

1. A spherical balloon is inflated with helium at the rate of 100π cubic feet per minute. How fast is the balloon's radius increasing at the instant the radius is 5 feet. How fast is the surface area increasing?

2. A rocket is launched vertically upward from a point 2 miles west of an observer on the ground. When the angle of elevation (from the horizontal) of the observer's line of sight to the rocket is $\pi/6$ radians, that angle is increasing at $\pi/36$ radians per second. What is the speed of the rocket at that time?

3. When a circular plate of metal is heated in an oven, its radius increases at the rate of 0.01 centimeters per minute. At what rate is the plate's area increasing when the radius is 50 centimeters.

4. Sand falls from a conveyer belt at the rate of 10 cubic feet per minute onto a conical pile. The radius of the base of the pile is always equal to half the pile's height. How fast is the height growing when the pile is 5 feet high?