Techno ACE

Illustrated Answer for Model Question Paper

Mathematics

Class : X going to XI

1. $(x^2-3x+3)^{x^2-16x+48}=1$

Case 1: $x^2 - 16x + 48 = 0$

$\Rightarrow x = 12, 4$

Case 2: $x^2 - 3x + 3 = 1$

$\Rightarrow x^2 - 3x + 2 = 0$

$\Rightarrow x = 1, 2$

Case 3: $x^2 - 3x + 3 = -1$ when $x^2 - 16x + 48$ is even

$\Rightarrow x^2 - 3x + 4 = 0$

$D = 9 - 16 = -7 < 0$

$\therefore$ no real solutions

$\therefore$ Product of all real integral solutions $= 12 \times 4 \times 2 \times 1 = 96$

Ans. ©

2. $x+y+\frac{5}{x-y}=10$; $x + y + 2(x - y) = 7$

$\Rightarrow 10-\frac{5}{x-y}+2(x-y)=7$

$\Rightarrow 2a-\frac{5}{a}=-3$ where $x - y = a$

$\Rightarrow 2a^2 + 3a - 5 = 0$

$\Rightarrow 2a^2 - 2a + 5a - 5 = 0$

$\Rightarrow 2a(a - 1) + 5(a - 1) = 0$

$\Rightarrow (a - 1)(2a + 5) = 0$

$\therefore a = 1, a = -\frac{5}{2}$

$\therefore x-y=\frac{-5}{2}$ (not possible)

$\therefore x - y = 1$

$\Rightarrow x + y = 5$

$\therefore 2x = 6$

$\Rightarrow x = 3, y = 2$

$\therefore x^2 + 4y^2 = 9 + 16 = 25$

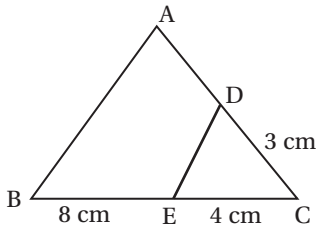
Ans. ©

3. $\sqrt{\frac{\cot^2\theta\sec^2\theta-1}{\operatorname{cosec}^2\theta\tan^2\theta-1}}+1=\sqrt{\frac{\operatorname{cosec}^2\theta-1}{\sec^2\theta-1}}+1=\sqrt{\frac{\cot^2\theta}{\tan^2\theta}}+1$

$=\cot^2\theta+1=\operatorname{cosec}^2\theta$

Ans. Ⓑ

4.



$\frac{EC}{EB}=\frac{CD}{DA}$

$\Rightarrow \frac{4}{8}=\frac{3}{DA}$

$\therefore DA = 6$ cm

Ans. Ⓐ

5. $153 = 3^2 \times 17$ $\quad \therefore$ HCF $= 17$

$85 = 5 \times 17$ $\quad \therefore 85x - 153 = 17$

$\Rightarrow 85x = 170$

$\therefore x = 2$

Ans. Ⓑ

6. $5\sec\theta-2\tan\theta=5$

Let $5\tan\theta-2\sec\theta=K$

$\therefore(5\sec\theta-2\tan\theta)^2-(5\tan\theta-2\sec\theta)^2=25-K^2$

$\Rightarrow 25(\sec^2\theta-\tan^2\theta)+4(\tan^2\theta-\sec^2\theta)=25-K^2$

$\Rightarrow 25 - 4 = 25 - K^2$

$\Rightarrow K^2=4 \quad \Rightarrow K=\pm2$

$\therefore 5\tan\theta-2\sec\theta=2$

Ans. Ⓓ

7. $\frac{KP}{PE}=\frac{KQ}{QT}\Rightarrow\frac{x-1}{x}=\frac{4x-5}{5x-4}$

$\Rightarrow 5x^2 - 5x - 4x + 4 = 4x^2 - 5x$

$\Rightarrow x^2 - 4x + 4 = 0 \Rightarrow (x - 2)^2 = 0 \Rightarrow x = 2$

$\therefore KP = (2 - 1)$ cm $= 1$ cm, $PE = 2$ cm

$\therefore KE = 3$cm.

$\Delta KPQ \sim \Delta KET \Rightarrow \frac{KP}{KE}=\frac{PQ}{ET}$

$\Rightarrow \frac{1}{3}=\frac{4\text{cm}}{ET}\Rightarrow ET=12\text{cm}$

$\therefore KI = ET = 12$ cm

Ans. Ⓓ

8. Values of a and b can be 2, 3, 5, 7.

$\alpha+\beta=a,\ \alpha\beta=b\ \because b$ is prime so one root must be 1.

Let $\alpha=1\ \therefore\beta=b\ \therefore 1+b=a$

$\Rightarrow a - b = 1$

$\therefore a = 3, b = 2$

$\therefore a^b = 3^2 = 9$

Ans. Ⓒ

9. $(x^2 - 5)^2 = 16$

$\Rightarrow x^2 - 5 = \pm 4$

$\Rightarrow x^2 = 9$ or $x^2 = 1$

$\Rightarrow x = \pm 3$ or $x = \pm 1$

4 different real values of x.

Ans. Ⓓ

10. $x^3 - ax^2 + bx - 1830$

$\alpha + \beta + \gamma = a,\ \alpha\beta + \beta\gamma + \alpha\gamma = b,\ \alpha\beta\gamma = 1830$

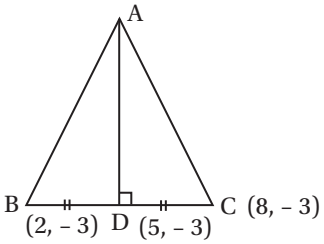
$\Rightarrow \alpha\beta\gamma = 2 \times 3 \times 5 \times 61$

For minimum value of a, three roots will be

6, 5, 61. $\quad a = 6 + 5 + 61 = 72$

Ans. Ⓒ

11.



$$AD = \frac{\sqrt{3}}{2}BC = \frac{\sqrt{3}}{\cancel{2}} \times \cancel{6}^{3} = 3\sqrt{3}$$

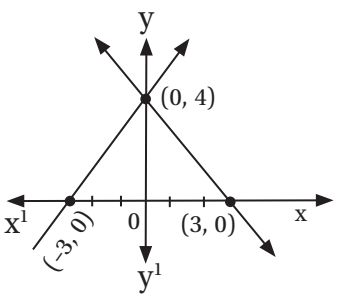
$\therefore$ Co-ordinates of $A(5, 3(\sqrt{3}-1))$

Ans. Ⓑ

12. $4x + 3y = 12,\ 4x - 3y = -12,\ y = 0$

For $y = 0,\ x = 3$ For $y = 0,\ x = -3$

For $x = 0,\ y = 4$ For $x = 0,\ y = 4$



$$\text{Area} = \frac{1}{\cancel{2}} \times 6 \times \cancel{4}^{2}$$

$= 12$ sq. units

Ans. Ⓑ

13. $\sqrt{a}+\sqrt{b}=7$

$2\sqrt{a}+3\sqrt{b}=17$

$\Rightarrow \sqrt{a}+2\sqrt{b}=10$

$-\sqrt{a}\pm\sqrt{b}\equiv 7$

$\sqrt{b}=3\Rightarrow b=9$

$\therefore \sqrt{a}=4\Rightarrow a=16$

$\therefore AD^2 = BD \times CD = 16 \times 9 \Rightarrow AD = 12$

Ans. Ⓐ

14. $\dfrac{1+\sin^2\theta(\cot^2\theta-1)}{\cos^2\theta}=2^n$

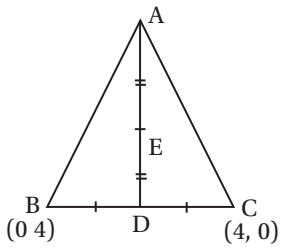
$\Rightarrow \dfrac{1+\sin^2\theta\cot^2\theta-\sin^2\theta}{\cos^2\theta}=2^n$

$\Rightarrow \dfrac{\cos^2\theta+\cos^2\theta}{\cos^2\theta}=2^n$

$\Rightarrow 2 = 2^n \Rightarrow n = 1$

Ans. Ⓐ

15.



$D = (2, 2)$

Let $A = (x, y)$

$\therefore E=\left(\dfrac{x+2}{2},\dfrac{y+2}{2}\right)$

$\therefore x = 33, \quad y = 11$

$\therefore A(33, 11)$

Ans. Ⓑ