

JEE Main PYQ • Question

Q1

Let $y^2 = 12x$ be the parabola with its vertex at O. Let P be a point on the parabola and A be a point on the x-axis such that $\angle OPA = 90^\circ$. Then the locus of the centroid of such triangles OPA is:

A $y^2 - 2x + 8 = 0$

C $y^2 - 4x + 8 = 0$

B $y^2 - 9x + 6 = 0$

D $y^2 - 6x + 4 = 0$

Solve independently • Mark the key idea / trick used

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Q2

Let one end of a focal chord of the parabola $y^2 = 16x$ be $(16, 16)$. If $P(\alpha, \beta)$ divides this focal chord internally in the ratio $5 : 2$, then the minimum value of $\alpha + \beta$ is equal to:

A 16

C 7

B 5

D 22

Solve independently • Mark the key idea / trick used

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Q3

Let A be the focus of the parabola $y^2 = 8x$. Let the line $y = mx + c$ intersect the parabola at two distinct points B and C. If the centroid of the triangle ABC is $(7/3, 4/3)$, then $(BC)^2$ is equal to:

A 80

C 89

B 41

D 32

Solve independently • Mark the key idea / trick used

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Q4

Let the image of the parabola $x^2 = 4y$, in the line $x - y = 1$ be $(y + a)^2 = b(x - c)$, where $a, b, c \in \mathbb{N}$. Then $a + b + c$ is equal to:

☒ A 8☐ C 12☐ B 6☐ D 4

Solve independently • Mark the key idea / trick used

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Q5

Let the locus of the mid-point of the chord through the origin O of the parabola $y^2 = 4x$ be the curve S. Let P be any point on S. Then the locus of the point, which internally divides OP in the ratio 3 : 1, is:

☒ A $2x^2 = 3y$

☐ C $2y^2 = 3x$

☐ B $3y^2 = 2x$

☐ D $3x^2 = 2y$

Solve independently • Mark the key idea / trick used

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Q6

If the chord joining the points $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$ on the parabola $y^2 = 12x$ subtends a right angle at the vertex of the parabola, then $x_1x_2 - y_1y_2$ is equal to:

☒ A 284☐ C 288☐ B 280☐ D 292

Solve independently • Mark the key idea / trick used

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Q7

An equilateral triangle OAB is inscribed in the parabola $y^2 = 4x$ with the vertex O at the vertex of the parabola. Then the minimum distance of the circle having AB as a diameter from the origin is:

☒ A $2(8 - 3\sqrt{3})$

☐ C $4(6 + \sqrt{3})$

☐ B $2(3 + \sqrt{3})$

☐ D $4(3 - \sqrt{3})$

Solve independently • Mark the key idea / trick used

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Q8

Let O be the vertex of the parabola $x^2 = 4y$ and Q be any point on it. Let the locus of the point P, which divides the line segment OQ internally in the ratio 2 : 3, be the conic C. Then the equation of the chord of C, which is bisected at the point (1, 2), is:

☒ A $5x - 4y + 3 = 0$

☐ C $4x - 5y + 6 = 0$

☐ B $5x - y - 3 = 0$

☐ D $x - 2y + 3 = 0$

Solve independently • Mark the key idea / trick used