

Related Rates Examples

1. Oil spills from a ruptured tanker and spreads in a circular pattern. If the radius of the oil spill increases at a constant rate of 1 m/s, how fast is the area of the spill increasing when the radius is 30 m?
2. A particle is moving along the curve $y = \sqrt{x}$. As the particle passes through the point $(4, 2)$ its x -coordinate increases at a rate of 3 cm/s. How fast is the distance from the particle to the origin changing at this instant?
3. Suppose the wood nymphs and satyrs are having a party in honor of Bacchus and the wine is flowing freely from the bottom of a giant cone shaped barrel which is 12 feet deep and 6 feet in radius at the top. If the wine is disappearing at a rate of 6 cubic feet per hour, at what rate is the depth of the wine going down when the depth is 4 feet?
4. A lighthouse is located on a small island 3 km away from the nearest point P on a straight shoreline and the light makes 4 revolutions per minute. How fast is the beam of light moving along the shoreline when it is 1 km away from P ?
5. Two people start from the same point. One walks east at 3 mi/h and the other walks northeast at 2 mi/hr, how fast is the distance between the two people changing after 15 minutes?
6. A trough is 10 ft long and its end have the shape of isosceles triangles that are 3 ft across at the top and have a height of 1 ft. If the trough is filled with water at a rate of 12 feet cubed per minute, how fast the water level rising when the water is a half a foot deep?
7. Bigfoot wanders out of the mountains and onto a city street in Seattle. Weighing in at 441 fur-covered pounds and reaching a height of 8 feet, he looks like an unusually big grunge rocker. Suppose that the Big Guy, new to the Big City, walks quizzically toward a streetlight at a rate of 2 feet per second. If the light is at a height of 12 feet, at what rate is the length of Bigfoot's shadow changing when he is 6 feet from the base of the lamppost?

Problems 3 and 7 are from "How to Ace Calculus" by Adams, Hass, and Thompson.