
**Q.1** Two tangents are drawn from the point (-2, -1) to the parabola $y^2 = 4x$ If a is the angle between them, then $\tan\alpha$ is equal to.
(a) 3 (b) $\frac{1}{3}$ (c) 2 (d) $\frac{1}{2}$

**Q.2** The magnitude of the chord normal to the parabola $y^2 = 4x$ which forms a right angle at the vertex, is.
(a) $6\sqrt{3}$ (b) $3\sqrt{3}$ (c) 2 (d) 1

**Q.3** If b and k denote the intercepts of a focal chord on the parabola $y^2 = 4ax$, then k is equal to.
(a) $\frac{ab}{b-a}$ (b) $\frac{b}{b-a}$ (c) $\frac{a}{b-a}$ (d) $\frac{ab}{a-b}$

**Q.4** If the line $3x - 4y + 5 = 0$ is tangent to the parabola $y^2 = 4ax$, then a, is equal to.
(a) $\frac{15}{16}$ (b) $\frac{5}{4}$ (c) $-\frac{4}{3}$ (d) $-\frac{5}{4}$

**Q.5** The tangents at the point $(at_1^2, 2at_1), (at_2^2, 2at_2)$ on the parabola $y^2 = 4ax$ are at right angle if.
(a) $t_1t_2 = -2$ (b) $t_1t_2 = 1$ (c) $t_1t_2 = 2$ (d) $t_1t_2 = -1$

**Q.6** The latus rectum of a parabola, where the focal chord is PSQ with SP = 3 and SQ = 2, is expressed as.
(a) $\frac{24}{5}$ (b) $\frac{12}{5}$ (c) $\frac{6}{5}$ (d) $\frac{48}{5}$

**Q.7** The count of parabolas that can be constructed when the two ends of the latus rectum are specified.
(a) 1 (b) 2 (c) 3 (d) 4

**Q.8** The locus of point P, from which two tangents are drawn to the parabola $y^2 = 4x$, forming a right angle, is given by.
(a) $x = -1$ (b) $2x - 1 = 0$ (c) $x = 1$ (d) $2x + 1 = 0$

**Q.9** Which one of the following lines is perpendicular to the parabola $y^2 = 16x$?
(a) $y = x - 11\cos\theta - 3\cos 3\theta$ (b) $y = (x - 11)\cos\theta - \cos 3\theta$
(c) $y = (x - 11)\cos\theta + \cos 3\theta$ (d) $y = x - 11\cos\theta - \cos 3\theta$

**Q.10** The equation of the tangent at the point (-4, -4) on the curve $x^2 = -4y$ is.
(a) $2x - y + 4 = 0$ (b) $2x + y - 4 = 0$
(c) $2x - y - 12 = 0$ (d) $2x + y + 4 = 0$

**Q.11** The vertex of the parabola $y^2 = (a - b)(x - a)$ is...
(a) (b, a) (b) (a, b) (c) (a, 0) (d) (b, 0)

**Q.12** The focal point of the parabola $y^2 = 4ax$ is...
(a) (a, 0) (b) (0, a) (c) (-a, 0) (d) (0, -a)

**Q.13** A particle is in motion along a parabolic trajectory defined by $y^2 = 4ax$.When the particle is at $P(x_1, y_1)$its distance from the focus of the parabolic path is at a minimum. In this scenario, $x_1$ is...
(a) – 1 (b) 0 (c) –a (d) a

**Q.14** The equation for the parabola with a vertex at (0, 0) and a focus at (0, 3) is.
(a) $y^2 = 12x$ (b) $y^2 = -12x$ (c) $x^2 = 12y$ (d) $x^2 = -12y$

**Q.15** The equation for the directrix of the parabola $y^2 + y - 4x - 5 = 0$ is.
(a) $x = -\frac{37}{8}$ (b) $x = -\frac{37}{16}$ (c) $x = -1$ (d) $x = 1$

**Q.16** A line tangent to the parabola $y^2 = 8x$ forms a 45° angle with the line, $y = 3x + 5$. The equation of the tangent line is...
(a) $x + 2y + 1 = 0$ (b) $2x + y + 1 = 0$ (c) $x + y + 2 = 0$ (d) $x + y + 1 = 0$

**Q.17** If the line $4x - 3y + 2 = 0$.is a tangent to the parabola, $y^2 = ax$ then the value of a is.
(a) $\frac{16}{9}$ (b) $\frac{16}{3}$ (c) $\frac{32}{3}$ (d) $\frac{32}{9}$

**Q.18** The equation for the latus rectum of the parabola $x^2 + 4x - 2y = 0$ is...
(a) $y = -\frac{1}{2}$ (b) $y = \frac{1}{2}$ (c) $y = -\frac{3}{2}$ (d) $y = \frac{3}{2}$

**Q.19** The coordinates of the opposite endpoint of a focal chord of the parabola $P_2$, wherein one of the endpoints coincides with the point of intersection of line L and parabola $P_2$, are...
(a) $(-a, 2a)$ (b) $(-\frac{a}{4}, a)$ (c) $(-\frac{a}{4}, -a)$ (d) $(-a, -2a)$

**Q.20** The equation for the directrix of $P_1$ is...
(a) $x + a = 0$ (b) $x - a = 0$ (c) $y + a = 0$ (d) $v - a = 0$

**Q.21** The equation for the directrix of $P_2$ is...
(a) $x + a = 0$ (b) $x - a = 0$ (c) $y + a = 0$ (d) $y - a = 0$

**Q.22** For the parabola $y^2 = 4ax$, the extent of the chord that passes through the vertex and forms an angle θ with the x-axis is...
(a) $|\frac{4a\cos\theta}{\sin^2\theta}|$ (b) $|\frac{4a\sin\theta}{\cos^2\theta}|$ (c) $|a\sec^2\theta|$ (d) $|a\operatorname{cosec}^2\theta|$

**Q.23** The extent of the chord intercepted by the parabola $y = x^2 + 3x$, on the line $x + y = 5$ is
(a) $3\sqrt{26}$ (b) $2\sqrt{26}$ (c) $\sqrt{26}$ (d) $6\sqrt{2}$

**Q.24** The count of points with integral coordinates situated within the shared area of the circle $x^2 + y^2 = 16$ and the parabola $y^2 = 4x$ is
(a) 13 (b) 10 (c) 18 (d) 20

**Q.25** The point (a, 2a) lies within the region enclosed by the parabola $y^2 = 16x$ and the double ordinate through the focus. In such a scenario.
(a) $a < 4$ (b) $0 < a < 4$ (c) $0 < a < 2$ (d) $a > 4$

**Q.26** The line $4x - 7y + 10 = 0$ intersects the parabola $y^2 = 4x$ at the points P and Q. the coordinates of the point where the tangents are drawn at points P and Q intersect are.
(a) $(-\frac{7}{2}, -\frac{5}{2})$ (b) $(\frac{5}{2}, \frac{7}{2})$ (c) $(-\frac{5}{2}, -\frac{7}{2})$ (d) $(\frac{7}{2}, \frac{5}{2})$

**Q.27** The coordinates of the point where the line $x\cos\alpha + y\sin\alpha + a\sin\alpha\tan\alpha = 0$ touches the parabola $y^2 = 4ax$ are...
(a) $(a\tan\alpha, 2a\tan\alpha)$ (b) $(2a\tan\alpha, a\tan\alpha)$
(c) $(a\tan^2\alpha, -2a\tan\alpha)$ (d) $(a\cos\alpha, 2a\cos\alpha)$

**Q.28** If $y + b = m_1(x + a)$ and $y + b = m_2(x + a)$ represent two tangents to the parabola $y^2 = 4ax$ then.
(a) $m_1 + m_2 = 0$ (b) $m_1m_2 = 1$ (c) $m_1m_2 = -1$ (d) $m_1 = m_2$

**Q.29** If the tangent at points A and B on the parabola intersect at point C, then the ordinates of A, C, and B are in.
(a) A.P. (b) G.P. (c) H.P. (d) A.G.P.

**Q.30** If the normal drawn at points $t_1$ and $t_2$ on the parabola intersect the parabola again at point $t_3$, then $t_1t_2$ is equal to...
(a) 2 (b) –1 (c) –2 (d) $t_3 - \frac{2}{t_3}$

**Q.31** The extent of the normal chord to the parabola, $y^2 = 4x$, which forms a right angle at the vertex, is.
(a) $3\sqrt{3}$ (b) $6\sqrt{3}$ (c) 2 (d) 1

**Q.32** The locus of the point where the normal intersect at the extremities of a focal chord of the parabola $y^2 = 4ax$ is...
(a) $y^2 = 4a(x - 3a)$ (b) $y^2 = 2a(x - 3a)$
(c) $y^2 = a(x - 3a)$ (d) $y^2 = 16a(x - 3a)$

**Q.33** The count of unique normal that can be drawn from (-2, 1) to the parabola $y^2 - 4x - 2y - 3 = 0$ is.
(a) 1 (b) 2 (c) 3 (d) 0

**Q.34** The normal at any point $P(t^2, 2t)$ on the parabola $y^2 = 4x$ intersects the curve again at point Q, then the ar(△ POQ) is in the form of $\frac{k}{|t|}(1 + t^2)(2 + t^2)$ the value of k is where o is the origin.
(a) $k > 2$ (b) $k = 2$ (c) $k < 2$ (d) $k = 1$

**Q.35** If the portion intercepted by the parabola $y^2 = 4ax$ with the line $\ell x + my + n = 0$ forms a right angle at the vertex, then.
(a) $4a\ell + n = 0$ (b) $4a\ell + 4am + n = 0$
(c) $4am + n = 0$ (d) $a\ell + n = 0$

**Q.36** The line $y = a - x$ is tangent to the parabola $y = x - x^2$ and $f(x) = \sin^2 x + \sin^2 (x + \frac{\pi}{3}) + \cos x \cdot \cos(x + \frac{\pi}{3})$ then.

(a) $a = \frac{4}{5} f(x)$ (b) $a = 5f(x)$ (c) $a = -\frac{4}{5} f(x)$ (d) $2a = \frac{4}{5} f(x)$

**Q.37** The coordinates of the points on the parabola$y^2 = 8x$, which are at the minimum distance from the circle $x^2 + (v + 6)^2 = 1$ are.

(a) (2,4) (b) $(-2,4)$ (c) $(2,-4)$ (d) $(-2,-4)$

**Q.38** If a circle intersects the parabola $y^2 = 4ax$ at point $A(at_1^2, 2at_1)$, $B(at_2^2, 2at_2)$, $C(at_3^2, 2at_3)$ $D(at_4^2, 2at_4)$, then $t_1 + t_2 + t_3 + t_4$ is

(a) 1 (b) –1 (c) 0 (d) 2

**Q.39** A beam of light, parallel to the x-axis, reflects off a parabolic mirror with the, $4(x + y) - y^2 = 0$. After reflection, the ray passes through the point (a, b). The sum of $(a + b)$ is...

(a) 2 (b) 1 (c) –2 (d) –1

**Q.40** If the parabola $y = (a - b)x^2 + (b - c)x + (c - a)$ touches the x-axis, then the line $ax + by + c = 0$ always passes through a constant point, which is...

(a) (1, 2) (b) (–2, 1) (c) (2, 1) (d) (2 – 1)

**Q.41** The center of a circle coincides with the vertex of the parabola, $y^2 = 8x$, and the parabola intersects the circle at the extremities of the latus rectum. In such a scenario, the equation of the circle is...

(a) $x^2 + y^2 = 4$ (b) $x^2 + y^2 = 20$

(c) $x^2 + y^2 = 80$ (d) $x^2 + y^2 = 1$

**Q.42** The reflection of the focus with respect to the directrix for the parabola $4(x + y) = y^2$ is...

(a) (0,2) (b) (2,2) (c) $(-4,2)$ (d) $(-2,2)$

**Q.43** Consider $m_1$ and $m_2$ as the slopes of two tangents drawn from (2, 3) to the parabola $y^2 = 4x$, and let $\alpha$ be the harmonic mean of $m_1$ and $m_2$. If $\beta$ represents the value of $(1 + \tan 23°)(1 + \tan 22°)$ then $\frac{3}{2}\alpha + \beta$ is.

(a) 2 (b) 3 (c) 1 (d) 5

**Q.44** The point on the curve, $y^2 = 4x$, closest to the point (2, 1) is...

(a) $(1,-2)$ (b) $(-2,1)$ (c) $(1,2\sqrt{2})$ (d) (1,2)

**Q.45** From a point P, two tangents are extended to the parabola $y^2 = 4x$. If the slope of one tangent is double the slope of the other, then the path followed by point P is...

(a) Circle (b) Straight line (c) Parabola (d) Ellipse

**Q.46** The axis of a parabola is aligned with the x-axis. If its vertex and focus are situated at distances 2 and 4, respectively, from the origin along the positive x-axis, then which of the following points is not part of it?

(a) $(4,-4)$ (b) $(5,2\sqrt{6})$ (c) $(6,4\sqrt{2})$ (d) (8,6)

**Q.47** Consider points A (4, 4) and B (9, 6) on the parabola $y^2 = 4x$. Choose point C on the arc AOB of the parabola, where O is the origin, such that the area of triangle $\triangle$ ACB is maximized. Then, the area of triangle $\triangle$ACB, in square units, is...

(a) 32 (b) $31\frac{3}{4}$ (c) $31\frac{1}{4}$ (d) $30\frac{1}{2}$

**Q.48** If the parabolas $y^2 = 4b(x - c)$ and $y^2 = 8ax$ share a common normal, which of the following options is a suitable selection for the ordered triad (a, b, c)?

(a) $(\frac{1}{2}, 2, 0)$ (b) $(\frac{1}{2}, 2, 3)$ (c) (1,1,0) (d) (1,1,3)

**Q.49** The extent of the chord for the parabola $x^2 = 4y$ with the equation $x - \sqrt{2}y + 4\sqrt{2} = 0$ is.

(a) $3\sqrt{2}$ (b) $6\sqrt{3}$ (c) $2\sqrt{11}$ (d) $8\sqrt{2}$

**Q.50** The equation of a shared tangent to the parabola $y^2 = 4x$ and the hyperbola $xy = 2$ is...

(a) $4x + 2y + 1 = 0$ (b) $x + 2y + 4 = 0$

(c) $x - 2y + 4 = 0$ (d) $x + y + 1 = 0$


**For each of questions 1 through 6, determine the equation of the parabola that meets the specified criteria.**

**Q.1** Focus (6, 0); directrix $x = -6$

**Q.2** Focus (0,–3); directrix $y = 3$

**Q.3** Vertex (0, 0); focus (3, 0)

**Q.4** Vertex (0, 0); focus (–2, 0)

**Q.5** Vertex (0, 0) passing through (2, 3) and axis is along x-axis.

**Q.6** Vertex (0, 0), passing through (5, 2) and symmetric with respect to y-axis.

**Q.7** Calculate the equation of the parabola that exhibits symmetry with respect to the y - axis and goes through the point (2, -3).

**Q.8** Determine the equation of the parabola that has a focus at (2, 0) and a directrix at $x = -2$.

**Q.9** Find the equation of the parabola with vertex at the origin and focus at $(0, -3)$.

**Q.10** If the equation of the parabola is $x^2 = 24y$,then find the co – ordinate of the focus and the length of the latus rectum.

**Q.11** The focal distance of a point on the parabola $y^2 = 16x$ whose ordinate is twice the abscissa is (except the vertex of parabola)

**Q.12** If $2x + 3y = 7$ and $x - y = 1$ are two normal of a parabola from a point, then third equation of third normal be $x + y = \mu$, then $(\lambda + \mu)$ is

## ANSWER KEY – LEVEL – I

| Q. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Ans. | a | a | a | a | d | a | b | a | b | a |
| Q. | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| Ans. | c | a | b | c | b | b | d | c | b | a |
| Q. | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| Ans. | b | a | d | a | b | b | c | c | a | a |
| Q. | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| Ans. | b | c | a | b | a | a | c | c | a | b |
| Q. | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| Ans. | b | c | b | d | c | d | c | d | b | b |

## ANSWER KEY – LEVEL – II

**1.** $y^2 = 24x$
**2.** $x^2 = -12y$
**3.** $y^2 = 12x$
**4.** $y^2 = -8x$
**5.** $2y^2 = 9x$
**6.** $2x^2 = 25y$
**7.** $3x^2 = -4y$
**8.** $y^2 = 8x$