

1) If $A(b, k)$, $B(1, 1)$, $C(2, 1)$ are the vertices of a right angled triangle with AC as hypotenuse and area of triangle is 1 sq. unit. Find the value of b and k .

Hint:- Use the formula of area of triangle and pythagoras theorem.

2) If the point of intersection of the lines $2px + 3qy + r = 0$ and $px - 2qy - 2r = 0$ lies strictly in the 4th quadrant and is equidistant from the axes then prove that $5p - 4q = 0$.

Hint:- First find the point of intersection and then apply the equidistant from both the axes.

3) If the lines $3x - 4y + 10 = 0$ and $3x - 4y - 15 = 0$ touches a circle then find the radius of a circle.

4) Prove that - the circles $\tilde{x}^2 + \tilde{y}^2 + 2ax + c = 0$ and $\tilde{x}^2 + \tilde{y}^2 + 2by + c = 0$ touch each other if $\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{c}$

Hint:- Apply the concept of touching circles.

5) If the normal to the parabola $\tilde{y} = 4ax$ at the point $(a\tilde{t}_1, 2a\tilde{t}_1)$ meets the parabola again at the point $(a\tilde{t}_2, 2a\tilde{t}_2)$ then prove that $\tilde{t}_2 = -\tilde{t}_1 - \frac{2}{\tilde{t}_1}$

6) Find the locus of the point of intersection of two tangents to the parabola $\tilde{y} = 4ax$ which are inclined at an angle 60° .

7) P and Q are two fixed points on a plane where $PQ = 2d$, the point R moves on the plane such that the sum of its distances from P and Q is a constant '2a', show that the locus of the point R is an ellipse.

Hint: - choose the line PQ as x-axis, the middle point of the segment PQ as the origin O and the line through O perpendicular to PQ in the plane of the locus as the y-axis, then $OP = OQ = d$ because $PQ = 2d$.

8) Prove that the line $3x - 2y = 8$ touches the ellipse $3x^2 + 4y^2 = 16$ and find the point of contact.

9) Find the equation's of the tangents to the hyperbola $x^2 - 4y^2 = 4$ which are parallel to the line $x - 2y + 1 = 0$.

10) If e_1 and e_2 are eccentricities of a hyperbola and its conjugate then prove that - $\frac{1}{e_1^2} + \frac{1}{e_2^2} = 1$.

My dear students, you all are requested to solve these unsolved problems so that you can improve your mathematical knowledge in this quarantine period. Please go through each and every questions, try to understand the questions and try to solve as many questions as u can. All the best