

Related Rates

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1. A dump-truck is pouring sand onto a pile at a rate of $0.5m^3/\text{min}$. The pile of sand is the shape of a cone whose base is always the same length as the height. How fast is the pile increasing when the height is 4cm.
2. A baseball player is currently on first base. He starts running from first base to second base at a rate of 30feet/sec. How fast is the distance between him and homeplate changing when the player is 45 feet off first base?

3. A spherical snowball melts at a rate of $2\pi\text{cm}^3/\text{hr}$. It melts symmetrically such that it is always a sphere. How fast is its radius changing at the instant $r = 10$.

4. A tank of water the shape of a cone is being drained with water at a rate of $15\text{m}^3/\text{min}$. The base radius is 27 meters and the height is 9 meters. At what rate is the depth of water changing when the radius of the top of the water is 10 meters.

5. The angle of elevation is the angle formed by a horizontal line and a line joining the observers eye to an object above the horizontal line. A person is 5km away from a launch pad for a rocket. The rocket is blasting off at a rate of 8km/s. At what rate is the angle of elevation θ , changing when the rocket is 40km above the ground.