

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. But it is much easier to measure directly the rate of increase of the volume than the rate of increase of the radius. 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).

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3. A water tank has the shape of an inverted circular cone with base radius 2 m and height 4 m. If water is being pumped into the tank at a rate of  $100 \text{ m}^3/\text{min}$ , find the rate at which the water level is rising when the water is 3 m deep.

4. Car A is traveling west at 50 mi/hr and car B is traveling north at 60mi/hr. Both are headed for the intersection of the two roads. At what rate are the cars approaching each other when car A is 0.3 mi and car B is 0.4 mi from the intersection? Which car gets to the intersection first and by how many seconds do the cars miss crashing into each other?

5. A man walks along a straight path at a speed of 4 ft/s. A searchlight is located on the ground 20 ft from the path and is kept focused on the man. At what rate is the searchlight rotating when the man is 15ft from the point on the path closest to the searchlight? And how fast is he moving away from the searchlight at this same moment?