

(a) Draw a sketch of the situation.

(c) Write an equation relating the (variable and constant) quantities.

(d) Finish solving the problem.

1. A plane flying horizontally at an altitude of 1 mile and a speed of 500 miles per hour passes directly over a radar station. Find the rate at which the distance from the plane to the station is increasing when it is 2 miles away from the station.
2. If a snowball melts so that its surface area decreases at a rate of $1 \text{ cm}^2/\text{min}$, find the rate at which the diameter decreases when the radius is 5 cm.

3. The rate of change of atmospheric pressure P with respect to altitude h is proportional to P . (This assumes the temperature is constant.)

(a) Write a differential equation corresponding to the first sentence above; use k for the constant of proportionality. Then write a formula for $P(h)$ in terms of $P(0)$, k , and h .

(b) At a temperature of 15°C , the pressure is 101.3 kPa at sea level and the pressure is 87.14 kPa at $h = 1000$ m. From these facts, determine $P(0)$ and k .

(c) What is the pressure at the top of Denali, at an altitude of 6187 m? (*This problem in the book, #19 in §3.8, has an error. It calls it "Mount McKinley."*)

(d) At what altitude is the pressure $1/3$ of what it is at sea level?