DPP
DAILY PRACTICE PROBLEMS

Class : XIth
Date :

Solutions

Subject : MATHS
DPP No. :2

Topic :-STRAIGHT LINES

221 **(c)**

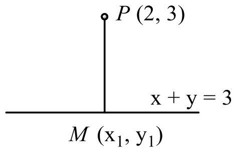
Let the coordinate of M are (x_1, y_1)

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

$x_1 = 1, \quad y_1 = 2$

$\therefore$ 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

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

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

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

$= 5\sqrt{2}a$

224 **(c)**

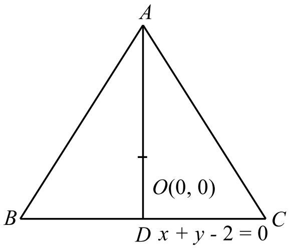
Let ABC be the equilateral triangle with centroid $O(0,0)$ and sides BC as $x + y - 2 = 0$.

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

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 $lx+my+n=0$ 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)

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

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

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

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

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

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

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

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

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

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

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

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

235 **(a)**

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

Any line perpendicular to Eq.(i) is

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

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

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

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

Thus, the equation is

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

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

236 **(b)**

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

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

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