



St. Lawrence High School  
A Jesuit Christian Minority Institution



Term : 1<sup>st</sup>

Solution of Work Sheet – 4

Class – XI

Subject – Physics

Date – 18.06.20

Chapter – Motion in 1D

Topic – Differentiation

Choose the correct option for the following questions.

1 × 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.  $15x^2 - x$

Ans: 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.  $3ax^2 - b + c$

Ans: a.  $3ax^2 - b$

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.  $10t + \cos t$

Ans: 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

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

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

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

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*

Ans: a.  $10(2x + 6)^4$

7. If  $y = e^x \cdot \ln x$ , then  $\frac{dy}{dx} =$

- a.  $\frac{e^x}{x} - e^x \cdot \ln x$
- b.  $\frac{e^x}{x} + e^x \cdot \ln x$
- c.  $e^x \cdot \ln x$
- d. *None of these*

Ans: b.  $\frac{e^x}{x} + e^x \cdot \ln x$

8. If  $y = 5t^3$  and  $x = \sin t$  then what will be the value of  $\frac{dy}{dx}$  ?

- a.  $15t^2 \cos t$
- b.  $15t^2 - \sec t$
- c.  $15t^2 + \cos t$
- d.  $15t^2 \sec t$

Ans: d.  $15t^2 \sec t$

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.

Ans: c. A straight line making an acute 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 and  $2t$  m/s<sup>2</sup>
- b.  $(2t - 5)$  m/s and  $2$  m/s<sup>2</sup>
- c.  $(2t)$  m/s and  $2$  m/s<sup>2</sup>
- d.  $(2t - 5)$  m/s and  $0$  m/s<sup>2</sup>

Ans: b.  $(2t - 5)$  m/s and  $2$  m/s<sup>2</sup>

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
- e. C. Non-Uniformly accelerated

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*

Ans: a. 0 m/s

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.  $0 \text{ m/s}^2$
- b.  $8 \text{ m/s}^2$
- c.  $-8 \text{ m/s}^2$
- d.  $16 \text{ m/s}^2$

Ans: C.  $-8 \text{ m/s}^2$

14. In the above problem, what will be the acceleration of the particle when velocity is momentarily zero?

- a.  $-24 \text{ m/s}^2$
- b.  $24 \text{ m/s}^2$
- c.  $48 \text{ m/s}^2$
- d. It is never possible to have acceleration when the velocity is zero.

Ans: b.  $24 \text{ m/s}^2$

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

Ans: d. Non-Uniformly decelerated

Name of the teacher – Soumitra Maity