

CHAPTER 21

DATA INTERPRETATION

21.1 How to Approach a DI Set

1. Read the title, the headings and the **units** first (thousands, lakhs, crores, percentages, tonnes). Most errors come from wrong units.
2. Read the question and pick out only the figures it needs. Do not calculate anything the question does not ask for.
3. Look at the options before calculating. If they are far apart, approximate; if they are close, calculate exactly.
4. For “which is the highest/lowest” questions, compare quickly by eye first and calculate only for the close cases.

21.2 Calculation Tools

Quantity	Formula
Percentage change	$\frac{\text{New} - \text{Old}}{\text{Old}} \times 100$
Percentage share (part as % of whole)	$\frac{\text{Part}}{\text{Total}} \times 100$
X as a percentage of Y	$\frac{X}{Y} \times 100$
Average	$\frac{\text{Sum of values}}{\text{Number of values}}$
Ratio	Divide both quantities by their HCF
Central angle in a pie chart	Percentage $\times 3.6^\circ$ (since $100\% = 360^\circ$)

Key Rule

Percentage change is always calculated on the earlier (old) value. “Percentage increase from 2020 to 2023” uses the 2020 figure as the base.

Fractions to remember

$1/2 = 50\%$	$1/3 = 33.33\%$	$1/4 = 25\%$	$1/5 = 20\%$	$1/6 = 16.67\%$
$1/7 = 14.29\%$	$1/8 = 12.5\%$	$1/9 = 11.11\%$	$1/11 = 9.09\%$	$1/12 = 8.33\%$

These make percentage questions quick. For example, 50 out of 55 is $10/11 = 1 - 1/11 = 100\% - 9.09\% = 90.91\%$.

21.3 Tables

A table gives exact figures in rows and columns. Read along a row for one item over time, and down a column for all items at one time. Totals of rows or columns are often needed, so add them once and reuse them.

Shop	January	February	March
P	40	50	60
Q	30	45	45
R	50	40	70

Example 21.1. The table above gives the sales (in ₹ lakh) of three shops. (a) What were the total sales in February? (b) What was the percentage increase in P's sales from January to March? (c) What were R's average monthly sales?

Solution:

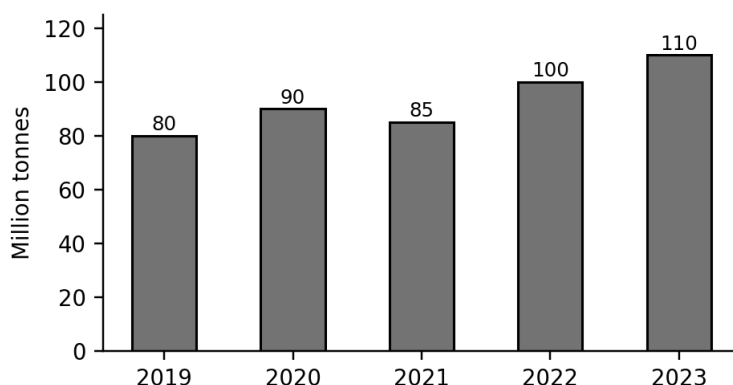
(a) $50 + 45 + 40 = \text{₹}135 \text{ lakh.}$

(b) $\frac{60-40}{40} \times 100 = 50\%.$

(c) $\frac{50+40+70}{3} = \frac{160}{3} = 53.33$, that is, **₹53.33 lakh.**

21.4 Bar Graphs

In a bar graph the length of each bar shows a value. A **simple** bar graph has one bar per item; a **multiple** (grouped) bar graph places two or more bars side by side for comparison; a **stacked** bar graph divides each bar into parts that add up to the total. Always read the value on the axis or the label, not the visual length alone.



Example 21.2. The bar graph above shows the production of wheat (in million tonnes).

(a) By what percentage did production rise from 2021 to 2022?

(b) What was the average production over the five years?

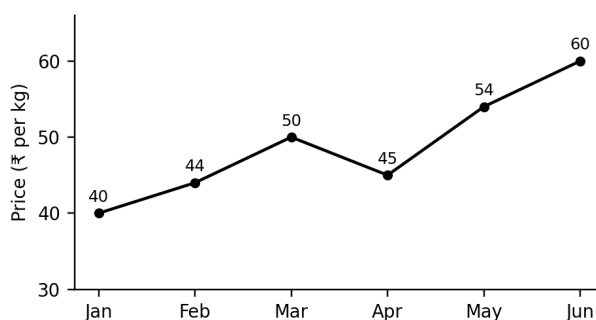
Solution:

(a) $\frac{100-85}{85} \times 100 = \frac{1500}{85} \approx 17.65\%.$

(b) $\frac{80+90+85+100+110}{5} = \frac{465}{5} = 93 \text{ million tonnes.}$

21.5 Line Graphs

A line graph joins values over time, so it shows trends at a glance: a steeper line means a bigger change. Two or more lines on one graph compare items. Remember that a steep line does not always mean the largest **percentage** change; that also depends on the starting value.



Example 21.3. The line graph above shows the price of a commodity (₹ per kg). In which month was the percentage rise over the previous month the greatest?

Solution:

Rises: Feb $4/40 = 10\%$; Mar $6/44 \approx 13.6\%$; May $9/45 = 20\%$; Jun $6/54 \approx 11.1\%$. (April shows a fall.)

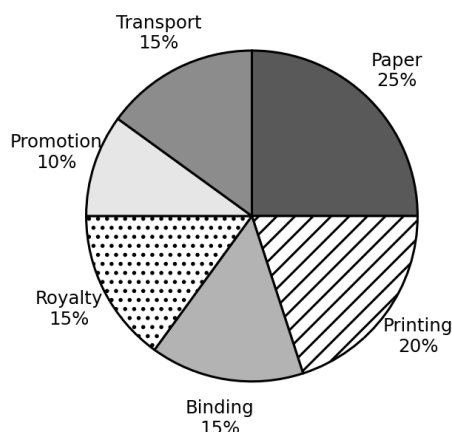
The greatest percentage rise was in **May**.

21.6 Pie Charts

A pie chart shows how a total is divided into parts. The parts may be given as percentages or as central angles.

Key Rule

$100\% = 360^\circ$, so $1\% = 3.6^\circ$. To change an angle into a percentage, divide by 3.6. The value of a part = its percentage $\times$ the total.



Example 21.4. The pie chart above shows the break-up of the cost of publishing a book. (a) What is the central angle for Royalty? (b) If the printing cost is ₹12,000, what is the royalty paid?

Solution:

(a) $15\% \times 3.6^\circ = 54^\circ$.

(b) Royalty : Printing = 15 : 20, so royalty = $12000 \times \frac{15}{20} = 9000$, that is, **₹9,000**.

Shortcut

When two parts of the same pie are compared, use the ratio of their percentages directly; the total is not needed.

21.7 Mixed Graphs

A mixed set combines two forms, for example a bar graph of totals with a table of percentages, or a pie chart with a table. The key step is to combine them correctly: usually, value of a part = total (from one source) $\times$ percentage (from the other). Work out the needed quantities for each item in a small table of your own before answering several questions.

Example 21.5. A bar graph shows that a factory has 400 workers in Unit A and 250 in Unit B. A table shows that 30% of Unit A and 40% of Unit B are women. How many women work in the two units together?

Solution:

Unit A: 30% of 400 = 120. Unit B: 40% of 250 = 100.

Total women = 120 + 100 = **220**. (Note that the percentages cannot simply be added or averaged, because the totals differ.)

21.8 Data Sufficiency

A data-sufficiency question asks a question and gives two statements. You do not have to find the answer; you only decide whether the statements give enough information to find it.

Option	Meaning
Statement 1 alone is sufficient	1 answers the question; 2 does not
Statement 2 alone is sufficient	2 answers the question; 1 does not

Option	Meaning
Both together are sufficient	Neither alone is enough, but together they answer it
Even both together are not sufficient	More data is needed
Either statement alone is sufficient	Each answers the question on its own (used when the paper gives five options)

- Test statement 1 alone, ignoring statement 2 completely.
- Test statement 2 alone, ignoring statement 1 completely.
- Only if neither works alone, combine them.
- “Sufficient” means a single definite answer. If a statement allows two values (for example, $x = 4$ or $x = -4$), it is not sufficient.

Example 21.6. What is the value of x ? 1. $x^2 = 16$. 2. $x > 0$.

Solution:

Statement 1 gives $x = 4$ or -4 : not sufficient. Statement 2 gives no value.

Together, $x = 4$. **Both statements together are sufficient.**

Common mistakes to avoid

1. Ignoring the units, or mixing thousands, lakhs and crores.
2. Calculating percentage change on the new value instead of the old value.
3. Adding or averaging percentages of groups of different sizes.
4. In pie charts, treating degrees as percentages (54° is 15%, not 54%).
5. In data sufficiency, actually solving the problem fully, or using statement 2 while testing statement 1.

Student Rough Space

PRACTICE EXERCISE

Each data set is followed by its questions. Read the units carefully. Target time: about 1 minute per question.

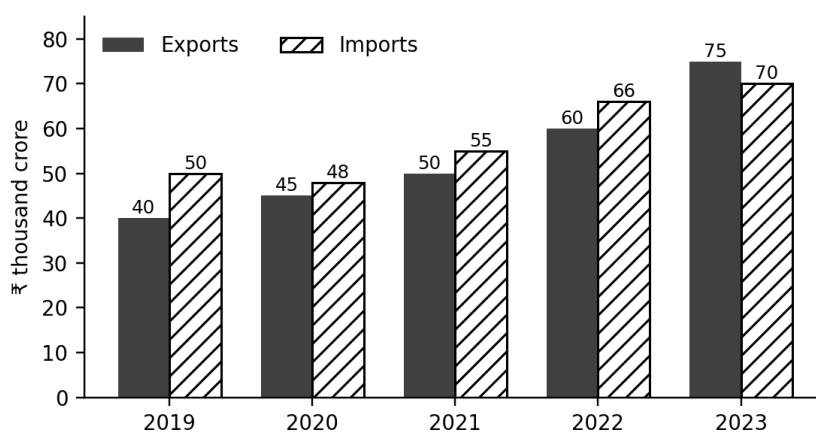
Level A: Foundation (Questions 1 to 10)

Directions (Questions 1 to 5): The table shows the production (in thousand units) of five companies from 2020 to 2023.

Company	2020	2021	2022	2023
A	120	150	180	200
B	90	108	120	135
C	150	140	168	175
D	80	100	96	120
E	60	75	90	105

- What was the total production of all five companies in 2022 (in thousand units)?
(a) 644 (b) 654 (c) 664 (d) 674
- What was the percentage increase in the production of company E from 2020 to 2023?
(a) 45% (b) 60% (c) 42.9% (d) 75%
- What was the average annual production of company B over the four years (in thousand units)?
(a) 113.25 (b) 110.5 (c) 115 (d) 120
- What is the ratio of the production of company C in 2021 to that of company D in 2023?
(a) 6 : 7 (b) 5 : 4 (c) 7 : 6 (d) 4 : 3
- In how many companies did production increase every year from 2020 to 2023?
(a) 2 (b) 3 (c) 4 (d) 5

Directions (Questions 6 to 10): The bar graph shows the exports and imports of a country (in ₹ thousand crore) from 2019 to 2023.

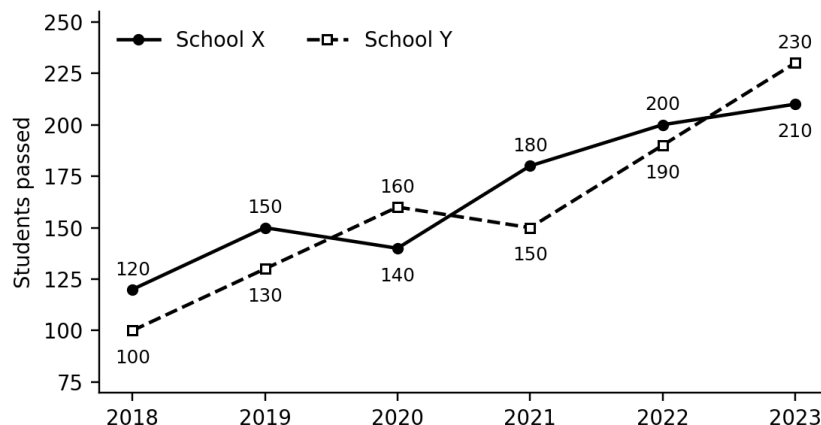


- In which year was the trade deficit (imports minus exports) the largest?
(a) 2019 (b) 2020 (c) 2021 (d) 2022
- What was the percentage increase in exports from 2022 to 2023?
(a) 15% (b) 20% (c) 25% (d) 30%
- What were the total imports over the five years (in ₹ thousand crore)?
(a) 270 (b) 279 (c) 299 (d) 289
- In how many of the five years did exports exceed imports?
(a) 0 (b) 1 (c) 2 (d) 3

10. Exports in 2021 were approximately what percentage of imports in that year?
 (a) 90.9% (b) 88.4% (c) 92.5% (d) 110%

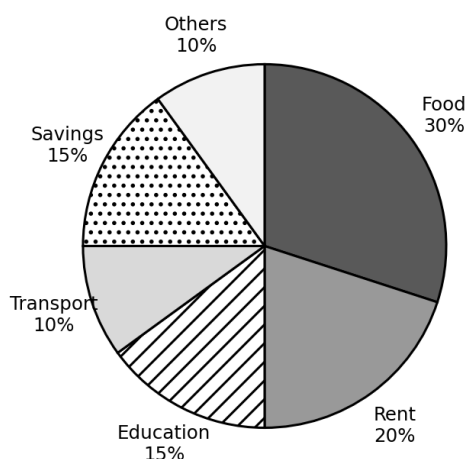
Level B: Moderate (Questions 11 to 22)

Directions (Questions 11 to 15): The line graph shows the number of students who passed the final examination in two schools, X and Y, from 2018 to 2023.



11. In which year was the difference between the numbers of students passing from the two schools the largest?
 (a) 2018 (b) 2020 (c) 2023 (d) 2021
12. What is the average number of students passing from school Y per year?
 (a) 150 (b) 155 (c) 160 (d) 165
13. What is the percentage increase in the number of students passing from school Y from 2018 to 2023?
 (a) 130% (b) 75% (c) 115% (d) 230%
14. In how many years did more students pass from school Y than from school X?
 (a) 1 (b) 2 (c) 3 (d) 4
15. What is the ratio of the total number of students passing from school X to that from school Y over the six years?
 (a) 24 : 25 (b) 5 : 4 (c) 21 : 20 (d) 25 : 24

Directions (Questions 16 to 20): The pie chart shows how a family spends its monthly income of ₹60,000.



16. How much does the family spend on food every month?
 (a) ₹15,000 (b) ₹12,000 (c) ₹18,000 (d) ₹20,000
17. What is the central angle of the sector for Education?
 (a) 54° (b) 15° (c) 45° (d) 60°
18. By how much does the expenditure on rent exceed that on transport?
 (a) ₹3,000 (b) ₹4,500 (c) ₹12,000 (d) ₹6,000

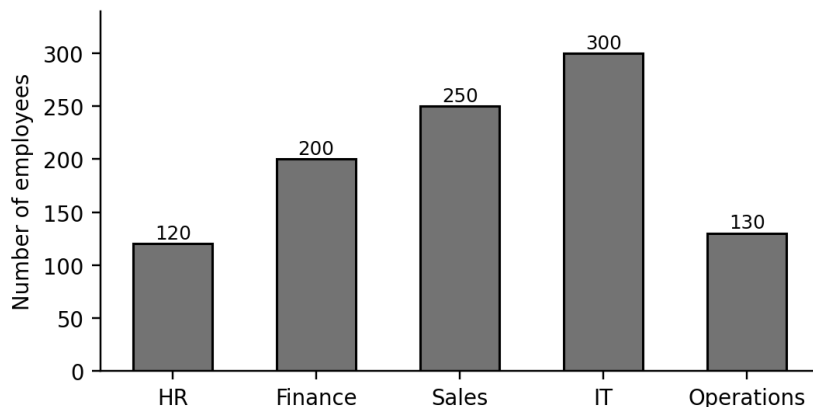
19. If the monthly income rises by 20% and the percentages stay the same, what will the monthly savings be?
 (a) ₹9,000 (b) ₹10,800 (c) ₹12,000 (d) ₹10,000
20. Food expenditure is approximately what percentage of the total amount spent (excluding savings)?
 (a) 35.3% (b) 30% (c) 33.3% (d) 40%

Directions (Questions 21 and 22): Each question is followed by two statements. Decide whether the statements are sufficient to answer the question.

21. What is the speed of the train?
 1. It crosses a 200 m long platform in 20 seconds.
 2. It crosses a pole in 10 seconds.
 (a) Statement 1 alone is sufficient
 (b) Statement 2 alone is sufficient
 (c) Both statements together are sufficient, but neither alone
 (d) Even both statements together are not sufficient
22. What is the profit percentage on an article?
 1. Its cost price is ₹500.
 2. Its marked price is ₹700.
 (a) Statement 1 alone is sufficient
 (b) Statement 2 alone is sufficient
 (c) Both statements together are sufficient, but neither alone
 (d) Even both statements together are not sufficient

Level C: EPFO Standard (Questions 23 to 30)

Directions (Questions 23 to 27): The bar graph shows the number of employees in five departments of a company, and the table shows the percentage of women in each department.



Department	HR	Finance	Sales	IT	Operations
Women (%)	50	30	40	25	20

23. What is the total number of women employees in the company?
 (a) 300 (b) 321 (c) 330 (d) 350
24. What is the ratio of the number of men in Sales to the number of men in IT?
 (a) 2 : 3 (b) 5 : 6 (c) 3 : 4 (d) 3 : 2
25. Women in Finance are approximately what percentage of all the women employees?
 (a) 20% (b) 30% (c) 15.5% (d) 18.7%
26. Which department has the largest number of men?
 (a) Sales (b) Finance (c) IT (d) Operations

27. If 20% of the men in IT are transferred to Operations, approximately what percentage of the Operations staff will then be women?
- (a) 20% (b) 14.9% (c) 17.5% (d) 12.4%

Directions (Questions 28 to 30): Each question is followed by two statements. Decide whether the statements are sufficient to answer the question.

28. What is the two-digit number?
1. The sum of its digits is 9.
 2. The number formed by reversing its digits is 27 more than the number.
- (a) Statement 1 alone is sufficient
(b) Statement 2 alone is sufficient
(c) Both statements together are sufficient, but neither alone
(d) Even both statements together are not sufficient
29. How many students are there in the class?
1. Ravi is 12th from the top and 18th from the bottom in the class.
 2. There are 10 girls in the class.
- (a) Statement 1 alone is sufficient
(b) Statement 2 alone is sufficient
(c) Both statements together are sufficient, but neither alone
(d) Even both statements together are not sufficient
30. What is the rate of simple interest per annum?
1. The interest on a sum for 3 years is ₹1,500.
 2. A sum of ₹4,000 amounts to ₹5,600 in 4 years.
- (a) Statement 1 alone is sufficient
(b) Statement 2 alone is sufficient
(c) Both statements together are sufficient, but neither alone
(d) Even both statements together are not sufficient

ANSWER KEY

1	2	3	4	5	6	7	8	9	10
(b)	(d)	(a)	(c)	(b)	(a)	(c)	(d)	(b)	(a)
11	12	13	14	15	16	17	18	19	20
(d)	(c)	(a)	(b)	(d)	(c)	(a)	(d)	(b)	(a)
21	22	23	24	25	26	27	28	29	30
(c)	(d)	(b)	(a)	(d)	(c)	(b)	(c)	(a)	(b)

DETAILED SOLUTIONS

1. Answer: (b) 654

2022: $180 + 120 + 168 + 96 + 90 = 654$ thousand units.

2. Answer: (d) 75%

$$\frac{105 - 60}{60} \times 100 = \frac{45}{60} \times 100 = 75\%$$

3. Answer: (a) 113.25

$$\frac{90+108+120+135}{4} = \frac{453}{4} = 113.25 \text{ thousand units.}$$

4. Answer: (c) 7 : 6

C in 2021 = 140 and D in 2023 = 120. $140 : 120 = 7 : 6$.

5. Answer: (b) 3

A (120, 150, 180, 200), B (90, 108, 120, 135) and E (60, 75, 90, 105) rise every year.

C falls in 2021 ($150 \rightarrow 140$) and D falls in 2022 ($100 \rightarrow 96$). So 3 companies.

6. Answer: (a) 2019

Deficit = imports – exports: 2019: 10, 2020: 3, 2021: 5, 2022: 6, 2023: -5 (a surplus).

The largest deficit was in 2019.

7. Answer: (c) 25%

$$\frac{75 - 60}{60} \times 100 = 25\%$$

8. Answer: (d) 289

$$50 + 48 + 55 + 66 + 70 = 289.$$

9. Answer: (b) 1

Exports exceed imports only in 2023 ($75 > 70$).

10. Answer: (a) 90.9%

$$\frac{50}{55} \times 100 = \frac{10}{11} \times 100 \approx 90.9\%$$

11. Answer: (d) 2021

Differences: 2018: 20, 2019: 20, 2020: 20, 2021: 30, 2022: 10, 2023: 20.

The largest difference, 30, is in 2021.

12. Answer: (c) 160

$$\frac{100 + 130 + 160 + 150 + 190 + 230}{6} = \frac{960}{6} = 160$$

13. Answer: (a) 130%

$$\frac{230 - 100}{100} \times 100 = 130\%$$

14. Answer: (b) 2

Y is above X in 2020 ($160 > 140$) and 2023 ($230 > 210$): 2 years.

15. Answer: (d) 25 : 24

Total X = 120 + 150 + 140 + 180 + 200 + 210 = 1000. Total Y = 960.

$$1000 : 960 = 25 : 24.$$

16. Answer: (c) ₹18,000

30% of ₹60,000 = ₹18,000.

17. Answer: (a) 54°

$$15\% \times 3.6^\circ = 54^\circ.$$

18. Answer: (d) ₹6,000

Rent – Transport = 20% – 10% = 10% of ₹60,000 = ₹6,000.

19. Answer: (b) ₹10,800

New income = 1.2 × 60,000 = ₹72,000. Savings = 15% of 72,000 = ₹10,800.

20. Answer: (a) 35.3%

Amount spent (excluding savings) = 100% – 15% = 85% of the income.

$$\text{Food as a percentage of this} = \frac{30}{85} \times 100 \approx 35.3\%.$$

21. Answer: (c) Both statements together are sufficient, but neither alone

Statement 1 alone: length + 200 = 20 × speed; two unknowns, so not sufficient. Statement 2 alone: length = 10 × speed; not sufficient.

Together: 10v + 200 = 20v, so v = 20 m/s. Both together are sufficient.

22. Answer: (d) Even both statements together are not sufficient

The profit percentage needs the selling price, which is not given; the marked price need not equal it.

Even together they are not sufficient.

23. Answer: (b) 321

Women: HR 60, Finance 60, Sales 100, IT 75, Operations 26.

$$\text{Total} = 60 + 60 + 100 + 75 + 26 = 321.$$

24. Answer: (a) 2 : 3

Men in Sales = 250 – 100 = 150. Men in IT = 300 – 75 = 225.

$$150 : 225 = 2 : 3.$$

25. Answer: (d) 18.7%

$$\text{Women in Finance} = 60. \frac{60}{321} \times 100 \approx 18.7\%$$

26. Answer: (c) IT

Men: HR 60, Finance 140, Sales 150, IT 225, Operations 104. IT has the most.

27. Answer: (b) 14.9%

Men in IT = 225, so 20% of them = 45 move to Operations.

Operations then has 130 + 45 = 175 staff, of whom 26 are women: $\frac{26}{175} \times 100 \approx 14.9\%$.

28. Answer: (c) Both statements together are sufficient, but neither alone

Statement 1 alone: 18, 27, 36, 45, ... all have digit sum 9. Not sufficient.

Statement 2 alone: the units digit is 3 more than the tens digit (14, 25, 36, ...). Not sufficient.

Together: a + b = 9 and b – a = 3 give a = 3, b = 6. The number is 36. Both together are sufficient.

29. Answer: (a) Statement 1 alone is sufficient

Statement 1: total = 12 + 18 – 1 = 29. Sufficient alone.

Statement 2 gives only the number of girls. Not sufficient.

30. Answer: (b) Statement 2 alone is sufficient

Statement 1 alone: the sum is not known, so the rate cannot be found.

Statement 2 alone: interest = ₹1,600 in 4 years on ₹4,000, so rate = $\frac{1600 \times 100}{4000 \times 4} = 10\%$. Sufficient.