

Math 201

Section 3.4 Related Rates

In a related rates problem, the idea is to compute the rate of change of one quantity in terms of the rate of change of another quantity (which may be more easily measured). For example, if we are pumping air into a balloon, both the volume and the radius of the balloon are increasing and their rates of increase are related to each other. However, it is much easier to measure directly the rate of increase of the volume than the rate of increase of the radius.

A Strategy for Solving Related Rates Problems

Step 1. Assign letters to all quantities that vary with time and any others that seem relevant to the problem. Give a definition for each letter.

Step 2. Identify the rates of change that are known and the rate of change that is to be found. Interpret each rate as a derivative.

Step 3. Find an equation that relates the variables whose rates of change were identified in Step 2. To do this, it will often be helpful to draw an appropriately labeled figure that illustrates the relationship.

Step 4. Differentiate both sides of the equation obtained in Step 3 with respect to time to produce a relationship between the known rates of change and the unknown rate of change.

Step 5. AFTER completing Step 4, substitute all known values for the rates of change and the variables, and then solve for the unknown rate of change.