

## DPP

DAILY PRACTICE PROBLEMS

CLASS : XI<sup>th</sup>  
DATE :

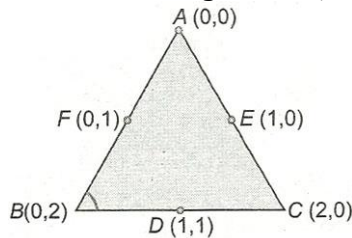
**Solutions**

SUBJECT : MATHS  
DPP NO. : 2

### Topic :- CO-ORDINATE GEOMETRY

1 (c)

Since,  $F, E$  and  $D$  are the mid points of the sides  $AB, AC$  and  $BC$  of triangle  $ABC$  respectively, then the vertices of triangle are  $A(0, 0), B(0, 2), C(2, 0)$



$$\text{Now, } AB = c = \sqrt{0^2 + 2^2} = 2$$

$$BC = a = \sqrt{2^2 + 2^2} = 2\sqrt{2}$$

$$\text{And } CA = b = \sqrt{2^2 + 0^2} = 2$$

$\therefore$   $x$  coordinates of incentre

$$\begin{aligned} &= \frac{ax_1 + bx_2 + cx_3}{a + b + c} \\ &= \frac{2\sqrt{2}(0) + 2(0) + 2(2)}{2\sqrt{2} + 2 + 2} \\ &= \frac{2}{2 + \sqrt{2}} = 2 - \sqrt{2} \end{aligned}$$

2 (a)

Let  $(x, y)$  be the coordinates of vertex  $C$  and  $(x_1, y_1)$  be the coordinates of centroid of the triangle.

$$\therefore x_1 = \frac{x+2-2}{3} \text{ and } y_1 = \frac{y-3+1}{3}$$

$$\Rightarrow x_1 = \frac{x}{3} \text{ and } y_1 = \frac{y-2}{3}$$

Since, the centroid lies on the line  $2x + 3y = 1$

$$\therefore 2x_1 + 3y_1 = 1$$

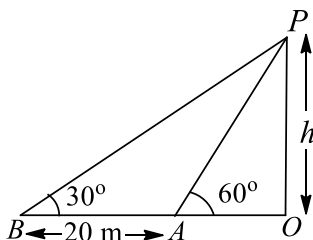
$$\Rightarrow \frac{2x}{3} + \frac{3(y-2)}{3} = 1$$

$$\Rightarrow 2x + 3y = 9$$

This equation represents the locus of the vertex  $C$

3 (c)

Let the height of the tower be  $h$





$$\text{In } \Delta PAO, \tan 60^\circ = \frac{h}{OA}$$

$$\Rightarrow OA = h \cot 60^\circ = \frac{h}{\sqrt{3}} \quad \dots(i)$$

$$\text{In } \Delta PBO, \tan 30^\circ = \frac{h}{OB}$$

$$\Rightarrow OB = \frac{h}{\frac{1}{\sqrt{3}}}$$

$$\Rightarrow AB + AO = \sqrt{3} h$$

$$\Rightarrow 20 + \frac{h}{\sqrt{3}} = \sqrt{3} h \quad [\text{using Eq.(i)}]$$

$$\Rightarrow h = \frac{20}{\sqrt{3} - \frac{1}{\sqrt{3}}}$$

$$\Rightarrow h = \frac{20\sqrt{3}}{2}$$

$$\Rightarrow h = 10\sqrt{3} \text{ m}$$

4 **(a)**

$$\text{We have, } \sin \frac{A}{2} = \sqrt{\frac{(s-b)(s-c)}{bc}}$$

$$\Rightarrow bc \sin^2 \frac{A}{2} = (s-b)(s-c)$$

$$\text{On comparing with } x \sin^2 \frac{A}{2} = (s-b)(s-c)$$

We get,  $x = bc$

5 **(c)**

$$\therefore p_1^2 + p_2^2 = \frac{4a^2}{\sec^2 \alpha + \operatorname{cosec}^2 \alpha} + \frac{a^2 \cos^2 2\alpha}{\cos^2 \alpha + \sin^2 \alpha}$$

$$= a^2 \left( \frac{4 \cos^2 \alpha \sin^2 \alpha}{\cos^2 \alpha + \sin^2 \alpha} + \frac{\cos^2 2\alpha}{1} \right)$$

$$= a^2 (\sin^2 2\alpha + \cos^2 2\alpha) = a^2$$

$$\text{and } p_1^2 p_2^2 = a^4 \sin^2 2\alpha \cos^2 2\alpha = \left(\frac{1}{4}\right) a^4 \sin^2 4\alpha$$

$$\therefore \left(\frac{p_1}{p_2} + \frac{p_2}{p_1}\right)^2 = \frac{(p_1^2 + p_2^2)^2}{p_1^2 p_2^2}$$

$$= \frac{4}{\sin^2 4\alpha} = 4 \operatorname{cosec}^2 4\alpha$$

6 **(c)**

Let  $A(2, 1), B(-2, 4)$

$$\therefore AB = 5$$

Hence, the locus is the line segment  $AB$

7 **(b)**

$$\frac{1}{r^2} + \frac{1}{r_1^2} + \frac{1}{r_2^2} + \frac{1}{r_3^2}$$

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

$$= \frac{4s^2 + a^2 + b^2 + c^2 - 2s(a+b+c)}{\Delta^2}$$

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

8 **(b)**

Let  $a = 4 \text{ cm}, b = 5 \text{ cm}$  and  $c = 6 \text{ cm}$



$$\therefore s = \frac{4 + 5 + 6}{2} = \frac{15}{2}$$

Hence, area of triangle =  $\sqrt{s(s-a)(s-b)(s-c)}$

$$= \sqrt{\left(\frac{15}{2}\right)\left(\frac{15}{2} - 4\right)\left(\frac{15}{2} - 5\right)\left(\frac{15}{2} - 6\right)}$$

$$= \sqrt{\frac{15}{2} \times \frac{7}{2} \times \frac{5}{2} \times \frac{3}{2}} = \frac{15}{4} \sqrt{7} \text{ cm}^2$$

10 (a)

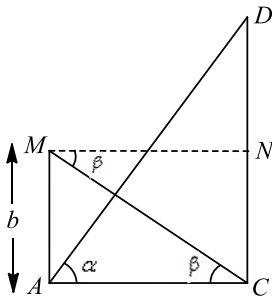
Let CD be the tower

In  $\triangle ACM$ ,  $\tan \beta = \frac{b}{AC}$

$$\Rightarrow AC = b \cot \beta$$

and in  $\triangle ADC$ ,  $\tan \alpha = \frac{CD}{AC}$

$$\Rightarrow CD = b \cot \beta \tan \alpha$$



11 (c)

$$\text{Since, } R = \frac{b}{2 \sin B} = \frac{2}{2 \sin 30^\circ} = \frac{2}{1}$$

$$\text{Area of circumcircle} = \pi R^2$$

$$= \pi \times (2)^2 = 4\pi \text{ sq unit}$$

13 (b)

$$\frac{b^2 - c^2}{4R^2} = \frac{4R^2(\sin^2 B - \sin^2 C)}{4R^2}$$

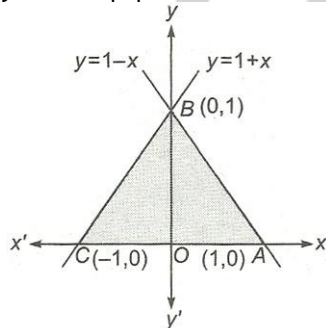
$$= \frac{2aR \sin(B+C) \sin(B-C)}{\sin A}$$

$$= \sin(B-C)$$

14 (a)

Given curve is

$$y = 1 - |x|$$



$$\therefore \text{Area of } \triangle ABC = 2 \text{ area of } \triangle AOB$$

$$= 2 \times \frac{1}{2} \times 1 \times 1 = 1 \text{ sq unit}$$

15 (b)

Given, angles  $A, B, C$  of  $\triangle ABC$  are in AP with  $d$  (common difference) =  $15^\circ$



$$\therefore B = A + 15^\circ \text{ and } C = A + 30^\circ$$

$$\text{Also, } A + B + C = 180^\circ$$

$$\Rightarrow A + A + 15^\circ + A + 30^\circ = 180^\circ$$

$$\Rightarrow \angle A = 45^\circ$$

$$\therefore \angle B = 45^\circ + 15^\circ = 60^\circ$$

16 (a)

$$\text{Since, } \left(1 - \frac{r_1}{r_2}\right)\left(1 - \frac{r_1}{r_3}\right) = 2$$

$$\therefore \left(1 - \frac{s-b}{s-a}\right)\left(1 - \frac{s-c}{s-a}\right) = 2$$

$$\Rightarrow \frac{(b-a)(c-a)}{(s-a)^2} = 2$$

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

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

So, triangle is right angled

17 (b)

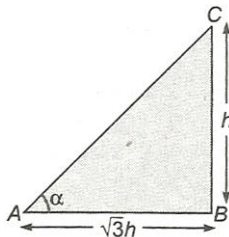
Let the height of the tower be  $BC = h$ , then length of shadow of tower  $AB = \sqrt{3}h$ .

$$\text{In } \triangle ABC, \tan \alpha = \frac{BC}{AB}$$

$$\Rightarrow \tan \alpha = \frac{h}{\sqrt{3}h}$$

$$\Rightarrow \tan \alpha = \tan 30^\circ$$

$$\Rightarrow \alpha = 30^\circ$$



18 (d)

Let the coordinates of  $P$  be  $(h, k)$ . Then,

$$x = X + h, y = Y + k$$

Substituting these in  $2x^2 + y^2 - 4x - 4y = 0$ , we get

$$2X^2 + Y^2 + 4(h-1)X + 2(k-2)Y + 2h^2 + k^2 - 4h - 4k = 0$$

Comparing this equation with

$$2X^2 + Y^2 - 8X - 8Y + 18 = 0, \text{ we get}$$

$$h-1 = -2, (k-2) = -4 \text{ and } 2h^2 + k^2 - 4h - 4k = 18$$

$$\Rightarrow h = -1, k = -2$$

20 (a)

$$\text{We have, } \tan \frac{C}{2} = \sqrt{\frac{(s-a)(s-b)}{s(s-c)}}$$

$$\therefore (s-a)(s-b) = s(s-c) \text{ (given)}$$

$$\therefore \tan \frac{C}{2} = \sqrt{\frac{s(s-c)}{s(s-c)}}$$

$$\Rightarrow \tan \frac{C}{2} = \tan \frac{\pi}{4}$$

$$\Rightarrow \angle C = 90^\circ$$

### ANSWER-KEY

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



**SMARTLEARN  
COACHING**