Question #53995, Physics / Mechanics | Kinematics | Dynamics |

what is acceleration

Answer:

Acceleration is the changing of an object's velocity with time.[1] Acceleration is a vector quantity which shows the rate of changing velocity. It is clear that object has acceleration if its velocity is changed.

Average acceleration is a vector quantity which is defined:

$<a> = (v_1-v_2)/t$,

where v_1 and v_2 – the initial and final velocities, respectively; t – the period of time at which velocity are changed.

Based on the equation the value of acceleration is measured in [velocity/time] units, namely, [m/s^2] in SI.

Acceleration is positive, when the object increases its velocity, and negative value is for the case, when the object is slowing down or moves in opposite direction.

Instantaneous acceleration is the change in velocity, when the time interval goes to zero, and equals the first derivative of velocity with respect to time:

$a = dv/dt$

If there is no change in velocity values (v = const), the acceleration is zero. This case the object has uniform motion.

The most important thing is that acceleration is associated with force exerted on the object. According to the Second Newton's Law the total force, which acts on the object, results in acceleration of the object:

$F = m \times a$, where F – the force, m and a – mass and acceleration of the object.

[1] Raymond A. Serway,Chris Vuille,Jerry S. Faughn, College Physics, vol.10.

Here there is a good detailed explanation of given points:
http://www.physicsclassroom.com/class/1DKin/Lesson-1/Acceleration