DPP

DAILY PRACTICE PROBLEMS

CLASS : XIth

DATE :

SUBJECT : MATHS

DPP NO. :6

Topic :- CO-ORDINATE GEOMETRY

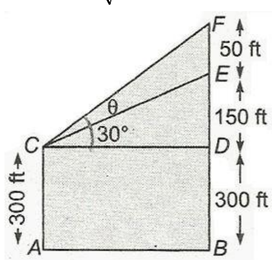
2 **(a)**

The sum of the distance of a point P from two perpendicular lines in aplane is 1, then the locus of P is a rhombus

3 **(a)**

In ΔDCE, $\tan 30° = \frac{150}{CD}$

$\Rightarrow CD = \sqrt{3} \times 150$



Now, In ΔDCF,

$$\tan\theta = \frac{DF}{CD} = \frac{200}{\sqrt{3}.150} = \frac{4}{3\sqrt{3}}$$

4 **(b)**

$$2\left(a\sin^2\frac{C}{2} + c\sin^2\frac{A}{2}\right)$$

$$= 2\left(a\,\frac{(s-a)(s-b)}{ab} + c\,\frac{(s-b)(s-c)}{bc}\right)$$

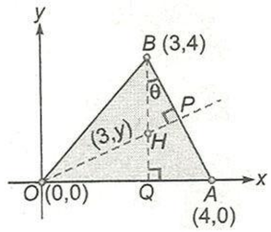
$$= 2\left(\frac{(s-b)}{b}(s-a+s-c)\right)$$

$$= \frac{2}{b}(s-b)b$$

$$= 2\,(s-b) = a-b+c$$

5 **(c)**

Let H be the orthocenter of ΔOAB



$\therefore$ (slope of OP) .(slope of BA) $= -1$

$\Rightarrow \left(\frac{y-0}{3-0}\right).\left(\frac{4-0}{3-4}\right) = -1$

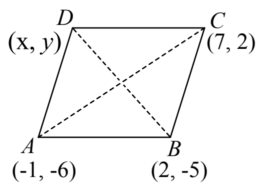
$\Rightarrow -\frac{4}{3}y = -1$

$\Rightarrow y = \frac{3}{4}$

$\therefore$ Required orthocentre $= (3, y) = \left(3, \frac{3}{4}\right)$

6 **(b)**

Let the fourth vertex be $D(x, y)$



We know that two diagonals of a parallelogram are bisect each other

$\therefore \frac{-1+7}{2} = \frac{2+x}{2} \Rightarrow x = 4$

and $\frac{-6+2}{2} = \frac{-5+y}{2} \Rightarrow y = 1$

$\therefore$ Fourth vertex of D is $(4, 1)$

7 **(c)**

We have, $\cos A \cos B + \sin A \sin B \sin C = 1$

$\Rightarrow 2\cos A\cos B + 2\sin A\sin B\sin C = 2$

$\Rightarrow 2\cos A\cos B + 2\sin A\sin B\sin C$

$= \cos^2 A + \sin^2 A + \cos^2 B + \sin^2 B$

$\Rightarrow (\cos A - \cos B)^2 + (\sin A - \sin B)^2 + 2\sin A\sin B(1 - \sin C) = 0$

$\Rightarrow \cos A - \cos B = 0, \sin A - \sin B = 0$

and $1 - \sin C = 0$

$\Rightarrow A = B$ and $C = 90°$

$\Rightarrow a = b$ and $C = 90°$

8 **(d)**

We have, $A + B + C = 180°$

$\Rightarrow A = 180° - (B + C)$

$\Rightarrow \tan A = \tan(180° - B - C)$

$\Rightarrow \tan 90° = -\tan(B + C)$

$\Rightarrow \infty = -\frac{\tan B + \tan C}{1 - \tan B \tan C}$

$\Rightarrow\ 1-\tan B\tan C\ =0$

$\Rightarrow\ \tan B\tan C\ =1$

9 **(b)**

Since, the given points lies on a line, then

$$\begin{vmatrix}1 & 1 & 1\\ -5 & 5 & 1\\ 13 & \lambda & 1\end{vmatrix}=0$$

$\Rightarrow\ 1(5-\ \lambda)-1(-5-13)+1(-5\,\lambda-65)=0$

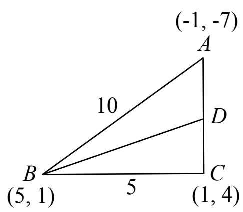
$\Rightarrow\ \ -6\,\lambda=42\ \Rightarrow\ \ \lambda=-7$

10 **(a)**

The vertices of triangle are (0, 0), (3, 0) and (0, 4). It is a right angled triangle, therefore circumcentre is $\left(\frac{3}{2},2\right)$

11 **(c)**

$BC=5, BA=10$



Let D divides AC in the ratio 2:1

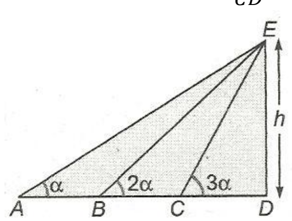
$\therefore$ Coordinate of D is $\left(\frac{1}{3},\frac{1}{3}\right)$

The bisector is the line joining B and D is

$$\frac{y-1}{x-5}=\frac{1}{7}\ \text{ or }\ x-7y+2=0$$

12 **(b)**

In ΔECD, $\tan 3\alpha=\frac{h}{CD}$



$\Rightarrow CD=h\cot 3\alpha$...(i)

In ΔEBD, $\tan 2\alpha=\frac{h}{BD}$

$\Rightarrow BD=h\cot 2\alpha$ ...(ii)

In ΔEAD,$\tan\alpha=\frac{h}{AD}$

$\Rightarrow AD=h\cot\alpha$ ...(iii)

From Eqs. (ii) and (iii),

$AD-BD=h\cot\alpha-h\cot 2\alpha$

$AB=h(\cot\alpha-\cot 2\alpha)$...(iv)

From Eqs. (i) and (ii),

$BD-CD=h\cot 2\alpha-h\cot 3\alpha$

$\Rightarrow BC = h(\cot 2\alpha - \cot 3\alpha)$ ...(v)

From Eqs. (iv) and (v),

$$\frac{AB}{BC} = \frac{h(\cot\alpha - \cot 2\alpha)}{h(\cot 2\alpha - \cot 3\alpha)}$$

$$= \frac{\frac{\cos\alpha}{\sin\alpha} - \frac{\cos 2\alpha}{\sin 2\alpha}}{\frac{\cos 2\alpha}{\sin 2\alpha} - \frac{\cos 3\alpha}{\sin 3\alpha}}$$

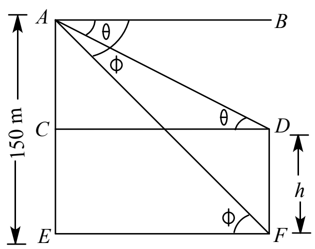
$$= \frac{\frac{\sin(2\alpha - \alpha)}{\sin\alpha \sin 2\alpha}}{\frac{\sin(3\alpha - 2\alpha)}{\sin 2\alpha \sin 3\alpha}}$$

$$= \frac{\sin 3\alpha}{\sin\alpha} = 3 - 4\sin^2\alpha$$

$= 3 - 2(1 - \cos 2\alpha)$

$= 1 + 2\cos 2\alpha$

14 **(b)**



In ΔAEF, $\tan\phi = \frac{AE}{EF} = \frac{150}{EF}$

$$\frac{5}{2} = \frac{150}{EF}$$

$\Rightarrow EF = 60$ m

and in ΔACD

$$\tan\theta = \frac{AC}{CD}$$

$$\Rightarrow \frac{4}{3} = \frac{150 - h}{60} \quad [\because CD = EF]$$

$\Rightarrow 80 = 150 - h$

$\Rightarrow h = 70$ m

$\therefore$ $AC = 80$ m and $CD = 60$ m

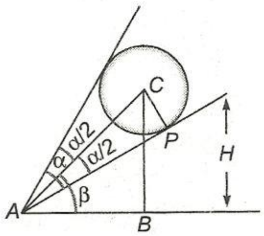
$\Rightarrow AD = \sqrt{AC^2 + CD^2}$

$= \sqrt{6400 + 3600}$

$= \sqrt{10000} = 100$ m

15 **(d)**

In ΔAPC, $\sin(\angle PAC) = \frac{CP}{AC}$



$\Rightarrow AC = \frac{r}{\sin\frac{\alpha}{2}} = r\ \text{cosec}\frac{\alpha}{2}$ ...(i)

Again, in ΔABC,$\sin\beta = \frac{BC}{AC}$

$\Rightarrow BC = AC\sin\beta$

$\Rightarrow H = r\ \text{cosec}\left(\frac{\alpha}{2}\right)\sin\beta$[from Eq.(i)]

16 **(b)**

Since, $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

$\Rightarrow\ b^2 - 2bc\cos A + (c^2 - a^2) = 0$

It is given that b_1 and b_2 are the roots of this equation

Therefore, $b_1 + b_2 = 2c\cos A$ and $b_1 b_2 = c^2 - a^2$

$\Rightarrow 3b_1 = 2c\cos A$ and $2b_1^2 = c^2 - a^2$

$[\because b_2 = 2b_1]$

$\Rightarrow\ 2\left(\frac{2c}{3}\cos A\right)^2 = c^2 - a^2$

$\Rightarrow 8c^2(1 - \sin^2 A) = 9c^2 - 9a^2$

$\Rightarrow \sin A = \sqrt{\frac{9a^2 - c^2}{8c^2}}$

17 **(a)**

$\because\ (\sqrt{a} + \sqrt{b} + \sqrt{c})(\sqrt{a} + \sqrt{b} - \sqrt{c}) = (\sqrt{a} + \sqrt{b})^2 - c$

$= a + b - c + 2\sqrt{ab} > 0$

$\therefore\ \sqrt{a} + \sqrt{b} > \sqrt{c}$

18 **(a)**

In $\Delta\ ABC$, $\angle A = 30°$, $BC = 10$ cm

O is the centre of circle

$\therefore\ \angle BOC = 60°$

and OB and OC are the radius

$\therefore\ \angle OBC = \angle OCB = 60°$

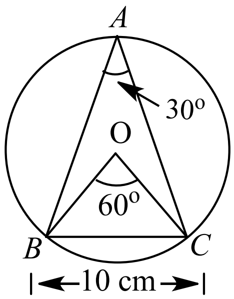
$\Rightarrow \Delta OBC$ is an equilateral triangle

$\therefore$ radius of circle is

$OB = OC = BC = 10$ cm

Now, area of the circumcircle is πr^2

$= \pi(10)^2 = 100\pi$ sq cm



19 **(b)**

We have, $R=\frac{abc}{4\Delta}$ and $r=\frac{\Delta}{s}$

$\therefore \frac{R}{r}=\frac{abc}{4\Delta}\cdot\frac{s}{\Delta}$

$=\frac{abc}{4(s-a)(s-b)(s-c)}$

Since, $a:b:c=4:5:6$

$\Rightarrow \frac{a}{4}=\frac{b}{5}=\frac{c}{6}=k$ (say)

Thus, $\frac{R}{r}=\frac{(4k)(5k)(6k)}{4\left(\frac{15k}{2}-4k\right)\left(\frac{15k}{2}-5k\right)\left(\frac{15k}{2}-6k\right)}$

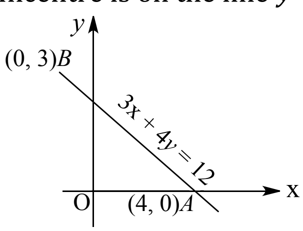
$=\frac{120k^3\cdot 2}{k^3\cdot 7\cdot 5\cdot 3}=\frac{16}{7}$

20 **(b)**

Given equation of lines are

$x=0, y=0$ and $3x+4y=12$

Incentre is on the line $y=x$ (Angled bisector of OA and OB)



Angle bisector of $y=0$ and $3x+4y=12$ is

$\pm 5y=3x+4y-12$

$\Rightarrow 3x+9y=12$

and $3x-y=12$

Here, $3x+9y=12$ internal bisector

So, intersection point of $y=x$ and $3x+9y=12$ is $(1, 1)$

$\therefore$ The required point of the incentre of triangle is $(1, 1)$

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