# ACE OF PACE OBJECTIVE SECTION
## (SOLUTION)

**1.** **(B)**

$25^{x-1} = 5^{2x-1} - 100$ (given)

Or, $5^{2(x-1)} = 5^{2x-1} - 100$

Or , $5^{2x-1} - 5^{2x-2} = 100$

Only, x = 2, satisfy above equation.

**2.** **(A)**

$104^o + 90^o + 25^o + x = 360^o$ [complete angle]

$\Rightarrow x = 141^o$

**3.** **(B)**

$PQ = QR$

$\Rightarrow \angle QPR = \angle QRP$

$\Rightarrow \angle QRP = 48^o$

In $\Delta PQR$

$\angle P + \angle Q + \angle QRP = 180^o$ [Angle sum property of $\Delta$]

$\Rightarrow 48^o + \angle Q + 48^o = 180^o$

$\Rightarrow \angle Q = 180^o - 96^o$

$\Rightarrow \angle Q = 84^o$

**4.** **(A)**

Let OD = x

$\Rightarrow AD = 5 - x$

In $\Delta OCD$, $OC^2 = OD^2 + CD^2$

$\Rightarrow 5^2 = x^2 + CD^2$

$\Rightarrow CD^2 = 25 - x^2$ ……(1)

In $\Delta ACD$ , $AC^2 = AD^2 + CD^2$

$\Rightarrow 6^2 = (5 - x)^2 + CD^2$

$\Rightarrow CD^2 = 11 + 10x - x^2$ …….(2)

From (1) and (2), we get

$11 + 10x - x^2 = 25 - x^2$

$\Rightarrow 10x = 14$

$\Rightarrow x = 1.4cm$

$CD^2 = 25 - (1.4)^2 = 23.04$

$\Rightarrow CD = 4.8cm$

$\therefore BC = 2 \times CD = 2 \times 4.8cm = 9.6cm$

**5. (D)**

$s = \frac{9+12+15}{2} = \frac{36}{2} = 18\text{cm}$

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

$= \sqrt{18(18-9)(18-12)(18-15)}$

$= \sqrt{18\times 9\times 6\times 3} = \sqrt{9\times 2\times 9\times 3\times 2\times 3}$

$= 9\times 3\times 2 = 54\text{cm}^2$.

Aliter:

$9^2 + 2^2 = 15^2$

Hence, triangle is right angled with hypotenuse = 15 cm.

$\therefore$ Area $= \frac{1}{2}\times 9\times 12 = 54\,\text{cm}$

**6. (D)**

$\sin^2 5^o + \sin^2 10^o + \sin^2 15^o ..... + \sin^2 90^o$

$= \left(\sin^2 5^o + \sin^2 85^o\right) + \left(\sin^2 10^o + \sin^2 80^o\right) + \ ..... + \sin^2 45 + \sin^2 90^o \left(\sin 85^o = \cos 5^o\right)$

$= 8 + \left(\frac{1}{\sqrt{2}}\right)^2 + 1, = 9 + 1/2 = 19/2$

**7. (A)**

(i) Number of ways of drawing 2 red balls = ${}^7C_2$, similarly number of ways of drawing 2 black balls = ${}^7C_2$.

(ii) Total number of ways of drawing 2 balls out of 14 balls = ${}^{14}C_2$

$\therefore \ \frac{{}^7C_2 + {}^7C_2}{{}^{14}C_2} = \frac{6}{13}$

**8. (D)**

Find the intercept made on X-axis and Y-axis. Then Area = $\frac{1}{2}|ab|$

**9. (C)**

(i) Evaluate the point using section formula then proceed.
(ii) Find the point on the required line that divides the line joining the points in the ratio 2 : 3.
(iii) If two lines are perpendicular then $m_1 \times m_2 = -1$
(iv) Find the slope of the required line
(v) Hence find the equation of the line by using slope-point formula.

**10. (B)**

Required area is the difference of areas of rectangle and sum of areas of two sectors.

**11. (B)**

We note that $\angle BDC = \angle BAC = x^o$. Now, we use the exterior angle theorem in $\Delta CDE$,

$130^o = 30^o + x^o$

$\Rightarrow x^o = 100^o$

**12. (A)**

The correct answer is 10. Using the angle sum property, we have:

$(7x-4)^0 + (6X-4)^0 + (5x+8)^0 = 180^0$

$\Rightarrow 18x = 180$

$\Rightarrow x = 10$

**13. (A)**

We have

$$S = \frac{2}{7+\sqrt{5}} \times \frac{7-\sqrt{5}}{7-\sqrt{5}} = \frac{2\left(7-\sqrt{5}\right)}{49-5}$$

$$= \frac{7-\sqrt{5}}{22}$$

**14. (B)**

$\alpha + \beta = 5,\ \alpha\beta = 4$

Now, $\frac{1}{\alpha} + \frac{1}{\beta} - 2\alpha\beta = \left(\frac{\alpha+\beta}{\alpha\beta}\right) - 2\alpha\beta = \frac{5}{4} - \frac{2\times 4}{1} = \frac{5-32}{4} = -\frac{27}{4}$

**15. (C)**

Let number of newspaper be x. If every students reads one newspaper, the number of students would be x(60) = 60x

Since, every students reads 5 newspaper

$\therefore$ Number of students = $\frac{x \times 60}{5} = 300,\ x = 25$

**16. (D)**

Consider $\Delta$s , DNR and BMR

DN = BM [Given]

$\angle DNR = \angle BMR$ [Each $90^o$]

$\angle DRN = \angle BRM$

[Vertically opposite angles]

$\therefore \Delta DNR \cong \Delta BMR$ [AAS congruency]

$\therefore DR = BR \Rightarrow BD = 2BR$

$\therefore BD = 2 \times 8 = 16cm$

**17. (B)**

**18. (C)**

Obviously radius = $\sqrt{(1-4)^2 + (2-6)^2} = 5$

Hence the area is given by $\pi r^2 = 25\pi$ sq. units.

**19. (B)**

Area of an equilateral triangle = $\frac{\sqrt{3}}{4}\times(\text{side})^2$

$9\sqrt{3} = \frac{\sqrt{3}}{4}\times(\text{side})^2$

$(\text{side})^2 = 36\text{cm}^2$

Side = 6cm

**20. (B)**

Volume of a cube = $(\text{side})^3$

$216 = (\text{side})^3$

$6^3 = (\text{side})^3$

6 meter = side

**21. (C)**

**22. (B)**

No. of vowels in alphabet = 5

No. of letters in alphabet = 26

Then probability of choosing a vowel = $\frac{5}{26}$

**23. (A)**

$$\frac{1+\sin 30^\circ}{\tan^2 45^\circ - \cos 60^\circ} = \frac{1+\frac{1}{2}}{(1)^2 - \frac{1}{2}} = 3$$

**24. (A)**

$$\frac{\cos 70^\circ}{\sin 20^\circ} + \frac{\cos 59^\circ}{\sin 31^\circ} - 8\times\left(\frac{1}{2}\right)^2$$

$$= \frac{\cos(90-20)}{\sin 20} + \frac{\cos(90-31)}{\sin 31} - 8\times\frac{1}{4}$$

$$= \frac{\cancel{\sin 20^\circ}}{\cancel{\sin 20^\circ}} + \frac{\cancel{\sin 31}}{\cancel{\sin 31}} - 2$$

$$= 1+1-2 = 2-2 = 0$$

**25. (A)**

$4\cot x = 3$

$\cot x = \frac{3}{4}$

$$\therefore \quad \frac{\sin x - \cos x}{\sin x + \cos x} = \frac{\sin x\left(1 - \frac{\cos x}{\sin x}\right)}{\sin x\left(1 + \frac{\cos x}{\sin x}\right)} = \frac{1 - \cot x}{1 + \cot x} = \frac{1 - 3/4}{1 + 3/4} = \frac{1}{7}$$

**26. (D)**

Let the Number of Re. 1 coins be x and Rs 2 coins be y

Then

Total value of Re 1 coins = Rs x

Total value of Rs 2 coins = Rs 2y

$\therefore \quad x + 2y = 75$

From (i) $x = 50 - y$

Putting the value of x in equation (2) and (3)

$50 - y + 2y = 75$

$y = 25$

Putting $y = 25$ is equation (3), we get $x = 25$

**27. (B)**

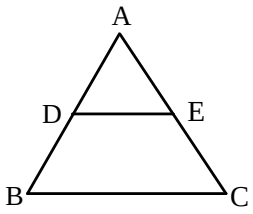
Since $DE \| BC \qquad \therefore \frac{AD}{DB} = \frac{AE}{EC}$

$\Rightarrow \quad \frac{2.5}{3} = \frac{3.75}{EC}$

$\Rightarrow \quad EC = 4.5\text{cm}$

$\therefore \quad AC = AE + EC$

$\Rightarrow \quad AC = 3.75 + 4.5 = 8.25\,\text{cm}$




**28. (A)**

Arranging x in the ascending order

| x | f | cf |
|---|---|---|
| 2 | 13 | 13 |
| 3 | 7 | 20 |
| 5 | 8 | 28 |
| $\boxed{6}$ | 9 | $37 \leftarrow$ median class |
| 7 | 12 | 49 |
| 9 | 14 | 63 |
| 10 | 11 | 74 |

Here $\frac{N}{2} = \frac{74}{2} = 37 \therefore \text{median} = 6$

**29. (A)**

**30. (A)**

We have

$$\frac{1}{\alpha}+\frac{1}{\beta}=\frac{\alpha+\beta}{\alpha\beta}=\frac{-\frac{8}{3}}{\frac{2}{3}}=-4$$

**31. (C)**

We will express all three terms in a way such that the exponents are the same:

$\sqrt[3]{7}=(7)^{\frac{1}{3}}=\left(7^4\right)^{\frac{1}{12}}=(2401)^{\frac{1}{12}}$

$\sqrt[4]{6}=(6)^{\frac{1}{4}}=\left(6^3\right)^{\frac{1}{12}}=(216)^{\frac{1}{12}}$

$\sqrt{5}=(5)^{\frac{1}{2}}=\left(5^6\right)^{\frac{1}{12}}=(15625)^{\frac{1}{12}}$

It is now straight forward to compare the three terms, and we obtain

$\sqrt[4]{6}<\sqrt[3]{7}<\sqrt{5}$

**32. (A)**

We have:

$$\left(\frac{1}{5}\right)^{m}\times\left(\frac{1}{4}\right)^{18}=\frac{1}{2\times10^{35}}$$

$$\Rightarrow \quad \frac{1}{5^{m}}\times\frac{1}{\left(2^2\right)^{18}}=\frac{1}{2\times(2\times5)^{35}}$$

$$\Rightarrow \quad \frac{1}{2^{36}\times5^{m}}=\frac{1}{2\times2^{35}\times5^{35}}$$

$$\Rightarrow \quad \frac{1}{2^{36}\times5^{m}}=\frac{1}{2^{36}\times5^{35}}$$

$\therefore \quad m=35$

**33. (C)**

We have

$\angle AOX+\angle BOX=180^{o}$ (Linear Pair)

$\Rightarrow 115^{o}+x+25^{o}=180^{o}$

$\Rightarrow x+140^{o}=180^{o}$

$\Rightarrow x=40^{o}$

Now, $\angle AOY+\angle BOY=180^{o}$

$\Rightarrow \angle AOY+3x-45^{o}=180^{o}$

$\Rightarrow \angle AOY+120^{o}-45^{o}=180^{o}$

$\Rightarrow \angle AOY+75^{o}=180^{o}$

$\Rightarrow \angle AOY=180^{o}-75^{o}=105^{o}$

**34. (B)**

The correct answer is 30. Using the angle sum property in $\Delta ABC$ and $\Delta DEC,$ we have

$40^{o}+70^{o}+\angle ACB=180^{o}$ and

$80^{o}+x^{0}+\angle DCE=180^{o}$

Clearly, $\angle ACB = \angle DCE,$ since these are vertically opposite angles. Thus, we have:

$40^o + 70^o = 80^o + x^0$

Thus, $x = 30$

**35. (C)**

Since $\angle OBA = \angle OAB = 25^o$ as well, we have:

$x^o = 180^o - \left(25^o + 25^o\right)$

$= 130^o$