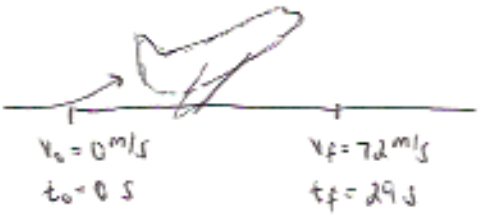
Example 4:
An airplane is starting from rest (initial velocity = 0 m/s) at an initial time ($t_o = 0$). The plane is trying to gain enough velocity to take off as it accelerates down the runway. At t = 29 s, the velocity is 72 m/s. Determine the average acceleration of the plane.



$$\bar{a} = \frac{\Delta v}{\Delta t} = \frac{v_f - v_o}{t_f - t_o}$$

$$\bar{a} = \frac{72 - 0}{29 - 0}$$

$$\bar{a} = 2.48\ m/s^2$$

Kinematics

Example 5:
A plane is moving down a runway, trying to take off. It begins from rest and must reach a velocity of 30.0 m/s to lift off the ground. The acceleration of the plane is a constant 3.00 m/s^2. How long must the runway be for the plane to take off?

Example 6:
A car has an initial velocity of 31.4 km/h. It accelerates at a uniform rate of 1.2 m/s^2 for 1.3 seconds. Please express your answers in SI units.

A. What is the final velocity of the car?
B. What is the displacement of the car during this time?

Example 7:
A bullet is fired from a gun with an initial velocity of 367 m/s before embedding itself into a lump of clay. The bullet penetrates into the clay a distance of 0.0621 m before coming to a stop. Assuming a uniform acceleration, what is the value for the acceleration of the bullet as it moves into the clay?