

COMPARING QUANTITIES (ON AN EXPRESSION MAT) 2.1.5 – 2.1.8

Combining two Expression Mats into an Expression Comparison Mat creates a concrete model for simplifying (and later solving) inequalities and equations.

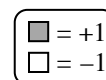
Tiles may be removed or moved on the mat in the following ways:

- (1) Removing the same number of opposite tiles (zeros) on the same side;
- (2) Removing an equal number of identical tiles (balanced set) from both the left and right sides;
- (3) Adding the same number of opposite tiles (zeros) on the same side; and
- (4) Adding an equal number of identical tiles (balanced set) to both the left and right sides.

These strategies are called “legal moves.”

After moving and simplifying the Expression Comparison Mat, students are asked to tell which side is greater. Sometimes it is only possible to tell which side is greater if you know possible values of the variable.

Example 1



Determine which side is greater by using legal moves to simplify.

Step 1: Remove balanced set

Left: Right:

Which is greater?

Step 2: Remove zeros

Left:

Right:

Which is greater?

Step 3: Remove balanced set

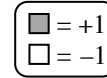
Left:

Right:

Which is greater?

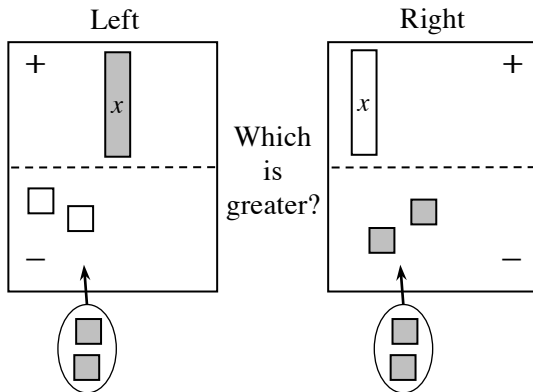
The left side is greater because after Step 3: $4 > 0$. Also, after Step 2: $6 > 2$. Note that this example shows only one of several possible strategies.

Example 2

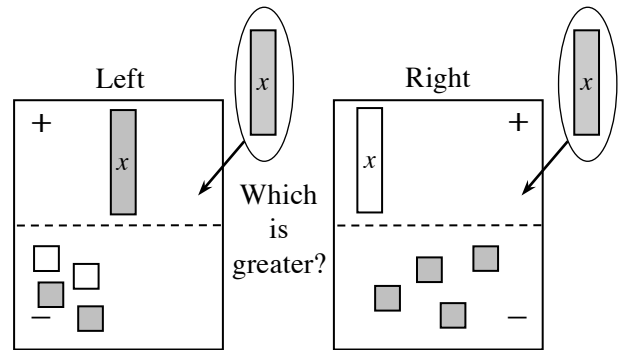


Use legal moves so that all the x -variables are on one side and all the unit tiles are on the other.

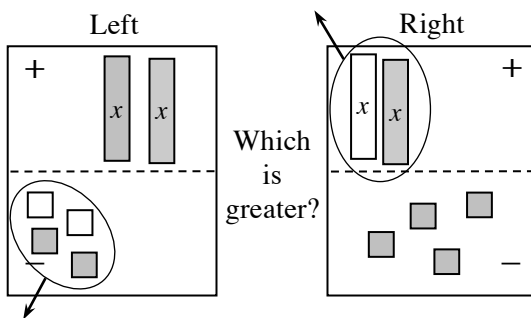
Step 1: Add balanced set



Step 2: Add balanced set



Step 3: Remove zeros

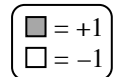


What remains is $2x$ on Mat A and -4 on Mat B. There are other possible arrangements.

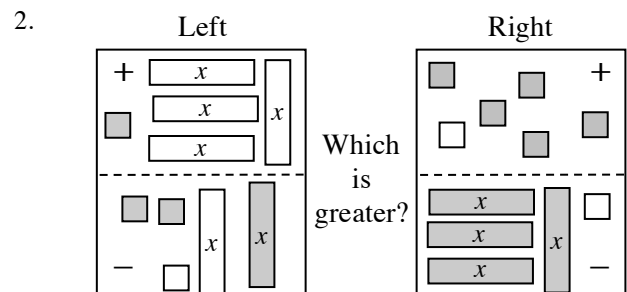
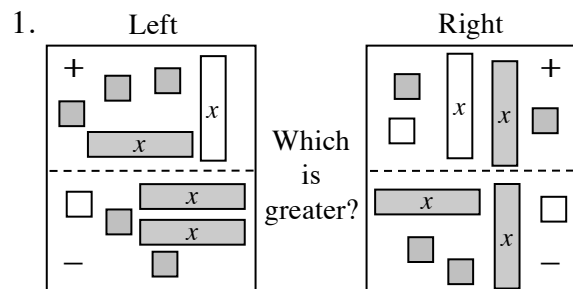
Whatever the arrangement, it is not possible to tell which side is greater because we do not know the value of “ x .” Students are expected to record the results algebraically as directed by the teacher. One possible recording is shown below.

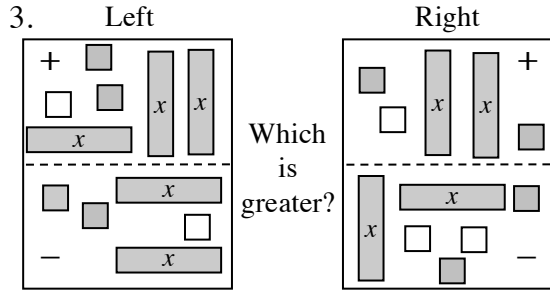
Left	Right
$x - (-2)$	$-x - (2)$
$x - (-2 + 2)$	$-x - (2 + 2)$
$x + x - (-2 + 2)$	$-x + x - (2 + 2)$
$2x$	4

Problems

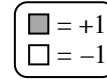


For each of the problems below, use the strategies of removing zeros or simplifying by removing balanced sets to determine which side is greater, if possible. Record your steps.





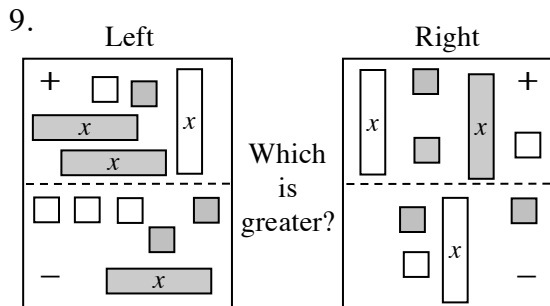
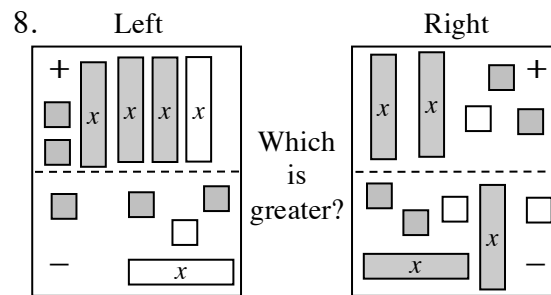
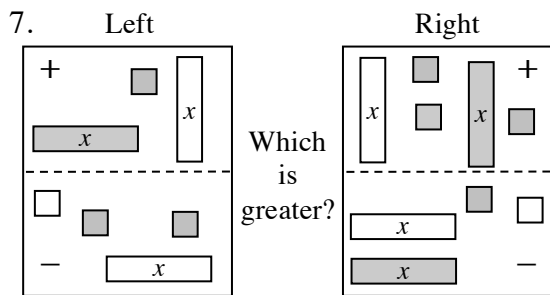
4. Left: $5 + (-8)$
Right: $-7 + 6$



5. Left: $2(x + 3) - 2$
Right: $4x - 2 - x + 4$

6. Left: $4 + (-2x) + 4x$
Right: $x^2 + 2x + 3 - x^2$

For each of the problems below, use the strategies of removing zeros or adding/removing balanced sets so that all the x -variables are on one side and the unit tiles are on the other. Record your steps.



10. Left: $3x - 2$
Right: $2x + 1$

11. Left: $4x + 2 + (-5)$
Right: $2x + 3 + (-8)$

12. Left: $2x + 3 + (-8)$
Right: $-x - 3$

Answers (Answers to problems 7 through 12 may vary.)

- | | | |
|-------------------|-------------------------|-------------------------|
| 1. left | 2. right | 3. not possible to tell |
| 4. right | 5. not possible to tell | 6. left |
| 7. A: x ; B: 3 | 8. A: $3x$; B: 1 | 9. A: 1; B: x |
| 10. A: x ; B: 3 | 11. A: $2x$; B: -2 | 12. A: $3x$; B: -6 |