Answer on Question #59556 – Physics – Other

Question: a particle moves along a straight line and its displacement x at a time t is given by $x = t^3 - 3t^2 + 3t + 4$. The velocity when the acceleration is zero is?

Solution:

The displacement of the particle at a time t is given by:

$$x(t) = t^3 - 3t^2 + 3t + 4$$

Thus, one can find the velocity of the particle as the first derivative of function $x(t)$:

$$v(t) = \frac{dx(t)}{dt} = 3t^2 - 6t + 3$$

Next, one can find the acceleration of the particle as the second derivative of $x(t)$:

$$a(t) = \frac{d^2x(t)}{dt} = \frac{dv(t)}{dt} = 6t - 6$$

We see that the acceleration is zero, when:

$$6t - 6 = 0 \rightarrow t = 1$$

Finally, we obtain the velocity at the time $t = 1$:

$$v(1) = 3 \cdot 1^2 - 6 \cdot 1 + 3 = 0$$

Answer:

Velocity at the time, when the acceleration of the particle is equal zero, is also equal to zero:

$$v(1) = 0$$