Acc. Geom/Algebra II

Solving Quadratic Word Problems

Helpful guidelines for problem solving (especially word problems)…

(1) UNDERSTAND 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 PLAN:
- *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 ANSWER and CHECK 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?*

Example 1: The square of a number minus twice the number is 48. Find this number.

Solution: Let x = the number

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

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

$x^2 - 2x - 48 = 0$

$(x + 6)(x - 8) = 0$

$x + 6 = 0 \qquad or \qquad x - 8 = 0$

$x = -6 \qquad or \qquad x = 8$

The number could be -6 or 8.

Define the *variable* – what does x represent?
Translate words *into* an *equation*.
Set the equation *equal to zero*.
Factor (or use the Quadratic Formula)
Set each factor equal to zero.
Solve each of these *simpler equations*.
Answer the *question* that was *asked*.

Example 2: 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

Remembering that Area is $\frac{1}{2}$ X base X height:

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

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

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

$2b^2 + 3b - 14 = 0$

$(2b + 7)(b - 2) = 0$

$b = -7/2 \qquad or \qquad b = 2$

The base would be 2 m with height of $3\frac{1}{2}$ m .

Define the *variable*-what is the base and height?
Remembering the Area formula for a triangle.
Translate words *into* an *equation*.
Multiply through by 4 *to get rid of fractions*.
Factor (or use the Quadratic Formula)
Solve each of these *simpler equations*.
Answer the *question* that was *asked*, knowing the base of a triangle *cannot have negative length*.

DIRECTIONS: , 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?

Hint: The equation is 1/14 +1/x = 1/9. Solve for x. Multiple by the common denominator: 9*14*x giving you the equation 9x + 126 = 14x. x should equal 25.2 minutes. Take a look at this video to help you out with some of these.

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?

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?

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

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

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? (Hint: Distance = rate*time)

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?

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?