MATHS

BOOKS - OBJECTIVE RD SHARMA ENGLISH

HYPERBOLA

Illustration

1. The equation of the hyperbola whose focus is $(1, 2)$, directrix is the line $x + y + 1 = 0$ and eccentricity $3/2$, is

A. $x^2 + y^2 + 18xy + 34x + 50y - 31 = 0$

B. $x^2 + y^2 - 18xy - 2x - 14y + 31 = 0$

C. $x^2 + y^2 + 18xy + 34x + 50y + 49 = 0$

D. $x^2 + y^2 - 18xy + 34x + 50y - 31 = 0$

Answer: A

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2. 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 of these

Answer: B

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3. The eccentricity of the conjugate hyperbola of the hyperbola $x^2 - 3y^2 = 1$ is (a) 2 (b) $2\sqrt{3}$ (c) 4 (d) $\frac{4}{5}$

A. 2

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

C. 4

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

Answer: A

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4. The eccentricity of the conics $-\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is

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

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

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

D. $\sqrt{\frac{a^2+b^2}{b^2}}$

Answer: D

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5. The equation $16x^2 - 3y^2 - 32x + 12y - 44 = 0$ represents a hyperbola. (a)the length of whose transvers axis is $4\sqrt{3}$ (b)the length of whose conjugate is 4 (c)whose center is $(-1, 2)$ (d)whose eccentricity is $\sqrt{\frac{19}{3}}$

A. the length of whose transverse axis is $4\sqrt{3}$

B. the length of whose conjugate axis is 4

C. whose centre is $(-1, 2)$

D. whose eccentricity is $\sqrt{\frac{19}{3}}$

Answer: D

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

A. hyperbolas

B. ellipses

C. parabolas

D. none of these

Answer: A

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7. If a hyperbola passes through a focus of the ellipse $\frac{x^2}{25}+\frac{y^2}{16}=1$ and its transverse and conjugate axes coincide with major and minor axes of the ellipse, and the product of their eccentricityis 1, then

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

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

C. $\frac{x^2}{9}-\frac{y^2}{25}=1$

D. none of these

Answer:

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8. For hyperbola $\frac{x^2}{\cos^2\alpha} - \frac{y^2}{\sin^2\beta} = 1$ which of the following remains constant with change in α

A. abscissae of vertex

B. abscissae of foci

C. eccentricity

D. directrix

Answer:

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9. The equation of the transvers and conjugate axes of a hyperbola are, respectively, $x + 2y - 3 = 0$ and $2x - y + 4 = 0$, and their respective lengths are $\sqrt{2}$ and $\frac{2}{\sqrt{3}}$. The equation of the hyperbola is

a) $\frac{2}{5}(x + 2y - 3)^2 - \frac{3}{5}(2x - y + 4)^2 = 1$

b) $\frac{2}{5}(x - y - 4)^2 - \frac{3}{5}(x + 2y - 3)^2 = 1$

c) $\frac{2}{5}(2x - y + 4)^2 - \frac{3}{5}(x + 2y - 3)^2 = 1$

d) $2(x + 2y - 3)^2 - 3(2x - y + 4)^2 = 1$

A. $\frac{2}{5}(x + 2y - 3)^2 - \frac{3}{5}(2x - y + 4)^2 = 1$

B. $\frac{2}{5}(2x-y+4)^2-\frac{3}{5}(x+2y-3)^2=1$

C. $2(2x-y+4)^2-3(x+2y-3)^2=1$

D. $2(x+2y-3)^2-3(2x-2y+4)^2=1$

Answer: B

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10. Find the equation of the hyperbola, the length of whose latusrectum is 8 and eccentricity is $3/\sqrt{5}$.

A. $5x^2-4y^2=100$

B. $4x^2-5y^2=100$

C. $-4x^2 + 5y^2 = 100$

D. $-5x^2 + 4y^2 = 100$

Answer: B

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11. The foci of a hyperbola coincide with the foci of the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$. Find the equation of the hyperbola, if its eccentricity is 2.

A. $3x^2 - y^2 = 6$

B. $3x^2 - y^2 = 12$

C. $x^2 - 3y^2 = 12$

D. none of these

Answer: B

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12. Find the equation of the hyperbola whose conjugate axis is 5 and the distance between the foci is 13.

A. $25x^2 - 144y^2 = 900$

B. $-25x^2 + 144y^2 = 900$

C. $144x^2 - 25y^2 = 900$

D. $-144x^2 + 25y^2 = 900$

Answer: A

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13. Find the equation of the hyperbola whose foci are (8, 3) and (0, 3) and eccentricity is 4/3.

A. $49x^2 - 3y^2 = 147$

B. $7x^2 - 9y^2 = 63$

C. $7(x-4)^2 - 9(y-3)^2 = 63$

D. $7(x+4)^2 - 9(y+3)^2 = 63$

Answer: C

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14. Prove that the locus of centre of circle which touches the given circle cxternally and given line is parabola.

A. a circle

B. an ellipse

C. a hyperbola

D. a pair of straight lines

Answer:

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15. The eccentricity of the hyperbola $9x^2 - 16y^2 + 72x - 32y - 16 = 0$, is

A. $\frac{5}{4}$

B. $\frac{4}{5}$

C. $\frac{9}{16}$

D. $\frac{16}{9}$

Answer: A

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16. The eccentricity of the hyperbola whose length of the latus rectum is equal to 8 and the length of its conjugate axis is equal to half of the distance between its foci, is :

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

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

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

D. $\sqrt{3}$

Answer: C

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17. Let a and b respectively be the semi-transverse and semi-conjugate axes of a hyperbola whose eccentricity satisfies the equation $9e^2 - 18e + 5 = 0$. If $S(5, 0)$ is a focus and $5x = 9$ is the corresponding directrix of this hyperbola, then $a^2 - b^2$ is equal to

A. -7

B. -5

C. 5

D. 7

Answer:

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18. The equation of the hyperbola whose foci are (-2, 0) and (2,0) and eccentricity is 2 is given by

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

B. $-x^2 + 3y^2 = 3$

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

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

Answer:

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19. If the chord joining the points $(a\sec\theta_1, b\tan\theta_1)$ and $(a\sec\theta_2, b\tan\theta_2)$ on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is a focal chord, then prove that $\tan\left(\frac{\theta_1}{2}\right)\tan\left(\frac{\theta_2}{2}\right) + \frac{ke-1}{ke+1} = 0$, where $k = \pm 1$

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

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

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

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

Answer:

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20. Prove that the straight line $lx + my + n = 0$ touches the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ if $a^2l^2 - b^2m^2 = n^2$.

A. $a^2l^2 + b^2m^2 = n^2$

B. $a^2l^2 - b^2m^2 = n^2$

C. $a^2m^2 - b^2n^2 = l^2$

D. $a^2n^2 - b^2l^2 = m^2$

Answer:

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21. If the straight line $x\cos\alpha + y\sin\alpha = p$ touches the curve $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, then p^2.

A. $a^2\cos^2\alpha - b^2\sin^2\alpha = p^2$

B. $a^2\cos^2\alpha - b^2\sin^2\alpha = p$

C. $a^2\cos^2\alpha + b^2\sin^2\alpha = p^2$

D. $a^2 \cos^2 \alpha + b^2 \sin^2 \alpha = p$

Answer: C

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22. If the line $y = 3x + \lambda$ touches the hyperbola $9x^2 - 5y^2 = 45$, then the value of λ is

A. $\pm 3\sqrt{6}$

B. ± 6

C. ± 3

D. ± 4

Answer: B

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23. If the line $y = 2x + \lambda$ be a tangent to the hyperbola $36x^2 - 25y^2 = 3600$, then λ is equal to

A. 16

B. -16

C. ± 16

D. none of these

Answer:

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24. Find the locus of a point $P(\alpha, \beta)$ moving under the condition that the line $y = ax + \beta$ is a tangent to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$.

A. a hyperbola

B. a parabola

C. a circle

D. an ellipse

Answer: A

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

$(-2, \sqrt{6})$ (b) $(-5, 2\sqrt{6})$ $\left(\frac{1}{2}, \frac{1}{\sqrt{6}}\right)$ (d) $(4, -\sqrt{6})$

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

B. $(-5, 2\sqrt{6})$

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

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

Answer: D

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A. $\sqrt{2}$

B. 2

C. $\sqrt{3}$

D. 1

Answer:

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27. If $2x - y + 1 = 0$ is a tangent to hyperbola $\frac{x^2}{a^2} + \frac{y^2}{16} = 1$, then which of the following are sides of a right angled triangle ?

A. $2a, 4, 1$

B. $2a, 8, 1$

C. $a, 4, 1$

D. $a, 4, 2$

Answer:

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28. The foci of a hyperbola coincide with the foci of the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$. If the eccentricity of the hyperbola is 2, then the equation of the tangent of this hyperbola passing through the point $(4, 6)$ is

A. $2x - y - 2 = 0$

B. $3x - 2y = 0$

C. $2x - 3y + 10 = 0$

D. $x - 2y + 8 = 0$

Answer:

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29. 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 of these

Answer: C

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30. The equation of the tangent to the hyperbola $3x^2 - y^2 = 3$ which is perpendicular to the line $x + 3y - 2 = 0$ is

A. $y = 3x \pm \sqrt{6}$

B. $y = 3x \pm 2\sqrt{3}$

C. $y = 3x \pm \sqrt{3}$

D. none of these

Answer:

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31. The equation of the tangent to the hyperbola $16x^2 - 9y^2 = 144$ at $(5, 8/3)$, is

A. $10x + 3y = 18$

B. $10x - 3y = 18$

C. $10x - 3y = 9$

D. $10x + 3y = 9$

Answer:

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32. The product of the perpendicular from two foci on any tangent to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is

(A) a^2 (B) $\left(\frac{b}{a}\right)^2$ (C) $\left(\frac{a}{b}\right)^2$ (D) b^2

A. b^2

B. $2b^2$

C. a^2

D. $2a^2$

Answer:

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33. 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 point P intersects the x-axis at (9, 0), then find the eccentricity of the hyperbola.

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

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

C. $\sqrt{2}$

D. $\sqrt{3}$

Answer:

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34. A hyperbola passes through the point $P(\sqrt{2}, \sqrt{3})$ and has foci at $(\pm 2, 0)$. Then the tangent to this hyperbola at P also passes through the point

A. $(\sqrt{3}, \sqrt{2})$

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

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

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

Answer:

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35. The condition that the straight-line $lx + my = n$ may be a normal to the hyperbola $b^2x^2 - a^2y^2 = a^2b^2$ is:

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 of these

Answer:

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36. If the normal at $'\theta'$ on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ meets the transverse axis at G, and A and A' are the vertices of the hyperbola , then $AC.\, A'G =$ (a) $a^2\left(e^4 \sec^2\theta - 1\right)$ (b) $a^2\left(e^4 \tan^2\theta - 1\right)$ (c) $b^2\left(e^4 \sec^2\theta - 1\right)$ (d) $b^2\left(e^4 \sec^2\theta + 1\right)$

A. $a^2\left(e^2 \sec^2\theta - 1\right)$

B. $a^2\left(e^4 \sec^2\theta - 1\right)$

C. $a^2\left(e^4 \sec^2\theta + 1\right)$

D. none of these

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

B. $-\frac{a^2+b^2}{a}$

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

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

Answer:

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38. The equation of the chord of contact of tangents drawn from a point $(2, -1)$ to the hyperbola $16x^2 - 9y^2 = 144$, is

A. $9x + 32y = 144$

B. $32x - 9y = 144$

C. $32x + 9y = 144$

D. none of these

Answer:

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39. The point of intersection of tangents drawn to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ at the points where it is intersected by the line $lx + my + n = 0$, is $\left(\frac{-a^2 l}{n}, \frac{b^2 m}{n}\right)$ (b) $\left(\frac{-a^2 l}{m}, \frac{b^2 n}{m}\right)$ $\left(\frac{a^2 l}{m}, \frac{-b^2 n}{m}\right)$ (d) $\left(\frac{a^2 l}{m}, \frac{b^2 n}{m}\right)$

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

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

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

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

Answer:

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40. The equation of the chord of $x^2 - y^2 = 9$ which is bisected at $(5, -3)$, is

A. $5x + 3y - 16 = 0$

B. $2x - 3y - 19 = 0$

C. $3x + 5y = 0$

D. none of these

Answer:

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41. 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:

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42. Prove that the straight line $lx + my + n = 0$ touches the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ if $a^2l^2 - b^2m^2 = n^2$.

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

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

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

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

Answer:

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43. Find the locus of the mid points of the chords of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ which subtent a right angle at the origin.

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

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

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

D. $\frac{x^2}{a^4} - \frac{y^2}{b^4} = \frac{1}{a^2} - \frac{1}{b^2}$

Answer:

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44. The equations of the asymptotes of the hyperbola $2x^2 + 5xy + 2y^2 - 11x - 7y - 4 = 0$ are

A. $2x^2 + 5xy + 2y^2 - 11x - 7y - 5 = 0$

B. $2x^2 + 4xy + 2y^2 - 7x - 11y - 5 = 0$

C. $2x^2 + 5xy + 2y^2 - 11x - 7y + 5 = 0$

D. none of these

Answer:

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45. The equation of a hyperbola whose asymptotes are $3x \pm 5y = 0$ and vertices are $(\pm 5, 0)$ is

A. $3x^2 - 5y^2 = 25$

B. $5x^2 - 3y^2 = 25$

C. $9x^2 - 25y^2 = 225$

D. $225x^2 - 9y^2 = 225$

Answer:

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46. The product of perpendicular distances from any point on the hyperbola $9x^2 - 16y^2 = 144$ to its asymptotes, is

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

B. $\frac{ab}{a^2 + b^2}$

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

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

Answer:

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47. If e and e_1 are the eccentricities of the hyperbola $xy = c^2$ and $x^2 - y^2 = a^2$, then $(e + e_1)^2$ is equal to

A. 1

B. 4

C. 6

D. 8

Answer: B

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48. The normal to the rectangular hyperbola $xy = 4$ at the point t_1 meets the curve again at the point t_2 Then

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

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

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

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

Answer:

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49. If the tangent and normal to a rectangular hyperbola cut off intercepts x_1 and x_2 on one axis and y_1 and y_2 on the other, then

A. $a_1a_2 + b_1b_2 = 0$

B. $a_1a_2 = -b_1b_2$

C. $a_1b_2 = a_2b_1$

D. $a_1a_2 = b_1b_2$

Answer:

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Section I Solved Mcqs

1. The eccentricity of the conic represented by $x^2 - y^2 - 4x + 4y + 16 = 0$ is 1 (b) $\sqrt{2}$ (c) 2 (d) $\frac{1}{2}$

A. 1

B. $\sqrt{2}$

C. 2

D. $1/2$

Answer:

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

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

B. $(6, 3)$ and $(-2, 3)$

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

D. none of these

Answer:

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3. Find the vertices of the hyperbola $9x^2 = 16y^2 - 36x + 96y - 252 = 0$

A. $(2, 3)$

B. $(-2, -3)$

C. $(-2, 3)$

D. $(2, -3)$

Answer:

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4. 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:

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5. The equation of the hyperbola with vertices $(3, 0)$ and $(-3, 0)$ and semi-latursrectum 4, is given by

A. $4x^2 - 3y^2 + 36 = 0$

B. $4x^2 - 3y^2 + 12 = 0$

C. $4x^2 - 3y^2 - 36 = 0$

D. none of these

Answer:

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6. Find the equation of tangents to the curve $4x^2 - 9y^2 = 1$ which are parallel to $4y = 5x + 7$.

A. $24y - 30x = 17$

B. $30y - 24x = \pm\sqrt{161}$

C. $24y - 30x = \pm\sqrt{161}$

D. none of these

Answer:

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7. The equation of the tangent parallel to $y = x$ drawn to $\frac{x^2}{3} - \frac{y^2}{2} = 1$, is

A. $x - y + 1 = 0$

B. $x - y + 2 = 0$

C. $x - y + 3 = 0$

D. $x - y - 2 = 0$

Answer:

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8. If m is a variable, then prove that the locus of the point of intersection of the lines $\frac{x}{3} - \frac{y}{2} = m$ and $\frac{x}{3} + \frac{y}{2} = \frac{1}{m}$ is a hyperbola.

A. parabola

B. ellipse

C. hyperbola

D. none of these

Answer:

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9. If the chords of contact of tangents fromtwo points (x_1, y_1) and (x_2, y_2) to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ are at right angles, then $\frac{x_1 x_2}{y_1 y_2}$ is equal to (a) $\frac{a^2}{-b^2}$ (b) $\frac{b^2}{-a^2}$ (c) $\frac{b^4}{-a^4}$

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

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

C. $-\frac{b^4}{a^4}$

D. $-\frac{a^4}{b^4}$

Answer:

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10. The equation of 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. $\frac{x}{y_1 - y_2} + \frac{y}{x_1 - x_2} = 1$

Answer:

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11. From any point on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, tangents are drawn to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 2$. The area cut-off by the chord of contact on the asymptotes is equal to $\frac{a}{2}$ (b) ab (c) $2ab$ (d) $4ab$

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

B. ab

C. $2ab$

D. $4ab$

Answer:

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12. 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 of these

Answer:

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13. If PN is the perpendicular from a point on a rectangular hyperbola $xy = c^2$ to its asymptotes, then find the locus of the midpoint of PN

A. circle

B. parabola

C. ellipse

D. hyperbola

Answer:

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14. The combined equation of the asymptotes of the hyperbola $2x^2 + 5xy + 2y^2 + 4x + 5y = 0$ is

A. $2x^2 + 5xy + 2y^2 + 4x + 5y + 2 = 0$

B. $2x^2 + 5xy + 2y^2 + 4x + 5y - 2 = 0$

C. $2x^2 + 5xy + 2y^2 = 0$

D. none of these

Answer:

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15. about to only mathematics

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:

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16. The slopes of the common tangents of the hyperbolas $\frac{x^2}{9} - \frac{y^2}{16} = 1$ and $\frac{y^2}{9} - \frac{x^2}{16} = 1$, are

A. ± 2

B. ± 1

C. $\pm 1/2$

D. none of these

Answer:

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17. about to only mathematics

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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18. 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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19. Prove that the locus of the point of intersection of the tangents at the ends of the normal chords of the hyperbola $x^2 - y^2 = a^2$ is $a^2(y^2 - x^2) = 4x^2y^2$.

A. $y^4 - x^4 = 4a^2x^2y^2$

B. $y^2 - x^2 = 4a^2x^2y^2$

C. $a^2(y^2 - x^2) = 4x^2y^2$

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

Answer:

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20. If angle subtended by any chord of a rectangular hyperbola at the centre is α and angle between the tangents at ends of chord is β, then

A. $\alpha = 2\beta$

B. $\beta = 2\alpha$

C. $\alpha + \beta + \pi$

D. $\alpha + \beta = \frac{\pi}{2}$

Answer:

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21. If a hyperbola passing through the origin has $3x - 4y - 1 = 0$ and $4x - 3y - 6 = 0$ as its asymptotes, then find the equation of its transvers and conjugate axes.

A. $x - y - 5 = 0$ and $x + y + 1 = 0$

B. $x - y = 0$ and $x + y + 5 = 0$

C. $x - y - 5 = 0$ and $x - y - 1 = 0$

D. $x + y - 1 = 0$ and $x - y - 5 = 0$

Answer:

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22. 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 centre of the hyperbola, then find 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:

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23. The normal at P to a hyperbola of eccentricity e, intersects its transverse and conjugate axes at L and M respectively. Show that the locus of the middle point of LM is a hyperbola of eccentricity $\frac{e}{\sqrt{e^2-1}}$

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

B. $\frac{e}{\sqrt{e^2-1}}$

C. e

D. none of these

Answer:

 Watch Video Solution

24. An ellipse intersects the hyperbola $2x^2 - 2y^2 = 1$ orthogonally. The eccentricity of the ellipse is reciprocal of that of the hyperbola. If the axes of the ellipse are along the coordinate axes, then

A. Equation of the ellipse is $x^2 + 2y^2 = 2$ with foci at $(\pm 1, 0)$

B. Equation of the ellipse is $x^2 + 2y^2 = 2$ with foci at $\left(\pm \sqrt{2}, 0\right)$

C. Equation of the ellipse is $x^2 + 2y^2 = 4$ with foci at $(\pm 1, 0)$

D. Equation of the ellipse is $x^2 + 2y^2 = 4$ with foci at $\left(\pm \sqrt{2}, 0\right)$

Answer:

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25. 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 (a) $\frac{\sqrt{a^2+b^2}}{ab}$ (b) $\frac{2ab}{\sqrt{a^2+b^2}}$ (c) $\frac{ab}{\sqrt{b^2-a^2}}$ (d) $\frac{\sqrt{a^2+b^2}}{2ab}$

A. $\frac{ab}{\sqrt{b-2a}}$

B. $\frac{a}{a-b}$

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

D. $\frac{ab}{\sqrt{b+a}}$

Answer:

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26. If $H(x, y) = 0$ represents the equation of a hyperbola and $A(x, y) = 0$, $C(x, y) = 0$ the joint equation of its asymptotes and the conjugate hyperbola respectively, then for any point (α, β) in the plane $H(\alpha, \beta)$, $A(\alpha, \beta)$, and $C(\alpha, \beta)$ are in

A. $A.P.$

B. $G.P.$

C. $H.P.$

D. none of these

Answer:

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27. The equation of a tangent to the hyperbola $16x^2 - 25y^2 - 96x + 100y - 356 = 0$, which makes an angle $\frac{\pi}{4}$ with the transverse axis, is

A. $y = x + 2$

B. $y = x - 5$

C. $y = x + 3$

D. $x = y + 2$

Answer:

Watch Video Solution

28. 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:

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

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

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

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

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

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

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

Answer:

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29. Let A and B be two fixed points and P, another point in the plane, moves in such a way that $k_1PA + k_2PB = k_3$, where k_1, k_2 and k_3 are real constants. The locus of P is

Which one of the above is not true ?

A. a circle if $k_1 = 0$ and $k_2, k_3 > 0$

B. a circle if $k_1 > 0$ and $k_2 < 0, k_3 = 0$

C. an ellipse if $k_1 = k_2 > \ = 0$ and $k_3 > 0$

D. a hyperbola if $k_2 = \ -1$ and $k_1, k_3 > 0$

Answer:

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30. The equation of the line passing through the centre of rectangular hyperbola is $x - y - 1 = 0$. If one of its asymptotes is $3x - 4y - 6 = 0$, the equation of the other asymptote is

A. $4x + 3y + 17 = 0$

B. $4x - 3y + 8 = 0$

C. $3x - 2y + 15 = 0$

D. none of these

Answer:

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31. Radii of director circles of curves $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ are 2er and r, respectively. If e_1 and e_2 are the eccentricities of ellipse and hyperbola, respectively, then $4e_2^2 - e_1^2 =$ _____.

A. $2e_h^2 - e_e^2 = 6$

B. $e_e^2 - 4e_h^2 = 6$

C. $4e_h^2 - e_e^2 = 6$

D. none of these

Answer:

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32. A variable straight line of slope 4 intersects the hyperbola xy=1 at two points. Find the locus of the point which divides the line segment between these two points in the ratio 1 : 2.

A. $16x^2 + 10xy + y^2 = 2$

B. $16x^2 - 10xy + y^2 = 2$

C. $16x^2 + 10xy + y^2 = 4$

D. none of these

Answer:

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33. If $P(a\sec\alpha, b\tan\alpha)$ and $Q(a\sec\beta, b\tan\beta)$ are two points on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$. Such that $\alpha - \beta = 2\theta$, then PQ touches the hyperbola

A. $\frac{x^2}{a^2 \sec^2 \theta} - \frac{y^2}{b^2} = 1$

B. $\frac{x^2}{a^2} - \frac{y^2}{b^2 \sec^2 \theta} = 1$

C. $\frac{x^2}{a^2} - \frac{y^2}{b^2} = \cos^2 \theta$

D. none of these

Answer:

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34. If the tangents drawn from a point on the hyperbola $x^2 - y^2 = a^2 - b^2$ to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ make angle α and β with the transverse axis of the hyperbola then

A. $\tan\alpha - \tan\beta = 1$

B. $\tan\alpha + \tan\beta = 1$

C. $\tan\alpha \tan\beta = 1$

D. $\tan\alpha \tan\beta = -1$

Answer:

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35. 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. $\frac{a^6}{x^2}+\frac{b^6}{y^2}=\left(a^2+b^2\right)^2$

B. $\frac{a^6}{x^2}-\frac{b^6}{y^2}=\left(a^2+b^2\right)^2$

C. $\frac{a^6}{x^2}-\frac{b^6}{y^2}=\left(a^2-b^2\right)^2$

D. $\frac{a^6}{x^2}+\frac{b^6}{y^2}=\left(a^2-b^2\right)^2$

Answer:

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36. Find the product of the length of perpendiculars drawn from any point on the hyperbola $x^2-2y^2-2=0$ to its asymptotes.

A. $1/2$

B. $2/3$

C. $3/2$

D. 2

Answer:

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37. The length of the transverse axis of the rectangular hyperbola $xy = 18$ is (a) 6 (b) 12 (c) 18 (d) 9

A. 6

B. 12

C. 18

D. 9

Answer:

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38. Find the eccentricity of the hyperbola with asymptotes $3x + 4y = 2$ and $4x - 3y = 2$.

A. 3

B. 2

C. $\sqrt{2}$

D. 4

Answer:

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39. The foci of a hyperbola are $(-5, 12)$ and $(10, 20)$ and it touches the y-axis . The length of its transverse axis, is

A. 100

B. $\sqrt{89}/2$

C. $\sqrt{89}$

D. $\sqrt{50}$

Answer:

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40. The locus of the foot of the normal drawn from any point $P(\alpha, \beta)$ to the family of circles $x^2 + y^2 - 2gx + c = 0$, where g is a parameter, is

A. $\left(\frac{5\pi}{6}, \frac{7\pi}{6}\right)$

B. $\left(0, \frac{\pi}{6}\right)$

C. $\left(\frac{11\pi}{6}, 2\pi\right)$

D. all of these

Answer:

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41. The circle $x^2 + y^2 - 8x = 0$ and hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ intersect at points A and B.

The equation of a common tangent with positive slope to the circle as well as to the hperbola is

A. $2x - \sqrt{5}y - 20 = 0$

B. $2x - \sqrt{5}y + 4 = 0$

C. $3x - 4y + 8 = 0$

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

Answer:

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42. The circle $x^2 + y^2 - 8x = 0$ and hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ intersect at the points A and B. Then the equation of the circle with AB as its diameter is

A. $x^2 + y^2 - 12x + 24 = 0$

B. $x^2 + y^2 + 12x + 24 = 0$

C. $x^2 + y^2 + 24x - 12 = 0$

D. $x^2 + y^2 - 24x - 12 = 0$

Answer: A

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43. 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. $\frac{x^2}{3} - \frac{y^2}{2} = 1$

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

C. $\frac{x^2}{2} - \frac{y^2}{3} = 1$

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

Answer:

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44. about to only mathematics

A. $(2, 0)$

B. $(0, 2)$

C. $(3, 0)$

D. $(0, 3)$

Answer:

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45. Suppose an ellipse and a hyperbola have the same pair of foci on the x-axis with centres at the origin and they intersect at $(2, 2)$. If the eccentricity of the ellipse is $\frac{1}{2}$, then the eccentricity of the hyperbola, is

A. $\sqrt{\frac{7}{4}}$

B. $\sqrt{\frac{7}{3}}$

C. $\sqrt{\frac{5}{4}}$

D. $\sqrt{\frac{5}{3}}$

Answer:

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46. Tangents are drawn to the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ parallet to the sraight line $2x - y = 1$. The points of contact of the tangents 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) $(-3\sqrt{3}, 2\sqrt{2})$

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

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

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

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

Answer:

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47. If ellipse $\frac{x^2}{16}+\frac{y^2}{b^2}=1$ and hyperbola $\frac{x^2}{144}-\frac{y^2}{81}=\frac{1}{25}$ are confocal, then find the value of b^2.

A. 7

B. 8

C. 10

D. 9

Answer:

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48. Consider the hyperbola $H: x^2 - y^2 = 1$ and a circle S with centre $N(x_2, 0)$ Suppose that H and S touch each other at a point $(P(x_1, y_1)$ with $x_1 > 1$ and $y_1 > 0$ The common tangent to H and S at P intersects the x-axis at point M. If (l,m) is the centroid of the triangle ΔPMN then the correct expression is (A) $\frac{dl}{dx_1} = 1 - \frac{1}{3x_1^2}$ for $x_1 > 1$ (B) $\frac{dm}{dx_1} = \frac{x_!}{3\left(\sqrt{x_1^2 - 1}\right)}\Bigg) f$ or $x_1 > 1$ (C) $\frac{dl}{dx_1} = 1 + \frac{1}{3x_1^2} f$ or $x_1 > 1$ (D) $\frac{dm}{dy_1} = \frac{1}{3} f$ or $y_1 > 0$

A. $\frac{dl}{dx_1} = 1 - \frac{1}{3x_1^2}$ for $x_1 > 1$

B. $\frac{dm}{dx_1} = \frac{x_1}{3\left(\sqrt{x_1^2 - 1}\right)}$ for $x_1 > 1$

C. $\frac{dl}{dx_1} = 1 + \frac{1}{3x_1^2}$ for $x_1 > 1$

D. $\frac{dm}{dy} = \frac{1}{3}$ for $y_1 > 0$.

Answer:

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49. The angle between pair of tangents to the curve $7x^2 - 12y^2 = 84$ from the point $M(1, 2)$ is

A. $2\tan^{-1}\frac{1}{2}$

B. $2\tan^{-1}2$

C. $2\left(\tan^{-1}.\frac{1}{3}+\tan^{-1}.\frac{1}{2}\right)$

D. $2\tan^{-1}3$

Answer:

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50. Consider the chords of the parabola $y^2=4x$ which touches the hyperbola $x^2-y^2=1$, the locus of the point of intersection of tangents drawn to the parabola at the extremitites of such chords is a conic section having latursrectum λ, the value of λ, is

A. 1

B. 2

C. 3

D. 4

Answer:

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51. There exist two points P and Q on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ such that $PO \perp OQ$, where O is the origin, then the number of points in the xy-plane

from where pair of perpendicular tangents can be drawn to the hyperbola , is

A. 0

B. 1

C. 2

D. infinite

Answer:

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52. If four points be taken on a rectangular hyperbola such that the chord joining any two is

perpendicular to the chord joining the other two, and if $\alpha, \beta, \gamma, \delta$ be the inclinations of either asymptote of the straight line joining these points to the centre, prove that $\tan\alpha \tan\beta \tan\gamma \tan\delta = 1$

A. 1

B. 2

C. -2

D. -1

Answer:

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53. A hyperbola whose transverse axis is along the major axis of the conic, $\frac{x^2}{3} + \frac{y^2}{4} = 4$ and has vertices atthe foci of this conic. If the eccentricity of the hyperbola is $\frac{3}{2}$, then which of the following points does NOT lie on it?

A. $\left(\sqrt{5}, 2\sqrt{2}\right)$

B. $\left(\sqrt{5}, 2\sqrt{3}\right)$

C. $(0, 2)$

D. $\left(\sqrt{10}, 2\sqrt{3}\right)$

Answer:

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54. The equation of the hyperbola whose foci are (-2, 0) and (2,0) and eccentricity is 2 is given by

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

B. $-x^2 + 3y^2 = 3$

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

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

Answer:

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Section Ii Assertion Reason Type

1. Statement-1 : If the foci of a hyperbola are at $(4, 1)$ and $(-6, 1)$ and eccentricity is $\frac{5}{4}$, then the length of its transverse axis is 4.

Statement-2 : Distance between the foci of a hyperbola is equal to the product of its eccentricity and length of the transverse axis.

A. 1

B. 2

C. 3

D. 4

Answer:

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

A. 1

B. 2

C. 3

D. 4

Answer:

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3. Statement-1 : Tangents drawn from the point $(2, -1)$ 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 $x^2 + y^2 = a^2 - b^2$.

A. 1

B. 2

C. 3

D. 4

Answer:

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4. Statement-1 : If $5/3$ is the eccentricity of a hyperbola, then the eccentricity of its conjugate hyperbola is $5/4$.

Statement-2 : If e and e' are the eccentricities of hyperbolas $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ and $\frac{x^2}{a^2} - \frac{y^2}{b^2} = -1$ respectively, then $\frac{1}{e^2} + \frac{1}{e'^2} = 1$.

A. 1

B. 2

C. 3

D. 4

Answer:

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Exercise

1. The equation of the hyperbola whose directrix $x + 2y = 1$, focus $(2, 1)$ and eccentricity 2, is

A. $x^2 + 16xy - 11y^2 - 12x + 6y + 21 = 0$

B. $x^2 - 16xy - 11y^2 - 12x + 6y + 21 = 0$

C. $x^2 - 4xy - y^2 - 12x + 6y + 21 = 0$

D. none of these

Answer:

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

A. $4/3$

B. $4/\sqrt{3}$

C. $2/\sqrt{3}$

D. none of these

Answer:

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3. The eccentricity of the hyperbola can never be equal to

A. $\sqrt{\frac{9}{5}}$

B. $2\sqrt{\frac{1}{9}}$

C. $8\sqrt{\frac{1}{8}}$

D. 2

Answer:

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4. The eccentricity of a rectangular hyperbola, is

A. 2

B. $\sqrt{2}$

C. 0

D. none of these

Answer:

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5. IF t is a parameter, then $x = a\left(t + \frac{1}{t}\right)$ and $y = b\left(t - \frac{1}{t}\right)$ represents

A. an ellipse

B. a circle

C. a pair of straight lines

D. a hyperbola

Answer:

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6. If $5x^2 + \lambda y^2 = 20$ represents a rectangular hyperbola, then λ equals

A. 5

B. 4

C. -5

D. none of these

Answer:

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7. The eccentricity of the hyperbola $3x^2 - 4y^2 = -12$ is

A. $\sqrt{\frac{7}{3}}$

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

C. $-\sqrt{\frac{7}{3}}$

D. $-\frac{\sqrt{7}}{2}$

Answer:

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8. The locus of the point of intersection of the straight lines $\frac{x}{a}+\frac{y}{b}=\lambda$ and $\frac{x}{a}-\frac{y}{b}=\frac{1}{\lambda}$ (λ is a variable), is

A. a circle

B. a parabola

C. an ellipse

D. a hyperbola

Answer:

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9. The equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ repersents a hyperbola if

A. $\Delta \neq 0, h^2 < ab$

B. $\Delta \neq 0, h^2 > ab$

C. $\Delta \neq 0, h^2 = ab$

D. $\Delta \neq 0, a + b = 0$

Answer:

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10. The equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ repersents a rectangular hyperbola if

A. $\Delta \neq 0, h^2 > ab, a + b = 0$

B. $\Delta \neq 0, h^2 < ab, a + b = 0$

C. $\Delta \neq 0, h^2 = ab, a + b = 0$

D. none of these

Answer:

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11. 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. $4x - 3y = 3$

D. $3x - 4y = 2$

Answer:

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12. Find the value of m, for which the line $y = mx + 25\frac{\sqrt{3}}{3}$ is a normal to the conic $\frac{x^2}{16} - \frac{y^2}{9} = 1.$

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

B. $\sqrt{3}$

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

D. none of these

Answer:

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13. The value of m for which the line $y = mx + 2$ becomes a tangent to the hyperbola $4x^2 - 9y^2 = 36$ is

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

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

C. $\pm \frac{8}{9}$

D. $\pm \frac{4\sqrt{2}}{3}$

Answer:

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

A. a hyperbola if $k<8$

B. an ellipse if $k>8$

C. a hyperbola if $8<k<12$

D. none of these

Answer:

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15. If the curves $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1(a>b)$ and $x^2-y(2)=c^2$ cut at

right angle 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:

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16. about to only mathematics

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:

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17. The equation of the tangent parallel to $y = x$ drawn to $\frac{x^2}{3} - \frac{y^2}{2} = 1$, is

A. $x - y + 1 = 0$

B. $x - y + 2 = 0$

C. $x + y - 1 = 0$

D. $x - y + 2 = 0$

Answer:

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

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

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

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

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

Answer:

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19. The tangents from a point $\left(2\sqrt{2}, 1\right)$ to the hyperbola $16x^2 - 25y^2 = 400$ inculde an angle equal to

A. $\pi / 2$

B. $\frac{\pi}{4}$

C. π

D. $\pi / 3$

Answer:

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20. If the line $y = 3x + \lambda$ touches the hyperbola $9x^2 - 5y^2 = 45$, then the value of λ is

A. 36

B. 45

C. 6

D. 15

Answer:

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21. 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. $y = \pm x \pm \left(a^2 - b^2\right)$

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

Answer:

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22. A point moves in a plane so that its distance PA and PB from who fixed points A and B in the plane satisfy the relation $PA - PB = k(k \neq 0)$ then the locus of P is a. a hyperbola b. a branch of the locus of P is c. a parabola d. an ellipse

A. a parabola

B. an ellipse

C. a hyperbola

D. a branch of a hyperbola

Answer:

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23. If ellipse $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$ and hyperbola $\frac{x^2}{144} - \frac{y^2}{81} = \frac{1}{25}$ are confocal, then find the value of b^2.

A. 1

B. 5

C. 7

D. 9

Answer:

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24. The curve represented by $x = a\cos h\theta$, $y = b\sin h\theta$, is

A. a hyperbola

B. an ellipse

C. a parabola

D. a circle

Answer:

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25. The equation oi the conic with focus at (1,-1) directrix along $x - y + 1 = 0$ and eccentricity $\sqrt{2}$ is $xy = 1$ b. $2xy + 4x - 4y - 1 = 0$ c. $x^2 - y^2 = 1$ d. $2xy - 4x + 4y = 1 = 0$

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

B. $xy = 1$

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

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

Answer:

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26. If the eccentricity of a hyperbola is $\sqrt{3}$, the eccentricity of its conjugate hyperbola, is

A. $\sqrt{2}$

B. $\sqrt{3}$

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

D. $2\sqrt{3}$

Answer:

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27. Area of the triangle formed by the lines $x - y = 0, x + y = 0$ and any tangant to the hyperbola $x^2 - y^2 = a^2$ is

A. $4a^2$

B. $3a^2$

C. $2a^2$

D. a^2

Answer:

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28. The angle between the asymptotes of $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is equal to

A. $2\tan^{-1}\left(\frac{b}{a}\right)$

B. $\tan^{-1}\left(\frac{a}{b}\right)$

C. $2\tan^{-1}\left(\frac{a}{b}\right)$

D. $\tan^{-1}\left(\frac{b}{a}\right)$

Answer:

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29. If a normal of slope m to the parabola $y^2 = 4ax$ touches the hyperbola $x^2 - y^2 = a^2$, then

A. $m^6 - 4m^4 - 3m^2 + 1 = 0$

B. $m^6 - 4m^4 + 3m^2 - 1 = 0$

C. $m^6 + 4m^4 - 3m^2 + 1 = 0$

D. $m^6 + 4m^4 + 3m^2 + 1 = 0$

Answer:

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30. Equation of common tangent to the parabola $y^2 = 8x$ and hyperbola $x^2 - \frac{y^2}{3} = 1$ is

A. $2x - y - 1 = 0$

B. $x - 2y + 1 = 0$

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

D. $2x + y + 1 = 0$

Answer:

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31. The circle drawn on the line segment joining the foci of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ as diameter cuts the asymptotes at (A) (a, a) (B) (b, a) (C) $(\pm b, \pm a)$ (D) $(\pm a, \pm b)$

A. (a, a)

B. (b, a)

C. $(\pm b, \pm a)$

D. $(\pm a, \pm b)$

Answer:

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32. The angle between the asymptotes of the hyperbola $2x^2 - 2y^2 = 9$, is

A. $\pi/4$

B. $\pi/3$

C. $\pi/6$

D. $\pi/2$

Answer:

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33. The difference of the focal distances of anypoint on the hyperbola is equal to a. Length of the conjugate axis b. Eccentricity c. Length of the transverse axis d. Latus rectum

A. latusrectum

B. eccentricity

C. transverse axis

D. conjugate axis

Answer: c

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34. about to only mathematics

A. $(x_4, -y_4)$

B. (x_4, y_4)

C. $(-x_4, -y_4)$

D. $(-x_4, y_4)$

Answer:

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35. The points of the intersection of the curves whose parametric equations are

$x = t^2 + 1, y = 2t$ and $x = 2s, y = \frac{s}{2}$ is given by

A. $(1, -3)$

B. $(2, 2)$

C. $(-2, 4)$

D. $(1, 2)$

Answer:

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36. 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:

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37. Find the point on the hyperbola $x^2 - 9y^2 = 9$ where the line $5x + 12y = 9$ touches it.

A. $(-5/4, 3)$

B. $(5, -4/3)$

C. $(3, -1/2)$

D. none of these

Answer:

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38. The length of the latusrectum of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = -1$, is

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

B. $\frac{2b^2}{a}$

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

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

Answer:

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39. P is a point on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, and N is the foot of the perpendicular from P on the transverse axis. The tantent 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

Answer:

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40. If the tangent at the point $(2\sec\theta, 3\tan\theta)$ to the hyperbola $\frac{x^2}{4} - \frac{y^2}{9} = 1$ is parallel to $3x - y + 4 = 0$, then the value of θ, is

A. 45°

B. 60°

C. 30°

D. 75°

Answer:

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41. The eccentricity of the hyperbola $\frac{\sqrt{1999}}{3}\left(x^2 - y^2\right) = 1$, is

A. $\sqrt{2}$

B. 2

C. $2\sqrt{2}$

D. $\sqrt{3}$

Answer:

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42. Tangents are drawn to the hyperbola $x^2 - y^2 = 3$ which are parallel to the line $2x + y + 8 = 0$. Then their points of contact is/are :

A. $(2, 1), (1, 2)$

B. $(2, -1), (-2, 1)$

C. $(-2, -1), (1, 2)$

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

Answer:

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43. If th tangent at the point $(a\sec\alpha, b\tan\alpha)$ to the hyberbola $\frac{x^2}{a^2} - \frac{yh^2}{b^2} = 1$ meets the transverse axis at T. Then the distances of T form a focus of the hyperbola is

A. $b(e - \cos\alpha)$

B. $b(e + \cos\alpha)$

C. $a(e + \cos\alpha)$

D. $\sqrt{a^2e^2 + b^2\cot^2\alpha}$

Answer:

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44. The equation of the hyperbola of given transverse axis $2a$ with its vertex mid-way between the centre and the corresponding focus, is

A. $3x^2 - y^2 = a^2$

B. $3x^2 - y^2 = 3a^2$

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

D. $x^2 - 3y^2 = a^2$

Answer:

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45. Find the locus of the midpoints of the chords of the circles $x^2 + y^2 = 16$, which are tangent to the hyperbola $9x^2 - 16y^2 = 144$.

A. $\left(x^2 + y^2\right)^2 = 16x^2 - 9y^2$

B. $\left(x^2 + y^2\right)^2 = 9x^2 - 16y^2$

C. $\left(x^2 - y^2\right)^2 = 16x^2 - 9y^2$

D. none of these

Answer:

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46. If the latus rectum subtends a right angle at the center of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, then find its eccentricity.

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

B. $\frac{\sqrt{5} - 1}{2}$

C. $\frac{\sqrt{5}+1}{2}$

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

Answer:

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47. If the latursrectum of a hyperbola through one foucs subtends 60° angle at the other focus, then its eccentricity e, is

A. $\sqrt{2}$

B. $\sqrt{3}$

C. $\sqrt{5}$

D. $\sqrt{6}$

Answer:

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48. If the latus rectum of a hyperbola forms an equilateral triangle with the vertex at the centre of the hyperbola, then find the eccentricity of the hyperbola.

A. $\frac{\sqrt{5}+1}{2}$

B. $\frac{\sqrt{11}+1}{2}$

C. $\frac{\sqrt{13}+1}{2\sqrt{3}}$

D. $\frac{\sqrt{13}-1}{2\sqrt{3}}$

Answer:

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49. Let LL' be the latus rectum through the focus of the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ and A' be the farther vertex. If $A'LL'$ is equilateral, then the eccentricity of the hyperbola is (axes are coordinate axes). (a) $\sqrt{3}$ (b) $\sqrt{3}+1$ $\left(\frac{\sqrt{3}+1}{\sqrt{2}}\right)$ (d) $\frac{\left(\sqrt{3}+1\right)}{\sqrt{3}}$

A. $\sqrt{3}$

B. $\sqrt{3}+1$

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

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

Answer:

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50. Find the angle between the asymptotes of the hyperbola $\frac{x^2}{16}-\frac{y^2}{9}=1$.

A. $\pi-2\tan^{-1}\frac{3}{4}$

B. $\pi - 2\tan^{-1}\frac{3}{2}$

C. $\tan^{-1}\frac{3}{4}$

D. $\pi - 2\tan^{-1}\frac{4}{3}$

Answer:

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51. Number of integral values of b for which tangent parallel to line $y = x + 1$ can be drawn to hyperbola $\frac{x^2}{5} - \frac{y^2}{b^2} = 1$ is _____.

A. $m \in (0, \infty)$

B. $m \in (-\infty, 2) - \left\{\sqrt{\frac{\sqrt{5}+1}{2}}\right\}$

C.

$$m \in (-\infty, -1) \cup (1, \infty) - \left\{\pm\sqrt{\frac{\sqrt{5}+1}{2}}\right\}$$

D. none of these

Answer:

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52. The number of integral points on the hyperbola $x^2 - y^2 = (2000)^2$ is (an integral point is a point

both of whose co-ordinates are integer) (A) 98 (B) 96 (C) 48 (D) 24

A. 98

B. 96

C. 48

D. 24

Answer:

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53. The relation between Q_3 and P_{75} is

A. $a - b$

B. $\sqrt{a^2 + b^2} - ab$

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

D. 0

Answer: 4

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54. The locus of the centre of a circle which touches two given circles externally is a

A. $\circ \leq$

B. parabola

C. hyperbola

D. none of these

Answer: option 3

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55. If tangents OQ and OR are dawn to variable circles having radius r and the centre lying on the rectangular hyperbola xy = 1, then the locus of the circumcentre of triangle OQR is (O being the origin)

A. $xy = 4$

B. $4xy = 1$

C. $xy = 1$

D. none of these

Answer:

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56. about to only mathematics

A. $x + 2 = 0$

B. $2x + 1 = 0$

C. $x - 2 = 0$

D. $x + y + 1 = 0$

Answer:

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Chapter Test

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

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

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

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

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

Answer:

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2. 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:

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3. The number of normals to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ from an external point, is

A. 2

B. 4

C. 6

D. 3

Answer:

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4. If e and e_1 are the eccentricities of the hyperbola $xy = c^2$ and $x^2 - y^2 = a^2$, then $(e + e_1)^2$ is equal to

A. 1

B. 4

C. 6

D. 8

Answer:

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5. A rectangular hyperbola with centre C, is intersect by a circle of radius r in four points, P, Q, R and S, $CP^2 + CQ^2 + CR^2 + CS^2$ is equal to

A. r^2

B. $2r^2$

C. $3r^2$

D. $4r^2$

Answer:

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6. The equation of the pair of asymptotes of the hyperbola $xy - 4x + 3y = 0$, is

A. $xy - 4x + 3y - 1 = 0$

B. $xy - 4x + 3y - 10 = 0$

C. $xy - 4x + 3y - 12 = 0$

D. none of these

Answer:

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7. If the latus rectum of the hyperbola $\frac{x^2}{16} - \frac{y^2}{b^2} = 1$ is $\frac{9}{2}$, then its eccentricity, is

A. $4/5$

B. $5/4$

C. $3/4$

D. $4/3$

Answer:

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8. Chords of the hyperbola $x^2 - y^2 = a^2$ touch the parabola $y^2 = 4ax$. Prove that the locus of their middle-points is the curve $y^2(x - a) = x^3$.

A. $x^2(y - a) = y^3$

B. $y^2(x - a) = x^3$

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

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

Answer:

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9. Tangents drawn from the point (c, d) to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ make angles α and β with the x-axis.

If $\tan\alpha \tan\beta = 1$, then find the value of $c^2 - d^2$.

A. $a^2 - b^2$

B. $b^2 - a^2$

C. $a^2 + b^2$

D. none of these

Answer:

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10. If the tangent at (h, k) on $b^2x^2 - a^2y^2 = a^2b^2$ cuts the auxiliary circle in two points whose ordinates are y_1 and y_2, then $\frac{1}{y_1} + \frac{1}{y_2}$ is

A. `1/k

B. 2/k

C. h/k

D. k/h

Answer:

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11. If the chords of contact of tangents drawn from P to the hyperbola $x^2 - y^2 = a^2$ and its auxiliary circle are at right angle, then P lies on

A. $x^2 - y^2 = 3a^2$

B. $x^2 - y^2 = 2a^2$

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

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

Answer:

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12. The tangent at a point P on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ meets one of the directrix at F. If PF subtends an angle θ at the corresponding focus, then θ =

A. 45°

B. 30°

C. 60°

D. 90°

Answer:

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13. The mid-point of the chord intercepted by the hyperbola $9x^2 - 16y^2 = 144$ on the line $9x - 8y - 10 = 0$, is

A. $(1, 2)$

B. $(-1, 2)$

C. $(-2, 1)$

D. $(2, 1)$

Answer:

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14. Locus of P such that the chord of contact of P with respect to $y^2 = 4ax$ touches the hyperbola $x^2 - y^2 = a^2$

A. $4x^2 - y^2 = a^2$

B. $y^2 - 4x^2 = 4a^2$

C. $4x^2 + y^2 = 4a^2$

D. $4y^2 - x^2 = 4a^2$

Answer:

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15. 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 $C\dot{Q}\dot{C}R = a^2 + b^2$.

A. a^2b^2

B. $a^2 - b^2$

C. $a^2 + b^2$

D. none of these

Answer:

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16. If $lx + my + n = 0$ is a tangent to the rectangular hyperbola $xy = c^2$, then

A. $l < m < 0$

B. $l > 0, m < 0$

C. $l < 0, m > 0$

D. none of these

Answer:

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17. A tangent to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ cuts the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ at $PandQ$. Show that the locus of the midpoint of PQ is $\left(\frac{x^2}{a^2} + \frac{y^2}{b^2}\right)^2 = \frac{x^2}{a^2} - \frac{y^2}{b^2}$.

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

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

C. $\left(\frac{x^2}{a^2} - \frac{y^2}{b^2}\right)^2 = \frac{2x^2y^2}{a^2b^2}$

D. none of these

Answer:

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18. The product of lengths of perpendicular from any point on the hyperbola $x^2 - y^2 = 8$ to its asymptotes, is

A. 8

B. 6

C. 2

D. 4

Answer:

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19. The angle between the asymptotes of the hyperbola $3x^2 - y^2 = 3$, is

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

B. $\frac{\pi}{5}$

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

D. $\frac{2\pi}{5}$

Answer:

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20. Find the area of the triangle formed by any tangent to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ with its asymptotes.

A. $4a^2b^2$

B. a^2b^2

C. $4ab$

D. ab

Answer:

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21. If $e_1 and\, e_2$ are respectively the eccentricities of the ellipse $\frac{x^2}{18} + \frac{y^2}{4} = 1$ and the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1,$ then the relation between $e_1 and\, e_2$ is $2e12 + e22 = 3$ b. $e12 + 2e22 = 3$ c. $2e12 + e22 = 3$ d. $e12 + 3e22 = 2$

A. $2e_1^2 + e_2^2 = 2$

B. $e_1^2 + 2e_2^2 = 3$

C. $2e_1^2 + e_2^2 = 3$

D. $e_1^2 + 3e_2^2 = 2$

Answer:

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22. The distance between the directrices of the hyperbola $x = 8sec\theta,\ y = 8\,tan\theta,\ 8\sqrt{2}$ b. $16\sqrt{2}$ c. $4\sqrt{2}$ d. $6\sqrt{2}$

A. $8\sqrt{2}$

B. $16\sqrt{2}$

C. $4\sqrt{2}$

D. $6\sqrt{2}$

Answer:

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23. The straight line $x + y = \sqrt{2}p$ will touch the hyperbola $4x^2 - 9y^2 = 36$, if

A. $p^2 = 2$

B. $p^2 = 5$

C. $5p^2 = 2$

D. $2p^2 = 5$

Answer:

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24. The locus of the point of intersection of perpendicular tangents to the hyperbola $\frac{x^2}{3} - \frac{y^2}{1} = 1$, is

A. $x^2 + y^2 = 2$

B. $x^2 + y^2 = 3$

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

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

Answer: A

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25. .Find the product of lengths of the perpendiculars from any point on the hyperbola $\frac{x^2}{16} - \frac{y^2}{9} = 1$ to its asymptotes.

A. $\frac{25}{12}$

B. $\frac{144}{25}$

C. $\frac{144}{7}$

D. $\frac{25}{144}$

Answer:

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26. The angle between the asymptotes of the hyperbola $27x^2 - 9y^2 = 24$, is

A. 30°

B. 120°

C. 45°

D. 240°

Answer:

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27. The equation of the chord of contact of tangents from $(1, 2)$ to the hyperbola $3x^2 - 4y^2 = 3$, is

A. $3x - 16y = 3$

B. $3x - 8y - 3 = 0$

C. $\frac{x}{3} - \frac{y}{4} = 1$

D. $\frac{x}{4} - \frac{y}{3} = 1$

Answer:

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28. Equation of the hyperbola whose vertices are $(\pm 3, 0)$ and foci at $(\pm 5, 0)$ is a.$16x^2 - 9y^2 = 144$ b. $9x^2 - 16y^2 = 144$ c. $25x^2 - 9y^2 = 225$ d. $9x^2 - 25y^2 = 81$

A. $16x^2 - 9y^2 = 144$

B. $9x^2 - 16y^2 = 144$

C. $25x^2 - 9y^2 = 225$

D. $9x^2 - 25y^2 = 81$

Answer:

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29. The length of the semi-transverse axis of the rectangular hyperbola $xy = 32$, is

A. 32

B. 16

C. 64

D. 8

Answer:

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