# MATHS

# BOOKS - CENGAGE MATHS (HINGLISH)

# COORDINATE SYSTEM

## Single Correct Answer Type

**1.** The maximum value of

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

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 $\alpha$ 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) as the feet of perpendiculars drawn from the vertices on the opposite sides is

A. 0

B. 1

C. 2

D. 3

**Answer: D**

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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 $y = m_1 x, y = m_2 x$ 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 has vertices $A(5, 1), B(-1, -7)$ and $C(1, 4)$ respectively. L be the line mirror passing through C and parallel to AB and a light ray eliminating from point A goes along the direction of internal bisector of the angle A, which meets the mirror and BC at E, D respectively. If sum of the areas of $\triangle ACE$ and $\triangle ABE$ is $K$ sq units then $\frac{2K}{5} - 6$ 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.** If G is the centroid of triangle with vertices $A(a, 0), B(-1, 0)$ and $C(b, c)$ then $\frac{AB^2 + BC^2 + CA^2}{GA^2 + GB^2 + GC^2} =$

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 then internal bisector of $\angle APB$ always passes through

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 veriable 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 $\Delta ABC$ 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 $\left(3+2\sqrt{3}, 3+4\sqrt{3}\right)$ 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. $-3/2$

B. $-1/2$

C. ½

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 $\Delta ABC$ such that $\cot A + \cot B$=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.** The equation of the altitudes AD, BE, CF of a triangle ABC are $x + y = 0, x - 4y = 0$ and $2x - y = 0$, respectively. If. A = (t,-t) where t varies, then the locus of centroid of triangle ABC is (A) $y = -5x$ (B) $y = x$ (C) $x = -5y$ (D) $x = y$

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 valye of m satisfying the equation $(a^2 - 1)m^2 - (2a - 3)m + a = 0$ gives the slope of a line parallel to the y-axis is

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

B. 0

C. 1

D. $\pm 1$

**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. $\frac{1\pm3\sqrt{2}}{7}$

D. $\frac{1\pm5\sqrt{2}}{7}$

**Answer: D**

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**20.** In a triangle ABC, AB is parallel to y-axis, BC is parallel to x-axis, centroid is at (2, 1), If

median through C is $x - y = 1$, then the slope of median through A is

A. 2

B. 3

C. 4

D. 5

**Answer: C**

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**21.** The number of rational points on the line joining $\left(\sqrt{5}, 3\right)$ and $\left(3, \sqrt{3}\right)$ 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 $\left(-1, \frac{\pi}{2}\right)$ 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 $\beta$ 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 $\beta$ 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 $\theta$, $x\cos\alpha + y\sin\alpha = P$ 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. $\sin\alpha = \sin(\beta - \theta)$

**Answer: A::C**