APTITUDE TEST

MATHEMATICS

1 DATA INTERPRETATION

Introduction

Data, in simple language, is the name given to basic facts like names and numbers. Time, dates, weights, prices are some simple examples of data. Handling numbers is not difficult. However, it is important to be clear about the basics. Data analysis is one of the important aspects of almost every competitive examination. Consequently the success in the examination depends much upon the candidates performance.

Methods of presenting Numerical Data

Four principal methods of statistical data presentation are (1) Tables (2) Bar Graphs (3) Pie charts or (circle graphs) (4) Line graphs.

A brief introduction of each method helps us in solving problems.

Tables

Tabulation is a common method of presenting statistical data. It is an arrangement of data in rows and columns. It provides an overall view of the situation and help in the process of decision making. Sometimes, the columns in a table are subdivided to give further information. Generally, it is easier to process the data in a table having more number of rows than columns. An example is shown below.

The marks obtained by a student in 1st, 2nd and 3rd term examinations in 4 subjects.

Subjects	1st term	2nd term	3rd term
Physics	75	70	82
Chemistry	60	65	72
Maths	65	55	68
Biology	80	85	92

Bar Graphs

A bar-diagram is essentially a graph converted into and presented in the form of rectangular blocks called as bars. These rectangular blocks have common width and hence are proportional in value as per their lengths. It may not present information as precisely as a table but it gives a quick overall impression of the findings. These bar-diagrams are of different types

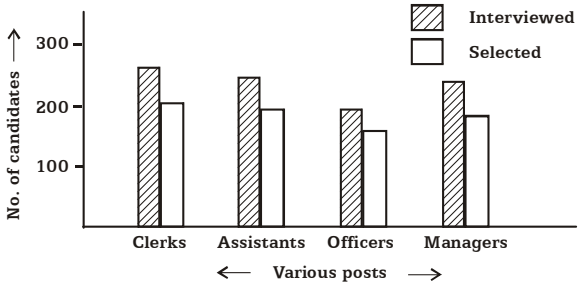
(1) Vertical bar-diagram

(2) Horizontal bar-diagram

(3) Multiple bar-diagram

(4) Subdivided bar-diagram and

(5) Deviation bar-diagram.



Bar diagrams are also known as column graphs. A simple multiple bar diagram is given above. The following bar diagram shows the number of candidates interviewed and selected for various posts in a company.

Pie Charts

This is one of the most commonly used method of pictorial presentation. Pie charts show the relationship of parts to the whole. The central angle of a circle is $360°$. The proportion that each part bears to the whole will be corresponding proportion of $360°$, which is required to be calculated. Pie charts are useful for representing

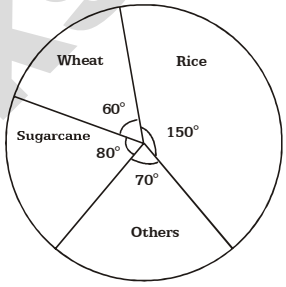
(1) percentages of various elements with respect to the total quantity.
(2) proportion of various elements with respect to the total quantity.
(3) shares of various parties of a particular quantity.

Note :

In a pie chart, $100\% = 360°$

hence $1\% = 3.6°$ and $1° = \frac{1}{3.6}\%$

The pie chart given below shows the annual agricultural yield.

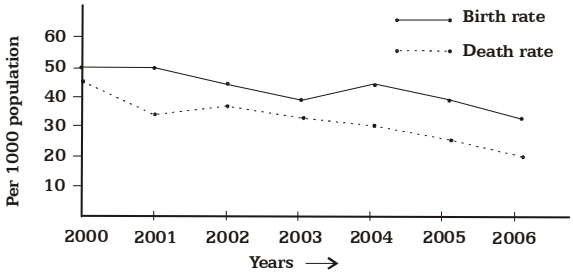


Line Graphs

It is a linear representation of the figures, put on a two-dimensional scale and show a relationship between the figures on the two axes, viz x and y. It is one of the simplest and easiest way of showing facts. It is drawn on graph paper to a certain scale. Each reading is plotted on the graph and points are joined with ruled lines. It may be of different types

(1) one dependent variable
(2) more than one dependent variable
(3) Graph having two scales
(4) frequency polygon
(5) cumulative frequency polygon and
(6) greater than frequency distribution.

The birth and death rates in India from 2000 to 2006 is given below.



In all the above captions following types of questions can be asked:
(1) Overall growth / decline in terms of %.
(2) Proportion of one quantity to others.
(3) Which quantity contributes the maximum / minimum ?
(4) Consistency of values over a period of time?
(5) Average computations etc.

Note : In answering such questions, adopt comparison method, rather than performing detailed calculations.

PROBLEMS FOR PRACTICE

Directions: (Qs. 1 - 5): The table below shows the number of employees in various departments of an organisation over the period from 2002 to 2007. Study the table carefully and answer the questions that follow :

Years	Production	Sales	Purchase	Admin. & Accounts	R & D	Total
2002	150	25	50	45	75	345
2003	225	40	45	62	70	442
2004	450	65	30	90	73	708
2005	470	73	32	105	70	750
2006	500	80	35	132	74	821
2007	505	75	36	130	75	821

1. For how many years the number of employees in Production Dept. account for more than half the total strength of employees ?

A) 3 years **B)** 4 years

C) 5 years **D)** 6 years

Solution:

Except the year 2002, for all other years,the numbers of employees in Production Department account for more than half the total strength of employees.

Total no. of years = **5**

Ans : C

2. Over the period shown, how much is the increase registered by the number of employees in Sales Dept.?

A) 50% **B)** 250%

C) 100% **D)** 200%

Solution:

Required % $= \frac{75-25}{25} \times 100 =$ **200%**

Ans : D

3. How much is the approximate overall growth rate in total number of employees over the period shown per annum?

A) 23% **B)** 28%

C) 140% **D)** 25%

Solution:

The overall growth rate in the total number of employees over the period shown (i.e.) from 2002 to 2007

$= \frac{821-345}{345} \times 100 = \frac{476}{345} \times 100 = 140\%$

The Annual growth rate $= \frac{140}{5} =$ **28%**

Ans : B

4. For how many years the total number of employees are below the overall average for the period shown?

A) 4 **B)** 3

C) 2 **D)** 1

Solution:

The overall average

$= \frac{345+442+708+750+821+821}{6}$

$= 648$

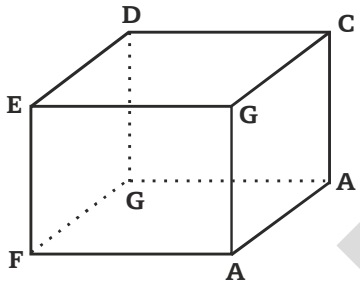
In the year 2002 and 2003, the total strength was below the overall average.

$\therefore$ No. of years = **2**

Ans : C

1 DICE

Dice is a cube. In cube there are 6 faces. Some important points are given below:



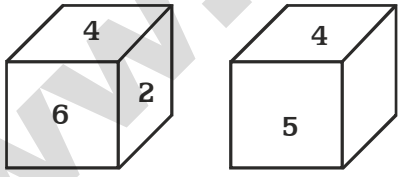
- There are 6 faces in the cube – ABCG, GCDE, DEFH, BCDH, AGEF and ABHF.
- Always four faces are adjacent to one face.
- Opposite of ABCG is DEFH and so on.
- CDEG is the upper face of the cube.
- ABHF is the bottom of the cube.

There are certain rules with the help of these rules question on dice can easily determined.

Rule No. 1: Two opposite faces cannot be adjacent to one another.

Example 1

Two different positions of a dice are shown below. Which number will appear on the face opposite to the face with number 4?



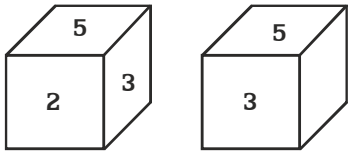
Solution:

Faces with four numbers 6, 2, 5 and 3 are adjacent of to the face with No. 4. Hence the faces with no. 6, 2, 5 and 3 cannot be opposite to the face with no. 4.Therefore the remaining face with no.1 will be the opposite of the face with no. 4.

Rule No. 2: If two different positions of a dice are shown and one of the two common faces is in the same position then of the remaining faces will be opposite to each other.

Example 2

Two different positions of a dice are shown below.

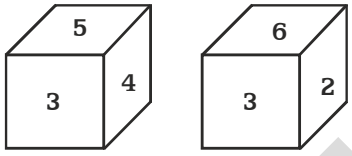


Solution

Here in both shown positions two faces 5 and 3 are common.
The remaining faces are 2 and 4.
Hence the number on the face opposite to the face with number 2 is 4.

Rule No. 3: If in two different positions of dice, the position of a common face be the same, then each of the opposite faces of the remaining faces will be in the same position.

Example 3

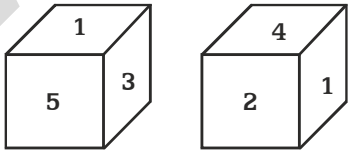


Solution

Here in both positions of common (3) is same.
Therefore, opposite of 5 is 6 and opposite of 4 is 2.

Rule No. 4: If in two different positions of a dice, the position of the common face be not the same, then opposite face of the common face will be that which is not shown on any face in these two positions. Besides, the opposite faces of the remaining faces will not be the same.

Example 4

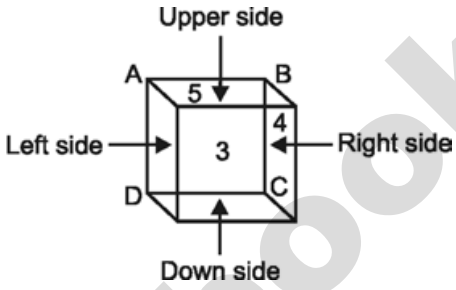


Solution

Here in two positions of a dice the face with number 1 is not in the same position.

The face with number 6 is not shown. Hence the face opposite to the face with number 1 is 6.Besides the opposite face of 3 will be the face with number 2 and opposite face to face 5 will be the face with number 1.

In this section, one or two or three cubes are provided. In every cube, only three surfaces are visible and on every surface some alphabet or number or dot, etc. is written and aspirants are asked to find what will be there on the opposite surface to any given surface.



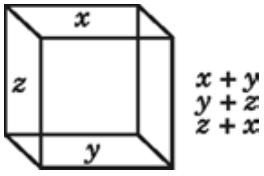
4 or 5 will not be opposite to 3

5 or 3 will not be opposite to 4

3 or 4 will not be opposite to 5

Note: Opposite surface is not an adjacent surface.

In any given cube, aspirants can't see more than three sides at a time. The surfaces which aspirants can see at a time are front surface, upper surface and left or right surface of a cube.



Standard Dice : If in none of these pairs you get 7 on adding the numbers, it is called a standard dice.

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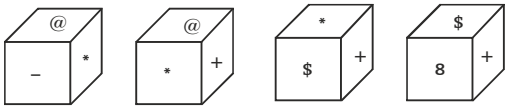
PROBLEMS FOR PRACTICE

1. Which symbol will be on the face opposite to the face with symbol * ?



A) @ **B)** $

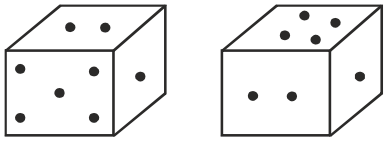
C) 8 **D)** +

Solution:

The symbols of the adjacent faces to the face with symbol * are @, -, + and $. Hence the required symbol is **8**.

Ans: C

2. Two positions of dice are shown below. How many points will appear on the opposite to the face containing 5 points?



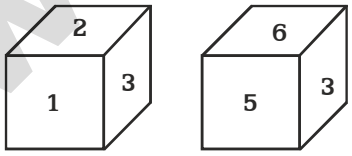
A) 3 **B)** 1

C) 2 **D)** 4

Solution:

In these two positions one of the common face having 1 point is in the same position. Therefore according to rule (2). There will be **4** points on the required face. **Ans: D**

3. Which digit will appear on the face opposite to the face with number 4?



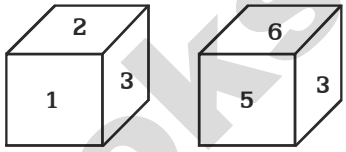
A) 3 **B)** 5

C) 6 **D)** 2/3

Solution:

Here the common faces with number 3, are in same positions. Hence 6 is opposite to 2 and 5 is opposite to 1. Therefore 4 is opposite to **3**. **Ans: A**

4. Two positions of a dice are shown below. Which number will appear on the face opposite to the face with the number 5?



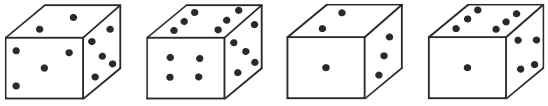
A) 2/6 **B)** 2

C) 6 **D)** 4

Solution:

According to the rule no. (3), common faces with number 3, are in same positions. Hence the number of the opposite face to face with number 5 will be **6**. **Ans: C**

5. How many points will be on the face opposite to in face which contains 2 points?



A) 1 **B)** 5

C) 4 **D)** 6

Solution:

In first two positions of dice one common face containing 5 is same. Therefore according to rule no. (3) the face opposite to the face which contains 2 point, will contains **6** points.

Ans: D

3 SERIES COMPLETION TEST

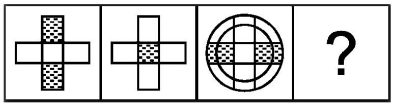
In this section, each row consists of four figures called question fi gures and next four fi gures called answer figures. Given four question fi gures always makes a series. Aspirants are to find out which one of the answer fi gures would be next or the fourth one in the series.

Directions : A series is given with one term missing. Choose the correct alternative from the given ones that will complete the series.

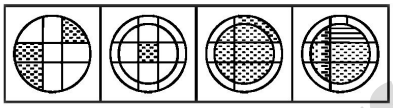
PROBLEMS FOR PRACTICE

Directions (Q. 1 to 10) : *Find the missing term of the series from the given responses.*

1. Question Figures



Answer Figures

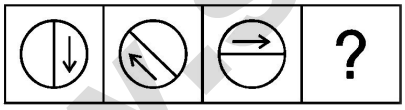


(A) (B) (C) (D)

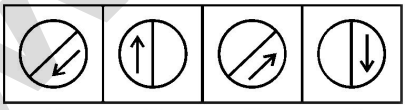
Solution:

Shaded part becomes middle part in the next figure. **Ans: B**

2. Question Figures



Answer Figures

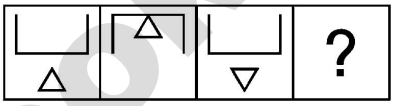


(A) (B) (C) (D)

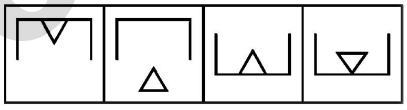
Solution:

The inner line of the circle rotates 45° clockwise. The arrow always keeps itself to the left of the line. **Ans : A**

3. Question Figures



Answer Figures

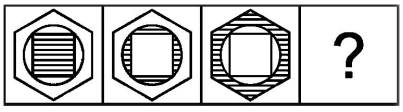


(A) (B) (C) (D)

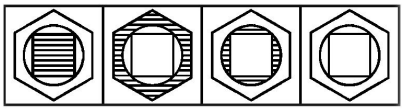
Solution:

The half of the square reverses its directions in subsequent figures. The triangle moves upward and downward in a specific pattern. **Ans : A**

4. Question Figures



Answer Figures

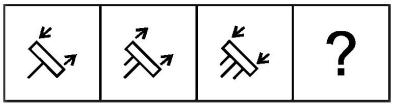


(A) (B) (C) (D)

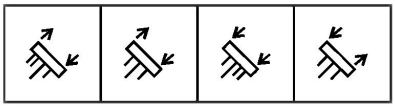
Solution:

The parallel lines inside the figure escape to outer and still outer figures i.e., from square to circle to hexagon and finally disappear. **Ans : D**

5. **Question Figures**



Answer Figures

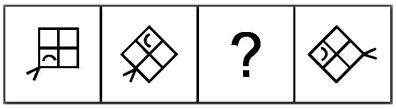


(A) (B) (C) (D)

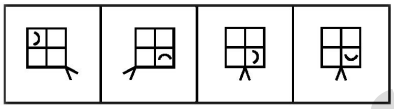
Solution:

In one step, the upper arrow is reversed and in the next step both the arrows are reversed and the two steps are repeated alternately. Lines are added in the lower portion of the figure on either side of the longer line. **Ans : A**

6. **Question Figures**



Answer Figures



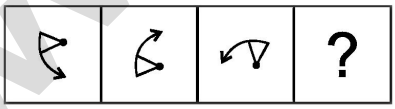
(A) (B) (C) (D)

Solution:

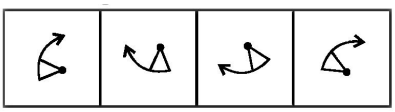
The square along the V-shaped figure rotates by 45° clockwise in each step. The arc rotates by 90° anti-clockwise and moves to the opposite quarter of the square clockwise in each step. The V-shaped figure moves 1, 2, 3, ... steps anti-clockwise in subsequent steps.

Ans: D

7. **Question Figures**



Answer Figures

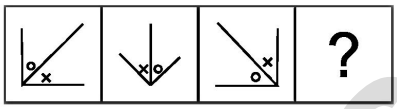


(A) (B) (C) (D)

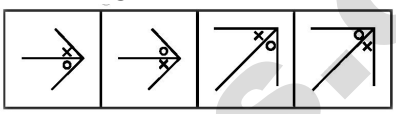
Solution:

In fi rst step the figure is simply vertically inverted. In the next step the figure is obtained by turning the original figure by 90° clockwise. **Ans : B**

8. **Question Figures**



Answer Figures

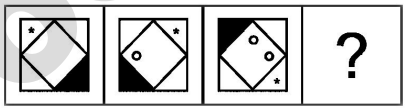


(A) (B) (C) (D)

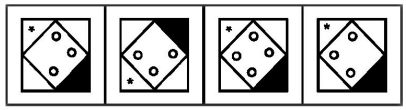
Solution:

In each subsequent figure the arrow moves 45° in anti-clockwise direction. The inner designs change its place in every step. **Ans : B**

9. **Question Figures**



Answer Figures

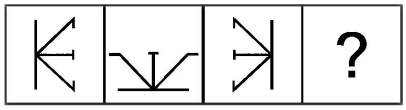


(A) (B) (C) (D)

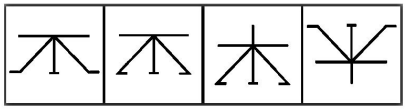
Solution:

In each subsequent figure the shaded part and star moves one step ahead in clockwise direction. Circle moves one step with one additional circle. **Ans : B**

10. **Question Figures**



Answer Figures



(A) (B) (C) (D)

Solution:

In each subsequent figure the design rotates through 90° anti-clockwise and the line segment at the two ends move to other side alternately. **Ans : A**

4 NUMBER SERIES

A number series can be considered as a collection of numbers in which all the terms are formed according to some particular rule or all the terms follow a particular pattern. The relation of any term to its preceding term will be same throughout the series.

Generally, two kinds of series are asked in the examination. One is based on numbers and the other based on alphabet. In questions based on series, some numbers or alphabets are arranged in a particular sequence. You have to decipher that particular sequence of numbers or alphabets and on the basis of that deciphered sequence, find out the next number or alphabet in the series which will logically follow in the same sequence. Although there is no limit for patterns which can be used to build a series, here are some important examples which highlight some of the types of series asked in the examination.

TYPES OF NUMBER SERIES

I. PRIME NUMBER SERIES

Example 1

2, 3, 5, 7, 11, 13, ...

A) 15 **B)** 17

C) 18 **D)** 19

Solution

The given series is prime number series. The next prime number is 17.

Example 2

2, 5, 11, 17, 23, ... 41.

A) 29 **B)** 31

C) 37 **D)** 39

Solution

The prime numbers are written alternately. The alternate prime number after 23 is 31.

II. DIFFERENCE SERIES

Example 3

2, 5, 8, 11, 14, 17, ... 23.

A) 19 **B)** 21

C) 20 **D)** 18

Solution

The difference between the consecutive numbers is 3.(17+3=20)

Example 4

45, 38, 31, 24, 17,.....3.

A) 12 **B)** 14

C) 10 **D)** 9

Solution

The difference between the consecutive numbers is 7. (17–7 = 10).

III. MULTIPLICATION SERIES

Example 5

2, 6, 18, 54, 162, ... 1458.

A) 274 **B)** 486

C) 1236 **D)** 1032

Solution

Each number is multiplied with 3 to get the next number. (162 × 3 = 486).

IV. DIVISION SERIES

Example 6

720, 120, 24, ... 21.

A) 12 **B)** 18

C) 20 **D)** 6

Solution

Starting with 720, the numbers are divided by 6, 5, 4, 3, and so on. 720/6 = 120, 120/5 = 24, 24/4 = 6; 6/3 = 2, 2/2 = 1.

V. N^2 SERIES

Example 7

1, 4, 9, 16, 25, ... 49.

A) 28 **B)** 30

C) 32 **D)** 36

Solution

The series is 1^2, 2^2, 3^2, 4^2, 5^2, ... The next number in the sequence is 6^2= 36.

Example 8

0, 4, 16, 36, 64, ... 144.

A) 100 **B)** 84

C) 96 **D)** 120

Solution

The series is 0^2, 2^2, 4^2, 6^2, etc. The next number is 10^2 = 100.

VI. $N^2 - 1$ SERIES

Example 9

0, 3, 8, 15, 24,35, 48, .

A) 60 **B)** 62

C) 63 **D)** 64

Solution

The series is $1^2 - 1$, $2^2 - 1$, $3^2 - 1$, and so on. The next number in the sequence is 8^2–1 = 63.

Another logic: Difference between numbers is 3, 5, 7, 9, 11, 13, etc (odd numbers).

The next number is (48 + 15 = 63).

VII. $N^2 + 1$ SERIES

Example 10

2, 5, 10, 17, 26, 37, ... 65.

A) 50 **B)** 48

C) 49 **D)** 51

Solution

The series is 1^2+ 1, 2^2+ 1, 3^2+ 1, and so on. The required number is 7^2 + 1 = 50.

VIII. N^2+N SERIES (or) N^2 –N SERIES

Example 11

2,6, 12,20, , 42.

A) 28 **B)** 30

C) 32 **D)** 36

Solution

The series is 1^2+ 1, 2^2 + 2, 3^2 + 3, 4^2 + 4, and so on. The required number is 5^2+ 5 = 30.

Another Logic : The series is 1 × 2, 2 × 3, 3 × 4, 4 × 5. The next number is 5 × 6 = 30.

Another Logic : The series is 2^2 – 2, 3^2 – 3, 4^2 – 4, 5^2 – 5. The next number is 6^2 – 6 = 30.

IX. N^3 SERIES:

Example 12

1, 8, 27, 64, 125, 216, ...

A) 256 **B)** 343

C) 365 **D)** 400

Solution

The series is 1^3, 2^3, 3^3, and so on. The missing number is 7^3 = 343.

X. N^3 + 1 SERIES:

Example 13

2, 9, 28, 65, 126, 217, 344, ...

A) 513 **B)** 500

C) 428 **D)** 600

Solution

The series is 1^3 + 1, 2^3 + 1, 3^3 + 1, and so on. The missing number is 8^3 + 1 = 513.