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# MATHS

# BOOKS - VK JAISWAL ENGLISH

# HYPERBOLA

## Exercise 1 Single Choice Problems

**1.** The normal to curve $xy = 4$ at the point (1, 4) meets curve again at :

A. $(-4, -1)$

B. $\left(-8, -\frac{1}{2}\right)$

C. $\left(-16, -\frac{1}{4}\right)$

D. $(-1, -4)$

**Answer: C**

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**2.** If $y = mx + c$ be a tangent to the hyperbola $\frac{x^2}{\lambda^2} - \frac{y^2}{(\lambda^3 + \lambda^2 + \lambda)^2} = 1, (\lambda \neq 0),$ then minimum value of 16m^2

A. 0

B. 1

C. 4

D. 9

**Answer: D**

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**3.** The area of quadrilateral formed by focii of hyperbola $\frac{x^2}{4} - \frac{y^2}{3} = 1$ & its conjugate hyperbola is (a) 13 (b) 14 (c) 11 (d) 15

A. 13

B. 14

C. 11

D. 15

**Answer: A**

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**4.** Let P(x, y) be a variable point such that

$$\left|\sqrt{(x-1)^2+(y-2)^2}-\sqrt{(x-5)^2+(y-5)^2}\right|=3$$

which represents a hyperbola.

The locus of the intersection of two perpendicular tangents to the hyperbola is

A. 12

B. 14

C. 17

D. 10

**Answer: D**

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**5.** A normal to the hyperbola $\frac{x^2}{4} - \frac{y^2}{1} = 1$ has equal intercepts on the positive x- and y-axis. If this normal touches the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ , then $a^2 + b^2$ is equal to 5 (b) 25 (c) 16 (d) none of these

A. 5

B. 25

C. 16

D. None of these

**Answer: B**

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**6.** The locus of a point whose chord of contact with respect to the circle $x^2 + y^2 = 4$ is a tangent to the hyperbola $xy = 1$ is a/an ellipse (b) circle hyperbola (d) parabola

A. ellipse

B. circle

C. hyperbola

D. parabola

**Answer: C**

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**7.** If the chord $x\cos\alpha + y\sin\alpha = p$ of the hyperbola $\frac{x^2}{16} - \frac{y^2}{18} = 1$ subtends a right angle at the center, and the diameter of the circle, concentric with the hyperbola, to which the given

chord is a tangent is $d$, then the value of $\frac{d}{4}$ is_____

A. 4

B. 5

C. 4

D. 7

**Answer: C**

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**8.** If the tangent and normal at a point on rectangular hyperbola cut-off intercept $a_1, a_2$ on x-axis and $b_1, b_2$ on the y-axis, then $a_1a_2 + b_1b_2$ is equal to :

A. 2

B. $\frac{1}{2}$

C. 0

D. -1

**Answer: C**

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## Exercise 2 One Or More Than One Answer Is Are Correct

**1.** about to only mathematics

A. $y = \frac{3}{\sqrt{7}}x + \frac{15}{\sqrt{17}}$

B. $y = 3\sqrt{\frac{2}{\sqrt{17}}x + \frac{25}{\sqrt{7}}}$

C. $y = 2\sqrt{\frac{3}{7}x + 15\sqrt{7}}$

D. $y = -3\sqrt{\frac{2}{\sqrt{7}}x + \frac{25}{\sqrt{7}}}$

**Answer: B::D**

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**2.** The tangent to the hyperbola $x^2 - y^2 = 3$ are parallel to the straight line $2x + y + 8 = 0$ at the following points

A. (2, 1)

B. (2, -1)

C. (-2, -1)

D. (-2, 1)

**Answer: B::D**

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**3.** If the line $ax + by + c = 0$ is a normal to the curve $xy = 1$, then $a > 0, b > 0$ $a > 0, b < 0$ $a\langle 0, b\rangle 0$ (d) $a < 0, b < 0$ none of these

A. $a > 0, b > 0$

B. $a > 0, b < 0$

C. $b < 0, a < 0$

D. $a < 0, b > 0$

**Answer: B::D**

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**4.** A circle cuts the rectangular hyperbola $xy = 1$ in the points $(x_r, y_r), r = 1, 2, 3, 4.$

Prove that $x_1x_2x_3x_4 = y_1y_2y_3y_4 = 1$

A. $y_1y_2y_3y_4 = 1$

B. $x_1x_2x_3x_4 =$

C. $x_1x_2x_3x_4 = y_1y_2y_3y_4 = -1$

D. $y_1y_2y_3y_4 = 0$

**Answer: A::B**

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## Exercise 3 Comprehension Type Problems

**1.** A point P moves such that the sum of the slopes of the normals drawn from it to the hyperbola xy = 16 is equal to the sum of ordinates of feet of normals . The locus of P is a curve C.

The equation of the curve C is

A. $x^2 = 4y$

B. $x^2 = 16y$

C. $x^2 = 12y$

D. $y^2 = 8x$

**Answer: B**

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**2.** A point P moves such that the sum of the slopes of the normals drawn from it to the hyperbola $xy = 4$ is equal to the sum of the ordinates of feet of normals. The locus of P is a curve C.

Q.If the tangent to the curve C cuts the coordinate axes at A and B, then , the locus of the middle point of AB is

A. $x^2 = 4y$

B. $x^2 = 2y$

C. $x^2 + 2y = 0$

D. $x^2 + 4y = 0$

**Answer: C**

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**3.** A point P moves such that the sum of the slopes of the normals drawn from it to the hyperbola $xy = 4$ is equal to the sum of the ordinates of feet of normals. The locus of P is a curve C.

Q. The area of the equilateral triangle inscribed in

the curve C having one vertex as the vertex of curve C is

A. $768\sqrt{3}$

B. $776\sqrt{3}$

C. $760\sqrt{3}$

D. None of these

**Answer: A**

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## Exercise 4 Subjective Type Problems

**1.** Let $y = mx + c$ be a common tangent to $\frac{x^2}{16} - \frac{y^2}{9} = 1$ and $\frac{x^2}{4} + \frac{y^2}{3} = 1$, then find the value of $m^2 + c^2$.

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**2.** The maximum number of tangents that can be drawn to a circle from a point outside it is.....

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**3.** Tangents at P to rectangular hyperbola $xy = 2$ meets coordinate axes at A and B, then area of

triangle OAB (where O is origin) is _____.

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