Inverse Operations - Operations that undo one another. Addition is the inverse of subtraction; multiplication is the inverse of division; roots are the inverses of exponents.

Isolating a Variable

A.CED.4 Rearrange formulas to highlight a quantity of interest using the same reasoning as in solving equations. Examples: Rearrange Ohm's law V = IR to highlight resistance R; Rearrange area of a circle formula A =πr^2 to highlight the radius r. Understand solving equations as a process of reasoning and explain the reasoning

What am I learning today?
How to rewrite a formula to isolate a variable

How will I show that I learned it?
Use inverse operations to isolate a variable

Isolating a variable is solving the equation so that the variable is alone on one side of the equal sign and everything else is on the other side.

In order to isolate a variable, you must move everything that is on the same side of the equal sign to the opposite side by **inverse operations**.

$$x = a - 5 \qquad x + 5 = a - 5$$
$$\;\; -5$$

Ex.1 $x + b = y - b$

$-b$

$$\boxed{x = y - b}$$

Think: $x + 5 = 8$
$ -5 \quad -5$
$x = 3$

Ex.2 $2x - 4y = 7 \ (x)$

Think: $2x - 40 = 7$

$+4y \quad +4y$ Solve

$+40 \quad +40$

$$\frac{2x}{2} = \frac{7 + 4y}{2}$$

$$\frac{2x}{2} = \frac{47}{2}$$

$$x = \frac{7 + 4y}{2}$$

$$x = 23.\overline{5}$$

$$x = \frac{7}{2} + 2y$$

Ex.3 $y = mx + b$

$$\frac{-b \quad -b}{\quad}$$

$$\frac{y - b}{m} = \frac{mx}{m}$$

$$x = \frac{y - b}{m}$$

Think: $15 = 3x + 8$

$$\frac{-8 \qquad -8}{\quad}$$

$$\frac{7}{3} = \frac{3x}{3}$$

$$7/3 = x$$

Ex.4 $2(A) = \left(\dfrac{h(b_1 + b_2)}{2}\right)2$ for b_1

Think: $2(7) = \left(\dfrac{5(x + 3)}{2}\right)2$

$2A = h(b_1 + b_2)$

$2A = hb_1 + hb_2$

$-hb_2 \qquad\qquad -hb_2$

$$\dfrac{2A - hb_2}{h} = \dfrac{hb_1}{h}$$

$14 = 5(x + 3)$

$14 = 5x + 15$

$-15 \qquad\qquad -15$

$$\dfrac{-1}{5} = \dfrac{5x}{5}$$

$x = -\dfrac{1}{5}$

You Try

1. Solve mx = y for x.

2. Solve 2x - 3y = 6 for y.

3. Solve A = 2πrh for r.

4. Solve V = $\dfrac{\pi r^2 h}{3}$ for r.