You will study students’ solutions to algebra equations. You should:

1. Describe each student’s solution to your partner and finish labeling their steps.
2. Talk about the answers to the questions and then write your final answers.
3. Sometimes you will solve a problem using one of the student’s ways.

Sometimes, you will solve some problems on your own.
Alex solved two different problems using the **distribute-first** way. Complete the step labels in the blank spaces provided below.

<table>
<thead>
<tr>
<th>Alex’s <strong>distribute-first</strong> way:</th>
<th>Alex’s <strong>distribute-first</strong> way:</th>
</tr>
</thead>
<tbody>
<tr>
<td>$2(x - 3) = 8$</td>
<td>$4(x + 2) = 12$</td>
</tr>
<tr>
<td>$2x - 6 = 8$</td>
<td>$4x + 8 = 12$</td>
</tr>
<tr>
<td>$2x = 14$</td>
<td>$4x = 4$</td>
</tr>
<tr>
<td>$x = 7$</td>
<td>$x = 1$</td>
</tr>
</tbody>
</table>

**Distributed 2**  
**Added _________ on Both**  
**Divided by _________ on Both**  
**Distributed 4**  
**Subtracted _________ on Both**  
**Divided by _________ on Both**

1. How do you know that Alex solved both problems correctly?

2. On the second step, why did Alex add on both sides in the first problem and subtract on both sides in the second problem?

GP1. **Solve** the following equation using Alex’s **distribute-first** way.

$$6(x - 2) = 18$$
3. Describe one way the two equations Alex solved are the same, and one way they are different.

Same:

Different:

4. Describe 2 ways that Alex’s solution steps are similar on the two problems.

(1)

(2)
SOLVE THESE PROBLEMS BY YOURSELF. Be sure to show your work. 
Next, check your answers with your partner. Last, raise your hand so a teacher can check your work.

\[ 24 = 4(x - 1) \quad \quad \quad 5(x + 3) = 60 \]
Alex’s **distribute-first** way:

<table>
<thead>
<tr>
<th>Equation</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>$3(n - 10) = 33$</td>
<td>$3n - 30 = 33$</td>
</tr>
<tr>
<td>$3n = 63$</td>
<td>$3n = 63$</td>
</tr>
<tr>
<td>$n = 21$</td>
<td>$n = 21$</td>
</tr>
</tbody>
</table>

**Distributed** on Both

**Added** on Both

**Divided by** on Both

Alex’s **distribute-first** way:

<table>
<thead>
<tr>
<th>Equation</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>$3(t - 1) + 3(t - 1) = 30$</td>
<td>$3t - 3 + 3t - 3 = 30$</td>
</tr>
<tr>
<td>$6t - 6 = 30$</td>
<td>$6t = 36$</td>
</tr>
<tr>
<td>$t = 6$</td>
<td>$t = 6$</td>
</tr>
</tbody>
</table>

**Combined 3t’s and 3’s**

**Added** on Both

**Divided by** on Both

5. Why can Alex use the same first step on both problems?

6. Is Alex’s way a good way to solve both problems? **Circle one:**

YES

NO

Explain your reasoning:
Alex’s **distribute-first** way:

\[
2(m + 3) + 2(m + 3) = 48 \\
2m + 6 + 2m + 6 = 48 \quad \text{Distributed} \quad \underline{_______} \\
4m + 12 = 48 \quad \text{Combined} \quad \underline{_______} \\
4m = 36 \quad \text{Subtracted} \quad \underline{_______} \quad \text{on Both} \\
m = 9 \quad \text{Divided by} \quad \underline{_______} \quad \text{on Both}
\]

Alex’s **distribute-first** way:

\[
\frac{1}{4}(x + 8) = 5 \\
\frac{1}{4}x + 2 = 5 \quad \text{Distributed} \quad \underline{_______} \\
\frac{1}{4}x = 3 \quad \text{Subtracted} \quad \underline{_______} \quad \text{on Both} \\
x = 12 \quad \text{Multiplied by} \quad \underline{_______} \quad \text{on Both}
\]

7. To solve \(4(y + 5) + 6(y + 4) = 42\), would Alex’s **distribute-first** step work? **Explain your reasoning:**

8. Why might you choose Alex’s way to solve this problem?

GP2. **Solve** the following equation using Alex’s **distribute-first** way.

\[
4(h + 2) + 3(h + 2) = 70
\]
SOLVE THESE PROBLEMS BY YOURSELF. Be sure to show your work. Next, check your answers with your partner. Last, raise your hand so a teacher can check your work.

\[
\begin{align*}
10 &= 2(x - 3) \\
12 &= 2(x - 4) + 2(x - 4) \\
7(x + 1) + 3(x + 1) &= 40 \\
6(f + 5) &= 120
\end{align*}
\]
PLEASE STOP HERE AND WAIT UNTIL DAY 2

Fill this part out tomorrow:

Do you have the same partner as yesterday? Please circle one. **YES or NO.**

If not, please write your new partner’s name here: ________________________________
These two students solved the same problem in two different ways. Complete the step labels in the blank spaces provided below.

**Alex’s distribute-first way:**

<table>
<thead>
<tr>
<th>Step</th>
<th>Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>7(x – 2) = 21</td>
<td>7x – 14 = 21</td>
</tr>
<tr>
<td>7x = 35</td>
<td>Added _______ on Both</td>
</tr>
<tr>
<td>x = 5</td>
<td>Divided by _______ on Both</td>
</tr>
</tbody>
</table>

**Morgan’s multiply/divide-first way:**

<table>
<thead>
<tr>
<th>Step</th>
<th>Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>7(x – 2) = 21</td>
<td>x – 2 = 3</td>
</tr>
<tr>
<td>x = 5</td>
<td>Added _______ on Both</td>
</tr>
</tbody>
</table>

9. Alex and Morgan divided both sides by 7, but in different steps. Why is the divide step OK to do in either step?

10. _______________________'s way is better on this problem because:

GP3. To solve 5(x + 3) = 25, do you want to use Alex’s **distribute-first** way or Morgan’s **multiply/divide-first** way?

**Circle One:** Alex  Morgan  

Now, solve it using your chosen way.

\[ 5(x + 3) = 25 \]
CIDE Day 2

<table>
<thead>
<tr>
<th>Alex’s <strong>distribute-first</strong> way:</th>
<th>Morgan’s <strong>multiply/divide-first</strong> way:</th>
</tr>
</thead>
<tbody>
<tr>
<td>$4(x + 5) = 8$</td>
<td>$4(x + 5) = 8$</td>
</tr>
<tr>
<td>$4x + 20 = 8$</td>
<td>$x + 5 = 2$</td>
</tr>
<tr>
<td>Distributed _________</td>
<td>$x = -3$</td>
</tr>
<tr>
<td>$4x = -12$</td>
<td>$x + 5 = 2$</td>
</tr>
<tr>
<td>Subtracted _________ on Both</td>
<td>$x = -3$</td>
</tr>
<tr>
<td>$x = -3$</td>
<td>Divided by _________ on Both</td>
</tr>
</tbody>
</table>

11. Describe 2 ways that these two students’ solution steps are different.

(1)

(2)

12. On a timed test, I would rather use ________________________’s way because:
CIDE Day 2

<table>
<thead>
<tr>
<th>Morgan’s multiply/divide-first way:</th>
<th>Alex’s distribute-first way:</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ \frac{1}{2}(b + 4) = 6 ]</td>
<td>[ \frac{1}{2}(b + 4) = 6 ]</td>
</tr>
<tr>
<td>[ b + 4 = 12 ]</td>
<td>[ \frac{1}{2}b + 2 = 6 ]</td>
</tr>
<tr>
<td>[ b = 8 ]</td>
<td>[ \frac{1}{2}b = 4 ]</td>
</tr>
</tbody>
</table>

13. Both students multiplied by the reciprocal of \( \frac{1}{2} \), which is 2. You could also say they divided both sides by \( \frac{1}{2} \). Explain why:

14. Describe 2 ways that these two students’ solution steps are similar.
   
   (1) 

   (2) 

GP4. To solve \( \frac{1}{3}(x - 6) = 4 \), do you want to use Morgan’s multiply/divide-first way or Alex’s distribute-first way? 

Circle One: Morgan Alex 

Now, solve it using your chosen way. 

\[ \frac{1}{3}(x - 6) = 4 \]
SOLVE THESE PROBLEMS BY YOURSELF. Be sure to show your work. Next, check your answers with your partner. Last, raise your hand so a teacher can check your work.

\[
\frac{1}{6}(x + 6) = 2 \quad \text{and} \quad 4 = 2(n + 5)
\]
Alex’s **distribute-first** way:

\[2(m + 7) + 4(m + 7) = 18\]

\[2m + 14 + 4m + 28 = 18\]

\[6m + 42 = 18\]

\[6m = -24\]

\[m = -4\]

Morgan’s **combine-then-divide** way:

\[2(m + 7) + 4(m + 7) = 18\]

\[2m + 14 + 4m + 28 = 18\]

\[6m + 42 = 18\]

\[m = -4\]

15. Describe one way the students’ **solution steps** are the same, and one way they are different.

Same:

Different:

16. What must be true about an equation for Morgan’s way to be easier than Alex’s way?

GP5. To solve \(3(y + 5) + 2(y + 5) = 55\), do you want to use Alex’s **distribute-first** way or Morgan’s **combine-then-divide** way?

**Circle One:** Alex  Morgan  

Now, solve it using your chosen way.

\[3(y + 5) + 2(y + 5) = 55\]
Morgan’s **combine-then-divide** way:

<table>
<thead>
<tr>
<th>Expression</th>
<th>Combined</th>
<th>Divided by</th>
<th>Added</th>
</tr>
</thead>
<tbody>
<tr>
<td>$24 = 3(h - 2) + 5(h - 2)$</td>
<td>$24 = 8(h - 2)$</td>
<td>$3 = h - 2$</td>
<td>$5 = h$</td>
</tr>
</tbody>
</table>

Alex’s **distribute-first** way:

<table>
<thead>
<tr>
<th>Expression</th>
<th>Distributed</th>
<th>Combined</th>
<th>Added</th>
<th>Divided by</th>
</tr>
</thead>
<tbody>
<tr>
<td>$24 = 3(h - 2) + 5(h - 2)$</td>
<td>$24 = 3h - 6 + 5h - 10$</td>
<td>$24 = 8h - 16$</td>
<td>$40 = 8h$</td>
<td>$5 = h$</td>
</tr>
</tbody>
</table>

17. Why might you choose Morgan’s way to solve this problem?

18. If the problem was $8(j + 2) + 4(j + 8) = 12$, you could not use Morgan’s way. **Explain why:**
SOLVE THESE PROBLEMS BY YOURSELF. Be sure to show your work. Next, check your answers with your partner. Last, raise your hand so a teacher can check your work.

\[
\begin{align*}
\frac{1}{5}(x + 15) &= 1 \\
5(y + 8) &= 30 \\
2(y + 6) + 3(y + 6) &= 25 \\
5(b - 3) + 2(b - 3) &= 35
\end{align*}
\]