PIPS
LITERAL EQUATIONS

1) Consider the literal equation $ax + b = c$
When solving, justify solution steps. Use as many lines as needed.

(a) Solve for b in terms of a , c and x

$ax + b = c$

$-ax \quad -ax$

$b = c - ax$ *Subtraction Property of Equality*

(b) Solve for x in terms of a , b and c

$ax + b = c$

$-b \quad -b$

$\frac{ax}{a} = \frac{c - b}{a}$ *Subtraction Property of Equality*

$x = \frac{c-b}{a}$ *Division Property of Equality*

(c) Solve for a in terms of b , c and x

$ax + b = c$

$-b \quad -b$

$\frac{ax}{x} = \frac{c - b}{x}$ *Subtraction Property of Equality*

$a = \frac{c-b}{x}$ *Divison Property of Equality*

2)

(a) Solve the literal equation $ax + ab = c$ for x.

$ax + ab = c$

$-ab \quad -ab$

$\frac{ax}{a} = \frac{c - ab}{a}$

$x = \frac{c-ab}{a}$

(b) Show another way to solve $ax + ab = c$ for x.
(Hint: "Undistribute" a).

$ax + ab = c$

$\frac{a(x + b)}{a} = \frac{c}{a}$ $\leftarrow$ *undistribute a*

$x + b = \frac{c}{a}$

$-b \quad -b$

$x = \frac{c}{a} - b$

(c) Compare and contrast your results in parts (a) and (b).

$x = \frac{c-ab}{a}$ $\qquad$ $x = \frac{c}{a} - b$

$x = \frac{c}{a} - \frac{ab}{a}$

$x = \frac{c}{a} - b$

The solutions are the same. In part (a), the solution is a binomial divided by a. In part (b), the solution is part (a) after each term was divided by a (see work).

3) (a) Amanda has a rectangular fish aquarium that holds 1,280 in^3 of water. The length of the aquarium is 16 inches and the height is 10 inches. What is the width of the aquarium? (Hint: $V = lwh$)

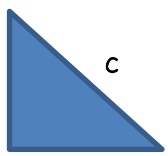
V = lwh
1280 = (16)(10)w
1280 = 160w
8 inches = w

(b) Create a formula which could be used to find the width, w, of ***any*** rectangular prism.

$$\mathbf{V = lwh \rightarrow w = \frac{V}{lh}}$$

4) Consider the formula used to find the missing side of a right triangle (*The Pythagorean Theorem*).

$\mathbf{a^2 + b^2 = c^2}$



Hint: The inverse operation of squaring (x^2) is taking the square root $\sqrt{\ }$.

(a) Solve the equation for **c**.

$$\mathbf{a^2 + b^2 = c^2}$$
$$\mathbf{\sqrt{a^2 + b^2} = \sqrt{c^2}}$$
$$\mathbf{\sqrt{a^2 + b^2} = c}$$

(b) Solve the equation for **b**.

$$\mathbf{a^2 + b^2 = c^2}$$
$$\mathbf{-a^2 \qquad -a^2}$$
$$\mathbf{b^2 = c^2 - a^2}$$
$$\mathbf{\sqrt{b^2} = \sqrt{c^2 - a^2}}$$
$$\mathbf{b = \sqrt{c^2 - a^2}}$$

5) (a) Sara is going to paint a circular piece of wood for the set of her school play. If the area of the wood is 36π, then what is the radius? (Hint: $A = \pi r^2$)

$$\mathbf{A = \pi r^2}$$
$$\mathbf{36\pi = \pi r^2}$$
$$\mathbf{36 = r^2}$$
$$\sqrt{36} = \sqrt{r^2} \rightarrow \mathbf{6 = r}$$

(b) Create a formula which could be used to find the radius of ***any*** circle.

$$\mathbf{A = \pi r^2 \rightarrow \frac{A}{\pi} = r^2 \rightarrow \sqrt{\frac{A}{\pi}} = r}$$

6) How does the solution of a literal equation differ from the solution of a specific equation? (Hint: Think about $ax + b = c$ vs. $2x + 3 = 10$)

The solution to a literal equation is an expression. It contains numbers, variables and operations. The solution to a specific equation is a numerical value.

$$\mathbf{ax + b = c \rightarrow x = \frac{c - b}{a}} \qquad \mathbf{2x + 3 = 10 \rightarrow x = 3.5}$$