Module 4: Equations and Inequalities
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Meeting Students’ Needs

Differentiation
Tiered Tasks
Small Group Instruction

Big Ideas

Equality and Inequality

The Equal Sign

Solving of Equations

Study of Equations

Step-by-Step
Big Ideas
The Equal Sign

$8 + 4 = \square + 5$

True/False Sentences
$5 + 2 = 7$
$8 = 10 - 1$

$10 - 3 = 11 - 4$
$9 + 5 = 0 + 14$
$8 + 4 = \square + 5$
(a)

\[ (3 \times 9) + 5 \quad \text{Tilt!} \quad 6 \times 8 \]

\[ (3 \times 9) + 5 < 6 \times 8 \]

**Balance!**

\[ (3 \times 4) + 2 \quad \text{2} \times 7 \]

\[ (3 \times 4) + 2 = 2 \times 7 \]

\[ \frac{455 + 197}{460 + 192} \]

Can you determine whether the expressions balance without doing the addition?

\[ \frac{5 \times 72}{(4 + 9) \times 3} \]

Can you determine whether the expressions balance without doing the multiplication?
True/False Sentences

$5 + 2 = 7$

$8 = 10 - 1$
True/False Sentences

5 + 2 = 7
8 = 10 - 1

10 - 3 = 11 - 4
9 + 5 = 0 + 14
(a)

\[ 4 - 6x \quad \quad \quad \quad 3(1 + x) \]

Subtract 4 from both sides and multiply right-hand expression.

\[ -6x \quad \quad \quad \quad 3 + 3x - 4 \]

Subtract 3x from both sides.

\[ -9x \quad \quad \quad \quad -1 \]

Divide both sides by -9.

\[ x \quad \quad \quad \quad \frac{1}{9} \]

Check:

\[ 4 - \frac{6}{9} \quad \quad \quad \quad 3(1 + \frac{1}{9}) \]

Both sides = \(3 \frac{1}{3}\).
Meaning of Variables

As unknown values

1. 🏈 + ⚽ = 1.25 pounds
2. 🏈 + ⚽ = 1.35 pounds
3. 🏈 + 😼 = 1.9 pounds

As quantities that vary
This unknown value is 1.25 pounds.

1. $\text{baseball} + \text{football} = 1.25 \text{ pounds}$

2. $\text{baseball} + \text{soccer ball} = 1.35 \text{ pounds}$

3. $\text{soccer ball} + \text{football} = 1.9 \text{ pounds}$
Equations and Inequalities

Nan rode the roller coaster 8 times, which was twice as many times as she rode the Ferris wheel. **_______**

<table>
<thead>
<tr>
<th>WHO</th>
<th>NUMBER OF BOXES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nan</td>
<td>4 + M</td>
</tr>
<tr>
<td>Masa</td>
<td>M</td>
</tr>
</tbody>
</table>
\[
\begin{array}{ccccc}
  x & x & x & x & x \\
  25 &  &  &  & 3 \\
\end{array}
\]
Nan rode the roller coaster 8 times, which was twice as many times as she rode the Ferris wheel.
<table>
<thead>
<tr>
<th>WHO</th>
<th>NUMBER OF BOXES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sean</td>
<td>$4 + M$</td>
</tr>
<tr>
<td>Marta</td>
<td>$M$</td>
</tr>
</tbody>
</table>
Systems of Equations

One bowl and two cups have a mass of 700 grams. Two bowls and one cup have a mass of 800 grams. Find the mass of a bowl and the mass of a cup.

At a school bake sale, a total of 40 cupcakes and muffins were sold. The total number of cupcakes sold was four more than twice the number of muffins. How many cupcakes and muffins were sold at the bake sale?
Systems of Equations

One bowl and two cups have a mass of 700 grams. Two bowls and one cup have a mass of 800 grams. Find the mass of a bowl and the mass of a cup.
\[
\frac{b+c}{700} = \frac{b+c}{800}
\]
\[
\begin{align*}
\frac{\text{bCc}}{700} & \quad \frac{\text{bCc}}{800} \\
\frac{\text{bCc}}{700} & \\
3c &= 600
\end{align*}
\]
\[
\frac{1800}{700} \quad \frac{1800}{800}
\]

\[3c = 600\]

\[c = 200\]
\[
\frac{bxc}{700} \quad \frac{bxc}{800} \\
\frac{bcc}{700} \quad \frac{3c = 600}{c = 200}
\]
\[
\begin{align*}
\frac{b\times c}{700} &= \frac{b\times c}{800} \\
\frac{b\times c}{700} &= \frac{3c}{600} = \frac{c}{200} \\
\frac{b\times c}{700} &= \frac{b\times c}{300}
\end{align*}
\]
\[ b + 2c = 700 \]
\[ 2b + c = 800 \]
\[2(b + 2c = 700)\]
\[-1(2b + c = 800)\]
\[2(b + 2c = 700)\]
\[-1(2b + c = 800)\]
\[2b + 3c = 1400\]
\[-2b - c = -800\]
2(b + 2c = 700)
-1(2b + c = 800)

2b + 4c = 1400
-2b - c = -800

3c = 600
\[ \begin{align*}
2(b + 2c &= 700) \\
-1(2b + c &= 800) \\
2b + 4c &= 1400 \\
-2b - c &= -800 \\
\underline{3c &= 600} \\
\underline{c &= 200}
\end{align*} \]
At a school bake sale, a total of 40 cupcakes and muffins were sold. The total number of cupcakes sold was four more than twice the number of muffins. How many cupcakes and muffins were sold at the bake sale?
labels

\[
\begin{array}{c|c}
C & \text{mm} + 4 \\
\hline
m & m \\
\end{array}
\]

40
\[ \begin{array}{l}
\text{labels} \\
C \left| \begin{array}{c}
\text{mm}^2 + 4 \\
3m + 4 = 40 \\
3m = 36 \\
m = 12
\end{array} \right|
\end{array} \]
c + m = 40
2m + 4 = c
C + m = 40
2m + 4 = c
2m + 4 + m = 40
\[ c + m = 40 \]
\[ 2m + 4 = c \]
\[ 2m + 4 + m = 40 \]
\[ 3m + 4 = 40 \]
\[ 3m = 36 \]
\[ m = 12 \]
\[ c + m = 40 \]
\[ 2m + 4 = c \]
\[ 2m + 4 + m = 40 \]
\[ 3m + 4 = 40 \]
\[ 3m = 36 \]
\[ m = 12 \]
\[ c + 12 = 40 \]
\[ c = 28 \]
Meeting Students' Needs

Differentiation

C-R-A: Concrete-Representational-Abstract
Allow students their own time to build their understanding. They will be in different places of understanding which is normal. It is okay for students to remain in the representational stage for an extended period until they are ready to move to abstract thinking.

Tiered Tasks

Tier 1: Solve for x, x + y = z
Tier 2: Solve for y, x(y + z) = a
Tier 3: Solve for x, x + y/z = a

Small Group Instruction
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Tier 2: Solve for y, $x(y + z) = a$
Tier 3: Solve for x, $x + y/z = a$

Small Group Instruction
Tiered Tasks

Tier 1: Solve for $x$, $x + y = z$

Tier 2: Solve for $y$, $x(y + z) = a$

Tier 3: Solve for $x$, $x + y/z = a$
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Tier 1: Solve for x, x + y = z
Tier 2: Solve for y, x(y +z) = a
Tier 3: Solve for x, x + y/z =a

Small Group Instruction
Option 1 - 45 minutes

30 students, 4 groups

- Monday- whole group lesson, mini-lesson, student-centered work session
- Tuesday- small group rotations
- Wednesday- small group rotations
- Thursday- Formative assessment, whole group lesson
- Friday- Common formative assessment
Option 2- 60 minutes

30+ students, 4 groups

- Monday- whole group, mini-lesson, student-centered, independent practice

- Tuesday- small group rotation

- Wednesday- small group rotation

- Thursday- Formative assessment, whole group lesson

- Friday- Common formative assessment