Five-Step Strategy to Solving Word Problems

1) Familiarize yourself with the problem
   a. Read the problem completely.
   b. Determine what type of problem it is: time/rate/distance, work, mixture, consecutive integers, area of a shape, etc. (sometimes you may want to use a table or a picture to categorize the data).
   c. Determine what formula(s) may be needed (for example, you may need distance = (rate) (time)).
   d. Determine what information is available to you: how fast, how long, what percentage?
   e. Determine what information is actually needed to solve the problem.
   f. Assign a specific variable to each unknown piece of information.

2) Translate the written information into a mathematical equation, or system of equations.

3) Solve the equation(s).

4) Check your answer in the original problem. Also, make sure that the answer makes sense. A negative time or rate doesn't make sense, for example.

5) State the answer clearly in written form. Make sure you answer the question. If you are asked the speed of the slowest train, for example, you should answer, "The slowest train was traveling at 65 mph."

We will now solve a word problem using the Five-Step Strategy.

A freight train leaves Chicago at 4:30 pm traveling at a speed of 60 mph. Two hours later a passenger train leaves the same station traveling at 90 mph. How far will the first train get before the passenger train catches up to it?

<u>Familiarize</u>: Did you read the problem completely? What type of problem is it?
(It is a time/rate/distance problem.)
It asks "how far?" This means we will probably be using the <u>distance = (rate) (time)</u> formula.
(*We categorized the data into a table.*)
What info is given?
(*The time that the trains left and the speed that they were traveling.*)
What information is actually needed?
(*You only need to know the speeds and that the passenger train leaves 2 hours later. The problem does not ask anything about the time of day they would meet. Of course, in the process of solving the problem, we may find the trains' travel times; we just have to remember that the fact that the freight train leaves at 4:30 is not relevant*).

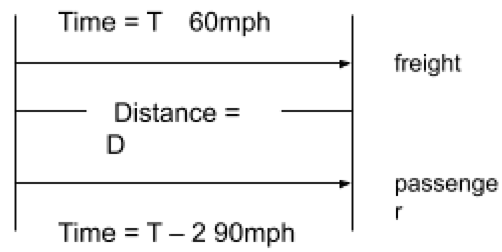
<u>Translate:</u> D = R x T

D *Freight*	**60 mph**	**T**
D *Passenger*	**90 mph**	**T – 2***

Distance = (Rate) (Time)
Freight Train: **D = 60T**
Passenger Train: D = 90 (T – 2)
D = 90T – 180

* *Since the passenger train leaves 2 hrs later, it will travel for 2 hrs less time than the freight train. Note that when the passenger train catches up, the two trains have traveled the same distance, D.*

A diagram may help to visualize the problem:



<u>Solve</u>: You wish to solve the equations above. Recall that the distances are equal so…
60T = 90T – 180
-30T = -180
T = 6 hrs
But this is the time of travel for the freight train and the problem asked for a distance. So we will use T = 6 and plug this value into either of our distance equations…

<u>Check</u>: If the freight train travels for 6 hrs, the distance it travels is (6) (60) = 360 miles. If the passenger train travels for 6 – 2 = 4 hrs, it will cover (4) (90) = 360 miles. This means that each train is at the same distance from Chicago, and this should be the case when the passenger train catches up with the freight. So our answer checks and makes sense.

D = 60T = (60) (6) = **360 miles**	
<u>Answer</u>: The freight train will get 360 miles away from Chicago when the passenger train catches up.	