Acceleration

- **Acceleration:**

$$a = \frac{\text{change in velocity}}{\text{change in time}} = \frac{\Delta v}{\Delta t}$$

Standard units of acceleration : m/s^2
(meters per second per second)

- **If there were no air resistance, all objects in Earth gravity would fall with the same acceleration,**

$g = 9.81\ m/s^2$
(directed downward)

Homework 5

Problem 1.

The largest passenger airplane, Airbus A380, needs 40 seconds to reach its takeoff speed, $v = 280$ km/h. What is the acceleration of the plane? Convert your answer to m/s^2 .

Problem 2.

If in the future humans are to reach the nearby stars, they would need spaceships traveling with speed close to the speed of light. Imagine that a spaceship is accelerating with acceleration 10 m/s^2 (more or less equal to the Earth's gravitational acceleration).

a) How long would it take such a ship to reach 1/10 of the speed of light? Speed of light is 3×10^8 m/s .
b) How long would it take such a ship to reach the Alpha Centauri system which is about 4 lightyears away from the Earth (and is the star system closest to us)? Assume that after reaching 1/10 of the speed of light the spaceship continues to move with that speed.