Answer on Question #48123 – Physics – Mechanics | Kinematics | Dynamics

Question.

The velocity of a body moving in straight line with a constant acceleration is 10 m/s at a certain instant "t". After 5 secs the velocity becomes 20 m/s, the velocity 3 secs before t was?

Given:

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

$v(t+5) = 20\ \frac{m}{s}$

$a = const$

Find:

$v(t-\ 3) = ?$

Solution.

By definition the accelerations is:

$$a = \frac{dv}{dt} = \frac{v(t+\Delta t) - v(t)}{\Delta t}$$

In our case, $\Delta t = 5$

$$a = \frac{dv}{dt} = \frac{v(t+\Delta t) - v(t)}{\Delta t} = \frac{v(t+5) - v(t)}{5}$$

Calculate:

$$a = \frac{20-10}{5} = 2\ \frac{m}{s^2}$$

So, we found the acceleration. And now we can define the velocity in any instant, because the acceleration is constant. We can express the acceleration as following:

$$a = \frac{dv}{dt} = \frac{v(t+\Delta t) - v(t)}{\Delta t}$$

Therefore,

$$v(t+\Delta t) = v(t) + a\Delta t$$

Let use $\Delta t = -3$:

$$v(t-3) = v(t) - 3a$$

Calculate:

$$v(t-3) = 10 - 3 \cdot 2 = 4\ \frac{m}{s}$$

Answer.

$v(t-3) = 4\ \frac{m}{s}$