Helpful guidelines for problem solving (especially word problems)...

(1) <u>UNDERSTAND</u> the problem fully:
- *What specifically am I trying to find?*
- *What information am I given?*
- *What assumptions should I make?*
- *Have I ever solved a similar problem to this one?*

(2) Develop and carry out a <u>PLAN</u>:
- *Can I use a variable to represent an unknown quantity.*
- *How can I represent other conditions in terms of that variable?*
- *Where can I find equivalent expressions?*
- *Can I now write and solve an equation?*

(3) Find the <u>ANSWER</u> and <u>CHECK</u> for sensibility:
- *Does the proposed solution check in the equation?*
- *What is the answer to the actual question that was asked?*
- *Does that answer seem reasonable?*
- *Have I stated the answer clearly in a complete sentence?*

<u>*Example 1*</u>: The square of a number minus twice the number is 48. Find this number.

Solution: Let **x** = the number $\qquad$ <u>Define</u> the <u>variable</u> – what does **x** represent?

The square of a number, minus twice the number, is 48.

$\qquad$ <u>Translate</u> words <u>into</u> an <u>equation</u>.

$$x^2 \qquad - \qquad 2x \qquad = 48$$

$x^2 - 2x - 48 = 0$ $\qquad$ <u>Set</u> the equation <u>equal</u> <u>to</u> <u>zero</u>.

$(x + 6)(x - 8) = 0$ $\qquad$ <u>Factor</u> (or use the Quadratic Formula)

$x + 6 = 0 \qquad$ or $\qquad x - 8 = 0$ $\qquad$ Set each factor equal to zero.

$\qquad x = -6 \qquad$ or $\qquad x = 8$ $\qquad$ <u>Solve</u> each of these <u>simpler</u> <u>equations</u>.

The number could be -6 or 8. $\qquad$ <u>Answer</u> the <u>question</u> that was <u>asked</u>.

<u>*Example 2*</u>: The height of a triangular sail is $1\frac{1}{2}$ meters more than the base. The area of the sail is $3\frac{1}{2}$ square meters. Find the base and height of the sail.

Solution: Let **b** = the base and **b** + $1\frac{1}{2}$ = the height $\qquad$ <u>Define</u> the <u>variable</u>-what is the base and height?

Remembering that Area is $\frac{1}{2}$ X base X height: $\qquad$ Remembering the Area formula for a triangle.

$\frac{1}{2}$ times the base, times the height, is $3\frac{1}{2}$.

$\qquad$ <u>Translate</u> words <u>into</u> an <u>equation</u>.

$$\frac{1}{2} \cdot b \cdot (b + 1\tfrac{1}{2}) = 3\tfrac{1}{2}$$

$$\frac{1}{2}b^2 + \frac{3}{4}b = \frac{7}{2}$$

$2b^2 + 3b - 14 = 0$ $\qquad$ <u>Multiply</u> through by 4 <u>to</u> get <u>rid</u> of <u>fractions</u>.

$(2b + 7)(b - 2) = 0$ $\qquad$ <u>Factor</u> (or use the Quadratic Formula)

$b = -7/2 \qquad$ or $\qquad b = 2$ $\qquad$ <u>Solve</u> each of these <u>simpler</u> <u>equations</u>.

$\qquad$ <u>Answer</u> the <u>question</u> that was <u>asked</u>, knowing the

The base would be 2 m with height of $3\frac{1}{2}$ m . $\qquad$ base of a triangle <u>cannot</u> <u>have</u> <u>negative</u> <u>length</u>.

DIRECTIONS: <mark>On your own paper</mark>, set up equations and solve each of the following problems.

1.) A panda can eat the eucalyptus leaves from a branch in 14 minutes. Together, two pandas can eat the leaves from that same branch in 9 minutes. How long would it have taken the second panda to eat the leaves from that branch by itself? **25.2 min**

2.) An empty oil tank can be filled by pipeline in 10 hours. The tank can be emptied in 20 hours by opening a valve. If the valve is opened while the pipeline is filling the tank, how long will it take to fill the tank? **20 hours**

3.) A painter works on a job for 10 days and is then joined by an associate. Together they finish the job in 6 more days. The associate could have done the job alone in 30 days. How long would it have taken the painter to do the job alone? **20 days**

4.) The ratio of 4 less than a number to 26 more than the number is 1 to 3. What is the number? **19**

5.) Five times the multiplicative inverse of a number is added to the number and the result is 10.5. What is the number? **½ or 10**

6.) A plane flies 2000 miles from Chicago to Los Angeles with a 50 mph tail wind in 3 1/3 hours. Returning against the same wind, it takes 4 hours. What is the speed of the plane if there is no wind? **550 mph**

7.) The speed of the current in the Puget Sound is 5 mph. A barge travels with the current 26 miles 10 2/3 hours. What is its speed in still water? **-2.56 mph (boat is traveling against current)**

8.) Pipe A can fill a tank in 4 hours and pipe B can fill the tank in 3 hours. With the tank empty, pipe A is turned on, and one hour later, pipe B is turned on. How long will pipe B run before the tank is full? **1 2/7 hours**