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Class: IX
Subject: Maths
Topic: Conic Section
No. of Questions: 20

1) Above x-axis, the equation of the common tangent to the circle $(x - 3)^2 + y^2 = 9$ and parabola $y^2 = 4x$ is

(A) $\sqrt{3}y = 3x + 1$
(B) $\sqrt{3}y = -(x + 3)$
(C) $\sqrt{3}y = x + 3$
(D) $\sqrt{3}y = -(3x + 1)$

2) The equation of the directrix of the parabola $y^2 + 4y + 4x + 2 = 0$ is

(A) $x = -1$
(B) $x = 1$
(C) $x = -\frac{3}{2}$
(D) $x = \frac{3}{2}$

3) The locus of the mid-point of the line segment joining 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) $x = a/2$

4) If the focal chord of $y^2 = 16x$ touches $(x - 6)^2 + y^2 = 2$, then the slope of such chord is

(A) $1, -1$
(B) $2, -\frac{1}{2}$
(C) $\frac{1}{2}, -2$
(D) $2, -2$

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

(A) $\frac{\pi}{2}$
(B) $\frac{\pi}{3}$
(C) $\frac{\pi}{6}$
(D) $\frac{\pi}{4}$

6) A tangent at point P(1, 7) of the parabola $y = x^2 + 6$ touching the circle $x^2 + y^2 + 16x + 12y + c = 0$ at point
(A) (– 6, – 7)
(B) (– 9, – 7)
(C) (– 6, – 3)
(D) (– 10, – 15)

7) **Direction:** The following question has four choices, out of which ONE or More is/ are correct. P And Q are two points on a parabora, if tangents P and Q intersecting at right angle,

(A) chord PQ always passes through a fixed point
(B) chord PQ always intersects the letus rectum
(C) the minimum angle subtended by chord PQ at the vertex is $\tan^{-1}\left(\frac{4}{3}\right)$
(D) the minimum length of the chord PQ > length of letus rectum

8) **Directions:** The following question has four choices, out of which ONLY ONE is correct. Let us consider a family of trajectory $y^2 = 4ax$ where *a* is a parameter, P, Q, R are three points on it, such that normal at Q and R meet at P.Locus of circum centre of triangle PQR is

(A) $2y^2 = a(x + a)$
(B) $2y^2 = 9a(x - a)$

(C) $2y^2 = a(x + 2a)$

(D) $2y^2 = a(x - a)$

9) **Directions:** The following question has four choices, out of which ONLY ONE is correct.Let us consider a family of trajectory $y^2 = 4ax$ where *a* is a parameter, P, Q and R are three points on it, such that normal at Q and R meet at P.If tangents drawn at the points P, Q, R, taken in pairs, meet at the points A, B and C,

$\frac{area\ of\ triangle\ ABC}{area\ of\ triangle\ PQR}$ is

(A) $\frac{1}{2}$
(B) 2
(C) 1
(D) depending on the positions of the points P, Q and R

10) **Directions:**The following question has four choices, out of which ONLY ONE is correct.
Let us consider a family of trajectory $y^2 = 4ax$ where *a* is a parameter, P, Q and R are three points on it, such that normals at Q and R meet at P.
If tangents drawn at the points Q and R intersect at t and the chord QR touches $y^2 = 4bx$, what is the locus of the point t?

(A) $by^2 = 4a^2x$
(B) $y^2 = 4ax$
(C) $4b^2x = ay^2$
(D) circle

11) **Directions:** The answer to the following question is a single digit integer, ranging from 0 to 9. Enter the correct digit in the box given below.

12) Directions:The answer to the following question is a single digit integer, ranging from 0 to 9. Enter the correct digit in the box given below. A tangent to the ellipse x2 + 4y2 = 4 meets the ellipse x2 + 2y2 = 6 at P and Q. If is the angle in radian between the tangents at P and Q, find [ ] (where [.] is g.i.f.)

13 **Directions:** The answer to the following question is a single digit integer, ranging from 0 to 9. Enter the correct digit in the box given below.

14) **Directions:** The answer to the following question is a single digit integer, ranging from 0 to 9. Enter the correct digit in the box given below.

15) A bar of length 20 cm moves along with its extremities on two fixed straight lines (take as axes) at right angles. If a marked point on it is at 4 cm from one end, the eccentricity of ellipse described by the marked point is

(A) 5/4
(B) $\sqrt{(15)/4}$
(C) 6
(D) $\sqrt{(21)/4}$

16) **Directions:** The answer to the following question is a single digit integer, ranging from 0 to 9. Enter the correct digit in the box given below.

If P is any point on the ellipse $\frac{x^2}{a}+\frac{y^2}{b}=1$ and F_1, F_2 are its foci, find maximum area of the triangle PF_1F_2 where a and b are respectively the greatest and the least values of the function $f(x) = x^3 - 6x^2 + 9x + 1$ on [0, 2].

17) **Directions:** The following question has four choices, out of which ONE or MORE is/are correct.

A hyperbola is lying between the acute angle formed by its pair of asymptotes $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$, which of the following is (are) not the eccentricity of its conjugate hyperbola?

(A) $\operatorname{cosec}\left(\frac{1}{2}\tan^{-1}\frac{2\sqrt{h^2-ab}}{|a+b|}\right)$

(B) $\sec\left(\frac{1}{2}\tan^{-1}\frac{2\sqrt{h^2-ab}}{|a+b|}\right)$

(C) $2\sin\left(\frac{1}{2}\tan^{-1}\frac{2\sqrt{h^2-ab}}{|a+b|}\right)$

(D) $2\cos\left(\frac{1}{2}\tan^{-1}\frac{2\sqrt{h^2-ab}}{|a+b|}\right)$

18) **Directions:** The following question has four choices, out of which ONLY ONE is correct.

$T_n = \frac{\sum_{k=1}^{n} k}{n!}$ and $\sum_{n=0}^{\infty} T_n$ is eccentricity of

(A) a circle
(B) a parabola
(C) an ellipse
(D) a hyperbola

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19) **Directions:** The following question has four choices, out of which ONLY ONE is correct.

If f(x) is a decreasing function, the set of values of k, for which y = 0 is the major axis of the ellipse $\frac{x^2}{f(k^2+2k+5)}+\frac{y^2}{f(k+1)}=1$, is

(A) $k \in (-2, 3)$
(B) $k \in (-3, 2)$
(C) $k \in (-\infty, -3) \cup (2, \infty)$
(D) $k \in (-\infty, -3) \cup (3, \infty)$

20) **Directions:** The following question has four choices, out of which ONLY ONE is correct.

If $(a\cos\theta + a\cos 2\theta, b\sin\theta + b\sin 2\theta)$ is parametric point on $\frac{2x}{a}=\left(\frac{x^2}{a^2}+\frac{y^2}{b^2}\right)\left(\frac{x^2}{a^2}+\frac{y^2}{b^2}-k\right)$, Find the value of k =

(A) 0
(B) 1
(C) 2
(D) 3

21. Find the lengths of axes & length of lat us rectum of the hyperbola, $\frac{y^2}{9}-\frac{x^2}{16}=1$

22. Find the eccentricity of the hyperbola of $\frac{y^2}{9}-\frac{x^2}{16}=1$

23. Find the equation of the hyperbola with centre at the origin, length of the trans verse axis 6 & one focus at (0,4)

24. Find the equation of the ellipse, the ends of whose major axis are $(\pm 3, 0)$ & at the ends of whose minor axis are $(0, \pm 4)$

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25. Find the equation of the parabola with focus at F (4,0) & directrix x =