Balancing Act

Strand: Patterns, Functions, & Algebra

Topic: Identifying equivalent and not equivalent quantities

Primary SOL: 2.17   The student will demonstrate an understanding of equality through the use of the equal symbol and the use of the not equal symbol.

Materials

- Balance scales
- Blue and green linking cubes
- Balancing Act: Equal or Not Equal? Activity sheet (attached)
- Balancing Act Card Set (attached)
- Scissors
- Balancing Act Work Mat (attached)
- Balancing Act Recording Sheet (attached)

Vocabulary

balance, equal, equality, equation, equivalent, not equivalent, number sentence, quantity, symbol, value

Student/Teacher Actions

1. To begin, display a balance scale, and ask students to explain its use. If students are unfamiliar with the balance scale, demonstrate how it is used to weigh objects by placing an equal number of linking cubes on each side. Allow students time to explore with the balance scale for a few minutes before doing the actual lesson.

2. Display Example 1 on the Balancing Act: Equal or Not Equal? Work mat. Choose a volunteer to come up and place the designated numbers of cubes on the balance scale to match the example. Ask whether the quantities of cubes on the two sides of the scale are equal/same as or not equal. In the space provided in the center of the diagram of the scale, write the correct symbol. Challenge the class to prove their answer in some way other than reading the scale. Possible explanations may include: "I know that 2 + 3 = 5, so there are 5 cubes on the left side. Since the right side is 5 + 2, I know there will be more than 5 cubes on the right, so the number of cubes on the two sides of the scale are not equal;" or "I know 2 + 3 = 5 and 5 + 2 = 7. Because 5 is smaller than 7, they are not equal." Record the equation to prove the answer.

3. Repeat this process for Example 2, using another volunteer.

4. Repeat this process with an additional example where the equal sign is in a different location (6 = 2 + 4).

5. Put students in small groups or pairs, and give each group a balance scale, a set of 10 blue and 10 green linking cubes, copies of the card set, a Balancing Act Work Mat, and the Balancing Act Recording Sheet (for each student). Have each group cut out, shuffle, and place the cards facedown. Then, have students take turns drawing two cards, placing one on one side of the work mat and the other on the other side. Students arrange the cubes

on the balance scale to determine whether the quantities written on the two cards are equal or not equal. Direct students to record all information from the work mat on their recording sheets by drawing the cubes on the scale and recording the equation or inequality* with the appropriate symbol to prove their answers. Instruct students to prove how they know that each pair of quantities is equivalent or not equivalent using numbers and symbols.

6. Review and summarize with the class what students did and learned in the activity. Have students share some of the proofs they wrote and any discoveries they made.

Note: Students are not expected to know the term "inequality."

Assessment
- **Questions**
  - How can someone determine whether two quantities are equal or not equal?
  - Were you able to predict whether two quantities were equal or not equal before placing the cubes on the balance scale? If so, how?
  - Why is it important to be able to determine whether values are equivalent or not equivalent?
  - Give at least one example of a time outside school when you would need to be able to determine whether values are equivalent or not equivalent.

- **Journal/writing prompts (include a minimum of two)**
  - Sam puts three green cubes and three blue cubes on one side of a balance scale. Draw a picture of the scale, and show what Sam could place on the other side to make the quantities equivalent. Explain how you know your solution will work, including an equation using the appropriate symbol. Are there any other solutions that will work?
  - Kyree puts nine green cubes and four blue cubes on one side of a balance scale. Draw a picture of the scale, and show what Kyree could place on the other side to make the quantities not equivalent. Explain how you know your solution will work, including an inequality using the appropriate symbol. Are there any other solutions that will work?

- **Other Assessments (include informal assessment ideas)**
  - Circulate as students are creating and recording their own equations and inequalities, and observe their strategies and rationales. Ask questions to determine whether students are absorbing the key points. Note who is having difficulty, and give help, as needed. Collect the papers as an assessment.
  - Create signal cards (green, yellow, and red) to check for understanding. Green means "I got it," yellow means "I'm not sure" or "Maybe," and red means "I'm lost. I need more help." Pause at different points in the activity and ask students to hold up their signal cards.

    o   Have the class form a circle to participate in a discussion. Have students take turns telling something that they learned and will remember, and why this discovery is important.

Extensions and Connections (for all students)

- Have students work in pairs to see whether they can make the scale balance using a bucket balance. The first student will place a known number of cubes plus a "mystery" number of cubes on one side of the bucket scale (e.g., 3 + __). The student will need to cover the bucket so that their partner cannot see the cubes inside. The partner must then use the scale and the known number of cubes placed to determine the "mystery" number.

- Have one partner create a number sentence, and have the other partner create a different number sentence equal to the one made by his/her partner.

- Explore the concepts of and the understandings behind the commutative property for addition and the identity property of addition using linking cubes and the balance scale.
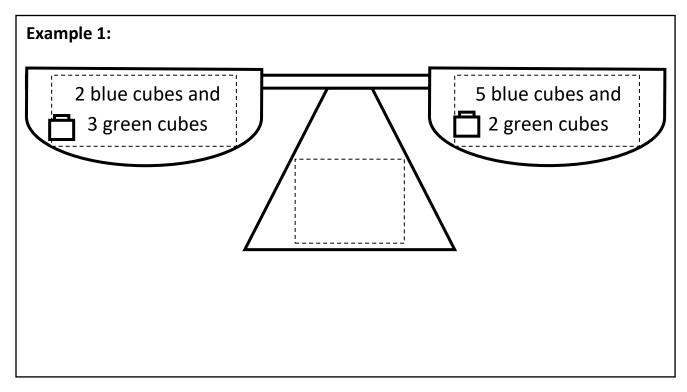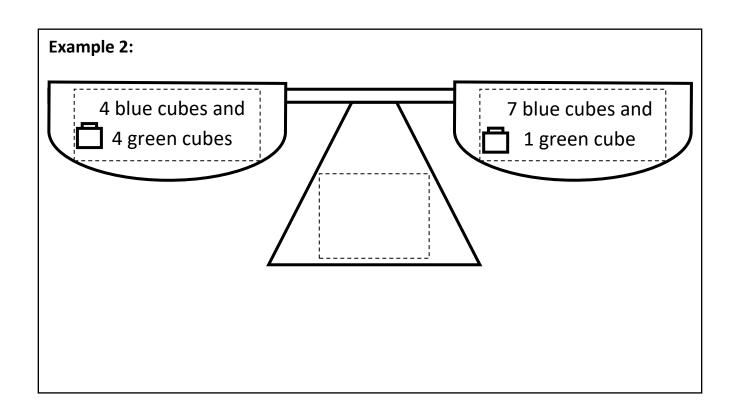
Strategies for Differentiation

- For a greater challenge, have students use weighted counters instead of connecting cubes.

- Allow students struggling to understand equal or not equal to connect the cubes on each side of the balance and compare them to each other, using one-to-one correspondence.

- Redirection and corrective feedback should be given throughout lesson.

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

Virginia Department of Education ©2018
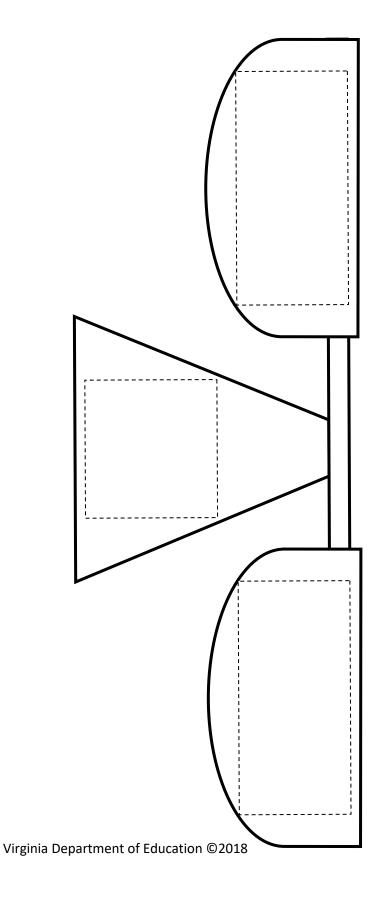
Balancing Act: Equal or Not Equal?

Example 1:

2 blue cubes and 3 green cubes

5 blue cubes and 2 green cubes

Example 2:

4 blue cubes and 4 green cubes

7 blue cubes and 1 green cube

Balancing Act Card Set

Cut cards apart on the dotted lines.

4 blue cubes and 6 green cubes	6 blue cubes and 4 green cubes	**Equal** **=**
2 blue cubes and 8 green cubes	8 blue cubes and 1 cube	**Not Equal**
5 blue cubes and 5 green cubes	4 blue cubes and 4 green cubes	
3 blue cubes and 7 green cubes	5 blue cubes and 2 green cubes	
6 blue cubes and 3 green cubes	0 blue cubes and 8 green cubes	
4 blue cubes and 3 green cubes	1 blue cube and 9 green cubes	

Balancing Act Work Mat

Balancing Act Recording Sheet

In each box below, record the information from your work mat, and prove each answer.