ACE OF PACE

MAIN (CODE: 11) **ANSWERS KEY** **DATE: 25/06/2017**

Question	Answer	Question	Answer
1	A	26	B
2	C	27	A
3	D	28	A
4	A	29	B
5	A	30	B
6	B	31	A
7	B	32	B
8	C	33	B
9	A	34	C
10	C	35	C
11	B	36	D
12	B	37	B
13	A	38	C
14	A	39	B
15	A	40	B
16	D	41	B
17	C	42	C
18	C	43	A
19	D	44	C
20	C	45	B
21	D	46	A
22	A	47	C
23	A	48	D
24	C	49	B
25	A	50	B

ACE OF PACE OBJECTIVE SECTION
(SOLUTION)

1. **(A)**

$\tan 1^o = \tan\left(90^o - 89^o\right) = \cot 89^o$

$= \dfrac{1}{\tan 89^o}$

$= \dfrac{1}{\tan 89^o} \cdot \dfrac{1}{\tan 88^o} \cdot \dfrac{1}{\tan 87^o} \ldots\ldots \tan 45^o . \tan 46^o \ldots\ldots \tan 87^o \tan 88^o \tan 89^o$

$= \dfrac{1}{\tan 89^o}\left(\dfrac{1}{\tan 88^o}\right) \cdot \dfrac{1}{\tan 87^o} \ldots\ldots \tan 45^o \left(\tan 88^o\right) \tan 89^o$

$= 1$

2. **(C)**

$\sin^2\theta - 5\sin\theta + 3 = 1 - \sin^2\theta$

$\left(2\sin\theta - 1\right)\left(\sin\theta - 2\right) = 0$

$\sin\theta = 2$ or $\sin\theta = \dfrac{1}{2}$

$\sin\theta = 2$ not possible

$\therefore \theta = 30^o$

3. **(D)**

$\log\left[\sin 0^o \times \sin 1^o \times \sin 2^o \times \ldots\ldots \times \sin 90^o\right]$

$= \log\left[0 \times \ldots\ldots\right] = \log 0$

$=$ undefined

4. **(A)**

$2\alpha = \beta$

$\therefore\ \alpha + 2\alpha = 90^o$

$\therefore\ \tan 30^o \cdot \tan 60^o = \dfrac{1}{\sqrt{3}} \times \sqrt{3} = 1$

5. **(A)**

$\dfrac{\left(1 - \cos\theta\right)^2 + \sin^2\theta}{\sin\theta\left(1 - \cos\theta\right)}$

$= \dfrac{\left(1 - \cos\theta\right)\left[1 - \cos\theta + 1 + \cos\theta\right]}{\sin\theta\left(1 - \cos\theta\right)}$

$= \dfrac{2}{\sin\theta} = 2\operatorname{cosec}\theta$

6. **(B)**

Let no. be $2x, 3x$

$\therefore$ LCM $= 6x$

$6x = 48$

$\therefore x = 8$

$\therefore$ Numbers are 16, 24

Sum = 40

7. **(B)**

$8640 = 2^6 \times 3^3 \times 5$

$\therefore\ 6 + 3 = 9$

8. **(C)**

$10 = 2^1 \times 5^1$

$10^8 = 2^8 \times 5^8$

$10^8 = 256\left(5^8\right)$

$\therefore\ n = 8$

9. **(A)**

$2^1 = 2$ $\qquad$ $2^4 = 16$

$2^2 = 4$ $\qquad$ $2^5 = 32$

$2^3 = 8$ $\qquad$ $2^6 = 64$

$\therefore$ Last digit are

2, 4, 8, 6, again 2, 4, 8, 6, ……

$\therefore\ 2^{100}$ will have last digit 6

10. **(C)**

$$\begin{array}{rr} & 0.2500 \\ + & 0.0025 \\ \hline & 0.2525 \\ + & 0.5 \\ \hline & 0.7525 \end{array}$$

11. **(B)**

$4x\left(\sqrt{3}x + 2\right) - \sqrt{3}\left(\sqrt{3}x + 2\right)$

$x = \dfrac{\sqrt{3}}{4}$ or $x = \dfrac{-2}{\sqrt{3}}$

12. **(B)**

$x^2 + \left(x + 7\right)^2 = \left(x + 8\right)^2$

$\therefore x = -3$ and 5

$A = \frac{1}{2} \times 5 \times (5+7)$

$= 30$ sq. units

13. (A)

$\frac{-2}{p} = \frac{3p}{p}$

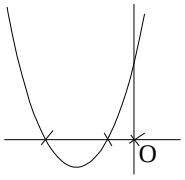
$\therefore\ -3p = 2$

14. (A)

$a = 2 > 0$ $\quad\therefore$ upward curve (parabola)

Also zeros are $x = -\frac{1}{2}$ & -2

Vertex (lower most point) $= \left(-\frac{5}{4}, \frac{-9}{8}\right)$



15. (A)

Breath = b

$\ell = b + 30$; diagonal = b + 60

$(b+30)^2 + b^2 = (b+60)^2$

$\therefore\ b = 90$ m

Length = 120 m

16. (D)

$5T_5 = 8T_8$

$5(a+4d) = 8(a+7d)$

$0 = 3a + 36d$

$3(a+12d) = 0$

Hence, $a + 12d = 0$

Now, $T_{13} = a + 12d = 0$

17. (C)

$\frac{1}{1\times 2} = \frac{1}{1} - \frac{1}{2}$

$= \frac{1}{1} - \frac{1}{2} + \frac{1}{2} - \frac{1}{3} + \frac{1}{3} - \frac{1}{4} + ... + \frac{1}{99} - \frac{1}{100}$

$= 1 - \frac{1}{100} = \frac{99}{100}$

18. **(C)**

$$\frac{\log 3}{\log 5}\times\frac{\log 5}{\log 7}\times\frac{\log 7}{\log 3}=\log_7 7$$

19. **(D)**

$\therefore\ L=120^o$

$\therefore$ Slope $=\tan 120^o$

$$=\tan(180-60)$$

$$=-\tan 60=-\sqrt{3}$$

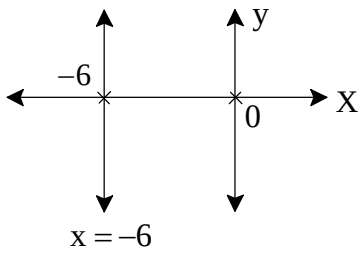
20. **(C)**

$P=(3,4)$

Equation is $y=mx$

$$m=\frac{4}{3}\ \Rightarrow\ y=\frac{4}{3}x$$

21. **(D)**

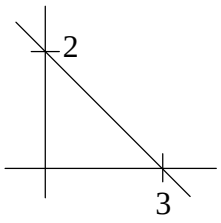


22. **(A)**

$$\frac{x}{3}+\frac{y}{2}=1$$

$$A=\frac{1}{2}\times 3\times 2$$

$$=3\text{ sq. units}$$



23. **(A)**

Divided by 3

$$x^2+y^2+2x+\frac{8}{3}y-\frac{1}{3}=0$$

$$c=(-g,-f)=\left(-1,-\frac{4}{3}\right)$$

24. **(C)**

$$Q=\left[\frac{0+9}{2},\frac{-1-3}{2}\right]=\left(\frac{9}{2},-2\right)$$

$$\underset{\times}{(0,1)} \qquad \underset{\times}{(3,-1)}$$
$$\underset{3:1}{\times}$$

25. (A)

$x^3 = 12 = 1000\ cm^3$

$x = 10\ cm$

$SA = 6x^2 = 600\ cm^2$

26. (B)

$$\frac{V_I = \frac{1}{3}\pi r^2 h}{V_N = \frac{1}{3}\pi 9r^2 \times 2h}$$

$\therefore V_N = 18\ V_I$

27. (A)

5 can be in 6 ways

Probability $= \frac{6}{6^3} = \frac{1}{6^2} = \frac{1}{36}$

28. (A)

$$\left\{\begin{matrix} H & H & H \\ H & H & T \\ H & T & H \\ H & T & T \\ T & H & H \\ T & H & T \\ T & T & H \\ T & T & T \end{matrix}\right\} = \begin{matrix} n(A) = 7 \\ p(A) = \frac{7}{8} \end{matrix}$$

29. (B)

Since there are 2 Red Queens

Hence, probability = $\frac{2}{52} = \frac{1}{26}$

30. (B)

$\frac{366}{7}\text{days} = 52\,\text{weeks} + 2\text{days}$

$\{MT, TW, WT, TF, FS, SS\}$

$= \frac{1}{7}$

31. **(A)**

$36-6(\text{equal})=30$

$\frac{30}{2}=15$ times greater

Prob. $=\frac{15}{36}$

32. **(B)**

$\frac{23}{72}=\frac{N^r}{2^3\times 3^2}$ $\because$ Denominator

Is not of form $2^n\times 5^n$

$\therefore$ non-terminating

33. **(B)**

$\sqrt{27}=3\sqrt{3}$ which is irrational

And 27 = +ve rational no.

Index = 2 = positive no.

34. **(C)**

$30\left(5\sqrt{3}+3\sqrt{5}\right)$

$\left(5\sqrt{3}-3\sqrt{5}\right)\left(5\sqrt{3}+3\sqrt{5}\right)$

$=\frac{\cancel{30}\left(5\sqrt{3}+3\sqrt{5}\right)}{(75-45)}$

35. **(C)**

$\frac{\sqrt{3}+\sqrt{2}+1}{3+2+2\sqrt{6}-1}\times\frac{2-\sqrt{6}}{2-\sqrt{6}}$

$=\frac{2\sqrt{3}-3\sqrt{2}+2\sqrt{2}-2\sqrt{3}+2-\sqrt{6}}{-4}$

$=\frac{1}{4}\left(\sqrt{2}-2+\sqrt{6}\right)$

$\therefore$ a = 4 and b = 2

36. **(D)**

$\left\{\sin^2 5^o=\left[\sin(90-85)^2=\cos^2 85^o\right]\right\}$

$=\cos^2 85^o+\cos^2 80+\cos^2 75^o+....+\sin^2 45^o+1+....+\sin^2 80+\sin^2 85+$

$=1+1+1+1+1+1+1+1+\left(\frac{1}{\sqrt{2}}\right)^2$

$=9\frac{1}{2}$

37. (B)

Area of rectangle = $AD \times Dc$

$= (7 \times 14)\,cm^2$

Area of 2 sectors = $2 \times \frac{1}{4}\left(A[\text{circle}]\right)$

$= \left[\frac{1}{2} \times \pi (7)^2\right] cm^2$

Ans. $\left[7 \times 14 - \frac{\cancel{49}^{7}}{\cancel{2}} \times \frac{\cancel{2}^{11}}{\cancel{7}}\right] = 7[3] = 21$

38. (C)

Area = $a \times b$

New Area $= (0.99)(1.01)ab = 0.9999$

Hence 0.01% decrease in area.

39. (B)

$$A = 6400 + 1008.80\left(1 + \frac{r}{2 \times 100}\right)^{\frac{3}{2} \times 2}$$

$$\therefore \left(1 + \frac{r}{200}\right)^3 = \left(\frac{21}{20}\right)^3 \Rightarrow r = 10\%$$

40. (B)

$$\left(a - \frac{1}{a}\right)^4 = \left[\left(a - \frac{1}{a}\right)^2\right]^2$$

$$(4)^4 = a^4 + \frac{1}{a^4} + 4 + 2\left[1 - 2\left(\frac{1}{a^2} + a^2\right)\right]$$

$$252 + 70 = a^4 + \frac{1}{a^4} = 322$$

41. (B)

Let A take x days, B take y days

$$\frac{1}{x} + \frac{1}{y} = \frac{1}{15}; \frac{1}{x} = \frac{3}{2} \times \frac{1}{y} \Rightarrow \frac{1}{x} - \frac{3}{2y} = 0$$

(1) (2)

Solving, $x = 25 \mid y = 37.5$

42. (C)

$$\left[\left(\frac{5}{4}\right)^3\right]^{2/3} \times \left(\frac{256}{625}\right)^{1/4} \times \frac{5}{4} = \frac{25}{16}$$

43. **(A)**

Total number of triangles = 12 + 12 +4 = 28

44. **(C)**

$\ell + b + h = 19; \ell^2 + b^2 + h^2 = (11)^2$

S.A. = $1(\ell b + bh + h\ell)$

$(\ell + b + h)^2 = \ell^2 + b^2 + h^2 + 2(\ell b + bh + h\ell)$

$19^2 = 11^2 + 2(\ell b + bh + h\ell)$

$\therefore S.A = 240 cm^2$

45. **(B)**

$-(\sec^2 A - \tan^2 A) - 1 = -1 - 1 = -2$

46. **(A)**

$$\sqrt{\frac{(1+\sin\theta)^2}{1-\sin^2\theta}} = \frac{1+\sin\theta}{\cos\theta} = \sec\theta + \tan\theta$$

47. **(C)**

$$\tan 2\theta = \frac{2\tan\theta}{1-\tan^2\theta} = \tan(2\times 22.5)^\circ = 1$$

$\therefore \tan^2\theta + 2\tan\theta - 1 = 0$

$\therefore \tan\theta = -1 \pm \sqrt{2}$

$\therefore \sqrt{2} - 1$

48. **(D)**

$2x + 3y - (x - y) = x - y - (x + y)$

$x + 4y = -2y \Rightarrow x = -6y$

49. **(B)**

squaring $\sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta = 1$

$1 + \sin 2\theta = 1 \quad \therefore \sin 2\theta = 0$

50. **(B)**

$b\cos 2\theta + a\sin 2\theta$

$$= b\left[\frac{1-\tan^2\theta}{1+\tan^2\theta}\right] + a\left[\frac{2\tan\theta}{1+\tan^2\theta}\right]$$

$$= b\left[\frac{1-\frac{a^2}{b^2}}{1+\frac{a^2}{b^2}}\right] + a\left[\frac{2\frac{a}{b}}{1+\frac{a^2}{b^2}}\right]$$

$$= \frac{b - \frac{a^2}{b} + \frac{2a^2}{b}}{\frac{b^2 + a^2}{b^2}}$$

$$= \frac{\frac{b^2 - a^2 + 2a^2}{b}}{\frac{b^2 + a^2}{b^2}} = \frac{b\left(b^2 + a^2\right)}{\left(b^2 + a^2\right)}$$

$$= b$$