

Related Rates

MA1161 Spring 2007

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1. A spherical balloon of radius r centimeters has a volume given by $V = \frac{4}{3}\pi r^3$. Air is being blown into the balloon at a constant rate of 50 cubic centimeters per second. How fast is the radius of the balloon increasing when $r = 1$? when $r = 2$?
2. A fan is watching a 100 meter foot race from a seat in the bleachers 15 meters back from the midway point. The winning runner is moving approximately 9 meters per second. How fast is the distance from the fan to the winning runner changing when he is x meters into the race?
3. A baseball diamond is a square whose sides are 90 ft long. Suppose that a player running from second base to third base has a speed of 30 ft/s at the instant he is 20 ft from third base. At what rate is the player's distance from home plate changing at that instant?
4. A camera is mounted at a point 3000 ft from the base of a rocket launching pad. If the rocket is rising vertically at 880 ft/s when it is 4000 ft above the launching pad, how fast must the camera elevation angle change at that instant to keep the camera aimed at the rocket?