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CAT 2004

Directions for Questions 1–4: Each question is followed by two statements, *A* and *B*. Answer each question using the following instructions:

Choose 1 if the question can be answered by using one of the statements alone but not by using the other statement alone.

Choose 2 if the question can be answered by using either of the statements alone.

Choose 3 if the question can be answered by using both statements together but not by either statement alone.

Choose 4 if the question cannot be answered on the basis of the two statements.

1. Tarak is standing 2 steps to the left of a red mark and 3 steps to the right of a blue mark. He tosses a coin. If it comes up heads, he moves one step to the right; otherwise he moves one step to the left. He keeps doing this until he reaches at one of the two marks, and then he stops. At which mark does he stop?
   (a) He stops after 21 coin tosses.
   (b) He obtains three more tails than heads.
2. Four candidates for an award obtain distinct scores in a test. Each of the four casts a vote to choose the winner of the award. The candidate who gets the largest number of votes wins the award. In case of a tie in the voting process, the candidate with the highest score wins the award. Who wins the award?
   (a) The candidates with top three scores each vote for the top scorer amongst the other three.
   (b) The candidate with the lowest score votes for the player with the second highest score.
3. Nandini paid for an article using currency notes of denominations ` 1, ` 2, ` 5, and ` 10 using at least one note of each denomination. The total number of five and ten rupee notes used was one more than the total number of one and two rupee notes used. What was the price of the article?
   (a) Nandini used a total of 13 currency notes.

(b) The price of the article was a multiple of ` 10

4. In a class of 30 students, Rashmi secured third rank among the girls, while her brother Kumar studying in the same class secured sixth rank in the whole class. Between the two, who had a better overall rank?
   (a) Kumar was among the top 25% of the boys merit list in the class in which 60% were boys.
   (b) There were three boys among the top five rank holders, and three girls among the top ten rank holders.

Directions for Questions 5–8: Answer the questions on the basis of the information given below.

Twenty one participants from four continents (Africa, Americas, Australasia and Europe) attended a United Nations conference. Each participant was an expert in one of four fields, labour, health, population studies, and refugee relocation. The following five facts about the participants are given.

(a) The number of labour experts in the camp was exactly half the number of experts in each of the three other categories.

(b) Africa did not send any labour expert. Otherwise, every continent, including Africa, sent at least one expert for each category.

(c) None of the continents sent more than three experts in any category.

(d) If there had been one less Australasian expert, then the Americas would have had twice as many experts as each of the other continents.

(e) Mike and Alfanso are leading experts of population studies who attended the conference. They are from Australasia.

5. If Ramos is the lone American expert in population studies, which of the following is NOT true about the number of experts in the conference from the four continents?
   (a) There is one expert in health from Africa.
   (b) There is one expert in refugee relocation from Africa.
   (c) There are two experts in health from the Americas.
   (d) There are three experts in refugee relocation from the Americas.

6. Alex, an American expert in refugee relocation, was the first keynote speaker in the conference. What can be inferred about the number of American experts in refugee relocation in the conference, excluding Alex?
   (i). At least one (ii). At most two
   (a) Only (i) and not (ii)
   (b) Only (ii) and not (i)
   (c) Both (i) and (ii)
   (d) Neither (i) nor (ii)

7. Which of the following numbers cannot be determined from the information given?
   (a) Number of labour experts from the Americas
   (b) Number of health experts from Europe
   (c) Number of health experts from Australasia

(d) Number of experts in refugee relocation from Africa

8. Which of the following combinations is NOT possible?
   (a) 2 experts in population studies from the Americas and 2 health experts from Africa attended the conference.
   (b) 2 experts in population studies from the Americas and 1 health experts from Africa attended the conference.
   (c) 3 experts in population studies from the Americas and 1 health experts from Africa attended the conference.
   (d) Africa and America each had 1 expert in population studies attending the conference.

Directions for Questions 9–12: Answer the questions on the basis of the information given below.

The year was 2006. All six teams in Pool A of World Cup hockey play each other exactly once. Each win earns a team three points, a draw earns one point and a loss earns zero points. The two teams with the highest points qualify for the semi finals. In case of a tie, the team with the highest goal difference (Goals For – Goals Against) qualifies.

In the opening match, Spain lost to Germany. After the second round (after each team played two matches), the pool table looked as shown below.

Teams	Games played	Won	Drawn	Lost	Goals For	Goals Against	Points
Germany	2	2	0	0	3	1	6
Argentina	2	2	0	0	2	0	6
Spain	2	1	0	1	5	2	3
Pakistan	2	1	0	1	2	1	3
New Zealand	2	0	0	2	1	6	0
South Africa	2	0	0	2	1	4	0

In the third round, Spain played Pakistan, Argentina played Germany, and New Zealand played South Africa. All the third round matches resulted in a draw. The following are some results from the fourth and fifth round matches:

(a) Spain won both the fourth and fifth round matches.
(b) Both Argentina and Germany won their fifth round matches by 3 goals to 0.
(c) Pakistan won both the fourth and fifth round matches by 1 goal to 0.

9. Which one of the following statements is true about matches played in the first two rounds?
   (a) Pakistan beat South Africa by 2 goals to 1.
   (b) Argentina beat Pakistan by 1 goal to 0.
   (c) Germany beat Pakistan by 2 goals to 1.
   (d) Germany beat Spain by 2 goals to 1.

10. Which one of the following statements is true about matches played in the first two rounds?

(a) Germany beat New Zealand by 1 goal to 0.
(b) Spain beat New Zealand by 4 goals to 0.
(c) Germany beat Pakistan by 2 goals to 1.
(d) Germany beat Spain by 2 goals to 1.

11. Which team finished at the top of the pool after five rounds of matches?
    (a) Argentina
    (b) Germany
    (c) Spain
    (d) Cannot be determined
12. If Pakistan qualified as one of the two teams from Pool A, which was the other team that qualified?
    (a) Argentina
    (b) Germany
    (c) Spain
    (d) Cannot be determined

Directions for Questions 13 and 14: Answer the questions independently of each other.

In an examination there are hundred questions divided into 3 groups *A*, *B* and *C*, such that each group contains at least 1 question. Each question in Group *A* carries 1 mark, each question in Group *B* carries 2 marks, each question in Group *C* carries 3 marks. It is known that the questions in Group *A* together carry at least 60% of the total marks.

13. If Group *B* contains 23 questions, then how many questions are there in Group *C*?
    (a) 1 (b) 2
    (c) 3 (d) Cannot be determined
14. If Group *C* contains 8 questions and Group *B* carries at least 20% of the total marks, which of the following best describes the number of questions in Group *B*?
    (a) 11 or 12 (b) 12 or 13
    (c) 13 or 14 (d) 14 or 15

Answer Key

1. (b)	2. (a)	3. (d)	4. (a)
5. (c)	6. (c)	7. (d)	8. (d)
9. (b)	10. (d)	11. (c)	12. (d)
13. (a)	14. (c)		

Solutions:

Solutions for Data Sufficiency (Questions 1–14)

1. The given situation is using even-odd logic. Statement A alone is sufficient as it can be seen that if he stops after 21 tosses, he must have stopped at the blue mark only.

   Statement B alone is also sufficient since if we know that he obtains 3 more tails than heads, the number of tosses must have been odd. Hence, he could only be at the odd place.

2. Assume the four candidates as A, B, C, D such that $A > B > C > D$. From statement A alone we can conclude that A must have voted for B, while B and C must have both voted for A. Thus A gets 2 votes and B gets 1 vote. Even though we do not know from this statement which way D voted, we can conclude that A must have won the award as even if D voted for B, there would be a tie in between A and B and the result would favour A (as he scored higher).

   Thus Statement A alone is sufficient.

   Statement B alone is not sufficient as it gives information only about the vote of 1 person.

   Hence, we choose option (a) as the answer.

3. The question of getting the price of the article using only one of the two statements does not arise at all. Even after using both statements together there are too many possibilities for the article's price. Hence, we choose option (d) as the correct answer.

4. From Statement A alone, we can just conclude that there were 18 boys and 12 girls and Kumar's rank among the boys must have been in the top 4.

   From Statement B alone, we just know that there were 3 boys and 2 girls in the top 5. Also since Kumar is in sixth place (from the basic information available), his sister Rashmi must have come in after him (as she is the third girl).

Solutions for Questions 5–8:

Since there are 21 experts in all from the first clue we get that if number of labour experts is x, then the number of experts in each of the other areas would be $2x$ each. Thus we get $7x = 21$ and $x = 3$.

Also from the fourth clue (d), we get Americas ($2x$) + Australia ($x + 1$) + Europe (x) + Africa (x) = 21 gives the respective number of experts from each of these continents as 8, 5, 4 and 4.

We can then start off with the basic table as follows (Adding the information in the second clue (b)):

	Labour (3)	**Health (6)**	**Population Studies (6)**	**Refugee Relocation (6)**	**Slack**
Americas (8)	1	At least 1	At least 1	At least 1	4
Australasia (5)	1	At least 1	At least 1	At least 1	1
Europe (4)	1	At least 1	At least 1	At least 1	0
Africa (4)	0	At least 1	At least 1	At least 1	1
Slack	0	2	2	2	

Analysis of the slacks (means how much freedom we have in placing more people in the row or the column) will give us the following definite values. We have also used the fifth clue (which says that there are 2 experts in population studies from Australasia) in order to make this table:

	Labour (3)	Health (6)	Population Studies (6)	Refugee Relocation (6)	Slack
Americas (8)	1	At least 1	At least 1	At least 1	4
Australasia (5)	1	1	2	1	0
Europe (4)	1	1	1	1	0
Africa (4)	0	At least 1	At least 1	At least 1	1
Slack	0	2	1	2	

This leaves us with the requirement to place 4 experts from the Americas between Health, Population Studies and Refugee Relocation.

This leaves us with the requirement to place 1 expert from Africa between Health, Population Studies and Refugee Relocation.

This leaves us with the requirement to place 2 more experts in the health column, 1 more expert in the Population Studies column and 2 more experts in the Refugee Relocation column.

At this stage we can move over to the questions and solve them on the basis of what we know till now:

5. If Ramos is the lone American expert in population studies, we are left with the need to place 4 extra American experts between Health and Refugee Relocation; and we have the constraint of not more than 3 experts in any area came from one particular continent. Hence, the 4 experts (slack) can only be distributed as 2 and 2. This means that there must be 3 American experts in Health and Refugee Relocation respectively. Hence, Option (c) is not true.
6. For this question, we will disregard the additional information contained in the previous question. Thus we have a situation, where we need to use up the slack of 4 (of the Americas) amongst Health (slack available 2), Population Studies (slack available 1) and Refugee Relocation (slack available 2). This means that we have to put in at least 1 extra expert in Refugee Relocation and at most 2 more experts in Refugee Relocation apart from Alex.
7. Looking at the options we know:
   (a) Number of labour experts from the Americas = 1
   (b) Number of health experts from Europe = 1
   (c) Number of health experts from Australasia = 1
   (d) Number of Refugee Relocation experts from Africa = 1 or 2.

   Hence, option (d) is the correct answer.
8. Option (d) is not possible as if we were to put 1 expert in population studies from each of Americas and Africa, then the slack of 1 for Population Studies remains unused.

Solutions for Questions 9–12:

The solution of the questions in this set depends upon the ability to interpret the table and find out the appropriate linkages. Let us look at the table and create our interpretations. From here onward goals for will denoted as G.F. and goals against as G.A.

Teams	Games played	Won	Drawn	Lost	Goals For	Goals Against	Points

Germany	2	2	0	0	3	1	6
Argentina	2	2	0	0	2	0	6
Spain	2	1	0	1	5	2	3
Pakistan	2	1	0	1	2	1	3
New Zealand	2	0	0	2	1	6	0
South Africa	2	0	0	2	1	4	0

Let us first analyse the given goals for & goals against columns. We will conclude that Germany has played a total of two games and has lost none, i.e., we can deduce that its two wins can be in one of the two combinations which can be given as Won 1-0/2-1 or Won 2-1/1-0 (no other combinations are possible because it has to maintain 3-1 G.F./G.A. situation) against two teams which are Spain and either Pakistan(PAK) or New Zealand(NZ) or South Africa(SA).

The above deductions give us an insight into the situation of Team Spain in the table where if Germany wins by 2-1 then Spain wins its other match by 4-0 or if 1-0 then Spain wins by 5-1 according to G.F./G.A. column. Now look into the goals against column where only New Zealand and South Africa have greater than or equal to 4 goals. Refer to the Team South Africa row, South Africa has conceded 4 goals against itself hence it lost in both rounds. This results into the deduction that Spain played its second round against New Zealand and if this deduction is true then no other team can play NZ in round two.

Hence we can draw the following possibilities from the above deductions:

(a) Team Germany: Round 1: vs. Spain Æ Won 2-1/ 1-0.
Round 2: vs. PAK/SA Æ Won 2-1 or 1-0.
Round 3: vs. Argentina Æ Draw

(b) Team Spain: Round 1: vs. Germany Æ Lost 0-1/ 2-1.
Round 2: vs. NZ Æ Won 5-1/4-0.
Round 3: vs. PAK Æ Draw

(c) Team NZ: Round 1: vs. Arg/PAK Æ Lost 1-0/1-2.
Round 2: vs. Spain Æ Lost 1-5/0-4.
Round 3: vs. South Africa Æ Draw.
Look into the G.F./G.A. columns, now we can draw conclusions from deductions made as:
(i) PAK won round 1 by 2-0 and lost second by 0-1(G.F./G.A. Æ 2/1).
(ii) Since NZ played Round 1 against PAK/Arg it could not have lost 1-2(because if PAK had won 2-1 against NZ in Round 1, its second round would be a draw and Arg has conceded two goals so it cannot win against NZ by 2-1). Hence NZ won rd.1 against Arg by 0-1 and lost Rd. 2 by 1-5 against Spain.

Now we can visualize the complete scenario as:

(a) Team Germany: Round 1: vs. Spain Æ Won 1-0.
Round 2: vs. SA Æ won 2-1(since Pak cannot loose 2-1)

(b) Team Spain: Round 1: vs. Germany Æ Lost 0-1.
Round 2: vs. NZ Æ Won 5-1.

(c) Team NZ: Round 1: vs. Arg Æ Lost 0-1.
Round 2: vs. Spain Æ Lost 1-5.

(d) Team PAK: Round 1: vs. SA Æ Won 2-0.
Round 2: vs. Arg Æ Lost 0-1.

The first three rounds are as under:

Round 1 matches:

Germany beat Spain 1-0.

Argentina beat PAK 1-0.

PAK beat SA 2-0.

Round 2 matches:

Spain beat NZ 5-1.

Argentina beat PAK 1-0.

Germany beat SA 2-1.

Round 3 matches:

Germany drew with Argentina.

Spain drew with Pakistan.

NZ drew with SA.

According to the information for the fourth and fifth round matches following deductions can be made:

Germany- Pakistan, Loss(0-1) & NZ won (3-0).

Argentina- Spain, loss by 'x' goals & SA won by 'y' goals.

Spain- Argentina won by 'x' goals & SA won by 'y' goals.

Pakistan- Germany won (1-0) & NZ won (1-0).

NZ- Germany loss (0-3) & PAK lost (0-1).

SA- Argentina lost (0-3) & Spain lost by 'y' goals.

Goal differences for the teams:

Germany $+ 1 + 1 + 0 - 1 + 3 = +4$

Argentina $+ 1 + 1 + 0 - x + 3 = 5 - x$ = Max. 4 or less.

Spain $- 1 + 4 + 0 + x + y = 3 + x + y$ = Min. 5 or more.

Pakistan $+ 2 - 1 + 0 + 1 + 1 = +3$.

New Zealand $- 1 - 4 + 0 - 3 - y = - 6 - y$

Now, looking into the questions given:

9. Argentina beat Pakistan 1-0 is true. Hence, option (b) is correct.
10. Germany beat SA 2-1 is true. Hence, option (d) is correct.
11. Spain will finish on top after 5 rounds. Hence, option (c) is correct.
12. This cannot happen since at last Spain and Germany will have a higher goal difference thar

Pakistan.

13. It can be seen that if Group C has 2 questions, the at least 60% marks criteria for Group A cannot be fulfilled. The scenario works out as:

    Group B = 23 questions, 46 marks, Group C = 2 questions, 6 marks, Group A 75 questions, 75 marks. Percentage of marks in Group A = 75/127 < 60.

    However, if we take C having 1 question the condition is fulfilled.

    Group B = 23 questions, 46 marks, Group C = 1 question, 3 marks, Group A 76 questions, 76 marks. Percentage of marks in Group A = 76/125 > 60.

14. The following scenarios can get worked out. First test for 12 questions in group B.

	Number of questions	**Number of marks**	**% of marks**
Group A	80	80	>60
Group B	12	24	<20
Group C	8	24	
Total	100	128	

Conditions not satisfied, hence reject both options (a) and (b).

Now test for 13 questions in Group B

	Number of questions	**Number of marks**	**% of marks**
Group A	79	79	>60
Group B	13	26	=20
Group C	8	24	
Total	100	129	

Hence, the third option is correct.

It can be reasoned that for 15 questions in Group B, the Group A marks condition (at least 60% marks in group A) is rejected.