

Geometry 2e – Practice

1. Give the ideal points of $3x^2 + 4xy - 2x - 5 = 0$ and $x^2 - 2xy + y^2 + 2x - 2y = -1$.
2. Give the equation of a hyperbolic curve with ideal points $P_1(2, -1, 0)$ and $P_2(1, 1, 0)$.
3. Give the equation of a parabolic curve with ideal point $P_1(1, 2, 0)$.
4. Prove that $8x^2 + 2xy - y^2 - 10x - 5y = 0$ contains the line, determined by $A(2, 3)$ and $B(1, -1)$.
5. Are $P(1, -2)$ and $Q(3, 1)$ points, conjugated to each other respected to the quadratic curve $x^2 - 8xy + 7y^2 + 6x - 6y + 9 = 0$?
6. Prove that $x^2 + 3xy + 2y^2 - 7x - 10y + 12 = 0$ is a singular conic. Find its singular point(s).
7. Give the polar of $P(3, 1)$ and the pole of $2x - 3y - 2 = 0$ respected to the quadratic curve $2x^2 - 4xy + y^2 - 2x + 6 = 0$.
8. Prove that the polar of any foci of any conic is its director line (directrix).
9. Give the equation of the tangent to $5x^2 + 7xy + y^2 - x + 2y = 0$ from the origin.
10. Give the equation of the tangent to $3x^2 + 4xy + 2y^2 - 6x + 2y - 1 = 0$ from $P(2, 1)$.
11. Give the diameter of $4x^2 + 6xy + 4y^2 - 3y + 1 = 0$, that is parallel to $x + 2y - 1 = 0$.
12. Give the diameter of $3x^2 + 2xy + 2y^2 + 3x - 4y = 0$, that is parallel to $x + 2y = -2$.
Give the diameter that is conjugated to the result.
13. Give the equation of the canonical ellipse that is passing through $A(4, 3)$ and $B(6, 2)$.
14. Give the equation of the canonical hyperbola that is passing through $A(6, -1)$ and $B(-8, 2\sqrt{2})$.
15. Give the magnitude and the angle of the radial vector of $3x^2 + 8y^2 = 120$ for $x = 4$.
16. Determine the secant of $\frac{x^2}{9} + \frac{y^2}{4} = 1$ such that $P(1, 1)$ bisects it.
17. Determine the asymptotes of the canonical hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$.
18. Prove that the product of the distances to the asymptotes of any point of a hyperbola is constant.