

Q- The particle's velocity moving along the x-axis varies according to the expression velocity = $50 - 10 t^2$, Find the average acceleration in the time interval $t = 0$ to $t = 2.0$ seconds.

The average acceleration is the ratio of change in velocity to the time interval, or

$$\langle a \rangle = \frac{\Delta v}{\Delta t}$$

Now velocity is given by

$$v = 50 - 10 t^2$$

Thus, velocity at $t = 0$ is given by

$$v_0 = 50 - 10 * 0^2 = 50 \text{ m/s}$$

And velocity at $t = 2$ is given by

$$v_2 = 50 - 10 * 2^2 = 10 \text{ m/s}$$

Thus, the change in velocity during this time interval of 2s is

$$\Delta v = v_2 - v_0 = 10 - 50 = -40 \text{ m/s}$$

Hence the average acceleration during this interval is

$$\langle a \rangle = \frac{\Delta v}{\Delta t} = \frac{-40}{2-0} = -20 \text{ m/s}^2$$

(Negative shows retardation)

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