



INDIAN SCHOOL AL WADI AL KABIR

Class XII, Mathematics *Worksheet - Derivatives*

18-08-2024

MCQ

Q.1. Derivative of 2^x with respect to x .

- A. 2^x B. $2^x \log 2$ C. $x \log 2$ D. $2^x(1+x)$

Q.2. If $\sqrt{x} + \sqrt{y} = \sqrt{a}$, then $\frac{dy}{dx}$

- A. $-\frac{\sqrt{x}}{\sqrt{y}}$ B. $\frac{\sqrt{x}}{\sqrt{y}}$ C. $-\frac{\sqrt{y}}{\sqrt{x}}$ D. $\frac{\sqrt{ax}}{\sqrt{y}}$

Q.3. if $y = \log(x + \sqrt{x^2 + a^2})$, then $\frac{dy}{dx}$

- A. $\frac{x}{\sqrt{x^2 + a^2}}$ B. $\frac{\log x}{\sqrt{x^2 + a^2}}$ C. $\frac{2x}{\sqrt{x^2 + a^2}}$ D. $\frac{1}{\sqrt{x^2 + a^2}}$

Q.4. if $y = \log(x)$, then $\frac{d^2y}{dx^2}$

- A. $\frac{x}{\log x}$ B. $\frac{\log x}{x}$ C. $-\frac{1}{x^2}$ D. $\frac{1}{x}$

Q.5. If $x = at^2, y = 3at^3$, then $\frac{dy}{dx}$ at $x = 1$.

- A. 9 B. 9a C. $\frac{9}{2}$ D. $\frac{9}{2a}$

Short answer type (1 mark)

Q6. If $x = t^2, y = t^3$, then find $\frac{d^2y}{dx^2}$.

Q7. Differentiate $\log_7(\log x)$ with respect to x .

Q8. Differentiate with respect to x : $\sqrt{3x+2} + \frac{1}{\sqrt{2x^2+4}}$.

Q9. Differentiate with respect to x : $(3x^2 - 9x + 5)^9$.

Q.10	Find the second order derivative of the function with respect to x: $x^3 \log x$.
	Long answer type (3 Marks)
Q.11	Find $\frac{dy}{dx}$, if $x^3 + y^3 + xy = 10$
Q.12	If $x\sqrt{1+y} + y\sqrt{1+x} = 0$, then prove: $\frac{dy}{dx} = -\frac{1}{(1+x)^2}$
Q.13	If $x^p y^q = (x+y)^{p+q}$, then prove: $\frac{dy}{dx} = \frac{y}{x}$ and $\frac{d^2y}{dx^2} = 0$
Q.14	Differentiate with respect to x: $x^{\log x} + (\log x)^x$
Q.15	Find $\frac{dy}{dx}$ if $x^y + y^x + x^x = a^b$
Q.16	If $x = e^{\frac{x}{y}}$, then prove: $\frac{dy}{dx} = \frac{x-y}{x \log x}$.
Q.17	If $y^x = e^{y-x}$, then prove: $\frac{dy}{dx} = \frac{(1+\log y)^2}{\log y}$.
Q18.	If $y = Ae^{mx} + Be^{nx}$, show that $\frac{d^2y}{dx^2} - (m+n)\frac{dy}{dx} + mny = 0$
Q19.	If $y = 500e^{7x} + 600e^{-7x}$, show that $\frac{d^2y}{dx^2} = 49y$.
Q.20	If $e^y(x+1) = 1$, then show that $\frac{d^2y}{dx^2} = \left(\frac{dy}{dx}\right)^2$

Answers													
Answers	1	B			2	A		3.	D		4	C	
	5	C	6	$\frac{3}{4t}$		7	$\frac{1}{x\log 7.\log x}$			8	$\frac{3}{2\sqrt{3x+2}}$ $-\frac{2x}{(2x^2+4)^{\frac{3}{2}}}$		
	9	$9(6x-9)(3x^2-9x+5)^8$				10.	$x(7+2\log x)$		11.	$-\frac{(3x^2+y)}{(3y^2+x)}$			
	14.	$x^{\log x-1}(2\log x) + (\log x)^x\left(\frac{1}{\log x} + \log(\log x)\right)$											
	15	$-\left[\frac{y^x\log y + yx^{y-1} + x^x(1+\log x)}{x.y^{x-1} + x^y\log x}\right]$											
