Answer on Question #51991 – Physics – Other

Question.

The displacement of a particle along the X-axis is given as $x = 5t^2 + 1$, where x is in metres and t in seconds. Calculate its instantaneous velocity 2 s.

Given:

$x = 5t^2 + 1\ (m)$

$t_0 = 2\ s$

Find:

$v(t_0) = ?$

Solution.

By definition:

$$x = \frac{at^2}{2} + v_0 t + x_0$$

$$v(t) = \frac{dx}{dt}$$

Therefore,

$$v_0 = 0$$

$$v(t) = 10t$$

So,

$$v(t_0) = 10t_0 = 10 \cdot 2 = 20\ \frac{m}{s}$$

Answer.

$v(t_0) = 10t_0 = 20\ \frac{m}{s}$