**Introduction to the Topic**

**The Data Sufficiency questions are challenging for everyone because they are unique in nature. Basic knowledge of Number Systems, Arithmetic, Algebra, Geometry, Reasoning and Mental Ability is a prerequisite to solve questions of Data Sufficiency. This chapter focuses on strategies specific to Data Sufficiency, and will at times assume familiarity with the core concepts of mathematics.**

**The Data Sufficiency questions take relatively less time as compared to problem solving questions as in many questions we do not have to actually solve the questions completely. With practice one can find them easy and less time consuming.**

Relevance in CAT

The questions on Data Sufficiency are not commonly asked in the CAT exam now, but till the year 2011, data sufficiency questions were asked in the CAT exam frequently. Since the exam has gone online the Data Sufficiency questions have not been asked in the examination.

Format of Data Sufficiency Questions

Each problem contains a question and two statements, (I) and (II), giving certain data. You have to decide whether the data given in the statements is sufficient to answer the question or not. Using the data given in the statement coupled with your knowledge of quantitative aptitude and reasoning, you have to select the correct answer from (a) to (d) depending on the sufficiency of the data given in the statements to answer the question. Mark your answer as:

a. If the question can be answered by using one of the statement alone but cannot be answered by using the other statement alone.

b. If the question can be answered by using either of the statement (I) or (II) alone.

c. If the question can be answered by using both the statements together but not by either statement alone.

d. If the question cannot be answered even by using both the statements together.

The Four answer choices in detail

**■ Option (a):** In any question the answer choice is (a),

if statement (I) alone is sufficient to answer the question asked, but statement (II) alone is not sufficient to answer the question asked

OR

Statement (II) alone is sufficient to answer the question asked, but statement (I) alone is not sufficient to answer the question asked.

**Example 1:** What is the value of *X* + *Y*?

I. *X*2 = 16

II. *X* = 2, *Y* = 5

**Using statement (I) alone:**

We cannot find the value of *X* + *Y*, as both *X* and *Y* are not given in the same statement. So, statement (I) alone is not sufficient to answer the question.

**Using statement (II) alone:**

We can find the value of *X* + *Y*, as both *X* and *Y* are given.

So, *X* + *Y* = 2 + 5 = 7.

So, statement (II) alone is sufficient to answer the question.

Since, statement (II) alone is sufficient but statement (I) alone is not sufficient hence the correct answer choice is (a).

**Example 2:** Is *x* = *y*?  **[CAT 2002]**

I. (*x* + *y*) = 4

II. (*x* – 50)2 = (*y* – 50)2

**Using statement (I) alone:**











By solving we find that *K* = 1

So, 

or *x* = *y*

So statement (I) alone is sufficient to answer the question.

**Using statement (II) alone:**

(*x* − 50)2 = (*y* − 50)2

*x*2 + 502 − 100*x* = *y*2 + 502 − 100*y*

*x*2 − *y*2 = 100*x* −100*y*

(*x* + *y*)(*x* − *y*) = 100 (*x* − *y*)

*x* + *y* = 100

So, *x* may or may not be equal to *y*.

Since statement (I) alone is sufficient but statement (II) alone is not sufficient. So, the correct answer is (a)

**■ Option (b):** In any question the answer choice is (b),

If either of the statement (I) or (II) independently is sufficient to answer the question asked.

**Example 3:** What is the area of the square?

I. The side of the square is 10 cm.

II. The diagonal of the square is 20√2.

**Using statement (I) alone:**

Area of the square = (side)2 . So, Area = (10)2=100

So, Statement (I) alone is sufficient to answer the question.

**Using statement (II) alone:**

Diagonal =  (side), So, Side = 20 & Area = (20)2= 400. So, Statement (II) alone is sufficient to answer the question.

Since each statement is by itself sufficient to answer the question, so the correct answer choice is (b).

**Example 4:** Thirty percent of the employees of a call centre are males. Ten percent of the female employees have an engineering background. What is the percentage of male employees with engineering background?

I. Twenty five percent of the employees have engineering background.

II. Number of male employees having an engineering background is 20% more than the number of female employees having an engineering background.

**Using statement (I) alone:**

Let total employees = 100

So, Male = 30 & Female = 70

Number of Females with engineering background

= 10% of 70 = 7

Total employees with engineering background = 25

So, number of Males with engineering background

= 25 − 7 = 18

Now the percentage of Male employees having engineering background = 

**Using statement (II) alone:**

The number of Males with engineering background can easily be calculated as well as their percentage.

Since either of the two statements is sufficient to answer the question, so the correct answer choice is (b).

**■ Option (c):** In any question the answer choice is (c), if each statement alone is not sufficient to answer the question but the two statements taken together are sufficient to answer the question.

**Example 5:** What is the value of *X*2 + *Y*2?

I. *X* = 2

II. *Y* = 7

**Using statement (I) alone:**

‘*X*’ is given as 2, but the value of ‘*Y*’ is not given. Hence we cannot find the value of *X*2 + *Y*2. So, Statement (I) alone is not sufficient to answer the question.

**Using statement (II) alone:**

‘*Y*’ is given as 7, but the value of ‘*X*’ is not given. Hence we cannot find the value of *X*2 + *Y*2. So, Statement (II) alone is sufficient to answer the question.

**Combining statement (I) & (II):**

‘*X*’ = 2 and ‘*Y*’ = 7, So the value of *X*2 + *Y*2= 22 + 72= 4 + 49 = 53. So, by combining statements (I) & (II), we can find the unique value of *X*2 + *Y*2.

Since, each statement alone is not sufficient to answer the question but the two statements taken together are sufficient to answer the question. So, the answer is (c).

**Example 6:** The average weight of a class of 100 students is 45 kg. The class consists of two sections, I and II, each with 50 students. The average weight, WI, of Section I is smaller than the average weight WII, of the Section II. If the heaviest student say Deepak, of section II is moved to Section I, and the lightest student, say Poonam, of Section I is moved to Section II, then the average weights of the two sections are switched, *i.e*., the average weight of Section I becomes WII and that of Section II becomes WI. What is the weight of Poonam?

**[CAT 2007]**

I. WII – WI = 1.0

II. Moving Deepak from Section II to I (without any move I to II) makes the average weights of the two sections equal.

**Using statement (I) alone:**

50 *W*I + 50 *W*II = 4500

and *W*II − *W*I = 1

Solving we get,

*W*I = 44.5 and *W*II = 45.5

Now, changing changing Deepak and Poonam

(50 × 44.5) − Poonam + Deepak = (50 × 45.5) ..... (1)

and (50 × 45.5) − Deepak + Poonam = (50 × 44.5) ..... (2)

So, statement (I) alone is not sufficient to answer the question.

We can only deduce Deepak − Poonam = 50

**Using statement (II) alone:**

50 *W*I + 50 *W*II = 45

If we move Deepak from Section II to I then the average weight of the sections become equal.



⇒ 49(50 *W*I + Deepak) = 51(50 *W*II − Deepak)

⇒ 2550 *W*II − 2450 *W*I = 100 Deepak

Nothing can be said about the weight of Deepak and Poonam.

**Combining statement (I) & (II):**

By combining the two statements and using:

*W*I = 44.5 and *W*II = 45.5 &

Deepak − Poonam = 50 &

2550 *W*II − 2450 *W*I = 100 Deepak

We find the values of weights of Deepak = 70 kg and Poonam = 20 kg

**■ Option (d):** In any question the answer choice is (d), if even the two statements taken together are not sufficient to answer the question

**Example 7:** What is the value of *X*2 + *Y*2 + *Z*2?

I. *X* = 3

II. *Y* = 2

**Using statement (I) alone:**

*X* = 3, but to find the value of *X*2 + *Y*2 + *Z*2, we also need the values of *Y* and *Z*. So, Statement (I) alone is not sufficient to answer the question.

**Using statement (II) alone:**

*Y* = 2, but to find the value of *X*2 + *Y*2 + *Z2*, we also need the values of *X* and *Z*. So, Statement (II) alone is not sufficient to answer the question.

**Combining statement (I) & (II):**

*X* = 3 & *Y* = 2, but still we cannot find the value of *X*2 + *Y*2 + *Z*2, as we also need the value of *Z* to find the answer. So, even by combining statements (I) & (II), we cannot find the answer.

Since, even the two statements taken together are not sufficient to answer the question, so the answer is (d).

**Example 8:** What are the ages of two individuals *X* and *Y*?

I. The age difference between them is 6 years.

II. The product of their ages is divisible by 6.

**[CAT 2000]**

**Using statement (I) alone:**

The value of *X* and *Y* cannot be uniquely determined as only the difference is given. They can be (10, 16), (11, 17), (12, 18), ....etc.

**Using statement (II) alone:**

Again the values of *X* and *Y* cannot be uniquely determined as they can be (6, 3), (6, 4), (6, 5), .... etc.

**Combining statement (I) & (II):**

Even after combining the two statements the ages of *X* and *Y* cannot be uniquely determined as multiple cases are possible as (12, 18), (18, 24), .... etc.

Since even the two statements taken together are not sufficient to answer the questions, so the correct answer choice is (d).

Approach to solve Data Sufficiency Questions

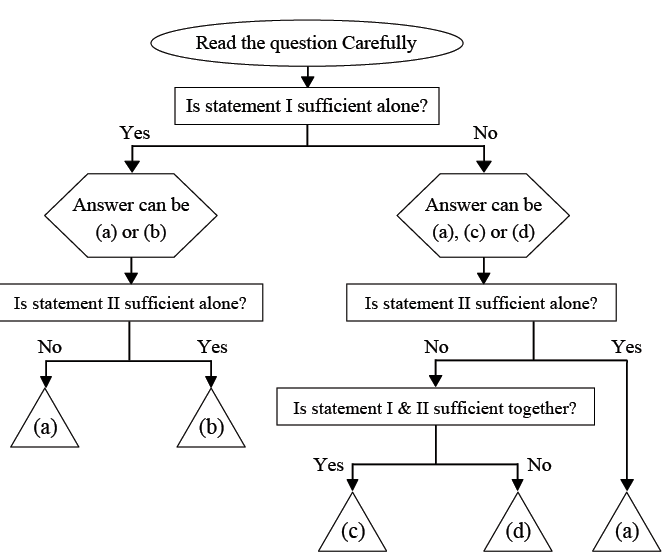
The best way to tackle a data sufficiency question is to answer the following questions:

I. Is the FIRST statement alone sufficient to answer the question asked?

II. Is the SECOND statement alone sufficient to answer the question asked?

III. Are BOTH the statements taken together sufficient to answer the question asked?

Answer to these questions should be given in ‘YES’ or ‘NO’ in order I, II, III. In many cases, you will not have to answer all three to get the correct choice. This approach can be summarized in the form of a flow chart as shown below:



**Elimination Techniques in Data Sufficiency**

Data Sufficiency questions provide fertile ground for elimination. In fact, it is rare that you won’t be able to eliminate some of the answer choices. Remember if you can eliminate at least one answer choice, the odds of gaining points by guessing are in your favor. The following table summarizes how elimination functions with data sufficiency problems.

|  |  |
| --- | --- |
|  | **Choices eliminated** |
| Statement I is sufficient alone | C, D |
| Statement I is not sufficient alone | B |
| Statement II is sufficient alone | C, D |
| Statement II is not sufficient alone | B |
| Either of the statement I and II is not sufficient alone | A, B |

Some Important Points

Data Sufficiency questions have many tricks & traps. In fact Data Sufficiency questions are designed to tempt the students to make wrong and invalid assumption. Here are some important points with solved examples on how to tackle the traps.

**■ Unique Answer**

The data statements should be able to provide a unique answer to the question asked as only then the answer will be considered as valid. Also the unique answer does not mean that we cannot have two different answers form the two statements separately. Lets look at the following examples to get more clarity on this trap.

**Example 9:** What is the value of ‘*X*’?

I. *X*2 = 36

II. 2*X*− 5 = 21

**Using statement (I) alone:**

Here *X*2 = 36, So the value of *X* can be +6 or – 6. Here, we are not geting a unique value of *X*. So, Statement (I) alone is not sufficient to answer the question.

**Using statement (I) alone:**

2*X* − 5 = 21

or *X* = 13

Since statement (II) alone is giving us a unique value of *X* and hence it is sufficient to answer the question.

So, the answer is (a).

**Example 10:** What is the value of ‘k’?

I. 3*K* – 2 = 19

II. 4*K* – 5 = 31

**Using statement (I) alone:**

3*K* – 2 = 19 or 3*K* = 21. Hence *K* = 3, which is a unique value. Statement (I) alone is sufficient to answer the question.

**Using statement (II) alone:**

4*K* – 5 = 31 or 4*K* = 36. Hence *K* = 9; which is again a unique value. Statement (II) alone is sufficient to answer the question.

Since each statement is by itself sufficient to answer the question, so the correct answer choice is (b).

**Note:** The two answers are different does not mean that it is not a valid answer.

**■ ‘NO’ & ‘YES’ as answers**

For “YES/NO” questions, a statement that gives either a firm YES or a firm NO is sufficient to answer the question asked. So, we can say that NO is as acceptable as YES. If you can answer the question stem as ‘NO’, you have sufficient data to answer the problem. Let’s look at the examples below to get more insight into this trap.

**Example 11:** Is ‘*K*’ a prime number?

I. *K* = 27

II. *K* = 13

**Using statement (I) alone:**

The answer to the question asked is NO, as 27 is not a prime number. So, statement (I) alone is sufficient to answer the question.

**Using statement (II) alone:**

The answer to the question asked is YES, as 13 is a prime number. So, statement (II) alone is sufficient to answer the question.

Since each statement is by itself sufficient to answer the question, so the correct answer choice is (b).

**Example 12:** Is ‘*A*’ an even number?

I. *A* + *B* is odd.

II. *B* is even.

**Using statement (I) alone:**

‘*A*’ can be even or odd, as the sum of two numbers is odd, when one is even and the other is odd, and here ‘*A*’ can be any of the two numbers. So, Statement (I) alone is not sufficient to answer the question.

**Using statement (II) alone:**

Nothing is said about ‘*A*’, so we cannot say that weather ‘*A*’ is an even number or not. So, statement (II) alone is not sufficient to answer the question.

**Combining statement (I) & (II):**

‘*B*’ is even, and ‘*A* + *B*’ is odd, then ‘*A*’ must be odd. So, the answer to the question is NO, ‘*A*’ is not even. As you can answer the question, even if the answer is negative, you have enough data to answer the question. So by combining statements (I) & (II), we can find the answer, hence the answer is (c).

**■ Redundant Facts**

A statement that merely states a already known formula or theorem is not sufficient to answer the question.

**Example 13:** What is the value of the largest angle of the triangle *PQR*?

I. *P* = 90°

II. ∠*P* + ∠*Q* + ∠*R* = 180°

**Using statement (I) alone:**

Here *P* has to be the largest angle, as the sum of other two angles is 90° & each one would definitely be smaller than *P*. So, Statement (I) alone is sufficient to answer the question.

**Using statement (II) alone:**

Sum of the three angles is given as 180°, an already known result in plane geometry. The data given in this statement is not required at all to find the answer. So, Statement (II) alone is not sufficient to answer the question.

Since, statement (I) alone is sufficient, but statement (II) alone is not. So the correct answer is (a).

**■ Repeated Information**

A statement which repeats the information that is already given in the question is not sufficient to answer the question.

**Example 14:** *a*, *b* & *c* are three natural numbers such that *a* is even. Is *a* + *b* + *c* odd?

I. *abc* is even.

II. *b* + *c* is even.

**Using statement (I) alone:**

‘*abc*’ is even which is implied from the question as ‘*a*’ is even. So, the data from this statement is nowhere required as we already know the same from the data given in the question. So, Statement (I) alone is not sufficient to answer the question.

**Using statement (II) alone:**

*b* + *c* is even, so *a* + *b* + *c* is also even as ‘*a*’ is also given as an even number. Hence the answer of the question is ‘No’. So, Statement (II) alone is sufficient to answer the question.

Since, statement (I) alone is not sufficient, but statement (II) alone is sufficient. So the correct answer is (a).

Key Points To Remember

1. Treat each of the statement I and II separately; do not transfer information from one statement to the other.

**2.** Avoid careless assumptions. **Do not assume anything that is not explicitly provided in the question stem or the statements that follow.** For instance, do not assume that x and y are integers unless it is explicitly given or can be deduced from the question. Unless instructed otherwise, assume that fractions, negatives, and zero are all included in the set of potential values.

3. Make a quick judgment on which statement is easier to assess and start with that one. **The order in which statements are analyzed does not matter.** By starting with the easier statement, you simplify the decision tree and leverage easier information first.

4. As soon as you know the data is sufficient to answer the question, stop there only and do not solve the problem right through till the end you should not care what the final answer is. In data sufficiency problems you need only a simple yes or no; to say whether the given data is sufficient or not. You do not have to actually solve the problem completely.

Practice Exercise – Easy

**Directions for questions 1 to 50:** *Each question is followed by two statements, I and II. Answer the questions based on the statements.*

**Mark the answer as:**

**Choose (a)** if the question can be answered with the help of anyone statement alone but not by the other statement.

**Choose (b)** if the question can be answered with the help of either of the statements taken individually.

**Choose (c)** if the question can be answered with the help of both statements together.

**Choose (d)** if the question cannot be answered even with the help of both statements together.

1. There are two identical cubical boxes P and Q which contain 16 and 25 balls respectively. The balls are made of the same material. Which box is heavier?

I. The balls are of different sizes.

II. The boxes are not made of same material.

2. What is the value of P (a two digit positive integer)?

I. Four times P is 48 less than the square of the smallest two digit number.

II. P is a prime number whose square lies between 150 and 250.

3. Find out the month?

I. The month does not have 31 days.

II. The year is AD 2026.

4. How many hours will it take for all boys and girls together to put up a tent?

I. There are 5 girls and 8 boys.

II. All the girls working together can do so in 6 hours.

5. A is older than B, C is younger than D and E is as old as B. Is C younger than A?

I. D may not be older than E.

II. D is not older than E.

6. Five people A, B, C, D and E are standing in a row. Who is standing at the middle position?

I. B and C are standing at the extreme positions.

II. There is exactly one person standing between A and E.

7. Q is as much older than P as he is younger than R. Find the age of R?

I. The sum of the ages of P, Q and R is 72 years.

II. Q’s age is equal to the average of P and R’s age.

8. PQRS is a cyclic quadrilateral. Is PQRS a rectangle?

I. PQ is parallel to RS.

II. ∠P + ∠R = 180°

9. Calculate the percentage change in the perimeter of a rectangle, if the length and the breadth of the rectangle are increased by 10% and 30% respectively?

I. The perimeter of the rectangle is 60 cm.

II. The sum of 20% of the length and 60% of the breadth of the rectangle is 7.8 cm.

10. What is the height of a right-angled triangle?

I. The area of the right-angled triangle is equal to the area of a rectangle whose length is 16 cm.

II. The breadth of the rectangle is 20 cm.

11. A ladder is leaning against a wall at a height of 9 m at 8:00 a.m. and it started slipping. What is the distance between the point at which the ladder is contacting the wall and point at which the ladder is contacting the floor at 8:30 a.m.?

I. The length of the ladder is 15 m.

II. The rate at which the top of the ladder is slipping is 2 cm per minute.

12. A circle circumscribes a square. What is the area of the square?

I. Radius of the circle is given.

II. Length of the tangent from a point 5 cm away from the centre of the circle is given.

13. A square is inscribed in a circle. What is the difference between the area of the circle and that of the square?

I. The diameter of the circle is 25√2 cm.

II. The side of the square is 25 cm.

14. There are two concentric circles C1 and C2 with radii r1 and r2. The circles are such that C1 fully encloses C2. Then what is the radius of C1?

I. The difference of their circumference is k cm.

II. The difference of their areas is m sq. cm.

15. F and M are father and mother of S respectively. S has four uncles and three aunts. F has two siblings. The siblings of F and M are unmarried. How many brothers does M have?

I. F has two brothers.

II. M has five siblings.

16. What is the present age of the son?

I. Father’s age is 37 years more than the mother’s age. Father got married at the age of 28 years.

II. Present age of the father is 48 years. Four years back the ratio of son’s age to father’s age was 3 : 11.

17. The age of a father is three times the age of his son five years back. What is the age of the father?

I. Eight years ago, the son was 14 years old.

II. Eight years ago, the father was more than 45 years old.

18. What is the value of the positive integer n?

I. The product of the numbers a, and b, which are respectively three less and two less than n, is 0.

II. n! + (n − 1)! = 2

19. The value of x is?

I. x(x + 1)(x + 2) is divisible by 6.

II. The average of 7 consecutive numbers starting from x is 18.

20. P, Q and R are integers. Is Q an even number?

I. (P + Q) is an odd number.

II. (Q + R) is an odd number.

21. Is  an integer?

I.  is an integer.

II.  is an integer.

22. Is mn an even number?

I. m is divisible by 3.

II. (n + 1) is divisible by 4.

23. Is a or b negative?

I. ab2 is positive.

II. ab is negative.

24. Is n odd?

I. n is divisible by 3, 5, 7 and 9.

II. 0 < n < 400

25. A, B and C are the three digits of a number ABC. ABC is a multiple of 4. Find (A + B + C)?

I. A = 3, B = 4.

II. C is an even number.

26. If p and q are integers, is p divisible by 11?

I. pq is divisible by 110.

II. q is divisible by 2.

27. Hemant bought 40 pens of two different types for Rs. 1000 in total. He sold the costlier pens at no profit no loss, but made a profit with the less expensive pens. What is the total percentage profit made by him?

I. Half the pens cost Rs. 20 each and half the pens cost Rs. 30 each.

II. The profit on the cheaper pens is 7.5 percent.

28. Rohit and Mohit went to restaurant for lunch. They had a total of Rs. 2000 available with them that they could spend on dinner. How much did they spend on dinner?

I. They have to pay 18.25% on tax and tip.

II. Rohit ordered food worth Rs. 780, without tax and tip.

29. Two friends, Ram and Gopal, bought apples from a wholesale dealer. How many apples did they buy?

I. Ram bought one-half the number of apples that Gopal bought.

II. The wholesale dealer had a stock of 500 apples.

30. The average weight of students in a class is 50 kg. What is the number of students in the class?

I. The heaviest and the lightest members of the class weigh 60 kg and 40 kg respectively.

II. Exclusion of the heaviest and the lightest members from the class does not change the average weight of the students.

31. What is the selling price of the mixture, if the ratio of the two qualities of sugar mixed is 3 : 4?

I. Cost price of the first quality of sugar is Rs. 25/kg.

II. Cost price of the second quality of sugar is Rs. 32.5/kg.

32. The length of train A and B are 4000m and 3500 respectively. What is the speed of the train B?

I. Train B crosses train A which is traveling at 60km/hr in 22 seconds.

II. The two trains are moving in opposite direction.

33. Train P leaves from town A to town B and travels at a constant rate of speed. At the same time train Q leaves from B to A and also travels at a constant rate of speed. Town T is between A and B. If Towns A, T and B lie on a straight line than which train is travelling faster?

I. Train Q arrives at town T before train P.

II. T is closer to A than B.

34. People in a club either speak French or Russian or both. Find the number of people in a club who speak only French.

I. There are 300 people in the club and the number of people who speak both French and Russian is 196.

II. The number of people who speak only Russian is 58.

35. In a computer course a college students have a choice of either studying C Sharp or .NET, but they are allowed to take both for extra credits. What is the fraction of students taking both?

I. th of the students studied C Sharp.

II. th of the students studied .NET.

36. What percentage of households in a city have monthly income of Rs. 25000 and own a car?

I. 28% of all the households in the city have a monthly income of over Rs. 25000 p.m.

II. 40% of all the households in the city with the monthly income of Rs. 25000 own a car.

37. What is the price of bananas?

I. With Rs. 84, I can buy 14 bananas and 35 apples.

II. If price of bananas if reduced by 50% then we can buy 48 bananas in Rs. 24.

38. A dress was initially listed at a price that would have given the store a profit of 20% of the whole sale cost. What was the wholesale cost of the dress?

I. After reducing the listed price by 10%, the dress sold for a net profit of $10.

II. The dress is sold for $50.

39. Nakul and Tushar are rivals in the muffins-eating competition. Who finished eating 24 muffins first, if both started simultaneously.

I. Tushar eats 2 muffins, then stops for breath for 13’s; again eats 2 muffins, and so on.

II. Nakul finishes eating 24 muffins in 9.5 minutes.

40. Three teams of carpenters took part in a competition (to cut the maximum quantity of wood). Which team could win the competition?

I. The first and second teams cut twice as much as the third team cut.

II. The second and the third teams cut three times as much as the first team cut.

41. Did Rakhi receive more than 40% of the 40,000 votes cast in an election?

I. Sushma received 50% of the votes.

II. Rakhi received exactly 12,000 votes.

42. Each student in a class of 40 students voted for exactly one of the 3 candidates Ajay, Mona or Charu for the post of the class representative. Did Ajay receive the most votes from the 40 votes cast?

I. Ajay received 15 of the votes.

II. Charu received 13 of the votes.

43. What is the first term of an arithmetic progression of positive integers?

I. Sum of the squares of the first and second term is 116.

II. The fifth term is divisible by 7.

44. The distance from Poonam’s school to her house is 45 miles. On Tuesday, Poonam went to school for a while but due to some health issues she returned home early. What was the total time spent in travelling?

I. She travelled at uniform rate of 40 miles per hour.

II. If she travelled 50 miles per hour faster than she actually did, it would have taken her half the time.

45. Find the number of boxes produced by a machine in 1 hour if the machine has been set at high speed?

I. The machine produces 40 boxes per hour when it is set on low speed.

II. The machine doubles its production as the gear is moved to a higher speed.

46. What is the units digit in the product (548)64 × (789)x?

I. x is a multiple of 3 less than 10.

II. x is odd.

47. What time does the clock show?

I. The angle between the hours hand and the minutes hand is 80°.

II. The time is between 3 O’clock and 4 O’clock.

48. What are the values of m and n?

I. n is an even integer, m is an odd integer, and m is greater than n.

II. Product of m and n is 30.

49. How many people are watching TV programme P?

I. Number of people watching TV programme Q is 1,000 and number of people watching both the programmes P and Q, is 100.

II. Number of people watching either P or Q or both is 1,500.

50. Find the value of ?

I. b = 2

II. c = 1

Practice Exercise – Medium

**Direction for question 1 to 50:** *Each question is followed by two statements, I and II. Answer the questions based on the statements.*

**Mark the answer as:**

**Choose (a)** if the question can be answered with the help of anyone statement alone but not by the other statement.

**Choose (b)** if the question can be answered with the help of either of the statements taken individually.

**Choose (c)** if the question can be answered with the help of both statements together.

**Choose (d)** if the question cannot be answered even with the help of both statements together.

1. If a ≠ b, then what is the value of a?

I.  = 7

II.  = 1

2. Is x = y?

I. (x + y) = 4

II. (x – 50)2 = (y – 50)2

3. If a, b and c are positive integers, is a × b × c odd?

I.  is even.

II. b × c is odd.

4. a3 + b3 + c3 = 135. Find abc.

I. (a2 × b2 × c2) = 2025

II. (a + b + c) = 0

5. Is the product of the natural numbers a, b, c and d divisible by 24?

I. 3 of the numbers out of a, b, c and d are 31, 32, 33.

II. a, b, c and d are consecutive numbers.

6. Is K2 an integer?

I. K is a negative whole number.

II. 4K2 is an integer.

7. n is an integer. Is n is divisible by 127?

I. n is divisible by 6.

II. n is divisible by 7.

8. Find the value of R.

I. The sum of 2 three-digit numbers PQR and QPR is 770.

II. R is the ten’s digit of the number (ab5)2, where ab5 is any three-digit number

9. For any two real numbers:

a ⊕ b = 1 if both a and b are positive or both a and b are negative.

a ⊕ b = –1 if one of the two numbers a and b is positive and the other negative. (a ⊕ b may not be equal to b a)

What is (2 ⊕ 0) ⊕ (– 5 ⊕ – 6)?

I. a ⊕ b is zero if a is zero.

II. a ⊕ b = b ⊕ a.

10. If p, q and r are even integers and 2 < p < q < r, then what is the value of q?

I. r < 10

II. p < 16

11. Are the integers a, b and c consecutive?

I. The average of a, b and c is b.

II. (b − a) = (c − b)

12. What is the value of a two digit number?

I. The difference between the digit is 9.

II. The sum of the two digit is 9 and one of the digits is also 9.

13. Is |x – 2| < 1?

I. |x| < 1

II. |x – 1| < 2

14. Let X be a real number. Is the modulus of X necessarily less than 3?

I. X(X + 3) < 0

II. X(X – 3) > 0

15. Are the lines l1 and l2 parallel?

I. For every point on line l1 there is a point on line l2 such that there is a one-one correspondence between the two and the points are distinct.

II. The two lines lie on the same plane.

16. How far is it from town A to B. Town C is 30 km from town A.

I. It is 20 km from town B to Town C.

II. There is a railway line between town A and town B.

17. What is the perimeter of the triangle PQR? One of its side is 20√3 units.

I. QR is the hypotenuse of the right angle triangle PQR.

II. The sum of the areas of the semicircles drawn on the three sides of the triangle PQR is 100 π sq. units.

18. There are two straight lines in the x - y plane with equations:

ax + by = c

dx + ey = f

Do the two straight lines intersect?

I. a, b, c, d, e and f are distinct real numbers.

II. c and f are non-zero.

19. Zakib spends 30% of his income on his children’s education, 20% on recreation and 10% on healthcare.

The corresponding percentage for Supriyo are 40%, 25%, and 13%. Who spends more on children’s education?

I. Zakib spends more on recreation than Supriyo.

II. Supriyo spends more on healthcare than Zakib.

20. How much is the height of a triangle PQR.

I. The measure of the three sides is 45, 12 and 13 cm.

II. One of the angles is 90°.

21. Is 2000 the average score in CMAT?

I. The highest CMAT score is 2490 and the lowest score is 780.

II. Half of those who take the CMAT score above 2000 and the other half scores below 2000.

22. The expenses of a residential society are fixed and each family has to share the expenses equally. How much does each family pay, if the total expenses of the society are Rs. 25000?

I. Had there been twelve more families, each family would pay 25% less than what it pays currently.

II. Had the number of families been 10% less, each family would pay Rs. 70 more than what is pays currently.

23. Nikki plucks mangoes. She sells some of the mangoes, distributes some of them among her friends, eats some and takes the rest home. How many mangoes did she eat?

I. She distributes 8 mangoes among his friends, which comes to be 3/5th of what she has eaten and sold.

II. She eats 1/4th of the plucked mangoes, which is 12 less than what she has plucked.

24. Four students were added to a dance class. Would the teacher be able to divide her students evenly into a dance team (or teams) of 8?

I. If 12 students were added, the teacher could put everyone in teams of 8 without any leftovers.

II. The number of students in the class is currently not divisible by 8.

25. If he did not stop along the way, what speed did Bimal had on an average on his 3 hours trip?

I. He travelled a total 120 miles.

II. He travelled half the distance at 30 miles per hour and half the distance at 60 miles per hour.

26. Did the Zenith Ltd. have higher profits in the year 2000 or year 2001?

I. In year 2002, the profits were thrice the profits in year 2001.

II. In year 2000, the profits were twice the average (arithmetic mean) of the profits in years 2000, 2001 and 2002.

27. The retail price of commodity (I) is 20% more than its wholesale price. The discounted price of commodity (II) is 20% less than the retail price of commodity (II). What percentage of discounted price of (II) is the retail price of (I)?

I. The retail price of (II) is twice the retail price of (I).

II. The discounted price of (II) is 60% more than the wholesale price of I.

28. Did the ABC Corporation have higher sales in 1988 or in 1989?

I. In 1988 sales were twice the average (arithmetic mean) of the sales in 1989 and 1990.

II. In 1990, the sales were three times those in 1989.

29. Three dice D, E and F are thrown together. What is the sum of all readings of the dice?

I. Dice D shows 4 more than dice F.

II. If we multiply the reading of dice E with that of dice F, we get the reading of dice D.

30. Four friends — A, B, C and D got the top four ranks in a competitive examination, but A did not get the first, B did not get the second, C did not get the third and D did not get the fourth rank.

Who secured which rank?

I. Neither A nor D were among the first 2.

II. Neither B nor C was third or fourth.

31. There are four envelopes — E1, E2, E3 and E4 — in which one was supposed to put letters L1, L2, L3 and L4 meant for persons C1, C2, C3 and C4 respectively, but by mistake the letters got jumbled up and went in wrong envelopes. Now if C2 is allowed to open an envelope at random, then how will he identify the envelope containing the letter for him?

I. L2 has been put in E1.

II. The letter belonging to C3 has gone in the correct envelope.

32. Sumit, Nitin, Prerna, Sadhna, Kapil and Neha are sitting around a circular table. Sumit, Nitin and Kapil are males while the rest are females. Who are the neighbours of Sumit?

I. Prerna does not want any male as her neighbour and Sadhna does not want to sit along the side of Sumit.

II. Kapil does not want any female as his neighbour and wants to sit to the left of Nitin.

33. Six people – P, Q, R, S, T and U – sit around a circular table, not necessarily in the same order. Q and T sit opposite each other. Does R sit opposite S?

I. If R and T interchange their positions, then T will be to the immediate left of Q.

II. If P and Q interchange their positions, then Q will be to the immediate left of T.

34. Five students Atul, Bala, Chetan, Dev and Ernesto were the only ones who participated in a quiz contest. They were ranked based on their scores in the contest. Dev got a higher rank as compared to Ernesto, while Bala got a higher rank as compared to Chetan. Chetan’s rank was lower than the median. Who among the five got the highest rank?

I. Atul was the last rank holder.

II. Bala was not among the top two rank holders.

35. In how many ways can a group photo of Anuj and Vikas be taken with their 3 colleagues?

I. Anuj and Vikas sit together.

II. Anuj and Vikas occupy extreme positions.

36. Two cards are drawn at random without replacement from a pack of cards. What is the probability that the second card is a king?

I. The first card is a king.

II. The first card is a queen.

37. In a bag there are less than 40 marbles which are green, blue and red in colour. What is the probability of picking a red marble?

I. The probability of drawing a blue marble is .

II. The probability of drawing a green marble is .

38. How many students among A, B, C and D have passed the examination?

I. The following is a true statement: A and B passed the examination.

II. The following is a false statement: At least one among C and D has passed the examination.

39. Ravi spent less than Rs. 75 to buy one kilogram each of potato, onion, and gourd. Which one of the three vegetables bought was the costliest?

I. 2 kg potato and 1 kg gourd cost less than 1 kg potato and 2 kg gourd.

II. 1 kg potato and 2 kg onion together cost the same as 1 kg onion and 2 kg gourd.

40. Meenakshi bought a new music album for which she had to pay entertainment tax as well as sales tax. She liked it so much that she bought 10 more copies so that she could present it to her friends. If she paid Rs. 22.5 as entertainment tax, what is the percentage of sales tax per copy?

I. The album she purchased was Rs. 25 less than the best album in the shop.

II. She paid Rs. 99 for the whole transaction.

41. A carton of bottles weighs 60 pounds. A truck carrying cartons of bottles loses 40% of its contents in an accident. How many cartons were on the truck before the accident?

I. The weight of the cartons left on the truck is 2 times the weight of those that were lost.

II. The difference between the weight of those that remained on the truck and those were lost is 4,580 pounds.

42. What is the sum of the geometric series 1, 3, 9, 27, 81 for N terms?

I. Next term after the Nth term is thrice of it.

II. Nth term is 2187.

43. Patrick goes to the disco on every Tuesday and Friday but does not go to the disco on any other day. Which day of the week is today?

I. He will not go to the disco three days later and he did not go to the disco two days earlier.

II. He did not go to the disco three days earlier and he will not go to the disco four days later.

44. Will Ram and Mohan take more than 14½ days to complete the work working together?

I. If they work on alternate days with Ram starting the work, they take 28½ days to complete the work.

II. If they work on alternate days with slower person among Ram and Mohan starting the work, they take 29 days to complete the work.

45. M and P working together take 30 days to complete a piece of work. How long does M take working alone?

I. M, N and P working together take 20 days.

II. N is 2 times more efficient than P.

46. If A and B run a race, then A wins by 60 seconds. If B and C run the same race, then B wins by 30 sec. Assuming that C maintains a uniform speed what is the time taken by C to finish the race?

I. A and C run the same race and A wins by 375 metres.

II. The length of the race is 1 km.

47. Is Country X’s GDP higher than country Y’s GDP?

I. GDPs of the countries X and Y have grown over the past 5 years at compounded annual rate of 5% and 6% respectively.

II. Five years ago, GDP of country X was higher than that of country Y.

48. 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?

I. The candidates with top three scores each vote for the top score amongst the other three.

II. The candidate with the lowest score votes for the player with the second highest score.

49. How many books are there on the shelf?

I. If 5 more books are placed on the shelf, the total number of books on the shelf will be more than 29.

II. If 6 books are removed, the shelf will contain less than 20 books.

50. A class of 180 students wrote an exam in which there were two subjects – English and Maths. 60 students passed only in English and 70 students passed in Maths. How many students failed in at least one of the two subjects?

I. 100 students passed in English.

II. 30 students passed in both the subjects.

Practice Exercise – Difficult

**Direction for questions 1 to 50:** *Each item is followed by two statements, A and B. Answer each question using the following instructions.*

**Mark the answer as:**

**Choose (a)** if the question can be answered by one of the statement alone but not by the other.

**Choose (b)** if the question can be answered by using either statement alone.

**Choose (c)** if the question can be answered by using both the statements together, but cannot be answered by using either statement alone.

**Choose (d)** if the question cannot be answered by either of the statements.

1. What is the value of f(f(5))?

I. f (x) = x2 + 1 for odd x.

II. f (x) = 4x + 3 for even x.

2. Nine numbers 2, 4, 8, 3, 9, 27, 5, 25 and 125 are arranged in a 3 × 3 grid. Are 2, 3, and 5 in the same row or the same column?

I. No number should have its square or cube in the row or column in which the number itself is located.

II. No row or column should contain two perfect squares or two perfect cubes.

3. Which is costlier – a can of corn or a can of beer?

I. Canned corn are sold at 8 cans for a dollar.

II. Two cans of beer can be exchanged for 8 cans of corn.

4. How long will it take to travel from X to Y? It takes 8 hour to travel from X to Y and back to X.

I. It takes 40% more time to travel from X to Y than it takes to travel from Y to X.

II. Z is midway between X and Y and it takes 2 hours to travel from X to Z and back to X.

5. A moving train moves Y m in T seconds. Find its acceleration.

I. Y = T3 − 4T2 + 16T − 2

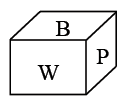
II. Velocity at the moment was 20 m/s.

6. In a hockey match, the Indian team was behind by 2 goals with 5 min remaining. Did they win the match?

I. Deepak Thakur, the Indian striker, scored 3 goals in the last 5 min of the match.

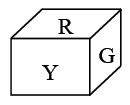
II. Korea scored a total of 3 goals in the match.

7. Each face of a cube is painted a different colour among Red, Black, White, Pink, Yellow and Green. These colour have, for the purpose of reference alone, been represented in the following figures by R, B, W, P, Y and G respectively. One of the views of the cube is given below.

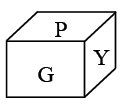


Which colour is painted on the face opposite to the face painted in Black?

I. One of the views of the cube is:



II. One of the views of the cube is:



8. In a class, 150 students took the examination of Physics and Chemistry, 90 students passed in Chemistry and 50 passed in Physics. How many students passed in both?

I. Overall 30 students failed in both the papers.

II. Physics paper was tougher than Chemistry paper.

9. If Pradeep can paint a house in 15 hours working alone, how long will it take to paint the house if Ravi helps him?

I. Ravi can paint the house in 20 hours working alone.

II. Working together with Pradeep, Ravi does  of the total work.

10. A spherical volume of radius 40 m is emptied into an inverted pyramid with a square base. What is the altitude of the pyramid?

I. The centre of the pyramid lies on the altitude of the pyramid.

II. The distance of the surface of the liquid from the square base of the pyramid is 160√3 m.

11. Mr. Sharma deposited Rs. 1,00,000 on 3rd January 2004 at a large bank, in a multi-option deposit scheme. He withdrew Rs. 10,000 on 15th February 2004, another Rs. 20,000 on 20th September 2004 and Rs. 20,000 on 10th August 2005. How much will be the interest earned by him until 31st December 2007?

I. The interest rate in his savings account is 3.5 percent and the interest rate on term deposits of more than three months duration is 4.5 percent.

II. The interest rate is compounded quarterly.

12. If a, b are natural numbers, is the value of a + b an even number?

I. L.C.M. of a and b is 12.

II. H.C.F. of b and a is 2.

13. If a, b and c are natural numbers, is ab + bc + ca even?

I. ab + bc is even.

II. bc + ca is even.

14. Is n2 + p odd, ‘n’ and ‘p’ are positive integers.

I. 2n + p is odd.

II. n – 2p is odd.

15. What is the value of a2 – 2b2 + 2ab?

I. a + b = 9

II. a2 = b2 + 9

16. Is n positive? ([n] refers to the greatest integer function.)

I. | n | + n = 0

II. [n] – | n | ≤ 2 | n |

17. A, B, C, D, E, F and G are in AP. B is negative. Is the common difference positive?

I. A + G > 0

II. ABC > 0

18. Is a2 : b2 < 1?

I. (b − a)(a + b) = 40% of 60 − 120 of 20

II. a < b

19. Is a < b?

I. 

II.  ‘p’ is odd.

20. If  < 1, then is?

I. x, y, a > 0

II. x < a < y

21. f(a, b, c, d) = Avg(a, b, c, d)

g(a, b, c, d) = Max(a, b, c)

h(a, b, c, d) = Min(c, d)

Which is the largest among a, b, c and d where these four numbers are distinct?

I. g(a, b, c, d) = h(a, b, c, d)

II. f(a, b, c, d) = g(a, b, c, d)

22. Is an > bn?

I.  > 1,  > 1, n > 0

II. a > b, n > 0

23. Is c > b? a, b and c are real numbers?

I. a2 + b2 + c2 = 0

II. a > b – c

24. Is b > c?

I.  = b + c

II. b > a

25. Is |x – 2| > 1?

I. | x | < 1

II. |x – 1| < 2

26. If |x2 – 4x| > x2 – 4x what is the value of x?

I. x is between 0 and 4.

II. x is an integer.

27. If d = √5, what is the value of r, if (r + d)3 = d3 + r3?

I. r < 0

II. r is not equal to 0.

28. Is y > 0?

I. x + y > 0

II. x – y > 0

29. Shankar wants to find log70 96.

I. He knows the value of log96 70.

II. He knows the value of log10 70.

30. “ABC” is a three-digit number in base 7, where A, B, C are distinct digits. What is the value of “B”?

I. (ACB)6 = (ABC)7

II. The difference between A and C is 4.

31. There are two numbers (61)x and (43)x, where ‘x’ is the base in which the numbers are expressed. Find the value of ‘x’.

I. The highest common factor of the two numbers is (7)10.

II. (61)x + (43)x = (124)x

32. Did Virat score a century in his 100th test match, if he played in both the innings of every match that he played?

[Note: Average runs per innings = ]

I. The average of Virat before the Test was 50. The average after the Test was lower than the one at the start of the match.

II. The average of Virat before the Test was 57.83 and the average after the Test was higher than that at the start of the match.

33. Four ants – A, B, C and D – came out of an anthill in a row in the order C, B, A and D. While going back into the anthill, no ant retained the same position in the row as that in which it came out. Which is the third ant to go in?

I. While going in, C is in a position adjacent to neither A nor D.

II. While going in, no ant is in a position adjacent to the position in which it came out.

34. Amit, Beenu, Chandu and Deepak are four batsmen who have just played a one-day cricket match and none of them scored zero run. These four batsmen are ranked from 1 to 4 as per the number of runs scored by them in this particular one-day match with the batsman having scored less runs being given a numerically lesser rank. Find the rank of Beenu.

I. The average number of runs scored by Amit and Chandu is same as the average number of runs scored by Amit, Chandu and Deepak.

II. The average number of runs scored by Beenu and Chandu is same as the average number of runs scored by Amit, Beenu and Chandu. It is also known that Beenu scored less runs than Chandu.

35. Three persons – Anuj, Dev and Vikas – are sitting in row facing North. Each of them is either a truth teller (i.e., always speaks the truth) or a liar (i.e., always lies). Further, it is known that there are exactly two truth tellers and one liar among them. Who is sitting to the immediate right of Dev?

I. Anuj says “Vikas is to my right and Dev is to my left”

II. Vikas says “I am to the left of Anuj while Dev is to my immediate right”.

36. In a survey conducted on the usage of mobile phones namely Spice, Apple and Micromax, it was found that 50 people use Micromax and 34 people use both Spice and Micromax. How many people are there who use both Spice and Apple but do not use Micromax?

I. The number of people who use both Spice and Apple but do not use Micromax is twice the number of people using both Apple and Micromax. The number of people using all the three mentioned mobile phones is 10 less than the number of people who use only Micromax.

II. Out of the number of people surveyed, the number of people using all the three mentioned mobile phones is 3.

37. What is the total number of trips to a certain construction site made by the two trucks delivering 160 metric tons of gravel?

I. The smaller truck carried 5 metric tons of gravel on each trip to the site and the larger truck carried 8 metric tons of gravel on each trip to the site.

II. Each truck delivers the same total amount of gravel to the site.

38. Among four students – P, Q, R and S, no two students got the same marks and each of them, is either a liar or a truth teller. A liar is one who always lies and a truth teller is one who always tells the truth. Who got the highest mark?

I. Each one of them claims that he got the highest mark. Between R and S, there is exactly one person who always lies.

II. A says, “Neither Q nor S got the highest mark.”

39. In a two-digit number, the digit at unit’s place is 4 more than the digit at the ten’s place. Find the two-digit number.

I. Sum of their digits is 10.

II. The difference between the number and the number obtained by interchanging the positions of the digits is 36.

40. Two boxes A and B contain blue marbles and red marbles. One marble is drawn at random from a box (each marble in the box has an equal chance of being drawn). If it is blue, you win 2 $. If it is red, you win nothing. Each box has an equal chance to be chosen. Which box should you choose?

I. Box A contains 5 blue marbles and 4 red marbles.

II. Box B contains 50 blue marbles and 30 red marbles.

41. A uniform circular disc of diameter 10 cm is cut in the centre and a circular hole is generated. Find the diameter of the hole.

I. The weight of the disc is reduced by 25%.

II. The thickness of the disc is 1 cm.

42. Did Jimmy get the highest number of gold medals in the competition where a total of 15 gold medals were given away?

I. Rajan got four gold medals, which is less than the number of gold medals that Jimmy got.

II. Totally, four players – Ponting, Rajan, Jimmy and Ramesh, shared all the gold medals in the competition and no two persons got the same number of gold medals.

43. In a box there are ‘n’ number of balls which are black, blue, or white in colour. Find the probability of picking a white ball when one ball is drawn randomly.

I. n = 48

II. Probability of drawing a black or a blue ball is .

44. A family has only one kid. The father says, “After ‘n’ years, my age will be 4 times the age of my kid.” The mother says, “After ‘n’ years, my age will be 3 times that of my kid.” What will be the combined ages of the parents after ‘n’ years?

I. The age difference between the parents is 10 years.

II. After ‘n’ years the kid is going to be twice as old as she is now.

45. A train has five stoppages on its route. The train starts from stoppage one and then proceeds to stoppage two, three, four and five respectively. After halting at stop five, the train takes a U-turn and returns to stoppage one. Each stoppage is distinguished by one of the five junctions P, Q, R, S and T. Which junction distinguishes stoppage three?

I. The junction R is immediately before junction Q, when the train moves from stoppage one towards stoppage five.

II. There are two junctions between junction P and junction S and junction P is not at the extreme end; when the train moves from stoppage one towards stoppage five.

46. If the 1st of this month was a Sunday, What day of the week was the first day of this year?

I. The 1st of next month is a Wednesday.

II. The 1st of previous month was a Saturday.

47. Three professors A, B and C are separately given three sets of numbers to add. They were expected to find the answers to 1 + 1, 1 + 1 + 2, and 1 + 1 respectively. Their respective answers were 3, 3 and 2. How many of the professors are mathematicians?

I. A mathematician can never add two numbers correctly, but can always add three numbers correctly.

II. When a mathematician makes a mistake in a sum, the error is +1 or –1.

48. There are 10 distinct points marked on line l1; 11 distinct points marked on line l2; and 9 distinct points marked on line l3. How many triangles can be formed using these marked points?

I. The lines l1, l2 and l3 are parallel.

II. The distance between the lines l1 and l2 is twice the distance between l2 and l3.

49. Is *a* less than 7000, given that *a* is a positive integer?

I. *a* is a positive integral power of 3.

II. The number of divisors of *a* is less than 9.

50. The rightmost digit of a number (N)10, when expressed in base 5 is 0.

If (100)10 < (N)10 < (200)10, then find the value of ‘N’.

I. When the number (N)10 is expressed in base 8, the leftmost digit is 1.

II. When (N)10 is expressed in base 11, the leftmost digit is 1.