DPP

DAILY PRACTICE PROBLEMS

Class : XIth
Date :

Solutions

Subject : MATHS
DPP No. :8

Topic :-STRAIGHT LINES

341 **(b)**

The equation of a line passing through $P(1,1)$ and parallel to $2x-y=0$ is

$\frac{x-1}{\cos\theta}=\frac{y-1}{\sin\theta}$, where $\tan\theta=2$

i.e. $\frac{x-1}{1/\sqrt{5}}=\frac{y-1}{2/\sqrt{5}}$

Since P is translated in the first quadrant through a unit distance, therefore the coordinates of P are given by

$\frac{x-1}{1/\sqrt{5}}=\frac{y-1}{2\sqrt{2}}=\pm 1$

$\Rightarrow x=1\pm\frac{1}{\sqrt{5}}, y=1\pm\frac{2}{\sqrt{5}}$

Hence, the coordinates of P are $\left(1\pm\frac{1}{\sqrt{5}}, 1\pm\frac{2}{\sqrt{5}}\right)$

342 **(a)**

Given, $\frac{1}{a}x^2+\frac{1}{b}y^2+2\frac{1}{h}xy=0$

$\therefore m_1+m_2=-\frac{\frac{2}{h}}{\frac{1}{b}}=\frac{-2b}{h}$ ...(i)

and $m_1m_2=\frac{\frac{1}{a}}{\frac{1}{b}}=\frac{b}{a}$ ...(ii)

Also given $m_2=2m_1$

$\Rightarrow 3m_1=\frac{-2b}{h}$ [from Eq.(i)]....(iii)

and $2m_1^2=\frac{b}{a}$ [from Eq.(ii)]....(iv)

From Eqs. (iii) and (iv),

$\frac{9m_1^2}{2m_1^2}=\frac{4b^2}{h^2}\times\frac{a}{b}$

$\Rightarrow \frac{9}{8} = \frac{ba}{h^2}$ or $ab{:}h^2 = 9{:}8$

344 **(a)**

Clearly the point (3,0) does not lie on the diagonal $x = 2y$. Let m be the slope of a side passing through (3,0). Then, its equation is

$y - 0 = m(x - 3)$ ...(i)

Since the angle between a diagonal and a side of a square is $\pi/4$. Therefore, angle between $x = 2\,y$ and $y - 0 = m(x - 3)$ is also $\pi/4$. Consequently, we have

$\tan\frac{\pi}{4} = \pm\frac{m - 1/2}{1 + m/2} \Rightarrow m = 3, -\frac{1}{3}$

Substituting the values of m in (i), we obtain

$y - 3\,x + 9 = 0$ and $3\,y + x - 3 = 0$ as the required sides

345 **(a)**

Any line which is perpendicular to $\sqrt{3}\sin\theta + 2\cos\theta = \frac{4}{r}$ is

$\sqrt{3}\sin\left(\frac{\pi}{2} + \theta\right) + 2\cos\left(\frac{\pi}{2} + \theta\right) = \frac{k}{r}$ ...(i)

Since, it is passing through $\left(-1, \frac{\pi}{2}\right)$

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

On putting $k = 2$ n Eq. (i), we get

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

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

346 **(c)**

Slope of refracted ray is

$-\tan 60° = -\sqrt{3}$

It passes through (1, 0)

$\therefore\ y = -\sqrt{3}(x - 1)$

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

347 **(c)**

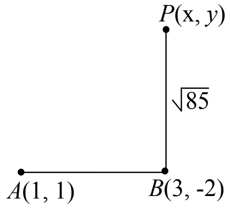
It is simple way to take a point from the option and finding the distance, which is equal to $\sqrt{85}$

Taking point $P(5, 7)$

$BP = \sqrt{(5 - 3)^2 + (7 + 2)^2}$

$= \sqrt{4 + 81} = \sqrt{85}$

Hence, option (c) is correct



348 **(b)**

Equation of the line $\frac{ax}{c-1} + \frac{by}{c-1} + 1 = 0$ has two independent parameters. It can pass through a fixed point if it contains only one independent parameter. Now , there must be one relation between $\frac{a}{c-1}$ and $\frac{b}{c-1}$ independent of a, b and c so that $\frac{a}{c-1}$ can be expressed in terms of $\frac{b}{c-1}$ and straight line contains only one independent parameter. Now, that given relation can be expressed as $\frac{5a}{c-1}+\frac{4b}{c-1}=\frac{t-20c}{c-1}$ RHS in independent of c if $t=20$

349 **(c)**

On comparing given equation with standard equation, we get

$a=1, b=-1, c=-2, h=0, g=-1/2, f=\lambda/2$

Given equation represent a pair of straight line,

$\therefore abc+2fgh-af^2-bg^2-ch^2=0$

$$\Rightarrow 2+0-\frac{\lambda^2}{4}+\frac{1}{4}=0$$

$$\Rightarrow \frac{\lambda^2}{4}=\frac{9}{4} \Rightarrow \lambda=\pm 3$$

350 **(b)**

The equation of given curve is

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

$$\Rightarrow \frac{dy}{dx}=\frac{1}{2\sqrt{x}}$$

Slope of line at (x_1, y_1), $m_1=\frac{1}{2\sqrt{x_1}}$

and let line parallel to x-axis is $y=k$ ...(ii)

Whose slope, $m_2=0$

Since, 45° is the angle between the line and the curve.

$$\therefore \tan 45° = \left|\frac{m_1-m_2}{1+m_1m_2}\right| \Rightarrow 1=\left|\frac{\frac{1}{2\sqrt{x_1}}-0}{1}\right| \Rightarrow x_1=\frac{1}{4}$$

$\therefore y_1=\frac{1}{2}$ [from Eq.(i)]

$\therefore$ Required line is $y=\frac{1}{2}$ [from Eq.(ii)]

351 **(c)**

(1)Let A and B be the points where the lines $2x+3y+19=0$ meets the coordinates axes and let C and O be the points where the line $9x+6y-17=0$ meet the coordinate axes

Then, $OA=\frac{19}{2}, OB=\frac{19}{2}$,

$OC=\frac{17}{9}$ and $OD=\frac{17}{6}$

Thus, the segments AOC and BOD intersect at such that $OA\cdot OC=OB\cdot OD$. Hence, A, B, C, D are concyclic

(2) Distance of $(2, -5)$ from the line $3x+y+5-0$ is

$$\frac{2\times 3-5+5}{\sqrt{3^2+1^2}}=\frac{6}{\sqrt{10}}$$

and distance of $(-1,4)$ from the line $3x+y+5=0$ is

$$\frac{3(-1)+4+5}{\sqrt{10}}=\frac{6}{\sqrt{10}}$$

Thus, the points are equidistant from the given line

Hence, both of these statements are correct

352 **(a)**

On comparing the given equation with the standard form of equation, we get $a=1$, $h=2$ and $b=1$

Let θ is the angle between them, then

$$\tan\theta=\frac{2\sqrt{h^2-ab}}{a+b}$$

$$\therefore \tan\theta=\frac{2\sqrt{2^2-1}}{1+1}=\frac{2\sqrt{4-1}}{2}=\sqrt{3}$$

$$\Rightarrow \theta=\tan^{-1}(\sqrt{3})=60°$$

354 **(d)**

Here, $a=6$, $2h=-1$, $b=4c$

$$\therefore m_1+m_2=\frac{1}{4c}, m_1m_2=\frac{6}{4c}$$

One line of given pair of line is $3x+4y=0$

Slope of line $=-\frac{3}{4}=m_1$(say)

$$\therefore\ -\frac{3}{4}+m_2=\frac{1}{4c}$$

$$\Rightarrow m_2=\frac{1}{4c}+\frac{3}{4}$$

$$\therefore\ \left(-\frac{3}{4}\right)\left(\frac{1}{4c}+\frac{3}{4}\right)=\frac{6}{4c}$$

$$\Rightarrow 1+3c=\frac{-6\times 4}{3}$$

$$\Rightarrow 3c=-9\ \Rightarrow c=-3$$

355 **(b)**

The equation $4x^2+8xy+ky^2-9=0$ represents a pair of straight lines, if

$(4)(k)(-9)-(-9)(4)^2=0 \Rightarrow k=4$

356 **(b)**

Slope of the line segment joining $(-4,6)$ and $(8,8)$ is

$$\frac{8-6}{8+4}=\frac{2}{12}=\frac{1}{6}$$

∴ Slope of line perpendicular to it.

$$m=-\frac{1}{1/6}=-6$$

As the line bisecting it.

$\therefore$ Mid point of this line is $\left(\frac{8-4}{2}, \frac{8+6}{2}\right) = (2, 7)$

$\therefore$ Required equation is

$y - 7 = -6(x - 2)$

$\Rightarrow y + 6x - 19 = 0$

357 **(c)**

Let (h,k) be the point of intersection of the line $x\cos\alpha + y\sin\alpha = a$ and $x\sin\alpha - y\cos\alpha = b$. Then,

$h\cos\alpha + k\sin\alpha = a$ ...(i)

$h\sin\alpha - k\cos\alpha = b$ ...(ii)

Squaring and adding (i) and (ii), we get

$(h\cos\alpha + k\sin\alpha)^2 + (h\sin\alpha - k\cos\alpha)^2 = a^2 + b^2$

$\Rightarrow h^2 + k^2 = a^2 + b^2$

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

358 **(a)**

Equations of the bisectors of the angles between the lines $x^2 - 2mxy - y^2 = 0$ are given by

$\frac{x^2 - y^2}{1-(-1)} = \frac{xy}{-m} \Rightarrow x^2 + \frac{2}{m}xy - y^2 = 0$ ...(i)

Since (i) and $x^2 - 2nxy - y^2 = 0$ represent the same pair of lines.

$\therefore \frac{1}{1} = \frac{2/m}{-2n} = \frac{-1}{-1} \Rightarrow mn = -1 \Rightarrow mn + 1 = 0$

359 **(d)**

Point of intersection of $\frac{x}{a} + \frac{y}{b} = 1$ and

$\frac{x}{b} + \frac{y}{a} = 1$ is $\left(\frac{ab}{a+b}, \frac{ab}{a+b}\right)$

$\therefore$ Equation of line joining (0, 0) and

$\left(\frac{ab}{a+b}, \frac{ab}{a+b}\right)$ is $x = y$ *ie*, $x - y = 0$

360 **(c)**

Here, $a = 4$, $b = 11$ and $h = -12$

$\therefore h^2 - ab = (-12)^2 - 4 \times 11 = 100$

$\therefore$ The two lines represented by given equation will be real and distinct which represent a pair of straight lines passing through the origin.

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