

CAT 2003 Actual Paper

Answers and Explanations

1	3	16	4	31	3	46	4	61	3	76	3	91	1	106	1	121	3	136	3
2	3	17	2	32	3	47	2	62	1	77	2	92	4	107	3	122	1	137	4
3	4	18	1	33	3	48	4	63	3	78	1	93	3	108	2	123	4	138	3
4	2	19	3	34	2	49	2	64	2	79	3	94	1	109	1	124	2	139	1
5	1	20	4	35	2	50	3	65	2	80	1	95	4	110	4	125	3	140	2
6	1	21	3	36	2	51	2	66	2	81	2	96	1	111	2	126	3	141	3
7	1	22	4	37	1	52	1	67	3	82	1	97	4	112	1	127	1	142	2
8	4	23	2	38	3	53	3	68	1	83	3	98	3	113	4	128	4	143	2
9	2	24	4	39	1	54	1	69	1	84	4	99	4	114	1	129	4	144	3
10	1	25	1	40	1	55	3	70	2	85	4	100	4	115	3	130	3	145	2
11	3	26	2	41	4	56	2	71	1	86	4	101	1	116	2	131	1	146	4
12	1	27	1	42	2	57	1	72	3	87	2	102	2	117	3	132	1	147	3
13	2	28	4	43	1	58	2	73	4	88	4	103	4	118	4	133	2	148	4
14	3	29	4	44	3	59	3	74	3	89	2	104	2	119	4	134	3	149	1
15	2	30	1	45	1	60	2	75	4	90	4	105	1	120	4	135	4	150	2

	Question number	Total questions	Total attempted	Total correct	Total wrong	Net Score	Time Taken
EU + RC	1 to 50	50					
QA + DS	51 to 100	50					
DI + DS + AR	101 to 150	50					
Total		150					

1. 3 See third paragraph last two lines. It is clearly mentioned that 'new free-flight concept . . . and other planes'.
2. 3 Paragraph 5, fourth line says that there is 'also a need for . . . , design talents . . .'
3. 4 First paragraph fifth line says '. . . , happened in less than a decade'.
4. 2 Paragraph 4 clearly talks about the increase in size of the aircraft.
5. 1 Paragraph 2, fourth line talks about the differences and explicitly mentions 'takes off vertically.'
6. 1 Refer to paragraph 5, line 1 'became . . . more divorced from religion.'
7. 1 Refer to paragraph 1, line 10 '. . . a means for advancement not only in income but also in status.'
8. 4 Refer to paragraph 3: 'Let us look at the clerical side first' and paragraph 4, line 5 'even though they entered the clergy, had secular goals.'
9. 2 Refer to para 1, line 7 'Christians educate their sons . . . for gain . . .'
10. 1 Refer to paragraph 4, line 1 'edu' was taking on many secular qualities . . .
11. 3 Refer to the part *while the dynamics of federalism and democracy have given added strength to the rights given to the States in the Constitution, they have worked against the rights of Panchayats*
12. 1 Refer to the words *volition* which means *preference* and *circumscribe* which means *confine*
13. 2 Refer to the part *while the dynamics of federalism and democracy have given added strength to the rights given to the States in the Constitution, they have worked against the rights of Panchayats*
14. 3 Refer to the part *exposed the intra-State level of our federal system to a dilemma of which the inter-State and Union-State layers are free*
15. 2 Refer to the part *The spurt given to a multi-party democracy by the overthrow of the Emergency in 1977 became a long-term trend later*
16. 4 (1), (2) and (3) are specifically stated in the paragraph starting *People born into the middle class to parents*
17. 2 Refer to the part *jobs in which they are closely supervised and are required to follow orders.*
18. 1 Refer to the part *Ultimately, corporate norms are based on middle-class values*
19. 3 Refer to the part *We're separated by class*
20. 4 (1), (2) and (3) are specifically stated in the passage at the end of the first^t paragraph and the second paragraph.
21. 3 Refer to last paragraph, line 10 'they would build what was more beautiful than . . .'
22. 4 Refer to paragraph 1, line 3 'Mysticism on the whole was alien' and last paragraph lines 6 and 7.
23. 2 Refer to last paragraph, lines 3 and 4 'Simplicity in the Parthenon St. Columns . . .'
24. 4 Paragraph 4, last line '. . . insignificant atom that was man.'
25. 1 Paragraph 1, line 3 'Mysticism on the whole was alien' and paragraph 2 line 1 'Greek art is intellectual are . . .'
26. 2 AD is clearly a mandatory pair as D talks about the extra enclosures. Also 'this . . . , wall' of E should follow from A, D and C.
27. 1 ED is a mandatory pair as the 'they' of D are 'the Japanese' off E. Only (1) has ED in that order.
28. 4 A is the general sentence. ED and B have to come one after another because they represent a sequence.
29. 4 Option (3) also looks correct but actually option (4) is right because (A) is just an analogy to explain the phenomenal mentioned in sentence (D). Also EC forms a mandatory pair.
30. 1 D is the general sentence. E and A form a mandatory pair because the 'it' mentioned in sentence A talks about the 'fox hunting' mentioned in sentence E.
31. 3 It seems as if CB is mandatory. However, looking at it closely reveals that the 'she' of B and the princess of D are two different entities. The monarch and the princess of C are general. The 'she' of B is the princess of A. Therefore, EC and CD and DA are mandatory.
32. 3 CE is mandatory as can be seen by the 'these . . . , food stuffs' of E. However, this still leaves us with three answer choices. B should follow E as can be seen by the word 'similarly', hence (3) becomes the answer.
33. 3 Link between BD 'British'-foreign policy' and then AE from 'overbranding' and 'since then . . . nervous on promoting' and the EC 'but reunification. . . think again'.

34. 2 (1) is wrong because 'if they focus on cost . . . they will reduce' [too definite]. (3) is wrong 'Any cost minimization' — is too broad. (4) is wrong because 'quality improvement rather than cost cutting' is not implied. Both should be done. Hence, choice (2) is correct.
35. 2 (1) is wrong because there is no mention of choices. (3) is wrong because 'always try' [too extreme]. (4) is wrong because 'we urge . . . to buy vans' is too narrow. Hence, choice (2) is correct.
36. 2 There is only one type of inertia which has both mental and physical effects. That is why (3) and (4) are wrong. (1) which says 'freezes . . . decapitates' is too extreme. Hence, choice (2) is correct.
37. 1 A is unambiguous, B is not right because the boss did not offer any job. C is wrong because free holiday accommodation does not come that frequently in our lives. D is wrong because you never take the boss's job when she is away.
38. 3 The phrase 'help with the beer' is incorrect as it should be 'help to the beer'.
39. 1 It's always 'suggestions look great on paper'.
40. 1 It should be 'serve themselves' in stead of 'service themselves'.
41. 4 The correct phrase is 'listen to reason' and not 'listen to a reason'.
42. 2 The phrase 'profitable business' should be 'a profitable business'.
43. 1 The first part talks about how punctuation should be. The second part gives reasons for it. If punctuation makes the reader 'least conscious' then it should be least 'obtruding'.
44. 3 'stimulate' and 'control' should be on almost opposite tangents as the passage talks of why a looser fiscal policy is better than the 'control' of budget.
45. 1 'leisure' and 'explore' go with 'peaceful and prosperous'. (2) is wrong because when you 'travel abroad' you don't 'ignore' the world. (3) is obviously wrong — you don't 'suffer' the world. (4) is wrong as 'temerity' means audacity.
46. 4 Reading this sentence tells us that the second blank has to be of a slightly higher degree but on the same theme. Only (4) fits this criterion.
47. 2 If men had groveled before her then her attitude would definitely be negative.
48. 4 The second blank cannot be filled by any other choice other than 'facing'.
49. 2 Again the second blank can only be filled by 'damaged'.
50. 3 The two blanks should have contrasting words as 'choices' and 'constraints' are also contrasting. (3) fits in.
51. 2 $MDCCLXXXVII = 1000 + 500 + 100 + 100 + 50 + 10 + 10 + 10 + 5 + 1 + 1 = 1787$
52. 1 $MCMXCIX = 1000 + (1000 - 100) + (100 - 10) + (10 - 1) = 1000 + 900 + 90 + 9 = 1999$
53. 3 (I) $MCMLXXV = 1000 + (1000 - 100) + 50 + 10 + 10 + 5 = 1975$
 (II) $MCMXCV = 1000 + (1000 - 100) + (100 - 10) + 5 = 1995$
 (III) $MVD = 1000 + (500 - 5) = 1495$
 (IV) $MVM = 1000 + (1000 - 5) = 1995$
 Therefore, the answer is (II) and (IV), i.e. option (3).
- For questions 54 to 56:** $A_1A_2 = 2r$, $B_1B_2 = 2r + r\sqrt{3}$, $C_1C_2 = 2r + 2r\sqrt{3}$
- Hence, $a = 3 \times 2r$
 $b = 3 \times (2r + r\sqrt{3})$
 $c = 3 \times (2r + 2r\sqrt{3})$
54. 1 Difference between (1) and (2) is $3\sqrt{3}r$ and that between (2) and (3) is $3\sqrt{3}r$. Hence, (1) is the correct choice.
55. 3 Time taken by A = $\frac{2r}{20} + \frac{2r}{30} + \frac{2r}{45} = \frac{(2r \times 9)}{60} = \frac{3}{40}r$
- Therefore, B and C will also travel for time $\frac{3}{10}r$.
- Now speed of B = $(10\sqrt{3} + 20)$
 Therefore, the distance covered
 $= (10\sqrt{3} + 20) \times \frac{3}{10}r = (\sqrt{3} + 2) \times 10 \times \frac{3}{10}r$
 $= (2r + \sqrt{3}r) \times 3 = B_1B_2 + B_2B_3 + B_3B_1$
 \therefore B will be at B_1 .
 Now time taken by for each distance are
 $\frac{C_1C_2}{\frac{40}{3}(\sqrt{3} + 1)}$, $\frac{C_2C_3}{\frac{40}{3}(\sqrt{3} + 1)}$, $\frac{C_3C_1}{120}$

$$\frac{3}{40} \times \frac{(2+2\sqrt{3})r}{(\sqrt{3}+1)}, \frac{3}{40} \times \frac{(2+2\sqrt{3})r}{(\sqrt{3}+1)}, \frac{(2+2\sqrt{3})r}{120}$$

i.e. $\frac{3}{40} \times 2r, \frac{3}{40} \times 2r, \frac{(1+\sqrt{3})}{60} r$

i.e. $\frac{3}{20} r, \frac{3}{20} r, \frac{(1+\sqrt{3})}{60} r$

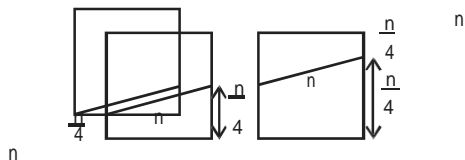
We can observe that time taken for C_1C_2 and C_2C_3 combined is $\frac{3}{20}r + \frac{3}{20}r = \frac{3}{10}r$, which is same as time taken by A. Therefore, C will be at C_3 .

56. 2 In similar triangles, ratio of Area = Ratio of squares of corresponding sides.
Hence, A and C reach A_3 and C_3 respectively.

57. 1 The whole height h will be divided into n equal parts. Therefore, spacing between two consecutive turns

$$= \frac{h}{n}$$

58. 2 The four faces through which string is passing can be shown as



Therefore, length of string in each face

$$= \sqrt{n^2 + \left(\frac{n}{4}\right)^2}$$

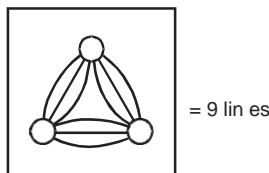
$$= \sqrt{n^2 + \frac{n^2}{16}} = \frac{\sqrt{17n}}{4}$$

Therefore, length of string through four faces

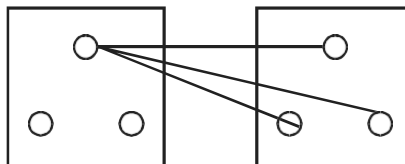
$$= \frac{\sqrt{17n}}{4} \times 4 = \sqrt{17n}$$

59. 3 As $h/n = \text{number of turns} = 1$ (as given). Hence $h = n$.

60. 2 Consider first zone. The number of telephone lines can be shown as follows.



Therefore, total number of lines required for internal connections in each zone = $9 \times 4 = 36$ lines.
Now consider the connection between any two zones.



Each town in first zone can be connected to three towns in the second zone.

Therefore, the lines required = $3 \times 3 = 9$

Therefore, total number of lines required for connecting towns of different zones = ${}^4C_2 \times 9 = 6 \times 9 = 54$

Therefore, total number of lines in all = $54 + 36 = 90$

61. 3 $PQ \parallel AC$

$$\therefore \frac{CQ}{QB} = \frac{AP}{PB} = \frac{4}{3}$$

$QD \parallel PC$

$$\therefore \frac{PD}{DB} = \frac{CQ}{QB} = \frac{4}{3}$$

As $\frac{PD}{DB} = \frac{4}{3}$

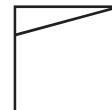
$$\therefore PD = \frac{4}{7} PB$$

$$\therefore \frac{AP}{PD} = \frac{AP}{\frac{4}{7} PB}$$

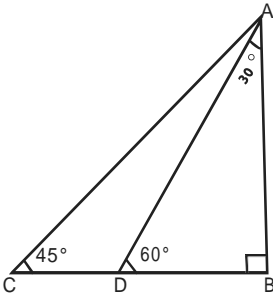
$$= \frac{7}{4} \times \frac{AP}{PB}$$

$$= \frac{7}{4} \times 3$$

$$= 7 : 3$$



62. 1



Let $AB = 1$
Therefore, $BC = 1$

$$\therefore \tan 60 = \frac{AB}{BD} \therefore \sqrt{3} = \frac{1}{BD}$$

$$\therefore BD = \frac{1}{\sqrt{3}}$$

$$\begin{aligned} \therefore CD &= BC - BD \\ &= 1 - \frac{1}{\sqrt{3}} \end{aligned}$$

As time for traveling CD, i.e. $1 - \frac{1}{\sqrt{3}}$ is 10 min.

$$\therefore \text{Time required for traveling BD} = \frac{\frac{1}{\sqrt{3}}}{1 - \frac{1}{\sqrt{3}}} \times 10$$

$$= \frac{1}{\sqrt{3} - 1} \times 10$$

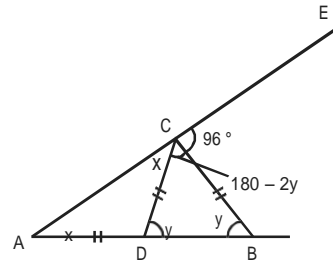
$$= \frac{10}{\sqrt{3} - 1}$$

$$= \frac{10}{\sqrt{3} - 1} \times \frac{\sqrt{3} + 1}{\sqrt{3} + 1}$$

$$= \frac{10(\sqrt{3} + 1)}{2}$$

$$= 5(\sqrt{3} + 1) \text{ min}$$

63. 3



Using exterior angle theorem

$$\angle A + \angle B = 96$$

$$\text{i.e. } x + y = 96 \quad \dots (i)$$

$$\text{Also } x + (180 - 2y) + 96 = 180^\circ$$

$$\therefore x - 2y + 96 = 0$$

$$\therefore x - 2y = -96 \quad \dots (ii)$$

Solving (i) and (ii),

$$y = 64^\circ \text{ and } x = 32^\circ$$

$$\therefore \angle DBC = y = 64^\circ$$

64. 2 $ax^2 + bx + 1 = 0$
For real roots

$$b^2 - 4ac \geq 0$$

$$\therefore b^2 - 4a(1) \geq 0$$

$$\therefore b^2 \geq 4a$$

For $a = 1, 4a = 4, \therefore b = 2, 3, 4$

$a = 2, 4a = 8, \therefore b = 3, 4$

$a = 3, 4a = 12, \therefore b = 4$

$a = 4, 4a = 16, \therefore b = 4$

\therefore Number of equations possible = 7.

65. 2 $\log_{10} x - \log_{10} \sqrt{x} = 2 \log_x 10$

$$\log_{10} \left[\frac{x}{\sqrt{x}} \right] = \log_x 100$$

$$\therefore \log_{10} \sqrt{x} = \frac{\log_{10} 100}{\log_{10} x}$$

$$\therefore \frac{1}{2} \log_{10} x = \frac{2}{\log_{10} x}$$

$$\therefore (\log_{10} x)^2 = 4$$

$$\therefore \log_{10} x = \pm 2$$

$$\therefore \log_{10} x = 2 \text{ or } \log_{10} x = -2$$

$$\therefore 10^2 = x \text{ or } 10^{-2} = x$$

$$\therefore x = 100 \text{ or } x = \frac{1}{100}$$

66. 2 Such numbers are 10, 17, ..., 94.
These numbers are in AP. There are 13 numbers.

$$\begin{aligned} \therefore \text{Sum} &= \frac{10 + 94}{2} \times 13 \\ &= 52 \times 13 = 676 \end{aligned}$$

67. 3 Total codes which can be formed = $9 \times 9 = 81$.
(Distinct digit codes)
The digits which can confuse are 1, 6, 8, 9, from these digit we can form the codes = $4 \times 3 = 12$
Out of these 12 codes two numbers 69 and 96 will not create confusion.
Therefore, $(12 - 2) = 10$ codes will create a confusion.
Therefore, total codes without confusion = $81 - 10 = 71$.

68. 1 Consider a square of side x .
Therefore, its area = x^2

Therefore, area of the largest circle = $\pi \left(\frac{x}{2}\right)^2$,

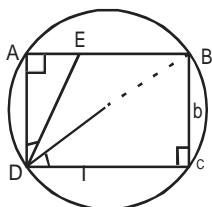
which can be cut from square = $\frac{\pi x^2}{4}$.

Therefore, area scrapped = $x^2 - \frac{\pi x^2}{4} = x^2 \left(1 - \frac{\pi}{4}\right)$

$$\therefore \frac{\text{Area scrapped}}{\text{Area of square}} = \frac{x^2 \left(1 - \frac{\pi}{4}\right)}{x^2} = 1 - \frac{\pi}{4} = \text{Contant}$$

As this ratio is constant whether we cut a circle from small square or larger square, scrapped area will be a fixed percentage of square. Therefore, in our problem as two squares are of the same size, the ratio will be 1 : 1.

69. 1



$BD = 2r$

$$\frac{\text{Area of circle}}{\text{Area of rectangle}} = \frac{\pi r^2}{lb} = \frac{\pi}{\sqrt{3}}$$

$$\frac{r^2}{lb} = \frac{1}{\sqrt{3}}$$

$$\frac{d^2}{lb} = \frac{4}{\sqrt{3}}$$

$$\therefore \frac{d^2}{4lb} = \frac{1}{\sqrt{3}}$$

$$\therefore \frac{l^2 + b^2}{4lb} = \frac{1}{\sqrt{3}}$$

$$\therefore \frac{l^2 + b^2}{lb} = \frac{4}{\sqrt{3}}$$

$$\therefore \frac{l}{b} + \frac{b}{l} = \frac{4}{\sqrt{3}} \quad \dots (i)$$

Now $\triangle AED \sim \triangle CBD$

$$\therefore \frac{AE}{CB} = \frac{AD}{DC}$$

$$\therefore \frac{AE}{AD} = \frac{BC}{DC}$$

$$\therefore \frac{AE}{AD} = \frac{b}{l}$$

\therefore We have to find $\frac{AE}{AD}$, i.e. $\frac{b}{l}$.

Let $\frac{b}{l} = x$

Therefore, from (i), we get

$$\frac{1}{x} + x = \frac{4}{\sqrt{3}}$$

$$\frac{1+x^2}{x} = \frac{4}{\sqrt{3}}$$

$$\sqrt{3} + \sqrt{3}x^2 = 4x$$

$$\therefore \sqrt{3}x^2 - 4x + \sqrt{3} = 0$$

$$\therefore x = \frac{-(-4) \pm \sqrt{16 - 4(\sqrt{3})\sqrt{3}}}{2\sqrt{3}}$$

$$= \frac{4 \pm \sqrt{16 - 12}}{2\sqrt{3}}$$

$$= \frac{4 \pm 2}{2\sqrt{3}}$$

$$= \frac{6}{2\sqrt{3}}$$

OR $\frac{2}{2\sqrt{3}}$
 $\frac{\sqrt{3}}{1}$ OR $\frac{1}{\sqrt{3}}$

From options, the answer is $\frac{1}{\sqrt{3}}$, i.e. $1:\sqrt{3}$.

70. 2 $\frac{1}{3} \log_3 M + 3 \log_3 N = 1 + \log_{0.008} 5$

$\log_3(M^{1/3}N^3) = 1 + \frac{(\log 10 - \log 2)}{\log 8 - \log 1000}$

$\log_3(M^{1/3}N^3) = 1 - \frac{(1 - \log 2)}{3(1 - \log 2)}$

$\log_3(M^{1/3}N^3) = 1 - \frac{1}{3} = \frac{2}{3}$

$\Rightarrow M^{1/3}N^3 = 3^{2/3}$

$\Rightarrow MN^9 = 3^2$

$\Rightarrow N^9 = 9/M$.

71. 1 Let's make the given sum by using minimum number of coins as

Value of coin	No. of coins	No. of coins	No. of coins	Total no. of coins
50	1	1	1	3
25	—	—	1	1
10	1	2	2	5
5	1	—	—	1
2	2	4	3	9
Total amount	69	78	101	19

72. 3 It's standard property among circle, square and triangle, for a given parameter, area of circle is the highest and area of the triangle is least whereas area of the square is in-between, i.e. $c > s > t$.

73. 4 Remainder when $\frac{4^{96}}{6}$

Let's come down to basic property of dividing the power of 4 by 6, i.e.

$\frac{4^1}{6} = 4$

$\frac{4^2}{6} = 4$

$\frac{4^3}{6} = 4$

$\frac{4^4}{6} = 4$

Hence, any power of 4 when divided by 6 leaves a remainder of 4.

74. 3 $5x + 19y = 64$

We see that if $y = 1$, we get an integer solution for $x = 9$, now if y changes (increases or decreases) by $5x$ will change (decrease or increase) by 19 . Looking at the options, if $x = 256$, we get $y = 64$.

Using these values we see options (1), (2) and (4) are eliminated and also that these exists a solution for $250 < x \leq 300$.

75. 4 Sum of $\log m + \log\left(\frac{m^2}{n}\right) + \log\left(\frac{m^3}{n^2}\right) + \dots$ n terms such

problem must be solved by taking the value of number of terms. Let's say 2 and check the given option. If we look at the sum of 2 terms of the given series it comes

out to be $\log m + \log \frac{m^2}{n} \Rightarrow \log \frac{m \times m^2}{n} = \log\left(\frac{m^3}{n}\right)$

Now look at the option and put number of terms as 2, only option (4) validates the above mentioned answer.

As $\log \left[\frac{m^{(n+1)}}{n^{(n-1)}} \right]^{\frac{1}{2}} \Rightarrow \log \left[\frac{m^3}{n} \right]^1 \Rightarrow \log \left(\frac{m^3}{n} \right)$

76. 3 $\frac{P + \frac{P}{\sqrt{2}} + \dots \infty}{A + \frac{A}{2} + \dots \infty} = \frac{1 - \frac{1}{\sqrt{2}}}{2A} = \frac{P\sqrt{2}}{(\sqrt{2}-1)} \times \frac{1}{2A}$

$= \frac{\sqrt{2}P(\sqrt{2}+1)}{2A} = \frac{\sqrt{2} \times 4a(\sqrt{2}+1)}{2 \times a^2}$

$= \frac{\sqrt{2} \times 2(\sqrt{2}+1)}{a} = \frac{2(2+\sqrt{2})}{a}$

77. 2 $xyz = 4$

$y - x = z - y$

$2y = x + z$

y is the AM of x, y, z .

Also $\sqrt[3]{xyz} = \frac{2}{4^3} \Rightarrow \sqrt[3]{xyz} = \frac{1}{2^3}$

AM ≥ GM

$$y \geq 2^3$$

Therefore, the minimum value of y is $\frac{2}{2^3}$.

78. 1 $\angle BAC = \angle ACT + \angle ATC = 50 + 30 = 80^\circ$
 And $\angle ACT = \angle ABC$ (Angle in alternate segment)

So $\angle ABC = 50^\circ$

$$\begin{aligned} \angle BCA &= 180 - (\angle ABC + \angle BAC) \\ &= 180 - (50 + 80) = 50^\circ \end{aligned}$$

Since $\angle BOA = 2\angle BCA = 2 \times 50 = 100^\circ$

Alternative Method:

Join OC

$\angle OCT = 90^\circ$ (TC is tangent to OC)

$\angle OCA = 90^\circ - 50^\circ = 40^\circ$

$\angle OAC = 40^\circ$ (OA = OC being the radius)

$\angle BAC = 50^\circ + 30^\circ = 80^\circ$

$\angle OAB = 80^\circ - 40^\circ = 40^\circ = \angle OBA$ (OA = OB being the radius)

$\angle BOA = 180^\circ - (\angle OBA + \angle OAB) = 100^\circ$

79. 3 Let $S = 1 + \frac{4}{7} + \frac{9}{7^2} + \frac{16}{7^3} + \frac{25}{7^4} \dots$ (i)

$\therefore \frac{1}{7}S = \frac{1}{7} + \frac{4}{7^2} + \frac{9}{7^3} + \frac{16}{7^4} \dots$ (ii)

(i) - (ii) gives,

$S\left(1 - \frac{1}{7}\right) = 1 + \frac{3}{7} + \frac{5}{7^2} + \frac{7}{7^3} + \frac{9}{7^4} \dots$ (iii)

$\frac{1}{7} \times S\left(1 - \frac{1}{7}\right) = \frac{1}{7} + \frac{3}{7^2} + \frac{5}{7^3} + \frac{7}{7^4} \dots$ (iv)

(iii) - (iv) gives,

$S\left(1 - \frac{1}{7}\right) - \frac{1}{7}S\left(1 - \frac{1}{7}\right) = 1 + \frac{2}{7} + \frac{2}{7^2} + \frac{2}{7^3} + \frac{2}{7^4} \dots$

$\therefore S\left(1 - \frac{1}{7}\right)\left(1 - \frac{1}{7}\right) = 1 + \frac{2}{7}\left[1 + \frac{1}{7} + \frac{1}{7^2} + \dots\right]$

$\therefore S\left(1 - \frac{1}{7}\right)^2 = 1 + \frac{2}{7} \times \frac{1}{1 - \frac{1}{7}}$

$\therefore S\left(\frac{6}{7}\right)^2 = 1 + \frac{2}{7} \times \frac{7}{6}$

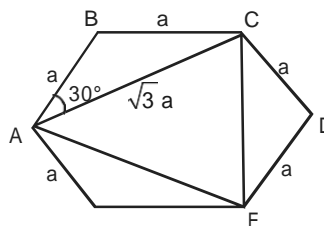
$\therefore S \times \frac{36}{49} = 1 + \frac{1}{3}$

$\therefore S = \frac{49}{36} \times \frac{4}{3}$

$S = \frac{49}{27}$

80. 1 By observing, we see 6 will appear in 5 sets T_2, T_3, T_4, T_5 and T_6 . Similarly, 12 will also appear in 5 sets and these sets will be distinct from the sets in which 6 appears, i.e. T_8, T_9, T_{10}, T_{11} and T_{12} . Thus, each multiple of 6 will appear in 5 distinct sets. Till T_{96} , there will be 16 multiples of 6. These 16 multiples of 6 will appear in $16 \times 5 = 80$ sets.

81. 2



ΔACE is equilateral triangle with side $\sqrt{3}a$.

Area of hexagon = $\frac{\sqrt{3}}{4} a^2 \times 6$

Area as $\Delta ACE = \frac{\sqrt{3}}{4} (\sqrt{3}a)^2$

Therefore, ratio = $\frac{1}{2}$

82. 1 Let α is the common root.

$\therefore \alpha^3 + 3\alpha^2 + 4\alpha + 5 = 0$
 $\alpha^3 + 2\alpha^3 + 7\alpha + 3 = 0$

$\alpha^2 - 3\alpha + 2 = 0$

$\alpha = 2, \alpha = 1$

But the above values of α do not satisfy any of the equations. Thus, no root is common.

83. 3 $1 - \frac{1}{n} < x \leq 3 + \frac{1}{n}$

Put $n = 1$

$\therefore 0 < x \leq 4$

84. 4 $36 \leq n \leq 72$

$$x = \frac{n^2 + 2\sqrt{n(n+4)} + 16}{n + 4\sqrt{n+4}}$$

Put $x = 36$.

$$\therefore x = \frac{(36)^2 + 2 \times 6 \times 40 + 16}{36 + 24 + 4}$$

Which is least value of 'n' = 28

85. 4 $13x + 1 < 2z$ and $z + 3 = 5y^2$

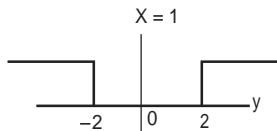
$13x + 1 < 2(5y^2 - 3)$

$13x + 1 < 10y^2 - 6$

$13x + 7 < 10y^2$ put $x = 1$

$20 < 10y^2$ $y^2 > 2$

$y^2 > \sqrt{2}$ $(y^2 - 2) > 0$



86. 4 Let $n = 6$

Therefore, $\sqrt{n} = \sqrt{6} \approx 2.4$

Therefore, divisors of 6 are 1, 2, 3.

If we take 2 as divisor, then $\sqrt{n} > 2 > 1$.

Statement A is true.

If we take 3 as divisor, then $6 > 3 > 2.4$, i.e. $n > 3 > \sqrt{n}$.

Therefore, statement B is true.

87. 2 $x = -|a|b$

Now $a - xb = a - (-|a|b)b$
 $= a + |a|b^2$

$\therefore a - xb = a + ab^2 \dots a \geq 0$ OR $a - xb = a - ab^2 \dots a < 0$
 $= a(1 + b^2) = a(1 - b^2)$

Consider first case:

As $a \geq 0$ and $|b| \geq 1$, therefore $(1 + b^2)$ is positive.

$\therefore a(1 + b^2) \geq 0$

$\therefore a - xb \geq 0$

Consider second case.

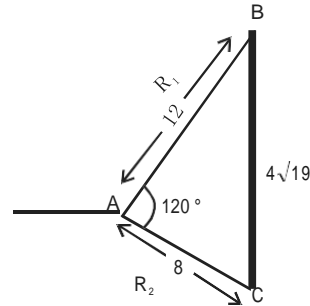
As $a < 0$ and $|b| \geq 1$, therefore $(1 - b^2) \leq 0$

$\therefore a(1 - b^2) \geq 0$ (Since $-ve \times -ve = +ve$ and $1 - b^2$ can be zero also), i.e. $a - xb \geq 0$

Therefore, in both cases $a - xb \geq 0$.

88. 4 The required answer is $34 \times 0.65 \times 0.65 = 14.365$
 Because we get two similar triangles and area is proportional to square of its side.

89. 2



$BC^2 = (12)^2 + 8^2 - 2 \times 12 \times 8 \times \cos 120^\circ$

$\therefore BC = 4\sqrt{19}$

$t_1 = \frac{4\sqrt{19} + 8}{3}$

$t_2 = \frac{4\sqrt{19} + 12}{2}$

[Where t_1 and t_2 are time taken by Ram and Shyam to reach the starting point]

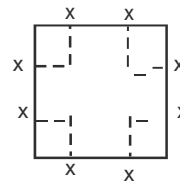
$$t_2 - t_1 = \frac{4\sqrt{19} + 12}{2} - \frac{4\sqrt{19} + 8}{3}$$

$$= \frac{12\sqrt{19} + 36 - 8\sqrt{19} - 16}{6}$$

$$= \frac{4\sqrt{19} + 20}{6} = \frac{2\sqrt{19} + 10}{3}$$

Therefore, choice (2).

90. 4



Volume = $l \times b \times h$

$V = (12 - 2x)(12 - 2x) \times x$

$V' = (12 - 2x)(12 - 2x) 4x$

Where $V' = 4 V$

Now sum = $12 - 2x + 12 - 2x + 4x = 24$ [Constant]

As sum is constant for maximum product $12 - 2x$

$$= 12 - 2x = 4x$$

Therefore, $x = 2$

91. 1 As any prime number greater than 3 can be expressed in the form $6n \pm 1$, minimum difference between three consecutive prime numbers will be 2 and 4. The values that satisfy the given conditions are only 3, 5 and 7, i.e. only one set is possible.

92. 4 $a = 6b = 12c$ and $2b = 9d = 12e$.
Dividing the first equations by 12 and second by 36,

$$\text{we get } \frac{a}{12} = \frac{b}{2} = \frac{c}{1} \text{ and } \frac{b}{18} = \frac{d}{4} = \frac{e}{3}$$

$$\text{i.e. } \frac{a}{108} = \frac{b}{18} = \frac{c}{9} \text{ and } \frac{b}{18} = \frac{d}{4} = \frac{e}{3}$$

$$\therefore \frac{a}{108} = \frac{b}{18} = \frac{c}{9} = \frac{d}{4} = \frac{e}{3}$$

$$\therefore a : b : c : d : e = 108 : 18 : 9 : 4 : 3.$$

$$\therefore \frac{c}{d} = \frac{9}{4} \text{ is not an integer.}$$

93. 3 Let in 2001 the number of huts before floods = 32

$$\therefore \text{Huts destroyed} = \frac{32}{2} = 16 \text{ and rebuilt} = 32.$$

$$\therefore \text{Total huts after floods in 2001} = 16 + 32 = 48$$

Similarly, in 2002, destroyed = 24

Rebuilt = 48

$$\text{Total} = 24 + 48 = 72$$

Similarly, in 2003, destroyed = 36

Rebuilt = 72

$$\text{Total} = 36 + 72 = 108$$

\therefore Checking with choices the answer is (3).

$$94. 1 \quad g^2 = g * g = h$$

$$g^3 = g^2 * g = h * g = f$$

$$g^4 = g^3 * g = f * g = e$$

$$\therefore n = 4$$

$$95. 4 \quad f \oplus [f * \{f \oplus (f * f)\}]$$

$$= f \oplus [f * \{f \oplus h\}]$$

$$= f \oplus [f * e]$$

$$= f \oplus [f]$$

$$= h$$

$$96. 1 \quad e^8 = e^2 * e^2 * e^2$$

$$= e * e * e$$

$$= e$$

If we observe $a * \text{anything} = a$

$$\therefore a^{10} = a$$

$$\therefore \{a^{10} * (f^{10} \oplus g^9)\} \oplus e^8$$

$$= a \oplus e$$

$$= e$$

97. 4 Case I: m

First place can be selected in five ways and hence the third in four ways.

$$\therefore 5 \times 4 = 20 \text{ ways}$$

Case II: n

First place can be selected in 5 ways and third in 2 ways

$$\therefore 5 \times 2 = 10 \text{ ways}$$

Case III: p

First place can be selected in 5 ways and last letter will be same, i.e. one way.

$$\therefore 5 \times 1 = 5 \text{ way}$$

$$\therefore \text{Total ways} = 20 + 10 + 5 = 35 \text{ ways.}$$

98. 3 As third letter is e that can be selected in one way only.

$$\text{Case I: } \underline{4 \quad m \quad e} = 4 \text{ ways}$$

$$\text{Case II: } \underline{5 \quad n \quad e} = 5 \text{ ways}$$

$$\text{Case III: } \underline{e \quad p \quad e} = 1 \text{ way}$$

$$= 10 \text{ ways}$$

99. 4 It will go by elimination.

$9 - 7 = 2$ is even, therefore option (1) not possible.

$2 \times 9 = 18$ is even, therefore option (2) not possible.

$$\frac{3+9}{3} = \frac{12}{3} = 4 \text{ is even, therefore option (3) is not possible.}$$

\therefore The correct option is (4).

100. 4 (15) A ir con ditio ning

R a dio (12)

$$\begin{array}{ccc} & 6 & 2 \\ 4 & & \\ & 3 & \\ & 2 & 1 \\ & & 5 \end{array}$$

Pow er w indow s (11)

$$\text{Total} = 4 + 6 + 2 + 2 + 3 + 1 + 5 = 23$$

$$\therefore \text{Cars having none of the option} = 25 - 23 = 2.$$

101. 1 Is a sitter, its just simple addition and subtraction, FRG + CZE = 43.01 and US Total = 42.83
Hence difference in time = 43.01 – 42.83 = 0.18

102. 2 The first two rankers of final score are 8905 and 8897. The third ranker is carrying a score of 8880. So he needs to score 8881 to get a bronze, whereas his sum is 582 + 3003 = 3585.
Least score required = 8881 – 3585 = 5296

103. 4 Let the positive weights given to a competitor in High Jump, Pole Vault and Long Jump be x, y and z respectively. Therefore, x + y + z = Score-2
In long jump event, Michael Smith must have out-jumped all those competitors (excluding Daley Thompson) who had scored more than or equal to Michael Smith in each of High Jump and Pole Vault but with consolidated Score-2 of less than the consolidated Score-2 of Michael Smith.
The four competitors whom Michael Smith must have out-jumped in the long jump event are Torsten Voss, Jurgen Hingsen, Grigory Degtyarov and Steve Fritz.

104. 2 Here you need to compare the ratio as which of the following is the highest $\frac{189}{561}$, $\frac{209}{587}$ and rest of the option have equal value.

Now you can see that $\frac{209}{587}$ is greater than $\frac{189}{561}$.

105. 1 Population of the Chaidesh is lowest for lowest per capita availability of Tea wrt production, i.e. for 1995.

106. 1 From 96 to 99 in each year the production has increased but the area has decreased. Therefore, the production in unit per area is highest in 1999.

	Cement	Limestone	Power	Wages
93 – 94	100	20	25	15
02 – 03	104	21	27	15.8

$$\text{So percentage profit} = \frac{104 - (21 + 27 + 15.8)}{104} \times 100$$

$$= \frac{40.2}{104} \times 100 = 38.65\%$$

108. 2

	Steel	Power	Wages	Iron Ore
93 – 94	100	30	10	25
02 – 03	105.5	32.4	10.53	26.5

So percentage profit

$$= \frac{105.5 - (32.4 + 10.53 + 26.5)}{105.5} \times 100$$

$$= 34.18\%$$

109. 1 You only need to see the the particular row in the table for the given options and for Power it experienced continuous rise.

110. 4 Again for timber and wages experienced declined only once for the given period.

For questions 111 to 114:

The table consists of sorting the different nations according to the birth rate and death rate. The only thing to remember is that if two countries have same rank (3), then next country will get (5) rank. So

rank of Philippines is 33,
rank of Spain is 17,
rank of Taiwan is 28.

In-between total 9 countries.

In consolidated list 37th country is Venezuela.

In last question, we have to check last country of South America (42, 11) and last country of Africa (50, 28). In-between there are 8 countries of Asia.

111. 2 112. 1 113. 4 114. 1

115. 3 March rainfall is lower than September rainfall in every location. Just check the bar graph.

116. 2 Peak rainfall occurs in April. Just check the bar graph.

For questions 117 to 119: Based on observation only.

117. 3 4 and 2

118. 4 5

119. 4 Egg and onion.

120. 4 According to statement (1), A which has the third highest profitability has the lowest operating income in 2002-03.

According to statement (2), company D has the highest combined operating income and has the lowest operating profit.

According to statement (3), only company B has higher operating income in 2001-02 than 2002-03, and has higher profitability in 2002-03 than 2001-02.

According to statement (4), the companies having profitability between 10-20% are A, C, E but C has operating income equal to 200 crore.

So the answer is 4.

121. 3 Operating profit of companies is:

- A = 15
- B = 7.75
- C = 30
- D = 3
- E = 35
- F = 20

So the answer is E.

122. 1 The companies excluded are B and D. As both of them have -ve profitability, the answer is -ve. So the answer is (1).

123. 4 Companies exceeding profitability of 10% are C and E.

$$\text{So the average is } \frac{(30 + 35)}{2} = 32.5 .$$

For questions 124 to 126:

- Increase of HP is from 884 to 970, i.e. 86
- Increase of Kerala is from 1004 to 1058, i.e. 54
- Increase of Punjab is from 832 to 874, i.e. 42
- Increase of Assam is 919 to 932, i.e. 13
- Increase of J & K is 882 to 900, i.e. 18

124. 2 HP and Kerala are highest.

125. 3 Goa (1091 to 960)
Tamil Nadu (1044 to 986)
Bihar (1061 to 921)
Orissa (1037 to 972)
Bihar just by inspection

126. 3 Females outnumbering males means that the sexratio is more than 1000.
So option (3), i.e. the number remains unchanged for 4 years.

For questions 127 and 128:

- | | |
|---------------------|--------------|
| Congress – Thursday | BJP – Friday |
| SP – Thursday | BSP – Friday |
| CPM – Friday | |

127. 1 Congress procession can only be allowed on Thursday.

128. 4 According to the given table, statement (4) is not true.

129. 4 From statement A, both Aakash and Biplab have the same scores. But we cannot find the man of match. From statement B only, we cannot find the man of the match. Combining both statements we can find the man of the match i.e. Aakash.

130. 3 From statement A, their ranks will be A - 4, B -1, C -2, D - 3.
From statement B, also their ranks will be A - 4, B -1, C - 2, D - 3.

131. 1 From statement A, the number of members are 20.
So Each member will pay Rs. 30.
From statement B, we cannot find the each payable amount.

132. 1 $F + n = 4 (k + n)$... (i)
 $M + n = 3 (k + n)$... (ii)

From the above equations

$$F - M = (k + n)$$

From A

$$F - M = 10 \Rightarrow k + n = 10$$

$$F + n = 40$$

$$M + n = 30$$

$$\Rightarrow F + M + 2n = 70$$

Hence, from A alone, we can get the answer.

For questions 133 to 137:

If a person copies from one source, he must have the same blank answers as the source and exactly one wrong answer more than the source (as the copier has introduced one wrong answer on his own). If the person copies from two sources, the distinct wrong answers from the two sources would be left blank by the copier and the same wrong answers in the two sources would be copied as it is.

133. 2 A and D have only one source since they have only one wrong answer each.

C may have copied from only one source i.e. I and hence only B has two sources

134. 3 I did it before C since 27 is the wrong choice for I, similarly A,D,E made keys before C. Hence 4 people made their keys before C.

135. 4 Both G and H can't be sources to any of F,B or I and hence (4) is the correct option.

136. 3 F introduced wrong answer to question 14. because nobody else has done question 14 wrong.

137. 4 A, D and G have one distinct wrong answer and no blank answers. So, they must have the same source. E and H also have a common wrong answer and no blanks. Hence, both groups had identical sources.

138. 3 VCD = 70% Microwave = 75% ACS = 80% Washing M/c = 85%
Least percentage of employees having both VCD and Microwave = $70 + 75 - 100 = 45\%$
Least percentage having all 3 – VCD, Microwave, ACS = $45 + 80 - 100 = 25\%$
Least percentage having all 4 = $25\% + 85\% - 100\% = 10\%$

For questions 139 to 142:

4 Families

The key to cracking this question is to follow the simple fundamentals in Analytical Reasoning of going 1 line at a time and making a simple table

Arrival Order	Husband	Wife	Kids
1		Joya	2
2		Shanathi	0
3		Sridevi	
4	Sunil		1

- Sentence 1 – Family with 2 kids before no kids
- Sentence 2 – Shanathi with no kids came before Sridevi
- Sentence 3 – Sunil and wife came last with only kid
- Sentence 4 – Anil and Joya not husband and wife
- Sentence 5 – Anil and Raj are fathers – hence cannot be the family with no kids
- Sentence 6 – Sridevi and Anita cannot be the persons with no kid
- Sentence 7 – Anil and Joya not husband and wife
- Sentence 8 – Joya before Shanti and Anita was already present.

Using the above info – Anil and Raj cannot be married to Shanathi as Shanathi has no kids! Hence, Sunil has to be married to Sridevi (not with Joya already stated) and Raman with Shanathi.

Arrival Order	Husband	Wife	Kids
1	Anil	Anita	1
2	Raj	Joya	2
3	Raman	Shanathi	0
4	Sunil	Sridevi	1

- 139. 1
- 140. 2
- 141. 3
- 142. 2

For questions 143 to 146:

7 Faculty

JC came in first and the next 2 people were SS and SM. When he left, DG left with him. JP and VR stayed behind.

Entry	Exit	Met
JC € SS € SM	JC & DG	JP & VR
JP & VR together		JC & one more person

SS left immediately after SM
PK only met JP & DG

The key to this question is that when JP & VR entered apart from JC there was ONLY 1 other person. This could not have been SS or SM as they came and left together. Hence, this would have to be DG.
Hence, DG came 4th, before JP and is the answer to both 143 and 144.

Now for Qs 145 we need to see how many people did VR meet. Both SS and SM had already left and JC and DG were sitting. He entered with JP eliminating 2 and 5 from our answer choices. Since, PK did not meet VR – the answer is 3 and not 4.

- 143. 2
- 144. 3
- 145. 2
- 146. 4

For questions 147 to 150:

	D	A	F
Entrance	Corridor		
	C	E	B

- 147. 3 If E faces the corridor, person to his left is C.
So the answer is (3).
- 148. 4 According to figure, E faces A's office.
So the answer is (4).
- 149. 1 According to figure, F's neighbour is A.
So the answer is (1).
- 150. 2 According to figure, B's room is last on the right.
So the answer is (2).