



Concept: Tiles, Balances, and Equations

Name:

Warm-Up:

In Partners:

With a partner play the “Guess My Number”. One student picks a number between 0 and 100 and the other student guesses the number through systematic trials. The student who picks the number must not talk but indicate if the number is higher or lower than the guessed number by using thumbs up and thumbs down to direct the guesser. The student who picks the number must keep track of how many guess their partner takes to reach their number. Once the guesser locates the picked number, the students reverse roles.

Whole Class:

(Think-Pair-Share) Ask the students to explain:

1. How do they narrow down their estimates to reach a final answer?
2. How do you choose your first estimate?

COMPUTER COMPONENT

Instructions: Select the computer program *Understanding Equations* (Neufeld) Follow the instructions to the Main Menu.
Select *Tiles, Balances, and Equations* from the Main Menu.



Work through all sections of this topic **in order**:

- *Definitions*
- *The Meaning of “Solving an Equation”*
- *Solve by Systematic Trials*
- *Recall Tile Concepts*
- *Balances...An Introduction*
- *Tiles, Balances, Equations*
- *Practice Questions*

Additional Required Materials: *Pencil Crayons (red and blue)*



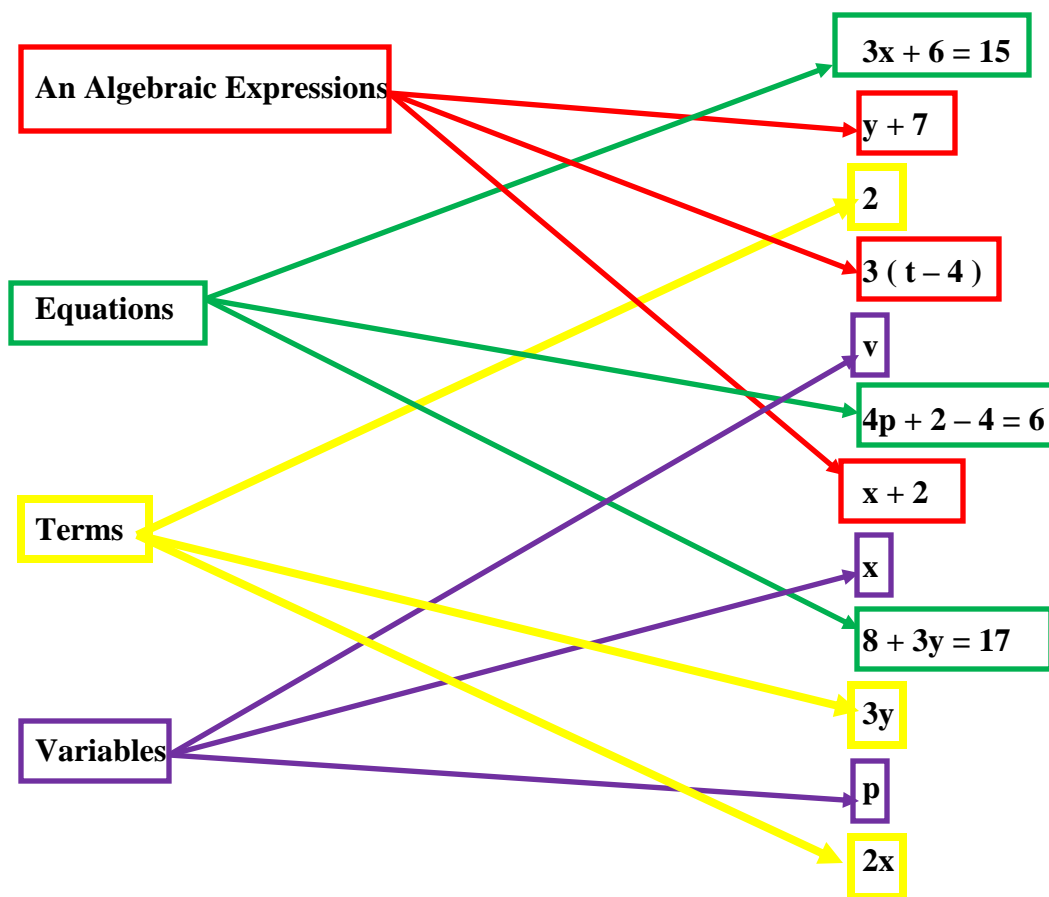
As you work through the computer exercises, make your notes in the **NOTES** section of this page.

When you reach the end of the section *Practice Questions* on the computer, move on to the **OFF COMPUTER EXERCISES** below.



NOTES:

Match the following:



Fill in the blanks.

Equations are mathematical **sentences** that use an **equal (=)**sign to relate **two** algebraic **expressions**.**Remember:**In an equation, the **left side** must equal the **right side**.To solve an equation means to find the **value** of the variable which makes the equation **true**.To find the root for an equation means to find the **value** of the variable which makes the equation **true**.





Solve by Systematic Trials (*Guess and check systematically*)





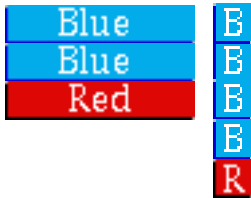
Fill in the blanks in the table.

Example: $3x + 4 = 28$ Solve for x

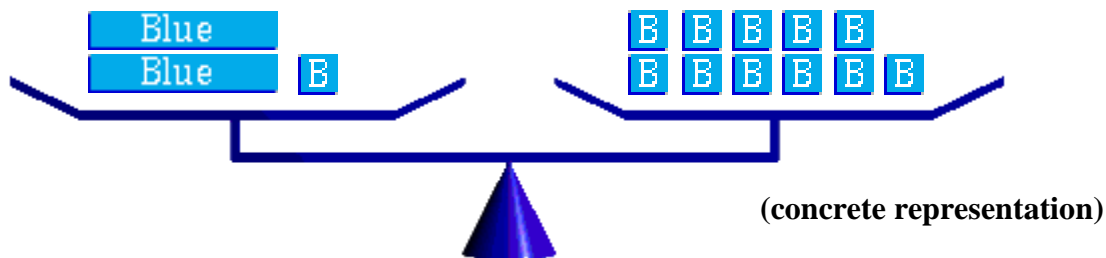
	x	$3x + 4$	
try	0	$= 3(0) + 4$ $= 0 + 4$ $= 4$	Too low
try	2	$= 3(2) + 4$ $= 6 + 4$ $= 10$	Still too low
try	5	$= 3(5) + 4$ $= 15 + 4$ $= 19$	Still too low
try	7	$= 3(7) + 4$ $= 21 + 4$ $= 25$	Still too low but close
try	8	$= 3(8) + 4$ $= 24 + 4$ $= 28$	We found it!

Therefore, the **solution (root)** is, $x = \underline{8}$ **Recalling Tile Concept****Remember:**

Tile	Is Called	Represents
 Blue Tile	unit tile	1
 Red Tile	negative tile	-1
 + 		1-1, or 0

Tile	Is Called	Represents
	variable tile	positive unknown quantity Could be called an <u>x tile</u>
		2x
	variable tile	negative unknown quantity Could be called an <u>-x tile.</u>
		-1x
		Algebraic Expression $2x - x + 4 - 1$ or $x + 3$

Balance: The tile representation of $2x + 1 = 11$ (abstract concept)

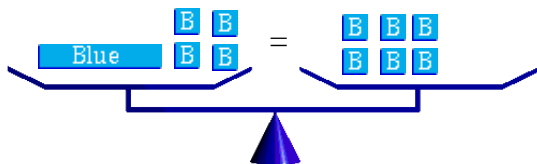


The concrete representation helps to understand the abstract concept of the equation.

OFF COMPUTER EXERCISES

1. What equation does each set of tiles model?

(a)



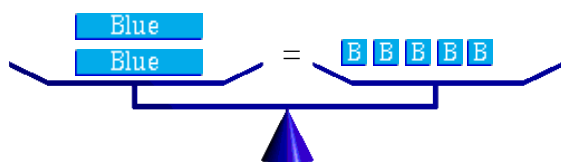
Equation?

$$1x + 4 = 6$$

or

$$x + 4 = 6$$

(b)



Equation?

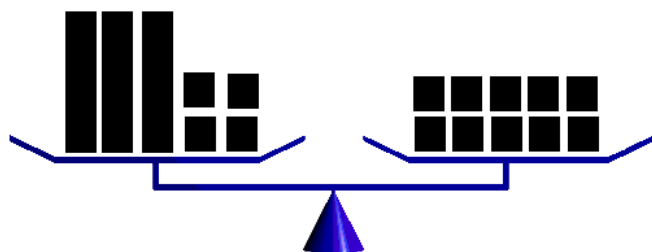
$$2x = 5$$

2. In the equation $5x - 1 = 14$, find

- (a) The variable is **x**
- (b) A term is **5x**, another term is **-1**
- (c) The algebraic expression is **5x - 1**
- (d) The equation is **5x - 1 = 14**

3. The left side of the balance is holding 3 containers and 4 lead weights. Each container contains an equal number of weights. The right side of the balance is holding 10 lead weights. All lead weights are identical.

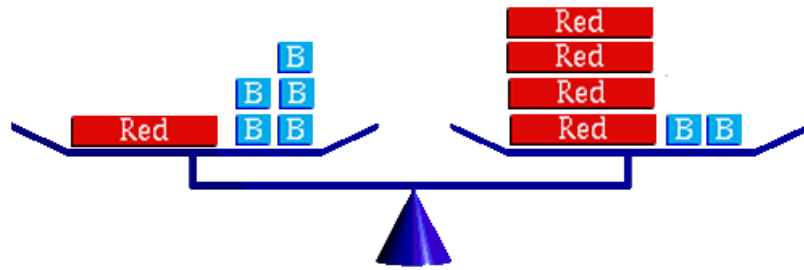
Your task is to find the number of weights in each container.



Each container contains 2 lead weights.

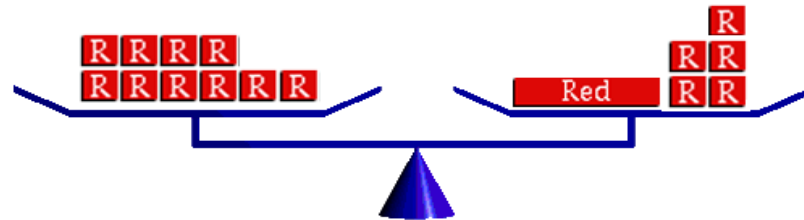
4. What is the equation represented by the balances?

(a)



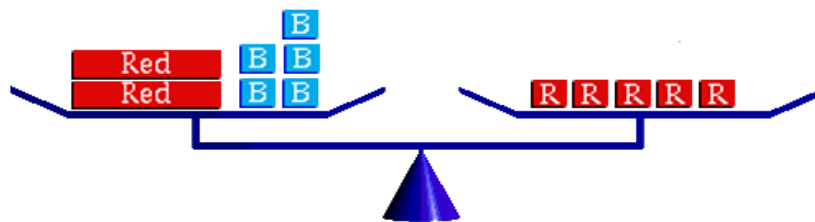
$$-x + 5 = -4x + 2$$

(b)



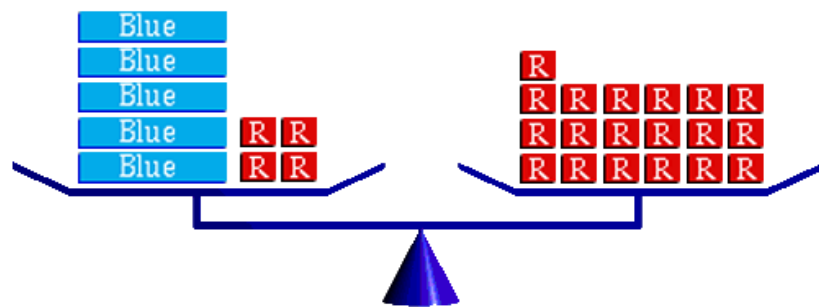
$$\begin{aligned} -10 &= -1x - 5 \\ \text{or} \\ -10 &= -x - 5 \end{aligned}$$

(c)



$$-2x + 5 = -5$$

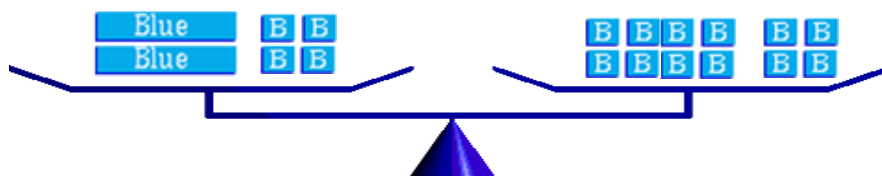
(d)



$$5x - 4 = -19$$

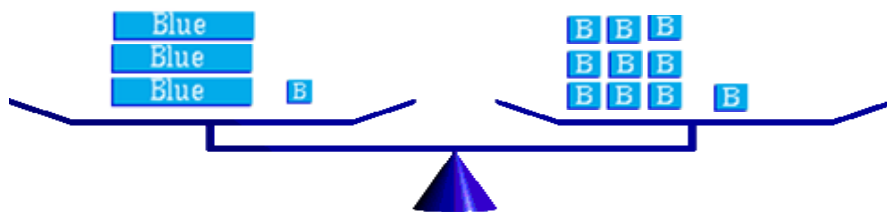
5. Sketch each equation on the balance and find the number of **B** (weights) that each **Blue** (container) holds. All lead weights are identical.

(a) $2x + 4 = 12$



Each **Blue** (container) holds 4 **B** (weights).

(b) $3x + 1 = 10$



Each **Blue** (container) holds 3 **B** (weights).

Math in the Real World

Make a list of real world incidence of equations.

Example 1:

From the United Nations

By the year 2025, it is projected that more than $\frac{1}{2}$ of the children in the world will be poor. The projected population of the world for 2025 is 7,818 million.

$$\frac{1}{2} x = \text{number of poor children}$$

(This could be a good lead off to the production of a short news clip (presentation with graphics, sound and picture) to emphasis the concerns about population explosion or diminishing natural resources.)

Example 2:

From World Concern

Local humanitarian Organizations cut budget after 30% fall in donations. As the budget stands, 350,000 people in developing countries will not receive medication to kill parasitic worms, in order to save \$50,000 in shipping costs for the medication.

$$\frac{3}{10} x = \$50\,000$$

(This could be a good lead off to the production of a short news clip (presentation with graphics, sound and picture) to emphasis the concerns about the need for aid both at home and abroad.)

Example 3:

From If the World Were a Village

“If we could turn the population of the earth into a small community of 100 people, keeping the same proportions we have today, it would be something like this...”

$$6x = 59\% \text{ of the entire wealth of the community}$$

<http://www.youtube.com/watch?v=oumVHSj6AE8&feature=related>

(This could be a good lead off to the production of a short news clip (presentation with graphics, sound and picture) to emphasis the concerns that our world faces.)

(Answers will vary)

