

## More Difficult Related Rates:

- 1) Grain is poured through a chute at the rate of  $10 \text{ ft}^3/\text{min}$  and falls into a conical pile whose radius is always  $\frac{1}{2}$  its height. How fast will the circumference of the base be increasing when the pile is 8 feet high?
- 2) How fast is the area of a square increasing when the side is 3 meters in length and growing at a rate of .3 meters/minute?
- 3) Another cone: Sand is trucked onto Smith Point Beach to combat erosion. When the truck deposits the sand, it forms a conical pile whose height is always equal to the diameter. If the height increases at a constant rate of 5 ft/sec, what rate is the volume of the sand changing when the pile is 10 ft high?
- 4) A Satellite is in elliptical orbit around the Earth. Its distance from the center of the Earth is given by 
$$r = \frac{4995}{1 + .12 \cos \theta}$$
  - a) Find the distance at the perigee and apogee
  - b) At the instant when  $\theta$  is  $120^\circ$ , the angle is increasing at the rate of  $2.7^\circ/\text{minute}$ . Find the altitude of the satellite and the rate at which it is changing.