MATHS

BOOKS - ML KHANNA

THE HYPERBOLA

Problem Set 1 Mcq

1. If the foci of the ellipse $\frac{x^2}{16}+\frac{y^2}{b^2}=1$ and the hyperbola $\frac{x^2}{144}-\frac{y^2}{81}=\frac{1}{125}$ coincide, the find the value of b^2.

A. 1

B. 5

C. 7

D. 9

Answer: C

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2. The latus rectum of the hyperbola $16x^2 - 9y^2 = 144$ is $16/3$ b. $32/3$ c. $8/3$ d. $4/3$

A. $\frac{16}{3}$

B. $\frac{32}{3}$

C. $\frac{8}{3}$

D. $\frac{4}{3}$

Answer: B

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3. The foci of the hyperbola $9x^2 - 16y^2 + 18x + 32y - 151 = 0$ are

A. (2, 3), (5, 7)

B. (4, 1) (-6, 1)

C. (0, 0), (5, 3)

D. None

Answer: B

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4. The foci of the hyperbola $4x^2 - 9y^2 - 36 = 0$ are

A. $\left[\pm\sqrt{(11)}, 0\right]$

B. $\left[\pm\sqrt{(12)}, 0\right]$

C. $\left[\pm\sqrt{(13)}, 0\right]$

D. $\left[0, \pm\sqrt{(12)}\right]$

Answer: C

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5. Find the eccentricity of the hyperbola $9y^2 - 4x^2 = 36$

A. $\frac{5}{2}$

B. $\frac{\sqrt{7}}{2}$

C. $\frac{\sqrt{13}}{2}$

D. 2

Answer: C

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6. The eccentricity of the hyperbola $3x^2 - y^2 = 4$ is :

A. 1

B. 2

C. -2

D. 5

Answer: B

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7. Which one of the following is independent of $(0 < \alpha < \pi/2)$ for the hyperbola $\frac{x^2}{\cos^2\alpha} - \frac{y^2}{\sin^2\alpha} = 1$

A. ecentricity

B. abscissa of foci

C. directrix

D. vertex

Answer: B

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8. The equation $16x^2 - 3y^2 - 32x - 12y - 44 = 0$ represents a

hyperbola, which one of the following is /are correct

A. transverse axis is $4\sqrt{3}$

B. conjugate axis is 4

C. eccentricity is $\frac{\sqrt{19}}{\sqrt{3}}$.

D. centre is $(-1, 2)$

Answer: C

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9. If e_1 and e_2 respectively be the eccentricities of the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$ and hyperbola $9x^2 - 16y^2 = 144$ then $e_1 e_2$ =

A. $16/25$

B. 1

C. > 1

D. $< 1/2$

Answer: B

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10. If $eande'$ the eccentricities of a hyperbola and its conjugate, prove that $\frac{1}{e^2}+\frac{1}{e'^2}=1.$

A. 0

B. 1

C. 2

D. None

Answer: B

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11. The eccentricity of the hyperbola whose latuscrectum is 8 and conjugate axis is equal to half the distance between the foci, is

A. $\frac{4}{3}$

B. $\frac{4}{\sqrt{3}}$

C. $\frac{2}{\sqrt{3}}$

D. none of these

Answer: C

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12. The eccentricity of the hyperbola $-\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is given by

A. $e=\sqrt{\frac{a^2+b^2}{a^2}}$

B. $e=\sqrt{\frac{a^2-b^2}{a^2}}$

C. $e=\sqrt{\frac{b^2-a^2}{a^2}}$

D. $e=\sqrt{\frac{a^2-b^2}{b^2}}$

Answer: B

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13. The eccentricity of the hyperbola with latursrectum 12 and semi-conjugate axis is $2\sqrt{3}$, is

A. 2

B. 3

C. $\sqrt{3}/2$

D. $2\sqrt{3}$

Answer: A

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14. If PQ is a double ordinate of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ such that OPQ is an equilateral triangle, O being the center of the hyperbola, then find the range of the eccentricity e of the hyperbola.

A. $1 < e < \frac{2}{\sqrt{3}}$

B. $e = \frac{2}{\sqrt{3}}$

C. $e = \frac{\sqrt{3}}{2}$

D. $e > \frac{2}{\sqrt{3}}$

Answer: D

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15. The $e(\lambda)$ be the eccentricity of rectangular hyperbola $xy = \lambda$ then the value of $e(1) - e(6)$ is

A. 0

B. 1

C. 2

D. 3

Answer: A

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16. The distance between foci of a hyperbola is 16 and its eccentricity is $\sqrt{2}$, then the equation of hyperbola is

A. $x^2 - y^2 = 32$

B. $\frac{x^2}{4} - \frac{y^2}{9} = 1$

C. $2x^2 - 3y^2 = 7$

D. None

Answer: A

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17. Find the equation of the hyperbola whose eccentricity is $\frac{3}{2}$ and whose foci are $(\pm 2, 0)$.

A. $x^2/4 - y^2/5 = 4/9$

B. $\left(x^2/9\right) - \left(y^2/9\right) = 4/9$

C. $x^2/4 - y^2/9 = 1$

D. None of these

Answer: A

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18. The equation $\frac{x^2}{12-\lambda}+\frac{y^2}{B-\lambda}=1$ represents

A. a hyperbola if $lamba < 8$

B. an ellipse if $\lambda > 8$

C. a hyperbola if $8 < \lambda < 12$

D. none of these

Answer: C

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19. The equation of the conic with focus at $(1, -1)$, directrix along $x - y + 1 = 0$ and with eccentricity $\sqrt{2}$, is

A. $x^2 - y^2 = 1$

B. $xy = 1$

C. $2xy - 4x + 4y + 1 = 0$

D. $2xy + 4x - 4y - 1 = 0$

Answer: C

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20. The centre of the hyperbola

$9x^2 - 36x - 16y^2 + 96y - 252 = 0$, are

A. $(2, 3)$

B. $(-2, -3)$

C. $(-2, 3)$

D. $(2, -3)$

Answer: A

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21. The equation of the hyperbola whose foci are $(6, 5), (-4, 5)$ and eccentricity $5/4$ is

A. $\frac{(x-1)^2}{16} - \frac{(y-5)^2}{9} = 1$

B. $\frac{x^2}{16} - \frac{y^2}{9} = 1$

C. $\frac{(x-1)^2}{16} - \frac{(y-5)^2}{9} = -1$

D. none of these

Answer: A

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22. The vertices of the hyperbola $9x^2 - 16y^2 - 36x + 96y - 252 = 0$ are

A. $(6, 3), (-2, 3)$

B. $(6, 3), (-6, 3)$

C. $(-6, 3), (-6, -3)$

D. none

Answer: C

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23. If e and e' be the eccentricities of two conics $S=0$ and $S'=0$ and if $e^2+e'^2=3$, then both S and S' can be

A. ellipses

B. parabola

C. hyperbolas

D. none of these

Answer: C

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24. The equation $\frac{x^2}{1-k} - \frac{y^2}{1+k} = 1, k > 1$ represents s

A. circle

B. ellipse

C. hyperbola

D. none of these

Answer: D

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25. If the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$ and the hyperbola $\frac{x^2}{144} - \frac{y^2}{81} = \frac{1}{25}$ coincide write the value of b^2.

A. 3

B. 7

C. $\sqrt{3}$

D. $\sqrt{7}$

Answer: B

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26. Let a hyperbola passes through the focus of the ellipse $\frac{x^2}{25} - \frac{y^2}{16} = 1$. The transverse and conjugate axes of this hyperbola coincide with the major and minor axes of the given ellipse, also the product of eccentricities of given ellipse and hyperbola is 1, then

A. equation of hyperbola is $\frac{x^2}{9} - \frac{y^2}{16} = 1$

B. focus of hyperbola is (5,0)

C. vertex of hyperbola is $\left(5\sqrt{2}, 0\right)$

D. equation of hyperbola is $\frac{x^2}{16} - \frac{y^2}{25} = 1$

Answer: B

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27. A hyperbola, having the transverse axis of length $2\sin\theta$, is confocal with the ellipse $3x^2 + 4y^2 = 12$. Then its equation is

A. $x^2 \cos ec^2\theta - y^2 \sec^2\theta = 1$

B. $x^2 \sec^2\theta - y^2 \cos ec^2\theta = 1$

C. $x^2 \sin^2\theta - y^2 \cos^2\theta = 1$

D. $x^2 \cos^2\theta - y^2 \sin^2\theta = 1$

Answer:

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28. A vertex of a branch of the hyperbola $x^2 - 2y^2 - 2\sqrt{2}x - 4\sqrt{2}y - 6 = 0$, B is one of the end points of its latuscrectum and C is the focus of the hyperbola nearest to the point A.

Statement-1 : The area of ΔABC is $\left(\frac{\sqrt{3}}{2} - 1\right)$ sq. units.

Statement-2 : Eccentricity of the hyperbola is $\frac{\sqrt{3}}{2}$ and length of the conjugate axis is $2\sqrt{2}$.

A. $1-\sqrt{\frac{2}{3}}$

B. $\sqrt{\frac{3}{2}}-1$

C. $1+\sqrt{\frac{2}{3}}$

D. $\sqrt{\frac{3}{2}}+1$

Answer:

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Problem Set 1 True And False

1. Prove that the locus of the point of intersection of the lines $\sqrt{3}x - y - 4\sqrt{3}k = 0$ and $\sqrt{3}kx + ky - 4\sqrt{3} = 0$ for different values of k is a hyperbola whose eccentricity is 2.

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Problem Set 1 Fill In The Blanks

1. For the hyperbola $9x^2 - 16y^2 - 72x + 96y - 144 = 0.$

(a) Foci ..... (b) Eccentricity .....

(c) L.R. ..... (d) Directrices .....

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2. The locus of the point which moves so that the difference of its distance from the points (5, 0) and (-5, 0) is 2, is .....

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3. Eccentricity of the hyperbola passing through (3,0) and $\left(3\sqrt{2}, 2\right)$ is

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4. Equation of hyperbola passing through the point $(1, -1)$ and having asymptotes $x + 2y + 3 = 0$ and $3x + 4y + 5 = 0$ is .....

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5. If e_1 and e_2 be the eccentricities of the two rectangular hyperbolas $xy = c^2$ and $xy = d^2$ referred to asymptotes as axes, then

$e_1 - e_2$ = ...

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Problem Set 2 Mcq

1. The equation of the tangent to the hyperbola $2x^2 - 3y^2 = 6$which is parallel to the line $y = 3x + 4$, is

A. $y = 3x + 5$

B. $y = 3x - 5$

C. $y = 3x = 5$ and $y = 3x - 5$

D. none

Answer: C

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2. C is the center of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ The tangent at any point P on this hyperbola meet the straight lines

$bx - ay = 0$ and $bx + ay = 0$ at points $QandR$, respectively. Then prove that $CQ\dot{C}R = a^2 + b^2$.

A. $a^2 + b^2$

B. $a^2 - b^2$

C. $\frac{1}{a^2} + \frac{1}{b^2}$

D. $\frac{1}{a^2} - \frac{1}{b^2}$

Answer: A

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3. Find the equation of the tagent to the hyperbola $x^2 - 4y^2 = 36$ which is perpendicular to the line $x - y + 4 = 0$.

A. $y = -x + 3\sqrt{3}$

B. $y = -x - 3\sqrt{3}$

C. $y = -x \pm 2$

D. none

Answer: A::B

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4. The point of intersection of two tangents to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, the product of whose slopes is c^2, lies on the curve

A. $y^2 - a^2 = c^2\left(x^2 + b^2\right)$

B. $y^2 + a^2 = c^2\left(x^2 - b(\hat{}(2))\right)$

C. $y^2 - b^2 = c^2\left(x^2 + a^2\right)$

D. $y^2 + b^2 = c^2\left(x^2 - a^2\right)$

Answer: D

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5. The line $y = x + 2$ touches the hyperbola $5x^2 - 9y^2 = 45$ at the point

A. $(0, 2)$

B. $(3, 1)$

C. $(-9/2, -5/2)$

D. none

Answer: C

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6. $2x + \sqrt{6}y = 2$ touches the hyperbola $x^2 - 2y^2 = 4$, then the point of contact is

A. $\left(\frac{1}{2}, \frac{1}{\sqrt{6}}\right)$

B. $(4, -\sqrt{6})$

C. $(4, \sqrt{6})$

D. $(-2, \sqrt{6})$

Answer: D

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7. The product of the lengths of the perpendiculars drawn from foci on any tangent to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is

A. a^2

B. b^2

C. a^2b^2

D. a^2 / b^2

Answer: B

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8. A common tangent to $9x^2 - 16y^2 = 144$ and $x^2 + y^2 = 9$ is

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

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

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

D. none of these

Answer: B

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9. If the chord through the points $(a\sec\theta, b\tan\theta)$ and $(a\sec\phi, b\tan\phi)$ on the hyperbola $\frac{x^2}{a^\circ} - \frac{y^2}{b^2} = 1$ passes through a focus, prove that $\frac{\tan\theta}{2}\frac{\tan\phi}{2} + \frac{e-1}{e+1} = 0.$

A. $\frac{e-1}{e+1}$

B. $\frac{1-e}{1+e}$

C. $\frac{1+e}{1-e}$

D. $\frac{e+1}{e-1}$

Answer: B

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10. Find the equations to the common tangents to the two hyperbolas $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ and $\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$

A. $y = \pm x \pm \sqrt{b^2 - a^2}$

B. $y = \pm x \pm \sqrt{a^2 - b^2}$

C. $y = \pm x \pm (a^2 - b^2)$

D. $y = \pm x \pm \sqrt{a^2 + b^2}$

Answer: B

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11. The value of m for which $y = mx + 6$ is a tangent to the hyperbola $\frac{x^2}{100} - \frac{y^2}{49} = 1$, is

A. $\sqrt{\frac{17}{20}}$

B. $\sqrt{\frac{20}{17}}$

C. $\sqrt{\frac{3}{20}}$

D. $\sqrt{\frac{20}{3}}$

Answer: A

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12. Tangents which are parrallel to the line $2x + y + 8 = 0$ are drawn to hyperbola $x^2 - y^2 = 3$. The points of contact of these tangents is/are

A. $(2, 1)$

B. $(2, -1)$

C. $(-2, 1)$

D. $(-2, -1)$

Answer: B::C

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13. The equation of the tangent to the hyperbola $4y^2 = x^2 - 1$ at the point $(1, 0)$, is

A. $x = 1$

B. $y = 1$

C. $y = 4$

D. $x = 4$

Answer: A

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14. If $ax + by + c = 0$ is a normal to hyperbola $xy = 1$, then (A) $a < 0, b < 0$ (B) $a < 0, b > 0$ (C) $a > 0, b > 0$ (D) $a > 0, b < 0$

A. $a > 0, b > 0$

B. $a > 0, b < 0$

C. $b > 0, a < 0$

D. $a < 0, b < 0$

Answer: B::C

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15. If the tangent and normal to a rectangular hyperbola cut off intercepts a_1 and a_2 on one axis and b_1 and b_2 on the other, then

A. $a_1b_1 + a_2b_2 = 0$

B. $a_1b_2 + b_2a_1 = 0$

C. $a_1a_2 + b_1b_2 = 0$

D. none of these

Answer: C

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16. If $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1(a>b)$ and $x^2-y^2=c^2$ cut at right angles then

A. $a^2+b^2=2c^2$

B. $b^2-a^2=2c^2$

C. $a^2-b^2=2c^2$

D. $a^2b^2=2c^2$

Answer: C

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17. Let $P(a\sec\theta, b\tan\theta)$ and $Q(a\sec\phi, b\tan\phi)$, where $\theta + \phi = \frac{\pi}{2}$, be two points on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$.

If (h, k) is the point of intersection of the normals at P and Q, then k is equal to

A. $\frac{a^2 + b^2}{a}$

B. $-\left(\frac{a^2 + b^2}{a}\right)$

C. $\frac{a^2 + b^2}{b}$

D. $-\left(\frac{a^2 + b^2}{b}\right)$

Answer: D

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18. If the normal at $(ct_1, c/t_1)$ on the curve $xy = c^2$ meets the curve again at the point $(ct_2, c/t_2)$ then

A. $t_2 = -\frac{1}{t_1^3}$

B. $t_2 = -\frac{1}{t_1}$

C. $t_2 = \frac{1}{t_1^2}$

D. none

Answer: A

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19. PQ and RS are two perpendicular chords of the rectangular hyperbola $xy = c^2$. If C is the center of the rectangular hyperbola, then find the value of product of the slopes of $CP, CQ, CR,$ and CS.

A. 1

B. -1

C. 0

D. none

Answer: A

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20. If the normal at P to the rectangular hyperbola $x^2 - y^2 = 4$ meets the axes at G and $gandC$ is the center of the hyperbola, then $PG = PC$ (b) $Pg = PC$ $PG - Pg$ (d) $Gg = 2PC$

A. PG = PC

B. Pg = PC

C. PG = Pg

D. Gg = 2PC

Answer: A::B::C::D

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Problem Set 2 True And False

1. Statement-1 : Tangents drawn from the point $(2, -1)(2, -1)$ to the hyperbola $x^2 - 4y^2 = 4$ are at right angle.

Statement-2 : The locus of the point of intersection of perpendicular tangents to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is the circle $x^2 + y^2 = a^2 - b^2$.

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2. The locus of the middle points of the portions of the tangents of the hyperbola. $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ included between the axes is

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Problem Set 2 Fill In The Blanks

1. The equation of the tangent drawn from the point $(-2, -1)$ to the hyperbola $2x^2 - 3y^2 = 6$ are .....

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2. If the line $lx + my + n = 0$ touches the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$. Then

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3. The equation of the common tangent to the parabola $y^2 = 8x$ and the hyperbola $3x^2 - y^2 = 3$ is

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4. If a variable straight line $x\cos\alpha + y\sin\alpha = p$ which is a chord of hyperbola $\frac{x^2}{a^2} = \frac{y^2}{b^2} = 1(b > a)$ subtends a right angle at the centre of the hyperbola, then it always touches a fixed circle whose radius, is

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Problem Set 3 Mcq

1. Find the locus of the midpoints of chords of hyperbola $3x^2 - 2y^2 + 4x - 6y = 0$ parallel to y = 2x.

A. $3x - 4y = 4$

B. $3y - 4x + 4 = 0$

C. $4x - 4y = 3$

D. $3x - 4y = 2$

Answer: A

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2. Equation of the chord of the hyperbola $25x^2 - 16y^2 = 400$ which is bisected at the point (6, 2) is

A. $16x - 75y = 418$

B. $75x - 16y = 418$

C. $25x - 4y = 400$

D. none of these

Answer: B

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3. The locus of the point of intersection of the tangents at the end-points of normal chords of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, is

A. $a^6/x^2 - b^6/y^2 = \left(a^2 + b^2\right)^2$

B. $x^2/a^2 - y^2/b^2 = \left(a^2 + b^2\right)^2$

C. $a^2/x^2 - b^2/y^2 = \left(a^2 + b^2\right)^2$

D. none

Answer: A

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4. A rectangular hyperbola whose centre is C is cut by any circle of radius r in four points P, Q, R and S. Then $CP^2 + CQ^2 + CR^2 + CS^2 =$

A. r^2

B. $2r^2$

C. $3r^2$

D. $4r^2$

Answer: D

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5. The diameter of $16x^2 - 9y^2 = 144$ which is conjugate to $x = 2y$ is

A. $y = \frac{16}{9}x$

B. $y = \frac{32}{9}x$

C. $x = \frac{16}{9}y$

D. $x = \frac{32}{9}y$

Answer: B

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6. 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. $x_2 x_2 x_3 x_4 = c^4$

D. $y_1 y_2 y_3 y_4 = c^4$

Answer: A::B::C::D

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7. The line $lx + my = n$ is a normal to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ if

A. $\frac{a^2}{l^2} + \frac{b^2}{m^2} = \frac{\left(a^2 + b^2\right)^2}{n^2}$

B. $\frac{a^2}{l^2} - \frac{b^2}{m^2} = \frac{\left(a^2 - b^2\right)^2}{n^2}$

C. $\frac{a^2}{l^2} - \frac{b^2}{m^2} = \frac{\left(a^2 + b^2\right)^2}{n^2}$

D. none

Answer: C

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8. Let

$H: x^2 - y^2 = 9, P: y^2 = 4(x - 5), L: x = 9$

be three curves.

If L is the chord of contact of the hyperbola H, then the equation of the corresponding pair of tangent is

A. $9x^2 - 8y^2 + 18x - 9 = 0$

B. $9x^2 - 8y^2 - 18x + 9 = 0$

C. $9x^2 - 8y^2 - 18x - 9 = 0$

D. $9x^2 - 8y^2 + 18x + 9 = 0$

Answer: B

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Problem Set 3 True And False

1. If a triangle is inscribed in a rectangular hyperbola, it's orhtocenter lies:

(A) inside the curve

(B) outside the curve

(C) on the curve

(D) none of these

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2. A series of chords of the hyperbola $x^2/a^2 - y^2/b^2 = 1$ touch the circle on the line joining the foci as diameter. The locus of the poles of these chords with respect to the hyperbola is

$$\frac{x^2}{a^4} + \frac{y^2}{b^4} = \frac{1}{a^2 + b^2}$$

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3. The portion of the tangent to the hyperbola intercepted between the asymptotes is bisected at the point of contact and the area of the triangle formed by the tangent and the two asymptotes is constant.

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4. The locus of poles with respect to the parabola $y^2 = 4ax$ of tangent to the hyperbola $x^2 - y^2 = a^2$ is the ellipse $4x^2 + y^2 = 4a^2$.

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5. A circle cuts the rectangular hyperbola $xy = 1$ in the points $(x_r, y_r), r = 1, 2, 3, 4,$ then $x_1x_2x_3x_4 = y_1y_2y_3y_4 = 1.$

True or False?

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Problem Set 3 Fill In The Blanks

1. The locus of the point of intersection of the tangents at the end-points of normal chords of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, is

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2. Chords of the hyperbola $x^2 - y^2 = a^2$ touch the parabola $y^2 = 4ax$. The locus of their middle point is the curve .....

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3. Find the locus of the midpoints of chords of hyperbola $3x^2 - 2y^2 + 4x - 6y = 0$ parallel to y = 2x.

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Miscellangeous Exercise Matching Enteries

1. Match the entries of List-A and List-B.

List-A		List-B	
(a)	Sum of the coefficients in the expansion of $(x + 2y + z)^{10}$ is	1.	$\frac{(n+1)(n+2)}{2}$
(b)	The number of terms in the expansion of $(x + y + z)^n$ is	2.	50
(c)	The number of irrational terms in the expansion of $(x^{1/5} + y^{1/16})^{55}$ is	3.	4^{10}

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Self Assessment Test

1. The line $2x + y = 1$ is tangent to the hyperbla $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$. If this line passes through the point of intersection of the nearest directrix and the x-axis, then the eccentricity of the hyperbola is

A. $\frac{3}{2}$

B. 2

C. $\frac{5}{2}$

D. 3

Answer: B

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2. Tangents are drawn to the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ parallel to the straight line $2x - y = 1$. The points of contact of the tangent on the hyperbola are

A. $\left(\frac{9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$

B. $\left(-\frac{9}{2\sqrt{2}}, -\frac{1}{\sqrt{2}}\right)$

C. $(3\sqrt{3}, -2\sqrt{2})$

D. $\left(-3\sqrt{3}, 2\sqrt{2}\right)$

Answer: A::B

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3. Let the eccentricity of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ be the reciprocal to that of the ellipse $x^2 + 4y^2 = 4$. If the hyperbola passes through a focus of the ellipse, then the equation of the hyperbola, is

A. the equation of the hyperbola is

$$\frac{x^2}{3} - \frac{y^2}{2} = 2$$

B. a focus of the hyperbola is $(2, 0)$

C. the eccentricity of the hyperbola is $\sqrt{\frac{5}{3}}$

D. the equation of the hyperbola is

$$x^2 - 3y^2 = 3$$

Answer: B::D

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4. Let $P(6, 3)$ be a point on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$. If the normal at the point P intersects the x-axis at $(9, 0)$ then the eccentricity of the hyperbola is

A. $\sqrt{\frac{5}{2}}$

B. $\sqrt{\frac{3}{2}}$

C. $\sqrt{2}$

D. $\sqrt{3}$

Answer: B

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