $9 ÷ 3 + 4 \cdot 7 - 20 ÷ 5$

Solution

\[
\begin{align*}
3 + 4 \cdot 7 - 20 ÷ 5 & \quad \text{Divide 9 by 3.} \\
3 + 28 - 20 ÷ 5 & \quad \text{Multiply 4 and 7.} \\
3 + 28 - 4 & \quad \text{Divide 20 by 5.} \\
31 - 4 & \quad \text{Add 3 and 28.} \\
27 & \quad \text{Subtract 4 from 31.}
\end{align*}
\]

Example 2

Simplify $8 - [3 \cdot 4 - 5]$.

Solution $8 - [12 - 5]$

\[
\begin{align*}
8 - 7 & \quad \text{Simplify the innermost parentheses first.} \\
1 & \quad \text{Then the [ ] grouping.} \\
& \quad \text{Subtract.}
\end{align*}
\]

Find the value of each expression. Show ALL work.

1. $8 + [(16 - 6) ÷ 2]$

2. $16 - 3[9 - 2(5 - 3)]$

3. $[(4 + 8) ÷ 6] \cdot 3$

4. $(8 + 16) ÷ (12 - 9)$

5. $\frac{30}{3(5 - 3)}$

6. $14 \cdot [(15 - 7) ÷ 4]$
Evaluating Expressions

Objective: To evaluate an algebraic expression.

Example 1

Evaluate the expression \( c + b - 23 \) if \( c = 25 \) and \( b = 16 \).

Solution

\[
\begin{align*}
c + b - 23 & = 25 + 16 - 23 \\
& = 41 - 23 \\
& = 18
\end{align*}
\]

Substitute the given values for the variables. Simplify by adding 25 and 16. Subtract 23 from 41.

Example 2

Evaluate the expression \( 2x + (3y - z) + 7 \) if \( x = 5 \), \( y = 2 \), and \( z = 4 \).

Solution

\[
\begin{align*}
2x + (3y - z) + 7 & = 2 \cdot 5 + (3 \cdot 2 - 4) + 7 \\
& = 10 + 2 + 7 \\
& = 19
\end{align*}
\]

Substitute the given values. Simplify by multiplying inside parentheses first. Multiply 2 times 5 and subtract 4 from 6. Add.

Evaluate each expression if \( x = 2 \) and \( y = -3 \). Show ALL work.

1. \( 2x - y \)  
2. \( 3y - (2 - x) \)  
3. \( (7 + x)(y - 1) \)

Evaluate each expression if \( r = 6 \) and \( t = 8 \). Show ALL work.

4. \( (r - 4) + 2t \)  
5. \( [10 - (r + 3)] + 2t \)  
6. \( [3 \cdot (t + 1)] - r \)
Combining Like Terms

Objective: To simplify an algebraic expression by combining like terms.

Example 1

Simplify the expression $3x + 5 - 9 - x$.

Solution

$3x - x + 5 - 9$  Rewrite expression so that like terms are together.
$2x - 4$  Combine the like terms.

Example 2

Simplify the expression $6x - 15 - 4x - (-8)$.

Solution

$6x - 4x - 15 - (-8)$  Rewrite expression so that like terms are together.
$2x - 7$  Combine $6x - 4x$ and $-15 - (-8)$.

Simplify each expression. Show ALL work.

1. $7x + 5 + 2x$

2. $6 + 9x - 3$

3. $4y - 7y + 6$

4. $-8m + 3 + 10 + 3m$

5. $-7w - 6k + 4w$

6. $-11g + 8h - 3g - 7h$

7. $-14b + 7y - 5b - 10y$

8. $6x - 15 - 4x - (-8)$

9. $-2m + 9 - 4m - 13$
Distributive Property

Objective: To simplify an algebraic expression by using the distributive property

Example 1

Simplify the expression $2(x + 3)$.

Solution

$2(x + 3)$  Distribute the 2 by multiplying it by the $x$ and 3.

$2x + 6$

Example 2

Simplify the expression $3(2x + y - 1)$.

Solution

$3(2x + y - 1)$  Distribute the 3 by multiplying it by $2x$, $y$, and $-1$.

$6x + 3y - 3$

Simplify each expression. Show ALL work.

1. $2(x + 4)$

2. $-3(x + 5)$

3. $2(3x - 6)$

4. $8(5 - 4x)$

5. $-7(1 + 4x)$

6. $5(3x - 10)$

7. $-4(x + y - 8)$

8. $2(-x + 2y - 11)$

9. $\frac{1}{2}(x + 4)$
# Solving Two Step Equations

**Objective:** To solve equations using two transformations.

## Example 1

a. Solve for $x$.

\[
2x + 8 = 14
\]

\[
2x + 8 - 8 = 14 - 8 \quad \text{Subtract 8 from both sides}
\]

\[
2x = 6
\]

\[
\frac{2x}{2} = \frac{6}{2} \quad \text{Divide by 2 on both sides}
\]

\[
x = 3
\]

b. Solve for $x$.

\[
\frac{x}{5} - 3 = -6
\]

\[
\frac{x}{5} - 3 + 3 = -6 + 3 \quad \text{Add 3 to both sides}
\]

\[
\frac{x}{5} = -3
\]

\[
5 \cdot \frac{x}{5} = -3 \cdot 5 \quad \text{Multiply by 5 on both sides}
\]

\[
x = -15
\]

Solve for $x$. Circle your final answer. Show ALL work.

1. \[2x + 4 = 12\]

2. \[-3x + 8 = -4\]

3. \[15 = -x - 7\]

4. \[5x - 4 = 21\]

5. \[-8 = \frac{x}{2} + 3\]

6. \[\frac{x}{5} - 3 = 10\]

7. \[\frac{x}{4} + 5 = 16\]

8. \[6x + 8 = 5\]

9. \[\frac{2}{3}x - 1 = 11\]
Two Step Inequalities & Graphing

Objective: To solve an inequality and graph the solution on a number line.

Example 1
Solve for \(3x + 6 \leq 15\) and graph the solution on a number line.

Solution
\[
\begin{align*}
3x + 6 & \leq 15 \\
-6 & \quad -6 \\
\frac{3x}{3} & \leq \frac{9}{3} \\
x & \leq 3
\end{align*}
\]

Subtract 6 from both sides.
Divide both sides by 3.
Plot a solid dot on 3 and shade everything less than 3 or to the left of 3.

Reminder:
\(\leq\) use a solid dot.
\(<\) use an open dot.

Example 2
Solve for \(-3x - 2 < 10\) and graph the solution on a number line.

Solution
\[
\begin{align*}
-3x - 2 & < 10 \\
+2 & \quad +2 \\
-3x & < 12 \\
\frac{-3x}{-3} & > \frac{12}{-3} \\
x & > -4
\end{align*}
\]

Add 2 to both sides.
Divide both sides by 3.
When you multiply or divide by a negative you must reverse the inequality symbol.
Plot an open dot on -4 and shade everything greater than -4 or to the right of -4.

Solve for \(x\) and graph the solution on the number line. Show ALL work.

1. \(\frac{x}{4} - 3 \leq 2\)
2. \(2 - 2x < -2\)
3. \(2x + 17 > 25\)
4. \(4 < 3x - 2\)
5. \(-5 - x \geq -3\)
6. \(-4 > \frac{x}{-3} + 1\)
Pythagorean Theorem

Objective: To find the missing side in a right triangle using Pythagorean Theorem

Steps: (Solving for a missing side in a right triangle)
1. Identify the legs and hypotenuse of the right triangle
2. Substitute the values into the formula $a^2 + b^2 = c^2$
3. Solve the equation for the missing side.

Example: (Finding a leg)
$$a^2 + 24^2 = 26^2$$
$$a^2 + 576 = 676$$
$$a^2 = 676 - 576$$
$$a^2 = 100$$
$$a = \sqrt{100}$$
$$a = 10$$

Example: (Finding the hypotenuse)
$$3^2 + 4^2 = c^2$$
$$9 + 16 = c^2$$
$$25 = c^2$$
$$\sqrt{25} = c^2$$
$$5 = c$$

Find the missing side in each of the following right triangles.

1.)

2.)

3.)

4.)
Real Number System

Objective: To understand and be able to classify numbers in the real number system.

Example:

Write all of the classifications that apply to the real number:

\(-4\) can be shown on a number line. It is real.

\(-4\) can be written as \(-\frac{4}{1}\) so it is rational.

Its decimal representation terminates: \(-4 = -4.0\).

\(-4\) is an integer.

\(-4\) is a negative integer. Stop.

There are no more subsets in the chart below negative integers.

\(-4\): real number, rational number, terminating decimal, integer

Write all of the classifications that apply to each real number:

1. \(-27\): ____________________________

2. \(\frac{1}{6}\): ____________________________

3. \(\sqrt{33}\): ____________________________

4. \(-6.8\): ____________________________

5. \(\sqrt{400}\): ____________________________