RELATED RATES

(1) A clown is blowing air into a soap bubble at the rate of 8 cm^3/sec. Assuming the bubble is spherical, how fast is the radius increasing when the volume is 288π cm^3? How fast is the surface area changing at that time?

(2) The length of a rectangle is increasing at a rate of 8 cm/sec and its width is increasing at a rate of 3 cm/sec. When the length is 20 cm and the width is 10 cm, how fast is the area of the rectangle increasing?

(3) A liquid is to be cleared of sediment by pouring it through an inverted cone-shaped filter. The height of the cone is 20 in and the diameter across the top is 16 in. If the liquid is flowing out at 2 in^3/min, how fast is the depth of the liquid changing when it is 12 in deep?

(4) A cylinder is being flattened so that its volume does not change and the height is decreasing at 0.2 in/sec. Find the rate of change of the radius when $r = 3$ in and $h = 4$.

(5) At noon, ship A is 150 km west of ship B. Ship A is sailing east at 35 km/hr and ship B is sailing north at 25 km/hr. How fast is the distance between the ships changing at 4:00pm?

(6) A 6–ft tall person is walking away from an 18–ft high streetlight at a rate of 8 ft/sec. At what rate is the tip of the person's shadow moving when the person is 100 ft from the light pole? At what rate is the length of the person's shadow changing at this same time?

(7) A camera is mounted at a point 3000 ft from the base of a rocket launch pad. If the camera to rocket distance is changing at 750 ft/sec when the rocket is 4000 ft high, how fast is the rocket rising at this time? At what rate is the angle between the tip of the rocket and the camera's line of sight changing at that time?

(8) A boat is pulled to a dock by a rope with one end attached to the front of the boat and the other end passing through a ring attached to the dock at a point 5 ft higher then the front of the boat. The rope is being pulled through the ring at the rate of 0.6 ft/sec. How fast is the boat approaching the dock when 13 ft of rope is left?

(9) A lighthourse is located on a small island 2 miles away from the nearest point P on a straight shoreline and its light makes 10 revolutions per minute. How fast is the beam of light moving along the shoreline when it is 2 miles from P?

(10) A ladder 13 meters long rests on horizontal ground and leans against a vertical wall. The foot of the ladder is pulled away from the wall at a rate of 0.6 m/sec. How fast is the tip sliding down the wall when the foot of the ladder is 5 meters from the wall?