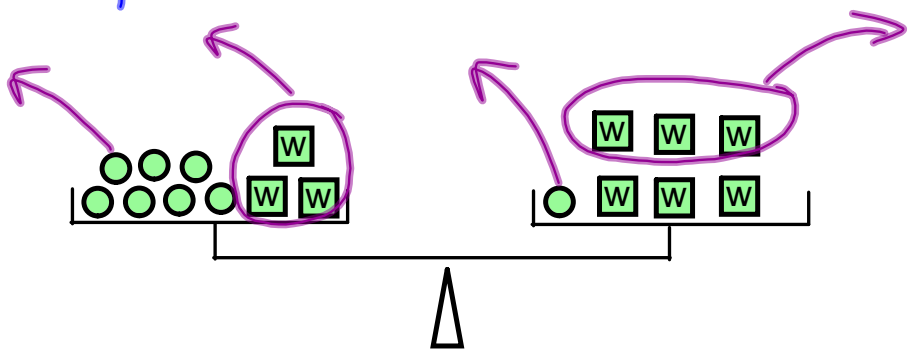
Section 6.2: Solving Equations by Using Balance Strategies

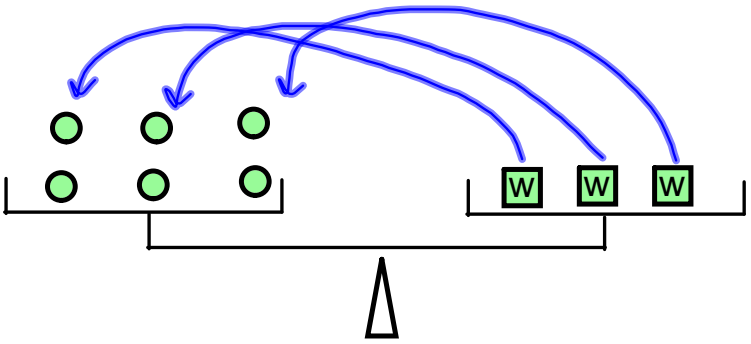
2 Strategies are: (1) Pan Balance Scale
(2) Algebra Tiles

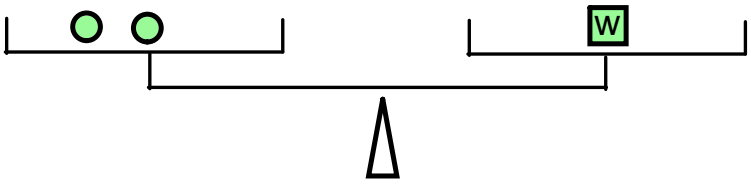
Pan Balance: Model the equation using blocks to represent the variables and circles to represent the constant terms

* Model the equation using both sides of the balance. Reducing blocks & circles until only one block remains on one side of the balance and the circles are on the other side.

Example: Solve $7+3w = 6w+1$







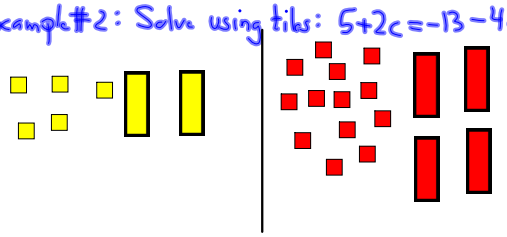
$w = 2$

Strategy #2: Algebra Tiles

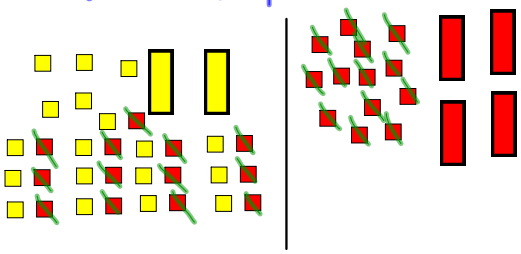
* Model both sides of the equation using algebra tiles.
* Use a line to seperate both sets of tiles. This line represents the equal sign in the eqn.
* Remove tiles using zero pairs so that you only have variable tiles on one side and constant unit tiles on the other side.
* Rearrange the constant unit tiles in groups based on the # of variable tiles you have.

NOTE: IF the variable tiles are red (negative), flip all tiles on both sides.

Example #2: Solve using tiles: $5+2c=-13-4c$

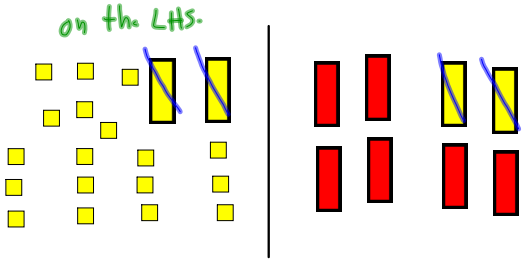


Note: To cancel the 13 red unit tiles on the right, we need 13 zero pairs on the left.

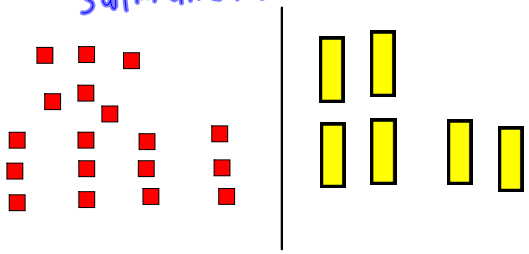


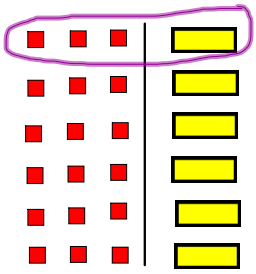
Note: Now, remove 13 red unit tiles from both sides

Note: Add two variable zero pairs on the RHS to eliminate the positive variable tiles on the LHS.

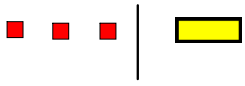


Note: Since the variable tiles are negative (red), switch all colors.





Note: Each positive variable tile has 3 negative unit tiles across the line.



$\therefore c=-3$

Solving Equations involving Rational Numbers

Note: If an equation involves rational #'s (fractions/decimals), a model is <u>not</u> used. Solve it algebraically.

(a) $\frac{122}{r} = 3.\,, r \neq 0$

(ANS) $\frac{122}{r} \times \frac{r}{1} = 3 \times r \rightarrow \frac{122r}{r} = 3r$

$\rightarrow \frac{122}{3} = \frac{3r}{3}$ $\quad$ oo $\quad r = \frac{122}{3}$

(b) $\frac{2a}{3} = \frac{4a}{5} + 7$

* LCD of 3 & 5 is 15

* Multiply every term by 15 ☺

Ans) $\frac{2a}{3} \times \frac{15}{1} = \frac{4a}{5} \times \frac{15}{1} + 7 \times 15$

$\frac{30a}{3} = \frac{60a}{5} + 105$

$10a = 12a + 105$

$10a - 12a = 12a + 105 - 12a$

$\frac{-2a}{-2} = \frac{105}{-2}$ $\therefore a = -\frac{105}{2}$

Practice: Algebraically solve for w:

$$\frac{5w}{2} - 10 = \frac{2w}{5}$$

*LCD = 10

And $\frac{5w}{2} \times \frac{10}{1} - 10 \times 10 = \frac{2w}{5} \times \frac{10}{1}$

$$\frac{50w}{2} - 100 = \frac{20w}{5}$$

$$25w - 100 = 4w$$

$$25w - 100 - 25w = 4w - 25w$$

$$\frac{-100}{-21} = \frac{-21w}{-21} \quad \therefore w = \frac{100}{21}$$

Practice #2: Solve algebraically:

$$-\frac{1}{7} + 5v = -\frac{37}{14}$$

LCD = 14

Ans) $-\frac{1}{7} \times \frac{14}{1} + 5v \times 14 = \frac{-37}{14} \times \frac{14}{1}$

$$-2 + 70v = -37$$

$$-2 + 70v + 2 = -37 + 2$$

$$\frac{70v}{70} = \frac{-35}{70} \qquad \therefore v = -\frac{1}{2}$$