Chapter 23 MASTERING DATA INTERPRETATION

PRACTICE EXERCISE 1

Directions for questions 1 to 4: ***Refer to the following chart and solve the questions based on it.***

The following table gives the career record in the One-Day Internationals of few of the Indian batsmen:

Name	Matches Played	Innings Played	Runs Scored	Average
Yuvraj	50	48	1800	40
Sachin	50	50	2034	45.2
Kapil	46	46	1679	36.5
Saurav	44	44	1539	40.5
Rahul	40	38	1806	51.6
Sehwag	42	40	1445	42.5

The average is calculated by dividing the total runs scored by the total number of matches in which the batsman got out.

1. Who among the following did not get out for the maximum amount of time in the total innings played?

(a) Yuvraj (b) Sachin
(c) Kapil (d) Sehwag

2. To reflect the performance of the players better, it was decided that the average would be calculated on the basis of the total innings played. Whose average will see the maximum change due to this?

(a) Yuvraj (b) Sachin
(c) Kapil (d) Sehwag

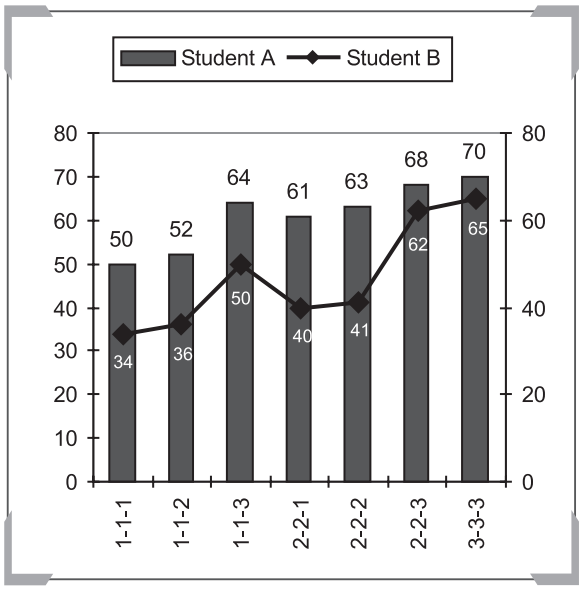
3. How many of the batsmen got out in all the innings played?
(a) 0 (b) 1
(c) 2 (d) Cannot be determined

4. To reflect the performance of the players better, it was decided that the average would be calculated on the basis of the total matches played. Whose average will see the minimum change due to this?
(a) Yuvraj (b) Sachin
(c) Kapil (d) Sehwag

Directions for questions 5 to 10: ***Refer to the following chart and solve the questions based on it.***

The bar chart given below represents the performance of two students A and B while studying three different subjects with different groups of teachers. Ratings given to the teachers are 1, 2, 3 with 1 being the lowest and 3 being the highest.

The bar chart also represents the percentage marks obtained by A and B in three subjects. Each subject carries 100 marks. Students always get integral marks in each subject. For example, if A studies all the three subjects from a group of teachers so that all the three teachers have 1 rating (low rating); then he gets 50% marks of the total marks of the three subjects.



5. What would be the change in the total marks obtained by student A when we compare the combination 1-1-1 and 1-1-3?
(a) 32 (b) 42
(c) 62 (d) Cannot be determined

6. What is the percentage change in the total marks obtained by student B when we compare the combination 1-1-3 and 2-2-2?
(a) 15% (b) 16%
(c) 17% (d) 18%

7. What can be the maximum marks obtained by student A in any of the three subjects with the combination of teachers being 1-1-3?

(a) 92 (b) 96
(c) 100 (d) None of these

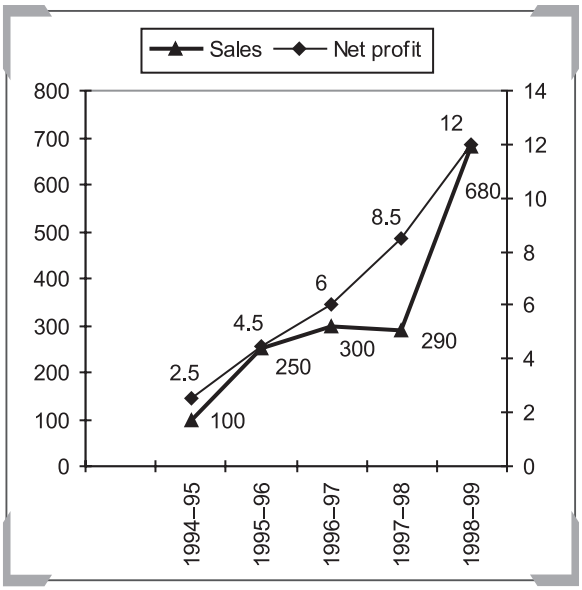
8. For which of the following options is the difference in the marks scored by student B the maximum?
(a) 1-1-1 and 3-3-3 (b) 1-1-1 and 1-1-3
(c) 1-1-1 and 2-2-3 (d) 1-1-2 and 3-3-3

9. For which of the following options are the marks scored by student A and student B the maximum?
(a) 1-1-1 (b) 1-1-3
(c) 2-2-3 (d) 2-2-2

10. It is allowed to choose two different bars from the above given bars, and the percentage marks obtained become weighted average of the percentage marks obtained, in the ratio of the presence of 3-rating teacher in the bar. In the absence of 3-rating teacher, weighted average should be calculated in the ratio of the presence of 2-rating teachers. For example, if we mix the third bar and 7th bar, we will have to find out the weighted average of 64% and 70% in the ratio 1 : 3 for student A. What would be the percentage marks obtained by the student B if he opts for 4th bar and 5th bar?
(a) 40.2% (b) 40.6%
(c) 40.8% (d) None of these

Directions for questions 11 to 14: ***Refer to the following chart and solve the questions based on it.***

The figure below represents sales and net profit (in ₹crore) of IVP Ltd, for five years from 1994-1995 to 1998-1999. During this period, the sales increased from ₹100 crore to ₹680 crore. Correspondingly, the net profit increased from ₹2.5 crore to ₹12 crore. (Net profit is defined as the excess of sales over total costs.)



11. The highest percentage growth in sales, relative to the previous year occurred in
(a) 1995-1996 (b) 1996-1997
(c) 1997-1998 (d) 1998-1999

12. The highest percentage growth in net profit, relative to the previous year, was achieved in
(a) 1998-1999
(b) 1997-1998
(c) 1996-1997
(d) 1995-1996

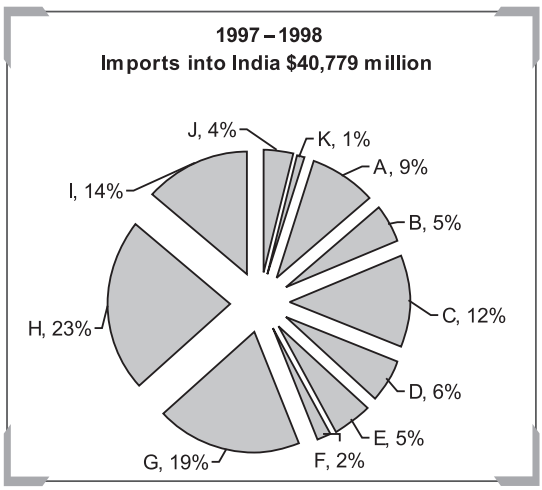
13. Defining profitability as the ratio of net profit to sales, IVP Ltd recorded the highest profitability in
(a) 1998-1999
(b) 1997-1998
(c) 1994-1995
(d) 1996-1997

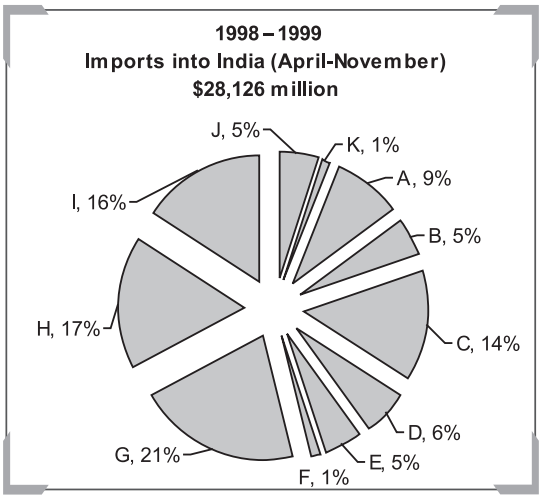
14. With profitability as defined in question 3, it can be concluded that
(a) Profitability is non-decreasing during the five years from 1994-1995 to 1998-1999.
(b) Profitability is non-decreasing during the five years from 1994-1995 to 1998-1999.
(c) Profitability remains constant during the five years from 1994-1995 to 1998-1999
(d) None of above

Directions for questions 15 to 18: ***Refer to the following chart and solve the questions based on it.***

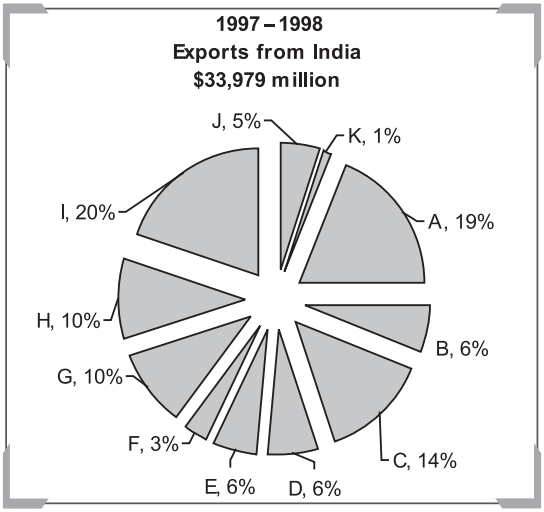
Consider the information provided in the figure below relating to India's foreign trade in 1997-1998 and the first eight months of 1998-1999. Total trade with a region is defined as the sum of exports and imports from that region. Trade deficit is defined as the excess of imports over exports; and it may be negative.

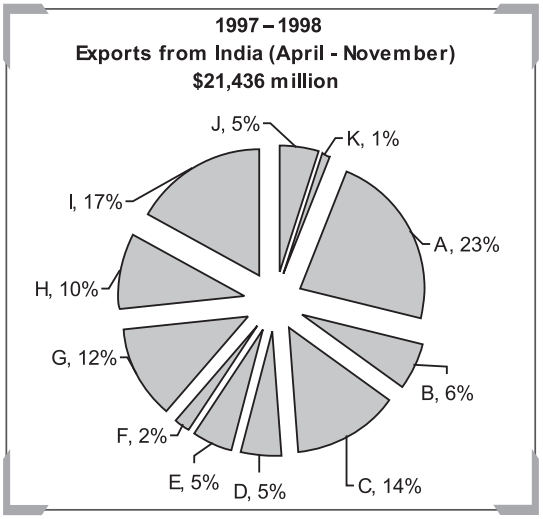
A. USA B. Germany
C. Other EU D. UK
E. Japan F. Russia
G. Other East-European countries
H. OPEC I. Asia
J. Other LDCs
K. Other Source of Imports





Destination of exports





15. With which region does India have the highest total trade in 1997-1998?
(a) USA (b) Other EU countries
(c) OPEC (d) Others

16. In 1997-1998, the amount of Indian exports (in million US $) to the region with which India has the lowest total trade, is approximately:
(a) 750 (b) 340
(c) 220 (d) 440

17. In 1997-1998, the trade deficit (in billion US $) for the region with which India has the highest trade deficit is approximately equal to
(a) 6.0 (b) 3.0
(c) 4.5 (d) 7.5

18. Which region has the lowest trade deficit with India in 1997-1998?
(a) USA (b) Asia
(c) Others (d) Other EU countries

Directions for questions 19 and 20: ***Answer the questions based on the following information:***

Assume that the average monthly exports and imports to India during the remaining four months of 1998-1999 are the same as that for the first eight months of the year.

19. To which region did India's exports register the highest percentage growth between 1997-1998 and 1998-1999?
(a) Other East-European countries
(b) USA
(c) Asia
(d) Exports have declined, therefore no growth

20. What is the percentage growth rate in India's total trade deficit between 1997-1998 and 1998-1999?
(a) 43% (b) 47%
(c) 50% (d) 40%

Directions for questions 21 to 25: ***Refer to the following chart and solve the questions based on it.***

The table below presents the data on the percentage of population covered by drinking water and sanitation facilities in select Asian countries.

Percentage Population Covered by Drinking Water and Sanitation Facilities

	Drinking Water			Sanitation Facilities		
	Urban	**Rural**	**Total**	**Urban**	**Rural**	**Total**
India	85	79	81	70	14	29
Bangladesh	99	96	97	79	44	48
China	97	56	67	74	7	24
Pakistan	82	69	74	77	22	47
Philippines	92	80	86	88	66	77

	Drinking Water			Sanitation Facilities		
	Urban	**Rural**	**Total**	**Urban**	**Rural**	**Total**
Indonesia	79	54	62	73	40	51
Sri Lanka	88	52	57	68	62	63
Nepal	88	60	63	58	12	1

Country A is said to dominate B or A > B as A has a higher percentage in total coverage for both drinking water and sanitation facilities; and B is said to be dominated by A, or B < A.

A country is said to be on the coverage frontier if no other country dominates it. Similarly, a country is not on the coverage frontier if it is dominated by at least one other country.

21. Which countries are on the coverage frontier?
(a) India and China
(b) Sri Lanka and Indonesia
(c) Philippines and Bangladesh
(d) Nepal and Pakistan

22. Which of the following statements are true?
I. India > Pakistan and India > Indonesia
II. India > China and India > Nepal
III. Sri Lanka > China
IV. China > Nepal
(a) I and III (b) II and IV
(c) I, II and III (d) II, III and IV

23. Using only the data presented under the 'Sanitation facilities' columns, it can be concluded that the rural population in India, as a percentage of its total population is approximately:
(a) 76 (b) 70
(c) 73 (d) Cannot be determined

24. Again, using only the data presented under the 'Sanitation facilities' columns, China, Indonesia and Philippines are sequenced in an ascending order of the rural population as a percentage of their respective total population. The correct order is:
(a) Philippines, Indonesia, China
(b) Indonesia, China, Philippines
(c) Indonesia, Philippines, China
(d) China, Indonesia, Philippines

25. India is not on the coverage frontier because
I. It is lower than Bangladesh in terms of the coverage of drinking water facilities.
II. It is lower than Sri Lanka in terms of the coverage of sanitation facilities.
III. It is lower than Pakistan in terms of the coverage of sanitation facilities.
IV. It is dominated by Indonesia.
(a) I and II (b) I and III
(c) IV (d) None of these

ANSWER KEYS

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

HINTS AND EXPLANATIONS

1. Yuvraj – 1800/40 = 45.
Hence, not-out in 3 innings.
Sachin – 2034/45.2 = 45.
Hence, not-out in 5 innings.
Kapil – 1679/36.5 = 46.
Hence, not-out in 0 inning.
Sehwag – 1445/42.5 = 34.
Hence, not-out in 6 innings.
Therefore, option (d) is the correct answer.

2. The difference is maximum in case of Sehwag.

3. Only Kapil got out in all the innings played. Take the help of the solution to Q 1.

4. Again, the difference is maximum in case of Sehwag & minimum for Kapil as he has played in all the innings & got out in all the matches. So, there will be no change in the average of Kapil by the new rule of calculating the average..

5. The difference in the total score = $64 \times 3 - 50 \times 3 = 42$ (Difference is caused by the teacher of the high rating only).

6. Marks obtained by student B in 1-1-3 & 2-2-2 are 50 & 41 respectively. So, % change is = $\frac{50-41}{50} \times 100\% = 18\%$.

7. A got average of 64 in 1-1-3. So, total marks in these 3 subjects is $3 \times 64 = 192$ marks. He must get 50 in 2 subjects of teachers of rating 1. So, he got 100 marks in 2 subjects & 92 in the 3rd subject.

8. Clearly the lowest & highest marks were obtained in 1-1-1 & 3-3-3.

9. Look at the bars for the maximum difference. It is the maximum in case of 2-2-2.

10. We would be required to find the weighted average of 40 and 41 in the ratio 2 : 3. Hence $(40 \times 2 + 41 \times 3)/5 = 40.6\%$

11. Using the graph, the percentage growth in sales are:

	Previous Sales	Current Sales	Difference	Percentage
1995-96	100	250	150	150%
1996-97	250	300	50	20%
1997-98	300	290	–10	–3.33%
1998-99	290	680	390	134.5%

It is but obvious from the above table that the maximum percentage increase relative to previous year occurred in 1995–1996.

12. We can again calculate the growth in profits.

	Previous Profit	Current Profit	Difference	Percentage
1995-96	2.5	4.5	2	80%
1996-97	4.5	6	1.5	33.33%
1997-98	6.0	8.5	2.5	41.66%
1998-99	8.5	12	3.5	41.2%

The highest percentage growth in net profit relative to the previous year was achieved in 1995-1996.

13.

	Net Profit	Net Sales	Ratio
1994-95	2.5	100	0.025
1995-96	4.5	250	0.02
1996-97	6	300	0.02
1997-98	8.5	290	0.03
1998-99	12	680	0.018

Therefore, profitability is maximum for 1997-1998.

14. It can be seen that profitability does not follow a fixed pattern and the first three statements try to generalize the profitability.
Therefore, they are not applicable and option (d) is the correct answer.

15. Total trade with a region = Sum of exports and imports from that region. From the pie charts for 1997-1998, we have the following sectors occupying the maximum area.

	Country	Exports	Imports	Trade
H	OPEC	3397.9	9379.2	12795.1
I	Asia	6796	5709	12505
G	East Europe	3397	7748	11145.9
C	EU	4757	4893.5	9650.5
A	USA	6456	3670	10126

Therefore, H-OPEC has the maximum trade with India in 1997-1998

16. Using the pie chart, the region having the lowest trade is K =
1% of imports + 1% of exports
So, Indian exports are 1% of 3397.9 which is roughly 340 millon US $.

17.

	Imports	Exports	Trade Deficit
A	3670.11	6456.01	–2785.9
B	2038.95	2038.74	0.21
C	4893.48	4757.06	136.42
D	2446.74	2038.74	408
E	2038.95	2038.74	0.21
F	815.58	1019.37	–203.79
G	7748.01	3397.9	4350.11
H	9379.17	3397.9	5981.27
I	5709.06	6795.8	–1086.74
J	1631.16	1698.95	–67.79

So, it can be seen that region H has the highest trade deficit of approximately $ 6,000 million or $ 6 billion.

18. Using the pie chart for 1997-1998, we can see that USA which is region A, has the lowest trade deficit.
(9% of imports – 19% of total exports)
(9/100 × 40779 – 19/100 × 33979)

19. Using the pie chart, we know that the exports have increased from three regions A, G and H as follows.

	Country	1998-99	1997-98
A	USA	7395.4	6456
G	East European Countries	3858.5	3397.9
H	OPEC	3215.4	3397.9

Now, the exports for 8 months have been given. According to new directions, we need to calculate exports for 12 months.

$\frac{21436 \times 12}{8}$ = $ 32,154 million

So, maximum percentage increase is from region A (USA).

20. Following is India's total trade deficit:

	Imports	Exports	Deficit
1997-98	40779	33979	6800
1998-99	42189	32154	10035

Total imports for 1998-1999

= 28126 × 12/8

= $ 42,189 million

Similarly, exports for 1998-1999

= 28126 x 12/8

= $ 32,154 million

Percentage growth rate

= 10035 – 6800/6800 x 100

= 47.6%

Therefore, option (b) is the correct answer.

21. Also, Bangladesh > Philippines (97 > 86) for drinking water.
And Philippines > any other country for sanitation facilities. Thus, countries are on the coverage frontier for two facilities.

22. A > B only if A has higher percentage in total coverage for both drinking water and sanitation facilities taken independently and not as a total of the two facilities.
Thus, only statement II and statement IV are true
India > China
(81 > 67 and 29 > 24)
India > Nepal
(81 > 63 and 29 > 18)
Also China > Nepal (67 > 63 and 24 >18)

23. Let the urban population be x and rural population be y.
Using the sanitation column, we have
$0.7x + 0.14y = 0.29(x + y)$
$0.41x = 0.15y$
So $x = 15/41y$
So, percentage of rural population

= y/x + y × 100

= y/15/41y + y × 100

= 41/56 × 100

= 73.2%

24. Use the method given in the last question to find the percentage of rural population for Philippines, Indonesia and China.

P	50%
I	66.66%
C	79.8%

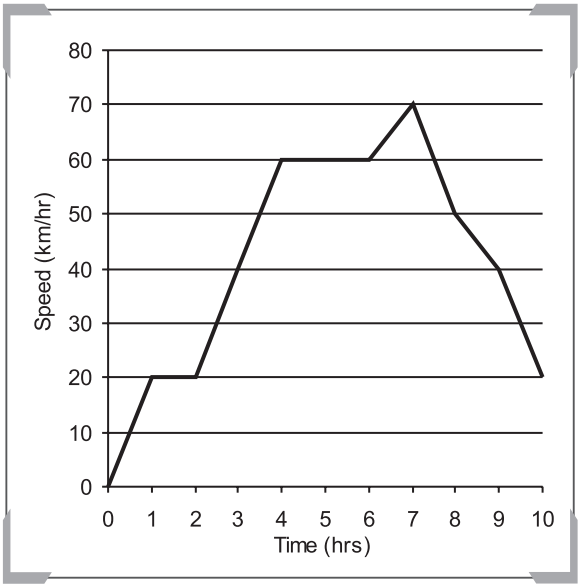
Thus, P < I < C

25. India is not on the coverage frontier because

(i) It is below Bangladesh and Philippines for drinking water.
(ii) For sanitation facilities it is below Philippines, Sri Lanka, Indonesia and Pakistan.

PRACTICE EXERCISE 2

Directions for questions 1 to 5: ***Go through the data set given below and solve the questions based on it.***



1. What is the average speed represented in the above graph?
(a) 32 km/h (b) 37 km/h
(c) 43 km/h (d) None of these

2. Considering two-hour slots from the beginning, the second highest distance covered in a two-hour slot was between
(a) 0 – 2 h (b) 2 – 4 h
(c) 4 – 6 h (d) 6 – 8 h

3. What is the highest rate of acceleration achieved during the whole period?
(a) 25 km/h^2 (b) 20 km/h^2
(c) 15 km/h^2 (d) 10 km/h^2

4. If the rate of deceleration of the 8th hour had continued further, the speed would have become zero in
(a) 9 hrs 10 mins (b) 10 hrs 30 mins
(c) 11 hrs 10 mins (d) None of these

5. For which of the given hours in the graph was the rate of change of speed **mi**nimum?
(a) 1st–2nd (b) 4th–5th
(c) 5th–6th (d) All of these

Directions for questions 6 to 9: ***Go through the data set given below and solve the questions based on it.***

In a management course, students of 2nd year are asked to select four optional subjects from the given list of seven optional subjects. There are ten students whose roll numbers are from 1 to 10. They have selected four optional subjects each. Their subjects selected are indicated by "X" marks.

Courses	Roll Number									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
TA	X		X	X		X		X	X	X
MBC		X	X		X	X		X		
YCA			X			X	X		X	X
DMBC	X	X		X	X		X	X		
XA		X					X		X	X
PG	X		X	X	X		X	X		
PM	X	X		X	X	X			X	X

6. Which of the following triple courses have maximum number of students in common?
(a) TA, MBC, YCA (b) DMBC, TA, PG
(c) YCA, PM, XA (d) DMBC, PG, XA

7. Which roll numbers have the maximum common number of optional subjects?
(a) 1 and 8 (b) 3 and 6
(c) 9 and 10 (d) None of these

8. Which optional subject was chosen by maximum number of students?
(a) XA (b) TA
(c) MBC (d) DMBC

9. Which roll numbers have the same optional subjects?
(a) 3 and 6 (b) 1 and 3
(c) 6 and 8 (d) 9 and 10

Directions for questions 10 to 14: ***Go through the data set given below and solve the questions based on it.***

A rating company rates the performance of three companies producing shoes. The points are allotted according to their sales. The point index (PI) of each of the companies = The number of lakh units sold during the month × points allotted.

Table 1

The number of lakh units sold = y	Points allotted
$y < 5$	3
$5 < y < 8$	4
$8 < y < 11$	5
$y > 11$	6

The following table shows the number of lakh units sold of each of the brands—Moon, Warle and Enivi—from Jan 07 to June 07.

Table 2

Name of month	Moon	Warle	Enivi	Rank of months according to PI
Jan 07	7	4	–	4
Feb 07	–	13	–	1
Mar 07	–	–	–	5
Apr 07	–	–	–	6
May 07	–	–	–	2
Jun 07	–	–	10	3

Note:

1. The number of lakh units sold by all the three companies in each of the months is identical.
2. The sum of the number of lakh units sold by each of the companies in all the six months together is identical.
3. The number of lakh units sold by any of the companies in any one of the months is at least 1.
4. The number of lakh units sold by exactly two companies in each of the months Feb 07, Mar 07 and Apr 07 is identical.
5. The Point Index of Jan 07 and May 07 is 26 and 17 less than Feb 07 respectively. Also, the PI in Jan 07 is one more than that of March 07.
6. The number of lakh units sold by Moon in Mar 07 and Apr 07 together is equal to that in May 07.
7. The sum of PI in any month is not greater than 100.
8. The least possible Point Index (PI) is in Apr 07 for the sum of lakh units sold by all three companies.

10. What is the number of lakh units sold by Enivi in Mar 07?
(a) 5 (b) 6
(c) 4 (d) 7

11. Find the PI of all the three companies in Apr 07.
(a) 59 (b) 60
(c) 61 (d) 58

12. What is the number of lakh units sold by Moon in all the six months together?
(a) 34 (b) 32
(c) 36 (d) 38

13. What is the number of lakh units sold by Enivi in May 07?
(a) 7 (b) 4
(c) 5 (d) 8

14. What is the PI of Warle in all the six months together?
(a) 139 (b) 153
(c) 138 (d) 148

Directions for questions 15 to 20: ***Go through the passage given below and solve the questions based on it.***

Five cricket coaches B, D, J, L and W were being judged for the award of best coach of the year. The selection committee ranked them on five different parameters viz., Empathy, Vision, Focus, Creativity, and Intuitions. The five coaches were given points on these five parameters. The best coach gets 5 points and the worst coach gets 1 point. There are no ties. The coach with highest total gets the award of best coach. B gets the award by scoring 24 points. W gets 5 points in Creativity and 3 points in Intuition. J got same score in four of the given five parameters. Their final standings were in alphabetical order of their names.

15. What is the overall score of J?
(a) 12 (b) 13
(b) 14 (c) Indeterminable

16. What is the rank of D in Creativity?
(a) 1st (b) 2nd
(c) 5th (d) Indeterminable

17. What are the points scored by J in Intuition?
(a) 1 (b) 2
(c) 4 (d) Indeterminable

18. If L scored his highest points in Empathy then what is the score of D in Vision?
(a) 1 (b) 2
(c) 3 (d) 4

19. For how many of the coaches given above, is it possible to determine the exact points obtained in different parameters?
(a) 2 (b) 3
(c) 4 (d) 5

20. If L gets a score of 2 in each—Empathy, Vision and Focus, then what is the rank of D in intuition?
(a) 2nd (b) 4th
(c) 3rd (d) 5th

ANSWER KEYS

1. (c)	**2.** (d)	**3.** (b)	**4.** (b)	**5.** (d)	**6.** (b)	**7.** (c)
8. (b)	**9.** (d)	**10.** (b)	**11.** (d)	**12.** (a)	**13.** (c)	**14.** (d)
15. (b)	**16.** (d)	**17.** (a)	**18.** (d)	**19.** (b)	**20.** (b)	

HINTS AND EXPLANATIONS

1 to 5

1. The average speed in first hour =10 km/hr
Average speed represented by the graph

$$= \frac{10 + 20 + 30 + 50 + 60 + 60 + 65 + 60 + 45 + 30}{10}$$

$$= \frac{430}{10} = 43\,\text{km/h.}$$

2. Distance covered in 0–2 hrs slot = 10 + 20 = 30 km
Distance covered in 2–4 hrs slot = 80 km
Distance covered in 4–6 hrs slot = 120 km
Distance covered in 6–8 hrs slot = 125 km

3. Acceleration = Change in velocity/h
= 20 km/h² in 1st, 3rd and 4th h

4. Deceleration in 8th hour = 20 km/h²
Speed at the end of 8th hour = 50 km/h
Speed will be zero after 't' h where $0 = 50 - 20 \times t$

$$= t = \frac{50}{20} = \frac{5}{2}\,\text{hours} = 2\frac{1}{2}\ \text{hrs.}$$

= Speed will be zero at 10 h 30 mts.

5. For all the given options, the change of speed = 0

6 to 9

6. (1) Roll nos 3 and 6
(2) Roll nos 1, 4 and 8
(3) Roll nos 9, 10
(4) Roll no 7

7. (1) Roll nos 1 and 8 have TA, DMBC and PG as common.
(2) Roll nos 3 and 6 have TA, MBC, YCA as common.
(3) Roll nos 9 and 10 have all the four common options.
(4) Roll nos 2 and 5 have MBC, DMBC and PM as common.

8. TA → 7 students
XA → 4 students
MBCA → 5 students
DMBC → 6 students

9. We can observe from the given table that roll no. 9 & 10 have same set of optional subjects.

15 to 20

Following table can be formed with the data given in the question:

	B	D	J	L	W
Empathy	5				
Vision	5				
Focus	5				
Creativity	4				5
Intuition	5				3
Total	24		Sum = 75 – 24 = 51		

We can see now that the minimum possible sum for W = 11.
Sum of points of the coaches are in the following order – B > D > J > L > W
And sum of the points of (D + J + L + W) = 5(1 + 2 + 3 + 4 + 5) – 24 (points of B) = 51
Hence, the point obtained by the remaining four coaches D, J, L and W will be 11, 12, 13, 15 respectively.
(Points obtained by any of J, L and W can not be other than 11, 12 and 13 because in that case, the sum of the points of the four coaches will be more than 51.)
Hence, the final points tally will be:

	B	D	J	L	W
Empathy	5	2/4	3	2/4	1
Vision	5	2/4	3	2/4	1
Focus	5	2/4	3	2/4	1
Creativity	4	1/2	3	1/2	5
Intuition	5	2/4	1	2/4	3
Total	**24**	**15**	**13**	**12**	**11**

Now all the questions can be answered.

15. Overall score of J is 13.

16. D scored 1 or 2 points in Creativity. So, his rank is either 4 or 5.

17. J scored 1 in Intution.

18. If L scored 4 in Empathy, he must have scored 2 in all other areas as his total score is 12. So, D got 4 in vision.

19. There are 3 coaches B, J & W for whom it is possible to exactly determine the points obtained in different parameters.

20. If L score 2 each in Empathy, Vision & Focus. The score of L in Creactivity & Intution must be 2 & 4 respectively. So, D must have scored 2 in Intution. So, rank of D in Intution is 4th.

PRACTICE EXERCISE 3

Directions for questions 1 to 7: ***Refer to the following table and solve the questions based on it.***

The following tables and charts show the details of the advertising expenses and corresponding results for XYZ Ltd.

During 2000–2004, the company issues ads in three different newspapers—TOI, HT and others.

Table 1 shows the year wise cost incurred by XYZ Ltd during the given period.

Table 2 shows the number of advertisements released in each publication during the given period.

Chart 1 shows the total number of enquiries generated at XYZ Ltd in response to the advertisements in each publication during the given period.

Chart 2 gives the number of clients (out of the total who enquire) who finally provide business to XYZ Ltd, as a result of its advertising in each publication during the given period.

Table 3 shows the average amount of business per new client for XYZ Ltd as a result of its advertising in each publication in during the given period. (Assume that all new clients in a year are a result of the advertising in that specific year only and the clients responding to advertising in different publications are mutually exclusive)

Table 1

Total Money Spent (₹Lacs)

Year	TOI	HT	Others
2000	3.5	3.2	2
2001	5	3.4	2.8
2002	6.2	4	5.2
2003	8	4.8	4.4
2004	14	3.5	3.1

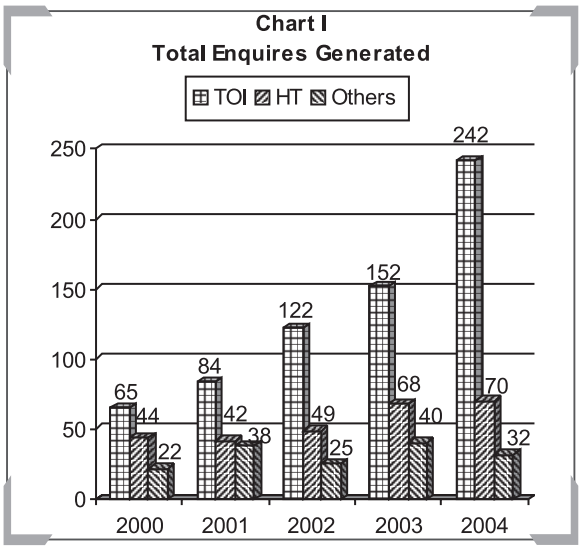
Table 2

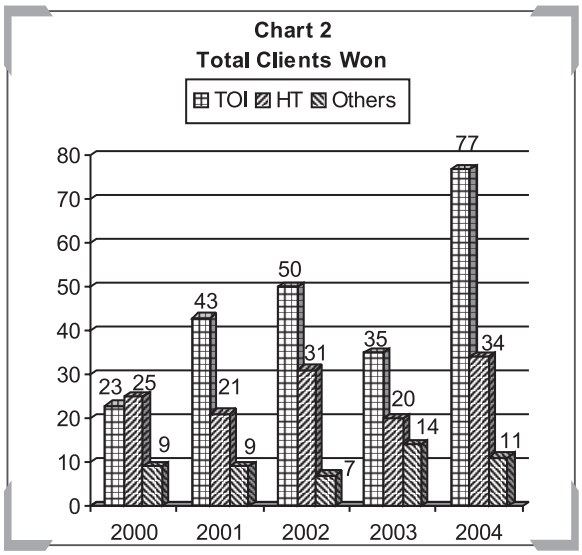
Number of Ads

Year	TOI	HT	Others
2000	10	12	15
2001	12	15	17
2002	15	20	36
2003	19	24	22
2004	38	18	30

Table 3

Average Business/Client (₹lacs)			
Year	**TOI**	**HT**	**Others**
2000	0.25	0.19	0.12
2001	0.19	0.28	0.09
2002	0.28	0.15	0.18
2003	0.31	0.55	0.22
2004	0.44	0.38	0.15





For advertising in any publication in any year (or period):

(i) Response ratio is the average number of enquiries generated per advertisement.

(ii) Conversion ratio is the percentage of clients who provide business out of those who enquire.

(iii) Success ratio is the average number of clients won per advertisement.

(iv) Return ratio is the ratio of business generated to the money spent on advertising.

1. During the given period, the average cost per advertisement for XYZ Ltd was highest in

(a) TOI (b) HT

(c) Others (d) Cannot be determined

2. The response ratio in a single year during the given period was highest for advertising in

(a) TOI in 2003 (b) HT in 2004

(c) Others in 2001 (d) TOI in 2002

3. The response ratio during the given period was the lowest in which of the publications?

(a) TOI (b) HT

(c) Others (d) Cannot be determined

4. The lowest conversion ratio for advertising by XYZ Ltd in HT was observed in

(a) 2001 (b) 2003

(c) 2002 (d) 2000

5. Which of the following shows the correct order of the conversion ratios for advertising by XYZ Ltd in the three publications during the given period?

(a) TOI > HT > Others (b) HT > Others > TOI

(c) HT < TOI < Others (d) Others < TOI < HT

6. For XYZ Ltd, the success ratio for advertising in the TOI during the given period was approximately what percentage of the success ratio for advertising in others in 2003?

(a) 525% (b) 425%

(c) 350% (d) 285%

7. In how many years during the given period was the success ratio for advertising in the TOI greater than the success ratio for advertising in the HT?

(a) 5 (b) 4

(c) 3 (d) 2

Directions for questions 8 to 13: ***Refer to the following table and solve the questions based on it.***

The tables given below show the currency exchange rates in April 2005 and April 2004 respectively. For any currency row, the value corresponding to each column shows that currency's exchange rate with the currency column. For example, in April 2005, one dollar was equivalent to ₹43.750

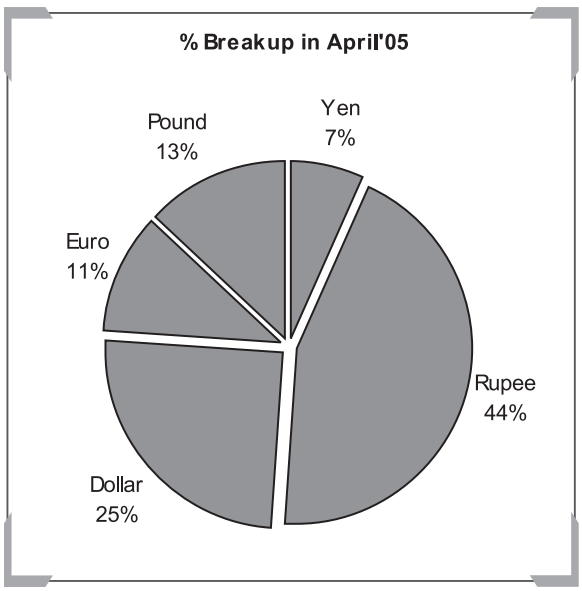
Chart 3 and Chart 4 show the percentage break-up of rupee equivalent of currency reserves of a company in April 2005 and April 2004 respectively. The rupee equivalent reserves of a currency are the currency reserves calculated in rupee terms based on the prevalent exchange rate between the rupee and that currency. For example, reserves of 1000 euros in April 2004 would constitute rupee equivalent reserves of ₹53,000. The rupee equivalent of currency reserves for the company was ₹5 crores in April 2004, and grew by 40% in the next one year.

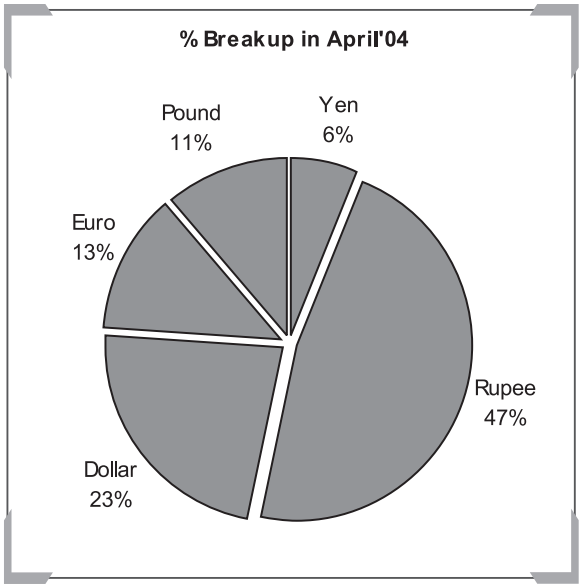
Table 1

Currency Rates (April 2005)					
Currency	**Rupee**	**Dollar**	**Euro**	**Pound**	**Yen**
Rupee	----	0.023	0.018	0.012	0.024
Dollar	43.750	----	0.770	0.535	1.065
Euro	56.790	1.298	----	0.695	1.382
Pound	81.750	1.869	1.440	----	1.990
Yen	41.090	0.939	0.724	0.503	----

Table 2

Currency Rates (April 2004)					
Currency	**Rupee**	**Dollar**	**Euro**	**Pound**	**Yen**
Rupee	----	0.020	0.019	0.013	0.029
Dollar	50.000	----	0.880	0.612	1.217
Euro	53.000	1.211	----	0.648	1.290
Pound	75.000	1.714	1.321	----	1.825
Yen	35.000	0.800	0.616	0.428	----





8. The dollar currency reserves for the company (in $ million) in April 2004 was closest to
(a) 11.5 (b) 4.0
(c) 2.3 (d) 0.25

9. The rupee equivalent (in rupees million) of the Yen reserves for the company in April 2005 was closest to
(a) 49 (b) 1.3
(c) 5 (d) 0.12

10. The ratio of money in dollar reserves to the money in euro reserves for the company in April 2004 was
(a) 7 : 4
(b) 3 : 5
(c) 9 : 4
(d) Cannot be determined

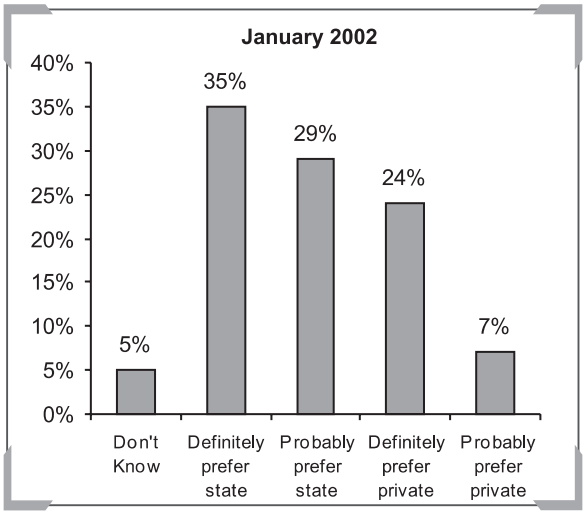
11. The money in pound reserves in April 2005 was how many times the money in Yen reserves in April 2004?
(a) 1.65 (b) 1.82
(c) 3 (d) Cannot be determined

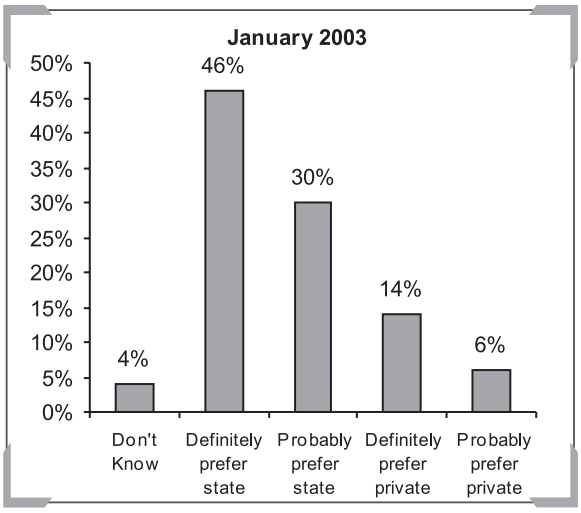
12. Between April 2004 and April 2005, by what percentage did the rupee reserves grow?
(a) 22%
(b) 31%
(c) 49%
(d) Cannot be determined

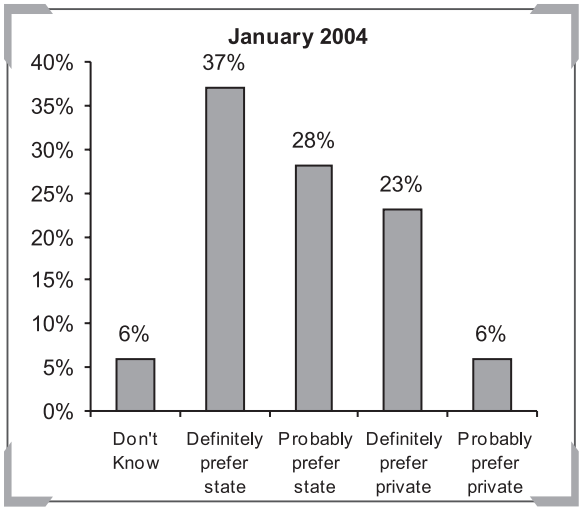
13. Between April 2004 and April 2005, the company's reserves of which currency saw the maximum absolute increase (in rupee equivalent terms)?
(a) Dollar (b) Euro
(c) Pound (d) Rupee

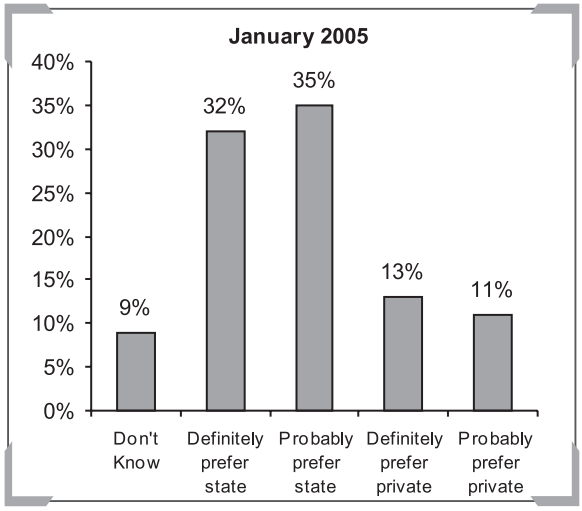
Directions for questions 14 to 20: ***Refer to the following table and solve the questions based on it.***

The following charts show the responses of the population of the state of ABC over a four-year period, to the question—"Is State ownership the best way to run an enterprise OR an enterprise is best run by private entrepreneurs?" The eligible voting population of ABC was 2.4 million in January 2003 and can be assumed to have grown by 20% each year during the period January 2002–January 2005. The entire eligible population voted in each of the four years and every person casted a vote in favour of only one of the five options shown each year.









14. For how many options during the given period did the number of people voting in favour of the options, increase in each year, relative to the the previous year?

(a) 2 (b) 3

(c) 1 (d) None

15. For how many options during the given period did the number of people voting in favour of the options, decrease in each year, relative to the previous year.

(a) 2 (b) 3

(c) 1 (d) None

16. The greatest absolute increase, between January 2002 and January 2005, in the number of people voting for an option was observed for:

(a) Definitely prefer private

(b) Probably prefer state

(c) Probably prefer private

(d) Don't know

17. For which option did the number of people casting their vote decrease between January 2002 and January 2005?
(a) Definitely prefer state
(b) Probably prefer state
(c) Definitely prefer private
(d) None

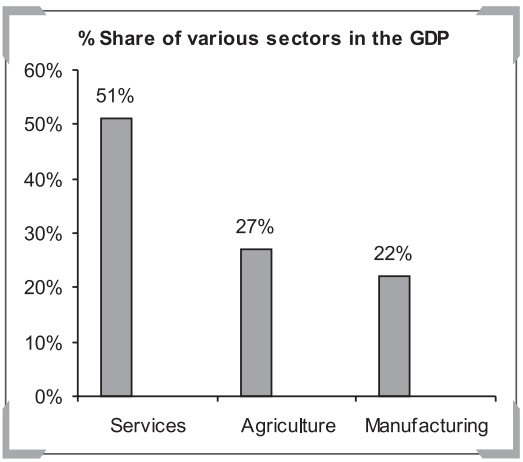
18. The greatest percentage increase, between January 2002 and January 2005, in the number of people voting for an option took place for
(a) Definitely prefer private
(b) Probably prefer state
(c) Probably prefer private
(d) Don't know

19. The greatest number of votes cast in favour of an option in a single year were for
(a) Definitely prefer state
(b) Probably prefer private
(c) Probably prefer state
(d) Don't know

20. What is (most nearly) the cumulative difference, over the entire period, between the number of votes in favour of 'state ownership'(definitely/probably) and the number of votes in favour of 'private ownership'(definitely/probably)?
(a) 2.2 million
(b) 5.4 million
(c) 3.3 million
(d) 6.3 million

Directions for questions 21 to 25: ***Refer to the following table and solve the questions based on it.***

The following charts show the sectorwise percentage break-up of $ 650 billion, which is the GDP of the country with a population of 12 billion people. 70% of the population of the country constitutes its working population, engaged in the various sectors of the economy and contributing to the GDP.



Productivity is defined as the average amount contributed to the GDP per person in that group or sector.

21. Which of the following groups/sectors has the lowest productivity?
(a) Agriculture sector workers
(b) Manufacturing sector workers
(c) Services sector workers
(d) Non-working population

22. What is the approximate difference in the number of people involved in the agriculture sector and the services sector?
(a) 1.8 billion
(b) 2.5 billion
(c) 4 billion
(d) 5.7 billion

23. What percentage of the country's total population is engaged in the manufacturing sector?
(a) 17.5%
(b) 35.7%
(c) 25%
(d) Indeterminate

24. The productivity for how many sectors is more than the productivity of the entire population of the country?
(a) 0 (b) 1
(c) 2 (d) 3

25. In the next year, the work force engaged in each of the sectors maintains its productivity at the same level. If there is an increase of 5% in the work-force for each of the sectors, then the productivity of the country has:
(a) Increased
(b) Decreased
(c) Remained same
(d) Cannot be determined

ANSWER KEYS

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

HINTS AND EXPLANATIONS

Table 1

Total Money Spent (₹Lacs)

Year	TOI	HT	Others
2000	3.5	3.2	2
2001	5	3.4	2.8
2002	6.2	4	5.2
2003	8	4.8	4.4
2004	14	3.5	3.1
Total	36.7	18.9	17.5

Table 2

Average of Ads

Year	TOI	HT	Others
2000	10	12	15
2001	12	15	17
2002	15	20	36
2003	19	24	22
2004	38	18	30
Total	94	89	120

Table 3

Average Business/Client (₹Lacs)

Year	TOI	HT	Others
2000	0.25	0.19	0.12
2001	0.19	0.28	0.09
2002	0.28	0.15	0.18
2003	0.31	0.55	0.22
2004	0.44	0.38	0.15
Total	1.47	1.55	0.76

Table 4

Total Client Won

Year	TOI	HT	Others
2000	23	25	9
2001	43	21	9
2002	50	31	7
2003	35	20	14
2004	77	34	11
Total	228	131	50

Table 5

Total Enquiries Generated

Year	TOI	HT	Others
2000	65	44	22
2001	84	42	38
2002	122	49	25
2003	152	68	40
2004	242	70	32
Total	665	273	157

1 to 7

1. While the amount of money spent on ads in TOI is the maximum (nearly twice as that on ads in HT or others), the number of ads is nearly the same as that in HT and less than that in others.

2. Response ratio: Average number of enquiries generated (Table 4) per advertising (Table 2)
(a) TOI in 2003:152/19 = 8
(b) HT in 2004:70/18 < 4
(c) Others in 2001:38/17 < 2.5
(c) TOI in 2002:122/15 > 8
So, amongst the given options, TOI in 2002 had the highest response ratio.

3. Amongst the three publications, the total number of clients (Table 5) to the number of enquiries generated was the least while the number of ads was the higher for others. So , the response ratio for others was the lowest during the given period.

4. Conversion ratio: Ratio of number of clients (Table 5) to the number of enquires generated (Table 4)
For HT:
2001:21/42 = 50% 2003: 20/68 < 33% 2002:31/49 > 60%
2000:25/44 > 55%
So, amongst the given options, HT had the lowest conversion ratio in 2003.

5. Conversion ratio: Ratio of number of clients (Table 5) to the number of enquiries generated (Table 4) over the entire period
TOI: 228/665 > 33% HT:131/273 = 48% Others: 50/157 < 33%
So, the conversion ratios are in the order: Others < TOI < HT

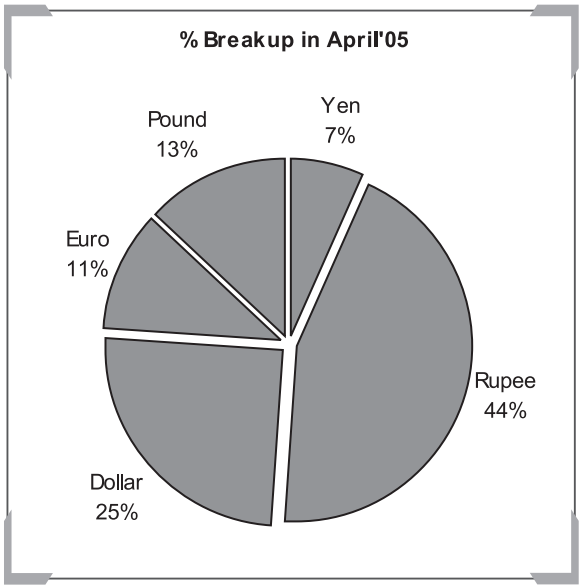
6. Success ratio of number of clients (Table 5) to number of ads (Table 2)
Success ratio for TOI over the entire period = 228/94 = 2.43; Success Ratios for others in 2003 = 14/22 = 0.63
Required percentage = 2.43 – 0.63/0.63 x 100 = 285% (You can see that it is < 300%)

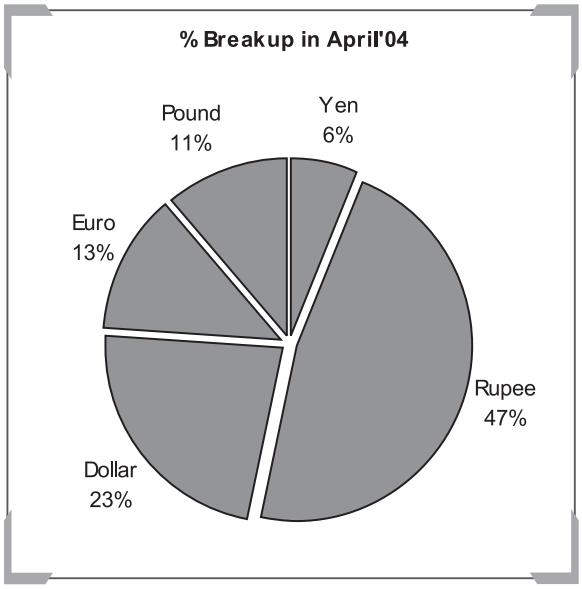
7. You need not calculate the success Ratios in 2001,2002 and 2003 to compare since the number of clients won by TOI is higher than HT and the number of ads in TOI is lower than HT in each of these years. So, the success ratio for TOI is higher than for HT in these 3 years. Comparing the success ratios for 2000 (when number of clients is less for TOI) and 2004 (when number of ads in TOI is more):

2000:	Success ratio for TOI = 23/10 = 2.3;
	Success ratio for HT = 25/12 = 2.083 < 2.3
2004:	Success ratio for TOI = 77/38 > 2;
	Success ratio for HT = 34/18 < 2

So, the success ratio for TOI > the success ratio for HT in each of the 5 years.

8 to 13





8. Dollar reserves in April 2004 = 0.23 × 5 = ₹1.15 crores = ₹11.5 million
= $ 11.5/50 million = $ 0.23 million ≈ 0.25 million

9. Yen reserves in April 2005 = 7% of ₹7 crores = ₹0.49 crores
= ₹4.9 million ≈ 5 million

10. The ratio of the amount of reserves in dollar to that in euro is the same as the ratio of their respective percentages in rupee equivalent terms i.e., 23 : 13 which is very close to 7 : 4.

11. Rupee equivalent in pound reserves in April 2005 = 13% of 7 crores = 0.91 crores
Rupee equivalent Yen reserves in April 2005 = 6% of 5 crores = 0.3 crores
➪ the money in pound reserves in April 2005 is nearly three times the money in Yen reserves in April 2004.

12. Rupee reserves in April 2004 = 47% of 5 crores = 2.35 crores
Rupee reserves in April 2005 = 44% of 7 crores = 3.08 crores
Percentage increase in Rupee reserves = 308 – 235/235 × 100
= 73/235 × 100 = 31%
The following table summarizes the status of reserves of various currencies (in Lacs)

	2004	2005	Absolute Increase	% Increase
Rupee	235.00	308.00	73.00	31.06
Dollar	2.30	4.00	1.70	73.91
Euro	1.23	1.36	0.13	10.56
Pound	0.73	1.11	0.38	51.79
Yen	0.86	1.19	0.34	39.13

13. Absolute change for Dollar reserves
= 0.25 × 700 – 0.23 × 500 = ₹60 lacs
Absolute change for Euro reserves
= 0.11 × 700 – 0.13 × 500 = ₹12 lacs
Absolute change for Pound reserves
= 0.13 × 700 – 0.11 × 500 = ₹36 lacs
Absolute change for Rupee reserves
= 0.44 × 700 – 0.47 × 500 = ₹73 lacs
Absolute change for Yen reserves
= 0.07 × 700 – 0.06 × 500 = ₹19 lacs

➪ The maximum absolute increase is for the Rupee (change of 73 lacs)

14 to 20

The population of ABC in January 2002 was 2.4/1.2 = 2 million; in January 2003 was 2.4 million;

In January 2004 was 2.4 × 1.2 = 2.88 million; in January 2005 was 2.4 x $(1.2)^2$ =3.46 million

14. Since the voting population increases by 20% each year, an increase in the number of people choosing an option would take place between any two years if:

(i) the percentage of people choosing an option would remain the same or increase between the two years

(ii) 1.2 × percentage in the second year ≥ percentage in the first year

Increase in each year, from 2003 to 2005, happens only for 'probably prefer state' and 'probably prefer private'

15. Using the reverse of the above conditions, you can see that the actual percentage voting for each one of the options increased in at least one of the years. Hence, none of the options saw a continuous decrease over the period.

16. Assume that P_1 and P_2 are the percentage votings for an option in January 2002 and January 2005 respectively. Then, the greatest absolute increase in the number of people would be for the option for which $(3.46P_2 – 2P_1)$ is the highest. This is the highest for the option 'probably prefer state'.

17. Assume that P_1 and P_2 are the percentage voting for an option in January 2002 and January 2005 respectively. A decrease in the number of people would take place for the option for which $(3.46\ P_2 - 2\ P_1) < 0$. This is so for the option 'definitely prefer private'.

18. Assume that P_1 and P_2 are the percentage votings for an option in January 2002 and January 2005 respectively. Then, the greatest percentage increase in the number of people would be for the option for which $3.46P_2 - 2\ P_1/2P_1$ is the highest or $1.73\ P_2/P_1$ or P_2/P_1 is the highest. This is clearly the case for the option 'don't know'.

19. For 2002, 2003 & 2004 the highest percentage is for D.P.S. (Definitely Prefer State). The maximum was 46% in 2003 & the number of voter for this, must be more than 2002 & 2004 clearly which has 35% & 37% respectively.

Number of voter for D.P.S. in 2003 = 46% of 2.4 × 1.2 = 1.32 million. In 2005, the highest percentage is for P.P.S. (Preferably Prefer State).

Number of voter for P.P.S. in 2005 = 35% of 1.2 × 1.2 × 1.2 × 2.4 = 1.45 million. So, the highest voter in 1 year were obtained by P.P.S.

20. In 2002 the population is 2.4 million

Number of voter for state ownership = 35% + 29% = 64% of 2.4 million = 1.53 million.

Number of voter for private ownership = 24% + 7% = 31% of 2.4 million = 0.74 million.

In 2003, the population is 2.4 million + 20% of 2.4 million = 2.88 million.

Number of voter for state ownership = 46% + 30% = 76% of 2.88 million = 2.19 million.

Number of voter for private ownership = 14% + 6% = 20% of 2.88 million = 0.58 million.

In 2004, the population is 2.88 million + 20% of 2.88 million = 3.45 million.

Number of voters for state ownership = 37% + 28% = 65% of 3.46 million = 2.25 million.

Number of voters for private ownership = 23% + 6% = 29% of 3.46 million = 1.00 million.

In 2005, the population is 3.46 million + 20% of 3.46 million = 4.15 million.

Number of voters for state ownership = 32% + 35% of 4.15 million = 2.78 million.

Number of voters for private ownership = 13% + 11% of 4.15 million = 1.00 million. Required difference = 5.4 million.

21 to 25

Population = 12 billion ⟹working population = 0.7 × 12 = 8.4 billion.

	Contribution to GDP ($ billion)	Number of People (billion)	Productivity ($/person)
Agriculture	= 0.27 of 650 = 175.5	= (22/36) of 8.4 = 5.13	34.2
Manufacturing	= 0.22 of 650 = 143	= (9/36) of 8.4 = 2.1	68.1
Services	= 0.51 of 650 = 331.5	= (5/36) of 8.4 = 1.17	284.1
Working population	650	= 0.7 of 12 = 8.4	77.4
Total population	650	12	54.2

21. Non-working population contributes nothing to the GDP; hence, its productivity is zero.

22. Required difference = 5.13 – 1.17 = 3.96 billion ≈ 4 billion

23. Required percentage = 2.1/12 × 100 = 17.5%

24. The productivity of total population = 54.2. The productivity of the manufacturing & services sectors is more than 54.2.

Correct option is (c)

25. Since we do not know anything about the non-working population, we cannot determine the answer.