

Answer on Question #50584 – Math – Calculus

Question

The length, l mm of an elastic string at time t seconds is given by $l = t^3/3 - 4t + 10$. Find the instants (that is, the value of t) when:

- a) The length is increasing at a rate of 5 mm/Sec
- b) The length is decreasing at a rate of 4 mm/Sec

Solution

$$l = \frac{t^3}{3} - 4t + 10$$

Evaluate the derivative of l with respect to t :

$$\frac{dl}{dt} = t^2 - 4$$

a)

$$\frac{dl}{dt} = 5$$

Therefore,

$$t^2 - 4 = 5$$

$$t^2 = 9$$

$t = 3$ sec, because instant (value of t) is non-negative

b)

$$\frac{dl}{dt} = -4$$

$$t^2 - 4 = -4$$

$$t^2 = 0$$

$$t = 0 \text{ sec}$$

Thus, it is initial moment.

Answer:

- a) $t = 3$ sec
- b) $t = 0$ sec.