

Example Suppose that both x and y depend on t (thought of as time) and for all values of t , $\sin x + \cos y = 1$. Suppose the most important thing in our lives right now is to figure out what dy/dt equals when $x = \pi/6$, $y = \pi/3$, and $dx/dt = 2$.

Example (Bigfoot Problem) 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?

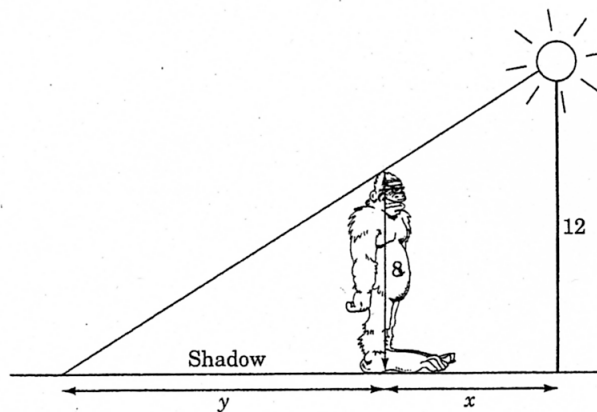


Figure 18.1 Bigfoot discovers electricity.

Example (Tracking a UFO) The TV show "Unnatural Experiences and Nauseating Aliens" claims to have photographed a UFO as it flies overhead, at a constant altitude of 3 miles and a constant speed. They state that they took the photo (which resembles a very blurry cigar, including what appears to be the cigar label) at the instant after the UFO had already flown horizontally 4 miles past the point directly above them. They say that the radar gun showed that at the instant the photograph was taken, the distance between the photographer and the UFO was growing at a speed of 384 mph. Determine the speed that the UFO/cigar was traveling.

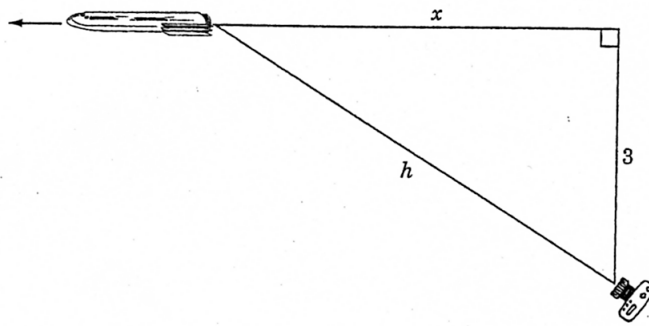


Figure 18.3 UFO captured on film.

Example (Wine Barrel Problem) Suppose the wood nymphs and satyrs are having a hot 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 wine in the tank going down when the depth is 4 feet?

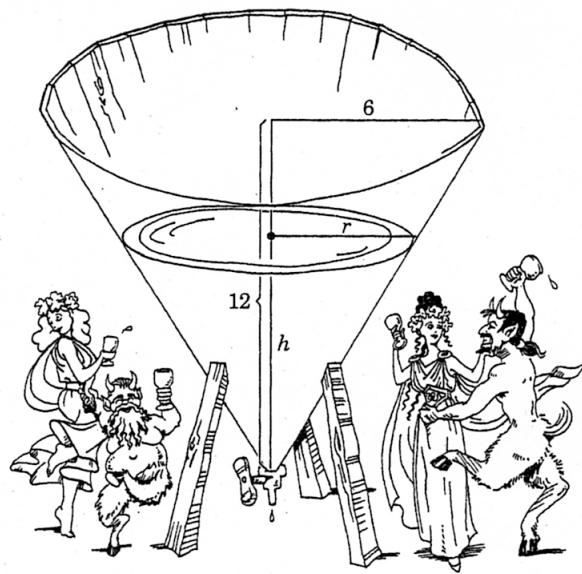


Figure 18.2 Wood nymphs and satyrs frolic.