MATHS

BOOKS - SAI MATHS (TELUGU ENGLISH)

LOCUS AND TRANSFORMATION OF AXES

Problems

1. If the origin of a coordinate system is shifted to $\left(-\sqrt{2}. \sqrt{2} \right)$ and then the coordinate system is rotated anticlockwise through an angle $45°$, the point $P(1, \ -1)$ in the original system has new coordinates

A. $\left(\sqrt{2}, \ -2\sqrt{2} \right)$

B. $\left(0, \ -2\sqrt{2} \right)$

C. $\left(0, \ -2 - \sqrt{2} \right)$

D. $\left(0, \ -2 + \sqrt{2} \right)$

Answer: C

2. The point (2,3) is first reflected in the straight line y=x and then translated through a distance of 2 units along the positive direction X-axis. The coordinates of the transformed point are

    A. $(5, 4)$

    B. $(2, 3)$

    C. $(5, 2)$

D. $(4, 5)$

Answer: C

3. The locus of the centroid of the triangle with vertices at $(a\cos\theta, a\sin\theta)$, $(b\sin\theta - b\cos\theta)$ and $(1, 0)$ is (here, θ is a parameter)

A. $(3x + 1)^2 + 9y^2 = a^2 + b^2$

B. $(3x - 1)^2 + 9y^2 = a^2 - b^2$

C. $(3x - 1)^2 + 9y^2 = a^2 + b^2$

D. $(3x + 1)^2 + 9y^2 = a^2 - b^2$

Answer: C

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4. The origin is translated to $(1, 2)$. The point $(7, 5)$ in the old system undergoes the following transformations successively.

I. Moves to the new point under the given

translation of origin.

II Translated through 2 units along the negative direction of the new X-axis.

III. Rotated through an angle $\dfrac{\pi}{4}$ about the origin of new system in the clockwise direction. The final position of the point $(7, 5)$ is

A. $\left(\dfrac{9}{\sqrt{2}}, \dfrac{-1}{\sqrt{2}}\right)$

B. $\left(\dfrac{7}{\sqrt{2}}, \dfrac{1}{\sqrt{2}}\right)$

C. $\left(\dfrac{7}{\sqrt{2}}, \dfrac{-1}{\sqrt{2}}\right)$

D. $\left(\dfrac{5}{\sqrt{2}}, \dfrac{-1}{\sqrt{2}}\right)$

Answer: C

5. The point $(4, 1)$ undergoes the following transformations successively

I. Reflection about the line $y = x$

II. Translation through a distance 2 units in the direction of positive X-axis.

III. Rotation through an angle $\dfrac{\pi}{4}$ about origin in the anticlock wise direction.

Then, the final position of the point is

A. $\left(-\sqrt{18}, \sqrt{18}\right)$

B. $(-2, 3)$

C. $\left(0, \sqrt{18}\right)$

D. $(0, 3)$

Answer: C

6. The locus of a point such that the sum of its distances from the points $(0, 2)$ and $(0, -2)$ is 6 is

A. $9x^2 - 5y^2 = 45$

B. $5x^2 + 9y^2 = 45$

C. $9x^2 + 5y^2 = 45$

D. $5x^2 - 9y^2 = 45$

Answer: C

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7. The transformed equation of $x^2 + y^2 = r^2$ when the axes are rotated through an angle $36°$ is

A. $\sqrt{5}X^2 - 4XY + Y^2 = r^2$

B. $X^2 + 2XY - \sqrt{5}Y^2 = r^2$
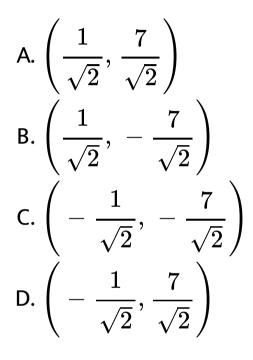
C. $X^2 - Y^2 = r^2$

D. $X^2 + Y^2 = r^2$

Answer: D

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8. The coordinate axes are rotated through an angle $135°$. If the coordinates of a point P in the new system are known to be $(4, -3)$,

then the coordinates of P in the original system are

A. $\left(\dfrac{1}{\sqrt{2}}, \dfrac{7}{\sqrt{2}} \right)$

B. $\left(\dfrac{1}{\sqrt{2}}, -\dfrac{7}{\sqrt{2}} \right)$

C. $\left(-\dfrac{1}{\sqrt{2}}, -\dfrac{7}{\sqrt{2}} \right)$

D. $\left(-\dfrac{1}{\sqrt{2}}, \dfrac{7}{\sqrt{2}} \right)$

Answer: D

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9. The point P is equidistant from $A(1, 3)$, $B(-3, 5)$ and $C(5, -1)$,then PA is equal to

A. 5

B. $5\sqrt{5}$

C. 25

D. $5\sqrt{10}$

Answer: D

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10. If the axes are rotated through an angle $45°$ in the positive direction without changing the origin, then the coordinates of the point $\left(\sqrt{2}, 4\right)$ in the old system are

    A. $\left(1 - 2\sqrt{2}, 1 + 2\sqrt{2}\right)$

    B. $\left(1 + 2\sqrt{2}, 1 - 2\sqrt{2}\right)$

    C. $\left(2\sqrt{2}, \sqrt{2}\right)$

    D. $\left(\sqrt{2}, 2\right)$

Answer: A

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11. If a point $(x, y) = (\tan\theta + \sin\theta, \tan\theta - \sin\theta)$, then the locus of (x, y) is

A. $\left(x^2 y\right)^{2/3} + \left(xy^2\right)^{2/3} = 1$

B. $x^2 - y^2 = 4xy$

C. $x^2 - y^2 = 12xy$

D. $\left(x^2 - y^2\right)^2 = 16xy$

Answer: D

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