Expressions on two side-by-side Expression Mats can be compared to determine which expression is greater.

To compare two expressions, represent each expression using algebra tiles on its own Expression Mat. Simplify the expression on each Expression Mat by moving or removing tiles using “legal” moves:

- “Flip” tiles (change them from negative to positive and vice versa) and move them from the negative region to the positive region. That is, change subtraction to adding the opposite.
- Remove an equal number of opposite tiles (one shaded and one not shaded) that are within the same region. That is, remove the zero pairs.
- Group tiles that are alike within the same region together. That is, combine like terms.

Continue to make “legal” moves, in any order, until the expressions cannot be simplified any more.

- Remove tiles that are the same from both Expression Mats if necessary.

Compare the expression on the left with the one on the right to determine which expression is greater. If there are variable tiles remaining after simplifying, you do not have enough information to tell which side is greater—depending on what number the variable tile represents, either expression could be larger than the other.

**Example 1**

The Expression Comparison Mat at right represents the expressions \(-2x + (-3) + 1 - (-x + 3)\) and \(2 + (-3) - (x - 2)\). Use legal moves to simplify and determine which side is greater.

**Solution:**

Flip tiles and move them from the negative region to the positive region.

Solution continues on next page →
Remove an equal number of opposite tiles (one shaded and one not shaded) that are within the same region. Also remove the same tiles from both Expression Mats.

Students are also asked to record their steps. Different teachers have different expectations, but here are two possible ways to record the steps. The steps may also be done in a different order.

Recording the steps symbolically:

<table>
<thead>
<tr>
<th>Left Expression</th>
<th>Right Expression</th>
</tr>
</thead>
<tbody>
<tr>
<td>$-2x + 1 - 3 - (-x + 3)$</td>
<td>$2 - 3 - (x - 2)$</td>
</tr>
<tr>
<td>$-2x + 1 - 3 + x - 3$</td>
<td>$2 - 3 - x + 2$</td>
</tr>
<tr>
<td>$-x - 5$</td>
<td>$1 - x$</td>
</tr>
<tr>
<td>$-5$</td>
<td>$-(-x)$</td>
</tr>
</tbody>
</table>

Recording the steps with justifications:

<table>
<thead>
<tr>
<th>Left Expression</th>
<th>Right Expression</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>$-2x + 1 - 3 - (-x + 3)$</td>
<td>$2 - 3 - (x - 2)$</td>
<td>Starting expressions</td>
</tr>
<tr>
<td>$-2x + 1 - 3 + x - 3$</td>
<td>$2 - 3 - (x - 2)$</td>
<td>Flip $-x + 3$ from “-” to “+”</td>
</tr>
<tr>
<td>$-x - 5$</td>
<td>$2 - 3 - (x - 2)$</td>
<td>Combine like terms</td>
</tr>
<tr>
<td>$-x - 5$</td>
<td>$2 - 3 - x + 2$</td>
<td>Flip $x - 2$ from “-” to “+”</td>
</tr>
<tr>
<td>$-5$</td>
<td>$2 - 3 + 2$</td>
<td>Remove $-x$ from both sides</td>
</tr>
<tr>
<td>$-5$</td>
<td>$1$</td>
<td>Combine like terms</td>
</tr>
</tbody>
</table>
Example 2

Create the expressions $x + 1 - ( -1 - 2x )$ and $3 + x - 1 - (x - 4)$ and then use legal moves to simplify and determine which side is greater.

Since we do not know the value of $x$, it is not possible to determine the greater side.

Recording the steps with justifications:

<table>
<thead>
<tr>
<th>Left Expression</th>
<th>Right Expression</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>$x + 1 - ( -1 - 2x )$</td>
<td>$3 + x - 1 - (x - 4)$</td>
<td>Starting expressions</td>
</tr>
<tr>
<td>$x + 1 + 1 + 2x$</td>
<td>$3 + x - 1 - x + 4$</td>
<td>Flip from “−” to “+”</td>
</tr>
<tr>
<td>$3x + 2$</td>
<td>$6$</td>
<td>Combine like terms</td>
</tr>
<tr>
<td>$3x$</td>
<td>$4$</td>
<td>Remove 2 from both sides</td>
</tr>
</tbody>
</table>
Problems

Write a set of expressions for problem. Use legal moves to simplify and determine which expression greater. Carefully record your steps.

1. Which is greater?  
   Left: $\underline{\text{+}}$ $\underline{\text{+}}$ \hfill Right: $\underline{\text{+}}$ $\underline{\text{+}}$

   $\underline{x^2}$ $\underline{x^2}$ $\underline{x^2}$ $\underline{x^2}$

   Which is greater?

2. Which is greater?  
   Left: $\underline{\text{+}}$ $\underline{\text{+}}$ \hfill Right: $\underline{\text{+}}$ $\underline{\text{+}}$

   $\underline{x}$ $\underline{x}$ $\underline{x}$ $\underline{x}$

   Which is greater?

3. Which is greater?  
   Left: $\underline{\text{+}}$ $\underline{\text{+}}$ \hfill Right: $\underline{\text{+}}$ $\underline{\text{+}}$

   $\underline{x^2}$ $\underline{x}$$\underline{x^2}$ $\underline{x}$$\underline{x^2}$

   Which is greater?

4. Which is greater?  
   Left: $\underline{\text{+}}$ $\underline{\text{+}}$ \hfill Right: $\underline{\text{+}}$ $\underline{\text{+}}$

   $\underline{x}$ $\underline{x}$ $\underline{x}$ $\underline{x}$

   Which is greater?

In problems 5 through 10, record your steps as you use legal moves to simplify each expression and determine which expression has the greater value.

5. Which is greater: $6 - (2x - 4) - 3$ or $-x - (1 + x) + 4$?

6. Which is greater: $3x - (2 - x) + 1$ or $-5 + 4x + 3$?

7. Which is greater: $-1 + 6x - 2 + 4y - 2x$ or $y + 5x - (-2 + x) + 3y - 2$?

8. Which is greater: $x^2 - 2x + 6 - (-3x)$ or $-(3 - x^2) + 5 + 2x$?

9. Which is greater: $x + 2 - (2 - 2x)$ or $4 + x - 2 - (x - 4)$?

10. Which is greater: $2x + 4 - x - (-2) + x^2$ or $3 + x^2 + 4x - (-3 + 3x)$?

Answers (Expressions and explanations will vary.)

1. $-4 > -7$; left side is greater
2. $-5 < -1$; right side is greater
3. $x \not= 1$; not enough information
4. $4 > 3$; left side is greater
5. $7 > 3$; left side is greater
6. $-1 > -2$; left side is greater
7. $-3 < 0$; right side is greater
8. $4 > x$; not enough information
9. $3x \not= 6$; not enough information
10. $0 = 0$; both sides equal