

Answer on Question #46835, Physics, Mechanics | Kinematics | Dynamics

A particle moves according to the position function $x(t)=ct^2+bt$, with $c = 2\text{m/s}$ and $b= -5\text{m/s}$. Find the acceleration and velocity when the particle is at the origin.

Solution:

The kinematics equation is:

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

where x_0 is the initial position, v_0 is the initial velocity and a is the acceleration.

From given we have

$$x(t) = ct^2 + bt = 2t^2 - 5t$$

Thus, from comparing two equations we have

$$x_0 = 0$$

$$v_0 = -5 \text{ m/s}$$

$$a = 4 \text{ m/s}^2$$

Answer: $a = 4 \text{ m/s}^2, v_0 = -5 \text{ m/s}$.