DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

Solutions

SUBJECT : MATHS
DPP NO. : 7

Topic :- CO-ORDINATE GEOMETRY

1 **(a)**

$BP - AP = \pm 6$ or $BP = AP \pm 6$

$\Rightarrow \sqrt{x^2 + (y+4)^2} = \sqrt{x^2 + (y-4)^2} \pm 6$

Squaring and simplification, we get

$4y - 9 = \pm 3\sqrt{x^2 + (y-4)^2}$

Again squaring, we get

$9x^2 - 7y^2 + 63 = 0$

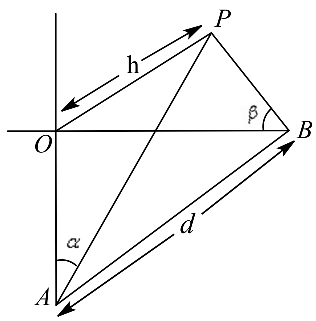
2 **(c)**

Let OP be the tower whose height is h metres

In $\Delta\, OAP$, $\tan\alpha = \frac{OP}{OA}$

$\Rightarrow OA = h\cot\alpha$ ...(i)

In $\Delta\, OBP$, $\tan\beta = \frac{OP}{OB}$



$\Rightarrow OB = h\cot\beta$ ...(ii)

Now, in $\Delta\, OAB$, $AB^2 = OA^2 + OB^2$

$\Rightarrow d^2 = h^2(\cot^2\alpha + \cot^2\beta)$ [from Eq. (i) and (ii)]

$$\Rightarrow h = \frac{d}{\sqrt{\cot^2\alpha + \cot^2\beta}}$$

3 **(d)**

Since, the coordinates of P are $(1, 0)$

Let any point Q on $y^2 = 8x$ is $(2t^2, 4t)$

Again, let mid point of PQ is (h, k), so

$h = \frac{2t^2+1}{2} \Rightarrow 2h = 2t^2 + 1$ ...(i) and $k = \frac{4t + 0}{2} \Rightarrow t = \frac{k}{2}$ ...(ii)

on putting the value of t from Eq. (ii) in Eq. (i), we get

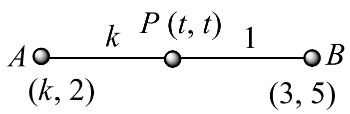
$$2h = \frac{2k^2}{4} + 1 \Rightarrow 4h = k^2 + 2$$

Hence, locus of (h, k) is $y^2 - 4x + 2 = 0$

4 **(b)**

Let $P(t, t)$ divides AB in the ratio k:1, then

$\frac{3k + k}{k + 1} = t$ and $\frac{5k + 2}{k + 1} = t$



$$\Rightarrow \frac{3k + k}{k + 1} = \frac{5k + 2}{k + 1}$$

$\Rightarrow 4k - 5k = 2$

$\Rightarrow k = -2$

5 **(c)**

Since, a, b and c, the sides of a triangle are in AP

$\therefore 2b = a + c$ ...(i)

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

$\Rightarrow \cos A = \frac{b^2 + c^2 - (2b - c)^2}{2bc}$ [from Eq. (i)]

$$\Rightarrow \cos A = \frac{b^2 + c^2 - 4b^2 - c^2 + 4bc}{2bc}$$

$$\Rightarrow \cos A = \frac{4c - 3b}{2c}$$

6 **(b)**

The intersection points of given lines are

$(0, 0), \left(\frac{5}{2}, 5\right), \left(\frac{5}{3}, 5\right)$

$$\therefore \text{Area of } \Delta = \frac{1}{2}\begin{vmatrix} 0 & 0 & 1 \\ \frac{5}{2} & 5 & 1 \\ \frac{5}{3} & 5 & 1 \end{vmatrix}$$

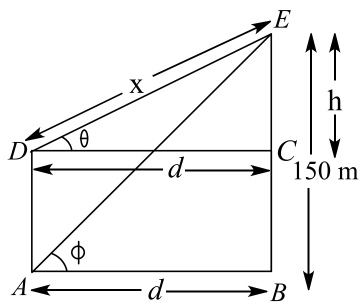
$$= \frac{1}{2}\left[1\left(\frac{25}{2} - \frac{25}{3}\right)\right]$$

$= \frac{1}{2} \times \frac{25}{6} = \frac{25}{12}$ sq units

7 **(d)**

Given that,

$\tan\theta = \frac{4}{3}$ and $\tan\phi = \frac{5}{2}$ ...(i)



In $\Delta\, ABE$, $\tan\phi = \frac{150}{d}$

$\Rightarrow\ d = 150\cot\phi$

$= 150 \times \frac{2}{5} = 60$ m ...(ii)

In $\Delta\, DCE$, $\tan\theta = \frac{h}{d}$

$\Rightarrow \frac{4}{3} = \frac{h}{d}$ [from Eq.(i)]

$\Rightarrow h = \frac{4}{3}(60)$ [from Eq.(ii)]

$\Rightarrow h = 80$ m

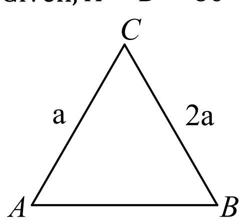
Now, in $\Delta\, DCE$, $DE^2 = DC^2 + CE^2$

$\Rightarrow\ x^2 = 60^2 + 80^2 = 10000$

$\Rightarrow x = 100$ m

8 **(d)**

Given, $A - B = 60°$



By sine rule,

$$\frac{2a}{\sin A} = \frac{a}{\sin B}$$

$\Rightarrow\ \sin A - 2\sin B = 0$

$\Rightarrow\ \sin(60° + B) - 2\sin B = 0$

$\Rightarrow \frac{\sqrt{3}}{2}\cos B + \frac{1}{2}\sin B - 2\sin B = 0$

$\Rightarrow \frac{\sqrt{3}}{2}\cos B - \frac{3}{2}\sin B = 0$

$\Rightarrow \sqrt{3}\left(\frac{1}{2}\cos B - \frac{\sqrt{3}}{2}\sin B\right) = 0$

$\Rightarrow \sqrt{3}[\cos(60° + B)] = 0$

$\Rightarrow 60° + B = 90°$

$\Rightarrow B = 30°$

$\Rightarrow A = 90°$

Hence, it is right angled triangle

9 **(c)**

$$\begin{vmatrix} 3q & 0 & 1 \\ 0 & 3p & 1 \\ 1 & 1 & 1 \end{vmatrix} = 0$$

$\Rightarrow\ 3q(3p-1)+1(0-3p)=0$

$\Rightarrow\ \ 9pq = 3p+3q$

$\Rightarrow \dfrac{1}{p}+\dfrac{1}{q}=3$

10 **(c)**

Here, $s=\frac{15+36+39}{2}=45$

$\therefore\ \sin\dfrac{C}{2}=\sqrt{\dfrac{(s-a)(s-b)}{ab}}$

$\Rightarrow \sin\dfrac{C}{2}=\sqrt{\dfrac{(45-15)(45-36)}{15\times 36}}$

$=\sqrt{\dfrac{30\times 9}{15\times 36}}=\dfrac{1}{\sqrt{2}}$

11 **(c)**

Since, $\frac{c}{\sin C}=2R \Rightarrow c=2R\ \ [\because C=90°]$ ...(i)

And $\tan\frac{C}{2}=\frac{r}{s-c}$

$\Rightarrow \tan\dfrac{\pi}{4}=\dfrac{r}{s-c}$

$\therefore\ r=s-c$

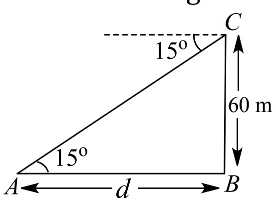
$\Rightarrow\ a+b-c=2r$ ...(ii)

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

$2(r+R)=a+b$

12 **(b)**

Let BC be the light house



In $\Delta\, ABC$, $\tan 15° = \frac{60}{d}$

$\Rightarrow\ d=60\cot 15°\ =60\left(\dfrac{\sqrt{3}+1}{\sqrt{3}-1}\right)$ m

13 **(b)**

Given that, $\cos^2 A+\cos^2 C=\sin^2 B$

Obviously it is not an equilateral triangle because $A=B=C=60°$ does not satisfy the given condition. But $B=90°$, then $\sin^2 B=1$ and

$\cos^2 A\ +\cos^2 C\ =\ \cos^2 A\ +\cos^2\left(\dfrac{\pi}{2}-A\right)$

$=\ \cos^2 A\ +\sin^2 A\ =1$

Hence, this satisfies the condition, so it is a right angled triangle but not necessary isosceles triangle

14 **(d)**

Given, $a{:}b{:}c = 1{:}\sqrt{3}{:}2$

Here, $c^2 = a^2 + b^2$

$\therefore$ Triangle is right angled at C

$\therefore \angle C = 90°$

and $\frac{a}{b} = \frac{1}{\sqrt{3}}$

$\Rightarrow \tan A = \frac{1}{\sqrt{3}}$

$\Rightarrow \angle A = 30°$ and $\angle B = 60°$ [as $\angle A + \angle B = 90°$]

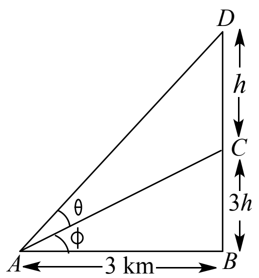
$\therefore$ Ratio of angles $= \angle A{:}\angle B{:}\angle C = 90°$

$= 30°{:}60°{:}90° = 1{:}2{:}3$

15 **(c)**

Given, $\tan\theta = \frac{1}{9}$

In ΔABC, $\tan\phi = \frac{3h}{3} = h$ ...(i)



In $\Delta\, ABD$, $\tan(\theta + \phi) = \frac{4h}{3}$

$$\Rightarrow \frac{\tan\theta + \tan\phi}{1 - \tan\phi\tan\theta} = \frac{4h}{3}$$

$$\Rightarrow \frac{\frac{1}{9} + h}{1 - \frac{h}{9}} = \frac{4h}{3}$$

$$\Rightarrow \frac{1 + 9h}{9 - h} = \frac{4h}{3}$$

$\Rightarrow 3 + 27h = 36h - 4h^2$

$\Rightarrow 4h^2 - 9h + 3 = 0$

$$\Rightarrow h = \frac{9 \pm \sqrt{81 - 48}}{2 \times 4} = \frac{9 \pm \sqrt{33}}{8}$$

16 **(c)**

Let $a = 60° - d$, $B = 60°$, $C = 60° + d$

$$\therefore \frac{b}{c} = \frac{\sin B}{\sin C} = \sqrt{\frac{3}{2}}$$

$$\Rightarrow \frac{\sin 60°}{\sin(60° + d)} = \sqrt{\frac{3}{2}}$$

$$\Rightarrow \frac{\sqrt{3}}{2\sin(60° + d)} = \sqrt{\frac{3}{2}}$$

$$\Rightarrow \sin(60° + d) = \frac{1}{\sqrt{2}}$$

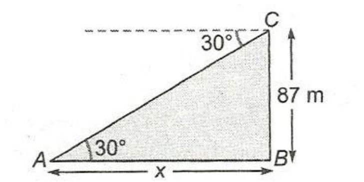
$\Rightarrow 60° + d = 45° \Rightarrow d = -15°$

So, $\angle A = 75°$

17 **(b)**

In ΔABC, $\tan 30° = \frac{87}{x}$

$\Rightarrow x = 87 \times \sqrt{3}$



$$\therefore \text{ Speed} = \frac{\text{Diatance}}{\text{Time}}$$

$$\Rightarrow \text{Time} = \frac{87 \times \sqrt{3} \times 60}{5.8 \times 1000} = \frac{9\sqrt{3}}{10} \text{ min}$$

18 **(c)**

It is given that the centroid of the triangle formed by the points (a,b),(b,c) and (c,a) is at the origin

$$\therefore \left(\frac{a+b+c}{3}, \frac{a+b+c}{3}\right) = (0,0)$$

$\Rightarrow a + b + c = 0 \Rightarrow a^3 + b^3 + c^3 = 3\,abc$

19 **(d)**

We have,

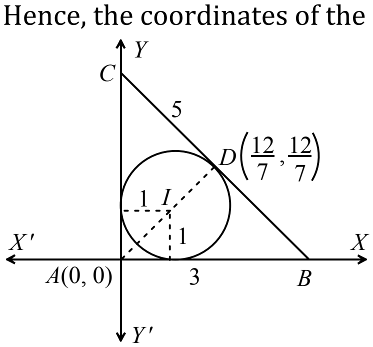
Δ = Area of Δ ABC

$$\Rightarrow \Delta = \frac{1}{2} \times AB \times = \frac{1}{2} \times 3 \times 4 = 6 \text{ sq. units}$$

$$s = \text{Semi} - \text{perimeter} = \frac{1}{2}(3 + 4 + 5) = 6 \text{ units}$$

$$\therefore r = \text{In} - \text{radius} = \frac{\Delta}{s} = 1$$

Hence, the coordinates of the incentre are (1, 1)



20 **(c)**

Given, $a^4 + b^4 + c^4 = 2c^2(a^2 + b^2)$ ...(i)

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

$\Rightarrow \cos^2 C = \left[\dfrac{a^4+b^4+c^4+2a^2b^2-2c^2(a^2+b^2)}{4a^2b^2}\right]$

$= \left[\dfrac{2c^2(a^2+b^2)+2a^2b^2-2c^2(a^2+b^2)}{4a^2b^2}\right]$

[from Eq. (i)]

$\Rightarrow \cos^2 C = \dfrac{1}{2}$

$\Rightarrow \cos C = \pm \dfrac{1}{\sqrt{2}}$

$\Rightarrow \angle C = 45^\circ$ or 135°

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	C	B	D	D	C	D	B	C	B	A

Q.	11	12	13	14	15	16	17	18	19	20
A.	C	A	D	B	A	B	C	A	C	D