DPP
DAILY PRACTICE PROBLEMS

Class : XIth | **Solutions** | **Subject : MATHS**
Date : | | **DPP No. :2**

Topic :-STRAIGHT LINES

221 **(c)**

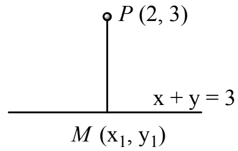
Let the coordinate of M are (x_1, y_1)

Since, the line PM is perpendicular to the given line $x + y = 3$

$\therefore \dfrac{y_1 - 3}{x_1 - 2} \times (-1) = -1$

$\Rightarrow y_1 - 3 = x_1 - 2$

$\Rightarrow x_1 - y_1 + 1 = 0$ ...(i)



and also the point lies on the given line.

$\therefore x_1 + y_1 - 3 = 0$ ...(ii)

On solving Eqs. (i) and (ii), we get

$x_1 = 1, \ y_1 = 2$

$\therefore$ The coordinates of M are (1, 2).

222 **(b)**

The equation of line in new position is

$y - 0 = \tan 15° (x - 2)$

$\Rightarrow y = (2 - \sqrt{3})(x - 2)$

$\Rightarrow (2 - \sqrt{3})x - y - 4 + 2\sqrt{3} = 0$

223 **(d)**

Here $a = 1, h = 1, f = -4a, \ g = -4a, c = -9a$

Now, required distance

$= \left| 2\sqrt{\dfrac{f^2 - bc}{b(b+a)}} \right|$

$= \left| 2\sqrt{\dfrac{16a^2 + 9a^2}{1(1+1)}} \right|$

$= \left|2\sqrt{\frac{25a^2}{2}}\right| = \frac{5a}{\sqrt{2}} \cdot 2$

$= 5\sqrt{2}a$

224 **(c)**

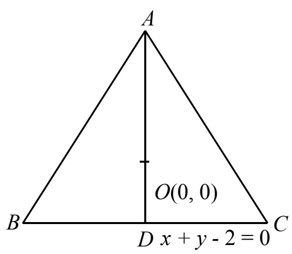
Let ABC be the equilateral triangle with centroid $O(0,0)$ and sides BC as $x + y - 2 = 0$.

$\therefore OD = \left|\frac{0+0-2}{\sqrt{1^2+1^2}}\right| = \sqrt{2} \Rightarrow OA = 2\sqrt{2}$

Since AD is perpendicular to BC. Therefore,

Slope of $AD = 1$

$\Rightarrow AD$ makes $45°$ with X-axis



Clearly, A lies on OA at a distance of $2\sqrt{2}$ units from O. So, its coordinates are given by

$\frac{x-0}{\cos \pi/4} = \frac{y-0}{\sin \pi/4} = \pm 2\sqrt{2} \Rightarrow x = \pm 2, y = \pm 2$

But, O and A lie on the same side of $x + y - 2 = 0$

Hence, the coordinates of A are $(-2, -2)$

225 **(c)**

The intersection point of lines $x - 2y = 1$ and $x + 3y = 2$ is

$\left(\frac{7}{5}, \frac{1}{5}\right)$

Since, required is parallel to $3x + 4y = 0$

Therefore, the slope of required line $= -\frac{3}{4}$

$\therefore$ Equation of required line which passes through $\left(\frac{7}{5}, \frac{1}{5}\right)$

and having slope $-\frac{3}{4}$, is

$y - \frac{1}{5} = \frac{-3}{4}\left(x - \frac{7}{5}\right)$

$\Rightarrow \frac{3x}{4} + y = \frac{21}{20} + \frac{1}{5}$

$\Rightarrow \frac{3x+4y}{4} = \frac{21+4}{20}$

$\Rightarrow 3x + 4y = 5$

$\Rightarrow 3x + 4y - 5 = 0$

226 **(b)**

Required ratio is given by

$-\frac{3 \times 1 + 3 - 9}{3 \times 2 + 7 - 9}$

$= \frac{3}{4}$ ie, 3:4 internally

227 **(d)**

The lines $4x - 7y + 10 = 0$ and $7x + 4y - 15 = 0$ are perpendicular and their point of intersection is (1,2).

Hence, the orthocentre is at (1,2)

228 **(b)**

Since the distance between the parallel lines $lx + my + \text{n} = 0$ and $lx + my + n' = 0$ is same as the distance between parallel lines $mx + ly + n = 0$ and $mx + ly + n' = 0$.

Therefore, the parallelogram is a rhombus.

Also, the diagonals of a rhombus are at right angles. Therefore, the required angle is a right angle.

229 **(a)**

Vertices are interception points of line

$x + y = 2\sqrt{2}$ ...(i)

with $y = x\tan(105°)$ or $y = x\tan(165°)$

(lines through centroid)

$y = -x\tan 75°$ ...(ii)

$y = -x\tan 15°$ ...(iii)

For the interception point of Eqs. (i) and (ii)

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

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

$\Rightarrow x = -\frac{2\sqrt{2}(1 - \sqrt{3})}{(1 + \sqrt{3})(1 - \sqrt{3})}$

$\Rightarrow x = \sqrt{2} - \sqrt{6}$

$\therefore y = -(\sqrt{2} - \sqrt{6})(2 + \sqrt{3})$

$= -(2\sqrt{2} + \sqrt{6} - 2\sqrt{6} - 3\sqrt{2}$

$= \sqrt{2} + \sqrt{6}$

and its image about $y = x$ is $(\sqrt{2} + \sqrt{6}, \sqrt{2} - \sqrt{6})$

230 **(a)**

It is given that the lines $ax + 2y + 1 = 0$, $bx + 3y + 1 = 0$ and $cx + 4y + 1 = 0$ are concurrent

$\therefore \begin{vmatrix} a & 2 & 1 \\ b & 3 & 1 \\ c & 4 & 1 \end{vmatrix} = 0$

$\Rightarrow -a + 2b - c = 0 \Rightarrow 2b = a + c \Rightarrow a,b,c$ are in A.P.

231 **(b)**

Let (h,k) be the centroid of the triangle whose vertices are $(a\cos t, a\sin t)$,$(b\sin t, -b\cos t)$ and (1,0). Then,

$3h = a\cos t + b\sin t + 1$ and $3k = a\sin t - b\cos t$

$\Rightarrow (3h - 1)^2 + (3k)^2 = a^2 + b^2$

Hence, the locus of (h,k) is $(3x - 1)^2 + (3y)^2 = a^2 + b^2$

234 **(c)**

The equation representing the bisectors of the angles between the lines given by $ax^2 + 2hxy + by^2 = 0$ is

$$\frac{x^2-y^2}{a-b}=\frac{xy}{h}$$

$\Rightarrow hx^2-(a-b)xy-hy^2=0$ ...(i)

The combined equation of the bisectors of the angles between these lines is

$$\frac{x^2-y^2}{h+h}=\frac{xy}{-\frac{(a-b)}{2}}\Rightarrow(a-b)(x^2-y^2)+4hxy=0$$

235 **(a)**

Given, $\sqrt{3}\sin\theta+2\cos\theta=\frac{4}{r}$ ...(i)

Any line perpendicular to Eq.(i) is

$\Rightarrow\sqrt{3}\cos\theta-2\sin\theta=\frac{k}{r}$

It passes through $\left(-1,\frac{\pi}{2}\right)$, then

$$\sqrt{3}\cos\frac{\pi}{2}-2\sin\frac{\pi}{2}=\frac{k}{-1}$$

$$-2=\frac{k}{-1}\ \Rightarrow k=2$$

Thus, the equation is

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

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

236 **(b)**

$$P=\left|\frac{a(4-3+4)+b(2+6-3)}{\sqrt{(2a+b)^2+(a-2b)^2}}\right|=\sqrt{10}$$

$\Rightarrow 25(a+b)^2=10(5a^2+5b^2)$

$\Rightarrow 25(a-b)^2=0\Rightarrow a=b$

Only one line which is $3x-y+1=0$

237 **(b)**

Let $\left(t,\frac{5-2t}{11}\right)$ be a point on the line $2x+11y=5$

Then,

$$p_1=\left|\frac{24t+7\left(\frac{5-2t}{11}\right)-20}{\sqrt{24^2+7^2}}\right|=\frac{|50t-37|}{55}$$

and,

$$p_2=\left|\frac{4t-3\left(\frac{5-2t}{11}\right)-2}{\sqrt{4^2+(-3)^2}}\right|=\frac{|50t-37|}{55}$$

Clearly, we have $p_1=p_2$

ALITER Clearly, $2x+11y=5$ is the angle bisector of the two lines. Therefore, $p_1=p_2$

238 **(c)**

The equation of lines are $\pm x \pm y = 0$. Now, we take the lines $x + y = 0$ and $x - y = 0$.

$\therefore$ The equation of bisector of the angles between these lines are

$$\frac{x+y}{\sqrt{1+1}} = \pm \frac{x-y}{\sqrt{1+1}}$$

$\Rightarrow x + y = \pm (x - y)$

Taking positive sign, $x + y = x - y \Rightarrow y = 0$

Taking negative sign, $x + y = -(x - y) \Rightarrow x = 0$

239 **(c)**

Given pair of lines are

$x^2 - 3xy + 2y^2 = 0$

and $x^2 - 3xy + 2y^2 + x - 2 = 0$

$\therefore$ $(x - 2y)(x - y) = 0$

and $(x - 2y + 2)(x - y - 1) = 0$

$\Rightarrow x - 2y = 0, x - y = 0$ and $x - 2y + 2 = 0, x - y - 1 = 0$

Since, the lines $x - 2y = 0, x - 2y + 2 = 0$ and $x - y = 0$, $x - y - 1 = 0$ are parallel.

Also, angle between $x - 2y = 0$ and $x - y = 0$ is not $90°$

$\therefore$ It is a parallelogram.

240 **(b)**

Let a and b the intercepts made by the straight line on the axes

Given that, $a + b = \frac{ab}{2}$

$\Rightarrow \frac{2a + 2b}{ab} = 1 \Rightarrow \frac{2}{a} + \frac{2}{b} = 1$

On comparing with $\frac{x}{a} + \frac{y}{b} = 1$, we get

$x = 2, y = 2$

$\therefore$ Required point is $(2, 2)$

So, the straight line passes through the point $(2, 2)$

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	C	B	D	C	C	B	D	B	A	A
Q.	11	12	13	14	15	16	17	18	19	20
A.	B	B	A	C	A	B	B	C	C	B