

Section 4.1: Related Rates

These notes reflect material from our text, *Calculus, Concepts and Contexts, Third Edition*, by James Stewart, published by Brooks/Cole, Pacific Grove, CA, 2005.

Key points from Stewart, Section 4.1: Related Rates.

Concepts

The goal: to relate the rate of change of one quantity to the rate of change of another quantity.

The procedure:

- (1) relate the variables by getting them both into a single equation, and then
- (2) take derivatives to relate their rates of change.

Some well-known related rates problems involve ripples spreading in a pond, inflating balloons and melting snowballs, sliding ladders, conical water tanks, boats and a dock, airplanes and an observer, shadows and a lamppost, TV cameras and a rocket, a man and a searchlight, and two ships passing in the night.

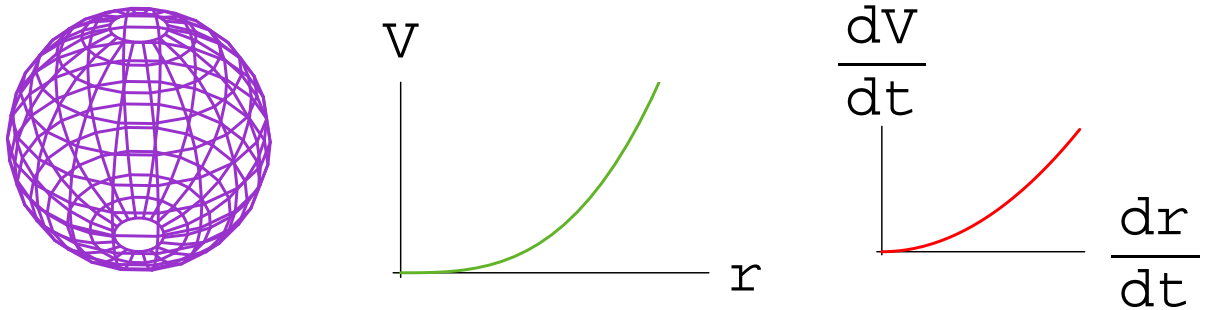


Fig. Related rates.

Exercises

Exercises for Section 4.1, pp 267–269: 1, 2, 4, 8, 10 (ships), 11 (plane), 12 (shadow), 14 (spotlight), 15 (walking), 17 (triangle), 18 (boat), 20 (particle), 26 (kite)