Resource Algebra/Algebra Support: Remote Learning Packet

Directions:

1. Sign up for the Resource Algebra/Algebra Support Google Classroom (class code: wkfkj3w; you should also have a link in your KIPP email!)

2. There are 8 total sections in this packet (about one section per day). Examples are given to remind you how to complete the problems. All problems packet must be completed in pencil on a separate sheet of notebook paper.

3. Answers to first five sections of this packet will be posted on Monday, 3/30/2020. Use the answers to check your work. Any errors found must be corrected.

If you need additional resources, you should use...

- The Google Classroom Page- we will be posting videos daily to help you complete the problems.
- Use other videos on Virtual Nerd and Khan Academy (try searching for the title of the lesson!)
- Reach out to Ms. Riley or Ms. Jones:
  
<table>
<thead>
<tr>
<th>Ms. Riley</th>
<th>Ms. Jones:</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="mailto:vriley@kippnashville.org">vriley@kippnashville.org</a></td>
<td><a href="mailto:mjoness@kippnashville.org">mjoness@kippnashville.org</a></td>
</tr>
<tr>
<td>(407) 674-9429</td>
<td>(774) 270-4217</td>
</tr>
</tbody>
</table>

- Attend virtual office hours for one-on-one real-time support
I. Order of Operations

1. Simplifying Numerical Expressions

Simplify each expression.

A

-4^2 + 24 ÷ 3 • 2
-4^2 + 24 ÷ 3 • 2
-16 + 24 ÷ 3 • 2
-16 + 8 • 2
-16 + 16
0

B

4\left[25 - (5 - 2)^2\right]
4\left[25 - (5 - 2)^2\right]
4\left[25 - 9\right]
4 \cdot 16
64

There are no grouping symbols.
There are two sets of grouping symbols.
Simplify powers. The exponent applies only to the 4.
Simplify powers within the brackets.
Divide.
Perform the operation in the innermost set.
Multiply.

Comprehension questions: part 1 (order of operations)

Answer each of the following questions on a separate sheet of paper.

<table>
<thead>
<tr>
<th>Order of Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluate each expression.</td>
</tr>
<tr>
<td>6^2 + 3 • 7 - 9</td>
</tr>
<tr>
<td>2 + 6(9 - 3^2) - 2</td>
</tr>
<tr>
<td>(\frac{8}{2} \times 3)</td>
</tr>
</tbody>
</table>
Find, correct the error below and explain the error below:
Incorrect work:

\[
\begin{align*}
4^2 - 2 \times 3 + 6 & \\
16 - 2 \times 3 + 6 & \\
16 - 6 + 6 & \\
16 - 12 & \\
4 &
\end{align*}
\]

II. Simplifying Expressions (Using the Distributive Property)

The Distributive Property is used with addition to simplify expressions.

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
<th>ALGEBRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>You can multiply a number by a sum or multiply each addend by the number and then add. The result is the same.</td>
<td>(3(4 + 8) = 3(4) + 3(8))</td>
<td>(a(b + c) = ab + ac)</td>
</tr>
</tbody>
</table>

Comprehension questions: part 2 (Simplifying Expressions Using the Distributive Property)

Answer each of the following questions on a separate sheet of paper.

<table>
<thead>
<tr>
<th>The Distributive Property</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Use the Distributive Property to rewrite each expression.</strong></td>
</tr>
<tr>
<td>(9(7 + 8))</td>
</tr>
</tbody>
</table>
Find, correct the error below and explain the error below:
Incorrect work:

Rachel solved the problem below. Her work and answer is in **bold**.
Simplify the expression: **5(2x – 6)**

\[ 10x - 6 \]
III. Simplifying Expressions (Combining Like Terms)

The **terms** of an expression are the parts to be added or subtracted. **Like terms** are terms that contain the same variables raised to the same powers. Constants are also like terms.

A **coefficient** is a number that is multiplied by a variable. Like terms can have different coefficients. A variable written without a coefficient has a coefficient of 1.

**Comprehension questions: part 3 (Simplifying expressions by combining like terms)**

Answer each of the following questions on a separate sheet of paper.

<table>
<thead>
<tr>
<th>Combining Like Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combine like terms to simplify each expression</td>
</tr>
<tr>
<td>$7y + y + 8y$</td>
</tr>
</tbody>
</table>
### Simplify Each Expression

<table>
<thead>
<tr>
<th>Expression</th>
<th>Simplify Each Expression by First Distributing and Then Combining the Like Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>$3x^2 + 5x^2$</td>
<td>$8d + d$</td>
</tr>
<tr>
<td>$9(5 + t) - 6(t + 3)$</td>
<td>$4(r + 8) - 5(2r - 1)$</td>
</tr>
<tr>
<td>$a[2 + b(2 + c)]$</td>
<td>$7b[8 + 6(b - 1)]$</td>
</tr>
</tbody>
</table>

### IV. Simplifying Expressions (Using Properties of Exponents)

#### Zero and Negative Exponents

<table>
<thead>
<tr>
<th>Expression</th>
<th>Simplify.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$2^{-3}$</td>
<td>$2^{-3} = \frac{1}{2^3} = \frac{1}{2 \cdot 2 \cdot 2} = \frac{1}{8}$</td>
</tr>
<tr>
<td>$(−3)^{-4}$</td>
<td>$(-3)^{-4} = \frac{1}{(-3)^4} = \frac{1}{(-3)(-3)(-3)(-3)} = \frac{1}{81}$</td>
</tr>
<tr>
<td>$-3^{-4}$</td>
<td>$-3^{-4} = \frac{-1}{3^4} = \frac{-1}{3 \cdot 3 \cdot 3 \cdot 3} = \frac{-1}{81}$</td>
</tr>
</tbody>
</table>

**B** $5^0 = 1$  
*Any nonzero number raised to the zero power is 1.*
Finding Products of Powers

Simplify.

A \[2^5 \cdot 2^6\]
\[= 2^{5+6}\]
Since the powers have the same base, keep the base and add the exponents.

B \[4^2 \cdot 3^{-2} \cdot 4^5 \cdot 3^6\]
\[= 4^2 \cdot 3^{-2} \cdot 4^5 \cdot 3^6\]
Group powers with the same base together.

\[(4^2 \cdot 4^5) \cdot (3^{-2} \cdot 3^6)\]
Add the exponents of powers with the same base.

\[4^{2+5} \cdot 3^{-2+6}\]
\[= 4^7 \cdot 3^4\]

Finding Powers of Powers

Simplify.

A \[(7^4)^3\]
\[= 7^{4 \cdot 3}\]
Use the Power of a Power Property.
\[= 7^{12}\]
Simplify.

B \[(3^6)^0\]
\[= 3^{6 \cdot 0}\]
Use the Power of a Power Property.
\[= 3^0\]
Zero multiplied by any number is zero.
\[= 1\]
Any number raised to the zero power is 1.

Finding Powers of Products

Simplify.

A \[(-3x)^2\]
\[= (-3)^2 \cdot x^2\]
Use the Power of a Product Property.
\[= 9x^2\]
Simplify.

B \[(-3x)^2\]
\[= (-3^2 \cdot x^2)\]
Use the Power of a Product Property.
\[= (-9 \cdot x^2)\]
Simplify.

C \[(x^{-2} \cdot y^0)^3\]
\[= (x^{-2})^3 \cdot (y^0)^3\]
Use the Power of a Product Property.
\[= x^{-2 \cdot 3} \cdot y^{0 \cdot 3}\]
Use the Power of a Power Property.
\[= x^{-6} \cdot y^0\]
Simplify.
\[= x^{-6} \cdot 1\]
Write \(y^0\) as 1.
\[= \frac{1}{x^6}\]
Write with a positive exponent.
### Comprehension questions: Part 4
(Simplifying Expressions Using properties of exponents)

Answer each of the following questions on a separate sheet of paper.

<table>
<thead>
<tr>
<th>Simplify.</th>
<th>$-7x^2(x^4)$</th>
<th>$\frac{1}{3}(2a^3b)(6b^3)$</th>
<th>$(-4x^5y)^2(-2x)^3$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{5^2}{5^5}$</td>
<td>$\frac{-2y^7}{14y^5}$</td>
<td>$\left(\frac{4p^4q^4}{3p^2q^2}\right)^3$</td>
<td></td>
</tr>
<tr>
<td>$\frac{p^{-8}}{p^3}$</td>
<td>$\frac{(-x^{-1}y)^0}{4w^{-1}y^2}$</td>
<td>$\frac{(-2mn^2)^{-3}}{4m^{-6}n^4}$</td>
<td></td>
</tr>
</tbody>
</table>
Identifying Functions

Give the domain and range of each relation. Tell whether the relation is a function. Explain.

### A

<table>
<thead>
<tr>
<th>Field Trip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students $x$</td>
</tr>
<tr>
<td>75</td>
</tr>
<tr>
<td>68</td>
</tr>
<tr>
<td>125</td>
</tr>
</tbody>
</table>

D: $\{75, 68, 125\}$
R: $\{2, 3\}$

Even though 2 appears twice in the table, it is written only once when writing the range.

This relation is a function. Each domain value is paired with exactly one range value.

### B

Use the arrows to determine which domain values correspond to each range value.

D: $\{7, 9, 12, 15\}$
R: $\{-7, -1, 0\}$

This relation is not a function. Each domain value does not have exactly one range value. The domain value 7 is paired with the range values $-1$ and 0.
Comprehension questions: Part 5

Identifying Functions

On a separate piece of paper: determine whether each relation is a function. Write yes if it is a function or no if it not a function. Be sure to explain your answer. Also identify the domain and range of each function.

\[
\begin{array}{c|c}
 x & y \\
-3 & 5 \\
-2 & -3 \\
1 & 3 \\
5 & -2 \\
\end{array}
\]

\[
\begin{array}{c|c}
 x & y \\
1 & 5 \\
-4 & -3 \\
7 & 6 \\
1 & -2 \\
\end{array}
\]

\[
\{(1, 4), (2, -2), (3, -6), (-6, 3), (-3, 6)\}
\]

\[
x = -2
\]

\[
y = 2
\]
VI. Solving Equations

Solve each equation.

A: \( x - 10 = 4 \)
\[
\begin{align*}
&x - 10 = 4 \\
&\quad + 10 + 10 \\
&x = 14
\end{align*}
\]

**Since 10 is subtracted from \( x \), add 10 to both sides to undo the subtraction.**

**Check**: \( x - 10 = 4 \)
\[
\begin{align*}
&\frac{14 - 10}{4} \\
&\quad 4 \checkmark
\end{align*}
\]

To check your solution, substitute 14 for \( x \) in the original equation.

Solve each equation. Check your answer.

A: \( x + 7 = 9 \)
\[
\begin{align*}
&x + 7 = 9 \\
&\quad - 7 - 7 \\
&x = 2
\end{align*}
\]

**Since 7 is added to \( x \), subtract 7 from both sides to undo the addition.**

**Check**: \( x + 7 = 9 \)
\[
\begin{align*}
&\frac{2 + 7}{9} \\
&\quad 9 \checkmark
\end{align*}
\]

To check your solution, substitute 2 for \( x \) in the original equation.

**Solving Equations by Adding the Opposite**

Solve \(-8 + b = 2\).
\[
\begin{align*}
&-8 + b = 2 \\
&\quad + 8 + 8 \\
&b = 10
\end{align*}
\]

**Since \(-8\) is added to \( b \), add 8 to both sides.**
Solving Equations by Using Division

Solve each equation. Check your answers.

A

\[ 7x = 56 \]

\[ \frac{7x}{7} = \frac{56}{7} \]

\[ x = 8 \]

Since \( x \) is multiplied by 7, divide both sides by 7 to undo the multiplication.

Check

\[ \frac{7x}{7} = \frac{56}{7} \]

\[ 7(8) \mid 56 \]

\[ 56 \mid 56 \checkmark \]

To check your solution, substitute 8 for \( x \) in the original equation.

Solving Two-Step Equations

Solve \( 10 = 6 - 2x \). Check your answer.

First \( x \) is multiplied by \(-2\). Then 6 is added.

\[ 10 = 6 - 2x \]

\[ -6 \]

\[ -6 \]

\[ 4 = -2x \]

Work backward: Subtract 6 from both sides.

Since \( x \) is multiplied by \(-2\), divide both sides by \(-2\) to undo the multiplication.

\[ 4 \]

\[ -2 = -2x \]

\[ -2 \]

\[ 2 = 1x \]

\[ -2 = x \]

Check

\[ 10 = 6 - 2x \]

\[ 10 \]

\[ 6 - 2(\overline{-2}) \]

\[ 10 \]

\[ 6 - (-4) \]

\[ 10 \mid 10 \checkmark \]
Solve each equation.

A  \[ 6x + 3 - 8x = 13 \]
\[ 6x + 3 - 8x = 13 \]
\[ 6x - 8x + 3 = 13 \]
\[ -2x + 3 = 13 \]
\[ -2x = 10 \]
\[ x = -5 \]

Use the Commutative Property of Addition.
Combine like terms.

Since 3 is added to \(-2x\), subtract 3 from both sides to undo the addition.

Since \(x\) is multiplied by \(-2\), divide both sides by \(-2\) to undo the multiplication.

B  \[ 9 = 6 - (x + 2) \]
\[ 9 = 6 + (-1)(x + 2) \]
\[ 9 = 6 + (-1)(x) + (-1)(2) \]
\[ 9 = 6 - x - 2 \]
\[ 9 = 6 - 2 - x \]
\[ 9 = 4 - x \]
\[ -4 \]
\[ 5 = -x \]
\[ 5 = \]
\[ -x \]
\[ -5 = x \]

Write subtraction as addition of the opposite.
Distribute \(-1\) on the right side.
Simplify.
Use the Commutative Property of Addition.
Combine like terms.

Since 4 is added to \(-x\), subtract 4 from both sides to undo the addition.

Since \(x\) is multiplied by \(-1\), divide both sides by \(-1\) to undo the multiplication.

B  \[ 5x - 2 = 3x + 4 \]
\[ 5x - 2 = 3x + 4 \]
\[ -3x \]
\[ 2x - 2 = 4 \]
\[ +2 \]
\[ 2x = 6 \]
\[ 2 \]
\[ x = 3 \]

To collect the variable terms on one side, subtract \(3x\) from both sides.

Since 2 is subtracted from \(2x\), add 2 to both sides to undo the subtraction.

Since \(x\) is multiplied by 2, divide both sides by 2 to undo the multiplication.
## Comprehension questions: Part 6 (solving Equations)

### Solving Equations

Solve the following equations. Show all of your work.

<table>
<thead>
<tr>
<th>Equation</th>
<th>Solve for</th>
<th>Equation</th>
<th>Solve for</th>
<th>Equation</th>
<th>Solve for</th>
<th>Equation</th>
<th>Solve for</th>
</tr>
</thead>
<tbody>
<tr>
<td>$2y = 8$</td>
<td>$y = 4$</td>
<td>$\frac{y}{3} = -9$</td>
<td>$y = -27$</td>
<td>$x + 6 = 12$</td>
<td>$x = 6$</td>
<td>$g - 8 = 21$</td>
<td>$g = 29$</td>
</tr>
<tr>
<td>$3(c - 2) = 21$</td>
<td>$c = 9$</td>
<td>$\frac{x}{5} - 9 = 14$</td>
<td>$x = 110$</td>
<td>$3x - 5x + 7 = 19$</td>
<td>$x = -2$</td>
<td>$-4d + 15 = 3d - 13$</td>
<td>$d = 5$</td>
</tr>
<tr>
<td>$4b + 2 = 3b$</td>
<td>$b = 2$</td>
<td>$2(y + 6) = 3y$</td>
<td>$y = 12$</td>
<td>$2k - 5 = 3(1 - 2k)$</td>
<td>$k = -1$</td>
<td>$3x + 15 - 9 = 2(x + 2)$</td>
<td>$x = 4$</td>
</tr>
<tr>
<td>$28 = 8x + 12 - 7x$</td>
<td>$x = 4$</td>
<td>$4t + 7 - t = 19$</td>
<td>$t = 4$</td>
<td>$15y + 31 = 61$</td>
<td>$y = 2$</td>
<td>$15 = \frac{a}{3} - 2$</td>
<td>$a = 51$</td>
</tr>
</tbody>
</table>
VII. Multiplying Binomials

To find the product, add all of the terms inside the rectangle by combining like terms and simplifying if necessary.

\[
10x^3 + 6x^2 + 50x^2 + 30x - 30x - 18 = 10x^3 + 56x^2 - 18
\]

Answer each of the following questions on a separate sheet of paper.

\[(x + 1)(x - 1)\] \[(x + 1)(x - 2)\] \[(x - 1)(x + 3)\]

\[(x + 4)(x - 1)\] \[(x - 5)(x + 1)\] \[(x + 6)(x - 1)\]

\[(x + 1)(x - 7)\] \[(x - 8)(x + 1)\] \[(x + 1)(x - 9)\]

\[(2x - 1)(2x - 1)\] \[(2x - 1)(2x - 2)\] \[(2x - 1)(3x - 3)\]

\[(2x - 4)(4x - 1)\] \[(2x - 5)(5x - 1)\] \[(2x - 6)(6x - 1)\]

\[(2x - 1)(7x - 7)\] \[(2x - 8)(8x - 1)\] \[(2x - 1)(9x - 9)\]

\[(9x - 2)(2x - 2)\] \[(8x - 2)(2x - 3)\] \[(7x - 2)(2x - 4)\]
VIII. Graphing Lines

Using Slope-Intercept Form to Graph

Write each equation in slope-intercept form. Then graph the line described by the equation.

A  \[ y = 4x - 3 \]

\[ y = 4x - 3 \] is in the form \[ y = mx + b. \]

slope: \( m = 4 = \frac{4}{1} \)

\( y \)-intercept: \( b = -3 \)

Step 1  Plot \((0, -3)\).
Step 2  Count 4 units up and 1 unit right and plot another point.
Step 3  Draw the line connecting the two points.

B  \[ y = -\frac{2}{3}x + 2 \]

\[ y = -\frac{2}{3}x + 2 \] is in the form \[ y = mx + b. \]

slope: \( m = -\frac{2}{3} = -\frac{2}{3} \)

\( y \)-intercept: \( b = 2 \)

Step 1  Plot \((0, 2)\)
Step 2  Count 2 units down and 3 units right and plot another point.
Step 3  Draw the line connecting the two points.

Answer each of the following questions on a separate sheet of paper. If you have the ability to print, you might want to print this section.