

RIDDLE  
AP CALCULUS  
RELATED RATES

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1. A conical paper cup 3 inches across the top and 4 inches deep is full of water. The cup springs a leak at the bottom and loses water at the rate of 2 cubic inches per minute. How fast is the water level dropping at the instant when the water is exactly 3 inches deep?
2. Air is being pumped into a spherical balloon at the rate of 7 cubic centimeters per second. What is the rate of change of the radius at the instant the volume equals  $36\pi$ ?
3. A kite 100 feet above ground is being blown away from the person holding its string in a direction parallel to the ground at a rate of 10 feet per second. At what rate must the string be let out when the length of the string already let out is 200 feet?

4. Sand is dumped off a conveyor belt into a pile at the rate of 2 cubic feet per minute. The sand pile is shaped like a cone whose height and base diameter are always equal. At what rate is the height of the pile growing when the pile is 5 feet high?
5. A ladder 13 feet long is leaning against the side of a building. If the foot of the ladder is pulled away from the building at a constant rate of 8 inches per second, how fast is the area of the triangle formed by the ladder, the building and the ground changing at the instant when the top of the ladder is 12 feet above the ground?