

PRACTICE PROBLEM SET 12

Now try these problems on your own. The answers are in Chapter 21.

1. Oil spilled from a tanker spreads in a circle whose circumference increases at a rate of 40 ft/sec. How fast is the area of the spill increasing when the circumference of the circle is 100π ft?
2. A spherical balloon is inflating at a rate of 27π in³/sec. How fast is the radius of the balloon increasing when the radius is 3 in?
3. Cars A and B leave a town at the same time. Car A heads due south at a rate of 80 km/hr and car B heads due west at a rate of 60 km/hr. How fast is the distance between the cars increasing after three hours?
4. A cylindrical tank with a radius of 6 meters is filling with fluid at a rate of 108π m³/sec. How fast is the height increasing? *When $h=2$*
5. The sides of an equilateral triangle are increasing at the rate of 27 in/sec. How fast is the triangle's area increasing when the sides of the triangle are each 18 inches long?
6. An inverted conical container has a diameter of 42 in and a depth of 15 in. If water is flowing out of the vertex of the container at a rate of 35π in³/sec, how fast is the depth of the water dropping when the height is 5 inches?
7. A boat is being pulled toward a dock by a rope attached to its bow through a pulley on the dock 7 feet above the bow. If the rope is hauled in at a rate of 4 ft/sec, how fast is the boat approaching the dock when 25 feet of rope is out?
8. A 6-foot-tall woman is walking at the rate of 4 ft/sec away from a street lamp that is 24 feet tall. How fast is the length of her shadow changing?
9. The voltage V , in an electrical circuit is related to the current, I , and the resistance, R , by the equation $V = IR$. The current is decreasing at -4 amps/sec as the resistance increases at 20 ohms/sec. How fast is the voltage changing when the voltage is 100 volts and the current is 20 amps?
10. The minute hand of a clock is 6 inches long. Starting from noon, how fast is the area of the sector swept out by the minute hand increasing in in²/min at any instant?

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1) $2000 \text{ ft}^2/\text{sec}$

2) $0.75 \text{ in}/\text{sec}$

3) $100 \text{ km}/\text{hr}$

4) $3 \text{ m}/\text{sec}$

5) $420.89 \text{ in}^2/\text{sec}$

6) $5/7 \text{ in}/\text{sec} \approx 0.714$

7) $4107 \text{ ft}/\text{sec}$