

## Answer on Question #63933 – Math – Calculus

### Question

1. A particle moves along a straight line according to the law:

$$S = 132 + 10t - 6t^2 + 3t^3.$$

Find the following:

- a) The velocity and acceleration at any time  $t$ ?
- b) Velocity at  $t = 2$ ;
- c) Acceleration at  $t = 3$ .

### Solution

Let's find laws for velocity and acceleration:

a) Velocity:  $V(t) = \frac{dS}{dt} = (132 + 10t - 6t^2 + 3t^3)' = 10 - 12t + 9t^2$ ;

Acceleration:  $A(t) = \frac{dV}{dt} = (10 - 12t + 9t^2)' = -12 + 18t$ .

Now we can find velocity and acceleration at any time  $t$ :

- b) Velocity at  $t = 2$ :

$$V(2) = 10 - 12 \cdot 2 + 9 \cdot 2^2 = 10 - 24 + 36 = 22.$$

- c) Acceleration at  $t = 3$ :

$$A(3) = -12 + 18 \cdot 3 = -12 + 54 = 42.$$

**Answer:**

a)  $V(t) = 10 - 12t + 9t^2$ ,  $A(t) = -12 + 18t$ ;

b)  $V(2) = 22$ ;

c)  $A(3) = 42$ .