Conic Sections MCQs: Class 12, Chapter 6, Exercise 6.8

These 15 high-difficulty MCQs are designed for entry test preparation, focusing on axis transformations of conic sections.

Multiple Choice Questions

1. The new origin for transforming $x^2 + 16y - 16 = 0$ to remove first-degree terms, with shift to (h, k), is:

   - (a) $(0, 1)$

   - (b) $(1, 0)$

   - (c) $(-1, 0)$

   - (d) $(0, -1)$

2. The transformed equation of $4x^2 + y^2 + 16x - 10y + 37 = 0$ with origin at $(-2, 5)$ is:

   - (a) $4X^2 + Y^2 - 4 = 0$

   - (b) $4X^2 + Y^2 + 4 = 0$

   - (c) $X^2 + Y^2 - 4 = 0$

   - (d) $4X^2 - Y^2 + 4 = 0$

3. The new origin to remove first-degree terms from $3x^2 - 2y^2 + 24x + 12y + 24 = 0$ is:

   - (a) $(-4, 3)$

   - (b) $(4, -3)$

   - (c) $(3, -4)$

   - (d) $(-3, 4)$

4. The transformed equation of $9x^2 + 4y^2 + 18x - 16y - 11 = 0$ with origin at $(-1, 2)$ is:

   - (a) $9X^2 + 4Y^2 - 36 = 0$

   - (b) $9X^2 - 4Y^2 + 36 = 0$

   - (c) $4X^2 + 9Y^2 - 36 = 0$

   - (d) $9X^2 + 4Y^2 + 36 = 0$

5. The new origin for $25x^2 + 9y^2 + 50x - 36y - 164 = 0$ to remove first-degree terms is:

   - (a) $(-1, 2)$

   - (b) $(1, -2)$

   - (c) $(2, -1)$

   - (d) $(-2, 1)$

6. The transformed equation of $x^2 - y^2 + 4x + 8y - 11 = 0$ with origin at $(-2, 4)$ is:

- (a) $X^2 - Y^2 + 1 = 0$
- (b) $X^2 + Y^2 - 1 = 0$
- (c) $X^2 - Y^2 - 1 = 0$
- (d) $X^2 + Y^2 + 1 = 0$

7. The angle of rotation to remove the xy-term in $xy = 1$ is:

- (a) $30°$
- (b) $45°$
- (c) $60°$
- (d) $90°$

8. The transformed equation of $7x^2 - 8xy + y^2 - 9 = 0$ with rotation angle $\theta = \arctan 2$ is:

- (a) $X^2 - 9Y^2 + 9 = 0$
- (b) $X^2 + 9Y^2 - 9 = 0$
- (c) $9X^2 - Y^2 + 9 = 0$
- (d) $X^2 - 9Y^2 - 9 = 0$

9. The angle of rotation to remove the xy-term in $9x^2 + 12xy + 4y^2 - x - y = 0$ with $\theta = \arctan \frac{2}{3}$ results in a transformed equation with:

- (a) X^2 and Y terms only
- (b) X^2 and Y^2 terms only
- (c) X and Y terms only
- (d) X^2, Y^2, and XY terms

10. The angle of rotation to remove the xy-term in $2x^2 + 6xy + 10y^2 - 11 = 0$ is:

- (a) $30°$
- (b) $45°$
- (c) $\tan^{-1} 3$
- (d) $\tan^{-1} \frac{1}{3}$

11. The transformed equation of $2x^2 + 6xy + 10y^2 - 11 = 0$ after rotation by $\theta = \tan^{-1} 3$ is:

- (a) $11X^2 + Y^2 - 11 = 0$
- (b) $X^2 + 11Y^2 - 11 = 0$
- (c) $X^2 + Y^2 - 11 = 0$
- (d) $11X^2 - Y^2 + 11 = 0$

12. The transformed equation of $xy + 4x - 3y - 10 = 0$ with rotation by $45°$ is:

- (a) $X^2 - Y^2 + \sqrt{2}X - 7\sqrt{2}Y - 20 = 0$
- (b) $X^2 + Y^2 - \sqrt{2}X + 7\sqrt{2}Y - 20 = 0$
- (c) $X^2 - Y^2 - \sqrt{2}X - 7\sqrt{2}Y + 20 = 0$
- (d) $X^2 + Y^2 + \sqrt{2}X - 7\sqrt{2}Y - 20 = 0$

13. The angle of rotation to remove the xy-term in $5x^2 - 6xy + 5y^2 - 8 = 0$ is:
    - (a) $30°$
    - (b) $45°$
    - (c) $60°$
    - (d) $90°$

14. The transformed equation of $5x^2 - 6xy + 5y^2 - 8 = 0$ after rotation by $45°$ is:
    - (a) $X^2 + 4Y^2 - 4 = 0$
    - (b) $X^2 - 4Y^2 + 4 = 0$
    - (c) $4X^2 + Y^2 - 4 = 0$
    - (d) $X^2 + Y^2 - 4 = 0$

15. The new origin for $9x^2 - 4y^2 + 36x + 8y - 4 = 0$ to remove first-degree terms is:
    - (a) $(-2, 1)$
    - (b) $(2, -1)$
    - (c) $(-1, 2)$
    - (d) $(1, -2)$

Answers with Explanations

1. Correct Answer: (a) $(0, 1)$ Explanation: From Q.1(i), $h = 0$, $k = 1$ removes the first-degree term $16y$.

2. Correct Answer: (a) $4X^2 + Y^2 - 4 = 0$ Explanation: From Q.1(ii), substituting $(-2, 5)$ yields the given equation.

3. Correct Answer: (a) $(-4, 3)$ Explanation: From Q.2(i), solving $6h + 24 = 0$ and $4k - 12 = 0$ gives $h = -4$, $k = 3$.

4. Correct Answer: (a) $9X^2 + 4Y^2 - 36 = 0$ Explanation: From Q.1(iii), transformation with $(-1, 2)$ results in this equation.

5. Correct Answer: (a) $(-1, 2)$ Explanation: From Q.2(ii), $50h + 50 = 0$ and $18k - 36 = 0$ give $h = -1$, $k = 2$.

6. Correct Answer: (a) $X^2 - Y^2 + 1 = 0$ Explanation: From Q.1(iv), transformation with $(-2, 4)$ yields this equation.

7. Correct Answer: (b) $45°$ Explanation: From Q.3(i), $\theta = 45°$ eliminates the xy-term.

8. Correct Answer: (a) $X^2 - 9Y^2 + 9 = 0$ Explanation: From Q.3(ii), the rotation with $\theta = \arctan 2$ gives this result.

9. Correct Answer: (c) X and Y terms only Explanation: From Q.3(iii), the transformed equation has linear terms due to the constant terms.

10. Correct Answer: (c) $\tan^{-1} 3$ Explanation: From Q.4(i), solving $3\tan^2\theta + 8\tan\theta - 3 = 0$ gives $\tan\theta = 3$.

11. Correct Answer: (a) $11X^2 + Y^2 - 11 = 0$ Explanation: From Q.4(i), substituting $\theta = \tan^{-1} 3$ yields this equation.

12. Correct Answer: (a) $X^2 - Y^2 + \sqrt{2}X - 7\sqrt{2}Y - 20 = 0$ Explanation: From Q.4(ii), rotation by $45°$ gives this result.

13. Correct Answer: (b) $45°$ Explanation: From Q.4(iii), $\tan\theta = 1$ corresponds to $\theta = 45°$.

14. Correct Answer: (a) $X^2 + 4Y^2 - 4 = 0$ Explanation: From Q.4(iii), rotation by $45°$ transforms to this ellipse equation.

15. Correct Answer: (a) $(-2, 1)$ Explanation: From Q.1(v), $h = -2$, $k = 1$ removes first-degree terms.