DPP
DAILY PRACTICE PROBLEMS

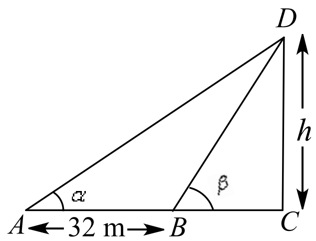
CLASS : XIth | **SUBJECT : MATHS**
DATE : | **DPP NO. :3**

Topic :- CO-ORDINATE GEOMETRY

1 **(a)**

Given that, $\cot\alpha = \frac{3}{5}$ and $\cot\beta = \frac{2}{5}$

In ΔBCD, $\tan\beta = \frac{h}{BC}$



$\Rightarrow\ BC = h\cot\beta\ \Rightarrow\ BC = \frac{2h}{5}$ ...(i)

and in $\Delta\, ACD$, $\tan\alpha = \frac{h}{32 + BC}$

$\Rightarrow\ h = \left(32 + \frac{2h}{5}\right)\frac{5}{3}$ [using Eq.(i)]

$\Rightarrow 3h = 160 + 2h$

$\Rightarrow\ h = 160$ m

2 **(a)**

The vertices of quadrilateral $ABCD$ is $A(2, 3)$, $B(3, 4)$, $C(4, 5)$ and $D(5, 6)$

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

$= \sqrt{(1)^2 + (1)^2} = \sqrt{2}$

Similarly, $BC = \sqrt{2}$, $CD = \sqrt{2}$, and $DA = 3\sqrt{2}$

$\therefore\ a = b = c = \sqrt{2}$ and $d = 3\sqrt{2}$

and $s = \frac{a+b+c+d}{2}$

$= \frac{\sqrt{2} + \sqrt{2} + \sqrt{2} + 3\sqrt{2}}{2}$

$= \frac{6\sqrt{2}}{2} = 3\sqrt{2}$

$\therefore$ Area of quadrilateral

$= \sqrt{(s-a)(s-b)(s-c)(s-d)}$

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

$= 0$

3 **(c)**

We have, $\Delta = \frac{1}{2}bc\sin A$

$\Rightarrow \frac{1}{2}k^2\sin B\sin C\sin A = \Delta$ ...(i)

$\therefore\ a^2\sin 2B + b^2\sin 2A$

$= 2(a^2\sin B\cos B + b^2\sin A\cos A)$

$= 2k^2(\sin^2 A\sin B\cos B + \sin^2 B\sin A\cos A)$

$= 2k^2(\sin A\sin B\sin C) = 4\Delta$ [from Eq.(i)]

4 **(c)**

1. $\dfrac{\sin A}{\sin C} = \dfrac{\sin(A-B)}{\sin(B-C)}$

$\Rightarrow \sin(B+C)\sin(B-C) = \sin(A+B)\sin(A-B)$

$\Rightarrow \sin^2 B - \sin^2 C = \sin^2 A - \sin^2 B$

$\Rightarrow b^2 - c^2 = a^2 - b^2$

$\Rightarrow 2b^2 = a^2 + c^2$

$\Rightarrow a^2, b^2, c^2$ are in AP

2. r_1, r_2, r_3 are in HP

$\Rightarrow \frac{1}{r_1}, \frac{1}{r_2}, \frac{1}{r_3}$ are in AP

$\Rightarrow \dfrac{2}{r_2} = \dfrac{1}{r_1} + \dfrac{1}{r_3}$

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

$\Rightarrow 2b = (a+c)$

$\Rightarrow a, b, c$ are in AP

Hence, both of these statements are correct

5 **(c)**

The largest side of triangle is $\sqrt{p^2+q^2+pq}$

Greatest angle will be opposite to largest side. Let θ be greatest angle, then

$\cos\theta = \dfrac{p^2+q^2-p^2-q^2-pq}{2pq} = -\dfrac{1}{2}$

$\Rightarrow \theta = \dfrac{2\pi}{3}$

6 **(a)**

Let area of triangle be Δ, then according to question

$\Delta = \frac{1}{2}ax = \frac{1}{2}by = \frac{1}{2}cz$

$\therefore \frac{bx}{c} + \frac{cy}{a} + \frac{az}{b} = \frac{b}{c}\left(\frac{2\Delta}{a}\right) + \frac{c}{a}\left(\frac{2\Delta}{b}\right) + \frac{a}{b}\left(\frac{2\Delta}{c}\right)$

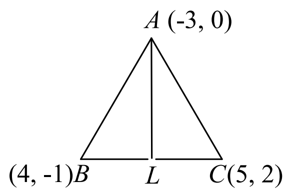
$= \frac{2\Delta(b^2 + c^2 + a^2)}{abc}$

$= \frac{2(a^2 + b^2 + c^2)}{abc} \cdot \frac{abc}{4R} \quad \left(\because \Delta = \frac{abc}{4R}\right)$

$= \frac{a^2 + b^2 + c^2}{2R}$

9 **(d)**

In $\Delta\, ABC$ the vertices are $A(-3, 0)$, $B(4, -1)$ and $C(5, 2)$



$\therefore \quad BC = \sqrt{(5-4)^2 + (2+1)^2}$

$= \sqrt{1+9} = \sqrt{10}$

Area of $\Delta\, ABC$

$= \frac{1}{2}[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$

$= \frac{1}{2}[-3(-1-2) + 4(2-0) + 5(0+1)]$

$= \frac{1}{2}[9 + 8 + 5] = 11$

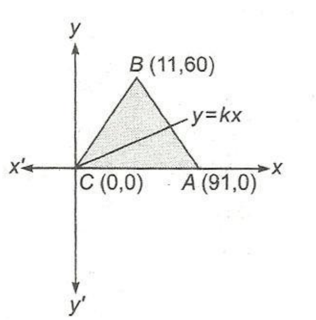
As we know that, area of $\Delta = \frac{1}{2} \times BC \times AL$

$\Rightarrow \quad 11 = \frac{1}{2} \times \sqrt{10} \times AL$

$\Rightarrow \quad AL = \frac{2 \times 11}{\sqrt{10}} = \frac{22}{\sqrt{10}}$

10 **(a)**

As the line divides the ΔABC in equal to area. Mid point of $AB(51, 30)$ which lies on $y = kx$



$\therefore \ 30 = 51k \quad \Rightarrow \quad k = \frac{30}{51}$

12 **(b)**

Let (h, k) be the point

According to question, $4\sqrt{(h-h)^2+k^2} = h^2+k^2$

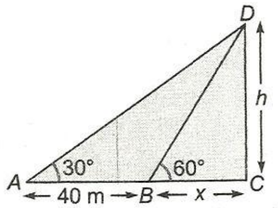
$\Rightarrow \quad 4|k| = h^2+k^2$

Locus of the point is $4|y| = x^2+y^2$

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

13 **(a)**

In ΔCBD, $\tan 60° = \frac{h}{x}$



$\Rightarrow h = x\sqrt{3}$ ...(i)

and in ΔCAD, $\tan 30° = \frac{h}{40+x}$

$\Rightarrow h\sqrt{3} = 40+x$

$\Rightarrow 3x = 40+x$ [from Eq. (i)]

$\Rightarrow x = 20$ m

14 **(d)**

(a) We know, $\tan A + \tan B + \tan C = \tan A \tan B \tan C$

Since, $\tan A + \tan B + \tan C = 0$

$\Rightarrow$ Let either of $\tan A$, $\tan B$ or $\tan C$ is zero *ie*, one angle is 0

So, it cannot be a triangle

(b) $\frac{\sin A}{2} = \frac{\sin B}{3} = \frac{\sin C}{1}$

$\Rightarrow \quad a{:}b{:}c = 2{:}3{:}1$

Let $a = 2k$, $b = 3k$, $c = k$, $a + c = b$ (so triangle not possible)

(c) $\sin A \sin B = \frac{\sqrt{3}}{4} = \cos A \cos B$

Either $\sin A$, $\sin B$ are both positive or both negative but, if both are positive $\sin A + \sin B > 0$ but $\sin A + \sin B$ is negative so both negative but, if both are negative, then $\angle A$ and $\angle B$ are more than $90°$, so it cannot be a triangle

(d) $(a+b)^2 = c^2 + ab$

$\Rightarrow \quad a^2+b^2+2ab = c^2+ab$

$\Rightarrow \quad a^2+b^2-c^2 = -ab$

$\Rightarrow \dfrac{a^2+b^2-c^2}{2ab} = -\dfrac{1}{2} = \cos C$

$\Rightarrow \angle C = 120°$

$\sin A + \cos A = \dfrac{\sqrt{3}}{\sqrt{2}}$

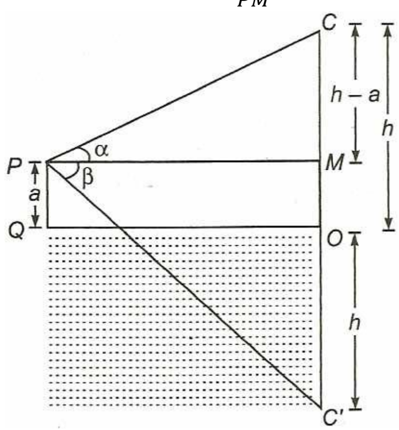
$\Rightarrow 1 + \sin 2A = \dfrac{3}{2} \Rightarrow \sin 2A = \dfrac{1}{2}$

$\Rightarrow 2A = 30° \Rightarrow \angle A = 15°$

So, it can form a triangle

15 **(b)**

In $\Delta\, PMC$, $\tan\alpha = \frac{h-a}{PM}$



$\Rightarrow PM = (h-a)\cot\alpha$ ...(i)

In $\Delta\, PMC'$, $\tan\beta = \frac{h+a}{PM}$

$\Rightarrow h + a = PM\tan\beta$

$\Rightarrow h = (h-a)\cot\alpha\tan\beta - a$

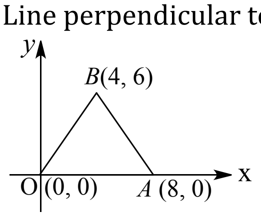
$\Rightarrow h(1 - \cot\alpha\cot\beta) = -a(1 + \cot\alpha\tan\beta)$

$\Rightarrow h = \dfrac{a(\sin\alpha\cos\beta + \cos\alpha\sin\beta)}{\sin\beta\cos\alpha - \sin\alpha\cos\beta}$

$= \dfrac{a\sin(\alpha+\beta)}{\sin(\beta-\alpha)}$ m

16 **(a)**

Line perpendicular to OA passing through B is $x = 4$



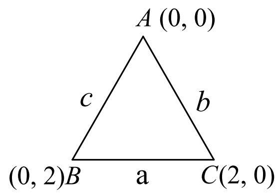
Slope of $AB = -\frac{3}{2}$

Line perpendicular to AB through origin is $y = \frac{2}{3}x$

$\therefore$ The point of intersection of a line $x = 4$ and $y = \frac{2}{3}x$ is $\left(4, \frac{8}{3}\right)$

17 **(c)**

Since, (0, 1), (1, 1) and (1, 0) are mid points of sides AB, BC and CA respectively



$\therefore$ Coordinates of A, B and C are (0, 0), (0, 2) and (2, 0) respectively

Now, $AB = 2, BC = 2\sqrt{2}, CA = 2$

$\therefore$ x-coordinate of incentre

$$= \frac{0 + 0 + 2.2}{2 + 2\sqrt{2} + 2} \quad \left(\because \ x = \frac{ax_1 + bx_2 + cx_3}{a + b + c}\right)$$

$$= \frac{2}{2 + \sqrt{2}} = 2 - \sqrt{2}$$

18 **(d)**

Let $P(x, y)$ is equidistant from the mid points $A(a + b, b - a)$ and $(a - b, a + b)$

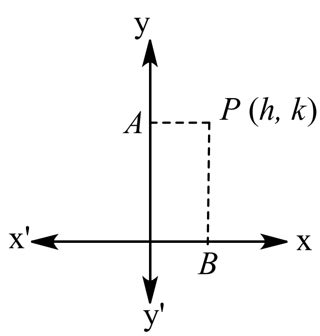
$\therefore \quad PA^2 = PB^2$

$\Rightarrow \ (a + b - x)^2 + (b - a - y)^2 = (a - b - x)^2 + (a + b - y)^2$

$\Rightarrow bx - ay = 0$

19 **(a)**

Let the locus of a point in a plane be $P(h, k)$



According to the question,

$|PA| + |PB| = 1 \ \Rightarrow \ |h| + |k| = 1$

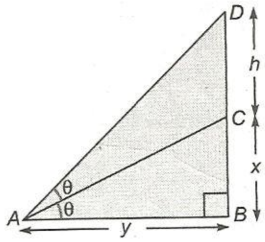
Hence, locus of a point is

$|x| + |y| = 1$

Which represents the equation of square

20 **(b)**

Let BCbe the height of tower and CD be height of the flagstaff



In ΔBAC,$\tan\theta = \frac{x}{y}$ ...(i)

In ΔDAB,$\tan 2\theta = \frac{x+h}{y}$

$\Rightarrow \frac{2\tan\theta}{1-\tan^2\theta} = \frac{x+h}{y} \Rightarrow \frac{2\left(\frac{x}{y}\right)}{1-\frac{x^2}{y^2}} = \frac{x+h}{y}$ [from Eq. (i)]

$\Rightarrow 2xy^2 - xy^2 + x^3 = \left(y^2 - x^2\right)h$

$\Rightarrow h = \frac{x(x^2+y^2)}{(y^2-x^2)}$

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