

Chapter 3. Differentiation

3.9 Related Rates

Example. Page 237 number 13.

Note. Related Rates Problem Strategy

We will follow this protocol when solving related rates problems:

Step 1. *Draw a picture and name the variables and constants.* Use t for time. Assume that all variables are differentiable functions of time.

Step 2. *Write down the numerical information* (in terms of the symbols you have chosen) and *write down what you are asked to find* (usually a rate, expressed as a derivative).

Step 3. *Write an equation that relates the variables.* You may have to combine two or more equations to get a single equation that relates the variable whose rate you want to the variables whose rates you know.

Step 4. *Differentiate with respect to t .* Then express the rate you want in terms of the rate and variables whose values you know.

Step 5. *Evaluate.* Use known values to find the unknown rate.

Example. Page 237 number 13 (again).

Examples. Page 238 number 18, page 239 number 30, and page 240 number 38.