

Related Rates Practice

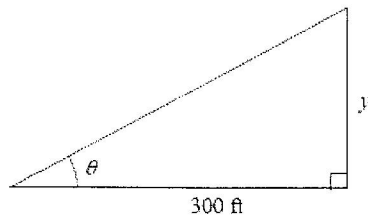
1. The radius of a circle is changing at the rate of $1/\pi$ inches per second. At what rate, in square inches per second, is the circle's area changing when $r = 5$ in?

(A) $\frac{5}{\pi}$ (B) 10 (C) $\frac{10}{\pi}$ (D) 15

2. The volume of a cube is increasing at the rate of $12 \text{ in}^3/\text{min}$. How fast is the surface area increasing, in square inches per minute, when the length of an edge is 20 in?

(A) 1 (B) $\frac{6}{5}$ (C) $\frac{4}{3}$ (D) $\frac{12}{5}$

3.



In the figure shown above, a hot air balloon rising straight up from the ground is tracked by a television camera 300 ft from the liftoff point. At the moment the camera's elevation angle is $\pi/6$, the balloon is rising at the rate of 80 ft/min. At what rate is the angle of elevation changing at that moment?

(A) 0.12 radian per minute (C) 0.2 radian per minute
(B) 0.16 radian per minute (D) 0.4 radian per minute

4. A car is approaching a right-angled intersection from the north at 70 mph and a truck is traveling to the east at 60 mph. When the car is 1.5 miles north of the intersection and the truck is 2 miles to the east, at what rate, in miles per hour, is the distance between the car and truck is changing?

(A) Decreasing 15 miles per hour (C) Increasing 6 miles per hour
(B) Decreasing 9 miles per hour (D) Increasing 12 miles per hour

5. The radius r of a sphere is increasing at a constant rate. At the time when the surface area and the radius of sphere are increasing at the same numerical rate, what is the radius of the sphere?

(The surface area of a sphere is $S = 4\pi r^2$.)

(A) $\frac{1}{8\pi}$ (B) $\frac{1}{4\pi}$ (C) $\frac{1}{3\pi}$ (D) $\frac{\pi}{8}$

6. If the radius r of a cone is decreasing at a rate of 2 centimeters per minute while its height h is increasing at a rate of 4 centimeters per minute, which of the following must be true about the volume V of the cone?

$$(V = \frac{1}{3}\pi r^2 h)$$

(A) V is always decreasing. (C) V is increasing only when $r > h$.
(B) V is always increasing. (D) V is increasing only when $r < h$.