



MATHS

BOOKS - CENGAGE PUBLICATION

COORDINATE SYSTEM

Single Correct Answer Type

1. The maximum value of

$$y = \sqrt{(x - 3)^2 + (x^2 - 2)^2} - \sqrt{x^2 - (x^2 - 1)^2}$$

is

A. 3

B. $\sqrt{10}$

C. $2\sqrt{5}$

D. none of these

Answer: B



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2. Number of values of α such that the points $(\alpha, 6)$, $(-5, 0)$ and $(5, 0)$ form an isosceles triangle is

A. 4

B. 5

C. 6

D. 7

Answer: B



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3. The number of triangles which are obtuse and which have the points $(8,9)$, $(8,16)$ and

(20,25). Then find the orthocenter of triangle ABC.



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4. If m_1, m_2 be the roots of the equation $x^2 + (\sqrt{3} + 2)x + \sqrt{3} - 1 = 0$, then the area of the triangle formed by the lines $y = m_1x$, $y = m_2x$ and $y = 2$ is

A. $\sqrt{33} - \sqrt{11}$ sq. units

B. $\sqrt{11} + \sqrt{33}$ sq. units

C. $2\sqrt{33}$ sq. units

D. 121 sq. units

Answer: B



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5. A triangle ABC vertices $A(5,1)$, $B(-1,-7)$ and $C(1,4)$. Respectively. L be the line mirror passing through C and parallel to AB. A light ray emanating from point A goes along the direction of the internal bisector of angle A,

which meets the mirror and BC at E and D, respectively. then the sum of the areas of $\triangle ACE$ and $\triangle ABC$ is

A. 17 sq. units

B. 18 sq. units

C. $\frac{50}{3}$ sq. units

D. 20 sq. units

Answer: C



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6. In a three-dimensional coordinate system, P , Q , and R are images of a point $A(a, b, c)$ in the $x - y$, $y - z$ and $z - x$ planes, respectively. If G is the centroid of triangle PQR , then area of triangle AOG is (O is the origin) a. 0 b. $a^2 + b^2 + c^2$ c. $\frac{2}{3}(a^2 + b^2 + c^2)$ d. none of these

A. 1

B. 2

C. 3

D. 4

Answer: C



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7. If $A(5, 2)$, $B(10, 12)$ and $P(x, y)$ is such that $\frac{AP}{PB} = \frac{3}{2}$, then the internal bisector of $\angle APB$ always passes through (a) $(20, 32)$ (b) $(8, 8)$ (c) $(8, -8)$ (d) $(-8, -8)$

A. $(20, 32)$

B. $(8, 8)$

C. $(8, -8)$

D. (- 8, - 8)

Answer: B



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8. Let ABC is be a fixed triangle and P be variable point in the plane of triangle ABC . Suppose a, b, c are lengths of sides BC, CA, AB opposite to angles A, B, C , respectively. If $a(PA)^2 + b(PB)^2 + c(PC)^2$ is minimum, then point P with respect to ΔABC is

A. centroid

B. circumcentre

C. orthocenter

D. incentre

Answer: D



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9. The incentre of a triangle with vertices $(7, 1)$, $(-1, 5)$ and $(3 + 2\sqrt{3}, 3 + 4\sqrt{3})$ is

A. $\left(3 + \frac{2}{\sqrt{3}}, 3 + \frac{4}{\sqrt{3}} \right)$

B. $\left(1 + \frac{2}{3\sqrt{3}}, 1 + \frac{4}{3\sqrt{3}} \right)$

C. $(7, 1)$

D. None of these

Answer: A



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10.

$$P(\cos \alpha, \sin \alpha), Q(\cos \beta, \sin \beta), R(\cos \gamma, \sin \gamma)$$

are vertices of triangle whose orthocenter is $(0, 0)$ then the value of $\cos(\alpha - \beta) + \cos(\beta - \gamma) + \cos(\gamma - \alpha)$ is

A. A. $-3/2$

B. B. $-1/2$

C. C. $\frac{1}{2}$

D. D. $3/2$

Answer: A



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11. Three vertices of a triangle ABC are $A(2, 1)$, $B(7, 1)$ and $C(3, 4)$. Images of this triangle are taken in x-axis, y-axis and the line $y = x$. If G_1 , G_2 and G_3 are the centroids of the three image triangles then area of triangle $G_1G_2G_3$ is equal to

A. 10 sq. units

B. 20 sq. units

C. 25sq. Units

D. 30 sq. units

Answer: B



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12. A and B are fixed points such that $AB=2a$.

The vertex C of $\triangle ABC$ such that

$\cot A + \cot B = \text{constant}$. Then locus of C is

A. straight line perpendicular to AB

B. straight line parallel to AB

C. circle

D. none of these

Answer: B



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13. Two vertices of a triangle are $(1, 3)$ and $(4, 7)$. The orthocentre lies on the line $x + y = 3$.

The locus of the third vertex is

A. $x^2 - 2xy + 2y^2 - 3x - 4y + 36 = 0$

B. $2x^2 - 4xy + 3y^2 - 4x - y + 42 = 0$

C. $3x^2 + xy - 4y^2 - 2x + 24y - 40 = 0$

D. $x^2 - 4xy + 3y^2 - 2x - y + 40 = 0$

Answer: C



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14. Let P be the point $(-3, 0)$ and Q be a moving point $(0, 3t)$. Let PQ be trisected at R so that R is nearer to Q . RN is drawn perpendicular to PQ meeting the x -axis at N .

The locus of the mid-point of RN is

A. $(x + 3)^2 - 3y = 0$

B. $(y + 3)^2 - 3x = 0$

C. $x^2 - y = 1$

D. $y^2 - x = 1$

Answer: D



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15. Given $\frac{x}{a} + \frac{y}{b} = 1$ and $ax + by = 1$ are two variable lines, 'a' and 'b' being the parameters connected by the relation $a^2 + b^2 = ab$. The locus of the point of intersection has the equation

A. $x^2 + y^2 + xy - 1 = 0$

B. $x^2 + y^2 - xy + 1 = 0$

C. $x^2 + y^2 + xy + 1 = 0$

D. $x^2 + y^2 - xy - 1 = 0$

Answer: A



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16. The extremities of a diagonal of a rectangle are (0,0) and (4, 4). The locus of the extremities of the other diagonal is equal to

A. $x^2 + y^2 - 4x - 4y = 0$

B. $x^2 + y^2 + 4x + 4y - 4 = 0$

C. $x^2 + y^2 + 4x + 4y + 4 = 0$

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

Answer: A



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17. In triangle ABC, the equation of the right bisectors of the sides AB and AC are $x+y=0$ and

$y-x=0$. respectively.

If $A \equiv (5, 7)$ the find the equation of side BC.

A. $y = -5x$

B. $y = x$

C. $x = -5y$

D. $x = -y$

Answer: C



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18. The real value of a for which the value of m

satisfying the equation

$$(a^2 - 1)m^2 - (2a - 3)m + a = 0$$
 given the

slope of a line parallel to the y -axis is $\frac{3}{2}$ (b) 0

(c) 1 (d) ± 1

A. $\frac{3}{2}$

B. 0

C. 1

D. ± 1

Answer: D



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19. If the lines $y = 3x + 1$ and $2y = x + 3$ are equally inclined to the line $y = mx + 4$, $\left(\frac{1}{2} < m < 3\right)$ then find the values m

A. $\frac{1 + 3\sqrt{2}}{7}$

B. $\frac{1 - 3\sqrt{2}}{7}$

C. $\frac{1 \pm 3\sqrt{2}}{7}$

D. $\frac{1 \pm 5\sqrt{2}}{7}$

Answer: D



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20. Let G be the centroid of triangle ABC and the circumcircle of triangle AGC touches the side AB at A

If $AC = 1$, then the length of the median of triangle ABC through the vertex A is equal to

A. 2

B. 3

C. 4

D. 5

Answer: C



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21. The number of rational points on the line joining $(\sqrt{5}, 3)$ and $(3, \sqrt{3})$ is

A. 0

B. 1

C. 2

D. infinite

Answer: A



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22. The Cartesian coordinates of point having polar coordinates $\left(-2, \frac{2\pi}{3}\right)$ will be

A. $(1, \sqrt{3})$

B. $(\sqrt{3}, 1)$

C. $(1, -\sqrt{3})$

D. $(-1, \sqrt{3})$

Answer: C



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23. The line passing through $(-1, \frac{\pi}{2})$ and perpendicular to $\sqrt{3}\sin(\theta) + 2\cos(\theta) = \frac{4}{r}$ is

A. $2 = \sqrt{3}r \cos \theta - 2r \sin \theta$

B. $5 = -2\sqrt{3}r \sin \theta + 4r \cos \theta$

$$C. 2 = \sqrt{3}r \cos \theta + 2r \cos \theta$$

$$D. 5 = 2\sqrt{3}r \sin \theta + 4r \cos \theta$$

Answer: A



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24. If origin is shifted to $(-2, 3)$ then transformed equation of curve

$x^2 + 2y - 3 = 0$ w.r.t. to $(0, 0)$ is

A. $x^2 - 4x + 2y + 4 = 0$

B. $x^2 - 4x - 2y - 5 = 0$

C. $x^2 + 4x + 2y - 5 = 0$

D. None of these

Answer: C



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Comprehension Type

1. $A(x_1, y_1), B(x_2, y_2), C(x_3, y_3)$ are three vertices of a triangle ABC, $lx + my + n = 0$ is

an equation of line L. If L intersects the sides BC, CA and AB of a triangle ABC at P, Q, R respectively, then $\frac{BP}{PC} \times \frac{CQ}{QA} \times \frac{AR}{RB}$ is equal to

A. -1

B. $-\frac{1}{2}$

C. $\frac{1}{2}$

D. 1

Answer: A



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2. $A(x_1, y_1), B(x_2, y_2), C(x_3, y_3)$ are three vertices of a triangle ABC. $lx + my + n = 0$ is an equation of the line L.

If P divides BC in the ratio 2:1 and Q divides CA in the ratio 1:3 then R divides AB in the ratio (P,Q,R are the points as in problem 1)

A. 2:3 internally

B. 2:3 externally

C. 3:2 internally

D. 3:2 externally

Answer: D



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3. Let $A(0, \beta)$, $B(-2, 0)$ and $C(1, 1)$ be the vertices of a triangle. Then

Angle A of the triangle ABC will be obtuse if β lies in

A. $(-1, 2)$

B. $\left(2, \frac{5}{2}\right)$

C. $\left(-1, \frac{2}{3}\right) \cup \left(\frac{2}{3}, 2\right)$

D. none of these

Answer: C



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4. Let $A(0, \beta)$, $B(-2, 0)$ and $C(1, 1)$ be the vertices of a triangle. Then

All the values of β for which angle A of triangle ABC is largest lie in the interval

A. $(-2, 1)$

B. $\left(-2, \frac{2}{3}\right) \cup \left(\frac{2}{3}, 1\right)$

C. $\left(-2, \frac{2}{3}\right) \cup \left(\frac{2}{3}, \sqrt{6}\right)$

D. none of these

Answer: C



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Multiple Correct Answers Type

1. Coordinates of points on curve

$5x^2 - 6xy + 5y^2 - 4 = 0$ which are nearest

to origin are

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

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

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

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

Answer: B::D



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2. Under rotation of axes through θ ,

$x \cos \alpha + y \sin \alpha = P$ changes to

$X \cos \beta + Y \sin \beta = P$ then . (a)

$\cos \beta = \cos(\alpha - \theta)$ (b) $\cos \alpha = \cos(\beta - \theta)$ (c)

$\sin \beta = \sin(\alpha - \theta)$ (d) $\sin \alpha = \sin(\beta - \theta)$

A. $\cos \beta = \cos(\alpha - \theta)$

B. $\cos \alpha = \cos(\beta - \theta)$

C. $\sin \beta = \sin(\alpha - \theta)$

D. $\sin \alpha = \sin(\beta - \theta)$

Answer: A::C



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