SUBJECTIVE

1. Find the equation of the normal to the curve $\frac{x^2}{16}-\frac{y^2}{9}=1$. at $(8,3\sqrt{3})$

2. A normal is drawn at one end of the latus rectum of the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ which meets the axes at points A and B respectively. Find the area of the ΔOAB.

3. Find the equation of the chord of contact of tangents from the point (2, 3) to the hyperbola $\frac{x^2}{9}-\frac{y^2}{4}=1$.

4. Find the locus of the mid-points of the portions of the tangents to the hyperbola $\frac{x^2}{9}-\frac{y^2}{4}=1$ included between the axes.

5. From the points on the circle $x^2 + y^2 = a^2$, tangents are drawn to the hyperbola $x^2 - y^2 = a^2$. Prove that the locus of the mid-points of the chord of contact is $(x^2 - y^2)^2 = a^2(x^2 + y^2)$.

6. Find the asymptotes of the curve $xy - 3y - 2x = 0$.

7. Find the eccentricity of the hyperbola whose asymptotes are $3x + 4y= 10$ and $4x - 3y = 5$.

8. Find the equation of a hyperbola whose asymptotes are $2x - y = 3$ and $3x + y = 7$ and which pass through the point (1, 1).

9. Find the product of the lengths of the perpendiculars from any point on the hyperbola $x^2 - 2y^2 = 2$ to its asymptotes.

10. Find the area of the triangle formed by any tangent to the hyperbola $\frac{x^2}{9}-\frac{y^2}{4}=1$ and its asymptotes.

SINGLE ANSWER CORRECT TYPE

11. If the normal to the rectangular hyperbola $xy = c^2$ at the point 't' meets the curve again at 't_1' then $t^3 t_1$ has the value equal to

(A) 1 (B) – 1 (C) 0 (D) none

12. In which of the following cases maximum number of normals can be drawn from a point P lying in the same plane

(A) circle (B) parabola (C) ellipse (D) hyperbola

13. The normals at three points P,Q,R on a rectangular hyperbola $xy = c^2$ intersect at a point on the curve. The centre of the hyperbola of the triangle PQR, is its

(A) centroid (B) orthocenter (C) incentre (D) circumcenter

14. P is a point on the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}$ = 1, N is the foot of the perpendicular from P on the transverse axis. The tangent to the hyperbola at P meets the transverse axis at T. If O is the centre of the hyperbola, then OT.ON is equal to :

(A) e^2 (B) a^2 (C) b^2 (D) b^2/a^2

15. The chord PQ of the rectangular hyperbola $xy = a^2$ meets the axis of x at A ; C is the mid point of PQ & 'O' is the origin. Then the Δ ACO is :

(A) equilateral (B) isosceles (C) right angled (D) right isosceles.

16. The tangent to the hyperbola $xy = c^2$ at the point P intersects the x-axis at T and the y-axis at T′. The normal to the hyperbola at P intersects the x-axis at N and the y-axis at N′. The areas of the triangles PNT and PN'T' are Δ and Δ' respectively, then $\frac{1}{\Delta} + \frac{1}{\Delta'}$ is

(A) equal to 1 (B) depends on t (C) depends on c (D) equal to 2

17. Locus of the middle points of the parallel chords with gradient m of the rectangular hyperbola $xy = c^2$ is

(A) $y + mx = 0$ (B) $y - mx = 0$ (C) $my - x = 0$ (D) $my + x = 0$

18. The locus of the foot of the perpendicular from the centre of the hyperbola $xy = c^2$ on a variable tangent is :

(A) $(x^2 - y^2)^2 = 4c^2 xy$ (B) $(x^2 + y^2)^2 = 2c^2 xy$

(C) $(x^2 + y^2) = 4c^2 xy$ (D) $(x^2 + y^2)^2 = 4c^2 xy$

19. The equation to the chord joining two points (x_1, y_1) and (x_2, y_2) on the rectangular hyperbola $xy = c^2$ is :

(A) $\frac{x}{x_1 + x_2} + \frac{y}{y_1 + y_2} = 1$ (B) $\frac{x}{x_1 - x_2} + \frac{y}{y_1 - y_2} = 1$

(C) $\frac{x}{y_1 + y_2} + \frac{y}{x_1 + x_2} = 1$ (D) $\frac{x}{y_1 - y_2} + \frac{y}{x_1 - x_2} = 1$

[MULTIPLE CORRECT TYPE]

20. If the circle $x^2 + y^2 = a^2$ intersects the hyperbola $xy = c^2$ in four points $P(x_1,y_1)$, $Q(x_2,y_2)$, $R(x_3,y_3)$, $S(x_4,y_4)$, then

(A) $x_1 + x_2 + x_3 + x_4 = 0$ (B) $y_1 + y_2 + y_3 + y_4 = 0$

(C) $x_1x_2x_3x_4 = c^4$ (D) $y_1y_2y_3y_4 = c^4$

Answers

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1. $2x + \sqrt{3}y = 25$ **2.** $\frac{1}{2}a^2e^5$ **3.** $4x - 9y = 18$ **4.** $\frac{9}{4x^2} - \frac{1}{y^2} = 1$ **6.** x = 2 and y = 3

7. $\sqrt{2}$ **8.** $6x^2 - xy - y^2 - 23x + 4y + 15 = 0$ **9.** $\frac{2}{3}$ **10.** 6 sq units **11.** (B) **12.** (A)

13. (A) **14.** (B) **15.** (B) **16.** (C) **17.** (A) **18.** (D) **19.** (A) **20.** (ABCD)