SUBJECTIVE

1. Find the equations of the tangents drawn from the point (2, 3) to the ellipse $9x^2 + 16y^2 = 144$.

2. If the line $x - y = 5$ touches the ellipse $9x^2 + 16y^2 = 144$, find the points of contact.

3. For what value of λ does the line $y = x + \lambda$ touches the ellipse $9x^2 + 16y^2 = 144$?

4. Find the equations of the tangents to the ellipse $\frac{x^2}{3}+\frac{y^2}{4}=1$ having slope 2.

5. Find the equations of the pair of tangents to the ellipse $2x^2 + 3y^2 = 1$ from the point (1, 1).

6. If the tangents are drawn from a point (1, 2) to the ellipse $3x^2 + 2y^2 = 5$, find the angle between the tangents.

SINGLE ANSWER CORRECT TYPE

7. The y-axis is the directrix of the ellipse with eccentricity e = 1/2 and the corresponding focus is at (3, 0), equation to its auxiliary circle is

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

(C) $x^2 + y^2 - 8x + 9 = 0$ (D) $x^2 + y^2 = 4$

8. Equation of the common tangent to the ellipses, $\frac{x^2}{a^2+b^2}+\frac{y^2}{b^2} = 1$ and $\frac{x^2}{a^2}+\frac{y^2}{a^2+b^2} = 1$ is -

(A) $ay = bx + \sqrt{a^4 - a^2b^2 + b^4}$ (B) $by = ax - \sqrt{a^4 + a^2b^2 + b^4}$

(C) $ay = bx - \sqrt{a^4 + a^2b^2 + b^4}$ (D) $by = ax + \sqrt{a^4 - a^2b^2 + b^4}$

9. $x - 2y + 4 = 0$ is a common tangent to $y^2 = 4x$ & $\frac{x^2}{4}+\frac{y^2}{b^2} = 1$. Then the value of b and the other common tangent are given by :

(A) $b = \sqrt{3}$; $x + 2y + 4 = 0$ (B) $b = 3$; $x + 2y + 4 = 0$

(C) $b = \sqrt{3}$; $x + 2y - 4 = 0$ (D) $b = \sqrt{3}$; $x - 2y - 4 = 0$

10. Consider the particle travelling clockwise on the elliptical path $\frac{x^2}{100}+\frac{y^2}{25} = 1$. The particle leaves the orbit at the point (–8, 3) and travels in a straight line tangent to the ellipse. At what point will the particle cross the y-axis?

(A) $\left(0, \frac{25}{3}\right)$ (B) $\left(0, \frac{23}{3}\right)$ (C) (0, 9) (D) $\left(0, \frac{26}{3}\right)$

11. The line $x\cos\alpha + y\sin\alpha = p$ will be a tangent to the conic $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, if-

(A) $p^2 = a^2 \sin^2\alpha + b^2 \cos^2\alpha$ (B) $p^2 = a^2 + b^2$

(C) $p^2 = b^2\sin^2\alpha + a^2\cos^2\alpha$ (D) None of these

12. **(a)** Which of the following is an equation of the ellipse with centre (–2, 1), major axis running from (–2, 6) to (–2,–4) and focus at (–2,5) ?

(A) $\frac{(x-2)^2}{25}+\frac{(y+1)^2}{16}=1$ (B) $\frac{(x+2)^2}{25}+\frac{(y-1)^2}{9}=1$

(C) $\frac{(x-2)^2}{9}+\frac{(y+1)^2}{25}=1$ (D) $\frac{(x+2)^2}{9}+\frac{(y-1)^2}{25}=1$

(b) Which of the following statement(s) is/are correct for the ellipse of 8(a) ?

(A) auxiliary circle is $(x + 2)^2 + (y - 1)^2 = 25$ (B) director circle is $(x + 2)^2 + (y - 1)^2 = 34$

(C) Latus rectum $=\frac{18}{5}$ (D) eccentricity $=\frac{4}{5}$

[MULTIPLE CORRECT TYPE]

13. If a number of ellipse be described having the same major axis 2a but a variable minor axis then the tangents at the ends of their latus rectum pass through fixed points which can be -

(A) (0,a) (B) (0,0) (C) (0,–a) (D) (a,a)

14. If a tangent having slope of –4/3 to the ellipse $\frac{x^2}{18}+\frac{y^2}{32}=1$ intersects the major and minor axes in points A and B respectively, then the area of the ΔOAB is equal to-

(A) 12 sq. units (B) 48 sq. units (C) 64 sq. units (D) 24 sq. units

15. Extremities of the latus rectum of the ellipses $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ $(a > b)$ having a given major axis 2a lies on-

(A) $x^2 = a(a - y)$ (B) $x^2 = a(a + y)$ (C) $y^2 = a(a + x)$ (D) $y^2 = a(a - x)$

Paragraph for question nos. 16 to 18

Consider the ellipse $\frac{x^2}{9}+\frac{y^2}{4}=1$ and the parabola $y^2 = 2x$. They intersect at P and Q in the first and fourth quadrants respectively. Tangents to the ellipse 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.

16. The ratio of the areas of the triangles PQS and PQR, is

(A) 1 : 3 (B) 1 : 2 (C) 2 : 3 (D) 3 : 4

17. The area of quadrilateral PRQS, is

(A) $\frac{3\sqrt{15}}{2}$ (B) $\frac{15\sqrt{3}}{2}$ (C) $\frac{5\sqrt{3}}{2}$ (D) $\frac{5\sqrt{15}}{2}$

18. The equation of circle touching the parabola at upper end of its latus rectum and passing through its vertex, is

(A) $2x^2 + 2y^2 - x - 2y = 0$ (B) $2x^2 + 2y^2 + 4x - \frac{9}{2}y = 0$

(C) $2x^2 + 2y^2 + x - 3y = 0$ (D) $2x^2 + 2y^2 - 7x + y = 0$

Answers

RACE # 59

1. $y = 3,\ x + y = 5$ **2.** $\left(\frac{16}{5}, \frac{-9}{5}\right)$ **3.** ± 5 **4.** $y = 2x \pm 4$

5. $4x^2 + 3y^2 - 12xy + 4x + 6y - 5 = 0$ **6.** $\theta = \tan^{-1}\left(\frac{12}{\sqrt{5}}\right)$ **7.** (A) **8.** (B) **9.** (A)

10. (A) **11.** (C) **12.** (a) D ; (b) A,B,C,D **13.** (AC) **14.** (D) **15.** (AB) **16.** (C) **17.** (B)

18. (D)