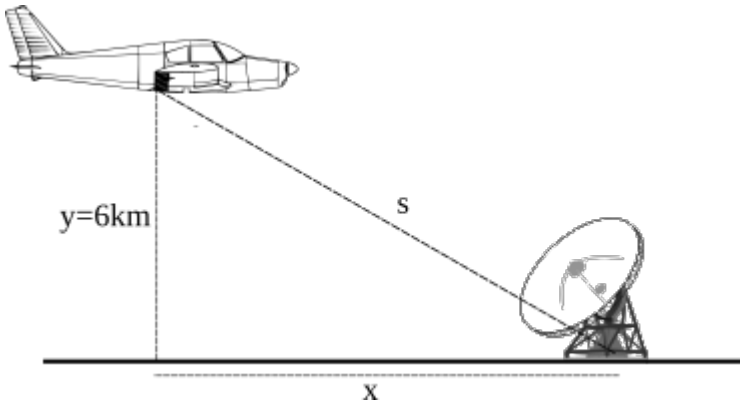
Differential Calculus - Level 2

Project Leibniz

November 25, 2019

1. A radar station can be used to deduce the speed of an airplane. The radar station measures the distance s to the airplane in km. The airplane is cruising at a height of 6km above the ground. The radar station finds that s is decreasing at a rate of 400km per hour when $s = 10$km.



   (a) When $s = 10$km, write down $\frac{ds}{dt}$

   (b) The altitude of the plane is not changing. Write down $\frac{dy}{dt}$.

   (c) Use Pythagoras' Theorem to write down the relationship between the values of x, y and s

   (d) Hence find x when $s = 10$

   (e) The displacement of the airplane from the tower is denoted x, write down how we would denote the speed of the airplane.

   (f) Hence, using rates of change, find the horizontal speed of the airplane in km per hour.