# MATHS

# BOOKS - VIKAS GUPTA MATHS (HINGLISH)

# ELLIPSE

## Exercise 1 Single Choice Problems

**1.** If CF be the perpendicular from the centre C of the ellipse $\frac{x^2}{12}+\frac{y^2}{8}=1$, on the tangent at any point P and G is the point where the normal at P meets the major axis, then the value of $(CF \cdot PG)$ equals to :

A. 5

B. 6

C. 8

D. None of these

**Answer: C**

Watch Video Solution

**2.** The minimum length of intercept on any tangent to the ellipse $\frac{x^2}{4} + \frac{y^2}{9} = 1$ cut by the circle $x^2 + y^2 = 25$ is :

A. 8

B. 9

C. 2

D. 11

**Answer: A**

View Text Solution

**3.** Find a point on the curve $x^2 + 2y^2 = 6$, whose distance from the line $x + y = 7$, is minimum.

A. (2, 3)

B. (2, 1)

C. (1, 0)

D. None of these

**Answer: B**

Watch Video Solution

**4.** If lines $2x + 3y = 10$ and $2x - 3y = 10$ are tangents at the extremities of a latus rectum of an ellipse, whose centre is origin, then the length of the latus rectum is :

A. $\frac{110}{27}$

B. $\frac{98}{27}$

C. $\frac{100}{27}$

D. $\frac{120}{27}$

**Answer: C**

Watch Video Solution

**5.** Prove that the area bounded by the circle $x^2 + y^2 = a^2$ and the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is equal to the area of another ellipse having semi-axis $a - b$ and $b$, $a > b$.

A. $a + b \text{ and } b$

B. $a - b \text{ and } a$

C. a and b

D. None of these

**Answer: B**

Watch Video Solution

**6.** If $F_1$ and $F_2$ are the feet of the perpendiculars from the foci $S_1 and S_2$ of the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$ on the tangent at any point $P$ on the ellipse, then prove that $S_1F_1 + S_2F_2 \geq 8$.

A. $S_1F_1 + S_2F_2 \geq 2$

B. $S_1F_1 + S_2F_2 \geq 3$

C. $S_1F_1 + S_2F_2 \geq 6$

D. $S_1F_1 + S_2F_2 \geq 8$

**Answer: D**

Watch Video Solution

**7.** Consider the ellipse $\dfrac{x^2}{f(k^2+2k+5)} + \dfrac{y^2}{f(k+11)} = 1$. If $f(x)$ is a positive decr4easing function, then the set of values of $k$ for which the major axis is the x-axis is $(-3, 2)$. the set of values of $k$ for which the major axis is the y-axis is $(-\infty, 2)$.

the set of values of $k$ for which the major axis is the y-axis is $(-\infty, -3) \cup (2, \infty)$ the set of values of $k$ for which the major axis is the y-axis is $(-3, -\infty, )$

A. $k \in (-7, -5)$

B. $k \in (-5, -3)$

C. $k \in (-3, 2)$

D. None of these

**Answer: C**

Watch Video Solution

**8.** If area of the ellipse $\frac{x^2}{16}+\frac{y^2}{b^2}=1$ inscribed in a square of side length $5\sqrt{2}$ is A, then $\frac{A}{\pi}$ equals to :

A. 12

B. 10

C. 8

D. 11

**Answer: A**

Watch Video Solution

**9.** Any chord of the conic $x^2 + y^2 + xy = 1$ passing through origin is bisected at a point (p, q), then $(p + q + 12)$ equals to :

A. 13

B. 14

C. 11

D. 12

**Answer: D**

Watch Video Solution

**10.** Tangents are drawn from the point (4, 2) to the curve $x^2 + 9y^2 = 9$, the tangent of angle between the tangents :

A. $\dfrac{3\sqrt{3}}{5\sqrt{17}}$

B. $\dfrac{\sqrt{43}}{10}$

C. $\dfrac{\sqrt{43}}{5}$

D. $\sqrt{\dfrac{3}{17}}$

**Answer: C**

Watch Video Solution

## Exercise 2 Comprehension Type Problems

**1.** An ellipse has semi-major axis of length 2 and semi-minor axis of length 1. It sides between the co-ordinate axes in the first quadrant, while maintaining contact with both x-axis and y-axis.

Q. The locus of the centre of ellipse is :

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

B. $x^2 + y^2 = 5$

C. $(x - 2)^2 + (y - 1)^2 = 5$

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

**Answer: B**

View Text Solution

**2.** An ellipse has semi-major axis of length 2 and semi-minor axis of length 1. It sides between the co-ordinate axes in the first quadrant, while maintaining contact with both x-axis and y-axis.

Q. The locus of the foci of the ellipse is :

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

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

C. $x^2 + y^2 - \frac{1}{x^2} - \frac{1}{y^2} = 2\sqrt{3} + 4$

D. $x^2 - y^2 + \frac{1}{x^2} - \frac{1}{y^2} = 2\sqrt{3} + 4$

**Answer: A**

View Text Solution

**3.** Comprehension- I A coplanar beam of light emerging from a point source have equation $\lambda x - y + 2(1 + \lambda) = 0, \lambda \in R$. The rays of the beam strike an elliptical surface and get reflected. The reflected rays form another convergent beam having equation $\mu x - y + 2(1 - \mu) = 0, \mu \in R$. Foot of the perpendicular from the point (2, 2) upon any tangent to the ellipse lies on the circle $x^2 + y^2 - 4y - 5 = 0$ The eccentricity of the ellipse is equal to

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

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

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

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

**Answer: C**

Watch Video Solution

**4.** A coplanar beam of light emerging from a point surce have the equation $\lambda x - y + 2(1 + \lambda) - 0, \ \forall \lambda \in R$ : the rays of beam strike an elliptical surface and get reflected inside the ellipse. The reflected rays form another convergent beam having the equation $\mu x - y + 2(1 - \mu) = 0, \forall \mu \in R.$ Further it is found that the foot of the perpendicular from the point (2, 2) upon any tangent to the ellipse lies on the circle $x^2 + y^2 - 4y - 5 = 0$

Q. The area of the largest that an incident ray and corresponding reflected ray can enclose with the major axis of the ellipse is equal to :

A. $4\sqrt{5}$

B. $\sqrt{5}$

C. $3\sqrt{5}$

D. $2\sqrt{5}$

**Answer: D**

View Text Solution

5. A coplanar beam of light emerging from a point surce have the equation $\lambda x - y + 2(1 + \lambda) - 0, \ \forall \lambda \in R$ : the rays of beam strike an elliptical surface and get

reflected inside the ellipse. The reflected rays form another convergent beam having the equation $\mu x - y + 2(1 - \mu) = 0, \forall \mu \in R.$ Further it is found that the foot of the perpendicular from the point (2, 2) upon any tangent to the ellipse lies on the circle $x^2 + y^2 - 4y - 5 = 0$

Q. The least value of total distance travelled by an incident ray and the corresponding reflected ray is equal to :

A. 6

B. 3

C. $\sqrt{5}$

D. $2\sqrt{5}$

**Answer: A**

View Text Solution

## Exercise 4 Subjective Type Problems

**1.** For the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$. Let O be the centre and S and S' be the foci. For any point P on the ellipse the value of $\frac{PS.\,PS'd^2}{9}$ (where d is the distance of O from the tangent at P) is equal to

Watch Video Solution

**2.** Number of perpendicular tangents that can be drawn on the ellipse $\frac{x^2}{16}+\frac{y^2}{25}=1$ from point (6, 7) is

Watch Video Solution