CAT 1999 Answer Key

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

CAT 1999 Solutions

1.	Consider the case when we choose the box with label red or white. Even if we know what is actually in the box, we cannot predict contents of the other boxes. If we choose the red and white box, and say the box actually contains white – then you know that the box labelled white contains the red ball; and the last one the white ball.
2.	We know that the lower limiting perimeter of any polygon S_1 is the circumference of the inscribed circle ($2*\pi$). The upper limiting perimeter of any polygon S_2 is the circumference of the circumscribed circle: $2*\pi$ This difference of perimeter reduces as the number of sides increase. Breaking up the expression into L1(13)/L2(17) + $2*\pi$/L2(17). Both the individual terms will be very close to 1, but greater than one.
3.	A triangle can be formed by choosing 3 points, 2 from one line and the third from the other. This can be done in $^{11}C_2$ and $^{10}C_1$ ways OR $^{11}C_1$ and $^{10}C_2$ ways. So required number of ways $= 55 \times 10 + 11 \times 45$ $= 550 + 495 = 1045$.
4.	$40 \times 0.75 = 30$ % of men earn > 25,000 a year. So % ge of women earning > 25,000 $= 45 - 30 = 15\%$. Total % ge of women = 60%. So fraction earning > 25000 = 15/60 = 1/4
5.	Area will be maximized with a right isosceles triangle, whose diagonal is equal to fence length = 100 m. So sides will be 100/ $\sqrt{2}$. So area = ½ × (100/$\sqrt{2}$) × (100/$\sqrt{2}$) = 10,000 / 4 = 2500.
6.	The algorithm will be to check a pair of numbers for GCD, and then use this GCD along with the next number to find out the new GCD. This will require one less iteration than the total numbers in the set. So $n - 1$ is the right answer.
7.	This is an interesting property of squares of 111. The original number has 15 digits – so the square root should have 8 digits.
8.	$342 = 7^3 - 1$. When we divide 7^{84} by this number, at the end of all the divisions, we will be left with a remainder of 1.
9.	The only number that fits in is $21^2 = 441$. So value of b is 1.
10.	Equation will be of the form: $700 \times 25 = F + 25V$ and $600 \times 50 = F + 50V$. Solving we get V = 500, F = 5000. For 100 students total cost = 5000 + 50000 = 55000. Average / student = 55000 / 100 = 550.
11.	$17y = 4x - 1$. So $17y \le 4000$; $y \le 235$. x can have 235/4 = 58.75 values. Since it is an integer it will be 58 values.
12.	Use a Venn diagram – $A \cup B \cup C = 78$; What is asked is: $(A \cap B + B \cap C + C \cap A - 2 \times A \cap B \cap C)$, which is simply 27 – 10 = 17.
13.	Let side AB = 1, perimeter = 4. Then BD = PQ = $\sqrt{2}$. Diagonal PR = diameter PQ = 2. Circumference

	of outside circle = 2π. Ratio = $2\pi/4 = \pi/2$.
14.	Number of ways in which we can select at least one student out of x is $^{2n+1}C_n + {}^{2n+1}C_{n-1} + {}^{2n+1}C_{n-3} + \ldots + {}^{2n+1}C_1$, which is given as 63. Plug in the options; it works only for $n = 3$.
15.	At 7:30 am, the distance between the 2 trains is 100 – (50 + 20) = 30 km. Relative speed is 60 + 30 = 90 km/h. So time remaining is 30/90 = 1/3 hr = 20 min.
16.	The equation is $42 - v = k \times \sqrt{n}$. Using data in the question, we get $42 - 24 = k\sqrt{9}$. Solving we get $k = 6$. For the wagon to just move, speed = 0. So $42 = 3\sqrt{n}$. Solving we get $n = 49$. With 49 compartments the train will not move, so we need to reduce by 1. Hence the answer is 48.
17.	Substitute values of x, as $x = 2\times3\times4\times5 = 120$ and check the options. Both A and C are correct.
18.	For solving modulus questions, use $r - 6 = +/- 11$, so $r = -5$ or 17. Similarly $2q - 12 = +/- 8$. So $q = 10$ or 2. Min. value of $q/r = 10/-5 = -2$. i.e 4^{th} option.
19.	Going by options, we see that 2^{nd} option is not possible. Also since Mrs. B is two places to the left of Mrs. E, so it cannot be to the right of Mr. A. So 3^{rd} and 4^{th} options are out. Hence answer is 1^{st} option.
20.	$F(f(x,y)) = -\lvert x + y \rvert$ $G(f(x,y)) = \lvert x + y \rvert$. Substitute this in all options and check. Option 4 will read as $\lvert x + y \rvert - \lvert x + y \rvert + \lvert x + y \rvert = \lvert x + y \rvert = \lvert -x - y \rvert$.
21.	$f(G(f(1,0)), f(F(f(1,2)), G(f(1,2))))$ $= f(G(f(1,0)), f(3,-3))$ $= f(G(f(1,0)), 0)$ $= f(-1, 0) = 1$.
22.	Substitute in option 3 and check. We get $2x \times 2x / 4 = x^2$
23 - 24	If the positions from left to right are 1 to 7 A and G take up positions 6 and 7 B takes up position 4 C and D are in places 1 and 5, so that they are as far as possible. E and F are in positions 2 and 3.

1	2	3	4	5	6	7
c	e	f	b	d	a	g

25.	Total distance covered = 35×2 + 45×2 = 160 km. Petrol consumption by Aditi = (160/3) / 16 + (160/3) /24 + (160/3) /30 = (160/3) /6 = 80/9 = 8.9 litres.
26.	Min. petrol = 160/24 = 6.67 litres.
27-29.	In the first round, G gets 8 and pays 16. –ve balance of 8. In the second round he gets Rs. 20. Balance = 12. In the 3^{rd} round he gets 6 & pays 6. Balance = 12. In the 4^{th} round he gets 8 & pays 16. Balance = 4. His gain is maximum at the end of round 2 or 3, in which case his gain would be 12.
28.	The min G has to have is the lowest negative balance = 8.
29.	Since he made a net gain of 4 at the end of the game, he must have started of with 100 – 4 = 96.
30.	If all of $S1$ and $S2$ are +ve, then the greatest number will be in $S2$. If all are –ve, then the greatest number will continue to be in $S1$. No definite conclusion possible.
31.	All elements of $S1$ are smaller than the smallest element of $S2$. In the given situation, the smallest element of $S2$ is $A25$. Even by exchanging it with the greatest element of $S1$, the ascending order will still remain.
32.	The addition will be maximum for the lowest element of $S1$ – which is L. The sum that will have to be added will be such that it becomes equal to the greatest number of $S2$ – which is G. The number to be added will hence be $G - L$.
33.	The average speed will be 2×45×55/100 = 49.5 km/h.
34.	Let dist BC = x. Since both reach at the same time, $(100 + x)/61.875 = \sqrt{(100^2 + x^2)} / 49.5$. Solving this quadratic for x, we get $x = 40$ or $x = 300$. We know that $x < 100$. So $x = 40$. So distance AC = $\sqrt{(100^2 + 40^2)} = 105$ (approx.)
35.	BD will be having the same length as AD (which is 105/2 = 52.5) as D is the diameter of the circumcircle – and B will lie on the circumference of this circle.
36.	Glucose on being sweetened by 100 times will have a sweetness of 74. Sweetness of a saccharin-sucrose mixture of ratio 1: x is $(1\times675 + x\times 1) / (1 + x) = 74$. Solving for x we get, $x = 9$.
37.	1 g of glucose, 2 g of sucrose and 3 g of fructose will have a sweetness of (1*0.74 + 2*1 + 3*1.7) / 6 = 1.3.
38.	In the best case scenario, all m containers are nearly having the same volume v_1. So each time we fill a white container, volume $1 - v_1$ will remain. Since there are m such containers having volume v_1, empty space will be $m(1 - v_1)$.
39.	Let m = 1 and n = 1. Option (a) gives the answer as 4 and option (d) gives the answer as 'greatest integer 1 less than or equal to 2'. So, both of these cannot be the answer. Option (b) gives the answer as 'smallest 1 integer greater than or equal to 2' and option (c) gives the answer as 1. But the actual answer can be greater than 1 as the volume of the vessel is 2 l. Hence, (b) is the answer.
	Q = 2P. 2 chances Q = 2, P = 1; Q = 4, P = 2.

	Then S, R are not equal to 2. Choices for S, R are 1,3; 3.4. So S has to be odd.
41.	R ≥ 2 + S. If S = 1. R = 3, 4. If S = 2, R = 4. Max of S is 2, then as Q > P, so Q > S.
42.	If Q < R, then R = 3 or 4. Arrangements for PQRS are 1243 or 1342 or 2341. Now check with options.
43-44.	Since lawyer is married to D, so A is the lawyer. As E is not the housewife, so E has to be architect. As B has to be the other housewife, so A, C and E are males and B, D and F are females.
45.	The equation would be $x + 2 = 6$, $y + 4 = 6$, So $x, y = 4, 2$.
46.	The two instructions will be WALK(-x) and WALK(-y)
47.	The max distance that can exist between C, D and E is 5×5^2 (diagonal) – this is less than $10\times\sqrt{3}$ (given in question as distance between closest pair). So closest pair cannot be F,C.
48.	No idea about absolute coordinates if points is given by the distances – so we cannot conclude anything.
49.	After putting x flowers in the pond, we get $2x$. Of these y are offered. Leaving $2x - y$ with Roopa. In round 2, these become $4x - 2y$, after offering $4x - 3y$. In round 3, these become $8x - 6y$, after offering $8x - 7y$. In the last round, these become $16x - 14y$ and after offering become $16x - 15y$. This has to be equated to 0. For this question, we know that $x = 30$, so we get $y = 16\times30 / 15 = 32$.
50.	Minimum number of flowers is such that values of x and y are integers. Since these are in multiples of ratio 16:15, min for $x = 15$ and $y = 16$.
51.	Refer above.
52. – 55.	For solving these problems create a table as below: x -2 -1 0 1 2 $F(x)$ 2 1 0 1 2 $F1(x)$ 2 1 0 -1 -2 $F(-x)$ 2 1 0 1 2 $-F(-x)$ -2 -1 0 -1 -2 We see that $F1(x)$ is not meeting any of the criteria, so we mark 4.
69.	Option 2 means that a 40% increase should have been ruled out. Option 3 works both ways and option 4 contradicts data that target was reached before time.
70.	Profitability and revenues are not directly linked. Extension of schemes to other routes could have been because of competitive factors. 3 and 4 are contradictory – only 3 will add to the argument of increasing air travel because of lowered prices.
71.	The conclusion of the passage is that the working population should start planning for old age. Options 1 and 2 are not pertinent to this conclusion. 4 and 3 reduce the need for planning – as either the state or the joint family will take care of this need. But the most weakening aspect is if the government starts providing social security as in the west.
72.	The surmise it that bio-diversity is inversely proportional to education. Only statement 4 gives evidence of that (at all levels of poverty)
73.	The conclusion is that the tax base will increase only option 2 – which talks of users of bidi switching over to cigarettes and adding to the tax base.
74.	Option 1 is not mentioned. McNeills' research area is not mentioned specifically. Option 4 is a direct statement and not an inference.
75.	Only option 3 supports Malthus' thesis.
76.	Option 1 is not mentioned. The comparison of option 4 has not been made.
77.	Directly quoted in the passage. (in words like confiding with a wrong sense of timing)
78.	Option 2 is taken out of context. 4 is not relevant and not mentioned while option 3 goes against the grain of his unseasonableness.
79.	Look at the beginning and the subsequent lines of the second para.
80.	This is what the last few lines of the first paragraph attest to.
81.	Please refer to the third paragraph. The line if *he had used….."* implies that its abstract nature alone was responsible for the consequences it generated.
82.	Please refer back to the line *"For example, through his work, …… "* from the third paragraph.
83.	The last three-four lines of the third paragraph hold the key to this question.
84.	Read the line "*With each of our acts , ….*" from the second paragraph.
85.	Please refer to the first paragraph.
86.	The last few lines of the fourth para hold the key to this question.
87.	Please refer back to the second line of the last paragraph.
88.	Second paragraph from the top.
89.	The very few starting lines of the passage point to this idea.
90.	Read the second the subsequent paragraphs.
92.	Please refer to the last few lines of the first paragraph for the right answer.
93.	The first paragraph contains the answer.
94.	Please go back to the 9th paragraph from the top.
95.	In terms of stealth and surprise, both of which are essential ingredients of the Asian way of war, this proposition certainly does not hold the ground.
96.	Refer to the penultimate passage for the right answer.
97.	The opening line of the fourth paragraph says something just opposite to it.
100	Please refer to the second paragraph in totality.
101	"Countries like Canada and other ….." from the second para.
103	"……. of member states were evaluated against 'the accomplishment of the most elementary community goals…".
105	Please refer to the penultimate paragraph.

106	*Tougher* in B obviously is in conjunction with *tricky* in line 1. DC too gel well. Hence the option.
107	AC talk of upsetting and restoring a particular balance. C goes very well with line 6. Did you notice the words *queen* in D and *her* in line 6?
108	Note the word they in line B. C explains what has been disc used in D.
109	*These* in A refers to motors in D only. C obviously contrasts very well with A.
110	They of A links up with revolutions of B. Besides line C tends to tone down the point made by line D by using *but* in relation with *unexceptionable*.
135	Trade of OPEC = 33% of imports Plus 10% of exports, For US the figures are 9 and 19%. So even without calculating we can say that OPEC is bigger.
136	Lowest total trade was with Others, Export was 1% of 34 b = 340 m
137	Highest trade deficit is OPEC = 23% of 41 – 10% of 34 = 6.0
138	By visual inspection it has to be USA or Asia – but A imports less
139	Here we need to only see market shares for a relative judgement – the share of Other east Europe decreased from 3 to 2. US increased from 19 to 23; Increase of 4/19. Asia increased from 15 to 18; Increase of 3/15. 4/19 is bigger than 3/15 so the answer is USA.
140	Trade deficit in 97-98 = 40779 – 33979 = 6800. Trade deficit in 98-99 = (28126-21436) ×12/8 = 6690 + 3345. Increase in deficit = 3345 – 110 / 6800 = 47%
141	By visual inspection.
142	Values are for Arhar 800/1900, Pepper 2000/18000, Sugar 90/1460 and Gold 500/4000. Lowest for sugar.
143	Average all the percentage changes to get the answer as 4.3% increase
144	This is the highest for Arhar = 8/19 = 40%
145	By visual inspection
146	By visual inspection
147	The profitability for the 4 years are 2.2/100, 4/250, 6/300 and 8/280. So highest in 1998
148	Profitability is down in 95-96, up in 96-97, so we cannot make any firm conclusions.
149	For drinking it is Bangladesh, for Sanitation it is Philippines
150	Check coverage data for both
151	70% $(1 - x)$ = 14% x = 29%. 70 – 29 = 70x – 14x = 56 x. So x = 41/56 = 73%
152	Philippines is about 50%, since average of 66 and 88 is 77. For Indonesia it is more than 50% rural – and China is more like India in Rural (> 70%)
153	India is not on coverage frontier because (i) it is below Bangladesh and Philippines for drinking water. (ii) for sanitation facilities it is below Philippines, Sri Lanka, Indonesia and Pakistan.
154 -	. For questions 154 and 155: The disparity for the coverage of rural sector is as follows.

155			
		Rural sector	***Urban sector***
	I	***65***	***15***
	B	***52***	***20***
	C	***49***	***23***
	P	***47***	***5***
	P	***20***	***4***
	I	***22***	***6***
	S	***-5***	***20***
	N	***51***	***30***
	Note: Disparity = (Percentage denoting drinking facilities coverage - Percentage denoting sanitation coverage), For example, rural sector of India = 79 - 14= 65% Thus, as it can be seen from the table, in rural sector the country with most disparity is India (79 - 14) = 65%. And the country with least disparity in urban sector is Philippines (92 - 88) = 4%		
154.	a		
155	c		
156	We need data about the shape and the regularity of the shape		
157	Length of AB and BC are not known		
158	If the tangent can be constructed, then the angle with the x-axis can be found out.		
159	Stmt A tells us that both the equations boil down to dx + ey = f. We can find any x and will be able to get a corresponding y = f – dx/e that will now satisfy both equations.		
160	Statement II tells us that mathematicians can make mistakes which are always errors of +1 and -1. Also statement I tells us that mathematicians can never add 2 numbers correctly but we know he can make mistakes also. Again he can always add 3 numbers correctly. Therefore, as mistakes can be made here too, we cannot decide as to who is a mathematician..		
161	Statement I gives the weight of the heaviest and lightest members of the class but no indication as to the number of students in the class or the total weight of the students is there. The second statement is also inconclusive, making our answer choice as (d).		
162	Statement I gives the thickness of the wall which is of no use to find the volume of the tank since we do not know the radius of the sphere. Statement II gives us the answer as the volume of water displaced is equal to the volume of the immersed tank (from Archimedes' principle) So to find the exact storage volume of the tank both the statements are needed.		
163	From I, we know A and B passed the examination. From II, we know the condition that among C and D at least one passed (or both passed) is false. Therefore, it is obvious that both C and D have failed. Thus, both statements are necessary to find the answer		

164	$2^{\sqrt{x}} = x$. x =4, 16 satisfy this equation. So both statements are required.
165	Statement I gives us the number of white flowers. But we know that a white seed gives both red or white flowers. Thus, proving statement II, gives the number of red flowers. But both black and white seeds give red flowers, again providing no solutions