



# MATHS

## BOOKS - SAI MATHS (TELUGU ENGLISH)

### LOCUS AND TRANSFORMATION OF AXES

**Problems**

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

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

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

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

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

**Answer: C**



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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**



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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,  $\theta$  is a parameter)

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

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

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

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

**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  $\frac{\pi}{4}$  about the origin of new system in the clockwise direction. The final position of the point  $(7, 5)$

is

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

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

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

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

**Answer: C**



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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  $\frac{\pi}{4}$  about origin in the anticlock wise direction.

Then, the final position of the point is

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

B.  $(-2, 3)$

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

D.  $(0, 3)$

**Answer: C**



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**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  $36^\circ$  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  $135^\circ$ . 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.  $\left(\frac{1}{\sqrt{2}}, \frac{7}{\sqrt{2}}\right)$

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

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

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

**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  $45^\circ$  in the positive direction without changing the origin, then the coordinates of the point  $(\sqrt{2}, 4)$  in the old system are

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

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

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

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

**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.  $(x^2 y)^{2/3} + (x y^2)^{2/3} = 1$

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

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

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

**Answer: D**



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