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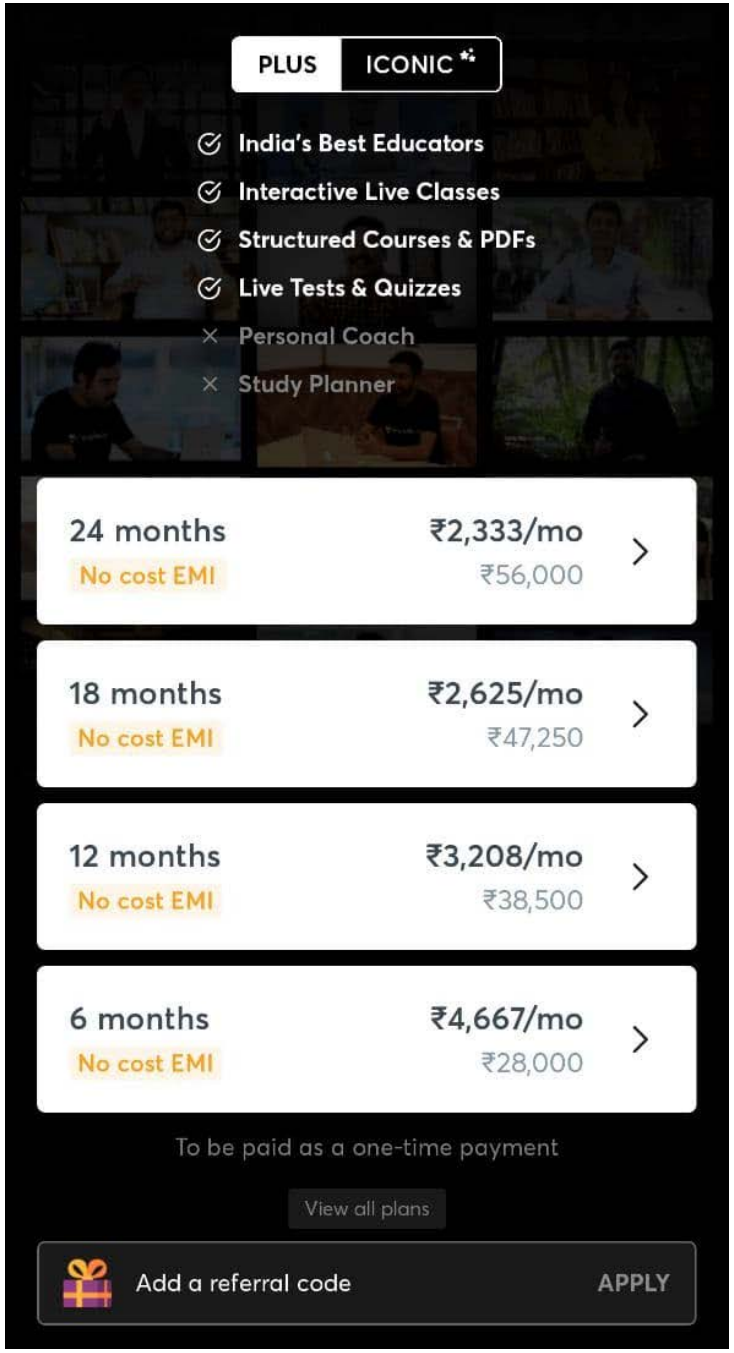

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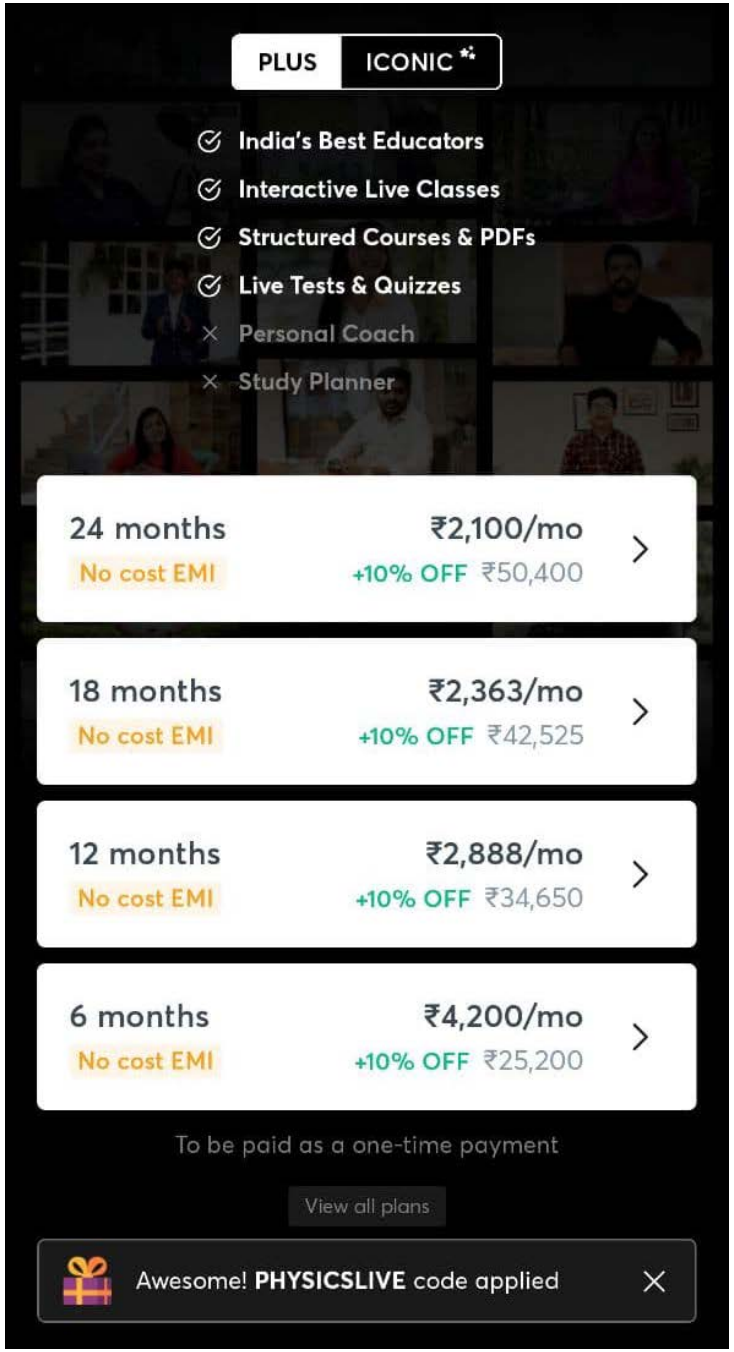

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IIT JEE
Physics DPP

DPP-4 Basic mathematics (Differentiations-1)

By Physicsaholics Team

Q) What is the derivative of a constant?

(a) 1

(b) zero

(c) ∞

(d) cannot be determined

Ans. b

$y = k$,

, where k = Constant

$$\frac{dy}{dx} = \frac{d}{dx}(k)$$

$$\boxed{\frac{dy}{dx} = 0}$$

Q) Find the derivative of the function: $F(x) = 6x^3 - 9x + 4$, w.r.t. 'x':

(a) $F'(x) = 18x^2 + 9$

(b) $F'(x) = 6x^2 - 9x$

(c) $F'(x) = 18x^2 - 9$

(d) None of these

Ans. c

$$F(x) = 6x^3 - 9x + 4$$

So, $\frac{d}{dx}(F(x)) = F'(x) = 6(3x^2) - 9(1) + 0$

$$\boxed{F'(x) = 18x^2 - 9}$$

Q) Find the derivative of the function: $F(x) = 10\sqrt[5]{x^3} - \sqrt{x^7} + 6\sqrt[3]{x^8} - 3$, w.r.t. 'x':

(a) $F'(x) = 6x^{-\frac{2}{5}} - \frac{7}{2}x^{\frac{5}{2}} + 16x^{\frac{5}{3}}$

(b) $F'(x) = 10x^{-\frac{2}{5}} - \frac{1}{2}x^{\frac{5}{2}} + 6x^{\frac{5}{3}}$

(c) $F'(x) = 6x^{-\frac{5}{2}} - \frac{7}{2}x^{\frac{7}{2}} + 16x^{\frac{8}{3}}$

(d) None of these

Ans. a

$$F(x) = 10\sqrt[5]{x^3} - \sqrt{x^7} + 6\sqrt[3]{x^8} - 3$$

$$F(x) = 10\,x^{3/5} - x^{7/2} + 6x^{8/3} - 3$$

So; $\frac{d}{dx}(F(x)) = F'(x)$

$$f'(x) = 10\left(\frac{3}{5}x^{\frac{3}{5}-1}\right) - \frac{7}{2}\left(x^{\frac{7}{2}-1}\right) + 6\left(\frac{8}{3}x^{\frac{8}{3}-1}\right) - 0$$

$$= 6x^{-\frac{2}{5}} - \frac{7}{2}x^{\frac{5}{2}} + 16x^{5/3}$$

$$\boxed{F'(x) = 6x^{-\frac{2}{7}} - \frac{7}{2}x^{\frac{5}{2}} + 16x^{5/3}}$$

Q) What is the derivative of $\cos x$ w.r.t. 'x'?

(a) $\cos x$

(b) $-\tan x$

(c) $\sin x$

(d) $-\sin x$

Ans. d

$$y = \cos x$$

$$\boxed{\frac{dy}{dx} = -\sin x}$$

Q) Differentiate w.r.t. ‘x’ if $y = 3\sin x - 2$

(a) $\frac{dy}{dx} = 3$

(b) $\frac{dy}{dx} = 3\cos x$

(c) $\frac{dy}{dx} = 3\cos x - 2$

(d) $\frac{dy}{dx} = 3\sin x$

Ans. b

$$y = 3\sin x - 2$$

$$\frac{dy}{dx} = 3(\cos x) - 0$$

$$\boxed{\frac{dy}{dx} = 3\cos x}$$

Q) Differentiate w.r.t. 'x' if $y = 15\sin x - 2e^x - \frac{1}{2}x^2 + 5$

(a) $\frac{dy}{dx} = 15\cos x - 2xe^x - 2x$

(b) $\frac{dy}{dx} = 15\cos x - 2e^x - x$

(c) $\frac{dy}{dx} = 15\cos x - 2$

(d) $\frac{dy}{dx} = 15\sin x - 2e^x - 2x$

Ans. b

$$y = 15\sin x - 2e^x - \frac{1}{2}x^2 + 5$$

$$\frac{dy}{dx} = 15(\cos x) - 2e^x - \frac{1}{2}(2x) + 0$$

$$\boxed{\frac{dy}{dx} = 15\cos x - 2e^x - x}$$

Q) Differentiate w.r.t. 'x' if $y = 2\,ln\,x - 2x^2 - 3\cos x + 1$

(a) $\frac{dy}{dx} = 2e^x - 4x - 3\sin x$

(b) $\frac{dy}{dx} = \frac{2}{x} - 4x - 3\sin x$

(c) $\frac{dy}{dx} = 2e^x - 4x + 3\sin x$

(d) $\frac{dy}{dx} = \frac{2}{x} - 4x + 3\sin x$

Ans. d

$$y = \cos x - 2x$$

$$\boxed{\frac{dy}{dx} = -\sin x - 2}$$

$$\because \frac{d}{dx}(\cos x) = -\sin x$$

Q) Differentiate w.r.t. 'x' if $y = \cos x - 2x$

(a) $\frac{dy}{dx} = \cos x - 2$

(b) $\frac{dy}{dx} = \sin x - 2$

(c) $\frac{dy}{dx} = -\sin x - 2$

(d) None of these

Ans. c

$$y = 2\ln x - 2x^2 - 3\cos x + 1$$

$$\frac{dy}{dx} = 2\left(\frac{1}{x}\right) - 4x - 3(-\sin x) + 0$$

$$\boxed{\frac{dy}{dx} = \frac{2}{x} - 4x + 3\sin x}$$

Q) Differentiate w.r.t. 'x' if $y = x^{\frac{5}{2}} + ln\, x + 2 \sin x$

(a) $\frac{dy}{dx} = \frac{5}{2} x^{\frac{3}{2}} + \frac{1}{x} + 2 \cos x$

(b) $\frac{dy}{dx} = \frac{5}{2} x^{\frac{3}{2}} - \frac{1}{x} - 2 \cos x$

(c) $\frac{dy}{dx} = x^{\frac{3}{2}} + \frac{1}{x} + 2 \cos x$

(d) $\frac{dy}{dx} = x^{\frac{3}{2}} + \frac{1}{x} - 2 \cos x$

Ans. a

$$y = x^{5/2} + \ln x + 2\sin x$$

$$\frac{dy}{dx} = \frac{5}{2}x^{\frac{5}{2}-1} + \frac{1}{x} + 2(\cos x)$$

$$\boxed{\frac{dy}{dx} = \frac{5}{2}x^{3/2} + \frac{1}{x} + 2\cos x}$$

Q) Differentiate w.r.t. 'x' if $y = \sin x - \cos x + \ln\left(\frac{1}{x}\right)$

(a) $\frac{dy}{dx} = \cos x - \sin x + \frac{1}{x}$

(b) $\frac{dy}{dx} = \cos x + \sin x + \frac{1}{x}$

(c) $\frac{dy}{dx} = \cos x + \sin x - \frac{1}{x}$

(d) None of these

Ans. c

$$y = \sin x - \cos x + \ln\left(\frac{1}{x}\right)$$

$$y = \sin x - \cos x + \ln(x^{-1})$$

$$y = \sin x - \cos x - \ln(x)$$

?

$$\frac{dy}{dx} = \frac{d}{dx}(\sin x - \cos x - \ln x)$$

$$= \cos x - (-\sin x) - \left(\frac{1}{x}\right)$$

$$\boxed{\frac{dy}{dx} = \cos x + \sin x - \frac{1}{x}}$$

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Chalo Niklo