

Test / Exam Name: Revision Test Chapters
567

Standard: 12th Science

Subject: Mathematics

- Q1.** Which of the following statements is true for the function $f(x) = \begin{cases} x+3, & x \neq 0 \\ 1, & x = 0 \end{cases}$? 1 Mark
- A** $f(x)$ is continuous and differentiable $\forall x \in \mathbb{R}$ **B** $f(x)$ is continuous $\forall x \in \mathbb{R}$
C $f(x)$ is continuous and differentiable $\forall x \in \mathbb{R} - (0)$ **D** $f(x)$ is discontinuous at infinitely many points
- Q2.** $\int x^2 e^{x^3} dx$ equals: 1 Mark
- A** $\frac{1}{3} e^{x^3} + C$ **B** $\frac{1}{3} e^{x^4} + C$
C $\frac{1}{2} e^{x^3} + C$ **D** $\frac{1}{2} e^{x^2} + C$
- Q3.** The value of k so that f defined by $f(x) = \begin{cases} x^2 \sin\left(\frac{1}{x}\right) & \text{if } x \neq 0 \\ k & \text{if } x = 0 \end{cases}$ is continuous at $x = 0$ is 1 Mark
- A** 0 **B** $\frac{1}{2}$ **C** 1 **D** 2
- Q4.** $\int \frac{1+\tan x}{1-\tan x} dx$ is equal to: 1 Mark
- A** $\sec^2\left(\frac{\pi}{4} + x\right) + C$ **B** $\sec^2\left(\frac{\pi}{4} - x\right) + C$
C $\log\left|\sec\left(\frac{\pi}{4} + x\right)\right| + C$ **D** $\log\left|\sec\left(\frac{\pi}{4} - x\right)\right| + C$
- Q5.** If $x = 2$ at $y = at^2$, where a is a constant, then $\frac{d^2y}{dx^2}$ at $x = \frac{1}{2}$ is: 1 Mark
- A** $\frac{1}{2}a$ **B** 1 **C** $2a$ **D** None of these
- Q6.** The least and greatest value of $f(x) = x^3 - 6x^2 + 9x$ in $[0, 6]$, are. 1 Mark
- A** 3, 4 **B** 0, 4 **C** 0, 3 **D** 3, 6
- Q7.** If $\sin(x+y) = \log(x+y)$, then $\frac{dy}{dx} =$ 1 Mark
- A** 2 **B** -2 **C** 1 **D** -1
- Q8.** $f(x) = \sin + \sqrt{3} \cos x$ is maximum when $x =$ 1 Mark
- A** $\frac{\pi}{3}$ **B** $\frac{\pi}{4}$ **C** $\frac{\pi}{6}$ **D** 0
- Q9.** If $y = a \sin mx + b \cos mx$, then $\frac{d^2y}{dx^2}$ is equal to: 1 Mark
- A** $-m^2y$ **B** m^2y **C** $-my$ **D** my
- Q10.** If $y = \sqrt{\sin x + y}$, then $\frac{dy}{dx}$ equals: 1 Mark
- A** $\frac{\cos x}{2y-1}$ **B** $\frac{\cos x}{1-2y}$
C $\frac{\sin x}{1-2y}$ **D** $\frac{\sin x}{2y-1}$
- Q11.** If the product of two positive numbers is 9, find the numbers so that the sum of their squares is minimum. 2 Marks
- Q12.** The volume of a cube is increasing at the rate of $9 \text{ cm}^3/\text{s}$. How fast is its surface area increasing when the length of an edge is 10 cm? 2 Marks
- Q13.** Find: $\int \sin x \cdot \log \cos x dx$. 2 Marks
- Q14.** Evaluate: 3 Marks
- $\int \frac{2x \cdot \tan^{-1}(x^2)}{1+x^4} dx$.

- Q15.** If $y = (\tan x)^x$, then find $\frac{dy}{dx}$. 3 Marks
- Q16.** If $x^{16}y^9 = (x + y)^{17}$, prove that $x \frac{dy}{dx} = 2y$ 5 Marks
- Q17.** Find the intervals on which the function $f(x) = (x - 1)^3 (x - 2)^2$ is: 6 Marks
1. Strictly increasing.
 2. Strictly decreasing.

- Q18.** Logarithmic differentiation is a powerful technique to differentiate functions of the form $f(x) = [u(x)]^{v(x)}$, where both $u(x)$ and $v(x)$ are differentiable functions and f and u need to be positive functions. 5 Marks

Let function $y = f(x) = (u(x))^{v(x)}$, then $y' = y \left[\frac{v(x)}{u(x)} u'(x) + v'(x) \cdot \log[u(x)] \right]$

On the basis of above information, answer the following questions.

1. Differentiate x^x w.r.t. x .
 1. $x^x(1 + \log x)$
 2. $x^x(1 - \log x)$
 3. $-x^x(1 + \log x)$
 4. $x^x \log x$
2. Differentiate $x^x + a^x + x^a + a^a$ w.r.t. x .
 1. $(1 + \log x) + (a^x \log a + ax^{a-1})$
 2. $x^x(1 + \log x) + \log a + ax^{a-1}$
 3. $x^x(1 + \log x) + x^a \log x + ax^{a-1}$
 4. $x^x(1 + \log x) + a^x \log a + ax^{a-1}$
3. If $x = e^{\frac{z}{y}}$, then find $\frac{dy}{dx}$.
 1. $-\frac{(x+y)}{x \log x}$
 2. $-\frac{(x-y)}{x \log x}$
 3. $\frac{(x+y)}{x \log x}$
 4. $\frac{x-y}{x \log x}$
4. If $y = (2 - x)^3(3 + 2x)^5$, then find $\frac{dy}{dx}$.
 1. $(2 - x)^3(3 + 2x)^5 \left[\frac{15}{3+2x} - \frac{8}{2-x} \right]$
 2. $(2 - x)^3(3 + 2x)^5 \left[\frac{15}{3+2x} + \frac{3}{2-x} \right]$
 3. $(2 - x)^3(3 + 2x)^5 \left[\frac{10}{3+2x} - \frac{3}{2-x} \right]$
 4. $(2 - x)^3(3 + 2x)^5 \cdot \left[\frac{10}{3+2x} + \frac{3}{2-x} \right]$
5. If $y = x^x \cdot e^{(2x+5)}$, then find $\frac{dy}{dx}$.
 1. $x^x e^{2x+5}$
 2. $x^x e^{2x+5} (3 - \log x)$
 3. $x^x e^{2x+5} (1 - \log x)$
 4. $x^x e^{2x+5} \cdot (3 + \log x)$

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- Q19.** An architecture design a auditorium for a school for its cultural activities. The floor of the auditorium is rectangular in shape and has a fixed perimeter P. 5 Marks



Based on the above information, answer the following questions.

1. If x and y represents the length and breadth of the rectangular region, then relation between the variable is.
 1. $x + y = P$
 2. $x^2 + y^2 = P^2$
 3. $2(x + y) = P$
 4. $x + 2y = P$
2. The area (A) of the rectangular region, as a function of x , can be expressed as.

1. $A = px + \frac{x}{2}$
2. $A = \frac{px+x^2}{2}$
3. $A = \frac{px-2x^2}{2}$
4. $A = \frac{x^2}{2} + px^2$

3. School's manager is interested in maximising the area of floor 'A' for this to be happen, the value of x should be.

1. P
2. $\frac{P}{2}$
3. $\frac{P}{3}$
4. $\frac{P}{4}$

4. The value of y, for which the area of floor is maximum, is.

1. $\frac{P}{2}$
2. $\frac{P}{3}$
3. $\frac{P}{4}$
4. $\frac{P}{16}$

5. Maximum area of floor is.

1. $\frac{P^2}{16}$
2. $\frac{P^2}{64}$
3. $\frac{P^2}{4}$
4. $\frac{P^2}{28}$

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