Balance Scales

Unit 6: Algebra

Grade Level

4

Overview

In this activity, students find an unknown quantity, explore the relationship between quantities, and enhance their understanding of the equal sign as equivalence and a balance point.

Key Standards

M4A1. Students will represent and interpret mathematical relationships in quantitative expressions.

b. Represent unknowns using symbols, such as □ and Δ .

c. Write and evaluate mathematical expressions using symbols and different values.

Possible Materials

- A piece of string or rope
- Dice
- Index Cards
- Markers or Crayons
- Bongo Balance Board (optional) (see photo to right)
- Pan Balance
- Internet access and projector
- Balance Activity Directions
- Balance Scales Easy Student Recording Sheet
- Balance Scales Moderate Student Recording Sheet
- Balance Scales Challenge Student Recording Sheet
- Try this Task Illuminations Balance Scale w. Numbers Student Recording Sheet
- Balance Scale Algebra Student Recording Sheet

Task

Engage

Demonstrate to students the concept of balance by trying to balance on a bongo board or similar demonstration activity.
Also, show students a pan balance and discuss how it is used.

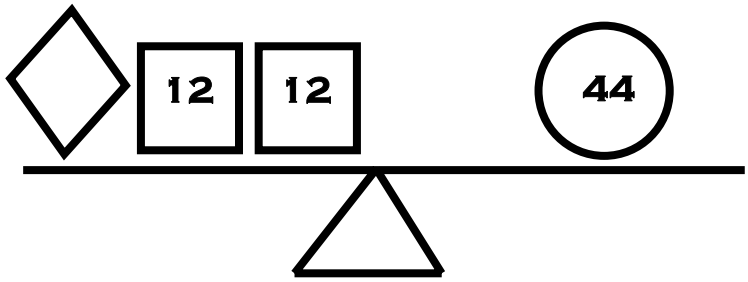
Explore

Whole Group: Show students NCTM's *Illuminations* web site using the "Pan Balance – Shapes (Fixed Values)." http://illuminations.nctm.org/ActivityDetail.aspx?ID=131 Have students work together to find the value of each shape through inductive reasoning.
Small Groups: Have students rotate through the following three groups.

Group 1: Students will work individually or in pairs to complete the "Try This!" student recording sheet. They will need to work on NCTM's *Illuminations* web site using the "Pan Balance – Numbers."
http://illuminations.nctm.org/ActivityDetail.aspx?ID=26

Group 2: Students will work to create balanced equations given a target number and following the order of operations. Directions and a grading rubric are on the "Balance Activity" student recording sheet.

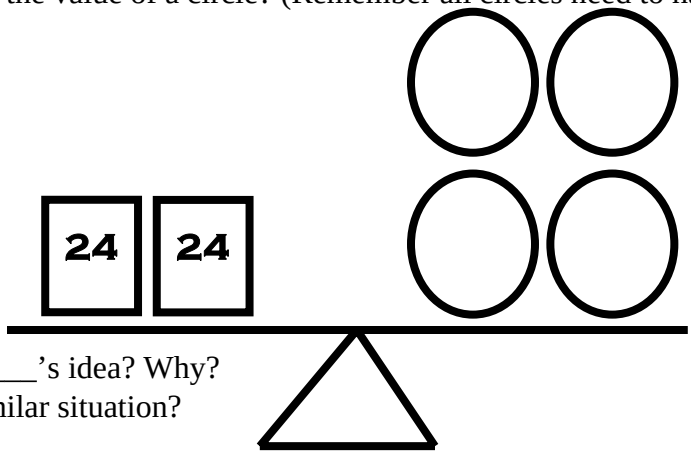
Group 3: Will work to complete missing value problems. The work can be individualized or students can work through all of the problems of increasing difficulty. All of the problems are on student recording sheets, "Balance Scales Easy," "Balance Scales Moderate," and "Balance Challenge." An example is below:



What is the missing number in the rhombus?
It would have to be 20 because 12 + 12 = 24; 24 + 20 = 44.
Students should be able to find the missing value or values as well as explain their thinking when finding a solution.

Sample Questions

Given the following balance, what is the value of a circle? (Remember all circles need to have the same value.)



Other Guiding Questions:

- How did you do it?
- Who has a different strategy?
- Do you agree or disagree with _____'s idea? Why?
- Will this strategy work in every similar situation?
- When will this strategy not work?
- How else could you find the missing value?

Sample Question Solutions

Each circle would be worth 12.
I know this because 24 + 24 = 48 and 48 ÷ 4 = 12.
Or
There are two circles for each square. If a square is worth 24, then a circle is worth half of 24 or 12.
Or
If the value of each square is divided by 2; 24 ÷ 2 = 12, I would have four 12s. Therefore each circle would have to be worth 12.

Assessment Ideas

Student progress can be assessed using the rubric attached to the "Balance Activity" directions. Additionally, student understanding can be assessed through discussion while students are working on the various activities. After the lesson, student work can be reviewed for common understanding and any misunderstandings students may have.