MATHS

BOOKS - BITSAT GUIDE

RECTANGULAR COORDINATES AND STRAIGHT LINE

Practice Exercise

1. The base f an equilateral triangle with side $2a$ lies along the y-axis such that the mid point

of the base is at the origin. Find the vertices of the triangle.

A. $\left(\sqrt{3}a, 0\right)$, (0, a),(0, -a)

B. $(\sqrt{3}a, 0)$, (a, 0), (1, -a)

C. $(\sqrt{3}a, 1)$, (a, 0), (-a, 0)

D. $(\sqrt{3}a, 0)$, (0, a), (-a, 0)

Answer: A

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2. If the equation of the base of an equilateral triangle is $x + y = 2$ and the vertex is $(2, -1)$, then the length of the side of the triangle is (in unit)

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

B. $\sqrt{\frac{3}{2}}$

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

D. $\sqrt{\frac{5}{6}}$

Answer: A

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3. The coordinates of the middle points of the sides of a triangle are (4, 2), (3, 3) and (2, 2), then the coordinates of its centroid are

A. $(3, 7/3)$

B. (3, 3)

C. (4, 3)

D. None

Answer: A

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4. If p is the length of perpendicular from the origin on the line $\frac{x}{a}+\frac{y}{b}=1$ and a^2,p^2 and b^2 are in AP, the show that $a^4+b^4=0$.

A. 1

B. 2

C. 3

D. 0

Answer: D

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5. A line joining $A(2, 0)$ and $B(3, 1)$is rotated about A .in anticlock wise direction through angle 15^0 ,then the equation of AB in the new position is

A. $y - \sqrt{2}x + 2\sqrt{3} = 0$

B. $y - \sqrt{3}x + \sqrt{3} = 0$

C. $y - \sqrt{2}x + \sqrt{3} = 0$

D. $y - \sqrt{3}x + 2\sqrt{3} = 0$

Answer: D

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6. The number of integral values of m, for which the x coordinate of the point of intersection of the lines $3x + 4y = 9$ and $y = mx + 1$ is also an integer, is

A. 2

B. 0

C. 4

D. 1

Answer: A

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7. If p is the length of perpendicular from origin to the line whose intercept on the axes are a and b, then $\frac{1}{a^2} + \frac{1}{b^2}$ is equal to

A. $1/p^3$

B. $1/p$

C. $1/p^2$

D. p

Answer: C

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8. If t_1, t_2 and t_3 are distinct, then the points $\left(t_1, 2at_1 + at_1^3\right), \left(t_2, 2at_2 + at_2^3\right)$ and $\left(t_3, 2at_3 + at_3^3\right)$ are collinear, when

A. $t_1t_2t_3 = 1$

B. $t_1 + t_2 + t_3 = t_1 t_2 t_3$

C. $t_1 + t_2 + t_3 = 0$

D. $t_1 + t_2 + t_3 = 1$

Answer: C

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9. If two vertices of a triangle are (5, -1) and (-2, 3) and if its orthocentre lies at the origin, then the coordinates of third vertex are

A. (4, 7)

B. (-4, -7)

C. (2, -3)

D. (5, -1)

Answer: B

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10. If the vertices of a triangle have integral coordinates, then the triangle is

A. equilateral

B. never equilateral

C. always isosceles

D. None of these

Answer: B

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11. The area bounded by the curves $x + 2|y| = 1$ and $x = 0$ is

A. $\frac{1}{4}$

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

C. 1

D. 2

Answer: B

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12. If x_1, x_2, x_3 as well as y_1, y_2, y_3 are in GP with same common ratio, then the points $P(x_1, y_1), Q(x_2, y_2)$ and $R(x_3, y_3)$

A. lie on a straight line

B. lie on an ellipse

C. lie on a circle

D. are vertices of a triangle

Answer: A

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13. If the area of the triangle whose vertices are (b, c), (c, a) and (a, b) is Δ, then the area of triangle whose vertices are

$(ac - b^2, ab - c^2), (ba - c^2, bc - a^2)$ and $(cb - a^2, ca - b^2)$, is

A. Δ^2

B. $(a + b + c)^2 \Delta$

C. $a\Delta + b\Delta^2$

D. None of these

Answer: B

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14. If $\frac{x}{c}+\frac{y}{d}=1$ is any line through the intersection of $\frac{x}{a}+\frac{y}{b}=1$ and $\frac{x}{b}+\frac{y}{a}=1$, then

A. $\frac{1}{c}+\frac{1}{d}=\frac{1}{a}+\frac{1}{b}$

B. $\frac{1}{d}+\frac{1}{a}=\frac{1}{b}+\frac{1}{c}$

C. $\frac{1}{b}+\frac{1}{d}=\frac{1}{c}+\frac{1}{a}$

D. None of these

Answer: B

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15. Let PS be the median of the triangle with vertices P(2, 2), Q(6, -1) and R(7, 3). The equation of the line passing through (1, - 1) and parallel to PS, is

A. $4x + 7y + 3 = 0$

B. $2x - 9y - 11 = 0$

C. $4x - 7y - 11 = 0$

D. $2x + 9y + 7 = 0$

Answer: D

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16. The x-coordinates of the incentre of the triangle that has the coordinates of mid-point of its sides as (0, 1), (1, 1) and (1, 0), is

A. $2 + \sqrt{2}$

B. $2 - \sqrt{2}$

C. $1 + \sqrt{2}$

D. $1 - \sqrt{2}$

Answer: B

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17. The angle between the lines $\sqrt{3}x + y = 1$ and $x + \sqrt{3}y = 1$ is

A. 30°

B. 60°

C. 90°

D. 45°

Answer:

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18. Show that the tangent of an angle between the lines $\frac{x}{a}+\frac{y}{b}=1$ and $\frac{x}{a}-\frac{y}{b}=1$ and $\frac{2ab}{a^2-b^2}$.

A. $\frac{3ab}{a^2-b^2}$

B. $\frac{ab}{a^2-b^2}$

C. $\frac{2ab}{a^2-b^2}$

D. $\frac{4ab}{a^2-b^2}$

Answer: C

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19. The locus of the point of intersection of the lines $x \sin\theta + (1 - \cos\theta)y = a \sin\theta$ and $x \sin\theta - (1 + \cos\theta)y + a \sin\theta = 0$ is

A. $x^2 - y^2 = a^2$

B. $x^2 + y^2 = a^2$

C. $y^2 = ax$

D. None of these

Answer: B

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20. If A(2, -3) and B(-2, 1) are two vertices of a triangle and third vertex moves on the line 2x + 3y = 9, then the locus of the centroid of the triangle is

A. $2x - 3y = 1$

B. $x - y = 1$

C. $2x + 3y = 1$

D. $2x + 3y = 3$

Answer: C

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21. If the line $2x + y = k$ passes through the point which divides the line segment joining the points (1, 1) and (2, 4) in the ratio 3:2, then k is equal to

A. $\frac{29}{5}$

B. 5

C. 6

D. $\frac{11}{5}$

Answer: C

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22. The distance between the line $3x + 4y = 9$ and $6x + 8y = 15$ is

A. $\frac{3}{10}$

B. $\frac{2}{9}$

C. $\frac{1}{4}$

D. $\frac{1}{3}$

Answer: A

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23. The foot of the perpendicular from (2, 3) upon the line 4x - 5y + 8 = 0 is

A. (0, 0)

B. (1, 1)

C. $\left(\frac{41}{78}, \frac{128}{75}\right)$

D. $\left(\frac{78}{41}, \frac{128}{41}\right)$

Answer: D

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24. A straight line L with negative slope passes through the point (8,2) and cuts the positive coordinate axes at the points P and Q .as L varies, the absolute minimum value of $\frac{OP+OQ}{2}$ O is origin is

A. 10

B. 18

C. 16

D. 112

Answer: B

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25. If the equation of the sides of a triangle are x + y = 2, y = x and $\sqrt{3}y + x = 0$, then which of the following is an exterior point of the triangle?

A. Orthocentre

B. Incentre

C. Centroid

D. None of these

Answer: A

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26. Without change of axes the origin is shifted to (h, k), then from the equation $x^2 + y^2 - 4x + 6y - 7 = 0$, then therm

containing linear powers are missing, then point (h, k) is

A. (3, 2)

B. (-3, 2)

C. (2, -3)

D. (-2, -3)

Answer: C

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27. Given the family of lines

$a(2x + y + 4) + b(x - 2y - 3) = 0.$ The number of lines belonging to the family at a distance $\sqrt{10}$ from any point (2,-3) is

A. 0

B. 1

C. 2

D. 4

Answer: B

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28. Let A(1,k),B(1,1) and C(2,1) be the vertices of a right angled triangle with AC as its hypotenuse. If the area of the triangle is 1, then the set of values which k can take is given by:

A. {1, 3}

B. {0, 2}

C. {-1, 3}

D. {-3, -2}

Answer: C

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29. The value of k such that

$3x^2 - 11xy + 10y^2 - 7x + 13y + k = 0$

may represent a pair of straight lines , is

A. 3

B. 4

C. 6

D. 8

Answer: B

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30. Let A(2, -3) and B(-2, 1) be the vertices of Δ ABC. If the centroid of this triangle moves on the line 2x + 3y = 1 then the locus of the vertex C is the line

A. 2x + 3y = 9

B. 2x - 3y = 7

C. 3x + 2y = 5

D. 3x - 2y = 3

Answer: A

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31. Find the equation of the straight line passing through the point of intersection of the lines $x - y + 1 = 0$ and $2x - 3y + 5 = 0$ and at a distance $\frac{7}{5}$ from the point $(3, 2)$

A. 3x - 4y+6= 0 and 4x - 3y +1=0

B. $3x + 4y+6= 0$ and $4x + 3y +1=0$

C. $3x - 4y -6= 0$ and $4x + 3y +1=0$

D. None of the above

Answer: A

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32. If the sides BC, CA, AB of ΔABC are respectively $x + 2y = 1$, $3x + y + 5 = 0$, $x - y + 2 = 0$. Then, the altitude through B is

A. $x - 3y + 1 = 0$

B. $x - 3y + 4 = 0$

C. $3x - y + 4 = 0$

D. $x - y + 2 = 0$

Answer: B

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33. The equation of straight line passing through (-2,-7) and having an intercept of length 3 between the straight lines : $4x + 3y =$

12 , $4x + 3y = 3$ are : (A) $7x + 24y + 182 = 0$ (B) $7x + 24y + 18 = 0$ (C) $x + 2 = 0$ (D) $x - 2 = 0$

A. $7x - 24y - 182 = 0$

B. $7x + 24y + 182 = 0$

C. $7x + 24y - 182 = 0$

D. None of the above

Answer: B

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34. A variable straight line drawn through the point of intersection of lines $\frac{x}{a}+\frac{y}{b}=1$ and $\frac{x}{b}+\frac{y}{a}=1$ meets the co ordinates axes in A and B. Locus of the mid point of AB is .....

A. 2xy (a + b) = ab (x + y)

B. 2xy (a - b) = ab (x - y)

C. 2xy (a + b) = ab (x - y)

D. None of the above

Answer: A

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35. If non-zero numbers a, b and c are in HP, then the straight line $\frac{x}{a}+\frac{y}{b}+\frac{1}{c}=0$ always passes through a fixed point

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

B. (1, -2)

C. (-1, -2)

D. (-1, 2)

Answer: B

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36. The vertices of a triangle are $(A(-1, -7), B(5, 1),$ and $C(1, 4)$. The equation of the bisector of $\angle ABC$ is___

A. x + 7y - 2 = 0

B. x - 7y - 2 = 0

C. x - 7y + 2 = 0

D. None of these

Answer: C

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37. If (a, a^2) falls inside the angle made by the lines $y = \frac{x}{2}, x > 0$ and $y = 3x, x > 0$, then a belongs to the interval

A. $\left(\frac{1}{2}, 3\right)$

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

C. $\left(0, \frac{1}{2}\right)$

D. $(3, \infty)$

Answer: A

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38. The equation of two equal sides of an isosceles triangle are $7x - y + 3 = 0$ and $x + y - 3 = 0$ and its third side is passes through the point $(1, -10)$. The equation of the third side is

A. $x - 3y = -31$

B. $x - 3y = 31$

C. $x + 3y = 31$

D. $x + 3y = -31$

Answer: B

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39. Let $P = (-1, 0), Q(0, 0)$ and $R = \left(3, 3\sqrt{3}\right)$ be three points. Then the equation of the bisector of the angle PQR is

A. $\frac{\sqrt{3}}{2}x + y = 0$

B. $x + \sqrt{3}y = 0$

C. $\sqrt{3}x + y = 0$

D. $x + \frac{\sqrt{3}}{2}y = 0$

Answer: C

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40. A straight line through the point A(3, 4) is such that its intercept between the axes is bisected at A. Its equation is -

A. $4x + 3y = 24$

B. $3x + 4y = 25$

C. $x + y = 7$

D. $3x - 4y + 7 = 0$

Answer: A

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41. The straight lines $5x + 4y = 0$, $x + 2y - 10 = 0$ and $2x + y + 5 = 0$ are

A. concurrent

B. the sides of an equilateral triangle

C. the sides of a right angled triangle

D. None of the above

Answer: A

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42. Let a, b, c and d be non-zero numbers. If the point of intersection of the lines $4ax + 2ay + c = 0$ and $5bx + 2by + d = 0$ lie in the fourth quadrant and is equidistant from the two axes, then

A. $3bc-2ad = 0$

B. $3bc + 2ad = 0$

C. 2bc-3ad = 0

D. 2bc + 3ad = 0

Answer: A

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43. Let PQR be a right angled isosceles triangle, right angled at P(2,1). If the equation of the line QR is $2x + y = 3$, then the equation representing the pair of lines PQ and PR is

A.

$$3x^2 - 3y^2 + 8xy - 20x - 10y + 25 = 0$$

B.

$$3x^2 - 3y^2 + 8xy + 20x + 10y + 25 = 0$$

C.

$$3x^2 - 3y^2 - 8xy - 20x - 10y - 25 = 0$$

D.

$$3x^2 - 3y^2 + 8xy + 20x - 10y + 25 = 0$$

Answer: B

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1. The value of k such that the lines $2x - 3y + k = 0, 3x - 4y - 13 = 0$ and $8x - 11y - 33 = 0$ are concurrent is

A. 20

B. -7

C. 7

D. -20

Answer: B

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2. Three straight lines

$2x + 11y - 5 = 0$

$24x + 7y - 20 = 0$

$4x - 3y - 2 = 0$

A. form a triangle

B. are only concurrent

C. are concurrent with one line bisecting the angle between the other two

D. None of the above

Answer: C

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3. The equation of the lines through ((1,1) and making angles of 45° with the line x+y=0 are

A. x-1=0, x - y = 0

B. $x - y = 0, y - 1 = 0$

C. $x + y - 2 = 0, y - 1 = 0$

D. $x - 1 = 0, y - 1 = 0$

Answer: D

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4. The equation of the base BC of an equilateral ΔABC is $x + y = 2$ and A is $(2, -1)$. The length of the side of the triangle is

A. $\sqrt{2}$

B. $\left(\frac{3}{2}\right)^{1/2}$

C. $\left(\frac{1}{2}\right)^{1/2}$

D. $\left(\frac{2}{3}\right)^{1/2}$

Answer: D

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5. The foot of the perpendicular from the point (3, 4) on the line 3x - 4y + 5 = 0 is

A. $\left(\frac{81}{25}, \frac{92}{25}\right)$

B. $\left(\frac{92}{25}, \frac{81}{25}\right)$

C. $\left(\frac{45}{26}, \frac{54}{24}\right)$

D. $\left(\frac{45}{26}, \frac{54}{26}\right)$

Answer: A

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6. The equation of the bisector of the acute angle between the lines 3x + 4y + 5 = 0 and 12x - 5y - 7= 0, is

A. $21x + 77y + 100 = 0$

B. $99x-27y + 30 = 0$

C. $99x + 27y + 30 = 0$

D. $21x - 77y - 100 = 0$

Answer: C

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7. The line $x + y = 4$ divides the line joining the points $(-1, 1)$ and $(5, 7)$ in the ratio

A. 2:1

B. 1:2

C. 1:2 extenally

D. None of the above

Answer:

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8. The condition that the straight line joining the origin to the points of intersection of the

line 4x + 3y = 24 with the circle $(x-3)^2+(y-4)^2=25$

A. are coincident

B. are perpendicular

C. make equal angle with X-axis

D. None of the above

Answer: B

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9. Two opposite vertices of a rectangle are (1, 3) and (5, 1). If the equation of a diagonal of this rectangle is $y = 2x + c$. Then, the value of c is

A. -1

B. -3

C. -4

D. -9

Answer: C

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10. The transformed equation of $3x^2 + 3y^2 + 2xy - 2 = 0$ when the coordinats axes are rotated through an angle of 45°, is

A. $x^2 + 2y^2 = 1$

B. $2x^2 + y^2 = 1$

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

D. $x^2 + 3y^2 = 1$

Answer: B

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11. If l, m, n are in AP, then the line lx+my+n=0` will always pass through the point

A. (-1, 2)

B. (1, -2)

C. (1, 2)

D. (2, 1)

Answer: B

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12. If a vertex of a triangle is (1, 1) and the mid-points of two side through this vertex are (-1, 2) and (3, 2), then centroid of the triangle is

A. $\left(1, \frac{7}{3}\right)$

B. $\left(\frac{1}{3}, \frac{7}{3}\right)$

C. $\left(-\frac{1}{3}, \frac{7}{3}\right)$

D. $\left(-1, \frac{7}{3}\right)$

Answer: A

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13. The equations to the sides of a triangle are

$x - 3y = 0, 4x + 3y = 5$ and $3x + y = 0.$

The line $3x - 4y = 0$ passes through

A. the incentre

B. the centroid

C. the orthocentre

D. the circumcentre

Answer: C

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14. If (0, -1) and (0, 3) are two opposite vertices of a square, then the other two vertices are

A. (0, 1), (0, -3)

B. (3, -1), (0, 0)

C. (2, 1), (-2, 1)

D. (2, 2), (1, 1)

Answer: C

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15. The equation to the line bisecting the joining of (3. - 4) and (5, 2) having its intercepts on X-axis and Y-axis in the ratio 2:1, is

A. $x + y - 3 = 0$

B. $2x - y = 9$

C. $x + 2y = 2$

D. $2x + y = 7$

Answer: C

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16. The circumcentre of the triangle formed by the lines $xy + 2x + 2y + 4 = 0$ and $x + y + 2 = 0$ is

A. (-1, -1)

B. (0, -1)

C. (1, 1)

D. (-1, 0)

Answer: A

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