Do Critical Thinking Tasks and Models Improve Algebraic Reasoning? Absolutely!

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Description: Algebraic reasoning skills improve when students explore algebraic reasoning through solving critical thinking tasks and building models. Explore using weight puzzles, Venn diagram puzzles, and tiles to enable students to discover and prove the rules of equations and systems of equations for themselves.

** During the session, participants will solve additional examples and create puzzles together. This is meant to be an overview of the session.*

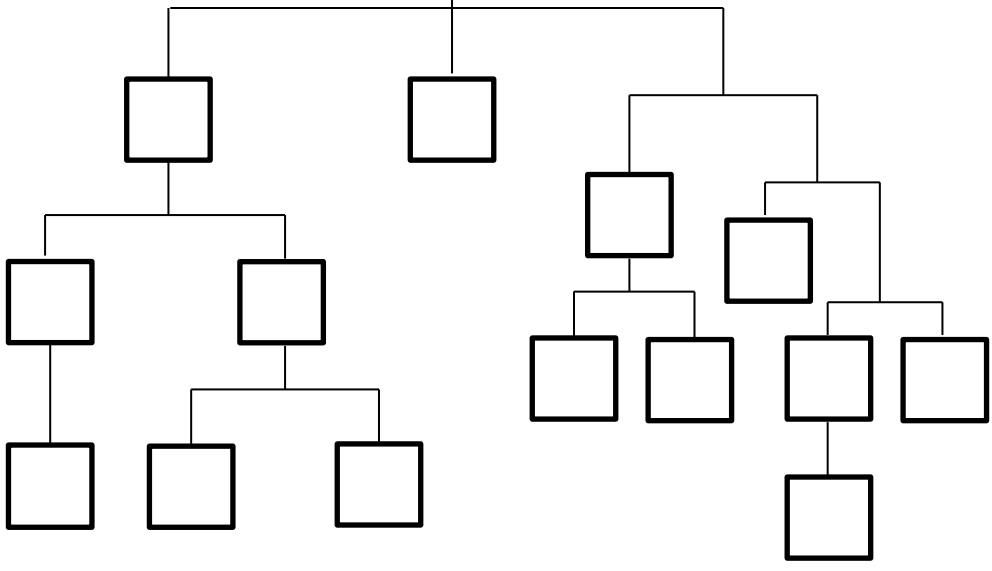
We will discuss the following types of puzzles.

- **Balance Puzzles**
  These puzzles build number sense and help students understand the concept of equations.
- **Weight Puzzles**
  These puzzles help students understand the concept of systems of equations by modeling elimination and substitution.
- **Venn Diagram Puzzles**
  These puzzles require students to write equations and, in more advanced puzzles, solve systems of equations.

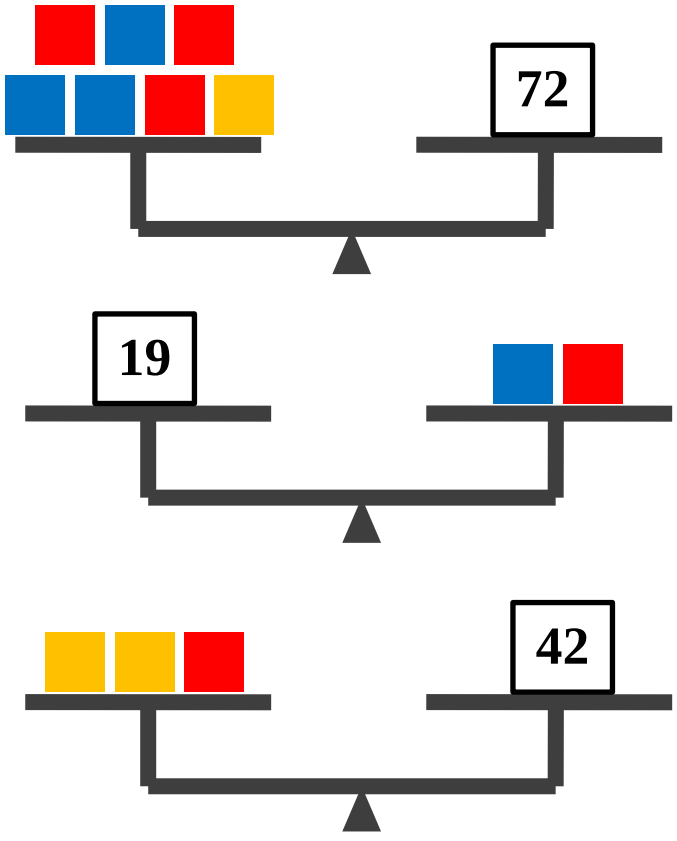
As we discuss each type of puzzle, consider these questions.

- ❑ ***What critical thinking is required?***
- ❑ ***Does this build conceptual understanding of mathematical concepts? Which concepts?***
- ❑ ***How could you use this in your classroom?***

Your Balance Puzzle



Clues:



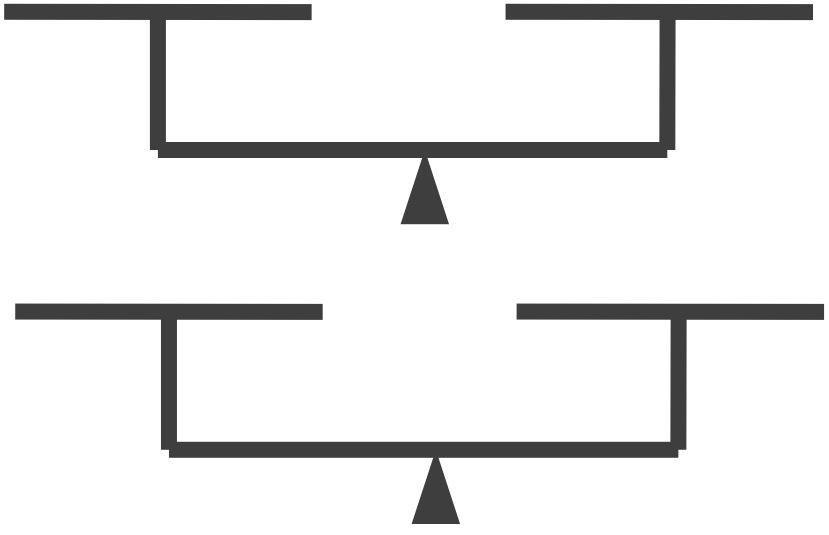
Model this using color tiles.

Each color has a unique, consistent weight.

What is the value of each color?

Discuss this with others at your table. How would students solve this? What concepts does this help them understand on a conceptual level?

How could you create your own?



Consider this system of equations:

$5x + 2y = 29$
$x + y = 10$

Earth Day

To celebrate Earth Day, a local elementary school sponsored an outdoor workday. Volunteers had three choices: pull weeds, plant flowers, or build benches for the outdoor classroom. Every volunteer participated in at least one activity. Use the clues to determine the total number of volunteers.

* Fifty-six of the volunteers helped to plant flowers.
* Sixty volunteers did not work on benches.
* The four people who participated in all three activities were there all day!
* Fifteen people only pulled weeds, and twenty people only planted flowers.
* Everyone who helped build benches also did something else.
* Three people built benches and pulled weeds but did not plant flowers.

How many volunteers helped with the Earth Day celebration? _____

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