

JEE MAIN COMPLEX NUMBERS AND QUADRATIC EQUATIONS — QUADRATIC EXPRESSIONS, LOCATION OF ROOTS AND COMMON ROOTS (JEE) — PYQS

Max. Marks: 32

Questions: 8

Section A (MCQ) — 7 questions

- Q.1** Let e_1 and e_2 be two distinct roots of the equation $x^2 - ax + 2 = 0$. Let the sets $\{a \in \mathbb{R} : e_1 \text{ and } e_2 \text{ are the eccentricities of hyperbolas}\} = (\alpha, \beta)$, and $\{a \in \mathbb{R} : e_1 \text{ and } e_2 \text{ are the eccentricities of an ellipse and a hyperbola, respectively}\} = (\gamma, \infty)$. Then $\alpha^2 + \beta^2 + \gamma^2$ is equal to :

[JEE Main 2026 (Online) 6th April Morning Shift]

- (1) 18 (2) 22 (3) 26 (4) 34

Scan or tap for the full solution



- Q.2** If the set of all solutions of $|x^2 + x - 9| = |x| + |x^2 - 9|$ is $[\alpha, \beta] \cup [\gamma, \infty)$, then $(\alpha^2 + \beta^2 + \gamma^2)$ is equal to:

[JEE Main 2026 (Online) 4th April Morning Shift]

- (1) 9 (2) 18 (3) 36 (4) 72

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- Q.3** If the quadratic equation $(\lambda + 2)x^2 - 3\lambda x + 4\lambda = 0$, $\lambda \neq -2$, has two positive roots, then the number of possible integral values of λ is :

[JEE Main 2026 (Online) 4th April Evening Shift]

- (1) 1 (2) 2 (3) 3 (4) 4

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- Q.4** Let the arithmetic mean of $\frac{1}{a}$ and $\frac{1}{b}$ be $\frac{5}{16}$, $a > 2$. If α is such that $a, 4, \alpha, b$ are in A.P., then the equation $\alpha x^2 - ax + 2(\alpha - 2b) = 0$ has :

[JEE Main 2026 (Online) 28th January Evening Shift]

- (1) one root in $(1, 4)$ and another in $(-2, 0)$
 (2) one root in $(0, 2)$ and another in $(-4, -2)$
 (3) both roots in the interval $(-2, 0)$
 (4) complex roots of magnitude less than 2

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- Q.5** The smallest positive integral value of a , for which all the roots of $x^4 - ax^2 + 9 = 0$ are real and distinct, is equal to

[JEE Main 2026 (Online) 24th January Evening Shift]

- (1) 7 (2) 3 (3) 4 (4) 9

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- Q.6** Let α and β be the roots of the equation $x^2 + 2ax + (3a + 10) = 0$ such that $\alpha < 1 < \beta$. Then the set of all possible values of a is :

[JEE Main 2026 (Online) 21st January Evening Shift]

- (1) $\left(-\infty, \frac{-11}{5}\right) \cup (5, \infty)$
 (2) $\left(-\infty, \frac{-11}{5}\right)$
 (3) $(-\infty, -3)$
 (4) $(-\infty, -2) \cup (5, \infty)$

Scan or tap for the full solution



- Q.7** Let the set of all values of $p \in \mathbb{R}$, for which both the roots of the equation $x^2 - (p + 2)x + (2p + 9) = 0$ are negative real numbers, be the interval $(\alpha, \beta]$. Then $\beta - 2\alpha$ is equal to

[JEE Main 2025 (Online) 7th April Morning Shift]

- (1) 5 (2) 0 (3) 20 (4) 9

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Section B (Numerical) — 1 question

- Q.8** If the set of all $a \in \mathbb{R} - \{1\}$, for which the roots of the equation $(1 - a)x^2 + 2(a - 3)x + 9 = 0$ are positive is $(-\infty, -\alpha] \cup [\beta, \gamma)$, then $2\alpha + \beta + \gamma$ is equal to _____.

[JEE Main 2025 (Online) 2nd April Evening Shift]

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ANSWER KEY**Section A (MCQ) — 7 questions**

Ques.	1	2	3	4	5	6	7				
Ans.	3	2	2	1	1	2	1				

Section B (Numerical) — 1 question

Ques.	8										
Ans.	7										