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STRAIGHT LINES

MCQs with One Correct Answer

1. Through the point $P(\alpha, \beta)$, where $\alpha\beta > 0$, the straight line $\frac{x}{a}+\frac{y}{b}=1$ is drawn so as to form with coordinate axes a triangle of area S. If $ab > 0$, then least value of S is

(a) $2\alpha\beta$ (b) $\frac{1}{2}\alpha\beta$

(c) $\alpha\beta$ (d) None of these

2. The vertices of a triangle are $\left(ab, \frac{1}{ab}\right)$, $\left(bc, \frac{1}{bc}\right)$ and $\left(ca, \frac{1}{ca}\right)$ where a, b, c are the roots of the equation $x^3 - 3x^2 + 6x + 1 = 0$. The coordinates of its centroid are.

(a) $(1, 2)$ (b) $(2, -1)$ (c) $(1, -1)$ (d) $(2, 3)$

3. Consider points A (3, 4) and B (7, 13). If P be a point on the line $y = x$ such that $PA + PB$ is minimum, then coordinates of P are

(a) $\left(\frac{12}{7}, \frac{12}{7}\right)$ (b) $\left(\frac{13}{7}, \frac{13}{7}\right)$

(c) $\left(\frac{31}{7}, \frac{31}{7}\right)$ (d) $(0, 0)$

4. If the straight lines $2x + 3y - 1 = 0$, $x + 2y - 1 = 0$ and $ax + by - 1 = 0$ form a triangle with origin as orthocentre, then (a, b) is given by

(a) $(6, 4)$ (b) $(-3, 3)$ (c) $(-8, 8)$ (d) $(0, 7)$

5. The line $\frac{x}{a} + \frac{y}{b} = 1$ meets the axis of x and y at A and B respectively and the line $y = x$ at C so that area of the trinagle AOC is twice the area of the triangle BOC, O being the origin, then one of the positions of C is

(a) (a, a) (b) $\left(\frac{2a}{3}, \frac{2a}{3}\right)$

(c) $\left(\frac{b}{3}, \frac{b}{3}\right)$ (d) $\left(\frac{2b}{3}, \frac{2b}{3}\right)$

6. The range of values of β such that $(0, \beta)$ lie on or inside the triangle formed by the lines $y + 3x + 2 = 0$, $3y - 2x - 5 = 0$, $4y + x - 14 = 0$ is

(a) $5 < \beta \le 7$ (b) $\frac{1}{2} \le \beta \le 1$

(c) $\frac{5}{3} \le \beta \le \frac{7}{2}$ (d) None of these

7. The intercepts on the straight line $y = mx$ by the lines $y = 2$ and $y = 6$ is less than 5, then m belongs to

(a) $\left(-\frac{4}{3}, \frac{4}{3}\right)$

(b) $\left(\frac{4}{3}, \frac{3}{8}\right)$

(c) $\left(-\infty, -\frac{4}{3}\right) \cup \left(\frac{4}{3}, \infty\right)$

(d) $\left(\frac{4}{3}, \infty\right)$

8. If three distinct points A, B, C are given in the 2-dimensional coordinate plane such that the ratio of the distance of each one of them from the point (1, 0) to the distance from (– 1, 0) is equal to $\frac{1}{2}$, then the circumcentre of the triangle ABC is at the point

(a) $\left(\frac{5}{3}, 0\right)$ (b) (0, 0)

(c) $\left(\frac{1}{3}, 0\right)$ (d) (3, 0)

9. Let A (–3, 2) and B (–2, 1) be the vertices of a triangle ABC. If the centroid of this triangle lies on the line $3x + 4y + 2 = 0$, then the vertex C lies on the line :

(a) $4x + 3y + 5 = 0$ (b) $3x + 4y + 3 = 0$

(c) $4x + 3y + 3 = 0$ (d) $3x + 4y + 5 = 0$

10. The circumcentre of a triangle lies at the origin and its centroid is the mid point of the line segment joining the points $(a^2 + 1, a^2 + 1)$ and $(2a, -2a)$, $a \neq 0$. Then for any a, the orthocentre of this triangle lies on the line:

(a) $y - 2ax = 0$

(b) $y - (a^2 + 1)x = 0$

(c) $y + x = 0$

(d) $(a - 1)^2x - (a + 1)^2y = 0$

11. The line parallel to the x- axis and passing through the intersection of the lines $ax + 2by + 3b = 0$ and $bx - 2ay - 3a = 0$, where $(a, b) \neq (0, 0)$ is

(a) below the x - axis at a distance of $\frac{3}{2}$ from it

(b) below the x - axis at a distance of $\frac{2}{3}$ from it

(c) above the x - axis at a distance of $\frac{3}{2}$ from it

(d) above the x - axis at a distance of $\frac{2}{3}$ from it

12. The straight line $y = x - 2$ rotates about a point where it cuts the x-axis and becomes perpendicular to the straight line $ax + by + c = 0$. Then its equation is

(a) $ax + by + 2a = 0$ (b) $ax - by - 2a = 0$

(c) $bx + ay - 2b = 0$ (d) $ay - bx + 2b = 0$

13. If the point $(a, 2)$ lies between the lines $x - y - 1 = 0$ and $2(x - y) + 5 = 0$, then the set of values of 'a' is

(a) $(-\infty, 3) \cup \left(\frac{9}{2}, \infty\right)$

(b) $\left(3, \frac{9}{2}\right)$

(c) $(-\infty, 3)$

(d) $\left(-\frac{1}{2}, 3\right)$

14. If two vertices of a triangle are (5, –1) and (–2, 3) and its orthocentre is at (0, 0), then the third vertex is

(a) (4, – 7) (b) (– 4, – 7)

(c) (– 4, 7) (d) (4, 7)

15. The base of an equilateral triangle is along the line given by $3x + 4y = 9$. If a vertex of the triangle is (1, 2), then the length of a side of the triangle is:

(a) $\frac{2\sqrt{3}}{15}$ (b) $\frac{4\sqrt{3}}{15}$

(c) $\frac{4\sqrt{3}}{5}$ (d) $\frac{2\sqrt{3}}{5}$

16. The equation of bisector of that angle between the lines $x + y + 1 = 0$ and $2x - 3y - 5 = 0$ which contains the point (10, – 20) is

(a) $x(\sqrt{13} + 2\sqrt{2}) + y(\sqrt{13} - 3\sqrt{2}) + (\sqrt{13} - 5\sqrt{2}) = 0$

(b) $x(\sqrt{13} - 2\sqrt{2}) + y(\sqrt{13} + 3\sqrt{2}) + (\sqrt{13} + 5\sqrt{2}) = 0$

(c) $x(\sqrt{13} + 2\sqrt{2}) + y(\sqrt{13} + 3\sqrt{2}) + (\sqrt{13} + 5\sqrt{2}) = 0$

(d) None of these

17. The bisector of the acute angle formed between the lines $4x-3y+7=0$ and $3x-4y+14=0$ has the equation :

(a) $x+y+3=0$ (b) $x-y-3=0$

(c) $x-y+3=0$ (d) $3x+y-7=0$

Numeric Value Answer

18. A straight line through the origin O meets the parallel lines $4x + 2y = 9$ and $2x + y + 6 = 0$ at points P and Q respectively. If the point O divides the segment PQ in the ratio $\frac{m}{n}$, then m + n is ________.

19. The vertex of an equilateral triangle is (2, –1), and the equation of its base is $x + 2y = 1$. If the length of its sides is $2/\sqrt{K}$, then value of K is ____.

20. If (sin θ, cos θ), θ ∈ [0, 2π] and (1, 4) lie on the same side or on the line $\sqrt{3}x - y + 1 = 0$, then the maximum value of sin θ will be ______.

21. The straight lines $(3\sec\theta+5\operatorname{cosec}\theta)x + (7\sec\theta-3\operatorname{cosec}\theta)y+11(\sec\theta-\operatorname{cosec}\theta)=0$ always pass through a fixed point P for all possible values of θ. If the maximum value of the difference of distances of P and B (3, 4) from a point on the line $x-y+3=0$ is k then $\frac{k^2}{10}$ is equal to .

22. The straight line $L \equiv x+y+1=0$ and $L_1 \equiv x+2y + 3 = 0$ are intersecting. m is the slope of the straight line L_2 such that L is the bisector of the anlge between L_1 and L_2. The unit digit of $812m^2 + 3$ is equal to

23. If tanα, tanβ, tanλ are the roots of the equation $t^3 - 12t^2 + 15t - 1 = 0$; then the centroid of triangle having vertices (tanα, cotα); (tanβ, cotbβ); (tanλ, cotλ) is given by $G(h, k)$; then evaluate $(h + k)/(k - h)$.

24. Consider a ΔABC whose sides AB, BC, and CA are represented by the straight lines $2x + y = 0$, $x + py = q$, and $x - y = 3$, respectively. The point $P(2, 3)$ is the orthocenter. The value of $(p + q)/10$ is ..... .

25. In ΔABC, the vertex $A = (1, 2)$, $y = x$ is the perpendicular bisector of the side AB and $x - 2y + 1 = 0$ is the equation of the internal angle bisector of $\underline{|L}$. If the equation of the side BC is $ax + by - 5 = 0$, then the value of $a - b$ is ..... .

ANSWER KEY

1	(a)	**4**	(c)	**7**	(c)	**10**	(d)	**13**	(d)	**16**	(a)	**19**	(15)	**22**	(1)	**25**	(4)
2	(b)	**5**	(d)	**8**	(a)	**11**	(a)	**14**	(b)	**17**	(c)	**20**	(0)	**23**	(9)		
3	(c)	**6**	(c)	**9**	(b)	**12**	(d)	**15**	(b)	**18**	(7)	**21**	(4)	**24**	(5)		