DPP

DAILY PRACTICE PROBLEMS

Class : XIth
Date :

Solutions

Subject : MATHS
DPP No. :4

Topic :-STRAIGHT LINES

261 **(d)**

Let the equation of line is $y = mx + c$

Given, $m = \tan 30° = \dfrac{1}{\sqrt{3}}$ and $c = -2$

$\therefore y = \dfrac{x}{\sqrt{3}} - 2 \Rightarrow \sqrt{3}y - x + 2\sqrt{3} = 0$

262 **(c)**

Here, $a = 1, b = 9, c = -4, h = -3, g = \frac{3}{2}$ and $f = -\frac{9}{2}$

$\therefore$ Required distance $= 2\sqrt{\dfrac{g^2 - ac}{a(a+b)}} = 2\sqrt{\dfrac{9/4 + 4}{10}} = \sqrt{\dfrac{5}{2}}$

263 **(b)**

The coordinates of A and B are $(0,12)$ and $(8,0)$ respectively. The equation of the perpendicular bisectors of AB is

$y - 6 = \frac{2}{3}(x - 4) \Rightarrow 2x - 3y + 10 = 0$ ....(i)

Equation of a line passing through $(0, -1)$ and parallel to x-axis is $y = -1$. This line meets line (i) at C. Therefore, the coordinates of C are $(-13/2, -1)$. Hence, the area A of the triangle ABC is given by

$$\Delta = \frac{1}{2}\begin{vmatrix} 0 & 12 & 1 \\ 8 & 0 & 1 \\ -13/2 & -1 & 1 \end{vmatrix} = 91 \text{ sq. units}$$

264 **(c)**

Let (h, k) be the coordinates of the fourth vertex.

Then,

$\Delta_1 = \dfrac{1}{2}\begin{vmatrix} 6 & 7 \\ 1 & 2 \end{vmatrix} = \dfrac{5}{2}, \Delta_2 = \dfrac{1}{2}\begin{vmatrix} 7 & -1 \\ 2 & 0 \end{vmatrix} = 1,$

$\Delta_3 = \dfrac{1}{2}\begin{vmatrix} -1 & h \\ 0 & k \end{vmatrix} = -\dfrac{k}{2}$ and $\Delta_4 = \dfrac{1}{2}\begin{vmatrix} h & 6 \\ k & 1 \end{vmatrix} = \dfrac{1}{2}(h - 6k)$

We have,

$|\Delta_1 + \Delta_2 + \Delta_3 + \Delta_4| = 4$

$\Rightarrow \left|\dfrac{5}{2} + 1 - \dfrac{k}{2} + \dfrac{h - 6k}{2}\right| = 4$

$\Rightarrow|7+h-7k|=8$
$\Rightarrow 7+h-7k=\pm 8$
$\Rightarrow h-7k-1=0, h-7k+15=0$
$\Rightarrow(h-7k-1)(h-7k+15)=0$
$\Rightarrow(h-7k)^2+14(h-7k)-15=0$
Hence, the locus of (h,k) is $(x-7y)^2+14(x-7y)-15=0$
265 **(a)**
The equation of the line joining $A(a,0)$ and $B(0,b)$ is $\frac{x}{a}+\frac{y}{b}=1$. Clearly, point $(3a,-2b)$ lies on this line
266 **(c)**
Lines are $\left[(l+\sqrt{3}m)x+(m-\sqrt{3}l)y\right]\left[(l-\sqrt{3}m)x+(m+\sqrt{3}l)y\right]=0$
and $lx+my+n=0$

$$\therefore m_1=-\frac{(l+\sqrt{3}m)}{(m-\sqrt{3}l)}, m_2=-\frac{(l-\sqrt{3}m)}{(m+\sqrt{3}l)}$$

and $m_3=-\dfrac{l}{m}$

$$\therefore\ \theta_1=\tan^{-1}\left[\frac{-\left(\frac{l+\sqrt{3}m}{m-\sqrt{3}l}\right)+\frac{l}{m}}{1+\left(\frac{l+\sqrt{3}m}{m-\sqrt{3}l}\right)\cdot\frac{l}{m}}\right]=60°$$

$$\text{and } \theta_2=\tan^{-1}\left[\frac{-\left(\frac{l-\sqrt{3}m}{m+\sqrt{3}l}\right)+\frac{l}{m}}{1+\left(\frac{l-\sqrt{3}m}{m+\sqrt{3}l}\right)\left(\frac{l}{m}\right)}\right]=60°$$

Hence, triangle is equilateral.
267 **(c)**
Here, $a=1$, $h=-3$, $b=9$, $g=\frac{3}{2}$, $f=-\frac{9}{2}$ and $c=-4$

$$\therefore \text{Required distance}=\left|2\sqrt{\frac{f^2-bc}{b(a+b)}}\right|$$

$$=\left|2\sqrt{\frac{\left(-\frac{9}{2}\right)^2+(9)(4)}{9(9+1)}}\right|$$

$$=\left|2\sqrt{\frac{225}{4\times 90}}\right|=\left|\frac{2\sqrt{5}}{2\sqrt{2}}\right|=\sqrt{\frac{5}{2}}$$

268 **(c)**
We have,
$\angle PRQ=\pi/2$
$\therefore$ Slope of $RP\times$ Slope of $RQ=-1$

$\Rightarrow \frac{y-1}{x-3} \times \frac{5-1}{6-3} = -1 \Rightarrow 3x + 4y = 13$ ...(i)

Now, Area of $\Delta RPQ = 7$

$\Rightarrow \frac{1}{2}\begin{vmatrix} x & y & 1 \\ 3 & 1 & 1 \\ 6 & 5 & 1 \end{vmatrix} = \pm 7 \Rightarrow 3y - 4x = 5 \Rightarrow 3y - 4x = -23$ ...(ii)

Solving, (i) and (ii), we get two points

269 **(c)**

We have,

$x^3 - 6x^2y + 11xy^2 - 6y^3 = 0$

$\Rightarrow (x-y)(x-2y)(x-3y) = 0$

$\Rightarrow x - y = 0, x - 2y = 0, x - 3y = 0$

Thus, the slopes of the lines represented by the given equation are $1, \frac{1}{2}, \frac{1}{3}$ which are in H.P.

270 **(a)**

Equation of the line passing through $(-4, 6)$ and $(8, 8)$ is

$(y-6) = \left(\frac{8-6}{8+4}\right)(x+4)$

$\Rightarrow 6y - x - 40 = 0$ ...(i)

Now, equation of any line perpendicular to Eq. (i), is

$6x + y + \lambda = 0$ ...(ii)

This line passes through the mid point of $(-4, 6)$ and $(8, 8)$, which is

$\left(\frac{-4+8}{2}, \frac{6+8}{2}\right)$ *ie*, $(2, 7)$

$\therefore 6 \times 2 + 7 + \lambda = 0 \Rightarrow \lambda = -19$

On putting $\lambda = -19$ in Eq. (ii), we get the required line which is $6x + y - 19 = 0$.

271 **(c)**

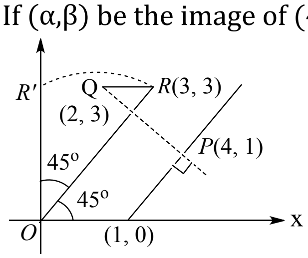
Given sides of a triangle are $x - 3y = 0$, $4x + 3y = 5$ and $3x + y = 0$

Since, the lines $x - 3y = 0$ and $3x + y = 0$ are perpendicular to each other, therefore it is right angled triangle and the point of intersection (0, 0) is the orthocentre of a triangle.

$\therefore$ The line $3x - 4y = 0$ is passes through origin (0, 0) *ie*, it is passes through orthocentre.

273 **(c)**

If (α, β) be the image of (4, 1) w.r.t. $y = x - 1$, then $(\alpha, \beta) = (2, 3)$ say point Q



After translation through a distance 1 unit along the positive direction of x-axis at the point whose coordinate are $R \equiv (3, 3)$. After rotation through are angle $\pi/4$ about the origin in the anti-clockwise direction, then R goes to R'' such that

$OR = OR'' = 3\sqrt{2}$

$\therefore$ The coordinates of the final point are $(0, 3\sqrt{2})$

275 **(d)**

The point of intersection of $x+2y-3=0$ and $2x+3y-4=0$ is $(-1,2)$ which satisfies $4x+5y-6=0$. But, it does not satisfy $3x+4y-7=0$

Hence, only three lines are concurrent

277 **(d)**

$\because P(1,2)$ is mid point of AB, therefore coordinate of A and B respectively $(2,0)$ and $(0,4)$.

$\therefore$ Equation of line AB is

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

278 **(c)**

On comparing the given line with

$ax^2+2hxy+by^2+2gx+2fy+c=0$

we get,

$$a=\lambda,\quad h=-5,\quad b=12, g=\frac{5}{2}, f=-8, c=-3$$

It represents a pair of line, if

$$\lambda\times 12\times(-3)+2(-8)\left(\frac{5}{2}\right)(-5)-\lambda(-8)^2-12\left(\frac{5}{2}\right)^2+3(-5)^2=0$$

$\Rightarrow\ -36\lambda+200-64\lambda-75+75=0$

$\Rightarrow 100\lambda=200\Rightarrow\lambda=2$

279 **(d)**

Equation of a line perpendicular to $5x-y+1=0$ is $x+5y+c=0$. This meets the axes at $A(-c,0)$ and $B(0,-c/5)$.

Now,

$$\text{Area of } \Delta OAB=5\Rightarrow\frac{1}{2}(-c)\left(-\frac{c}{5}\right)=5\Rightarrow c=\pm 5\sqrt{2}$$

Hence, the required line is $x+5y\pm 5\sqrt{2}=0$

280 **(b)**

Let $h=u\cos\alpha\cdot t, k=u\sin\alpha\cdot t-\frac{1}{2}gt^2$

On eliminating t, we get

$$k=h\tan\alpha-\frac{1}{2}g\frac{h^2}{u^2\cos^2\alpha}$$

Hence, locus of (h,k) is

$y=x\tan\alpha-\frac{1}{2}g\frac{x^2}{u^2\cos^2\alpha}$, which is a parabola

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

A.	C	D	C	A	D	C	D	C	D	B