MATHS

BOOKS - VK JAISWAL ENGLISH

PARABOLA

Exercise 1 Single Choice Problems

1. If BC is a latus rectum of parabola $y^2 = 4ax$ and A is the vertex, then the minimum length

of the projection of BC on a tangent drawn in the portion BAC is

A. 2

B. 4

C. $2\sqrt{3}$

D. $2\sqrt{2}$

Answer: D

2. A normal is drawn to the parabola $y^2 = 9x$ at the point P(4, 6). A circle is described on SP as diameter, where S is the focus. The length of the intercept made by the circle on the normal at point P is :

A. $\dfrac{17}{4}$

B. $\dfrac{15}{4}$

C. 4

D. 5

Answer: B

3. about to only mathematics

A. 70

B. 71

C. 80

D. 75

Answer: D

4. Find the length of normal chord which subtends an angle of 90^0 at the vertex of the parabola $y^2 = 4x.$

A. $6\sqrt{3}$

B. $7\sqrt{2}$

C. $8\sqrt{2}$

D. $9\sqrt{2}$

Answer: A

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5. If b and c are lengths of the segments of any focal chord of the parabola $y^2 = 4ax$, then write the length of its latus rectum.

A. $\dfrac{bc}{b+c}$

B. $\dfrac{2bc}{b+c}$

C. $\dfrac{b+c}{2}$

D. $\sqrt{bc}$

Answer: B

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6. The length of the shortest path that begins at the point (-1, 1), touches the x-axis and then ends at a point on the parabola $(x - y)^2 = 2(x + y - 4)$, is :

A. $3\sqrt{2}$

B. 5

C. $4\sqrt{10}$

D. 13

Answer: A

7. The normal to the parabola $y^2 = 4ax$ at three points P,Q and R meet at A. If S is the focus, then prove that $SP \cdot SR = aSA^2$.

A. 2^3

B. $a^2(SO')$

C. $a(SO')^2$

D. None of these

Answer: C

8. A and B are two points on the parabola $y^2 = 4ax$ with vertex O. if OA is perpendicular to OB and they have lengths r_1 and r_2 respectively, then the value of $\dfrac{r_1^{4/3} r_2^{4/3}}{r_1^{2/3} + r_2^{2/3}}$ is

A. $16a^2$

B. a^2

C. $4a$

D. None of these

9. Length of the shortest chord of the parabola $y^2 = 4x + 8$, which belongs to the family of lines $(1 + \lambda)y + (\lambda - 1)x + 2(1 - \lambda) = 0$, is :

A. 6

B. 5

C. 8

D. 2

Answer: C

10. If locus of mid point of any normal chord of

the parabola :

$y^2 = 4x$ is $x - a = \dfrac{b}{y^2} + \dfrac{y^2}{c}$,

where $a, b, c \in N$, then $(a + b + c)$ equals to

:

A. 5

B. 8

C. 10

D. None of these

Answer: B

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11. Let tangents at P and Q to curve

$y^2 - 4x - 2y + 5 = 0$ intersect at T. If S(2, 1)

is a point such that $(SP)(SQ) = 16$, then the

length ST is equal to :

A. 3

B. 4

C. 5

D. None of these

Answer: B

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12. Abscissa of two points P and Q on parabola

$y^2 = 8x$ are roots of equation

$x^2 - 17x + 11 = 0$. Let Tangents at P and Q

meet at point T, then distance of T from the

focus of parabola is :

A. 7

B. 6

C. 5

D. 4

Answer: A

13. If $Ax + By = 1$ is a normal to the curve $ay = x^2$, then :

A. $4A^2(1 - aB) = aB^3$

B. $4A^2(2 + aB) = aB^3$

C. $4A^2(1 + aB) + aB^3 = 0$

D. $2A^2(2 - aB) = aB^3$

Answer: D

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14. The equation of a curve which passes through the point (3, 1), such the segment of any tangent between the point of tangency and the x-axis is bisected at its point of intersection with y-axis, is :

A. $x = 3y^2$

B. $x^2 = 9y$

C. $x = y^2 + 2$

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

Answer: A

15. The parabola $y = 4 - x^2$ has vertex P. It intersects x-axis at A and B. If the parabola is translated from its initial position to a new position by moving its vertex along the line $y = x + 4$, so that it intersects x-axis at B and C, then abscissa of C will be :

A. 3

B. 4

C. 5

D. 8

Answer: D

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16. A focal chord for parabola $y^2 = 8(x + 2)$ is inclined at an angle of $60°$ with positive x-axis and intersects the parabola at P and Q. Let perpendicular bisector of the chord PQ intersects the x-axis at R, then the distance of R from focus is :

A. $\dfrac{8}{3}$

B. $\dfrac{16\sqrt{3}}{3}$

C. $\dfrac{16}{3}$

D. $8\sqrt{3}$

Answer: C

17. The chord of contact of a point $A(x_A, y_A)$

of $y^2 = 4x$ passes through (3, 1) and point A

lies on $x^2 + y^2 = 5^2$. Then :

A. $5x_A^2 + 24x_A + 11 = 0$

B. $13x_A^2 + 8x_A - 21 = 0$

C. $5x_A^2 + 24x_A + 61 = 0$

D. $13x_A^2 + 21x_A - 31 = 0$

Answer: A

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Exercise 2 One Or More Than One Answer Is Are Correct

1. PQ is a double ordinate of the parabola $y^2 = 4ax$. If the normal at P intersect the line passing through Q and parallel to x-axis at G, then locus of G is a parabola with :

   A. vertex at (4a, 0)

   B. focus at (5a, 0)

   C. directrix as the line $x - 3a = 0$

   D. length of latus rectum equal to 4a

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

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Exercise 5 Subjective Type Problems

1. Points A and B lie on the parabola $y = 2x^2 + 4x - 2$, such that origin is the mid-point of the line segment AB. If $'l'$ be the length of the line segment AB, then find the unit digit of l^2.

2. The chord AC of the parabola $y^2 = 4ax$ subtends an angle of $90°$ at points B and D on the parabola. If points A, B, C and D are represented by $(at_i^2, 2at_i)$, $i = 1, 2, 3, 4$ respectively, then find the value of $\left| \dfrac{t_2 + t_4}{t_1 + t_3} \right|$.