

RELATED RATES PROBLEMS

1. *Growing Crystals* Sodium Chlorate crystals are easy to grow in the shape of cubes by allowing a solution of water and sodium chlorate to evaporate slowly. Let V be the volume of the cube and x be the length of an edge. If each edge of a cube is expanding at the rate of 1 millimeter (mm) per hour, how fast is the volume changing when the length of each edge is (a) 5 mm? (b) 10 mm? (c) x mm?
2. *Police Chases* A police car, being videotaped for World's Wildest Police Chases, is chasing a car that has just turned the corner at a right-angled intersection. The police car is heading south and the speeding car is traveling due east. When the police car is 0.6 miles north of the intersection, the speeding car is 0.8 miles to the east, and the police radar detector indicates that the distance between the two vehicles is increasing at 20 mph. The police car is going 60 mph at the moment of this measurement. What is the speed of the car?
3. *Baseball* A baseball diamond is 90 foot square. A ball is batted along the third base line at a constant speed of 100 feet per second. How fast is its distance from first base changing when (a) it is halfway to third base? (b) it reaches third base?
4. *The Moving Point* A particle is moving along the parabola $y = x^2$. At what point on the curve are the x -coordinate and the y -coordinate changing at exactly the same rate?
5. *The Lighthouse Problem* A revolving beacon, located 3 miles from a straight shoreline, is rotating at a constant speed of 2 revolutions per minute. Find the speed of the spot of light along the shore when it is exactly 2 miles from the point on the shore nearest the beacon.