

## SECTION 4-1: RELATED RATES

A strategy.

- Draw a picture.
  - Identify what you want and what you know
  - Take derivative with respect to  $t$ .
  - Solve for what you want.
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1. Water runs into a conical tank at the rate of  $9 \text{ ft}^3/\text{min}$ . The tank stands point down and has a height of 10 ft and a base radius of 5 ft. How fast is the water level rising when the water is 6 ft deep?

2. A street light is mounted at the top of a 10-ft-tall pole. A woman 5 ft tall walks away from the pole along a straight path at a speed of 5 ft/s. How fast is the tip of her shadow moving when she is 40 ft from the pole?

3. A hot air balloon rising straight up from a level field is tracked by a range finder 500 feet from the lift-off point. At the moment the range finder's elevation angle is  $\pi/4$ , the angle is increasing at the rate of 0.14 radians/min. How fast is the balloon rising at that moment?