

Lesson 16: Related Rates, Part 2

1. The base of a 10-ft ladder that is leaning against a wall is pushed towards the wall. When the base is 6 ft from the wall and moving at the rate of 2 ft/sec, how fast is the top of the ladder sliding up the wall?

2. An airplane flies at an altitude of 5 miles toward a point directly over an observer. The speed of the plane is 600 miles per hour. Find the rate at which the angle of elevation is changing when the angle is:

(a) $\frac{\pi}{3}$

(b) $\frac{\pi}{4}$

3. Two airplanes depart the Purdue Airport. One leaves at noon heading due east at 550 miles per hour and the other leaves at 12:30pm heading due north at 600 miles per hour. How quickly is the distance between them changing at 1:30pm?

4. An airplane flying at an altitude of 10 miles passes directly over a radar antenna. When the airplane is 15 miles away, the radar detects that the distance is changing at a rate of 250 miles per hour. What is the speed of the airplane?

5. A boat is pulled into a dock by means of a winch 15 feet above the deck of the boat. The winch pulls in rope at a rate of 5 feet per second. Determine the speed of the boat when there is 39 feet of rope out.

6. In softball, the distance between each base is 60 feet. A player is running from second base to third base at a speed of 16 feet per second. Find the rate at which the distance from home plate is changing when the player is 20 feet from second base.