MODELING ADDITION AND SUBTRACTION OF INTEGERS

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WELCOME!

Who is in the room?
NC.6.NS.9

Apply and extend previous understandings of numbers to the system of rational numbers.

Apply and extend previous understandings of addition and subtraction.

- Describe situations in which opposite quantities combine to make 0.
- Understand $p + q$ as the number located a distance $q$ from $p$, in the positive or negative direction depending on the sign of $q$. Show that a number and its additive inverse create a zero pair.
- Understand subtraction of integers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two integers on the number line is the absolute value of their difference.
- Use models to add and subtract integers from -20 to 20 and describe real-world contexts using sums and differences.
The standard addresses adding and subtracting integers. Students add and subtract integers between -20 and 20, using models. **Rules are not expected at this grade level.** When derived from a real-world problem, students describe the sum or difference in context. These problems may require multiple steps.
Interpret integers as having both a distance and a direction.

While students are required to understand addition and subtraction of integers using number lines, students may use and interpret other models to find sums and differences or to demonstrate an understanding of the concepts of this standard. Students may start using physical models, such as algebra tiles and integer chips. By the end of the year, students should move to visual models, such as number lines.
NC.7.NS.1

Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers, using the properties of operations, and describing real-world contexts using sums and differences.
Students understand that the properties of operations learned with whole numbers in elementary apply to rational numbers. Those properties include the identity, commutative and associative properties. Students rewrite subtraction as addition to apply properties as needed. Students apply their knowledge of addition and subtraction of rational numbers to describe real-world contexts and develop a process, their own rules, to add and subtract rational numbers.

Great opportunity to allow students to use SMP8: Look for and express regularity in repeated reasoning.
Students are expected to create examples in which a number and the opposite of that number combine to make zero. Students describe these numbers as an additive inverse of each other and recognize that together they make a zero pair.
ADDITION OF INTEGERS
Modeling with Number Lines
Which One Doesn’t Belong?

1. 

2. 

3. 

4. 

Source: Openupresources.org Grade 7, Unit 5, Lesson 2
Adding Integers on the Number Line

\[-4 + 6\]
Adding Integers on the Number Line

\[-4 + 6\]

When adding, start at zero and represent the first number.
Adding Integers on the Number Line

\[ -4 + 6 \]

The arrow for the second number begins where the first number ended. The answer is where the second arrow ends.
Write an Addition Sentence

\[-4 + (-5) = -9\]

\[3 + (-9) = -6\]
SUBTRACTION OF INTEGERS

Modeling with Number Lines
Two ways to think about subtraction:

• Take away

• Distance between two numbers.
Subtracting Integers on the Number Line

1. \(4 + 3 = 7\)
2. \(3 + 4 = 7\)
3. \(7 - 4 = 3\)
4. \(7 - 3 = 4\)

For subtraction:

1. \(-2 + 5 = 3\)
2. \(5 + (-2) = 3\)
3. \(3 - (-2) = 5\)
4. \(3 - 5 = -2\)

Adapted from Open Up Resources, Grade 7, Unit 5, Lesson 5
Subtracting Integers on the Number Line
Distance Between

4 + x = 7  or  7 – 4 = 3
Subtracting Integers on the Number Line
Distance Between

2 – (– 4) = ?
Subtracting Integers on the Number Line
Distance Between

\[ 4 - 8 = ? \]
Subtracting Integers on the Number Line
Distance Between

\[-5 - (-8) =\]
Subtracting Integers on the Number Line
Distance Between

\[-3 - 6 = ?\]
Subtracting Integers on the Number Line
Distance Between

What Do You Notice?

<table>
<thead>
<tr>
<th>Expression</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 – (–4)</td>
<td>6</td>
</tr>
<tr>
<td>2 + 4</td>
<td>6</td>
</tr>
<tr>
<td>4 – 8</td>
<td>–4</td>
</tr>
<tr>
<td>4 + (–8)</td>
<td>–4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Expression</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>–5 – (–8)</td>
<td>3</td>
</tr>
<tr>
<td>–5 + 8</td>
<td>3</td>
</tr>
<tr>
<td>–3 – 6</td>
<td>–9</td>
</tr>
<tr>
<td>–3 + (–6)</td>
<td>–9</td>
</tr>
</tbody>
</table>

Adapted from Open Up Resources, Grade 7, Unit 5, Lesson 5
Subtracting Integers on the Number Line – Take Away

\[ 2 - (-4) = ? \]

To take away negatives, move in a positive direction (right)
Subtracting Integers on the Number Line – Take Away

4 − 8 = ?

To take away positives, move in a negative direction (left)
Subtracting Integers on the Number Line – Take Away

\[ -3 - 6 = ? \]

To take away positives, move in a negative direction (left)
Subtracting Integers on the Number Line – Take Away

\[-5 - (-8) = ?\]

To take away negatives, move in a positive direction (right)
Addition of Integers

Use 11 chips to create a model with a value of 3.
SUBTRACTION OF INTEGERS
Modeling with Integer Chips
Modeling Subtraction – Take Away

\(-2 - (-5)\)

Represent the first number
Modeling Subtraction – Take Away

\[-2 - (-5)\]

Represent the first number

Represent the second number as zero pairs
Modeling Subtraction – Take Away

\[-2 -(-5)\]

Remove \(-5\)
Modeling Subtraction – Take Away

\[ -2 \ -(-5) \]

\[ -2 \ + \ 5 \]

Remove any zero pairs
Modeling Subtraction – Take Away

\[-2 -(-5)\]

Answer is 3
\[-2 \quad -(-5)\]

\[
\begin{array}{ccc}
  - & + & - \\
  - & + & - \\
  - & + & - \\
  + & - \\
  + & - \\
  + & - \\
\end{array}
\]
\[-2 - (-5)\]
\(-2 -(-5)\)

Remove any zero pairs
\[ -2 - (-5) \]

Answer
Your Turn

Model: 3 – 5
Modeling Subtraction – Take Away

3 – 5

Represent the first number
Modeling Subtraction – Take Away

3 – 5

Represent the first number

Represent the second number as zero pairs
Modeling Subtraction – Take Away

3 − 5

Remove 5
Modeling Subtraction – Take Away

3 – 5
3 + (–5)

Remove any zero pairs
Modeling Subtraction – Take Away

\[ 3 - 5 \]
\[ 3 + (-5) \]

Answer is \(-2\)
RESOURCES
SALUTE THE GENERAL
Beat Me to the Top
Beat Me to the Top
Number Pyramids
Number Pyramids
Use $-1$, $-2$, $-3$, $4$ and $5$ to fill in the borders.

<table>
<thead>
<tr>
<th>+</th>
<th></th>
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<th></th>
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<tbody>
<tr>
<td></td>
<td>2</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>10</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>4</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$-6$</td>
</tr>
</tbody>
</table>
Use $-1$, $-2$, $-3$, $4$ and $5$ to fill in the borders.

<table>
<thead>
<tr>
<th></th>
<th>+</th>
<th>4</th>
<th>−1</th>
<th>5</th>
<th>−2</th>
<th>−3</th>
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</thead>
<tbody>
<tr>
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<td>2</td>
<td>−3</td>
<td>3</td>
<td>−4</td>
<td>−5</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>9</td>
<td>4</td>
<td>10</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>−1</td>
<td>3</td>
<td>−2</td>
<td>4</td>
<td>−3</td>
<td>−4</td>
<td></td>
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<tr>
<td>4</td>
<td>8</td>
<td>3</td>
<td>9</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>−3</td>
<td>1</td>
<td>−4</td>
<td>2</td>
<td>−5</td>
<td>−6</td>
<td></td>
</tr>
</tbody>
</table>
Boxes
Game

-8 -3 11 12 -5 4 -19 -15
-9 -20 -8 -4 -15 -3 -3 -3
18 4 20 15 -19 16 6 10
-19 8 -3 16 -18 6 -6 9
-13 7 -12 -11 13 -9 -19 20

mathspad.co.uk
Integer Math Squares

Integer Two Way

Grayson Wheatley
## Lining Up Dominoes

<table>
<thead>
<tr>
<th>Start</th>
<th>-3 -7</th>
<th>-10</th>
<th>3 - (-2)</th>
<th>5</th>
<th>2 - 10</th>
<th>-8</th>
<th>0 - 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>-1 - (-1)</td>
<td>0</td>
<td>12 - 4</td>
<td>8</td>
<td>-1 - 1</td>
<td>-2</td>
<td>-4 - 1</td>
</tr>
<tr>
<td>-5</td>
<td>-3 - (-7)</td>
<td>4</td>
<td>6 - (-3)</td>
<td>9</td>
<td>0 - (-7)</td>
<td>7</td>
<td>8 - 9</td>
</tr>
<tr>
<td>-1</td>
<td>-4 - (-5)</td>
<td>1</td>
<td>12 - 10</td>
<td>2</td>
<td>-4 - (-7)</td>
<td>3</td>
<td>-6 - 1</td>
</tr>
<tr>
<td>-7</td>
<td>4 - (-2)</td>
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<td>1 - 4</td>
<td>-3</td>
<td>-6 - 5</td>
<td>-11</td>
<td>-7 - (-1)</td>
</tr>
<tr>
<td>-6</td>
<td>-9 - 3</td>
<td>-12</td>
<td>-11 - (-2)</td>
<td>-9</td>
<td>2 - (-8)</td>
<td>10</td>
<td>-4 - 9</td>
</tr>
<tr>
<td>-13</td>
<td>-1 - (-12)</td>
<td>11</td>
<td>4 - (-9)</td>
<td>13</td>
<td>6 - (-6)</td>
<td>12</td>
<td>End</td>
</tr>
</tbody>
</table>
QUESTIONS?
THANKS!

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