

3.5

CHAPTER

Line Graph

Data Analysis

Data analysis is a process of collection, presentation and interpretation of the information contained in the data to aid to reach some kind of conclusions. Usually data collection and presentation is further coupled with mathematical and analytical tools to react on further conclusion. Visual representation is the best representation of data because of ease of comprehension. Visual representation data can be primarily represented into following forms.

1. Line-graphs/cartesian graphs
2. Tables
3. Bar diagrams
4. Caselets
6. Some other non-conventional miscellaneous figure

Skills: That individual need to, to handle DI (Data Interpretation) efficiently from exam point of view.

1. **Data Comprehension Skills:** Ability to select relevant information from any given set of data in context of question be asked, based upon that data set.
2. **Ability to differentiate between easy & difficult questions:** It has many aspect for example, how many question in data set requires actual calculation and how many can be answered by observation which are based on patterns. How many questions which are having options can't not be determined or data insufficient and out of such actually for how many question required information is not available.
3. **Ability to apply approximation techniques:** That is based upon the scenario that how far the options are value wise.
4. **Last but not the least:** In entire DI section which strategy can help me to maximize my attempts with higher accuracy.

Strategy-1: Doing all easy questions from all the given sets (that ask for fast reading, wide and quick eye span and efficient data comprehension from all sets).

Strategy-2: Doing all the questions from selective and relatively easier DI sets where data comprehension is far more easier.

5. Basic command over elementary mathematical calculation tool. Which comprises of following:
 - Percentage and equivalent fractional forms
 - Averages
 - Ratios
 - Approximation

Data Interpretation

Executive member, managers and personnel at different level in the various organizations are require to analyse different sets of datas. Balance sheet, Records of Annual General Meeting, Quarterly Report etc. requires interpretation of various data types. On the basis of the given sets of datas future projections can be made and corrective action can be taken at regular intervals. Mainly there are following sets to represent datas.

- Graph
- Table
- Bar Diagrams
- Pie Charts
- Miscellaneous Figures etc.

Line Graph

Line graph is the simplest way to represent data. Single set or multiple sets of datas can be shown in a graph. Normally following things are required to analyse.

- Increase in profit in absolute terms
- Increase in profit in percentage term
- Growth rate of the given duration
- Average annual growth rate
- Average profit
- Capacity utilisation
- In case of trade, Trade Deficit and Trade Surplus etc.

Advantage: Advantage with line graph is that it gives an ideal about the quantity expressed in this graph between the given time period as well.

Disadvantage: Usually exact values are not available, when we try to represent exact value on the line graph, incase of multiples line representation graph become complex.

Lets have an example of graph

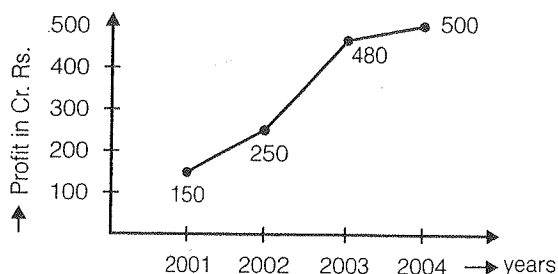


Fig. (I) Balance Sheet of ABC corporation.

On the basis of the given balance sheet of ABC corporation we can calculate following things.

- Increase in profit in absolute terms

2001-02	$250 - 150 = 100$ Cr.
2002-03	$480 - 250 = 230$ Cr.
2003-04	$500 - 480 = 20$ Cr.

 - The highest absolute increment in profit is observed during financial year 2002-03.
 - The least absolute increment in profit is observed during financial year 2003-04.

- Percent increase in profit

$$2001-02 \quad \frac{250 - 150}{150} \times 100 = 66.66\%$$

$$2002-03 \quad \frac{480 - 250}{250} \times 100 = 92\%$$

$$2003-04 \quad \frac{500 - 480}{480} \times 100 = 4.16\%$$

- The highest profit increment in percentage term is for financial year 2002-03.
- The minimum profit increment in percentage term is for financial year 2003-04.

- Growth rate for the duration 2001-04

$$\Rightarrow \frac{500 - 150}{150} \times 100 = 233\%$$

[Growth rate for the duration]

$$= \frac{\text{Final years Profit} - \text{Base years profit}}{\text{Base years profit}}$$

$$4. \quad \text{Average Annual Growth Rate} = \frac{\text{Increase in profit for the duration}}{\text{Base years profit}}$$

$$\times \frac{100}{\text{Number of years}}$$

In the above example

$$\frac{500 - 150}{150} \times \frac{100}{3}$$

$$= \frac{350}{150} \times \frac{100}{3} = 66.66\%$$

$$5. \quad \text{Average profit} = \frac{\text{Sum of profits of the duration}}{\text{Total number of years}}$$

$$\Rightarrow \frac{150 + 250 + 480 + 500}{4} = \frac{1380}{4} = 345.$$

Capacity Utilisation

$$\text{Capacity utilisation} = \frac{\text{Total Production}}{\text{Total Capacity}} \times 100$$

- Ex.1 The total capacity of Tata Nano car plant in Gujrat is 150 car per day. In the month of April 2009 the plant manufactured at the rate of 120 car a day. Find the capacity utilisation in the month of April.

Sol.: Capacity utilisation in April 2009

$$= \frac{120}{150} \times 100 = 80\%$$

- Ex.2 The manufacturing capacity of Nokia Inc. plant based in Yokohama, Japan is 3,00,000 cellphones per day. In the month of March 2009 there was slump in demand due to recession and capacity utilisation come down to 30%. Find the production of cellphones in March 2009.

Sol.: Capacity utilisation

$$= \frac{\text{Total Production}}{\text{Total Capacity}} \times 100$$

Total production in march 2009

$$= \frac{\text{Capacity Utilisation} \times \text{Total Capacity}}{100}$$

$$\Rightarrow \frac{30 \times 3,00,000}{100}$$

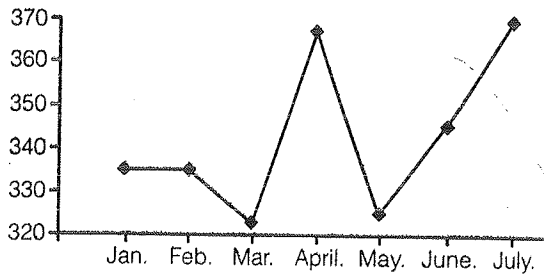
$$\Rightarrow 90,000 \text{ Ans.}$$



Practice Exercise: I

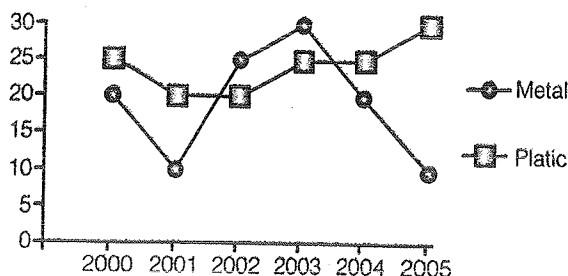
Direction (Qs. 1 to 5) : Refer to the graph (Fig.) and answer the questions given below that

(Consumer price index in 1993-1994)



- Which month showed the highest absolute difference in the Consumer Price Index (CPI) over the previous month?
(a) March (b) April
(c) May (d) July
- Which month showed the highest percentage difference in the CPI over the previous month?
(a) March (b) April
(c) May (d) July
- For how many month was the CPI greater than 350?
(a) One (b) Two
(c) Three (d) Four
- In how many months was there a decrease in the CPI over the previous month?
(a) One (b) Two
(c) Three (d) Four
- The difference in the number of months in which there was an increase in the CPI and the number of months in which there was a decrease was
(a) One (b) Two
(c) Three (d) Four

Direction (Qs.6 to Q. 10) : Study the following graph to answer the given questions:

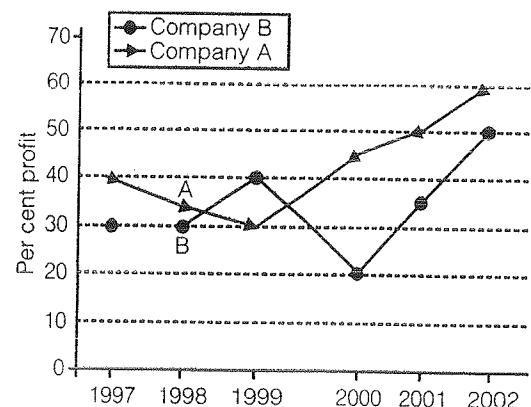


Consumption of Metals versus plastics in the given Years for Car manufacturing (in thousands tonnes)
The graph shows the trend of consumption of metals and plastic in the production of cars between 2000-05.

- The number of years for which the consumption of Metals was less than the consumption of Plastic over the given time period was
(a) One (b) Two
(c) Three (d) Four
- The total consumption of plastic (for car manufacturing) divided by the total consumption of Metal (for car manufacturing) over the period will give a ratio closest to
(a) 4 : 3 (b) 5 : 4
(c) 6 : 5 (d) 7 : 4
- Which item and for which year shows the highest percentage change in consumption over the previous year?
(a) Metal 2003 (b) Plastic 2003
(c) Metal 2002 (d) Plastic 2005
- For the two data series shown, how many years have shown decrease in consumption over previous year for both the items?
(a) One (b) Two
(c) Three (d) Four
- Which year showed the highest percentage decrease in the total consumption of the two?
(a) 2001 (b) 2002
(c) 2004 (d) 2005

Direction (Qs. 11 to 15): Study the following graph to answer the given questions:

Percent profit earned by two companies over the given years:



11. If the expenditure of Company B in year 2000 was Rs. 200 crore, what was its income?

- (a) Rs. 240 crore
- (b) Rs. 220 crore
- (c) Rs. 160 crore
- (d) Cannot be determined

12. If the income of Company A in year 2002 was Rs. 600 crore, what was its expenditure?

- (a) Rs. 360 crore
- (b) Rs. 480 crore
- (c) Rs. 375 crore
- (d) Can't be determined

13. If the income of Company B in 1998 was Rs. 200 crores, what was its profit in 1999?

- (a) Rs. 21.5 crore
- (b) Rs. 153 crore
- (c) Rs. 46.15 crore
- (d) Can't be determined

14. If the income of the two companies in 1998 were equal, what was the ratio of their expenditures?

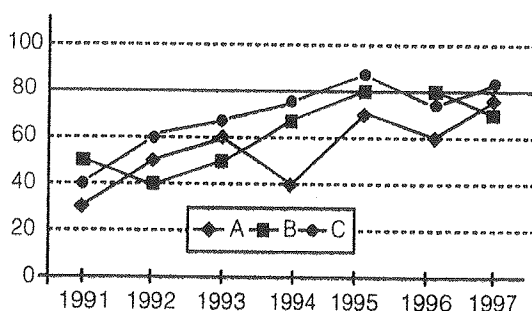
- (a) 1 : 2
- (b) 26 : 27
- (c) 100 : 67
- (d) Can't be determined

15. What is the percent increase in percent profit for company B from year 2000 to 2001?

- (a) 75
- (b) 175
- (c) 42.86
- (d) Can't be determined

Direction (Qs. 16 to 20): Study the following graph carefully and answer the questions given below it.

Imports of 3 companies over the years
(Rs. in crore)



16. In which of the following years, the imports made by Company A was exactly equal to its own average imports?

- (a) 1992
- (b) 1993
- (c) 1994
- (d) None of these

17. In which of the following years was the difference between the imports made by Company B and C the maximum?

- (a) 1995
- (b) 1994
- (c) 1991
- (d) 1992

18. In which of the following years was the imports made by Company A exactly half of the total imports made by Company B and C together in that year?

- (a) 1992 only
- (b) 1993 only
- (c) 1992 and 1993
- (d) 1995 only

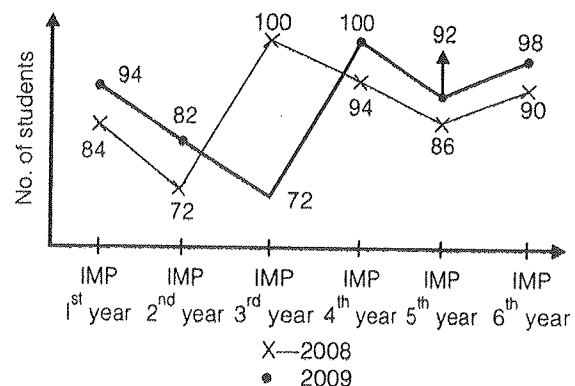
19. What was the percentage increase in imports of Company B from 1992 to 1993?

- (a) 10
- (b) 25
- (c) 40
- (d) 20

20. In which of the following years was the total imports made of all the three companies together the maximum?

- (a) 1996 only
- (b) 1997 only
- (c) 1995 only
- (d) 1995 & 1997 only

Direction (Qs. 21 to 24): The line graph gives the number of students in a Engg. college's M.Tech program integrated (IMP) for the years 2008 & 2009. The program in takes the student in only 1st year & students can leave college only if they complete 6-years program. Every year the students who pass the annual exam of a particular year are promoted to the next class while students who fail, have to study in the same class next year also.



Imp: It is known that 76 students passed out of final (6th year) class of IMP in the year 2008.

21. How many fresh students joined the program (IMP) in the year 2009?

- (a) 94
- (b) 92
- (c) 90
- (d) 88

22. In how many classes did exactly four students fail in year 2008?

- (a) 5 (b) 3
(c) 4 (d) 2

23. How many students in total failed in the entire program of six years together in year 2008?

- (a) 38 (b) 36
(c) 32 (d) 34

24. In which year pass percentage was the highest in year 2008?

- (a) Vth year (b) VIth year
(c) IVth year (d) IIIrd year

25. How many total student failed together in entire program in 2009?

- (a) 32
(b) 34
(c) 38
(d) Can't be determined

26. How many total no. of students passed in (IMP) in all 6 years combined in year 2008?

- (a) 492
(b) 484
(c) 462
(d) Can't be determined

□□□□

Solutions

Answer 1 to 5:

- (b)
- (b) Visually clear that it is April
- (b) April and July – Two.
- (b) The CPI decreased in March and May
- (a) The CPI increased in three months (April, June and July) while it decreased in two months (March and May).
- (d) Visually seen as 4. 2000, 2001, 2004 & 2005.
- (b) $145 : 115 = 29 : 23$ is closest to $5 : 4$
- (c) Metals in 2002 is more than double over its value in 2001.
- (a) 2001 is the only year which satisfy the condition.
- (a) 33.33% between 200 to 2001.

11. (a) Income of Company B in 2000

$$= 200 \times \frac{120}{100} = \text{Rs. } 240 \text{ cr.}$$

12. (c) Expenditure of Company A in 2002

$$= 600 \times \frac{100}{160} = \text{Rs. } 375 \text{ cr.}$$

13. (d) We can find out the amount of profit in 1998, we do not know the income and expenditure of A and B therefore option (d) is the correct choice.

14. (b) Ratio of their expenditures

$$= \frac{100}{135} \times \frac{130}{100} = 26 : 27.$$

15. (d) Reqd. % increase = $\frac{35 - 20}{20} \times 100 = 75\%$.

16. (d) Average imports made by company A

$$= \frac{30 + 50 + 60 + 40 + 70 + 60 + 75}{7}$$

$$= \frac{385}{7} = 55$$

In none of the given years the imports is exactly equal to 55 (crore). Hence, the answer is (d)

17. (d) By visual inspection it is clear that 1992 is the desired year (as the distance between two points is the maximum in 1992).

18. (a) By observation, in year 1992

$$\left(\text{as } 50 = \frac{40 + 60}{2} \right)$$

So 1992 is the desired year. We do not need any calculation see the year where the point A lies exactly in the middle of points of B and C

19. (b) Reqd percentage increase = $\frac{50 - 40}{40} = 25\%$

20. (c) The total imports (in crore) made by all the three companies together : From the height of the points we observe that the total heights of three points is the maximum either in 1995 or 1997. If you observe carefully our clear answer is 1995, but to be sure we find actual values for the two years.

$$\text{In } 1995 = 70 + 80 + 85 = 235$$

$$\text{In } 1997 = 75 + 70 + 85 = 230$$

Clearly, 1995 is the desired year.

Solution 21 to 26

If 76 students passed out of 6th year in 2008 out of 90 students, it means 14 students who are failed in 2008, they will stay back in 6th year in 2009 also. It means in 2009, out of 98 students, 14 students are those who failed in 2008, in 6th year, and rest $98 - 14 = 84$ students are those, who passed in 5th year in 2008 & being promoted to 6th year in 2009.

On the basis of same reasoning we can draw following table.

	2008			2009	
	No. of students in class	No. of students passed	No. of students failed	No. of students in class	No. of students promoted from last year class
1st year	84	78	6	94	$99 - 6 = 88$ fresh students
2nd year	72	68	4	82	$82 - 4 = 78$
3rd year	100	96	4	72	$72 - 4 = 68$
4th year	94	90	4	100	$100 - 4 = 96$
5th year	86	84	2	92	$92 - 2 = 90$
6th year	90	76	14	98	$98 - 14 = 84$

from table above.

21. (d) 88 fresh students came to 1st year in 2009.

22. (b) In each of classes 2nd, 3rd, 4th year of 2008 four students failed.

23. (a) Total no. of students failed in 2008 = $6 + 4 + 4 + 4 + 2 + 14 = 34$.

24. (a) From table directly pass percentage is highest in the 3rd year in 2008.

25. (d) Can't be determined, because no data about total number of students passed in 2009 is available.

26. (a) From table, number of students passed in all six years combined in 2008 = 492,

