Name: Bhoomika B V
Id: COMETFWC046
Date: 21 January 2026

CBSE Mathematics Examination, 2016

2016/14.

Evaluate:

$$\int (3x+5)\sqrt{5+4x-2x^2}\,dx$$

2016/15.

Solve the differential equation:

$$x\frac{dy}{dx} + y - x + xy\cot x = 0, \quad x \neq 0$$

2016/16.

Solve:

$$(x^2+3xy+y^2)\,dx - x^2\,dy = 0$$

given that $y = 0$ when $x = 1$.

2016/17.

If

$$\vec{a} = 2\hat{i} - \hat{j} + 3\hat{k}, \quad \vec{b} = 3\hat{i} + \hat{j} - 2\hat{k},$$

find the angle between $(\vec{a}+\vec{b})$ and $(\vec{a}-\vec{b})$. Also find a vector perpendicular to both.

2016/18.

Show that the lines

$$\frac{x-1}{3} = \frac{y-1}{-1} = \frac{z+1}{0} \quad \text{and} \quad \frac{x-4}{2} = \frac{y}{0} = \frac{z}{-3}$$

intersect. Find their point of intersection.

2016/19.

A committee of 4 students is selected from 7 boys and 4 girls. Find the probability that the committee contains exactly 2 girls, given that at least one girl is selected.

2016/20.

Show that the relation R defined by

$$(a,b)R(c,d) \iff a+d = b+c$$

on $A\times A$, where $A = \{1,2,\ldots,10\}$, is an equivalence relation. Hence write the equivalence class of $(3,4)$.

2016/21.

Solve:

$$\begin{vmatrix} a+x & a-x & a \\ a-x & a+x & a-x \\ a & a-x & a+x \end{vmatrix} = 0$$

2016/22.

Show that the height of the cylinder of greatest volume inscribed in a right circular cone of height h and semi-vertical angle α is $\frac{h}{3}$. Hence find the greatest volume.

2016/23.

Using integration, find the area of the triangle formed by the negative x-axis and the tangent and normal to the circle

$$x^2 + y^2 = 9$$

at the point $(-1, 2\sqrt{2})$.

2016/24.

Find the foot of the perpendicular and the perpendicular distance from $P(4, 3, 2)$ to the plane

$$x + 2y + 3z = 2.$$

Also find the image of P in the plane.

2016/25.

A company manufactures two types of cardigans. Formulate the LPP and find the maximum profit graphically.