

Objective Logical Reasoning



**OBJECTIVE
LOGICAL REASONING**



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PREFACE

Reasoning, as a subject, has been growing in significance across competitive examinations in India. This is the only assessment area where one finds conventional question types evolving inclusively, as well as new types of questions emerging. As we know, there are mainly three focus areas in the assessment of reasoning: (i) non-verbal reasoning, or spatial aptitude; (ii) verbal reasoning, or mental aptitude; and (iii) logical reasoning, or critical thinking aptitude.

Objective Logical Reasoning owes its existence to comprehensive research and methodical planning. Logical reasoning has mainly two parts: (i) analytical reasoning, and (ii) critical reasoning. The book caters comprehensively to both these evolving parts of logical reasoning tests that assess the critical thinking and analytical skills of the candidates. This book is an attempt to provide the young aspirants with both: (i) a clear understanding of important types and concepts, and (ii) comprehensive practice material structured in a methodical way. Another important issue with any reasoning book is the way the solutions are provided. There are some ambiguous aspects in certain questions that need to be covered with complete explanations, with all scenarios in mind.

About the series

Students are always on the lookout for resources that provide them with a balanced approach to learn the ever-growing types of reasoning questions, as well as give them ample practice material to hone their skills while preparing for success. This Objective Reasoning series is structured in three books:

1. *Objective Non-Verbal Reasoning*
2. *Objective Verbal Reasoning*
3. *Objective Logical Reasoning*

This book is an effort to provide the candidates with a resource to attain conceptual clarity needed to comprehend reasoning questions in a simple way and solve the questions accurately. A good thing about this series is that all the three books are structured in the same way. So, the instruction methodology in each of these is the same, which will help students learn and practise the entire gamut of exercises in the same learning methodology. Teachers will also appreciate this aspect as a standardized approach will sync well with their teaching methodology and lesson plans.

Acknowledgements

We must confess that bringing out such a comprehensive book on one aspect of reasoning—Logical Reasoning—where collection, verification, and assessment of material is a huge task, has been a group effort. The team behind this effort is a gifted squad of researchers, who went through the entire process meticulously, without losing steam at any phase, and keeping in mind the timelines and all qualitative aspects of publishing a book. Despite our best efforts at the desk-level, a few errors may have unintentionally crept in the book. I request that such blemishes must not be ignored but brought forward to us, so that we may rectify these in our next editions. Suggestions for improving the book in any way are most welcome.

We wish all the aspirants the very best.

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PART 1

ANALYTICAL REASONING TESTS

➤ **CHAPTER 1** Introduction to Analytical Reasoning Questions


1**CHAPTER**

Introduction to Analytical Reasoning Questions

❖ ANALYTICAL REASONING (AR) QUESTIONS

Introduction

Analytical Reasoning (AR) questions examine the analytical and logical thinking abilities of a candidate. No specialized knowledge of any particular field is required for answering the questions, and no knowledge of the terminology and conventions of formal logic is presupposed. In these questions you are to analyze the situation on which each question is based, and then select the answer that is the most appropriate response to the question.

Each question or group of questions is based on a passage or set of conditions. In answering some of the questions, it may be useful to draw a rough diagram. For each question, select the best answer from the choices given. Darken the corresponding oval in the answer sheet.

Passage

A particular Mumbai restaurant serves dinner from Tuesday to Sunday. The restaurant is closed on Monday. Five entrees—Russian, Indian, Italian, Continental, and Chinese—are served each week according to the following restrictions:

- Indian is served on three days each week, but never on Friday.
- Italian is served on one day each week.
- Continental is served on three days each week, but never on consecutive days.

- Indian and Russian are both served on Saturday and Sunday.
 - Chinese is served five days each week.
 - Not more than three different entrees are served on any given day.
1. On which of the following pairs of days could the restaurant's menu of entrees be identical?
 - (a) Friday and Sunday
 - (b) Tuesday and Wednesday
 - (c) Saturday and Sunday
 - (d) Wednesday and Friday
 - (e) Thursday and Friday
 2. Which of the following is a complete and accurate list of the days on which Indian and Italian may both be served?
 - (a) Tuesday, Thursday
 - (b) Tuesday, Wednesday, Thursday
 - (c) Monday, Tuesday, Wednesday
 - (d) Tuesday, Wednesday, Thursday, Friday
 - (e) Tuesday, Wednesday, Thursday, Saturday
 3. If Continental is served on Saturday, it could be true that
 - (a) Russian and Continental are both served on Sunday
 - (b) Russian and Indian are both served on Tuesday
 - (c) Italian and Indian are both served on Thursday
 - (d) Chinese and Russian are both served on Saturday
 - (e) Italian and Russian are both served on Friday

1.4 □ ANALYTICAL REASONING TESTS

4. Which of the following statements provides sufficient information to determine on which three days Indian is served?
- Continental and Italian are served on the same day.
 - Italian and Russian are both served on Tuesday.
 - Chinese is served on Saturday, and Italian is served on Tuesday.
 - Continental is served on Saturday, and Russian is served on all but one of the six days.
 - Chinese is served on Sunday, and Russian is served on Tuesday and Thursday.

Answer Analysis

Understanding the Problem

This game requires you to make six “yes-or-no” decisions for each entree. The best way to organize the information here is with a matrix, or “checkerboard,” diagram (see below), in which you fill in a box with either a checkmark or an “X” as you determine whether a particular entree is served on a particular day.

Before you attempt any of the questions, ask yourself whether you can fill in any boxes in your diagram, based solely on the game’s explicit conditions. Yes, you can:

- You’re given that Indian is not served on Friday, so place “X” in the appropriate box (see adjoining diagram).
- You’re given that Indian and Russian are both served on Saturday and Sunday, so place a check mark in the four appropriate boxes (see diagram adjoining).

	T	W	Th	F	Sa	Su	
Russian					✓	✓	
Indian				×	✓	✓	(3)
Italian							(1)
Continental							(3) <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Chinese							(5)

(Maximum 3 per day)

Next, ask yourself what else you can deduce from the game’s conditions. This is the key step

in this game! Focus on the Saturday and Sunday columns in the diagram above. The rules of the game permit no more than three check marks per column. Here’s what you can deduce:

- Continental must be served on either Saturday or Sunday, but not on both days. Why? Because this entree must be served three days per week, but never on consecutive days.
- Chinese must be served on Tuesday to Friday and on Saturday or Sunday, but not on both days. Why? Chinese must be served on five of the six days, so it must be served on at least one of the two weekend days. But if Chinese were served on both Saturday and Sunday, then on one of those two days four entrees (Russian, Indian, Continental, and Chinese) would be served. (**Remember:** We concluded above that Continental must be served either on Saturday or Sunday.) This result would exceed the limit of three entrees per day.

Based on these deductions, two basic alternatives emerge:

- Continental is served on Saturday (but not Sunday), and Chinese is served on Sunday (but not Saturday)
- Continental is served on Sunday (but not Saturday), and Chinese is served on Saturday (but not Sunday)

	T	W	Th	F	Sa	Su	
Russian					✓	✓	
Indian				×	✓	✓	(3)
Italian					×	×	(1)
Continental							(3) <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Chinese	✓	✓	✓	✓			(5)

(Maximum 3 per day)

×	✓
✓	×

 or

✓	×
×	✓

We’re not quite done deducing all we can from the game’s rules. Based on what we’ve deduced so far, we can also conclude that Italian cannot be served either on Saturday or Sunday (again, because the game limits the number of entrees per day to three). So your final matrix diagram might look like this:

Now you're ready to tackle the questions.

Answer Analysis

1. The correct response is (d). You can eliminate (a) because Indian is served on Sunday but not on Friday, so the menu for these two days cannot be the same. You can eliminate (b) as well as (e) because Continental cannot be served on consecutive days. You can eliminate (c) also because Continental is served on either Saturday or Sunday, but not on both days. By process of elimination, (d) must be the correct answer.
2. The correct response is (b). Indian cannot be served on Friday, and Italian cannot be served on either Saturday or Sunday. However, both may be served on any of the other three days.
3. The correct response is (e). If Continental is served on Saturday, it must be served on Tuesday and Thursday as well (otherwise, Continental would be served on at least two consecutive days), and Chinese must be served on Sunday rather than Saturday (otherwise, four entrees would be served on Saturday). Given these conclusions, you can eliminate (a), (b), (c), and (d) because in each one at least four entrees would be served on the day specified by the answer choice. (e) could be true, however Italian and Russian can both be served on Friday, since Chinese is the only entree that must be served on that day.
4. The correct response is (e). This question essentially asks what information is required to determine the entire week's schedule for Indian. Only (e) provides sufficient information. If Chinese is served on Sunday, Continental must be served on Saturday and therefore on Tuesday and Thursday as well. (**Remember:** Continental must be served on three non-consecutive days.) In addition, given that Russian is served on Tuesday and Thursday, Russian, Continental, and Chinese must all be served on these two days. Accordingly, Indian cannot be served on either of those days; otherwise, four entrees would be served on that day. Indian must be served three days each week, and therefore must be served on Wednesday.

SOLVED EXAMPLES

Passage 1

✎ **Directions** Read the following information carefully and answer the questions given below:

- I. There are five types of cards, viz. A, B, C, D and E. There are three cards of each types. These are to be inserted in envelopes of three colours-red, yellow and brown. There are five envelopes of each colour.
 - II. B, D and E type cards are to be inserted in red envelopes; A, B and C types cards are to be inserted in yellow envelope and C, D and E types cards are to be inserted in brown envelopes.
 - III. Two cards each of B and D type are inserted in red envelopes.
1. How many cards of E types are inserted in brown envelopes?
 (a) Nil (b) One (c) Two (d) Three
 (e) Data inadequate.

2. Which of the following combinations of the type of cards and the number of cards is definitely correct in respect of yellow coloured envelopes?
- (a) A-II, B-I, C-II (b) B-I, C-II, D-II
 (c) A-II, E-I, D-II (d) A-III, B-I, C-I
 (e) None of these.
3. Which of the following combinations of types of cards and the number of cards and colour of envelope is definitely correct?
- (a) C-II, D-I, E-II, Brown (b) C-I, D-II, E-II, Brown
 (c) B-II, D-II, A-I, Red (d) A-II, B-II, C-I, Yellow
 (e) None of these.
4. Which of the following combinations of colour of the envelope and the number of cards is definitely correct in respect of E type cards?
- (a) Red-II, Brown-I (b) Red-I, Yellow-II
 (c) Red-II, Yellow-I (d) Yellow-I, Brown-II
 (e) None of these.

Answer Keys

1. (c) 2. (d) 3. (a) 4. (e)

Explanations

For Qs. 1 – 4:

Total number of cards = $5 \times 3 = 15$

Total number of envelopes = $5 \times 3 = 15$

Tabulating the given data:

Colour of Envelope	Number of Envelope				
	1	2	3	4	5
Red	B	B	D	D	E
Yellow	A	A	A	B	C
Brown	C	C	D	E	E

Passage 2

Eight dogs in an obedience class are learning to follow two commands—“heel” and “stay.” Each dog is either a shepherd, a retriever, or a terrier, and each of these three breeds is represented at least once among the group. All female dogs in the group are retrievers. The results of the first lesson are as follows:

- At least two of the dogs have learned to follow the “heel” command, but not the “stay” command.
- At least two of the dogs have learned to follow the “stay” command, but not the “heel” command.
- At least one of the dogs has learned to follow both commands.
- Among the eight dogs, only terriers have learned to follow the “stay” command.

5. Which of the following statements CANNOT be true?
 - (a) The group includes more females than males.
 - (b) The group includes fewer terriers than shepherds.
 - (c) The group includes more shepherds than retrievers.
 - (d) Most of the dogs have learned to stay than to heel.
 - (e) Most of the dogs have learned to heel than to stay.

6. If each dog has learned to follow at least one of the two commands, all of the following must be true EXCEPT:
 - (a) All retrievers have learned to heel.
 - (b) All shepherds have learned to heel.
 - (c) All terriers have learned to stay.
 - (d) No retriever has learned to stay.
 - (e) No shepherd has learned to stay.

7. If four of the dogs are male and four of the dogs are female, all of the following must be true EXCEPT:
 - (a) One of the dogs is a shepherd.
 - (b) Four of the dogs are retrievers.
 - (c) Three of the dogs are terriers.
 - (d) Three of the dogs have learned to stay.
 - (e) Four of the dogs have learned to heel.

8. If the group includes more shepherds than terriers, the minimum number of male dogs among the group that have learned to heel is
 - (a) 0
 - (b) 1
 - (c) 2
 - (d) 3
 - (e) 4

9. If each dog has learned to follow at least one of the two commands, and if two of the dogs have learned to heel but not stay, it could be true that
 - (a) two of the dogs are female
 - (b) all of the dogs are male
 - (c) only one male dog has learned to heel
 - (d) one female dog has learned to stay
 - (e) two of the dogs are retrievers

Understanding the Problem

The key to handling this complex “matching” game is to recognize the inferences in each of the two conditional rules:

								S ↓ T
command	h	h	h	s	s	h/s		
breed				T	T	T		
gender				m	m	m		
								R S/T ↑ ↓ f m

All 3 breeds (R, S, T)

Rule: All female dogs in the group are retrievers.

Inference: All shepherds and terriers are male.

Rule: Only terriers have learned to follow the “stay” command.

Inference: No shepherd or retriever has learned to follow the “stay” command.

Here's one way to incorporate this information into a master diagram:

Notice in this diagram that the conditional rules are expressed visually to the right of the diagram. Follow the direction of the arrows; for example, *if* a dog has learned the stay command ("s"), *then* that dog must be a terrier ("T"). Now you're ready to tackle the questions.

Answer Analysis

5. The correct response is (a). At least three dogs are terriers, all of which are male. At least one dog must be a shepherd, and all shepherds are male. Thus, at least four dogs must be male, and so it is not possible for there to be more females than males among the group. Statement (a) must be false.
6. The correct response is (c). All dogs other than terriers must have learned to heel but not stay, because all dogs that have learned to stay are terriers. Thus, all retrievers and all shepherds have learned to heel but not stay, and statements (a), (b), (d), and (e) must all be true. However, it is possible for a terrier to have learned to heel but not stay; thus, statement (c) is not necessarily true.
7. The correct response is (e). Since all females must be retrievers, terriers and shepherds must all be male. There must be at least one dog of each breed among the group, and so one dog must be a shepherd, and three dogs must be terriers. (The remaining four dogs must be retrievers.) Thus, statements (a), (b), and (c) must be true. If a dog has learned to stay, the dog must be a terrier; thus, three dogs have learned to stay, and statement (d) must be true. Although at least three dogs have learned to heel, it is possible that as many as three dogs have learned neither to heel nor to stay. Thus, statement (e) is not necessarily true.
8. The correct response is (c). At least three dogs must be terriers. Since each breed of dog must be represented at least once among the group, one of the dogs must be a retriever, and the remaining four dogs must be shepherds. One of the three terriers (all of which are male) has learned to heel. All four shepherds are male, and at least one of the four shepherds has learned to heel; otherwise, only three of the dogs at most could be shepherds. Thus, a minimum of two male dogs must have learned to heel.
9. The correct response is (b). All dogs other than the two that have learned to heel but not stay must have learned to stay. All of those dogs (six in total) must be terriers and thus must be male (see general comments above). Since each breed must be represented among the group, of the two remaining dogs one must be a shepherd while the other must be a retriever. Both the shepherd and the retriever must have learned to heel but not stay. The shepherd must be male, although the retriever could be either male or female.

Passage 3

Monu, Nonu, Onu, Ponu and Ranu are different people.

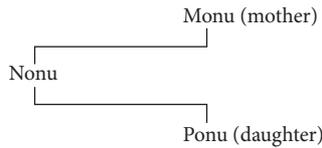
- Onu is the son of Monu.
- Monu is the mother of Nonu.

- Ponu is the daughter of Nonu.
- Ronu is the brother of Onu.

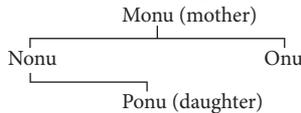
10. Which of the following statement is TRUE?
- (a) Nonu is the mother of Ponu.
 - (b) Nonu is sister of Ronu.
 - (c) Ronu is grandson of Monu.
 - (d) Monu is the aunt of Ponu.
 - (e) Onu is the uncle of Ponu.
11. Given the four statements above, which of the following is NOT possible?
- (a) Ronu is father of Nonu.
 - (b) Nonu is sister of Ronu.
 - (c) Ronu is the uncle of Ponu.
 - (d) Nonu is the son of Monu.
 - (e) Ponu is the granddaughter of Monu.
12. If Ponu is the sister of Onu, then which of the following must be TRUE?
- I. Ronu is the uncle of Onu.
 - II. Nonu is the father of Onu.
 - III. Onu and Ponu are sisters.
- (a) I and II only
 - (b) I only
 - (c) I, II and III
 - (d) I and II only
 - (e) II and III only

Understanding the Problem

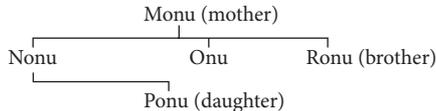
The relationship expressed in the opening four statements may be represented by a diagram. From statements (2) and (3) we can construct the following diagram:



From statement (1) we can add to the above diagram as follows:



From statement (4), we know that



Now, on the basis of this final diagram, we will be able to answer the questions.

10. (e) is the right choice. Choices (a) and (b) are incorrect because it is not known whether Nonu is a male or female. Ronu is son of Monu, hence choice (c) is incorrect. Monu is grandmother of Ponu, so choice (d) is also incorrect. Onu is uncle of Ponu. Therefore, choice (e) is correct.
11. Choices (c) and (e) are clearly consistent with the four statements. Choices (b) and (d) are possible, since Nonu may be either male or female. Choice (a), however is not possible.

12. If Ponu is the sister of onu, then Ronu must be uncle of onu, so that I must be true. Since it is not known whether Nonu is male or female, II is not necessarily true. Since it is not known whether onu is male or female, III is not necessarily true. Hence, choice (b) is correct.

Passage 4

Four men and four women have been invited to a dinner party. They will be seated at a circular table. Following are the seating conditions:

- Geeta refuses to sit next to Aditya, (2) Leena wants to be between Tom and Harish, (3) Kareena refuses to sit next to Farid, (4) Neetu is seated to Aditya's right, (5) Farid and Tom are seated diametrically opposite to each other, (6) Seating alternates by gender.
13. Which of the following is the ONLY possible seating arrangement in accordance with the conditions set down?
- (a) Neetu is seated to the left of Tom.
 - (b) Leena is seated between Geeta and Farid.
 - (c) Kareena is seated diametrically opposite Geeta.
 - (d) Farid is seated next to Kareena.
 - (e) Aditya is seated to the right of Geeta.
14. Which of the following combinations is NOT found at the table?
- (a) Geeta, Farid, Leena
 - (b) Aditya, Kareena, Tom
 - (c) Harish, Leena, Tom
 - (d) Farid, Neetu, Aditya
 - (e) Harish, Geeta, Farid.
15. Which of the following statements are correct?
- I. Aditya is on Kareena's right.
 - II. Leena is on Tom's left.
 - III. Farid is between Neetu and Geeta.
- (a) I only
 - (b) II only
 - (c) III only
 - (d) I and II only
 - (e) I, II, and III

Understanding the Problem

We must try to determine the seating arrangement. We draw a circle divided into eight places. Following condition (4), we put Aditya in the first place, with Neetu on his right. (*as shown in Fig. 1*)

Condition (5) tells us that Farid and Tom are opposite each other, but condition (6) ensures that they cannot be in places 2 and 6. Thus, they must be in places 3 and 7. Condition (2) leads us to put Harish on 5, with Leena either in 4 or 6. Two possibilities are *as shown in Fig. 2 and 3*. However, conditions (1) and (3) rule out possibility B, and lead to the final seating arrangement *as shown in Fig. 4*. Now, on the basis of this final diagram, we will be able to answer the questions.

17. Three of the men are to be chosen for a committee in which they must all be mutually friendly. How many different ways are there in choosing the three?
 (a) 2 (b) 3 (c) 4 (d) 6
 (e) 8
18. For any three of these six men chosen at random, which statement would be TRUE?
 (a) It is more likely that they do not get along than they do.
 (b) It is equally likely that they do not get along than they do.
 (c) It is less likely that they do not get along than they do.
 (d) One cannot decide the chances that they do get along, but if they do not get along, then the three remaining men do get along.
 (e) One cannot decide the chances that they do get along, but if they do get along, then do the three remaining men do not get along.

Understanding the Problem

Let us represent the men by small circles, and their relationships by the lines connecting the small circles. For example, one man is friendly with four of the other, but not with remaining man, the relationship can be depicted by the Fig 1 shown here. In this case, the outsider is 6. The outsider's friends are 2, 3, 4, and 5. His "enemy" is 1.

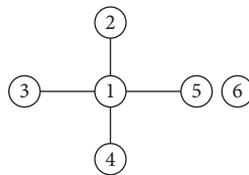


Fig 1

Let us consider the octahedron (8 sides) as shown in figure below. Each of the six men reside at the vertices of the octahedron. Men opposite one another avoid one another. The octahedron correctly represents the pattern of the relationships in the social club.

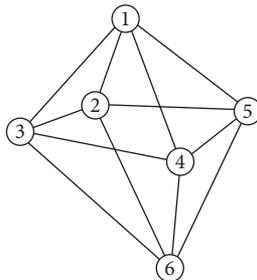


Fig 2

16. (E) is the correct answer. Any group of four men must contain two small circles diametrically opposite. Hence, statement I is true. Now for statement II. Three mutual friends always form a triangle which is a face of the octahedron. The remaining three men reside on the opposite face. Accordingly, they are friends. Hence, statement II, is

also true. Now for statement III. Any group of five has at least two opposite pairs of small circles. Therefore, Statement III is also true.

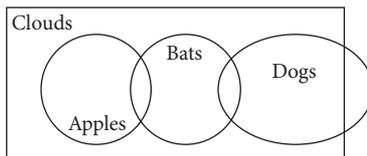
17. (D) is the right answer. The question virtually asks for the number of faces of the octahedron. By definition, a regular octahedron is an 8-sided figure, all of whose faces are equilateral triangles.
18. (A) is the right choice. One might count ‘*can’t-get-along*’ committees as follows: For each pair of “enemies” (for example, 1 and 6), there are four men whom one could add to fill out the committee of three. Since there are three such pairs, 12 can’t-get-along committees may be formed. But, as explained above only eight good committees are possible. So, it is more likely that three randomly chosen men do not get along.

Passage 6

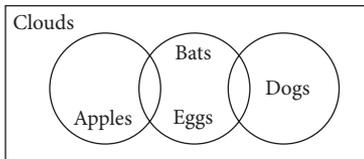
- (1) All Apples are Clouds
 (2) Some Apples are Bats
 (3) All Bats are Clouds
 (4) Some Bats are Dogs
 (5) Some Dogs are Clouds
 (6) No Dogs are Apples
19. Which of the following CANNOT be inferred from the statement above?
- (a) Some Bats are Apples or Dogs.
 (b) Some Dogs are Bats as well as Clouds.
 (c) All Apples and Bats and Dogs are Clouds.
 (d) Some Dogs are neither Apples nor Bats nor Clouds.
 (e) All Apples and Bats are Clouds.
20. Which of the following would be needed to prove that “No Eggs are Dogs”?
- I. Some Eggs are Apples.
 II. All Eggs are bats.
 III. No Egg is both a Bat and a Dog.
- (a) I only
 (b) II only
 (c) III only
 (d) II and III
 (e) I and II
21. If all Dogs are Frogs, which of the following MUST be true?
- (a) Some Apples are not Frogs
 (b) Some Bats are not Frogs
 (c) If an Apple is a Frog, then it is a Bat
 (d) All Clouds are Frogs
 (e) If a Bat is a Frog, then it is a Dog

Understanding the Problem

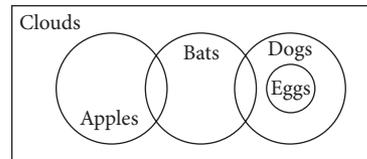
To start, we must make a diagram which illustrates Statement I through 6 (as shown in Fig 1):



19. (c) is the right choice. It is clear from Fig 1. Since part of 'Dogs' circle is outside of the 'Clouds' box, all 'Dogs' are not 'Clouds'. Accordingly, Choice (c) cannot be inferred from the given six statements.
20. (d) is the right choice. Here, we wish to find out how much we need to know about 'Egg' to prove that no 'Eggs' are 'Dogs'. Thus, we amend the basic diagram (Fig. 1) in ways corresponding to the five choices. We use the information given in the statement I, II and III, but try to see whether that information could be consistent with an Egg being a Dog.

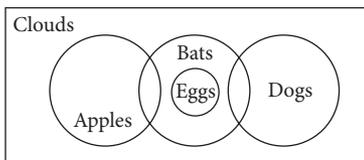


Changed Fig. as per choice (A and also E)

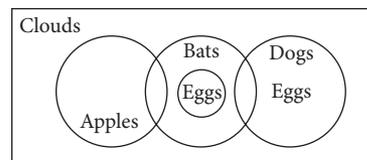


Changed Fig. as per choice (B)

Since, every choice but (d) permits an Egg to be a Dog, choice (d) is the correct answer.

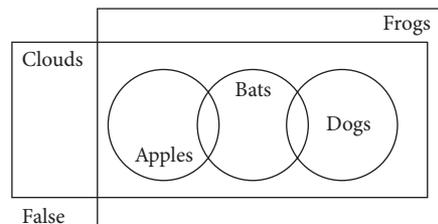
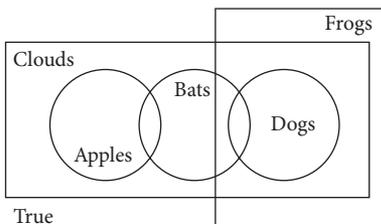


Changed Fig. as per choice (C)



Changed Fig. as per choice (D)

21. (b) is the correct answer. As we can see by modifying the initial diagram, choice (a), (c), (d) and (e) can be true or false, depending on the size of 'Frogs'. For example, with choice (a):



Only Choice (b) is true no matter what the size of 'Frogs' – even if Frog is exactly the same size as 'Dogs'.

Passage 7

A 5-member research group is to be chosen from Physics Deptt. of the Punjab University, Chandigarh. A, B, C, and D are Nuclear Physics Researchers and E, F, G and H are Astrophysics researchers. At least three Nuclear Physics researchers must be in the research group. However,

A refuses to work with D.
 B refuses to work with E.
 F refuses to work with G.
 D refuses to work with F.

22. If B is chosen, who else would have to be in the group?
 (a) F (b) G (c) A (d) C
 (e) D
23. If G is rejected, which other member could not work with the group?
 (a) A (b) B (c) C (d) F
 (e) D
24. If B and C are chosen, which is necessarily true?
 I. A is chosen
 II. D is chosen
 III. Either F or G is chosen
 (a) I only (b) II only (c) III only (d) II and III only
 (e) neither I, II or III.
25. If H is chosen, which must be TRUE?
 I. A must be chosen
 II. B must be chosen
 III. G must be chosen
 (a) I only (b) II only (c) III only (d) I and III only
 (e) neither I, II or III

Understanding the Problem

The Nuclear Physics researchers from A, B, C and D must be chosen. The only combinations are:

A B C A C D A B D B C D A B C D

Since A refuses to work with D, combination ACD, ABD, and ABCD are ruled out. Thus only combinations with nuclear Physics researchers are:

A B C or B C D

Since B refuses to work with E, and F refuses to work with G, the nuclear-physics researchers A B C could only work with F and H or G and H. Thus, possible combinations of the 5-member research group are:

A B C F G or A B C G H

Since B refuses to work with E, D refuses to work with F, the nuclear Physics researchers B C D could only work with G and H. Thus a possible combination of the group is:

B C D G H

The only possible combinations are therefore:

A B C F H A B C G H B C D G H

22. (D) is the correct answer. It can be seen from the three combinations that C appears in every possible group.

23. (E) is the right answer. It can be seen from the three combinations that if G is rejected, the group must be

A B C F H

Thus, D is not in the group.

24. (C) is the right choice. From the set of possible combinations, it can be seen that only statement III is not necessarily true.

25. (B) is the right choice. From the set of possible combinations, only statement II must be true.

Passage 8

- (1) Bhisham is shorter than Charan
- (3) Pritam is lighter than Sam
- (5) Anil is taller than Mary

- (2) Jeevan is heavier than Mary
- (4) Sam is taller than Ian

26. If Ian is taller than Anil, then

- (a) Sam is shorter than Mary
- (b) Sam is taller than Mary
- (c) Sam is shorter than Pritam
- (d) Sam is taller than Pritam
- (e) Jeevan is taller than Sam

27. If Mary and Sam weigh exactly the same, then which of the following could NOT be possible weights of the persons?

- (a) Jeevan – 65 kgs, Mary – 62.5 kgs
- (b) Sam – 65 kgs, Anil – 60 kgs
- (c) Pritam – 65 kgs, Jeevan – 62.5 kgs
- (d) Charan – 65 kgs, Bhisham – 65 kgs
- (e) Ian – 65 kgs, Bhisham – 65 kgs

28. Which of the following would ensure that Bhisham is exactly the same height as Sam?

- (a) Mary is exactly the same height as Charan
- (b) Ian is exactly the same height as Anil, and Mary is exactly the same height as Charan
- (c) Ian, Anil, Charan and Mary are nearly the same heights
- (d) Mary is 5 feet 4 inches, Charan is 5 feet 4 inches, and Ian is 5 feet 4 inches
- (e) None of the above

29. Which can we conclude as TRUE?

- (a) Mary is either shorter or lighter than at least three people in the group
- (b) Sam is both taller and heavier than at least one person in the group
- (c) If an additional person, Harish, is taller than Anil and shorter than Bhisham, then Charan is taller than Mary
- (d) If an additional person, Zeba is taller than Ian, then she is also taller than Sam
- (e) None of the above



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