ACE OF PACE (MAIN)

1. **(A)**

$$a^3+\frac{1}{a^3}=\left(a+\frac{1}{a}\right)^3-3\left(a+\frac{1}{a}\right)$$

$$=3\sqrt{3}-3\sqrt{3}=0$$

2. **(B)**

$$\frac{M}{a}=m+n;\frac{N}{b}=m-n$$

$$\therefore\left(\frac{M}{a}+\frac{N}{b}\right)\div\left(\frac{M}{a}-\frac{N}{b}\right)=2m\div 2n=\frac{m}{n}$$

$$=\frac{m}{n}$$

3. **(C)**

$$(a + b + c)^2 = 0$$

$$\Rightarrow a^2+b^2+c^2+2(ab+bc+ca)=0$$

$$\Rightarrow \quad \frac{a^2+b^2+c^2}{bc+ca+ab}=-2$$

4. **(B)**

$a + b = -c$ ect

$$\therefore \quad G.E=\frac{(-c)(-a)(-b)}{abc}=-1$$

5. **(C)**

$$\left(\frac{a}{b}\right)^{x-1}=\left(\frac{a}{b}\right)^{-(x-3)}$$

$\Rightarrow \quad x - 1 = -x + 3$

$\Rightarrow \quad 2x = 4$ or $x = 2$

6. **(A)**

Given expression:

$$\frac{1}{1+a+b^{-1}}+\frac{1}{1+b+c^{-1}}+\frac{1}{1+c+a^{-1}}$$

$$=\frac{1}{1+a+b^{-1}}+\frac{b^{-1}}{b^{-1}+1+b^{-1}c^{-1}}+\frac{a}{1+ca+1}$$

$$=\frac{1}{1+a+b^{-1}}+\frac{b^{-1}}{1+b^{-1}+a}+\frac{a}{a+b^{-1}+1}$$

$$=\frac{1+b^{-1}+a}{1+b^{-1}+a}$$

$= 1$

7. (C)

$5\tan\theta = 4$ i.e., $\tan\theta = \frac{4}{5}$

$\frac{5\sin\theta - 3\cos\theta}{5\sin\theta + 2\cos\theta}$

Dividing numerator and denominator by $\cos\theta$

$= \frac{5\tan\theta - 3}{5\tan\theta + 2}$

$= \frac{5\times\frac{4}{5} - 3}{5\times\frac{4}{5} + 2} = \frac{4-3}{4+2} = \frac{1}{6}$

$= \frac{1}{6}$

8. (A)

$(\tan A + \cot A)\sin A \times \cos A$

$= \left(\frac{\sin A}{\cos A} + \frac{\cos A}{\sin A}\right)\times \sin A \times \cos A$

$= 1$

9. (A)

For $0 < \theta < \pi/4; \cos\theta > \sin\theta$

$\therefore \cos 10^0 > \sin 10^0 \Rightarrow \cos 10^0 - \sin 10^0$

is positive

10. (B)

$\cos 1^0 \cos 2^0 \cos 3^0 \ldots \cos 179^0$

$= \cos 1^0 \cos 2^0 \cos 3^0 \ldots \cos 90^0 \ldots \cos 179^0$

$= 0$ since $\cos 90^0 = 0$

11. (B)

12. (D)

13. (D)

14. (C)

15. (B)

16. (D)

Applying the distance formula for the two points, we have

$d = \sqrt{(a-0)^2 + (b-0)^2}$

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

17. (C)

18. (B)

S = {HH, HT, TH, TT}

$\Rightarrow n(S) = 4$

E = event of getting at the most one

= {TT, HT, TH}

$\Rightarrow$ n(E) = 3

$\therefore P(E) = \frac{n(E)}{n(S)} = \frac{3}{4}$

$= \frac{3}{4}$

19. (B)

S = {1, 2, 3, 4, 5, 6}

$\Rightarrow$ n(S) = 6

E = {3, 6}

$\Rightarrow$ n(E) = 2

$\therefore P(E) = \frac{2}{6} = \frac{1}{3}$

20. (A)

$n(S) = 6 \times 6 = 36$

E = {(2, 6); (6, 2); (3, 5); (5, 3); (4, 4); (4, 5);
(5, 4); (4, 6); (6, 4); (5, 5); (3, 6); (6, 3);
(5, 6); (6, 5); (6, 6)}

$\Rightarrow$ n (E) = 15

$\Rightarrow P(E) = \frac{15}{36} = \frac{5}{12}$

$= \frac{5}{12}$

21. (C)

$n(S) = 6 \times 6 = 36$

E = {(1, 3); (3, 1); (1, 5); (5, 1); (2, 4);
(4, 2); (3, 3); (3, 5); (5, 3); (2, 6); (6, 2);
(6, 6); (4, 4); (2, 2)}

$\therefore$ n(E) = 14

$\Rightarrow P(E) = \frac{14}{36} = \frac{7}{18}$

$= \frac{7}{18}$

22. (A)

In a year, there are 365 days. So, there are 52 weeks and one odd day

In 52 weeks there are 52 Sundays, so it is required to find the probability that this day is Sunday.

$\therefore$ n(S) = 7

and n(E) = 1

Hence $P(E) = \frac{1}{7}$

$= \frac{1}{7}$

23. **(A)**

We know that in a simultaneous throw of two dice, $n(S) = 6 \times 6 = 36$

Let E = event of getting a total of 7 = {(1, 6), (2, 5), (3, 4), (4, 3), (5, 2), (6, 1)}

$\therefore P(E) = \frac{n(E)}{n(S)} = \frac{6}{36} = \frac{1}{6}$

24. **(B)**

Using the exterior angle theorem, we have:

$\angle A + \angle B = \angle PCB$

$\Rightarrow \angle a + \angle b = \angle d + \angle e$

25. **(C)**

Since $AB \parallel CD$, we have:

$\angle AEF = \angle DFE$

$\Rightarrow 2y + 15^o = 3y - 35^o$

$\Rightarrow y = 50^o$

26. **(A)**

We have:

$x^o = \angle BDC = \frac{1}{2}\angle BOC$

$= \frac{1}{2}\left(180^o - 150^o\right) = \frac{1}{2} \times 30^o$

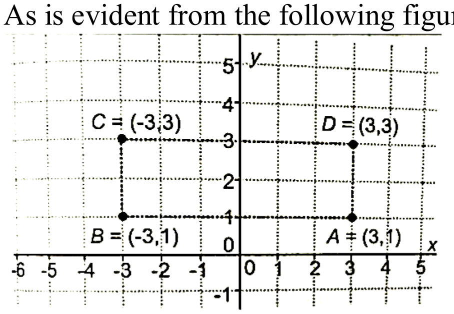
$= 15^o$

27. **(A)**

The point (x, y) may lie in quadrants I or III, because any point in these two quadrants will have coordinates of the same signs, so that their product will be positive.

28. **(C)**

As is evident from the following figure;



29. **(B)**

30. **(C)**

Dividing by $\cos^2\theta$ on both sides of the given relation, we have:

$7\tan^2\theta + 3 = 4\sec^2\theta = 4\left(1 + \tan^2\theta\right)$

$\Rightarrow 3\tan^2\theta = 1$

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