3-5 Solving Equations and Formulas

Objectives:

• A.4a Solve literal equations (formulas) for a specified variable

• A.4f Apply these skills to solve practical problems

Definitions:

• An <u>equation</u> is a mathematical sentence that contains an equal sign (=).

- Ex: x = yz What do x, y, and z stand for?

• A <u>formula</u> is an equation that states a rule for the relationship between certain quantities.

-Ex: A = lw What do A, l, and w stand for?

What it means to solve:

To solve for x would mean to get x by itself on one side of the equation, with no x's on the other side. (x = __)

Similarly, to solve for y would mean to get y by itself on one side of the equation, with no y's on the other side. (y = __)

The DO-UNDO chart

1) Solve the equation -5x + y = -56 for x. Ask yourself:

- What is the first thing being done to x, the variable being solved for?
 – x is being multiplied by -5.
- What is being done next?
 y is being added to -5x.

DO	UNDO
·-5	- y
+ y	÷(-5)

Show all of your work!

- First, subtract y from both sides of the equation.
- Next, divide by -5.
- This process actually requires LESS WORK than solving equations in one variable ^(C)

Ex:
$$-5x + y = -56$$

 $-y - y$
 $-5x = -56 - y$
 $-5 - 5$

$$x = \frac{-56 - y}{-5} = \frac{56 + y}{5}$$

Let's try another:

Complete the do-undo chart. $\begin{array}{c|c}
DO & UNDO \\
\bullet \cdot 2 & +4y \\
\bullet -4y & \div 2
\end{array}$

To solve for x:

- First add 4y
- Then divide by 2

Ex: Solve 2x - 4y = 7 for x.

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

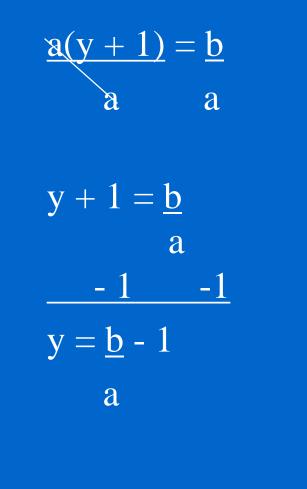
$$x = \frac{7 + 4y}{2}$$

• This fraction cannot be simplified unless both terms in the numerator are divisible by 2.

Another example:

 \bullet

- Solve a(y + 1) = b for y.
 DO UNDO
 +1 ÷ a
 ·a -1
 To solve for y:
 First divide by a
- Then subtract 1



Here's a tricky one!

Solve 3ax - b = d - 4cx for x.

- First, we must get all terms with x together on one side.
 - Add 4cx to both sides
 - Add b to both sides
- Next, use the distributive property to factor x out of the two terms on the left.
- Now, x is being multiplied by (3a + 4c). To undo this, divide both sides by (3a + 4c).

3ax - b = d - 4cx +4cx + 4cx 3ax - b + 4cx = d +b + b

3ax + 4cx = d + bx(3a + 4c) = d + b $(3a + 4c) \quad (3a + 4c)$

$$x = \frac{d+b}{(3a+4c)}$$

Try a few on your own.

• Solve $P = \underline{1.2W}$ for W. H^2

• Solve P = 21 + 2w for 1.

• Solve 4x - 3m = 2mx - 5 for x.

The answers:

