Answer on Question #40354, Physics, Mechanics | Kinematics | Dynamics

How large an average force is required to stop a 1400-kg car in 5.0 s if the car's initial speed is 25 m/s?

Solution:

The force is defined as the rate of change of momentum for a particular interval of time t. It is difficult to find the rate of change if time interval is small. So there comes the term average force.

An average force is the rate of change of momentum over a period of intervals (Δt). It is given by

$$F = \frac{m(v_f - v_i)}{\Delta t}$$

Where m is the mass of the body,

v_f is the final speed,

v_i is the initial speed,

Δt is the change in time.

Given: Mass of car m = 1400 kg,

Initial velocity v_i = 25 m/s

Final velocity v_f = 0

change in time Δt = 5.0 s

The average force is given by

$$F = \frac{m(v_f - v_i)}{\Delta t} = \frac{1400 \cdot (0 - 25)}{5} = -7000 \text{ N}$$

" - "sign indicates that force acts opposite to the direction of motion of a car.

Answer. -7000 N.