CATalsyt Education Group :

CATaylst is a Unique group tuition program. It was created by Munira Lokhandwala with general idea of selecting a small group of students every year and training them to crack the mother of all entrance tests.

Rahul Vani and Bijoy Shah soon joined the group to give CATalyst a whole new dimension, so that maximum number of students benefit from CATalyst.

Our CAT 2006 Results

Total Students : 28   IIM call getters : 9

More than 33% CATalystians scored 99.xx%tile

Munira Lokhandawala teaches at CATalyst.

Who's Munira Lokhandawala:

- **30 year old woman. Currently resides in Vashi**
- **Mathematics graduate, St. Xavier's, Class of 1997**
- **IIM Calcutta, Class of 1999**
- **Worked as CAT Product Head and Faculty, IMS, CL etc.**
- **Loves solving Maths Puzzles, dancing, bullet points**
- **99.99%ile in CAT 2004, 100%ile in CAT 2005, 99.99%ile in CAT 2006**

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Solutions for CAT 2003 :

1. (d) Converting to base 2, 3 and 5, we get 31 = (11111)2 = (1011)3 = (111)5. In 63 and 75, the last digit can't be 1. Taking 91 = (10l1011)l = (10101)3 = (331)5. In 2 of 3 cases, the first digit is 1, hence (d).

2. (d) g(x) = max (5-x, x + 2). By hit and trial, if x = 1.5, g(x) = 3.5. Hence smallest value is 3.5

3. (b) f(x) = |x - 2| + |2.5 - x| + |3.6 - x|. This can attain minimum value when either of the terms = 0. Case I: When |x - 2| = 0 then x = 2, the value of f(x) = 0 + 0.5 + 1.6 = 2.1 Case II: When |2.5-x| = 0 then x = 2.5; value of f(x) = 0.5 + 0 + 1.1= 1 .6. Case III: When |3.6-x| = 0 then x=3.6; value of f(x) = 1.6 + 1.1 +0 = 2.7. Hence the minimum value of f(x) is 1.6 at x = 2.5.

4. (a) Working from the choices, (a) 5p - 2q - r = (5x + 10y - 15z) - (4x + 12y - 22z) - (x - 2y + 7z) = 0. For no other choices is the condition satisfied, hence (a).

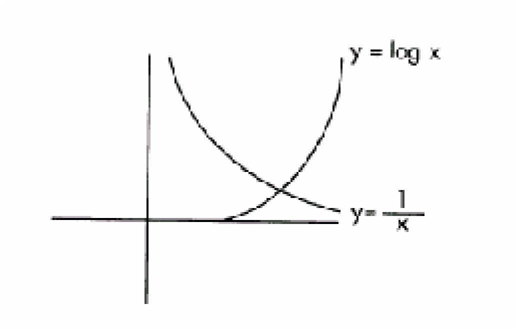
5. (c) Even numbers divisible by 7: 112, 126, 140, 154, 168, 182, 196.= (7). Even numbers divisible by 9: 108, 126, 144, 162, 180, 198 = (6). We see that 126 is common, hence there are 12 numbers. Total number of even numbers between $100 \leq x \leq 200$ are 51. Hence required number = 51-12 = 39.

6. (b) By elimination: all the choices (a), (c) and (d) may or may not be true. Statement (b) can never be true because every person cannot have a different number of acquaintances.

7. (d) Let the radius of A be a and that of B be b. Then, $4n\ a^2 : 4n\ b^2$ = 4: 1, hence a:b = 2: 1. Since the surface area 'a' is 30 % higher than that of 'b'. Volume of A= $4\ n\ a^3$, Vol of B = $4\ n\ b^3$ %. Difference = $(a^3 – b^3)/a^3$ = (8 – 1)/8 = 87.5%

8. (c) Let x be the number of questions answered correctly, y be wrong attempts and z be number of questions not attempted. Then, net score 32 = x – y/3 – z/6 =32; 6x -2y-z = 192. Also, x + y + z = 50. Adding, we get 7x - y = 242, or y = 7x - 242. By hit and trial, we get y = 3 for x = 35. y cannot be less than 3 for integral values of x.

9. (c) Using the formula of nth term of AP, we get 3rd +5th term = (a+2d) + (a+4d)=2a+6d. Similarly, 6, 11 and 13th terms = (a + 5d) + (a + l0d) + (a + 12d) = 3a + 27d. Now 2a + 6d = 3a + 27d, hence a + 11 d = 0. This means that the 12th term is zero.



10. (b) The curves can be plotted as follows:

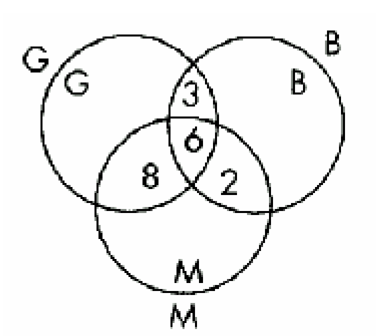
We see that they meet once.

11. (c) Shepard adds p% of 108 goats every year and sells q% of (108+ p/100 x 108). We notice that number of goats sold is more than number of goats purchased. Hence if he has 108 goats left, it means he should have added more than he sold. Hence p > q.

12. (c) Since the speed is double, one runner will complete 2000 m and the slow runner will compete 1000 m. Time taken = Distance/Relative Speed = 1000/(2x – x) = 5, hence x =200. Speed of fastest runner = 2 x 200 = 400m/min = 10 min

13. (a) Choice (a): 75 x 4 + 80 x 5 = 700 hrs of Machine A. 75 x 6 + 10 x 80 = 125 hrs of Machine B. Profit = 75 x 20 + 80 x 30 = 3900. In all others, profit is below 3900 or the number of hours exceed the given conditions.

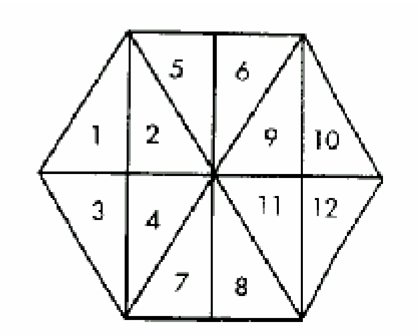
14. (d) Total number of projects = 2 (8 + 6 + 3 + 2) 1 =37. We have G+M+B+ 19=37, hence G+M+B= l8. Aiso G+B =M+8+6+ 2. We can solve for M but cannot find G.



15. (b) G+B = M+ 16; G+B+M = 18. So 2M+ 16= 18; or M= 1

16. (c) 2^x=x+l. At x = 0, we have 2° = 0+ l. At x - 1 , we have 2^1 = 1 + 1 . No other Positive number satisfies the equation. Hence there are 2 roots.

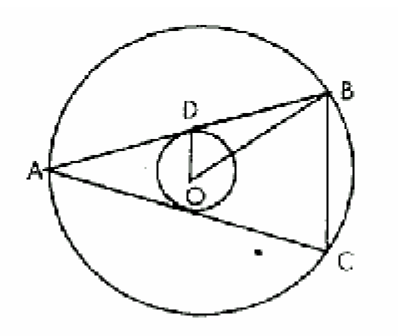
17. (a) This sum can be solved by constructing the following triangles:



We see that there are 1 2 similar triangles. Hence (a)

18. (b) Minimum value of 4m +1 is 4 (1) + 1 = 5. Since a + b + c + d = 5, we can have a=b=c=1 and d = 2. Then a^2 + b^2 + c^2 + d^2 - 1^2 + 1^2 + 1^2 + 1^2+2^2=7

19. (c) Sin OBD = OD/OB = ½; HENCE OBD = 30° and ABC =, 60°. Hence triangle ABC is equilateral. The next step is to find side AB.



OD = ½ (\/12/*n*. Since *n* r2 - 12, we get OB = \/12/*n* and OD = 1/2 \/12/*n*. Using Pythagorus, we get DB2 = OB2 - OD2 = 12/*n* - 1/4 *n* 12/*n* = 9*n*; hence side AB = 2 x 3/\/*n* = 6/\/*n*. Area of Δ ABC = \/3/4 x side2 = \/3/4 x 36/*n* = 9\/3/*n*

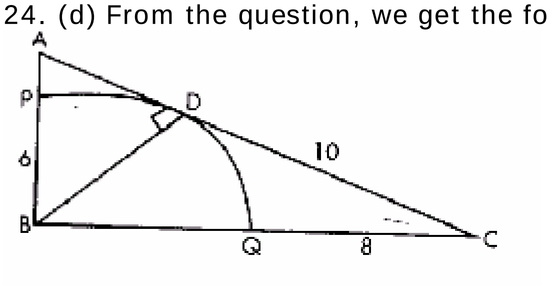
20. (d) The series is increasing by 1. Sum of terms = n (n + 1)/2 which must be close to 288. By hit and trial, we get n=23. Hence 23(24) = 276. The 24th alphabet is x, hence the 299th term is 'x'

21. (d) Sum of roots p+q = @ - 1. Product of roots pq = - @ - 1. Now p2 + q2 = (p+q)2 -2pq = (@ - 2)2 + 2(@+1) = (@+l)2 + 5. The minimum value of this will be 5

22. (c) The number of convex corners is always less than concave corners by 4. Hence 25-4 = 21.

23. (b) Let PO = r. Then area grazed by horses P and R = *n*r2. Radius of circle with centre S = 2/3 r (by theorem). Area grazed by S = *n* (2/3r)2 = *n* r2 Total area grazed = *n*r2. Percentage of area that cannotπr2+4/9 be grazed (2*n*r2 – 13/9*n*r2)/2*n*r2 x 100 = 5/18 x 100 = 28% approx.

24. (d) From the question, we get the following diagram:



We see that AP is much smaller than QC. There is only one ratio that satisfies this condition, hence (d)

25. (b) Using the quality of similar triangles, CP/PB = CD/AB = 1/3. In Δs BPQ and BCD, CD/PA = BC/BP = 4/3 = 1: 0.75

26. (d) In an AP, the three terms a,b,c are related as b = (a+c)/2. Hence, 2 [(log3(2x - 5)] = 1og32 + log3 (2x – 7/2) = log (2x-5)2 = log 2 (2x – 7/2) = log2x+1 - 7 hence (2x-5)2 = (2x+1-7). Substitute the choices. Only x= 3 satisfies the conditions.

27. (c) The number of balls in each layer is 1 , 3, 6, 10... (each term is sum of 2 = n(m +×previous natural numbers). Hence Σn(n+1)/2 = 8436 = Σn2+ Σn= 8436 2. Solving, we get n = 36.×1) (2n + 1)/6 + n(n+1)/2 = 8436

28. (c) In the right angled D, r2 - (r-20)2 + (r-10)2 solving, we get r = 50. Alternately, we get a pyth. triplet 30, 40, 50, hence 50.

29. (b) We are given that APB = 60°. Then ΔAPB is an equilateral Δ. AP = AB = b. Now in right angled ΔAOP, 2b/b)2 +h2; b2- ½ b2 = h2 or ½ b2 = h2 or 2h2=b2.√AP2 = AO2 + PO2; b2 = (

30. (c) Consider the number: x y z where x < y, y > z. If y = 9, x can be between 1 to 8 and z can be between 0 to 8. Total combinations = 9 x 8 = 72. If y = 8, x can be between 1 to 7 and z can be between 0 to 7. Combinations = 7 x 8 = 56. Similarly we add all combinations: 8 x 9+7 x 8 +6 x 7 +5 x 6+ 4 x 5 + 3 x 4 + 2 x 3 + 2 x 1 = 240 ways.

31. (a) angle OBC = y = x (isos triangle). Then angle ABO = 2y (ext. angle). angle

ABO = angle OAB = 2y (isos triangle). Angle AOB = (180 - 4y) (sum of angles = 180). Then angle DOA + AOB + BOC = 180; x + (180-4y) + y = 180; or x = 3y.

32. (c) The numbers must be reciprocals of each other. Hence, 2 x 1/2 = 1 and 2 + 1/2 = 2 ½. Hence the sum is greater than the number of numbers.

33. (b) Substitute the extreme values in the inequalities: V=1 , u = -0.5, z = -2. Then w = vz/u = 4. Only one option gives this.

34. (d) He now travels one chord and one semi-circle. \/5 r/15\/5 + *n*2/20*n* = 1 + ¾ = 105 minutes.

35. (c) Amit travels one quarter circle and one chord. Dividing by speed, we get: *n*r/30*n* + \/5 r/15\/5 = 90/60. Solving, we get r = 15 and 2r = 30.

36. (c) Length E1 to N2 can be found by using Pythagorus since inner and outer dia are 1 and 2 respectively =
\/22 + 12 = \/5. Reqd. ratio = (4 x \/5)/2*n* (2r) = \/5 : *n*.

37. b As they are consecutively numbered, total number of ways will be 6 + 5 + 4 + 3 + 2 + 1 =21 ways.

38. a There are 12 points. Since they can be reached from any other point, the edges will be 12C2 = 66. Also the number of edges will be maximum 11.

39. d T = {3, 1 1 , 19, 27..... 467} is an AP with a=3 and d = 8. To find number of terms, we use the formula for nth term: a+ (n-1)d = 3+(n-1)8 = 467. Hence n = 59. S = subset in which no two elements with sum = 470. So S can be a set in which either the first half or the second half of the terms are present = 59/2 = 29.5 or 30.

40. (d) Substitute values –2 $\leq$ x $\leq$ 2 in the given curves. We find the curves will intersect at x = 0, 1 and -1.

41. (b) We need the number of prime numbers between 12 and 40, which are: 13, 17, 19, 23, 29, 31
and 37 = 7.

42. (c) Simply substitute x = 1 , y = 2 and z = 3 in the expression to get the answer.

43. (a) There are 2n-j students who answer wrongly. For j = 1 , 2, 3, ... n, the number of students will be a GP with base 2. Hence 1 + 2 + 22 + ... 2n-1 = 4095. Using the formula, we get 2n = 4095 + l; hence n=12.

44. (d) 244 < b11; or b > 24. Even if b > 16, we cannot say whether b is an integer or not.

45. (b) Sum of roots = -b/4. Product of roots = c/4. Statement a: sum of roots = 0; Product of roots = -1/4.
From this, b and c can be found out. Statement b: x = -1/2 in the equation

4x2+bx+b=0. Hence b can be found out. Answer is obtained through either statement.

46. (d) We cannot get the answer from both the statements.

47. (a) Statement 1 is not enough. From statement 2: We get x = ½ = a. Hence LHS > RHS.

48. (b) From statement A, we get ABC as equilateral triangle, hence Δ DEF can be found out. Similarly we can get the answer from statement B as well.

49. (d) Cost of perfume bottle in bahts = 520 + 2 (70% of 520) = 1248 bahts; cost to each friend = 1248/3
= 416 baht. R pays 2 Euros = 92 bahts. M pays = 46 X 4 + 27 = 211 bahts. S pays = 1248 - 303 = 945. R owes S = 416 - 92=324.

50. (c) M owes = (416-211) = 205 bahts. Converting into dollars, we get 205/41 - dollars.

Section II
51. (b) Draw the line y = 10% of x. The number of points above this line are the required companies

52. (b) Visual question. Simply count the circles and squares above the line drawn in Q. 62.

53. (c) Visual question. Simply count the number of circles > 2000 and < 300

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54. (b) Compare the columns of Notified Amount with total amount realised. Only on 17 July 02 notified amount is 40 crore while amount mobilised is 16 crore.

55. (c) Check the figures for 4 June 03. We find maturity in second round is 9 while the bids are more, 378.

56. (d) Check the figures for 5 May 03. The value of non-competitive bids accepted in the 2 rounds in 0.31 and 0.42. Hence statement (d) is not true.

57. (b) Seeta grows maximum in 2-3 month but grows at a slower rate after 3rd month.

58. (a) Visual question. Geeta starts the lowest but is maximum at month 2.

59. (a) Geeta's graph is flat in the 2-3 month.

60. (d) Find the range for each person. We see that for Shyam the range is the lowest.

61. (d) Number of respondents less than 40 years can be: Male 1 + 1 + 1 + 2 = 5 and Female 1 + 1 + 1 + 1 = 4. Total = 9. Required 9/30 = 30% approx.

62. (c) Male= 1 +0+7+0=8. Female=4+7+ 3 + 1 = 15 total 23. Required percentage = 23/30 = 76%.

63. (c) Male in 35-40 category = 1 + 0 + 0 + 0 = 1 . Females = 0 + 1 + 1 + 1 = 3 (Taking minimum in each category). Required percentage = 4/30 = 13%.

64. (d) For D, profitability = 3946/ 15782 = 25%, which is the highest.

65. (a) (A + B)/Total = (24568 + 25468)/89570 = 50, 036/89570 = 55% approx.

66. (d) Only University of California has median starting salary of $70,000 with fees of $ 1 8,788 (less than $23,000).

67. (b) Universities with salary 770,000 and fees < 23,700 are Stanford and New York University.

68. (d) Simple digit rankings in 3 of 4 parameters are for universities at 1 to 7 and 9 = 8 universities.

69. (d) Statement A: Success rate for males = 637/60133 = 1.05%. Success rate for females in 2003 = 399/ 40763 = less than 1%. Hence success rate for males was more.

70. (c) Statement A: Females selected = 48/19236= 0.24%. Males selected = 171/ 61205= 0.28%. Hence false.
Statement B: Males for interview = 684/61205 = 1.17%. Females = 138/19236 = 0.71 %. Hence statement B is true.

71. (a) Statement A: Female absentees in 2002 = (19236 - 15389) = 3847. Percentage = 3847/19236 = 20% Figures for 2003: (45292 - 40763)/45292 = 4529 = 10%. Hence (a) is correct.

Statement B: Absentees among males in 2003 = (63298 - 60133/63298 = 3165/63298 = 5%.

72. (c) Only for products is the percentage of spam increasing at a decreasing rate. In other categories it is either declining or increasing at a faster rate.

73. (a) Dec 2002 = 19%, June 2003 = 18%. It is also given that Dec 2002 > June 2003. Hence first figure is greater than second.

74. (d) Sep 2002 = 25%, March 2003 = 37%. Since we do not know the figures, it is not possible to say which figure is greater.

75. (b) Table A gives children of age 9 or less as 48. Table B gives children of height 135 cm as 45. Hence 45 children satisfy both conditions.

76. (a) Children's age 10 years or more = 40. Children taller than 150 cm = 25. Children more than 48 kg = 9
To find children not more than 48 kg, we get 25 - 9 = 16.

77. (c) Children's age 6-12 years = 77 - 22 = 55. Children's weight more than 38 kg = 67. Children satisfying given condition = 67 - 23 = 44.

78. (b) C gets home or finance, hence (a) and (d) are wrong. Statement (b) is also wrong as she gets D and F together.

79. (d) A = home, then C = finance, D and B must have power and telecom hence (d) is wrong.

80. (c) Cheapest way to make orange = Rs 22/1. Cheapest way to make pink = mix white and red = (20 + 15)/2 = 17.50. Total cost of 2 litres = 22 + 17.50 = 39.50. Cost per litre = 39.50/2 = 19.75.

81. (d) Since equal amounts of orange and white are needed, we look for the choice where this condition is satisfied. Only in (4) do we get equal proportion.

82. (b) Least price of Avocado = 19.75 (from Q. 80). Cream = (15 X 7 + 25 X 3)/10 = Rs 18. Washedorange = (22 + 15)/2 = Rs 18.50. Since they sell at the same price, the most profitable is cream.

83. (a) S has four uncles. If F has 2 brothers, the other 2 uncles must be brothers of M, hence (A) is sufficient. B is redundant.

84. (a) Cost incurred to play the game = (10 + n) where n is the number of tosses. Statement A says the game ended normally, hence we can form the equation 50 = (10 + n) - 100. Hence (A) is sufficient.

85. (c) Combining the statements, we get (A): number of coupons = 21, and (B): number of vowels = 18. The last letter being S, it leaves 2 blanks, which must be P's. Hence answer is (c).

86. (c) To find C's time, we need total distance and C's speed. These 2 variables are given by statement (A) and (B) combined.

87. (d) We have 2 couples: Lawyer - D (housewife) and C (accountant) - F (professor). Since A is married to a housewife, one of the couples is A-D.

88. (b) There are 2 married couples, hence 2 males. E is an engineer, hence cannot be female. Total males = 3.
From the above, E can be either engineer or housewife. Since she is not a housewife, E is an engineer.

89. (c) There are 2 married couples, hence 2 males. E cannot be female. Hence 3 males.

90. (a) We have A - 8 = 4 (i) and D + R = 37 (ii), also A + G = 40 (v). Solving (i) and (v) we get A + (A-8)=40; 2A-8=40 or A = 24,G= 16. From (iv) we get A - D = 5 hence D = 19. Hence the first statement is true.

91. (a) From (iii) we get J = D + 8 hence J = 27. From (ii) R=37-19 = l8. Hence D + J = 19+27 = 46 (statement i).

92. (c) We note that C or D can be on the left end while G can be on the right end. Hence (c).

93. (d) E can be only on 2nd or 3rd position, From the above. Since A is on 6th or 7th position, E and A cannot be together.

94. (c) G cannot occupy a position next to B.

95. (c) We get S = 2517. Then C = 2517 - 1 378 = 1 139. A = 2234, D = 1193 and H = 1340.

96. (c) from the above

97. (a) f rom the above

98. (c and d) We get the foll. table:
Idli Vada Chutney

×Bimal 8 4
Mukesh 4 × 2
×Sandeep 1 0
Ignesh 6 6 yes
Daljit 5 1 yes

99. (a)

100. (c)

Section III

101. 2 102. 4 103. 3 104. 3 105. 1 106. 1 107. 1 108. 1 109. 3 110. 3 111. 112.2 113. 4 115. 3

116. 2 a group of…
117. 3 he is clear…
118. 1 the headmaster's effort…
119. 3 are host…
120. 2 all sorts
121. 4 122. 3 123. 4 124. 3 125. 3 126. 3 127. 1 128. 3 129. 2 130. 1 131. 2 132. 1 133. 2 134. 1 135. 1 136. 4 137. 2 138. 2 139. 2 140. 1 141. 1 142. 3 143. 2 144. 1 145. 3 146. 2 147. 1 148. 4 149. 3 150. 1