CBSE Mathematics Questions

14. Evaluate: $\displaystyle\int (x+3)\sqrt{3-4x-x^2}\,dx$

15. Find the particular solution: $\dfrac{dy}{dx} = -\dfrac{x+y\cos x}{1+\sin x}, \quad y(0)=1$

16. Find the particular solution: $2ye^{x/y}\,dx + (y - 2xe^{x/y})\,dy = 0, \quad x=0$ when $y=1$

17. Show that the points $A(4,5,1),\ B(0,-1,-1),\ C(3,9,4),\ D(-4,4,4)$ are coplanar.

18. Find the foot of the perpendicular from $A(-1,8,4)$ to the line joining $B(0,-1,3)$ and $C(2,-3,-1)$, and hence find the image of point A in line BC.

19. A bag X contains 4 white and 2 black balls, and bag Y contains 3 white and 3 black balls. Two balls are drawn at random (without replacement) and are found to be one white and one black. Find the probability that the balls were drawn from bag Y.

20. Three numbers are chosen at random from the first six positive integers. Let X be the largest number. Find the probability distribution of X.

21. Let $A = \mathbb{R} \times \mathbb{R}$ and define $(a,b) * (c,d) = (a+c, b+d)$. Show that $*$ is commutative and associative.

22. Prove that $y = \dfrac{4\sin\theta}{2+\cos\theta} - \theta$ is increasing on $\left[0, \dfrac{\pi}{2}\right]$.

OR

Show that the semi-vertical angle of a cone of maximum volume is $\cos^{-1}\left(\dfrac{1}{\sqrt{3}}\right)$.

23. Using integration, find the area of the triangle with vertices $(2,-2),\ (4,3),\ (1,2)$.

24. Find the equation of the plane containing the line of intersection of $\vec{r}\cdot(\hat{i} - 2\hat{j} + 3\hat{k}) - 4 = 0$ and $\vec{r}\cdot(-2\hat{i} + \hat{j} + \hat{k}) + 5 = 0$, given that the x- and y-intercepts are equal.

25. A retired person wants to invest **Rs. 50,000**. Solve the Linear Programming Problem graphically to maximise returns.

26. Prove that: $\begin{vmatrix} (x+y)^2 & zx & zy \\ zx & (z+y)^2 & xy \\ zy & xy & (z+x)^2 \end{vmatrix} = 2xyz(x+y+z)^3$