DPP
DAILY PRACTICE PROBLEMS

Class : XIth
Date :

Solutions

Subject : MATHS
DPP No. :9

Topic :-STRAIGHT LINES

361 **(a)**

Let the slope of first line be m, then slope of second line is $5m$.

Then, $m+5m=-\frac{2h}{b}$ and $m\cdot 5m=\frac{a}{b}$

$\Rightarrow m=-\frac{2h}{6b}=\frac{-h}{3b}$

$\therefore\ 5m^2=\frac{a}{b}\Rightarrow 5\left(-\frac{h}{3b}\right)^2=\frac{a}{b}$

$\Rightarrow \frac{5h^2}{9b^2}=\frac{a}{b}\Rightarrow 5h^2=9ab$

362 **(a)**

We have,

$|x|=|y|x=\pm y\Rightarrow x+y=0, x-y=0$

Let $(t,4-t)$ be the required point. It is equidistant from the lines $|x|=|y|$

$\therefore\left|\frac{t+4-t}{\sqrt{2}}\right|=\left|\frac{t-(4-t)}{\sqrt{2}}\right|$

$\Rightarrow 4=|2t-4|\Rightarrow t-2=\pm 2\Rightarrow t=0,4$

Hence, required points are $(0,4)$ and $(4,0)$

363 **(d)**

Equation of line is $\frac{x}{3}+\frac{y}{4}=1$

$\Rightarrow 4x+3y-12=0$

Now, distance from origin $=\left|\frac{4\times 0+3\times 0-12}{\sqrt{3^2+4^2}}\right|=\frac{12}{5}$ units

364 **(c)**

As $m\in\left(\frac{1}{2},3\right)$

$\therefore$ Line $y=mx+4$ lies between

$y=3x+1$ and $2y=x+3$

Slope of given lines are $m_2=3$, $m=m$ and $m_1=\frac{1}{2}$

$\therefore\ \tan\theta=\frac{3-m}{1+3m}$

and $\tan\theta = \dfrac{m-\frac{1}{2}}{1+\frac{m}{2}}$

$\Rightarrow \dfrac{3-m}{1+3m} = \dfrac{2m-1}{2+m}$

$\Rightarrow 7m^2 - 2m - 7 = 0$

$\therefore m = \dfrac{2 \pm \sqrt{4+196}}{2\times 7} = \dfrac{1}{7}(1 \pm 5\sqrt{2})$

365 **(d)**

The point of intersection of the given lines is

$\left(\dfrac{ab}{a+b}, \dfrac{ab}{a+b}\right)$

Clearly, it satisfies equation of options (a),(b) and (c)

366 **(c)**

Equation of the straight lines are

$3x - 4y + 7 = 0$ ...(i)

and $12x + 5y - 2 = 0$ ...(ii)

The equation of bisectors of the angles between these lines are

$\dfrac{3x-4y+7}{\sqrt{3^2+4^2}} = \dfrac{12x+5y-2}{\sqrt{12^2+5^2}}$

$\Rightarrow \dfrac{3x-4y+7}{5} = \dfrac{12x+5y-2}{13}$

$\Rightarrow 39x - 52y + 91 = 60x + 25y - 10$

$\Rightarrow 21x + 77y - 101 = 0$

367 **(b)**

Given equation of pair of lines can be written as

$(3x-y)(x+2y) = 0$

Slope of separate equations of line $3x - y = 0$ is 3 and $x + 2y = 0$ is $-\frac{1}{2}$

Thus, required sum $= 3 - \dfrac{1}{2} = \dfrac{5}{2}$

Alternate

Sum of slope of the lines $3x^2 + 5xy - 2y^2 = 0$ is

$m_1 + m_2 = -\dfrac{h}{b} = \dfrac{5}{2}$

368 **(b)**

Let the another equation of line is

$x - 2y + 1 = 0$

$\therefore$ Equation of bisector of angle between two lines is

$\dfrac{2x-y-1}{\sqrt{4+1}} = \pm \dfrac{x-2y+1}{\sqrt{1+4}}$

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

369 **(d)**

Given equation can be rewritten as

$a(x+y-1) + b(2x-3y+1) = 0$

This is the form of intersection of two lines.

$\therefore\ x+y-1=0$ ...(i)

and $2x-3y+1=0$ ....(ii)

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

$x=\frac{2}{5}$ and $y=\frac{3}{5}$

Hence, coordinates of required point are $\left(\frac{2}{5},\frac{3}{5}\right)$

370 **(a)**

Since, $ax+by+c=0$ is always passes through $(1,\ -2)$

$\therefore a-2b+c=0$

$\Rightarrow 2b=a+c$

Therefore, a, b and c are in AP

371 **(a)**

Let the locus of point be (x,y)

Area of triangle with points (x,y), $(1,5)$ and $(3,\ -7)$ is 21 sq unit

$$\therefore \frac{1}{2}\begin{vmatrix} x & y & 1 \\ 1 & 5 & 1 \\ 3 & -7 & 1 \end{vmatrix}=21$$

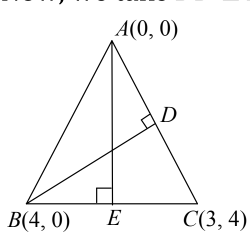
$$\Rightarrow \frac{1}{2}[x(5+7)-y(1-3)+1(-7-15]=21$$

$$\Rightarrow \frac{1}{2}[12x+2y-22]=21$$

$\Rightarrow 6x+y-32=0$

372 **(c)**

Now, we take $BD\perp AC$ and $AE\perp BC$



Slope of $BD=-\frac{3}{4}$

Equation of BD, $y-0=\frac{-3}{4}(x-4)$

$\Rightarrow 4y=-3x+12$

$\Rightarrow 3x+4y-12=0$ ...(i)

and slope of $AE=\frac{1}{4}$

$\therefore$ Equation of AE, $y-0=\frac{1}{4}(x-0)$

$\Rightarrow x-4y=0$ ...(ii)

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

$x=3,\qquad y=\frac{3}{4}$

$\therefore$ Orthocentre of the traingle is $\left(3, \frac{3}{4}\right)$

373 **(b)**

Let $A(2, -1)$ be one vertex of an equilateral triangle ABC. Then, its altitude is the length of the perpendicular from $A(2, -1)$ on $c + y - 2 = 0$ i.e.

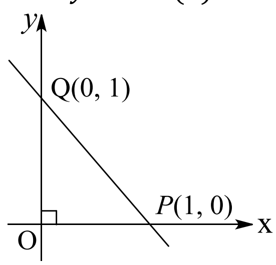
$AD = \left|\frac{2-1-2}{\sqrt{1+1}}\right| = \frac{1}{\sqrt{2}}$

$\Rightarrow \frac{\sqrt{3}}{2}(\text{Side}) = \frac{1}{\sqrt{2}} \Rightarrow \text{side} = \sqrt{\frac{2}{3}}$

374 **(a)**

We have, $x + y = 1$ ...(i)

and $xy = 0$ ...(ii)



On putting $x = 1 - y$ from Eq. (i) into Eq. (ii), we get

$(1 - y)y = 0$

$\Rightarrow y = 0, 1$

At $y = 0 \Rightarrow x = 1$

and at $y = 1 \Rightarrow x = 0$

$\therefore$ Coordinates of the vertices of a triangle are (0, 0), (1, 0) and (0, 1)

$\therefore$ Point (0, 0) is its orthocentre

375 **(a)**

The equation of required line is

$3x^2 + 4xy - 4x(2x + y) + (2x + y)^2 = 0$

$\Rightarrow 3x^2 + 4xy - 8x^2 - 4xy + 4x^2 + y^2 + 4xy = 0$

$\Rightarrow -x^2 + y^2 + 4xy = 0$

(Coefficient of x^2) + (Coefficient of y^2) $= -1 + 1 = 0$

$\therefore$ Lines are mutually perpendicular.

ie, Angle between lines is $\frac{\pi}{2}$.

376 **(a)**

The equation of given line is

$y = mx + \frac{a}{m}$ ...(i)

The equation of line perpendicular to Eq. (i) is

$my + x + \lambda = 0$ ...(ii)

This line passing through $(a, 0)$.

$0 + a + \lambda = 0 \Rightarrow \lambda = -a$

On putting this value on λ in Eq. (ii) and solving with Eq. (i), we get

$x = 0$ and $y = \frac{a}{m}$

Coordinates of the foot of perpendicular are $\left(0, \frac{a}{m}\right)$.

377 **(b)**

$\because$ Slope of perpendicular $= -\left[\frac{\cos\alpha - \cos\beta}{\sin\alpha - \sin\beta}\right] = \tan\frac{\alpha+\beta}{2}$

$\therefore$ Equation of perpendicular is

$y = \tan\left(\frac{\alpha+\beta}{2}\right)x \quad \ldots(\text{i})$

On solving the Eq. (i) with the line, we get

$\left[\frac{a}{2}(\cos\alpha + \cos\beta), \frac{a}{2}(\sin\alpha + \sin\beta)\right]$

378 **(d)**

Mid point of the line joining the points $(4, -5)$ and $(-2, 9)$ is

$\left(\frac{4-2}{2}, \frac{-5+9}{2}\right)$ *ie*, $(1, 2)$

$\therefore$ Inclination of straight line passing through point $(-3, 6)$ and mid point $(1, 2)$ is

$m = \frac{2-6}{1+3} = \frac{-4}{4} = -1$

$\therefore \tan\theta = -1 \Rightarrow \theta = \frac{3\pi}{4}$

379 **(d)**

Given pair of line is

$x^2\sin^2\alpha + y^2\sin^2\alpha = x^2\cos^2\theta + y^2\sin^2\theta - 2xy\sin\theta\cos\theta$

$\Rightarrow x^2(\sin^2\alpha - \cos^2\theta) + y^2(\sin^2\alpha - \sin^2\theta) + 2(\sin\theta\cos\theta)xy = 0$

On comparing with $ax^2 + by^2 + 2hxy = 0$

We get, $a = \sin^2\alpha - \cos^2\theta$,

$b = \sin^2\alpha - \sin^2\theta$ and $h = \sin\theta\cos\theta$

Let θ be the angle between the pair of lines.

$$\therefore \tan\theta = \left|\frac{2\sqrt{\sin^2\theta\cos^2\theta - (\sin^2\alpha - \cos^2\theta)\times(\sin^2\alpha - \sin^2\theta)}}{\sin^2\alpha - \cos^2\theta + \sin^2\alpha - \sin^2\theta}\right|$$

$$= \left|\frac{2\sqrt{\sin^2\theta\cos^2\theta - (\sin^2\alpha)^2 + \sin^2\alpha\sin^2\theta + \sin^2\alpha\cos^2\theta - \sin^2\theta\cos^2\theta}}{-(1 - 2\sin^2\alpha)}\right|$$

$$= \left|\frac{2\sqrt{\sin^2\alpha(\sin^2\theta + \cos^2\theta) - (\sin^2\alpha)^2}}{-\cos 2\alpha}\right|$$

$$= \left|\frac{2\sqrt{\sin^2\alpha(1 - \sin^2\alpha)}}{-\cos 2\alpha}\right|$$

$$\Rightarrow \tan\theta = \left|\frac{\sin 2\alpha}{\cos 2\alpha}\right| = \tan 2\alpha$$

$\Rightarrow \theta = 2\alpha$

380 **(b)**

Given equations of line and circle are respectively

$\sqrt{3}x + y = 2$ ...(i)

and $x^2 + y^2 = 4$ ...(ii)

From Eqs. (i) and (ii), we get

$x^2 + (2 - \sqrt{3}x)^2 = 4$

$\Rightarrow 4x^2 - 4\sqrt{3}x = 0$

$\Rightarrow x(x - \sqrt{3}) = 0 \Rightarrow x = 0, \sqrt{3}$

$\therefore$ Points of intersection of line and circle are (0, 2) and $(\sqrt{3}, -1)$.

Slope, of line joining (0, 0) and (0, 2)

$= \frac{2-0}{0-0} = \infty \Rightarrow \theta_1 = \frac{\pi}{2}$

Also, slope of line joining (0, 0) and $(\sqrt{3}, -1)$

$= \frac{-1}{\sqrt{3}} \Rightarrow \theta_2 = \frac{\pi}{6}$

$\therefore$ Required angle $= \frac{\pi}{2} - \frac{\pi}{6} = \frac{\pi}{3}$

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