Related Rates

1. A man 2 m tall walks directly away from a street light that is 8 m high at the rate
Of 3/2 m/sec. How fast is the length of his shadow changing?

(Ans. 1/2 m /sec)

2. One side of a rectangle is increasing at a rate of 3 cm/sec and the other side is decreasing at a rate of 4 cm/sec. How fast is the area of the rectangle changing when the increasing side is 12 cm long and the decreasing side is 10 cm long?

(Ans. -18 cm^2 /sec)

3. A ladder 15 ft long rests against a vertical wall. If the bottom of the ladder slides away from the wall horizontally at a rate of 4 ft/sec. How fast is the ladder sliding down the wall when the top of the ladder is 12 ft from the ground?

(Ans. −3 f t/sec)

4. The area of a circle is decreasing at a rate of (8π/9) cm^2/min. At what rate is the radius of the circle changing when the area is (π/9) cm^2?

(Ans. (−4/3) cm/min)

5. A Street light is mounted at the top of a 5-meter-tall pole. A man 2m tall walks away from the pole with a speed of (3/2) m/s along a straight path. How fast is his shadow moving when he is 10 m from the pole?

(Ans. 1m/s)

6. The edge of a cube increases at a rate of 3 cm/s. When the edge length is 2 cm, the rate at which the surface area of the cube is increasing is:

(Ans. 72 cm^2/s)

7. A 10 − ft ladder is leaning against a vertical wall when its base starts to slide away from the wall. By the time the base is 8 ft from the wall, the base is moving at the rate of 2 ft/s. At this instant, the rate at which the area of the triangle (formed by the wall, the ground, and the ladder) is changing is

(Ans. (−14/3) ft^2/s)

8. A hot air balloon rising straight up from a level field is tracked by a boy 300 ft on the ground from the lifting point. If the balloon is rising at the constant rate of 150 ft/min, then the rate of change of the boy's elevation angle θ when θ = (π/4) is

(Ans. 0.25 rad/min)

9. A car A is travelling east at 68 km/h and a car B is travelling south at 80 km/h. Both are headed towards the same intersection of the roads. At what velocity are the cars approaching each other when car A is 500 m and car B is 1200m from the intersection?

10. A street-light is mounted at the top of a 10-metre-tall pole. A man 2 meters tall runs away from the pole in a straight line with a speed of 8 m/s. At what rate is the line from the top of the pole to the tip of his shadow rotating when he is 6 meters from the pole?

(Ans. 0.64 rad/s)

11. The two equal sides of an isosceles triangle have length 4m. If the angle between them is increasing at a rate of 0.06 rad/s, then the rate at which the area of the triangle is changing when the angle between the sides of the triangle is (π/3) equals

(Ans. 0.24 m^2/s)

12. If a snow ball melts so that its surface area decreases at a rate of 1 cm^2/ min, then the rate at which the diameter changes, when the diameter is 10 cm equals
(Hint: Surface area of a sphere = $4\pi r^2$)

(Ans. ($-1/20\pi$) cm/min)