

Guidelines for Solving Related-Rate Problems

Step 1: Read the problem, really! You'd be amazed how many people skip this step. Then read it again! ☺

Step 2: Draw a diagram showing what's going on. Identify all relevant information and assign variables to what's changing. Use the general case (numbers for values that NEVER change in this situation, and variables for anything that is changing).

* Related Rates usually involve motion ... any diagram you draw is like a still picture of what is occurring. Any part of your picture that NEVER changes can be labeled with a constant (or number), but any part of your picture that is in motion or is changing MUST be labeled with a variable!

In other words, if the radius of a circle is increasing and you are asked to find the rate of change in the area at the exact moment when the radius is 5 cm, then your diagram would be a circle, but you would NOT label the radius 5 because it is changing ... you would label the radius r .

Step 3: Find the equation that gives the relationship between the variables you just named in step 2. This is sometimes the hardest part, but most problems fall into three categories ... a triangle that you can use a trigonometric ratio (involving sides and angles), the Pythagorean theorem (involving all 3 sides of a right triangle), or a known formula like Area, Volume, Distance, etc.

Step 4: Find the particular information (values of variables at the exact moment you drew your diagram) for the problem and write it down, and list what you are looking for (normally this would be a derivative).

Step 5: Implicitly differentiate the equation with respect to time. Usually this equation will have at least two derivatives. If it has more than two, be sure you have enough information, or you may have find a relationship between two of the variables, and rewrite the equation in step 3 using this relationship.

Step 6: Plug in the particular information, and solve for the desired quantity. **DO NOT DO THIS UNTIL AFTER YOU HAVE TAKEN THE DERIVATIVE!**

Step 7: Write down your answer and circle it with your favorite color. (Be sure to use correct units)