A Balancing Act

Strand: Patterns, Functions, and Algebra

Topic: Exploring equality

Primary SOL: 3.17 The student will create equations to represent equivalent mathematical relationships.

Related SOL: 3.3, 3.4

Materials

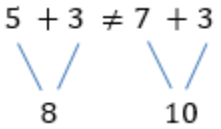
- Balance scale
- Two-color counters
- Balance Sort activity sheet (attached)
- Expression Cards activity sheet (attached)
- Equivalent Equation Mat (attached)
- Non-Equivalent Expressions Mat (attached)

Vocabulary

balanced, commutative property, equal, equation, expression, not equal

Student/Teacher Actions: What should students be doing? What should teachers be doing?

1. Have students explain the meaning of the equal sign. Then, display a balance scale, and ask how a balance scale can be used to demonstrate the meaning of the equal sign. Place a stack of three counters and then a stack of five more counters in one pan, and have students describe what the balance looks like. Record this on the board. Point out that because the two pans are not balanced, they are *not equal* in weight. Ask what will happen when you place five counters and then three more counters in the other pan. Record this step on the board. Ask, *"Will the scale be balanced?"* (Yes) Place the counters in the pan, and point out that the two pans are balanced—that is, they are *equal* in weight. Put the equal sign between the two equations. Explain that this is true because all counters weigh the same; it does not matter where they are placed. Ask students to explain exactly what this demonstration illustrates. (The commutative property of addition—the weight of 3 + 5 counters is *equal* to the weight of 5 + 3 counters, or 3 + 5 = 5 + 3.)
2. Ask: *"What if I put in three counters and then five more in one side and put four and one more in the other side" "Will they be equal?" "How do you know?"* Write the equations on the board with the equal sign between them.
3. Now demonstrate expressions that are not equal. Put five and three counters in one side of the balance and seven and three counters in the other side. Write each expression on the board as you place the counters in the tray. Have students explain why the sides are not balanced. Write the expression on the board with the not equal sign (≠) in between and show how they are not equal.



4. Distribute the Balance Sort activity sheet. Have students cut and sort the cards and justify their answers.
5. Engage students in a discussion about their findings through their sort. How did they determine equivalence?

Assessment

- **Questions**
  - What's the difference between an expression and an equation?
  - What would make the equation true?

    $2 \times ___ = 5 \times 4$
- **Journal/writing prompts (include a minimum of two)**
  - Write an expression on the line to make each statement true.

    $5 \times 6 = _____$

    $150 + 150 = _____$
  - Write an expression on the line to make each statement true.

    $5 \times 6 \neq _____$

    $150 + 150 \neq _____$
- **Other Assessments (include informal assessment ideas)**
  - The Expression Cards can be used for a variety of activities:
    - Cut cards apart and use to play a memory game. Put all cards face down in rows. Students turn over two cards to try to find equivalent equations.
    - Cut cards apart and player 1 draws two cards. Put them together to see whether they are equivalent. Place them on the correct mat. Player 2 takes a turn.
    - Have students take the blank cards at the bottom and create their own expressions.
    - Play Go Fish. Deal out three or four cards to each player and ask for a value.

Extensions and Connections (for all students)

- Have students create challenging equations that are equal.
- Search for apps that allow students to build equations and practice equality.

Strategies for Differentiation

- Some students will benefit from using a calculator for more difficult tasks.
- Challenge students to use various operations.

- Allow students to use the balance to test equations.
- Some students will need to start with a number balance.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

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Balance Sort

3 + 4 ___ 7 + 3	6 + 5 ___ 15 – 4
20 + 8 ___ 4 x 7	15 – 5 ___ 10 x 0
24 + 24 ___ 6 x 7	12 X 12 ___ 142 - 12
18 + 12 ___ 50 – 20	16 – 3 ___ 9 + 7
8 + 8 ___ 2 x 8	10 x 10 ___ 125 - 25
4 x 3 ___ 14 – 2	8 x 6 ___ 60 - 16
10 x 8 ___ 70 + 18	20 – 16 ___ 8 ÷ 2
100 ÷ 10 ___ 2 x 6	24 ÷ 6 ___ 3 x 8

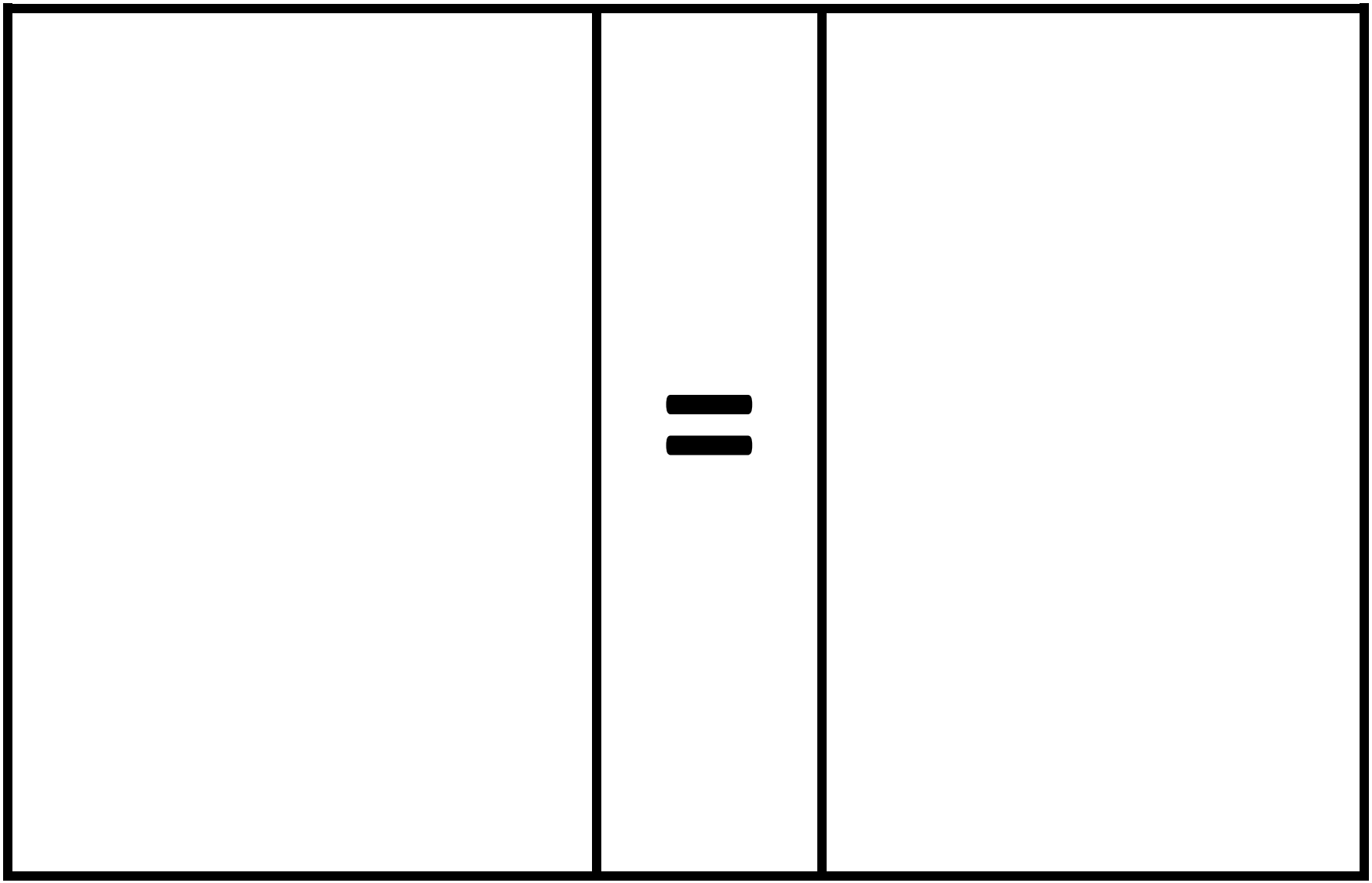
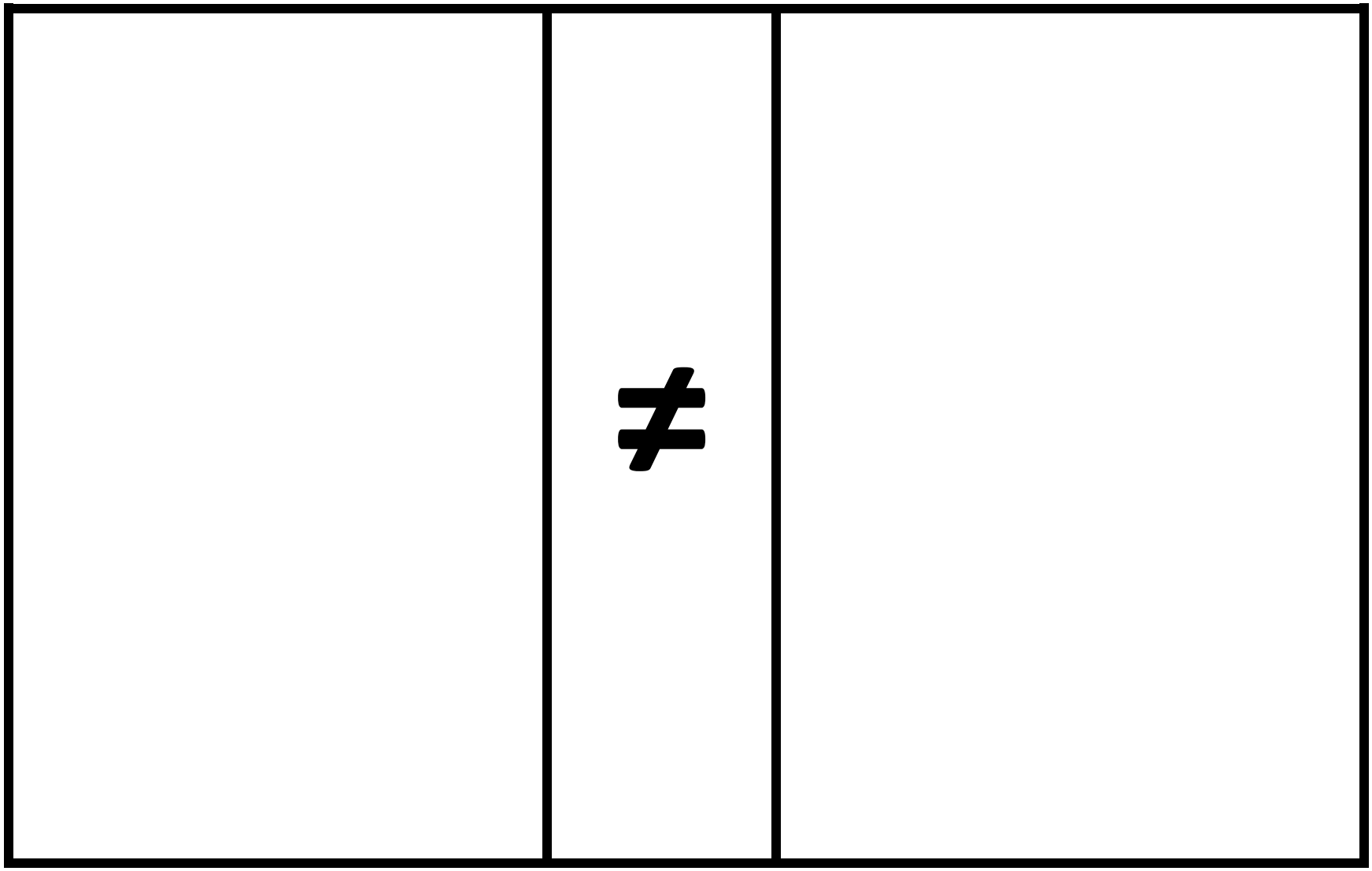
Equal =	**Not Equal ≠**

Expression Cards

200 + 356	**12 x 5**	**9 x 5**	**7 x 5**
25 + 75	**160 - 16**	**16 + 16**	**357 + 100**
457 + 100	**20 + 15**	**29 x 1**	**3 x 8**
12 + 12	**50 – 5**	**12 x 12**	**300 – 25**
657 - 100	**39 – 10**	**3 x 3**	**75 – 15**
125 + 150	**6 x 4**	**457 – 0**	**32 x 1**

150 – 50	**9 + 0**	**150 + 406**	**30 – 6**

Equivalent Equations Mat



Non-Equivalent Expressions Mat