

Mock CAT – 5

Answers and Explanations

1	b	2	c	3	a	4	d	5	b	6	d	7	a	8	b	9	c	10	a
11	a	12	b	13	c	14	d	15	a	16	b	17	c	18	a	19	d	20	a
21	c	22	a	23	b	24	a	25	d	26	b	27	b	28	b	29	c	30	a
31	c	32	b	33	a	34	d	35	b	36	c	37	b	38	b	39	b	40	c
41	c	42	a	43	b	44	a	45	d	46	a	47	b	48	c	49	c	50	b
51	d	52	b	53	a	54	c	55	c	56	a	57	b	58	c	59	b	60	a
61	a	62	d	63	d	64	d	65	d	66	b	67	c	68	a	69	a	70	c
71	c	72	c	73	c	74	b	75	d	76	b	77	b	78	b	79	d	80	d
81	b	82	d	83	d	84	d	85	b	86	b	87	b	88	c	89	c	90	b
91	d	92	b	93	a	94	a	95	a	96	d	97	b	98	c	99	a	100	a
101	a	102	a	103	d	104	b	105	d	106	b	107	a	108	a	109	c	110	a
111	a	112	c	113	b	114	c	115	a	116	b	117	a	118	c	119	a	120	a
121	c	122	c	123	b	124	b	125	a	126	c	127	d	128	d	129	b	130	c
131	a	132	a	133	c	134	a	135	a	136	c	137	b	138	a	139	b	140	b
141	b	142	c	143	b	144	a	145	c	146	c	147	d	148	c	149	a	150	b
151	b	152	a	153	b	154	c	155	b	156	c	157	a	158	d	159	b	160	c
161	d	162	a	163	b	164	d	165	d										

Scoring table

Section	Question number	Total questions	Total attempted	Total correct	Total wrong	Net score	Time taken
EU + RC	1 to 55	55					
QA	56 to 110	55					
DI + DS + AR	111 to 165	55					
Total		165					

1. b CB is a mandatory pair, and introduces the topic. D is the conclusion.
2. c AC is a mandatory pair. A opens the topic, and C follows it up. The 'also' in C is a clue. CD is a mandatory pair. B shows the reaction to A and C.
3. a D has to precede A because the word 'soon' in A implies it happened after some time. C has to conclude the sentence because of the word 'eventually'. The sequence of events is — trade started - - - people transported - - - merchants grew rich - - - people got variety.
4. d D opens the topic, and C follows up with what unemployment means other than an economic index. A says that it is not proportional in effect and B tells us who it affects most. Hence DC and AB are mandatory pairs.
5. b The first sentence begins by talking about the setting up of a socialist government, sentence C talks about the fate of this government and the action by the US. Sentence E describes the details of this operation and sentence B goes on to mention how this was condoned by the US. Sentence D makes a comment on the significance of this. This makes choice (b) correct.
6. d Sentence B mentions one of the reactions regarding the omission of introspective dwelling. Sentence D mentions the reason for this disappointment; sentence E then goes on to mention parts from his early life and sentence A further adds to it. Both E and A talk about his family. Sentence C ends on a comment about his relationships with friends. This makes choice (d) correct.
7. a Sentence B talks about the other career of a person; sentence D talks about what direction that has taken and sentence C mentions her latest book. Sentence E talks about how it has been inspired by an instance in her life and sentence A goes on to describe that instance. This makes option (a) correct.
8. b Sentence A mentions the fact that there are some rumours. Sentence B seems most apt to come next which mentions the official policy according to Russian law, sentence C follows with the situation in reality. Sentence E mentions what this "autonomy" which has been mentioned in the previous sentence results into. Sentence D talks about the status of allegations and sentence F ends with the writer mentioning her attempts at arriving at the truth about these "allegations". This makes choice (b) correct.
9. c Sentence A mentions a person's personal life. If one looks chronologically, sentence C is the most apt, which is followed by sentence B. Sentence E mentions his second marriage. Sentences D and F give more details about Betsey. This makes choice (c) correct.
10. a Sentence A mentions about the beginning of Merrit's musical career. Sentence C mentions his status now. This makes AC a pair. Sentence E mentions one of the reason why he "he does not harvest much pleasure" from his success. Sentence D is a quote where he mentions an instance of the general response to his music; and sentence B is his reaction to it and is followed by sentence F. This makes choice (a) correct.
11. a 'Effrontery' is a bold shameless action. The peasant's effrontery affronted the mandarin (a Chinese official). To affront is to insult someone.
12. b 'Leitmotif' means a recurring theme. 'Cupidity' is greed.
13. c 'Pseudo-hospitality' means a false or fake hospitality. The room gave a tired desultory welcome. None of the other options can fill the second blank. So (c) is the answer.
14. d Mother Teresa gives off aura of calm force which rejuvenates the weak. Manna according to the Old Testament is miraculous food that God gave to the Israelites. The statement is praising Mother Teresa. So (d) has to be the answer.
15. a 'Stentorian' and 'sarcastic' can only describe a person. Thus (a) is the answer.
16. b The author mentions this in the first paragraph — "This in itself....for granted". This makes choice (b) correct.
17. c The author uses this term in the second paragraph. Out of the options present, choice (c) is apt and correct.
18. a The author uses the phrase in the third paragraph and goes on to say — "Rather...old practices", which is best stated by choice (a). Therefore, this is the correct choice.
19. d Janet Abbate is quoted as mentioning the significance of the turbulent history of the Internet. Option (d) is not mentioned in the passage, and hence is the correct choice.
20. a The author mentions this in paragraph 6. He says, "Rather, the ... communication". Sentence (a) states this most aptly, and is the correct choice.
21. c The various aspects of surveillance are dealt with in paragraph 7. The author mentions all of these except choice (c), which is not mentioned. Hence, this is the correct choice.
22. a The last paragraph mentions the various steps and guidelines. OECD Protection Directive is not mentioned, making it the correct choice.
23. b This issue is considered in the fourth paragraph and the author states that — "While not wishing ... we conceive of cyberspace". This makes choice (b) the correct one.
24. a The first paragraph mentions this "While the philosophically ...massive theft". This makes choice (a) correct.

25. d The author mentions these actions in the second paragraph and nowhere is sentence (d) mentioned. This makes (d) the correct choice.
26. b This is mentioned in the third paragraph — “Finally, the Internet ... cultural life”. This makes choice (b) correct.
27. b The fourth paragraph sees the mention of this — “These complexities ... political one”. This makes choice (b) correct.
28. b The answer in the fourth paragraph. The correct choice is (b).
29. c The author discusses these points in the fifth and sixth paragraphs. “The shift ... today”, and further “Since 1945 ... US \$ 8 billion”. This makes choice (c) correct.
30. a The seventh paragraph contains “Despite rampant ... anti-piracy campaigns”, and further “The reason ... complex,”. This makes choice (a) correct.
31. c This issue is mentioned in the last paragraph — “However as early as ... developing countries”. This makes choice (c) correct.
32. b The first paragraph carries the answer to this and G B Shaw is not mentioned making choice (b) correct.
33. a The answer is mentioned verbatim in the second paragraph — “Because of the social ... symbolic weight”. This makes choice (a) correct.
34. d The second paragraph mentions this event in history — “Most estates were built on or near the ruins of monasteries, whose antiquity seemed to offer historical legitimacy to their upstart possessors ...”. This makes choice (d) correct.
35. b The author mentions this in the third paragraph where he states that the prevalent understanding was to look at beauty in the work of art, but what had changed by the end of the century was “Either the ... chose the second course”. This makes choice (b) correct.
36. c Associationism is the theory that advocates that association is the basic principle of mental activity. Also refer the paragraph 4.
37. b This aspect is broached by the author in the last paragraph — “Thus from an ... pavilions”. The rest of the options are not verified by the content of the passage. This makes choice (b) correct.
38. b The third paragraph mentions this issue and the author states — “The eighteenth century, though ... Western culture”. Also refer to paragraph 5. This makes choice (b) correct.
39. b The first paragraph mentions this point — “To do this ... of the music”. Statement (b) mentions it most appropriately although the phrase “content” is not used, and sentence (c) wrongly defines “content”. This makes choice (b) correct.
40. c This issue is raised in the first paragraph and the author lists many beliefs regarding New Orleans Jazz. Sentence (c) mentions the belief of most critics, which is not mentioned by the author. This makes choice (c) correct.
41. c This is discussed by the author in the second line of the second paragraph — “Persons who question ... to the communication feeling by any medium”. This makes choice (c) correct.
42. a The third paragraph mentions this — “The striking ... course be absurd”. Using this logic, the author is making the point that a religious element is present in both of them. This makes choice (a) correct.
43. b The author mentions this aspect of music in the fourth paragraph — “Unlike a monk ... eternal aspirations”. This makes choice (b) correct.
44. a This is mentioned in the fifth paragraph — “It has often ... thinking”. This makes choice (a) correct.
45. d This is mentioned in the sixth paragraph — “Their faith ... Christianity”, and further “It is interesting ... as in Bach”. This makes choice (d) correct.
46. a The author mentions this in the last paragraph — “Not that ... non-traditional music” and further, “Even in Bird ... Christian believer”. This makes choice (a) correct.
47. b The author makes the point in the opening paragraph where he mentions how at that time ‘fine art’ was distinguished from commercial art in being regarded as non-commercial which was not correct since it was sold in galleries and auction rooms. This makes choice (b) correct.
48. c This influence is dealt with in the second paragraph where the author mentions “His lessons were eagerly ... and kitsch.” This makes choice (c) correct.
49. c The author talks about this in the second and third paragraphs: “Just as the socialist ... America”. He further mentions: “Although Warhol was probably ... of life”. This makes choice (c) correct.
50. b These values are mentioned in the third paragraph and the author mentions: “The amoral ... middle America”. This makes choice (b) correct.
51. d Dick’s article is mentioned in the fourth paragraph where the author says that: “Dick Hebdige ... high culture”. This makes choice (d) the correct one.
52. b The author while talking about Charles Saatchi in paragraph 6, begins by stating that: “In public ...” and ends by saying “... museum of advertising”. He has picked Saatchi and not some other member of the bourgeoisie to show that in spite of what their affinities are (Saatchi being an advertising man), in public they patronize high culture. This makes choice (b) a more apt answer.

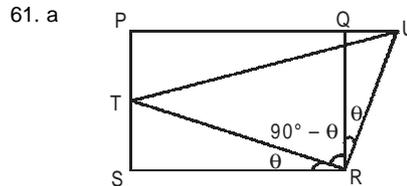
53. a The author mentions this in the seventh paragraph, after mentioning the Saatchi example: "They truly enjoyed ... to be adopted". He then goes on to mention instances of this and makes the point that the assimilation happens and is a miracle. This makes choice (a) the most apt interpretation.
54. c The author mentions Guston in the second last paragraph and mentions that: "The iconography ... Mouse". At the end of the passage, he further adds: "His aim ... cartoon films". Choices (a) and (b) both are correct. Therefore choice (c) is the answer.
55. c A stumblebum is an awkward stupid person or a second-rate prize fighter.
56. a $V = 7^{3n} - 3^{5n} = 343^n - 243^n$
 $343^n - 243^n$ will always be divisible by $343 - 243$ for any value of n .
57. b If altitude from Q to PR bisects PR then
 $\angle P = \angle R = 60^\circ$. Since two of the angles of ΔPQR are 60° each so even the third angle will be of 60° , it is an equilateral triangle. In radius of an equilateral triangle is half of its circumradius.
 In radius = $\frac{2}{2} = 1$
58. c $15! = 2^{11} \times 3^6 \times 5^3 \times 7^2 \times 11^1 \times 13^1$
 Since $15!$ has 6 prime factors, it can be expressed as product of two coprime numbers in $2^6 - 1 = 2^5$ ways.
 $\therefore 2^5$ pairs of (a, b) are possible and hence $a \neq b$ from every pair we can get $0 < \frac{a}{b} < 1$ keeping the smaller number as a and the larger as b.
Alternative method:
 Total number of numbers are 2^6 . In these 2^6 numbers half of them will be such that the denominator is less than the numerator.
 So total required numbers = $\frac{2^6}{2} = 2^5$
59. b $\log_{30} 3 + \log_{30} 5 + \log_{30} 2 = 1$
 $[\log_a + \log_b + \log_c = \log_abc]$
 or, $x + y + \log_{30} 2 = 1$
 or, $\log_{30} 2 = 1 - x - y$
 or, $3 \log_{30} 2 = 3(1 - x - y)$
 or, $\log_{30} 8 = 3(1 - x - y)$
 or, $\log_8 30 = \frac{1}{3(1 - x - y)}$
60. a If P_1 and P_2 are twin-primes then P_1 will be of the form $6K - 1$. (K is a natural number.)

$$P_1 = 6K - 1 \text{ and } P_2 = 6K + 1.$$

$$P_1 + P_2 = 6K - 1 + 6K + 1 = 12K$$

$$\therefore 12 \text{ would always divide } P_1 + P_2.$$

Note: Any prime number greater than 3 has to be of the form $6K + 1$ or $6K - 1$.



Since PQRS is a square of area 256 sq. cm therefore each of the sides is equal to 16 cm.

In triangles ΔTSR and ΔQUR

$$\angle TSR = \angle UQR = 90^\circ$$

$$\angle SRT = \angle URQ = \theta$$

$$\text{and } SR = QR = 16 \text{ cm}$$

$\therefore \Delta TSR$ and ΔUQR are congruent triangles.

So, $TR = RU$ and $QU = TS$.

$$\text{Now } \frac{1}{2} TR \cdot RU = 200 \text{ sq. cm}$$

$$\text{or, } TR^2 = 400 \text{ sq cm}$$

$$\text{or, } TR = 20 \text{ cm}$$

$$\therefore \Delta TSR$$

$$TS = \sqrt{20^2 - 16^2} = 12 \text{ cm}$$

$$\therefore QU = TS = 12 \text{ cm}$$

62. d $1000^7 - 17 = 10^{21} - 17$. In decimal notation of this number these will be 19 nines followed by 8 and 3.

$$1000^7 - 17 = 10^{21} - 17 = 9999 \dots 983$$

$$\therefore \text{Sum of the digits is equal to } (19 \times 9) + 8 + 3 = 182$$

63. d $1^5 + 2^5 + 3^5 + 4^5 + 5^5 + \dots + 3000^5$
 $= 1^5 + 3^5 + 5^5 + 7^5 + \dots + 2999^5 + (2^5 + 4^5 + 6^5 + \dots + 3000^5)$

Now the part inside the bracket is completely divisible by 4 and we have to get the remainder when the part outside the bracket is divided by 4.

$1^5 + 3^5$ is divisible by $(1 + 3)$, similarly $5^5 + 7^5$ is divisible by $5 + 7$ and hence by 4.

\therefore Sum of all these terms (outside the bracket)

$2997^5 + 2999^5$ is divisible by 4 and hence the remainder is zero.

64. d We have, $4x + \frac{5}{x+3} = \frac{10}{2x+6} - 12$

$$\text{or, } 4x + \frac{5}{x+3} = \frac{10}{2(x+3)} - 12$$

$$\text{or, } 4x + \frac{5}{x+3} = \frac{5}{x+3} - 12$$

or, $4x = -12$ or $x = -3$

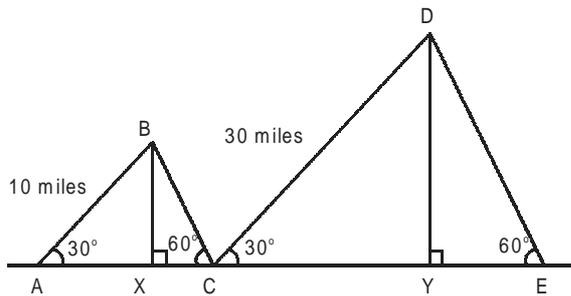
But x can not be equal to -3 , as $\frac{5}{x+3}$ appears in the equation and we know that the denominator cannot be equal to zero. \therefore No root exists.

65. d Coefficient of the 7th term = nC_6
 Coefficient of the 18th term = ${}^nC_{17}$
 Now ${}^nC_6 = {}^nC_{17}$
 or, $n = 17 + 6 = 23$
 \therefore The equation is $x^2 + 24x + 23$
 or, $(x + 1)(x + 23)$
 \therefore The roots of the equation are -1 and -23 .
66. b We can have six (i.e. 4C_2) pairs of groups from 4 different groups. I and II both can be satisfied if and only if there is exactly one student belonging to each of the six pairs.

Alternative method:

If one group is selected then each other three groups has one student is common from first group. So in first group there are only three students. Similarly for the other three groups. If student numbers are 1, 2, 3, 4, 5 and 6 then groups can be made (1, 2, 3), (3, 4, 5), (5, 6, 1) and (2, 4, 6). Hence there are six students in the class.

For questions 67 and 68:



In $\triangle ABC$, $\angle B = 90^\circ$; $\angle A = 30^\circ$; $\angle C = 60^\circ$,

$$\tan 60^\circ = \sqrt{3} = \frac{AB}{BC}; AB = 10 \text{ miles.}$$

So $BC = \frac{10}{\sqrt{3}}$. Since $\triangle ABC$ and $\triangle CDE$ are similar

triangles, if $DC = 30$ miles, $DE = \frac{10}{\sqrt{3}} \times 3 = 10\sqrt{3}$

$$\text{Hence total time taken} = \frac{10+30}{20} + 10\sqrt{3} \left(1 + \frac{1}{3}\right) \times \frac{1}{40}$$

$$= \left(2 + \frac{\sqrt{3}}{3}\right) \text{hr} \approx 2 \text{ hours } 35 \text{ min.}$$

Now, $\angle BCD = 90^\circ$, $BC = \frac{10}{\sqrt{3}}$ miles and $CD = 30$ miles.

So, $BD^2 = BC^2 + CD^2$

$$= \left(\frac{10}{\sqrt{3}}\right)^2 + (30)^2 = \frac{100}{3} + 900$$

$$= \frac{100 \times 28}{3}$$

$$\therefore BD = 10\sqrt{\frac{28}{3}} \text{ miles}$$

67. c

68. a

69. a $Y = 5 - [|X+1| + |X-3|]$

Max(Y) is when $|X+1| + |X-3|$ is minimum.

$|X+1| + |X-3|$ is minimum when X lies between -1 and 3 , and the minimum value is 4 .
 Hence the answer is 1 .

70. c The ticket vendor at the counter will not have a problem if the sequence of the guys is 1212 or 1122. Each of these can be arranged in $2! \times 2!$ ways or 4 ways. Hence in all there are 8 ways.

71. c a. $c = a + b$, only if $a + b < k$

b. k cannot be uniquely identified.

For example, if $x = 11$, $y = 12$ and $a = 1$, $b = 2$; then the value $x + y$ leaves $c = 3$ as the remainder even if $k = 5$ or $k = 10$. Hence these is no unique answer. c. c has to be $a + b$ if $a + b < k$; or it is equal to $a + b - k$ if $a + b > k$. This has to be the true statement.

Alternative method:

If the sum of the remainders (i.e. $a + b$) is less than the divisor (i.e. k) then the remainder is sum of the remainders (i.e. $a + b$). If the sum of the remainders (i.e. $a + b$) remainder is more than the divisor (i.e. k) then the remainder is sum of the remainder minus divisor (i.e. $a + b - k$).

72. c The question could be done using the choices. Choice (a) cannot be the answer because the largest 6 digit binary number itself is $2^6 - 1$ which is less than 19600 . Similarly (d) can be eliminated because when working with base 14 a 5 digit decimal number converted to base 14 must have fewer than or equal to 5 digits. Check with (b) $(111100)_5 = 5^4 + 5^4 + 5^3 + 5^2 < 19600$ Hence the answer is base 7.

73. c $\sum x = \frac{(1+x)}{2} \cdot x$

$$x! - \sum x = x! - \frac{(x)(1+x)}{2}$$

$x! - \sum x$ would be divisible by x only if $(x + 1)$ is divisible by 2 (or) we are referring to all 2 digit odd numbers. There are 45 of them from 11 to 99.



74. b Let V be the number that when divides 34369 and 31513 leaves the same remainder. V must be a factor of $34369 - 31513 = 2856$. When 31513 is divided by 2856 it leaves a remainder of 97 and hence any three-digit factor of 2856 when divides 31513 the remainder will be 97.

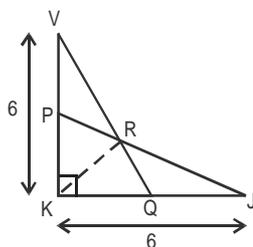
Note: How many of you went for option (d)?

75. d $\frac{p}{q}, \frac{q}{v}, \frac{r}{s}$ and $\frac{s}{p}$ are all positive numbers and for positive numbers.
A.M. \geq G.M.

$$\text{So, } \frac{\frac{p}{q} + \frac{q}{v} + \frac{r}{s} + \frac{s}{p}}{4} \geq \left(\frac{p}{q} \cdot \frac{q}{v} \cdot \frac{r}{s} \cdot \frac{s}{p} \right)^{\frac{1}{4}}$$

$$\text{or, } \frac{p}{q} + \frac{q}{v} + \frac{r}{s} + \frac{s}{p} \geq 4$$

76. b

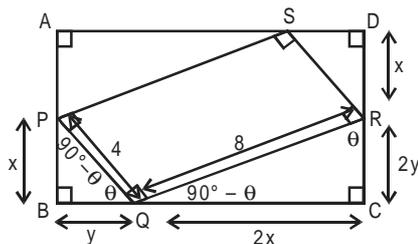


R is the centroid. Since JP and VQ are the medians of ΔJVK ,

$$\text{Area of } \Delta RQJ = \frac{1}{2} \times QJ \times \text{altitude from } R \text{ to } QJ$$

$$= \frac{1}{2} \times QJ \times \left(\frac{1}{3} \times VK \right) = \frac{1}{2} \times 3 \times \frac{1}{3} \times 6 = 3 \text{ sq. cm.}$$

77. b



In ΔPBQ , $\angle PBQ = 90^\circ$, $\angle PQB = \theta$ (say)

$$\therefore \angle BPQ = 90 - \theta$$

In ΔQCR , $\angle QCR = 90^\circ$

$$\angle BQP + \angle PQR + \angle RQC = 180^\circ$$

$$\text{or, } \theta + 90^\circ + \angle RQC = 180^\circ$$

$$\text{or, } \angle RQC = 90^\circ - \theta$$

$$\angle CRQ = \theta$$

$\therefore \Delta$'s PBQ and QCR are similar.

$$\text{If } PB = x \text{ and } BQ = y \text{ then } \frac{PB}{4} = \frac{QC}{8} \Rightarrow QC = 2x$$

Similarly $RC = 2y$.

$$\therefore \text{ We have } x^2 + y^2 = 4^2 \quad \dots (i)$$

We can see that RD is also equal to x .

Area of the rectangle $ABCD = BC \times CD$

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

$$= 2y^2 + xy + 4xy + 2x^2$$

$$= 2x^2 + 5xy + 2y^2$$

$$= 2(x^2 + y^2) + 5xy$$

$$= 2(16) + 5xy = 32 + 5xy \quad [\text{From (i)}]$$

$$\therefore x^2 + y^2 = 16$$

\therefore The measures of x^2y^2 is maximum when $x^2 = y^2 = 8$.

$$\therefore \text{ The maximum of } x^2y^2 = 8^2 = 64$$

$$\therefore \text{ The maximum of } xy = 8$$

$$\text{The maximum area of the rectangle } ABCD = 32 + 5xy = 32 + 5(8) = 72$$

78. b The n th term of the series is given by $\frac{n(n+1)}{2}$.

$$\therefore \sum \frac{n(n+1)}{2} = \frac{1}{2} \left[\sum n^2 + \sum n \right]$$

$$= \frac{1}{2} \left[\frac{n(n+1)(2n+1)}{6} + \frac{n(n+1)}{2} \right] = \frac{n(n+1)(n+2)}{6}$$

79. d $V^4 - 20V^2 + 4 = (V^2)^2 - 2 \cdot V^2 \cdot 2 + 2^2 - 16V^2$

$$= (V^2 - 2)^2 - (4V)^2 = (V^2 - 2 - 4V)(V^2 - 2 + 4V)$$

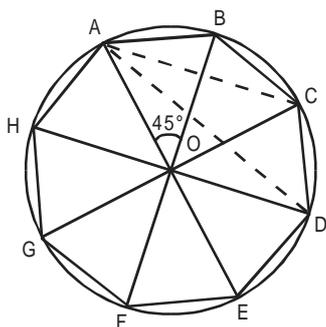
$$= (V^2 - 4V - 2)(V^2 + 4V - 2)$$

But we have to check whether any of the factor is equal to one or not. But for integer v none of them can be one.

Now for any integer value of V , $V^4 - 20V^2 + 4$ will have at least two factors $(V^2 - 4V - 2)$ and $(V^2 + 4V - 2)$ and for no value of V , $V^4 - 20V^2 + 4$ will be a prime number.

80. d If we take 18 consecutive numbers, one of the numbers has to be a multiple of 18 and sum of its digits will be either 9 or 18 and in either case the number will be divisible by sum of its digits.

81. b



Let ABCDEFGH be a regular octagon inscribed in a circle with centre O.

$$OA = OB = OC = OD = OE = OF = OG = OH = 1$$

We have to get the value of

$$AB \times AC \times AD \times AE \times AF \times AG \times AH$$

We know that

$$AB = AH$$

$$AC = AG$$

$$AD = AF \text{ and } AE = AO + OE = 1 + 1 = 2$$

$$\therefore AB \times AC \times AD \times AE \times AF \times AG \times AH$$

$$= 2(AB)^2(AC)^2(AD)^2$$

In $\triangle AOB$

$$\angle AOB = \frac{360^\circ}{8} = 45^\circ \quad OA = OB = 1$$

$$\cos \angle AOB = \frac{AO^2 + OB^2 - AB^2}{2AO \cdot OB}$$

$$\text{or, } \cos 45^\circ = \frac{1^2 + 1^2 - AB^2}{2 \times 1 \times 1}$$

$$\text{or, } \frac{1}{\sqrt{2}} = \frac{2 - AB^2}{2}$$

$$\text{or, } 2 - AB^2 = \sqrt{2}$$

$$\text{or, } AB^2 = 2 - \sqrt{2} \quad \dots \text{ (i)}$$

In $\triangle AOC$,

$$\angle AOC = 90^\circ, \quad AO = OC = 1$$

$$AC^2 = AO^2 + OC^2 = 1^2 + 1^2 = 2 \quad \dots \text{ (ii)}$$

In $\triangle AOD$,

$$\angle AOD = 135^\circ, \quad AO = OD = 1$$

$$\cos 135^\circ = \frac{AO^2 + OD^2 - AD^2}{2AO \times OD}$$

$$\text{or, } -\frac{1}{\sqrt{2}} = \frac{1^2 + 1^2 - AD^2}{2 \times 1 \times 1} \quad \text{or, } -\sqrt{2} = 2 - AD^2$$

$$\text{or, } AD^2 = (2 + \sqrt{2}) \quad \dots \text{ (iii)}$$

Now combining (i), (ii) and (iii), we have

$$2(AB)^2(AC)^2(AD)^2$$

$$= 2(2 - \sqrt{2})(2)(2 + \sqrt{2})$$

$$= 4(4 - 2) = 8$$

For questions 82 and 83: We don't know whether she travels both half with same uniform speed or not.

82. d

83. d

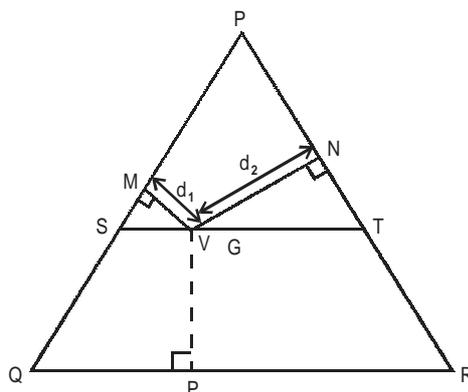
84. d The average profit percent can be found only if we know that the cost price of each type of item. Hence the data is insufficient.

85. b Product of first 20 multiples of 30 can be written as $(30)^{20} [20!]$. $(30)^{20}$ has 20 zeroes and $20!$ has 4 zeroes. Hence total number of zeroes is 24.

86. b Sum of the digits of 5775 is 24. If 5775 is written 8000 times, the sum of the digits will be $24 \times 8000 = 192000$ and the digit sum will be 3. So the number 57755775 ... 5775 is of the form $9K + 3$ and in this case K is an even number as $57755775 \dots 5775 - 3$ ends with 2. $9K + 3$ can also be written as $9(2K_1) + 3 = 18K_1 + 3$, where $2K_1 = K$. Now the remainder will of course be 3 when this number is divided by 18.

87. b Existence of one number in V will give rise to the existence of two more numbers in V. Therefore V has to be real number set.

88. c



Here in the figure PQR is an equilateral triangle. G is the centroid and $ST \parallel QR$.

V is an arbitrary point on ST.

VM and VN are perpendicular to PQ and PR respectively. Distance of point V from the base is d.

$$VM = d_1 \text{ and } VN = d_2$$

$$\angle PQR = \angle PRQ = \angle PTS = \angle PST = 60^\circ$$

$$PQ = QR = RP = a \text{ (say)}$$

So the length of the median of the triangle $\triangle PQR$ is

$$\frac{\sqrt{3}a}{2}$$

$$VP = d = \frac{\sqrt{3}a}{2} \times \frac{1}{3} = \frac{a}{2\sqrt{3}}$$

Δ^s PST and PQR are similar and ST passes through the centroid.

$$\therefore \text{We have } PS = ST = TP = \frac{2a}{3}$$

$$\text{In } \Delta VSM, \sin \angle VSM = \frac{VM}{VS} = \frac{d_1}{VS}$$

$$\text{or, } \sin 60^\circ = \frac{d_1}{VS}$$

$$\text{or, } d_1 = VS \times \sin 60^\circ$$

$$= VS \times \frac{\sqrt{3}}{2}$$

Similarly in ΔVTN

$$d_2 = VT \times \frac{\sqrt{3}}{2}$$

$$\text{Now } d_1 + d_2 = \frac{\sqrt{3}}{2}(VS + VT) = \frac{\sqrt{3}}{2}ST = \frac{\sqrt{3}}{2} \times \frac{2a}{3}$$

$$\text{or, } d_1 + d_2 = \frac{a}{\sqrt{3}} = 2 \times \frac{a}{2\sqrt{3}} = 2d$$

$$\text{or, } d = \frac{d_1 + d_2}{2}$$

Alternative method:

If the point is the centroid of an equilateral triangle then d, d_1, d_2 are equi distance from the sides.

$$\text{So } d = \frac{d_1 + d_2}{2}$$

89. c $v + \frac{1}{v} < \sqrt{5}$

$$v^2 - \sqrt{5}v + 1 < 0$$

$$\frac{\sqrt{5}-1}{2} < v < \frac{\sqrt{5}+1}{2}$$

But given that $v > 1$

$$\text{So } 1 < v < \frac{\sqrt{5}+1}{2}$$

90. b $xyz = 24$

or, $3x \cdot 3y \cdot z = 216$

Now $3x + 3y + z$ will be minimum when

$$3x = 3y = z = (216)^{\frac{1}{3}} = 6$$

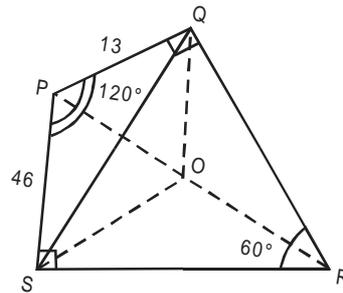
$$\therefore \text{The minimum value of } 3x + 3y + z = 6 + 6 + 6 = 18$$

91. d $n^5 - 5n^3 + 4n = n(n^4 - 5n^2 + 4) = n(n^2 - 1)(n^2 - 4)$

$$= (n-2)(n-1)n(n+1)(n+2)$$

$\therefore n^5 - 5n^3 + 4n$ is product of 5 consecutive integers and hence it is always divisible by $5!$, i.e. 120.

92. b



In quadrilateral PQRS

$$\angle PQR = \angle PSR = 90^\circ$$

$$\angle QPS = 120^\circ \text{ and } \angle QRS = 60^\circ$$

Since sum of opposite angles is 180° .

\therefore PQRS is a cyclic quadrilateral. PR is the diameter of the circumscribing circle and O is the centre. $PO = OR$.

In ΔQPS ,

$$\cos \angle QPS = \frac{46^2 + 13^2 - QS^2}{2 \times 46 \times 13}$$

$$\text{or, } -\frac{1}{2} = \frac{2285 - QS^2}{46 \times 26}$$

$$\text{or, } QS^2 = 2883$$

$$\therefore \angle QRS = 60^\circ$$

$$\therefore \angle QOS = 120^\circ \text{ [Angle made at the centre.]}$$

$$QO = OS = r \text{ [Say]}$$

[QO and OS are radii of the circumcircle]

In ΔOSQ ,

$$\cos \angle QOS = \frac{r^2 + r^2 - QS^2}{2 \times r \times r}$$

$$\text{or, } \cos 120^\circ = \frac{2r^2 - QS^2}{2r^2}$$

$$\text{or, } -\frac{1}{2} = \frac{2r^2 - 2883}{2r^2}$$

$$\text{or, } -r^2 = 2r^2 - 2883$$

$$\text{or, } 3r^2 = 2883$$

$$\text{or, } r^2 = \frac{2883}{3} = 961$$

$$\text{or, } r = 31$$

$$\text{Now } PR = 2r = 2 \times 31 = 62$$

\therefore Option (b).

For questions 93 to 95:

$V_1 = 101, V_2 = 10101, V_3 = 1010101$ and So on
 $V_n = 100^n + 100^{n-1} + 100^{n-2} + \dots + 1$

$$\begin{aligned} &= \frac{1(100^{n+1}-1)}{100-1} = \frac{10^{2n+2}-1}{99} = \frac{(10^{n+1})^2-1}{99} \\ &= \frac{(10^{n+1}+1)(10^{n+1}-1)}{99} \end{aligned}$$

Now if n is odd then $10^{n+1} - 1$ is divisible by $(10 + 1)$ as well as $(10 - 1)$ and so by 99.

$$\therefore \frac{(10^{n+1}+1)(10^{n+1}-1)}{99} \text{ will be a composite number}$$

for odd values of n except for $n = 1$.

For $n = 1$ obviously V_1 is divisible by 101 for an odd

$n > 1$ also V_n is divisible by 101 as either $\frac{10^{n+1}-1}{99}$

or, $\frac{10^{n+1}+1}{99}$ will be a multiple of 101 for alternate odd values of n .

When n is even, $V_n = \frac{(10^{n+1}+1)(10^{n+1}-1)}{99}$ can be

written as $\frac{10^{n+1}+1}{11} \times \frac{10^{n+1}-1}{9}$ which is always

composite as $10^{n+1} + 1$ is divisible by $10 + 1$ for even values of n and $10^{n+1} - 1$ is always divisible by $(10 - 1)$.

93. a V_n is prime for $n = 1$ only.

94. a For odd n, V_n is always divisible by 101 only.

95. a $V_4 = \frac{(10^{4+1}+1)(10^{4+1}-1)}{99} = \frac{100001}{11} \times \frac{99999}{9} = 9091 \times 11111$

96. d Initial concentration = 60%. If final concentration = 50%.

Then ratio of concentration = $\frac{5}{6}$.

Hence ratio of volumes would be $\frac{6}{5}$ (or)

10 litres is $\frac{1}{5}$ of the original volume. So $V = 50$ litres.

If final concentration = 40%

Concentration has become $\frac{4}{6}$ or $\frac{2}{3}$ of initial

concentration and so volume be $\frac{3}{2}$ of initial volume

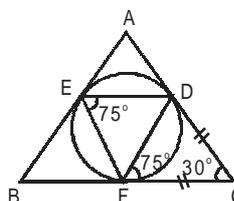
(or) 10 litres is $\frac{1}{2}$ of the initial volume

(or) initial volume = 20 litres.

97. b A's effective speed = $E + 5$; where E represents speed of the escalator in steps/second.
 B's effective speed = $10 - E$
 Relative speed of A with respect to B = 15 steps/s.
 Since time taken = 10 s
 There are $15 \times 10 = 150$ steps in the escalator.

Note: This question is similar to questions of two boats, one travelling upstream and another travelling downstream in a river.

98. c



CF and CD are tangents drawn to the circle from C. So $CF = CD$.

If $\angle C = 30^\circ$ then $\angle DFC = 75^\circ$. Since $\triangle DCF$ is an isosceles triangle.

Using alternate segment theorem we can conclude that $\angle DFC = \angle DEF = 75^\circ$.

99. a 2 and 4 are the roots of the expression and hence we have

$$2^4 + 2 \cdot 2^3 + a \cdot 2^2 + b \cdot 2 + 3 = 0$$

$$\text{or, } 4a + 2b = -35 \quad \dots (i)$$

Again,

$$4^4 + 2 \cdot 4^3 + a \cdot 4^2 + b \cdot 4 + 3 = 0$$

$$\text{or, } 16a + 4b = -387 \quad \dots (ii)$$

Solving (i) and (ii), we get

$$2a + 3b = 106$$

100. a $p^2 + q^2 + r^2 = (p + q + r)^2 - 2(pq + qr + rp)$

$$\text{or, } 9 = 1^2 - 2(pq + qr + rp)$$

$$\text{or, } pq + qr + rp = -4$$

$$p^3 + q^3 + r^3 = (p + q + r)(p^2 + q^2 + r^2 - pq - qr - rp) + 3pqr$$

$$\text{or, } 1 = (9 + 4) + 3pqr$$

$$\text{or, } 3pqr = -12; \text{ or, } pqr = -4$$

$$\frac{1}{p} + \frac{1}{q} + \frac{1}{r} = \frac{pq + qr + rp}{pqr} = \frac{-4}{-4} = 1$$

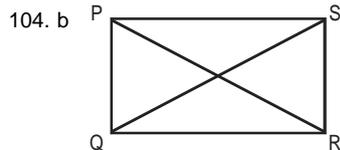
101. a All the prime numbers greater than 3 are of the form $6K + 1$ or $6K - 1$. Therefore, if 3 prime numbers are in A.P., they are all of the form $6K + 1$ or they are all of the form $6K - 1$. Clearly the common difference is a multiple of 6.

102. a $\log_K V = 6$ or $V = K^6$

$\log_{25K} 8V = \log_{25K} 8K^6 = 3$ or, $8K^6 = (25K)^3$

or, $K^3 = \frac{25^3}{2^3}$ or, $K = 12.5$

103. d $ax^2 + x + c = 0$ when x is negative. So roots have to be negative. And $1 - 4ac$ cannot be a perfect square. So roots cannot be rational numbers. Hence roots cannot be positive and rational numbers.



We can have PQ, QR, RS, SP and PR (or SQ) as diameters of 5 different circles.

Note: Those people who have marked option 3 should realise that PR and QS are both diameters of the same circle.

105. d (a) is true because 'a' has more than two values as 5 and 10 etc.
 (b) is true because there is no perfect square that ends in a 2.
 (c) is true because number is a 4 digit number abc2. Hence (d) is false.

106. b There are only two values of n , i.e. $n = 0$ or 1 for which $n!$ is also a perfect square.

107. a $V_1 = 2, V_2 = 1, V_3 = \frac{3(1)-2}{2} = \frac{1}{2}$

[as we have $V_n = \frac{3V_{n-1} - V_{n-2}}{2}$]

$V_4 = \frac{3(\frac{1}{2}) - 1}{2} = \frac{1}{4}, V_5 = \frac{3(\frac{1}{4}) - \frac{1}{2}}{2} = \frac{1}{8}$

Thus we observe that $V_n = \frac{1}{2^{n-2}}$

$\therefore V_9 = \frac{1}{2^{9-2}} = \frac{1}{2^7} = \frac{1}{128}$

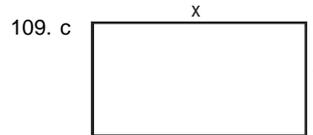
108. a We know that $(P-1)! + 1 = PK$
 [Where K is a natural number.]
 or, $(P-1)! = PK - 1 \Rightarrow (P-1)! = P(K-1) + P - 1$
 $\Rightarrow (P-1)[(P-2)!] = P(K-1) + P - 1$
 $\Rightarrow (P-2)! = \frac{P(K-1)}{P-1} + \frac{P-1}{P-1} \Rightarrow (P-2)! = \frac{P(K-1)}{P-1} + 1$
 Now $(P-2)!$ is an integer.

$\therefore \frac{P(K-1)}{P-1}$ is also an integer but P is a prime number.

$\therefore K-1$ must be divisible by $P-1$.

\therefore We have $(P-2)! = PK_1 + 1$ (where $K_1 = \frac{K-1}{P-1}$ is a natural number.)

\therefore The remainder when $(P-2)!$ is divided by P is 1.



We have $2(x+y) = 78$ m
 or, $x+y = 39$ m

Now area xy of the field is a multiple of 13, or, $x(39-x)$ is a multiple of 13, which is possible in two case.

Either $x = 13$ m or, $x = 26$ m

In either case the value of $V = \frac{13 \times 26}{13} = 26$ m

110. a Total number of integers lying between 2000 and 9000 (excluding 2000 and 9000) is $7 \times 10 \times 10 \times 10 - 1 = 6999$

Total number of integers without repetition in the same range = $7 \times 9 \times 8 \times 7 = 3528$

\therefore Total number of integers which have at least two-digits repeated is $6999 - 3528 = 3471$

111. a Option (a) is the best answer because the writer is trying to interpret each notion by tracing its respective practical consequences. (b) is a close choice, but somewhat abrupt and out of focus. (c) is obviously wrong, given (a), and (d) makes little sense.

112. c Options (a) and (b) are wrong as the writer obviously is of the opinion that we are far from the ludicrous arrogance of ruling from our corner that it is only from this corner that one can have perspectives. (c) is right because the writer has taken the view that instead of trying to give and use a definition of absolute or universal truth, we can only study how the concept of truth has been and is being used in particular societies.

113. b Option (d) goes far beyond the scope of the argument. (c) goes against the grain of the argument. (a) is besides the point. (b) is the answer because *information overload* clearly points towards *drowning in information*.

114. c Option (a) questions the claim in the argument which is not what we are supposed to do. (b) does not talk about conflict. We must look for the possible cause for the conflict, which is (c). Had (c) not been true, the four versions would not have been in conflict with each other.

115. a The sub-conscious has not been explored in the argument, so (d) is ruled out. We do not know whether (c) is true. The word *nearly* makes the answer doubtful. (b) is wrong, as there is insufficient information in the argument to make a comparison. (a) directly follows from the argument.
116. b Options (a), (c) or (d) are perhaps all true, but only (b) provides information that can help to resolve the apparent paradox.
117. a Option (a) is definitely one of the justifications used by racists to support their views. (b) and (d) are but observations which can be voraciously denied. (c) actually goes on to weaken the eugenicists' stand.
118. c Options (a) and (b) are highly misleading choices. Loftus found that the way in which the questions were asked had quite an effect on what the subjects remembered. Hence (c) is the only answer. When we are asking someone to remember something, we have to be very careful that we do not accidentally say things which will distort their memories.
119. a Option (a) is the answer, it can be inferred easily from the student's thought *because of the circumstances I had or the culture I have*. (b) is a very general statement and leads nowhere. (c) is a highly derogatory choice.
120. a Options (b) and (c) are obviously wrong. (a) is a logical and rational answer.
121. c Out of the given codes, only one (35047) has the sum of first four digits as 12. Hence this clue would identify the right code.
122. c Total number of members = $3 + 2 = 5$
 Djibouti to Athens and back = $(5 \times 6958) \times 2 + (5 \times 42 \times 2)$ [including distance from Athens airport to games village]
 = 70,000 kms
 For marathon runners, distance = $2(15 + 42.195 + 15)$
 = 144.39 kms
 For middle distance runners, distance = $2(15 + 1.5 + 1.5 + 15) + (15 + 1.5 + 1.5 + 1.5 + 15) \approx 100.5$ kms
 Total distance = 70,244 kms \approx 70,250 kms
123. b Dennis scored 31 points (reversing the digits of 13).
 So, Chirag scored $(31 \times 2 + 4) = 66$ points
 From (i), Bansi scored = $\frac{66}{2} = 33$ points.
 Abhay scored = $33 + 6 = 39$ points.
 Winning team Chirag – Dennis = $66 + 31 = 97$ points
 Losing team Abhay – Bansi = $33 + 39 = 72$ points
 Difference = 25 points
124. b Assume x be the length of the suit.
 The required equation is $\frac{2}{3} \cdot \frac{x}{2} = 2$
 $\Rightarrow x = 6$ m
125. a Mallika is 15 years old when she is $\frac{1}{3}$ her father's age

$$\left(\frac{x}{x+30} = \frac{1}{3} \Rightarrow x = 15 \right)$$

 She is 22.7 years old when she is $\frac{3}{7}$ her father's age

$$\left(\frac{x}{x+30} = \frac{3}{7} \Rightarrow x = 22.5 \text{ years} \right)$$

 So, difference = $22.5 - 15 = 7.5$ years.
126. c Total number of buyers
 = $1000 \times 0.12 + 1100 \times 0.11 + 1200 \times 0.15 + 1300 \times 0.12 + 1400 \times 0.18 = 829$
127. d Number of people who buy music by mail order changed from 2% (1990) to 5% (1994). Number of people buying from online stores changed from 10% to 15%. Difference between number of people who buy music by mail order and those buying from online stores changed from $(10 - 2) = 8\%$ in 1990 to $(15 - 5) = 10\%$ in 1994. Thus the registered change was an increase of $100 \times \frac{(10-8)}{8} = 25\%$
128. d Note that for 3 consecutive years 91, 92 and 93, multi product shops managed to retain the number of customers 12%, 12% and 13% of 1500 and online shops managed to retain the number of its customers 24%, 24%, and 26%. Thus both outlets has managed to retain the percentage share (as a % of total) of its customers at almost the same level. But nothing can be said about the number of customers as no data on number of buyers in each of these years is given.
129. b In 1990, 46% people are from 25 years to below 45 years age group. 70% people purchased from music shops. Note that in every age group the pattern of buying from various sales outlet shows the same break up as the total and the total number of buyers in 1990 was 1000 (from Q.126) . So, in 1990 the number of people in age group of 25 years to below 45 years buying from music shops was approximately

$$\frac{46}{100} \times \frac{70}{100} \times 1000 = 322$$
130. c If in every age group the pattern of buying from various sales outlets shows the same break up as the total then the percentage difference in the number of people in the age group 10 years to below 25 years buying from online shops, between 1993 and 1994, was
 approximately $100 \times \frac{\{(40 \times 15) - (42 \times 12)\}}{42 \times 12} = 19.0\%$

131. a From statement I $\Rightarrow \angle P < \angle Q$; No information about $\angle R$.

But from statement II $\angle R = 90^\circ$

$$[\angle P + \angle Q + \angle R = 180^\circ]$$

132. a Note that for two consecutive integers the larger must be 1 more than the smaller.

Statement I alone is sufficient can probably be seen most easily by considering particular values for m and n . For example, if $m = 4$, then $n = 3$ or 5 since m and n are consecutive. Then $m - 1 = 3$ and $n + 1 = 4$ or 6 . Since $m - 1$ and $n + 1$ are consecutive integers. Thus, $m = n + 1$, or $m > n$.

The fact given in statement II that m is even is irrelevant.

133. c The inequality, $a - b + c > a + b - c$ is equivalent to $-b + c > b - c$, which is equivalent to $2c > 2b$ or $c > b$. Thus the simpler inequality, $c > b$, may be considered. In statement I, $b > 0$ is not sufficient to determine whether $c > b$ since no information is given about c . Similarly, in statement II, $c < 0$ is not sufficient since no information is given about b .

Using I and II together, $c < 0 < b$, so that $c < b$, or equivalently, $a - b + c < a + b - c$.

134. a For each 360 degree rotation, the wheel has travelled a distance equal to its circumference. Thus, the number of 360 degree rotation is equal to the number of times the circumference of the wheel can be laid out along the straight-line path that is 100 meters long; so it suffices to know the size of the wheel.

From statement I the circumference of the wheel can be determined. Thus I alone is sufficient.

Statement II gives the speed at which the wheel is traveling; however the size of the wheel cannot be determined and II alone is not sufficient.

135. a From statement I it can be determined that it takes

$$\frac{17,280}{24 \times 60} \text{ minutes to run the cartoon.}$$

Thus statement I alone is sufficient.

From statement II, it can be determined because we don't know whether it is without interruption or not

136. c Since n is odd, it follows that either p is odd and r is even or p is even and r is odd. From statement I together with the fact that 2 is the only even prime number, it can be concluded that $p = 2$ or $r = 2$; but additional information is needed to decide which one of these two alternative holds. Thus statement I alone is not sufficient.

From statement II, $r \neq 2$. But this alone is not sufficient. By combining both we can find the value of p .

137. b The absolute value of a number y , denoted by $|y|$, is defined to be y , if y is positive or zero and $-y$ if y is negative. For example if $y = 8$, then $|y| = |8| = 8 = y$; but if $y = -8$, then $|y| = |-8| = 8 = -(-8) = -y$, it is given that $x + y > 0$ or $x > -y$, thus statement I alone is sufficient to determine that $x > |y|$ since $x > -y$ and $x > y$.

From statement II y is negative, and so by definition $|y| = -y$ since $x > -y$ is given, it follows that $x > y$. Thus statement II alone is sufficient.

138. a The three digit number abc is $(100 \times a) + (10 \times b) + c$. if abc is a multiple of 9, then there is an integer k such that $9k = (100 \times a) + (10 \times b) + c$. Divide this equation by 9 and you have

$$k = \left(\frac{100}{9} \times a\right) + \left(\frac{10}{9} \times b\right) + \frac{c}{9}$$

$$= \left(11a + \frac{a}{9}\right) + \left(b + \frac{b}{9}\right) + \frac{c}{9}$$

$$= 11a + b + \left(\frac{a}{9} + \frac{b}{9} + \frac{c}{9}\right)$$

$$= 11a + b + \frac{a+b+c}{9} \text{ [Or if a number is multiple of 9 its}$$

sum of digits has to be multiple of 9]. So statement I alone is sufficient.

Statement II is not sufficient since choosing $a = 0 = b$ and $c = 9$ makes II valid and $(a + b + c)$ is 9 but choosing $a = 4 = b$ and $c = 2$ also makes II valid with $(a + b + c)$ equal to 10.

139. b Since the length of the arc of the circle is proportional to the length of the chord connecting the end points, statement I alone is sufficient.

Statement II alone is sufficient, since the areas of the circular segments are proportional to the squares of the length of the chord.

140. b Since there are 4 sides and a bottom each a congruent square, the amount of card board needed will be $5e^2$, where e is length of an edge of the box. So we need to find e . Statement I alone is sufficient.

From statement II, the volume of box is e^3 , it means $e^3 = 8$ and $e = 2$ feet.

141. b Total selection in 2002 = $94 + 38 = 132$

\therefore Percentage selection in 2002

$$= \frac{132}{50,000 + 10,000} \times 100 = 0.22\%$$

Similarly percentage of selection in 2003

$$= \frac{106 + 94}{50,000 + 30,000} = \frac{200}{80,000} \times 100 = 0.25\%$$

\therefore Percentage increase = $0.25 - 0.22 = 0.03\%$

142. c Number of graduates not called for technical interview in 2002 = 2000

Number of postgraduates not called for technical interview in 2003 and 2002 = 4000.

$$\therefore \text{ Required ratio} = \frac{2}{4} = 0.5$$

143. b Total final selection of both the years = $94 + 38 + 106 + 94 = 332$
 Postgraduate candidates called for an HR interview = $300 + 90 = 390$
 \therefore Percentage selection with respect to HR interview = $\frac{332}{390} \times 100 = 85\%$

144. a Finally selected graduates in 2002 = 94
 Finally selected postgraduates in 2003 = 94
 \therefore Ratio is 1 : 1.

145. c Check the choices, by putting the values of x and y. Put $x = 2$ and $y = 45$, then (c) is the correct answer.

Alternative method:

Let the equation be $y = ax^3 + bx^2 + cx + d$

$8a + 4b + 2c + d = 45$... (1)

$27a + 9b + 3c + d = 39$... (2)

$64a + 16b + 4c + d = 33$... (3)

$125a + 25b + 5c + d = 21$... (4)

(2) - (1) and (3) - (2), (4) - (3) give

$19a + 5b + c = -6$... (5)

$37a + 7b + c = -6$... (6)

$61a + 9b + c = -12$... (7)

(6) - (5) and (7) - (6) given

$18a + 2b = 0$... (8)

$24a + 2b = -6$... (9)

(9) - (8) gives $6a = -6$, $a = -1$

From (8), $b = 9$

from (7), $c = -32$ and from (4), $d = 81$

Hence the equation is $y = -x^3 + 9x^2 - 32x + 81$.

146. c $y = \frac{1}{3}x^3 - 4x^2 + 15x + 4$ if $x = 4$, $y = ?$

$y = \frac{1}{3} \times 64 - 4 \times 16 + 15 \times 4 + 4$

$= \frac{64}{3} - 64 + 60 + 4 = \frac{64}{3} = 21.33$

or Rs. 21,333

For questions 147 and 148:

For VC, price in 1997 = $\frac{1}{3}x^3 - 4x^2 + 15x + 4$

price = $\frac{1}{3} \times 27 - 4 \times 9 + 15 \times 3 + 4$

$= 9 - 36 + 45 + 4 = 22$

or Rs 22,000 per tonne.

For PVC price in 1997 =

$-\left(\frac{7}{2}\right)^3 + 9 \times \left(\frac{7}{2}\right)^2 - 32 \times \left(\frac{7}{2}\right) + 81$ (using equation

formed in Q. 145)

$= -\frac{343}{8} + 9 \times \frac{49}{4} - 16 \times 7 + 81$

$= \frac{-343 + 882}{8} - 31 = \frac{539 - 248}{8} = 36.375$

\Rightarrow Rs 36,375 per tonne

Therefore contribution per tonne of PVC produced in 1997 = $36000 - 22000 \times 1.2 =$ Rs. 9,975

Fixed cost = 50×10^5

Hence breakeven production = $\frac{50 \times 10^5}{10 \times 10^3} = 500$

147. d

148. c

149. a Crude death rate

$= \frac{180 + 200 + 120 + 140}{3000 + 5000 + 4000 + 2000} \times 1000 = 45.7$

150. b Percentage =

$\frac{45.7 \times (1500 + 2200 + 2800 + 2500) \times 100}{(75 + 55 + 56 + 150) \times 1000} = 122.5\%$

151. b Standardized death rate of Dhanusha

$= \frac{20 + 30 + 40 + 50}{11000 + 12000 + 14000 + 16000} \times 1000$

$= \frac{140}{53} = 2.62$

152. a Standardized death rate of town Chitra

$= \frac{40 + 50 + 30 + 43}{16000 + 18000 + 19000 + 20000} \times 1000$

$= \frac{163}{73} = 2.23$

So, difference = $2.62 - 2.23 = 0.39$

153. b Crude death rate of town Akshaya = 45.7

And that of Bistara is 37.33 (c) is not true as seen in 152. Standardized death rate is less than crude death rate. Hence (b) is true.

154. c A company needs Rs. 2 crore for 330 sec of live relay of finals on Doordarshan. For same on Star requires 60 lakhs for 30 seconds. So with Rs. 2 crore, the company can get

$= \frac{30 \times 200,00,000}{50,00,000} = 120$ seconds

\therefore The company will get 210 less seconds

155. b Note that the cheapest rate that is available is for the live coverage on Star Sports of the Group B league matches not featuring India. So, the sponsor will opt for it to get the optimum media mix for him.



156. c Most profitable rate / rupee for finals = Rs. 1 crore/ 210 sec. So after spending Rs. 10 crore on coverage of final on Doordarshan, company X can get maximum of 2100 seconds. Also expenditure of Rs. 10 crore on same match, but on Star Sports will provide company Y (Rs. 10,00,00,000 × 30 seconds)/ Rs. 50,00,000 = 600 seconds. So the maximum difference between the air times that company X can get was 2100 – 600 = 1500 seconds.
157. a The recorded coverage of the quarter finals on Star costs 25 lakh/ 30seconds. So 180 seconds of airtime will cost Rs. 150 lakhs. The live coverage Group A league match on Doordarshan costs Rs. 1 crore for 180 seconds. So, due to change in his plans, he should pay Rs. 50 lakhs less.
158. d For the live coverage of Group B league matches featuring India on Star Sports, no data is given. Hence, we cannot say with certainty.
159. b From the table is clear that only seven cars are with single owner and registered between the years 1999-2001 (both inclusive) have price more than Rs. 1,60,000.
160. c In June 2000, three cars have been registered. Among these three cars two are Zen-Lx and one is M-800 AC. Therefore, June 2000 the number of cars registered of the same model is maximum.
161. d From the table it is evident that there are seven cars of single user and without insurance.
162. a Total price of 11 white cars = Rs. 1,805,500
And total price of 11 other coloured cars = 2,243,000
Hence difference of average price is approximately Rs. 40,000
163. b The total number of cars registered in 1999 = 3
The number registered in 2000 = 8
Hence percentage increase = $\frac{8-3}{3} = 166.66\%$

For questions 164 and 165:

Model	Colour of the car	Date of registration	Kilometer reading (KMs)	Selling Price (Rs.)	Position in		
					KM table	Price table	Cumulative table
M-800 STD	White	28/01/1998	33462	119000	3	5	4
M-800 STD	White	18/05/1998	66751	119000	7	5	7
M-800 STD	M. Blue	09/03/1999	46991	127000	5	4	6
M-800 STD	White	14/07/1999	68171	127000	8	4	8
M-800 STD	Ph. Red	20/05/2000	57498	145000	6	3	5
M-800 STD	White	20/04/2001	42899	151000	4	2	3
M-800 STD	White	19/07/2001	21638	151000	2	2	2
M-800 STD	White	12/06/2003	16975	169000	1	1	1

164. d Position is 6.

165. d Position is 3.