Tips and a Systematic Procedure for Solving Related Rates Problems

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Math 105

- Read and understand the problem. Let t denote the time elapsed.

- **Diagram:** Draw a good diagram of the general variable situation. Label non-changing quantities with given values. Do not put values on the diagram if it is for a changing quantity. Specifically, do not place the *Key Moment Information* on the diagram.

- **Variables:** Assign variables to relevant quantities that vary with time t. Label changing quantities with these variables on your diagram.

- **Given Information:** Off to the side, state the given information for values and rates, at the **key** moment in question. Express clearly what the desired quantity is that you are solving for, at the specific instant described. Do not use these values yet!

- **Equation relating variables:** Write the equation relating all of the variables. Sometimes you need to use your diagram to find (geometric) relationships between some of the variables in order to substitute for, say, one solvable variable. Sometimes similar triangles might help.

- **Differentiate:** $\frac{d}{dt}$ both sides to get a **related rates** $\ddot{\smile}$ equation for the general case. Don't forget to use the chain rule to account for the functions being functions of time t.

- **Substitute:** Now plug in the given values for the key moment described into the resulting related rates equation. *Now and not before now.* Figure out any unknown (but solvable) remaining info. Do not substitute values any earlier!

- **Solve:** Use algebra to solve for the unknown desired rate of change. You can always check units at the end to make sure you calculated correctly.

- **Answer:** Please take the time to answer the original question, in words, with correct units.