MATHS

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MATHS (HINGLISH)

PARABOLA

Illustration

1. Find the equation of the parabola whose focus is (0,-4) and directrix is y=4.

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2. Find the equation of the tangent with slopes 5 to the parabola $y^2 = 20x$, also find the coordinates of the point of contact of the tangent to the parabola.

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3. A normal of slope 4 at a point P on the parabola $y^2 = 28x$, meets the axis of the parabola at Q. Find the length PQ.

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4. PP' is a focal chord of the parabola $y^2 = 8x$. If the coordinates of P are (18,12), find the coordinates of P'

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5. Show that the tangents at the extremities of any focal chord of a parabola intersect at right angles at the directrix.

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6. The normal at a point $P(36, 36)$ on the parabola $y^2 = 36x$ meets the parabola again at a point Q. Find the coordinates of Q.

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7. The normal drawn at a point $\left(at_1^2, 2at_1\right)$ of the parabola $y^2 = 4ax$meets on the point $\left(ar_2^2, 2at_2\right)$ then

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8. The tangent and normal at $P(t)$, for all real positive t, to the parabola $y^2 = 4ax$ meet the axis of the parabola in T and G respectively, then the angle at which the tangent at P to the parabola is inclined to the tangent at P to the circle passing through the points P, $T$and G is

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Solved Examples Concept Based Single Correct Answer Type Questions

1. The point of intersection of the normals to the parabola $y^2 = 4x$ at the ends of its latus rectum is

A. $(0, 2)$

B. $(3, 0)$

C. $(0, 3)$

D. $(2, 0)$

Answer: B

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2. Equation of the line joining the foci of the parabola $y^2 = 4x$ and $x^2 = -4y$ is

A. $x + y - 1 = 0$

B. $x - y - 1 = 0$

C. $x - y + 1 = 0$

D. $x + y + 1 = 0$

Answer: B

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3. The tangent at a point P on the parabola $y^2 = 8x$ meets the directrix of the parabola at Q such that distance of Q from the axis of the parabola is 3. Then the coordinates of P cannot be

A. $(2, 4)$

B. $(8, 8)$

C. $(1/2, 2)$

D. $(8 - 8)$

Answer: A

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4. $y^2 = 16x$ is a parabola and $x^2 + y^2 = 16$ is a circle . Then

A. circle passes through the vertex of the parabola

B. circle touches the parabola at the vertex

C. circle passes through the focus of the parabola

D. circle lies inside the parabola .

Answer: C

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5. The slope of the line touching both the parabolas $y^2 = 4x$ and $x^2 = -32y$ is (a) $\frac{1}{2}$ (b) $\frac{3}{2}$ (c) $\frac{1}{8}$ (d) $\frac{2}{3}$

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

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

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

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

Answer: A

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6. Let L_1 be the length of the common chord of the curves $x^2 + y^2 = 9$ and $y^2 = 8x$ and L_2 be the length of the latus rectum of $y^2 = 8x$, then

A. $L_1 > L_2$

B. $L_1 = L_2$

C. $L_1 < L_2$

D. $\frac{L_1}{L_2} = \sqrt{2}$

Answer: C

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7. If m is the slope of a common tangent of the parabola $y^2 = 16x$ and the circle $x^2 + y^2 = 8$, then m^2 is equal to

A. 1

B. 2

C. 4

D. 8

Answer: A

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8. Equation of a normal to the parabola $y^2 = 32x$ passing through its focus is

A. x=0

B. y=0

C. $x + y - 8 = 0$

D. $x - y - 8 = 0$

Answer: B

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9. $P_1 : y^2 = 49x$ and $P_2 : x^2 = 4ay$ are two parabolas. Equation of a tangent to the parabola P_1 at a point where it intersects the parabola P_2 is :

A. $2x - y - 4a = 0$

B. $y = 0$

C. $x - 2y + 4a - 0$

D. $x - y - 0$

Answer: C

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10. The point on the parabola $y^2 = 4x$ at which the abscissa and ordinate change at the same rate is

A. $-1 < \lambda < \frac{3}{5}$

B. $-\frac{3}{5} < \lambda < 5$

C. $-2 < \lambda 2$

D. $-\frac{3}{5} < \lambda 1$

Answer: D

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11. A point on the parabola $y^2 = 18x$ at which the ordinate increases at twice the rate of the abscissa is (2,6) (b) $(2, -6)$ $\left(\frac{9}{8}, -\frac{9}{2}\right)$ (d) $\left(\frac{9}{8}, \frac{9}{2}\right)$

A. $\left(-\frac{9}{8}, \frac{9}{2}\right)$

B. $(2, -4)$

C. $(2, 4)$

D. $\left(\frac{9}{8}, \frac{9}{2}\right)$

Answer: D

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12. The normal at the point $\left(bt_1^2, 2bt_1\right)$ on the parabola $y^2 = 4bx$ meets the parabola again in the point $\left(bt_2^2, 2bt_2, \right)$ then

A. $t_2 = -t_1 + \frac{2}{t_1}$

B. $t_2 = t_1 - \frac{2}{t_1}$

C. $t_2 = t_1 + \frac{2}{t_1}$

D. $t_2 = -t_1 - \frac{2}{t_1}$

Answer: D

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13. let P be the point $(1, 0)$ and Q be a point on the locus $y^2 = 8x$. The locus of the midpoint of PQ is

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

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

C. $y^2 - 4x + 20$

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

Answer: C

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14. A parabola has the origin as its focus and the line $x = 2$ as the directrix. Then the vertex of the parabola is at (1) (0, 2) (2) (1, 0) (3) (0, 1) (4) (2, 0)

A. $(2, 0)$

B. $(0, 2)$

C. $(1, 0)$

D. $(0, 1)$

Answer: C

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15. A chord is drown through the focus of the parabola $y^2 = 6x$ such than its distance from the vertex of this parabola is $\frac{\sqrt{5}}{2}$, then its slope can be

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

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

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

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

Answer: A

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Solved Examples Level 1 Single Correct Answer Type Questions

1. The focus of the parabola $4y^2 + 12x - 20y + 67 = 0$ is

A. $(-7/2, 5/2)$

B. $(-3/4, 5/2)$

C. $(-17/4, 5/2)$

D. $(5/2, 3/4)$

Answer: C

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2. A line bisecting the ordinate PN of a point $P(at^2, 2at), 6 > 0$, on the parabola $y^2 = 4ax$ is drawn parallel to the axis to meet the curve at Q. If NQ meets the tangent at the vertex at the point T, then the coordinates of T are:

A. $(0, 4\text{at}/3)$

B. $(0, 2\text{at})$

C. $(\text{at}^2/4, \text{at})$

D. $(0, at')$

Answer: A

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3. If P, Q, R are three points on a parabola $y^2 = 4ax$ whose ordinates are in geometrical progression, then the tangents at P and R meet on :

A. the line through Q parallel to x-axis

B. the line through Q parallel to y-axis

C. the line joining Q to the vertex

D. the line joining Q to the focus.

Answer: B

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4. The locus of the mid-point of the line segment joning the focus to a moving point on the parabola $y^2 = 4ax$ is another parabola with directrix

A. $x = -a$

B. $x = -a/2$

C. $x = 0$

D. $x = a/2$

Answer: C

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5. The equation of the common tangent to the curve $y^2 = -8x$ and $xy = -1$ is

A. $3y = 9x + 2$

B. $y = 2x + 1$

C. $2y = x + 8$

D. $y = x + 2$

Answer: D

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6. The tangent at the point $P(x_1, y_1)$ to the parabola $y^2 = 4ax$ meets the parabola $y^2 = 4a(x + b)$ at Q and R. the coordinates of the mid-point of QR are

A. $(x_1 - a, y_1 + b)$

B. (x_1, y_1)

C. $(x_1 + b, y_1 + a)$

D. $(x_1 - b, y_1 - b)$

Answer: B

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7. AB is a chord of the parabola $y^2 = 4ax$ with its vertex at A. BC is drawn perpendicular to AB meeting the axis at C.The projecton of BC on the axis of the parabola is

A. a

B. 2a

C. 4a

D. 8a

Answer: C

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8. The equation of the common tangent touching the circle $(x-3)^2+y^2=9$ and the parabola $y^2=4x$ above the x-axis is $\sqrt{3}y=3x+1$ (b) $\sqrt{3}y=-(x+3)$ $\sqrt{2}y=x+3$ (d) $\sqrt{3}y=-(3x-1)$

A. $\sqrt{3}y=3x+1$

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

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

D. $\sqrt{3}y=-(3x+1)$

Answer: C

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9. The point of intersetion of the tangents to the parabola $y^2 = 4x$ at the points where the circle $(x-3)^2 + y^2 = 9$ meets the parabola, other than the origin, is

A. $(-2, 0)$

B. $(1, 0)$

C. $(0, 0)$

D. $(-1, -1)$

Answer: A

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10. Equation of the directrix of the parabola $y^2 + 4x + 2 = 0$ is

A. $x = -1$

B. $x = 1$

C. $x = -3/2$

D. $x = 1/2$

Answer: D

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11. If $x + y = k$ is a normal to the parabola $y^2 = 12x$, then the value of k is-

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12. If a normal chord at a point on the parabola $y^2 = 4ax$ subtends a right angle at the vertex, then t equals

A. 4

B. $\sqrt{5}$

C. $\sqrt{2}$

D. 1

Answer: C

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13. The slopes of the normals to the parabola $y^2 = 4ax$ intersecting at a point on the axis of the a distance 4a from its vertex are in

A. A.P

B. G.P

C. H.P

D. none of these

Answer: A

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14. If the focus of a parabola divides a focal chord in segments of lengths 3 and 2 , then the length of its latus rectum is

A. $3/2$

B. $6/5$

C. $12/5$

D. $24/5$

Answer: D

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15. P is a point on the parabola whose ordinate equals its abscissa. A normal is drawn to the parabola at P to meet it again at Q. If S is the focus of the parabola, then the product of the slopes of SP and SQ is

A. -1

B. $1/2$

C. 1

D. 2

Answer: A

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16. the equation of the parabola whose focus is the point $(0, 0)$ and the tangent at the vertix is $x - y + 1 = 0$ is

A. $x - y = 0$

B. $x - y - 1 = 0$

C. $x - y + 2 = 0$

D. $x + y - 1 = 0$

Answer: C

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17. The common tangent to the circle $x^2 + y^2 = a^2/2$ and the parabola $y^2 = 4ax$ intersect at the focus of the parabola

A. $x^2 = 4ay$

B. $x^2 = -4ay$

C. $y^2 = -4ax$

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

Answer: C

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18. The locus of the vertices of the family of parabolas $y = \frac{a^3x^2}{3} + \frac{a^2x}{2} - 2a$ is:

A. $xy = 64/105$

B. $xy = 105/64$

C. $xy = 3/4$

D. $xy = 35/16$

Answer: B

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19. The equation of a tangent to the parabola $y^2 = 8xisy = x + 2$. The point on this line from which the other tangent to the parabola is perpendicular to the given tangent is (1) $(-1, 1)$ (2) $(0, 2)$ (3) $(2, 4)$ (4) $(-2, 0)$

A. $(-1, 1)$

B. $(0, 2)$

C. $(2, 4)$

D. $(-2, 0)$

Answer: D

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20. If two tangents drawn from a point P to the parabola y2 = 4x are at right angles, then the locus of P is (1) $2x + 1 = 0$ (2) $x = 1$ (3) $2x1 = 0$ (4) $x = 1$

A. $x = -1$

B. $2x - 1 = 0$

C. $x = 1$

D. $2x + 1 = 0$

Answer: A

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21. The shortest distance between the lines $y - x = 1$ and the curve $x = y^2$ is

A. $\frac{3\sqrt{2}}{5}$

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

C. $\frac{3\sqrt{2}}{8}$

D. $\frac{2\sqrt{3}}{8}$

Answer: C

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22. If $a \neq 0$ and the line $2bx + 3cy + 4d = 0$ passes through the points of intersection of the parabola $y^2 = 4ax$ and $x^2 = 4ay$, then

A. $d^2 + (2b - 3c)^2 = 0$

B. $d^2 + (3b + 2c)^2 = 0$

C. $d^2 + (2b + 3c)^2 = 0$

D. $d^2 + (3b - 2c)^2 = 0$

Answer: C

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23. The locus of a point $P(\alpha\beta)$ moving under the condition that the line $y = \alpha x + \beta$ is a tangent to the parabola $y^2 = 4ax$ is

A. $xy = 4a$

B. $xy = a$

C. $xy = a^2$

D. $ax^3 + 2ax + y = 0$

Answer: B

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24. The point of intersection of the normals to the parabola $y^2 = 4x$ at the ends of its latus rectum is

A. $(0, 2)$

B. $(3, 0)$

C. $(0, 3)$

D. $(2, 0)$

Answer: B

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25. Two tangents are drawn from a point $(-2, -1)$ to the curve $y^2 = 4x$. If α is the angle between them, then $|\tan\alpha|$ is equal to :

A. $\frac{1}{3}$

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

C. $\sqrt{3}$

D. 3

Answer: D

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26. Let O be the vertex and Q be any point on the parabola, $x^2 = 8y$. It the point P divides the line segment OQ internally in the ratio 1 : 3, then the locus of P is : (1) $x^2 = y$ (2) $y^2 = x$ (3) $y^2 = 2x$ (4) $x^2 = 2y$

A. $x^2 = y$

B. $y^2 = x$

C. $y^2 = 2x$

D. $x^2 = 2y$

Answer: D

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27. Let $y^2 = 16$ be a given parabola and L be an extremity of its latus rectum in the first quadrant . If a chord is drawn through L with slope -1, then the length of this chord is :

A. 32

B. $16\sqrt{2}$

C. $16\sqrt{3}$

D. $32\sqrt{2}$

Answer: D

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28. The locus of the mid-point of the chords of the parabola $x^2 = 4py$ having slope m, is a

A. line parallel to x-axis at a distance |2pm| from it .

B. line parallel to y-axis at a distance |2pm| from it.

C. line parallel to $y = mx, m \neq 0$ at a distance |2pm| from it .

D. circle with centre at the origin and radius |2pm|.

Answer: B

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29. Let (x,y) be any point on the parabola $y^2 = 4x$. Let P be the point that divides the line segment from (0,0) and (x,y) n the ratio 1:3. Then the locus of P is :

A. $x^2 = y$

B. $5y^2 = 2x$

C. $5y^2 = 8x$

D. $5x^2 = 2y$

Answer: C

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30. Let L be a normal to the parabola $y^2 = 4x$. If L passes through the point (9, 6), then L is given by

A. $y - x + 3 = 0$

B. $y + 3x - 33 = 0$

C. $y + x - 15 = 0$

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

Answer: C

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Solved Examples Level 2 Single Correct Answer Type Questions

1. If the line x-1 = 0 is the directrix of the para bola $y^2 - kx + 8 = 0, k \neq 0$ and the parabola intersect the circle $y^2 + x^2 = 4$ in two real distinct points, then the value of k is

A. -4

B. -8

C. 4

D. 2

Answer: B

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2. M is the foot of the perpendicular from a point P on the parabola $y^2 = 8(x - 3)$ to its directrix and S is an equilateral triangle, the length of side of the triangle is

A. 2

B. 3

C. 4

D. 8

Answer: D

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3. PQ is a double ordinate of a parabola $y^2 = 4ax$. The locus of its points of trisection is another parabola length of whose latus rectum is k times the length of the latus rectum of the given parabola, the value of k is

A. $1/9$

B. $1/3$

C. $2/3$

D. none of these

Answer: A

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4. An equilateral triangle is inscribed in the parabola = 4 ax, where one vertex is at the vertex of the parabola. Find the length of the side of the triangle.

A. $\sqrt{3}/2$

B. $4\sqrt{3}/2$

C. $8\sqrt{3}/2$

D. $8\sqrt{3}$

Answer: D

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5. If PQ is a focal chord of the parabola $y^2 = 4ax$ with focus at s, then $\frac{2SP.\,SQ}{SP + SQ} =$

A. a

B. 2a

C. 4a

D. a^2

Answer: B

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6. If the tangent at the extrenities of a chord PQ of a parabola intersect at T, then the distances of the focus of the parabola from the points P.T. Q are in

A. A.P

B. G.P

C. H.P

D. none of these

Answer: B

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7. If the normals to the parabola $y^2 = 4ax$ at the ends of the latus rectum meet the parabola at $QandQ'$, then $\mathbb{Q}'$ is $10a$ (b) $4a$ (c) $20c$ (d) $12a$

A. $x = 2a$

B. $x = 3a$

C. $x = 6a$

D. $x = 9a$

Answer: D

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8. The orthocenter of a triangle formed by 3 tangents to a parabola $y^2 = 4ax$ lies on

A. $x + a = 0$

B. $x - a = 0$

C. $x = 0$

D. $y = 0$

Answer: A

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9. Through the vertex of the parabola $y^2 = 4ax$, chords OA and OB are drawn at right angles to each other . For all positions of the point A, the chord AB meets the axis of the parabola at a fixed point . Coordinates of the fixed point are :

A. (a,0)

B. (-a,0)

C. (4a,0)

D. (-4a,0)

Answer: C

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10. A is a point on the parabola $y^2 = 4ax$. The normal at A cuts the parabola again at point B. If AB subtends a right angle at the vertex of the parabola, find the slope of AB.

A. ± 1

B. $\pm \sqrt{2}$

C. $\pm\frac{1}{\sqrt{2}}$

D. $\pm 2\sqrt{2}$

Answer: B

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Solved Examples Numerical Answer Type Questions

1. If the line with equestion x+y=6 is a normal to the parabola $y^2 = 8x$ at point $(a, b), b > 0$ then a/b is equal to

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2. The line $y = 2x - k, k \neq 0$, meets the parabola $y = x^2 - 4x$ at points A and B. If $\angle AOB = \pi/2$, then value of k is

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3. If AB is a focal chord of the parabola $y^2 = 4ax$, then minimum possible value of $l(AB)$ is [l(AB) stands for length of AB] $(a = 7/4)$

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4. If the parabola $x^2 = 4y$ and the cilcle $x^2 + (y-7)^2 = r^2$ have maxiumum number of common chords , then least value of r is $(\sqrt{6} = 2.45)$

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5. If L is the length of the latus rectum of the parabola

$289\left\{(x-3)^2 + (y-1)^2\right\} = (15x - 8y + 13)^2$

then L is equal to

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6. Â·If the normals of the parabola $y^2 = 4x$ drawn at the end points of its latus rectum are tangents to the circle $(x-3)^2(y+2)^2 = r^2$, then the value of r^2 is

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7. The slope of line which belongs to family (1+ l) x + (1-l)y + 2(1-l) = 0 and makes shortest intercept on $x^2 = 4y - 4$

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8. If the line $x + by + c = 0, (bc \neq 0)$, touches both the parabolas $y^2 = 4x$ and $x^2 = -32y$, then $\frac{b+c}{8}$ is equal to

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9. Let l be the length of the latus rectum of the parabola whose focus is (1,2) and two tangents are $x - y = 0$ and $x + y = 0$, then l is equal to $(\sqrt{5} = 2.24)$

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10. If normals at points (a, y_1) and $(4-a, y_2)$ to the parabola $y^2 = 4x$ meet again on the parabola , then $|y_1 + y_2|$ is equal to $\left(\sqrt{2} = 1.41\right)$

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11. If the line $ax + by + c = 0$ is a common tangent of the parabola $y^2 = 4x$ and $x^2 + 32y = 0$, then $\frac{|a| + |b|}{|c|}$ is

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12. If $x + y = k$ is a normal to the parabola $y^2 = 36x$, then k is equal to

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13. The angle between the tangents drawn from the point $(1, 4)$ to the parabola $y^2 = 4x$ is

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14. Let ABCD be a square such that the side AB is on the line $2x - y = 17$ and two vertices C and D

are on the parabola $y = x^2$. If length of side of ABCD is less than 10 and its area is A, then A is equal to

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Exercise Concept Based Single Correct Answer Type Questions

1. A chord is drawn through the focus of the parabola $y^2 = 6x$ such that its distance from the vertex of this parabola is $\frac{\sqrt{5}}{2}$, then its slope can be :

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

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

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

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

Answer: A

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2. An equation of the parabola whose focus is $(-3, 0)$ and the directrix is x +5=0 is :

A. $y^2 = 4(x + 5)$

B. $y^2 = 4(x + 4)$

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

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

Answer: B

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3. The centre C of a variable circle passing through a fixed point $(a, 0), a > 0$, touches the line y=x. Locus of C is a parabola whose directrix is

A. $x + y = 0$

B. $x + y = a$

C. $x - y = 0$

D. $x - y = a$

Answer: C

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4. The parabola $y^2 = 4x$ and $x^2 = 32y$ intersect at a point P other than the origin . If the angle of intersection is θ then $\tan\theta$ is equal to

A. $\frac{5}{3}$

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

C. $\frac{3}{5}$

D. 1

Answer: C

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5. Length of the common chord of the parabola $y^2 = 8x$ and the circle $x^2 + y^2 - 2x - 4y = 0$ is :

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

B. $\sqrt{5}$

C. $2\sqrt{5}$

D. $3\sqrt{5}$

Answer: C

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6. If P is the point (1,0) and Q lies on the parabola $y^2 = 36x$, then the locus of the mid point of PQ is :

A. $y^2 = 9(2x - 1)$

B. $y^2 = 9(x + 2)$

C. $y^2 = 2(x - 9)$

D. $x^2 = 9(y-2)$

Answer: A

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7. Let Q be the foot of the perpendicular from the origin O to the tangent at a point $P(\alpha, \beta)$ on the parabola $y^2 = 4ax$ and S be the focus of the parabola , then $(OQ)^2$ (SP) is equal to

A. α

B. $a\alpha^2$

C. β

D. $a\beta^2$

Answer: B

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8. The equation of the latus rectum of the parabola $x^2 + 4x + 2y = 0$ is

A. $y = \frac{-3}{2}$

B. $y = \frac{2}{3}$

C. $y = \frac{3}{2}$

D. $y = \frac{-2}{3}$

Answer: C

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9. If the normal chhord of the parabola $y^2 = 4x$ makes an angle 45° with the axis of the parabola, then its length, is

A. $(1, 2)$

B. $(1, -2)$

C. $(4, 4)$

D. $(4, -4)$

Answer: A

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10. Distance of a point P on the parabola $y^2 = 48x$ from the focus is l and its distance from the tangent at the vertex is d then l-d is equal to

A. 4

B. 8

C. 12

D. 16

Answer: C

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11. The locus of the mid-point of the chords of the hyperbola $x^2 - y^2 = 4$, that touches the parabola $y^2 = 8x$ is

A. $(y^2 - 4x)^2 = 16(x^2 + 4)$

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

C. $(y^2 - 4x)^2 = 4(16 + y^2)$

D. $(y^2 - 4x)^2 = 16(4 + y^2)$

Answer: C

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12. If θ is the angle between the tangents to the parabola $y^2 = 12x$ passing through the point (-1,2) then $|\tan\theta|$ is equal to

A. 2

B. 3

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

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

Answer: A

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13. Let L be a normal to the parabola $y^2 = 4x$.If L passes through the point (9,6) then L is given by

A. $y - x + 3 = 0$

B. $y + 3x - 33 = 0$

C. $y + x - 15 = 0$

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

Answer: C

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14. Normal at a point P on the parabola $y^2 = 4ax$ meets the axis at Q such that the distacne of Q from the focus of the parabola is 10a. The coordinates of P are :

A. $(6a, 9a)$

B. $(6a, -9a)$

C. $(9a, 6a)$

D. $(3a, 6a)$

Answer: C

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15.

$P_1 : y^2 = x, P_2 : y^2 = -x, P_3 : x^2 = y, P_4 : x^2 = -y$ are four parabola, points of intersection of the parabola P_3 and P_4 with P_1 and P_2 (other than the origin) enclose a square of area (in sq. units).

A. 2

B. 4

C. 8

D. 16

Answer: B

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Exercise Level 1 Single Correct Answer Type Questions

1. The directrix of the parabola $y^2 + 4x + 3 = 0$is

A. $x - 3/4 = 0$

B. $x + 1/4 = 0$

C. $x - 1/4 = 0$

D. $x - 4/3 = 0$

Answer: C

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2. The line $x + y = 6$ is normal to the parabola $y^2 = 8x$ at the point.

A. $(18, -12)$

B. $(4, 2)$

C. $(2, 4)$

D. $(3, 3)$

Answer: C

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3. The length of the chord of the parabola $y^2 = 4ax$ whose equation is $y - x\sqrt{2} + 4a\sqrt{2} = 0$ is

A. $2\sqrt{11}a$

B. $4\sqrt{2}a$

C. $8\sqrt{2}a$

D. $6\sqrt{3}a$

Answer: D

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4. Perpendiculars are drawn on a tangent to the parabola $y^2 = 4ax$ from the points $(a \pm k, 0)$. The difference of their squares is

A. 4

B. 4a

C. 4k

D. 4ak

Answer: D

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5. If the normal drawn form the point on the axis of the parabola $y^2 = 8ax$ whhose distance from the focus is 8 a , and which is not parallel to either axes . Makes an angle θ with the axis of x, then θ is equal to

A. $\pi/6$

B. $\pi/4$

C. $\pi/3$

D. none of these

Answer: C

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6. Let AB be a chord of the circle $x^2 + y^2 = r^2$ subtending a right angle at the center. Then the locus of the centroid of the ΔPAB as P moves on the circle is (1) A parabola (2) A circle (3) An ellipse (4) A pair of straight lines

A. a parabola

B. a circle

C. an ellipse

D. a pair of stright lines

Answer: B

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7. For the parabola $y^2 + 8x - 12y + 20 = 0$

A. vertex (2,6)

B. focus (0,6)

C. length of the latus rectum=4

D. axis is y =6

Answer: C

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8. Show that the tangents at the extremities of any focal chord of a parabola intersect at right angles at the directrix.

A. on the axis of the parabola

B. on the tangent at the vertex

C. at the point of intersection of the directrix and the line parallel to the axis of the

parabola through the mid-point of the chord

.

D. none of these

Answer: C

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9. The coordinates of an end-point of the rectum of the parabola $(y-1)^2 = 2(x+2)$ are

A. $(-2, 1)$

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

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

D. $(-3/2, 0)$

Answer: C

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10. The equation of tangent to the parabola $y^2 = 9x$, which pass through the point (4, 10) is

A. $(4/9, 2)$

B. $(36, 18)$

C. $(4, 6)$

D. $(1/4, 3/2)$

Answer: A

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11. The point on the parabola $y^2 = 36x$ whose ordinate is three times the abscissa, is

A. $2x + 3y + 44 = 0$

B. $2x - 3y + 44 = 0$

C. $2x + 3y - 44 = 0$

D. $2x - 3y = 0$

Answer: C

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12. Which of the following equation does not represent a pair of lines ?

A. $x = t^2 + 2t + 1, y = 2t + 2$

B. $x = a\left(t^2 - 2t + 1\right), y = 2at - 2$

C. $x = 3\sin^2 t, y = 6\sin t$

D. $x = a\sin t, y = 2a\cos t$

Answer: D

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13. If the line $x + y = a$ touches the parabola $y = x - x^2$, then find the value of a.

A. $(-2, 2)$

B. $(2, -2)$

C. $(-2, 6)$

D. $(2, -6)$

Answer: B

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14. A is a point on the parabola $y^2 = 4ax$. The normal at A cuts the parabola again at point B. If AB subtends a right angle at the vertex of the parabola, find the slope of AB.

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

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

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

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

Answer: A

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15. The equation of a common tangent of the parabolas $y^2 = 4ax$ and $x^2 = 4by$ is

A. $x - y + 1 = 0$

B. $x + y - 1 = 0$

C. $x + y + 1 = 0$

D. $y = 0$

Answer: C

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16. $y = -2x + 12a$ is a normal to the parabola $y^2 = 4ax$ at the point whose distance from the directrix of the parabola is

A. 4a

B. 5a

C. $4\sqrt{2}a$

D. 8a

Answer: B

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17. Let N be the foot of perpendicular to the x-axis from point P on the parabola $y^2 = 4ax$. A straight line is drawn parallel to the axis which bisects PN and cuts the curve at Q; if NO meets the tangent at the vertex at a point then prove that $AT = \frac{2}{3}PN$.

A. $3/2$

B. $4/3$

C. $2/3$

D. $3/4$

Answer: C

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18. If the area of the triangle inscribed in the parabola $y^2 = 4ax$ with one vertex at the vertex of the parabola and other two vertices at the extremities of a focal chord is $5a^2/2$, then the length of the focal chord is

A. 3a

B. 5a

C. $25a/4$

D. none of these

Answer: C

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19. Length of the tangent drawn from an end of the latus rectum of the parabola $y^2 = 4ax$ to the circle of radius a touching externally the parabola at the vertex is

A. $\sqrt{3}a$

B. $2a$

C. $\sqrt{7}a$

D. 3a

Answer: C

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20. If the tangents at the extremities of a focal chord of the parabola $x^2 = 4ay$ meet the tangent at the vertex at points whose abcissac are x_1 and x_2 then $x_1x_2 =$

A. a^2

B. $a^2 - 1$

C. $a^2 + 1$

D. $-a^2$

Answer: D

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21. Equation of the tangent at a point P on the parabola $y^2 = 4ax$, the normal at which is at a distance $a\sqrt{5}/4$ from the focus of the parabola is

A. $4x - 2y + a = 0$

B. $4x - 8y + 9a = 0$

C. $2x - y - 12a = 0$

D. $2x + y - 12a = 0$

Answer: A

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22. An isosceles triangle is inscribed in the parabola$y^2 = 4ax$ with its base as the line joining the vertex and positive end of the latus rectum of the parabola. If $(at^2, 2at)$ is the vertex of the triangle then

A. $2t^2 - 8t + 5 = 0$

B. $2t^2 + 8t - 5 = 0$

C. $2t^2 + 8t + 5 = 0$

D. $2t^2 - 8t - 5 = 0$

Answer: B

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23. Equation of a family of circle passing through the extremities of the latus rectum of the parabola $y^2 = 4ax$, g being a parametric is

A. $x^2 + y^2 + 2g(y - 2a) - 5a^2 = 0$

B. $x^2 + y^2 + 2g(x + a) - 5a^2 = 0$

C. $x^2 + y^2 + 2g(x - a) - 5a^2 = 0$

D. $x^2 + y^2 + 2g(y + 2a) - 5a^2 = 0$

Answer: C

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24. A triangle ABC is inscribed in the parabola $y^2 = 4x$ such that A lies at the vertex of the parabola and BC is a focal chord of the parabola with one extremity at (9,6), the centroid of the triangle ABC lies at

A. $(41/27, 8/9)$

B. $(82/27, 16/9)$

C. $(87/27, 20/9)$

D. $(80/27, 20/9)$

Answer: B

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25. P is a point on the parabola $y^2 = 4ax$ whose ordinate is equal to its abscissa and PQ is focal chord, R and S are the feet of the perpendiculars from P and Q respectively on the tangent at the vertex, T is the foot of the perpendicular from Q to PR, area of the triangle PTQ is

A. $75a^2/4$

B. $85a^2/2$

C. $75a^2/8$

D. $45a^2/2$

Answer: C

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26. The lacus of the middle points of the chords of the parabola $y^2 = 4ax$ which pass through the facus, is

A. $(4a, 4a)$

B. $(3a, 3a)$

C. $(2a, 2a)$

D. none of these

Answer: D

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27. The lengths of the perpendiculars from the focus and the extremities of a focal chord of a parabola on the tangent at the vertex form :

A. an.A.P

B. a G.P

C. an H.P

D. none of these

Answer: B

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28. Locus of the point of intersection of the normals to the parabola $y^2 = 16x$ which are at right angles is

A. $y^2 = 4(x - 4)$

B. $y^2 = 4(x - 8)$

C. $y^2 = -4(x - 12)$

D. $y^2 = -8(x - 8)$

Answer: C

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29. The equation of the common tangent to the parabola $y = x^2$ and $y = -(x - 2)^2$ is

A. $y = 4(x - 1)$

B. $y = 4(x + 1)$

C. $y = 4(x - 1)$

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

Answer: A

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30. If $(x_r, y_r); r = 1, 2, 3, 4$ be the points of intersection of the parabola $y^2 = 4ax$ and the circle $x^2 + y^2 + 2gx + 2fy + c = 0$, then

A. $y_1 - y_2 + y_3 - y_4 = 0$

B. $x_1 + x_2 + x_3 + x_4 = 0$

C. $y_1 y_2 y_3 y_4 = 16a^2$

D. $x_1 x_2 x_3 x_4 = c^2$

Answer: D

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Exercise Level 2 Single Correct Answer Type Questions

1. P is a point on the axis of the parabola $y^2 = 4ax$,

Q and R are the extremities of its latus rectum, A is

its vertex. If PQR is an equilateral triangle lying within the parabola and $\angle$ AQP=θ, then $\cos\theta =$

A. $\frac{2-\sqrt{3}}{2\sqrt{5}}$

B. $\frac{9}{8\sqrt{5}}$

C. $\frac{\sqrt{5}-2}{2\sqrt{3}}$

D. none of these

Answer: A

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2. The points of intersection of the circle $x^2 + y^2 = a^2$ with the parabolas $y^2 = 4ax$ and $y^2 = -4ax$ form a rectangle whose area is

A. $8\left(\sqrt{5} - 2\right)a^2$

B. $8\left(\sqrt{5} - 2\right)^{3/2}a^2$

C. $8\left(\sqrt{5} + 2\right)^{3/2}a^2$

D. none of these

Answer: B

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3. Consider the circle $x^2 + y^2 = 9$ and the parabola $y^2 = 8x$. They intersect at P and Q in the first and fourth quadrants, respectively. Tangents to the circle at P and Q intersect the X-axis at R and tangents to the parabola at P and Q intersect the X-axis at S.

The ratio of the areas of $\triangle PQS$ and $\triangle PQR$ is

A. $1 : \sqrt{2}$

B. $1 : 2$

C. $1 : 4$

D. $1 : 8$

Answer: C

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4. The common tangents to the circle $x^2 + y^2 = 2$ and the parabola $y^2 = 8x$ touch the circle at P, Q andthe parabola at R, S. Then area of quadrilateral $PQRS$ is

A. 3

B. 6

C. 9

D. 20

Answer: D

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5. Length of the chord of contact drawn from the point (-3,2) to the parabola $y^2 = 4x$ is

A. 4

B. $2\sqrt{2}$

C. $8\sqrt{2}$

D. $4\sqrt{2}$

Answer: C

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6. The tangent PT and the normal PN to the parabola $y^2 = 4ax$ at a point P on it meet its axis at points T and N, respectively. The locus of the centroid of the triangle PTN is a parabola whose:

A. $\left(\frac{a}{3}, 0\right)$

B. $\left(\frac{2a}{3}, 0\right)$

C. $(a, 0)$

D. $\left(\frac{4a}{2}, 0\right)$

Answer: B

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7. Let P and Q be distinct points on the parabola $y^2 = 2x$ such that a circle with PQ as diameter passes through the veriex O of the parabola. if P lies in the first quadrant and the area of the triangle ΔOPQ is $3\sqrt{2}$, then which of the following is (are) the coordiantes of P?

A. $\left(4, 2\sqrt{2}\right)$

B. $\left(9, 3\sqrt{2}\right)$

C. $\left(\frac{1}{4}, \frac{1}{\sqrt{2}}\right)$

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

Answer: A

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8. Points A, B, C lie on the parabola $y^2 = 4ax$ The tangents to the parabola at A, B and C, taken in pair, intersect at points P, Q and R. Determine the ratio of the areas of the $\triangle ABC$ and $\triangle PQR$

A. $3:2$

B. $2:1$

C. $3:1$

D. $2:3$

Answer: B

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9. Prove that for $\theta \in R$, the line $y = (x - 11)\cos\theta - \cos 3\theta$ is always normal to the parabola $y^2 = 16x$.

A. $\theta = \pi/3$

B. $\pi/6$

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

D. all values of θ

Answer: D

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10. IF P_1P_2 and Q_1Q_2 two focal chords of a parabola $y^2 = 4ax$ at right angles, then

A. the axis of the parabola.

B. the directrix of the parabola

C. the tangent at the vertex of the parabola

D. latus rectum of the parabola

Answer: b

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Exercise Numerical Answer Type Questions

1. Tangent are drawn from the point $(-1, 2)$ on the parabola $y^2 = 4x$. Find the length that these tangents will intercept on the line $x = 2$.

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2. If two tangents drawn from the point (a, b) to the parabola $y^2 = 4x$ be such that the slope of one tangent is 3 times of the other then

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3. The length of normal chord of parabola $y^2 = 4x$, which subtends an angle of 90° at the vertex is :

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4. Let the focus S of the parabola $y^2 = 8x$ lies on the focal chord PQ of the same parabola . If PS = 6 , then the square of the slope of the chord PQ is

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5. Consider the parabola $y^2 = 8x$. Let Δ_1 be the area of the triangle formed by the end points of its latus rectum and the point $P\left(\frac{1}{2}, 2\right)$ on the parabola, and Δ_2 be the area of the triangle formed by drawing tangents at P and at the end points of the latus rectum. Then $\frac{\Delta_1}{\Delta_2}$ is

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6. Let S be the focus of the parabola $y^2 = 8x$ and let PQ be the common chord of the circle $x^2 + y^2 - 2x - 4y = 0$ and the given parabola. The area of the triangle PQS is -

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7. Let the curve C be the mirror image of the parabola $y^2 = 4x$ with respect to the line $x + y + 4 = 0$. If A and B are the points of

intersection of C with the line $y = -5$, then the distance between A and B is

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8. If y= 2x-3 is a tangent to the parabola $y^2 = 4a\left(x - \frac{1}{3}\right)$ then 'a' is equal to:

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9. The number of common chords of the parabola $y = x^2 - x$ and $x = y^2 - y$ is

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10. $y^2 = 12x$

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11. Let PQ be a double ordinate of the parabola, $y^2 = -4x$ where P lies in the second quadrant. If R divides PQ in the ratio $2:1$ then teh locus of R is

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12. Let O be the vertex and Q be any point on the parabola,$x^2 = 8y$. It the point P divides the line segment OQ internally in the ratio 1 : 3, then the locus of P is : (1) $x^2 = y$ (2) $y^2 = x$ (3) $y^2 = 2x$ (4) $x^2 = 2y$

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13. Suppose the line $y = kx - 7$ intersects the parabola $y = x^2 - 4x$ at points A and B. If $\angle AOB = \pi/2$, then k is equal to

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14. Let L be the length of the normal chord of the parabola $y^2 = 8x$ which makes an angle $\pi/4$ with the axis of x , then L is equal to $\left(\sqrt{2} = 1.41\right)$

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15. The equation of a common tangent of the parabolas $y^2 = 4ax$ and $x^2 = 4by$ is

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Questions From Previous Years Aieee Jee Main Papers

1. The normal at the point $\left(bt_1^2, 2bt_1\right)$ on a parabola meets the parabola again in the point $\left(bt_2^2, 2bt_2\right)$ then

A. $t_2 = -t_1 + 2/t_1$

B. $t_2 = t_1 - 2/t_1$

C. $t_2 = t_1 + 2/t_1$

D. $t_2 = -t_1 - 2/t_1$

Answer: D

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2. A point on the parabola $y^2 = 18x$ at which the ordinate increases at twice the rate of the abscissa is (2,6) (b) $(2, -6)$ $\left(\frac{9}{8}, -\frac{9}{2}\right)$ (d) $\left(\frac{9}{8}, \frac{9}{2}\right)$

A. $(-9/8, 9/2)$

B. $(2, -4)$

C. $(2, 4)$

D. $(9/8, 9/2)$

Answer: D

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3. If $a \neq 0$ and the line $2bx + 3cy + 4d = 0$ passes through the points of intersection of the parabola $y^2 = 4ax$ and $x^2 = 4ay$, then

A. $d^2 + (2b - 3c)^2 = 0$

B. $d^2 + (3b + 2c)^2 = 0$

C. $d^2 + (2b + 3c)^2 = 0$

D. $d^2 + (3b - 2c)^2 = 0$

Answer: C

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4. let P be the point $(1, 0)$ and Q be a point on the locus $y^2 = 8x$. The locus of the midpoint of PQ is

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

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

C. $y^2 - 4x + \ = 0$

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

Answer: C

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5. The locus of the vertices of the family of parabolas $y = \frac{a^3x^2}{3} + \frac{a^2x}{2} - 2a$ is:

A. $xy = 64/105$

B. $xy = 105/64$

C. $xy = 3/4$

D. $xy = 35/16$

Answer: B

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6. The equation of a tangent to the parabola $y^2 = 8xisy = x + 2$. The point on this line from which the other tangent to the parabola is perpendicular to the given tangent is (1) $(-1, 1)$ (2) $(0, 2)$ (3) $(2, 4)$ (4) $(-2, 0)$

A. $(-1, 1)$

B. $(0, 2)$

C. $(2, 4)$

D. $(-2, 0)$

Answer: D

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7. A parabola has the origin as its focus and the line $x = 2$ as the directrix. Then the vertex of the parabola is at (1) (0, 2) (2) (1, 0) (3) (0, 1) (4) (2, 0)

A. $(2, 0)$

B. $(0, 2)$

C. $(1, 0)$

D. $(0, 1)$

Answer: C

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8. The shortest distance between the lines $y - x = 1$ and the curve $x = y^2$ is

A. $3\sqrt{2}/5$

B. $\sqrt{3}/4$

C. $3\sqrt{2}/8$

D. $2\sqrt{3}/8$

Answer: C

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9. If two tangents drawn from a point P to the parabola y2 = 4x are at right angles, then the locus of P is (1) $2x + 1 = 0$ (2) $x = 1$ (3) $2x1 = 0$ (4) $x = 1$

A. $x = -1$

B. $2x - 1 = 0$

C. $x = 1$

D. $2x + 1 = 0$

Answer: A

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10. Statement 1: An equation of a common tangent to the parabola $y^2 = 16\sqrt{3}x$ and the ellipse $2x^2 + y^2 = 4 is y = 2x + 2\sqrt{3}$. Statement 2: If the line $y = mx + \frac{4\sqrt{3}}{m}, (m \neq 0)$ is a common tangent to the parabola $y^2 = 16\sqrt{3}x$ and the ellipse $2x^2 + y^2 = 4$, then m satisfies $m^4 + 2m^2 = 24$. (1) Statement 1 is false, statement 2 is true (2) Statement 1 is true, statement 2 is true; statement 2 is a correct explanation for statement 1 (3) Statement 1 is true, statement 2 is true; statement 2 is not a correct explanation for statement 1 (4) Statement 1 is true, statement 2 is false

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11. Given : A circle, $2x^2 + 2y^2 = 5$ and a parabola, $y^2 = 4\sqrt{5}x$. Statement - I : An equation of a common tangent to these curves is $y = \mathrm{x}+\sqrt{5}$ Statement - II : If the line, $y = mx + \frac{\sqrt{5}}{m}(m \neq 0)$ is their common tangent, then m satisfies $m^4 - 3m^2 + 2 = 0$. (1) Statement - I is True; Statement -II is true; Statement-II is not a correct explanation for Statement-I (2) Statement -I is True; Statement -II is False. (3) Statement -I is False; Statement -II is True (4) Statement -I is True;

Statement -II is True; Statement-II is a correct explanation for Statement-I

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12. Statement-1: The slopw of the tangent at any point P on a parabola, whose axis is the axis of x and vertex is at the origin, is inversely proportional to the ordinate of the point P .

Statement-2: The system of parabolas $y^2 = 4ax$ satisfies a differential equation of degree 1 and order 1.

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13. Statement 1 : The line $x - 2y = 2$ meets the parabola, $y^2 + 2x = 0$ only at the points $(- 2, 2)$ Statement 2: The line $y = mx - \frac{1}{2m}(m \neq 0)$ is tangent to the parabola, $y^2 = - 2x$ at the point $\left(- \frac{1}{2m^2}, - \frac{1}{m} \right)$.

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14. The point of intersection of the normals to the parabola $y^2 = 4x$ at the ends of its latus rectum is

A. $(0, 2)$

B. $(3, 0)$

C. $(0, 3)$

D. $(2, 0)$

Answer: B

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15. The slope of the line touching both the parabolas $y^2 = 4x$ and $x^2 = -32y$ is (a) $\frac{1}{2}$ (b) $\frac{3}{2}$ (c) $\frac{1}{8}$ (d) $\frac{2}{3}$

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

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

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

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

Answer: A

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16. Area common to the circle $x^2 + y^2 = 9$ an the parbola $y^1 = 8x$ is

A. $L_1 > L_2$

B. $L_1 = L_2$

C. $L_1 < L_2$

D. $\frac{L_1}{L_2} = \sqrt{2}$

Answer: C

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17. Two tangents are drawn from a point $(-2, -1)$ to the curve $y^2 = 4x$. If α is the angle between them, then $|\tan\alpha|$ is equal to :

A. $\frac{1}{3}$

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

C. $\sqrt{3}$

D. 3

Answer: D

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18. A chord is drawn through the focus of the parabola $y^2 = 6x$ such that its distance from the vertex of this parabola is $\frac{\sqrt{5}}{2}$, then its slope can be :

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

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

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

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

Answer: A

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19. Let O be the vertex and Q be any point on the parabola,$x^2 = 8y$. It the point P divides the line segment OQ internally in the ratio 1 : 3, then the locus of P is : (1) $x^2 = y$ (2) $y^2 = x$ (3) $y^2 = 2x$ (4) $x^2 = 2y$

A. $x^2 = y$

B. $y^2 = x$

C. $y^2 = 2x$

D. $x^2 = 2y$

Answer: D

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20. Let PQ be a double ordinate of the parabola, $y^2 = -4x$ where P lies in the second quadrant. If R divides PQ in the ratio $2:1$ then teh locus of R is

A. $9y^2 = 4x$

B. $9y^2 = -4x$

C. $3y^2 = 2x$

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

Answer: B

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21. If the tangent to the conic, $y - 6 = x^2$ at $(2, 10)$ touches the circle, $x^2 + y^2 + 8x - 2y = k$ (for some fixed k) at a point (α, β); then

A. $\left(-\frac{6}{17}, \frac{10}{17}\right)$

B. $\left(-\frac{8}{17}, \frac{2}{17}\right)$

C. $\left(-\frac{4}{17}, \frac{1}{17}\right)$

D. $\left(-\frac{7}{17}, \frac{6}{17}\right)$

Answer: B

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22. Let P be the point on the parabola, $y^2 = 8x$ which is at a minimum distance from the centre C of the circle,$x^2 + (y + 6)^2 = 1$. Then the equation of the circle, passing through C and

having its centre at P is : (1)

$x^2 + y^2 - 4x + 8y + 12 = 0$ (2)

$x^2 + y^2 - x + 4y - 12 = 0$ (3)

$x^2 + y^2 - \frac{x}{4} + 2y - 24 = 0$ (4)

$x^2 + y^2 - 4x + 9y + 18 = 0$

A. $x^2 + y^2 - 4x + 8y + 12 = 0$

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

C. $x^2 + y^2 - x/4 + 2y - 24 = 0$

D. $x^2 + y^2 - 4x + 9y + 18 = 0$

Answer: A

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23. The minimum distance of a point on the curve $y = x^2 - 4$ from the origin is :

A. $\frac{\sqrt{15}}{2}$

B. $\sqrt{\frac{19}{2}}$

C. $\sqrt{\frac{15}{2}}$

D. $\sqrt{\frac{19}{2}}$

Answer: C

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24. P and Q are two distinct points on the parabola, $y^2 = 4x$ with parameters t and t_1 respectively. If the normal at P passes through Q, then the minimum value of t_1^2 is

A. 8

B. 4

C. 6

D. 2

Answer: D

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25. If the common tangents to the parabola $x^2 = 4y$ and the circle $x^2 + y^2 = 4$ intersectat the point P, then the distance of P from the origin, is.

A. $\sqrt{2} + 1$

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

C. $2\left(\sqrt{2} + 1\right)$

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

Answer: C

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26. If $y = mx + c$ is the normal at a point on the parabola $y^2 = 8x$ whose focal distance is 8 units.Then $|c|$

A. $2\sqrt{3}$

B. $8\sqrt{3}$

C. $10\sqrt{3}$

D. $16\sqrt{3}$

Answer: A

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27. The radius of a circle, having minimum area, which touches the curve $y = 4 - x^2$ and the lines y=|x|, is

A. $4\left(\sqrt{2}+1\right)$

B. $2\left(\sqrt{2}+1\right)$

C. $2\left(\sqrt{2}-1\right)$

D. $4\left(\sqrt{2}-1\right)$

Answer: D

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28. Tangent and normal are drawn at P(16,16) on the parabola $y^2 = 16x$ which intersect the axis of the parabola at A and B respectively. If C is the centre of the circle through the points P,A and B and $\angle CPB = \theta$ then the value of $\tan\theta$ is

A. 2

B. 3

C. $4/3$

D. $1/2$

Answer: A

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29. Two parabola with a coomon vertex and with axes along x-axis and y-axis, respectively intersect each other in the first quadrant . If the length of the latus rectum of each parabola is 3 , then the equation of common tangent to the two parabola is

A. $4(x+y)+3=0$

B. $8(2x+y)+3=0$

C. $3(x+y)+4=0$

D. $x+2y+3=0$

Answer: A

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30. Axis of a parabola lies along x-axis. If its vertex and focus are at distances 2 and 4, respectively, from the origin on the positive x-axis, then which of the following points does not lie on it ?

A. $\left(5, 2\sqrt{6}\right)$

B. $(8, 6)$

C. $\left(6, 4\sqrt{2}\right)$

D. $(4, -4)$

Answer: B

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31. The length of the chord of the parabola $x^2 = 4y$ having equations $x - \sqrt{2}y + 4\sqrt{2} = 0$ is

A. $3\sqrt{2}$

B. $2\sqrt{11}$

C. $8\sqrt{2}$

D. $6\sqrt{3}$

Answer: D

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32. If the parabolas $y^2 = 4b(x - c)$ and $y^2 = 8ax$ have a common tangent, then which one of the following is a valid choice for the ordered triad (a, b, c)?

A. $\left(\frac{1}{2}, 2, 3\right)$

B. $(1, 1, 3)$

C. $\left(\frac{1}{2}, 2, 0\right)$

D. $(1, 1, 0)$

Answer: B

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33. Let $A(4, -4)$ and B(9,6) be points on the parabola $y^2 = 4x$. Let C be chosen on the on the arc AOB of the parabola where O is the origin such that the area of ΔACB is maximum. Then the area (in sq. units) of ΔACB is :

A. $31\frac{1}{4}$

B. $30\frac{1}{2}$

C. 32

D. $31\frac{3}{4}$

Answer: A

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34. Equation of a common tangent to the circle $x^2 + y^2 - 6x = 0$ and the parabola $y^2 = 4x$ is

A. $2\sqrt{3}y = 12x + 1$

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

C. $2\sqrt{3}y = -x - 12$

D. $\sqrt{3}y = 3x + 1$

Answer: B

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35. If the area of the triangle whose one vertex is at the vertex of the parabola, $y^2 + 4\left(x - a^2\right) = 0$ and the other two vertices are the points of intersection of the parabola and Y-axis, is 250 sq units, then a value of 'a' is

A. $5\sqrt{5}$

B. $5\left(2^{1/3}\right)$

C. $(10)^{2/3}$

D. 5

Answer: D

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36. Equation of a common tangent to the parabola $y^2 = 4x$ and the hyperbola xy=2 is

A. $x + y + 1 =$

B. $x - 2y + 4 = 0$

C. $x + 2y + 4 = 0$

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

Answer: C

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Questions From Previous Years B Architectre Entrance Examination Papers

1. An equilateral trinagle is inscribed in parabola $y^2 = 8x$ whose one vertex coincides with vertex of parabola.Find area of triangle.

A. $8\sqrt{3}$

B. $16\sqrt{3}$

C. 16

D. 8

Answer: B

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2. Statement-1: The point $\left(\frac{1}{4}, \frac{1}{2}\right)$ on the parabola $y^2 = x$ is closest to the line $y = x + 1$

Statement-2: The tangent at $\left(\frac{1}{4}, \frac{1}{2}\right)$ to the parabola $y^2 = x$ is parallel to the line $y = x + 1$

A. Statement-1 is true, statement-2 is true, statement-2 is not a correct explanation for statement-1

B. Statement-1 is true, statement-2 is false. S

C. Statement-1 is false, statement-2 is true.

D. Statement-1 is true, statement-2 is true.

statement-2 is a correct explanation for statement-1.

Answer: A

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3. The angle between the tangents drawn from the point $(1, 4)$ to the parabola $y^2 = 4x$ is

A. $p\pi/6$

B. $\pi/2$

C. $\pi / 3$

D. $\pi / 4$

Answer: B

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4. Statement-1: Point of intersection of the tangents drawn to the parabola $x^2 = 4y$ at $(4, 4)$ and $(-4, 4)$ lies on the y-axis.

Statement-2: Tangents drawn at the extremities of the latus rectum of the parabola $x^2 = 4y$ intersect on the axis of the parabola.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true , statement-2 is not a correct explanation for statement-1.

C. Statement-2 is true, statement-2 is false.

D. Statement-1 is false, statement-2 is true.

Answer: B

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5. Let $y^2 = 16x$ be a given parabola and L be an extremity of its latus rectum in the first quadrant . If a chord is drawn through L with slope-1, then the length of this chord is

A. 32

B. $16\sqrt{2}$

C. $16\sqrt{3}$

D. $32\sqrt{2}$

Answer: D

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6. The locus of the mid-point of the chords of the parabola $x^2 = 4py$ having slope m, is a

A. line parallel to a-axis at a distance 12 pm| from it .

B. line parallel to y-axis at a distance |2pm| from it.

C. line parallel to $y = mx, m \neq 0$ at a distance |2 pm| from it .

D. circle with centre at the origin and radius |2pm|.

Answer: B

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7. Let PQ be a focal chord of the parabola $y^2 = 4ax$. If the centre of a circle having PQ as its diameter lies on the line $\sqrt{5}y + 4 = 0$, then length of the chord PQ, is

A. $\frac{26}{5}$

B. $\frac{36\sqrt{5}}{5}$

C. $\frac{26\sqrt{5}}{5}$

D. $\frac{36}{5}$

Answer: D

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8. Let O be the vertex and Q be any point on the parabola,$x^2 = 8y$. It the point P divides the line segment OQ internally in the ratio 1 : 3, then the locus of P is : (1) $x^2 = y$ (2) $y^2 = x$ (3) $y^2 = 2x$ (4) $x^2 = 2y$

A. $9x^2 + 24y + 32 = 0$

B. $y^2 + 332 = 0$

C. $32x^2 + 24x + 32 = 0$

D. $32y^2 + 27x + 36 = 0$

Answer: A

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9. If any tangent to the parabola $x^2 = 4y$ intersects the hyperbola $xy = 2$ at two points P and Q , then the mid point of the line segment PQ lies on a parabola with axs along

A. x-axis and focus on positive x-axis

B. y-axis and focus on positive y-axis

C. x-axis and focus on negative x-axis

D. y-axis and focus on negative y-axis.

Answer: C

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