St. Lawrence High School

A Jesuit Christian Minority Institution

Term : 1ˢᵗ

Work Sheet – 4

Class – XI   Subject – Physics   Date – 18.06.20

Chapter – Motion in 1D   Topic – Differentiation

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Choose the correct option for the following questions. $1 \times 15 = 15$

1. Differentiating $5x^3 - \frac{1}{2}x^2$ w.r.t x we will get –

   a. $\frac{5}{3}x^2 - x$

   b. $5x^2 - 1$

   c. $15x^2 - 2x$

   d. $15x^2 - x$

2. If $y = ax^3 - bx + c$, where a, b and c are the non zero constants, then $\frac{dy}{dx} =$

   a. $3ax^2 - b$

   b. $ax^2 - bx$

   c. $3ax^2 - bx$

   d. $3ax^2 - b + c$

3. $s = 5t^2 - \sin t$, then $\frac{ds}{dt} =$

   a. $10t - \cos t$

   b. $10t^2 + \cos t$

   c. $\frac{5}{2}t + \cos t$

   d. $10t + \cos t$

4. If $y = \frac{x^4}{4}\cos x$, then $\frac{dy}{dx} =$

   a. $x^3\cos x - \frac{x^4}{4}\sin x$

   b. $x^3\sin x - \frac{x^4}{4}\cos x$

   c. $\frac{x^3}{4}\cos x - \sin x$

   d. None of these

5. Differentiating $\sqrt{x} - \frac{1}{\sqrt{x}}$ w.r.t x, we get –

   a. $\frac{1}{2\sqrt{x}}\left(1 + \frac{1}{x}\right)$

   b. $\frac{1}{2\sqrt{x}}\left(1 - \frac{1}{x}\right)$

   c. $\frac{1}{\sqrt{x}}\left(1 + \frac{1}{x}\right)$

   d. None of these

6. If, $y = (2x + 6)^5$, then $\frac{dy}{dx} =$
   a. $10(2x + 6)^4$
   b. $5(2x + 6)^4$
   c. $30(2x + 6)^4$
   d. *None of these*

7. If $y = e^x . lnx$, then $\frac{dy}{dx} =$
   a. $\frac{e^x}{x} - e^x . lnx$
   b. $\frac{e^x}{x} + e^x . lnx$
   c. $e^x . lnx$
   d. None of these

8. If $y = 5t^3$ and $x = sint$ then what will be the value of $\frac{dy}{dx}$?
   a. $15t^2 \, cost$
   b. $15t^2 - sect$
   c. $15t^2 + cost$
   d. $15t^2 \, sect$

9. The displacement of a particle in 1D motion is given as $x = 3t^3 - 9t$ m. The nature of acceleration – time graph of the particle will be –
   a. A straight line parallel to the time axis
   b. A straight line parallel to the acceleration axis
   c. A straight line making an acute angle with the time axis.
   d. A straight line making an obtuse angle with the time axis.

10. The displacement of a particle is given as a function of time as $s = (t^2 - 5t)m$, where t is in sec. The velocity and acceleration of the particle are respectively –
    a. $(t^2 - 5)m/s \quad and \quad 2t \, m/s^2$
    b. $(2t - 5)m/s \, and \, 2 \, m/s^2$
    c. $(2t)m/s \, and \, 2 \, m/s^2$
    d. $(2t - 5)m/s \, and \, 0 \, m/s^2$

11. The displacement of a particle in 1D motion is given as $x = 3t^3 - 9t$ m. where t is in sec. the motion of the particle is –
    a. Uniformly accelerated
    b. Uniformly decelerated
    c. Non-Uniformly accelerated
    d. Non-Uniformly decelerated

12. In the above problem what is the velocity of the particle at 1sec?
    a. 0 m/s
    b. 9 m/s
    c. $- 9$m/s
    d. None of these

13. the velocity of a particle is given as $v = \frac{2}{3}t^3 - 4t^2$ m/s. what will its acceleration at t = 2 sec?
    a. 0 m/s^2
    b. 8 m/s^2
    c. – 8 m/s^2
    d. 16 m/s^2

14. In the above problem, what will be the acceleration of the particle when velocity is momentarily zero?
    a. – 24 m/s^2
    b. 24 m/s^2
    c. 48 m/s^2
    d. It is never possible to have acceleration when the velocity is zero.

15. The displacement of a particle in 1D motion is given as $x = 50 + 2t - 3t^3$ m. where t is in sec. the motion of the particle is –
    a. Uniformly accelerated
    b. Uniformly decelerated
    c. Non-Uniformly accelerated
    d. Non-Uniformly decelerated

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