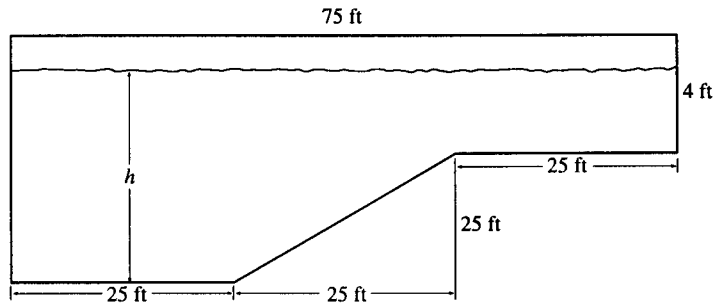


Group Work 2, Section 3.9
Related Rates

1. The Swimming Pool

We wish to find the change in volume of a 20-foot-wide pool as it fills up with water. A cross-section of the pool is shown below.



- (a) Use the first six steps of the strategy to express dV/dt in terms of h , V , and dh/dt .
- (b) What additional information would you need to find dV/dt at $t = 10$ minutes?

2. The Growing and Shrinking Cube

- (a) We are designing a computer graphic in which we zoom in on a cube. The volume V , surface area S , and side length x of the cube are all varying with respect to time. With this information, compute the following quantities:
- (i) dS/dt when $x = 2$ and $dV/dt = 1$.
- (ii) dV/dt when $x = 2$ and $dS/dt = 1$.
- (b) Suppose an ice cube of original side length 1 is melting at the rate of $0.01 \text{ in}^3/\text{s}$.
- (i) What is the rate of change of the side length when that length is 0.5? When it is 0.1? 0.01?
- (ii) What is the rate of change of the length of the major diagonal at time t ?