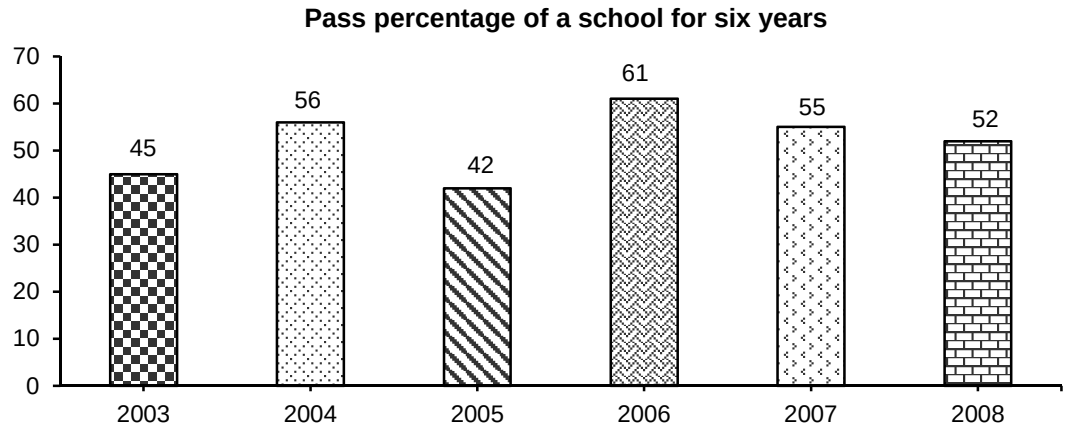
CHAPTER – 8
REASONING BASED DI

Worked out Examples:

These questions are based on the following information.



Note: The bar graph gives the number of students passed as a percentage of the total number of students of a school for six years.

8.01. If the number of students appearing for the exam in the school in each of the six years was the same, the number of students passing in 2006 is approximately what percentage of that in 2005?
(A) 130% (B) 145% (C) 155% (D) 175%

Sol: As the number of students appearing for the exam in each year is the same, the ratio of students passing out in 2006 and 2005 is 61 : 42.

$\therefore$ The required percentage = $\frac{61}{42}\times 100$ = 145.2%.

Choice (B)

8.02. If the number of students passing out of the school was the highest in the year 2007 and was 550, what was the maximum number of students who appeared for the exam in 2006?
(A) 900 (B) 840 (C) 800 (D) 750

Sol: As the number of students passing out in 2006 was less than 550, the number of students in 2006 (x) would be
61% of $x \le 549$

$x \le \frac{549}{61} \times 100 = 900$. Choice (A)

8.03. If the number of students who passed out of the school in the year 2005 and 2006 was in the ratio 2 : 3, then what is the ratio of the number of students who appeared for the exam in 2005 and 2006?
(A) 8 : 7 (B) 1 : 1 (C) 7 : 8 (D) 61 : 63

Sol: If the number of students who appeared for the exam in 2005 and 2006 are x and y.

$\frac{42x}{61y} = \frac{2}{3}$ = 1.26 x = 1.22y

or $\frac{x}{y} = \frac{1.22}{1.26} = \frac{61}{63}$. Choice (D)

8.04. If the ratio of the students who appeared for the exam in the years 2003 to 2007 are 2 : 3 : 4 : 3 : 2 : 3 respectively, then the pass percentage of the school in the six years together is
(A) 42%
(B) 47·5%
(C) 51·5%
(D) 55%

Sol: The pass percentage of the school in the six years together =

$\frac{2\times.45+3\times.56+4\times.42+3\times.61+2\times.55+3\times.52}{2+3+4+3+2+3}\times 100$

$= \frac{.90+1.68+1.68+1.83+1.1+1.56}{17}\times 100$

$= \frac{8.75}{17}\times 100$ = 51.5%. Choice (C)

8.05. If the numbers of students who passed out of the school in the year 2004 and 2005 are in the ratio 1 : 2, then what is the percentage increase in the number of students who studied in the school from 2004 to 2005?
(A) 37.5%
(B) 266.66%
(C) 66.66%
(D) 166.66%

Sol: Let the total number of students who studied in the years 2004 and 2005 be a and b respectively.

Given $\frac{56\%\text{ of } a}{12\%\text{ of } b} = \frac{1}{2} \Rightarrow \frac{a}{b} = \frac{42}{56\times 2} = \frac{3}{8}$

Let a = 3k, b = 8k

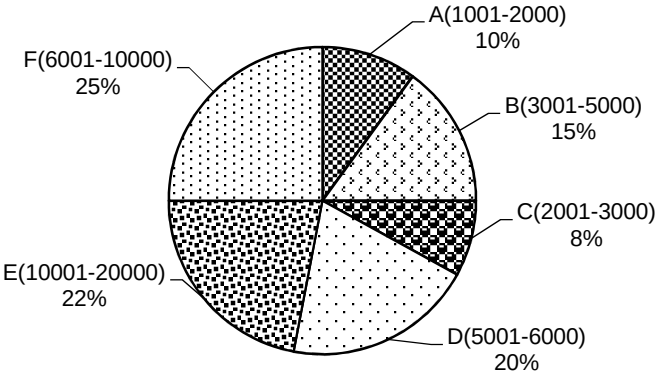
$\therefore$ Percentage increase in students

$= \frac{8k-3k}{3k}\times 100 = \frac{5k}{3k}\times 100 = 166.66\%$

Choice (D)

Exercise – 8(a)

Directions for questions 1 to 5: These questions are based on the following pie chart which shows the population-wise categorization of villages of a district into six groups A, B, C, D, E and F.



Note: The values given in the brackets indicate the range of population. For example, 10% of the total villages have a population in each of them in the range of 1001-2000. In the district there is no village whose population is less than or equal to 1000.

Directions for questions 1 to 5: Type in your answer in the input box provided below the question.

1. The number of villages having a population in the range of 3001-5000 is what percentage of the number of villages having a population in the range of 6001 – 10,000?

2. By what percent is the number of villages having a population of at least 1001 but at most 3000 more than the number of villages having a population of more than 3000 but at most 5000?

3. If the number of villages having a population in the range of 5001 to 6000 is 60, then what is the total number of villages having a population of more than 6000?

4. If the total number of villages in the district is 500, then how many villages have a population of at least 3001?

5. If the total population of all the villages in group-B is 45,000, then what is the minimum number of villages in group-B?

Directions for questions 6 to 10: These questions are based on the following table, which gives the distribution of marks of 160 students in five subjects. The maximum marks in each subject is 100.

Marks → / Subject ↓	70 and above	60 and above	50 and above	40 and above
Maths	83	108	127	143
Marati	91	113	139	151
Social	103	104	131	149
Statistics	108	139	149	156
English	93	105	117	139

6. How many students scored 50 marks or more but less than 60 marks in Social?
(A) 29 (B) 27 (C) 131 (D) 104

7. How many students scored less than 50% marks in English?
(A) 32 (B) 43 (C) 67 (D) 117

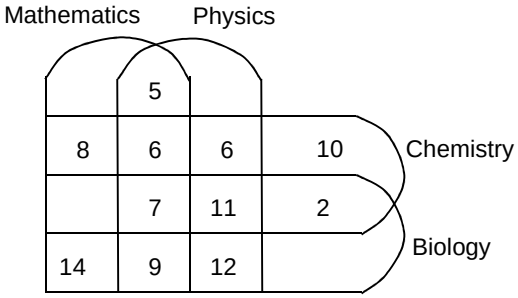
8. In which of the following subjects, is the number of students who scored 50 or more but less than 70, the highest?
(A) English (B) Maths
(C) Social (D) Marati

9. The number of students who scored more than 60 marks in all the given subjects is
(A) 104
(B) 105
(C) 113
(D) Cannot be determined

10. How many students scored less than 60 marks in Marati?
(A) 56 (B) 68
(C) 108 (D) 47

Directions for questions 11 and 12: These questions are based on the following information.

The Venn diagram below shows the number of students who study Mathematics, Physics, Chemistry and Biology. The total number of students studying the subjects in the given order is 64, 76, 63 and 72 respectively.



11. How many students study only Mathematics?
(A) 1 (B) 2
(C) 3 (D) Data insufficient

12. How many students study either Physics and Mathematics or Chemistry and Biology?
(A) 67 (B) 99 (C) 53 (D) 60

Directions for questions 13 to 16: These questions are based on the following information.

The following table gives the number of students in class I to IV in a school in two consecutive academic years – year I and year II. New students join the school only in class I and students leave the school only after passing out of class IV. Each year, students who pass the annual exams are promoted to the next class while students who fail, have to stay in the same class the next year also, and are joined by students who get promoted. It is known that 35 students passed out of class IV at the end of year I.

Class	Year I	Year II
I	36	34
II	42	38
III	31	39
IV	38	32

13. How many students joined the school in year II?
(A) 23 (B) 26
(C) 29 (D) 31

14. How many students failed in class I in year I?
(A) 1
(B) 2
(C) 3
(D) 4

15. How many students were promoted from class III at the end of year I?
(A) 21 (B) 29 (C) 30 (D) 31

16. How many students in the school failed in the annual exams in year I?
(A) 5 (B) 8
(C) 10 (D) None of these

Directions for questions 17 to 20: These questions are based on the following information.

The table gives the partial data on the expected number of emails to be sent from one email account to another email account (in billion) in the year 2020.

Expected Number of emails to be sent and received (in billions).

Server	Yahoo	mailcity	Hotmail	Msn	Eudora	Rediff	Total sent
Yahoo	180	200				115	1182
Mailcity	100		137				1784
Hotmail		300		317			2074
Msn			386		198		
Eudora	85				372		
Rediff		215		273			1818
Total received	2183				1800	1000	10,000

It is expected that in the year 2020, any particular email account (out of the six given) will receive at least 1 billion emails from each of the six email accounts. Also, any particular email account will send at least 1 billion emails to each of the six email accounts.

17. Find the maximum number of emails (in billion) which is expected to be sent from hotmail to hotmail in the year 2020?
(A) 1454 (B) 1457
(C) 1400 (D) 1386

18. Find the minimum number of emails (in billion) expected to be sent from either msn or hotmail to either Eudora or Msn.
(A) 515 (B) 520
(C) 517 (D) 508

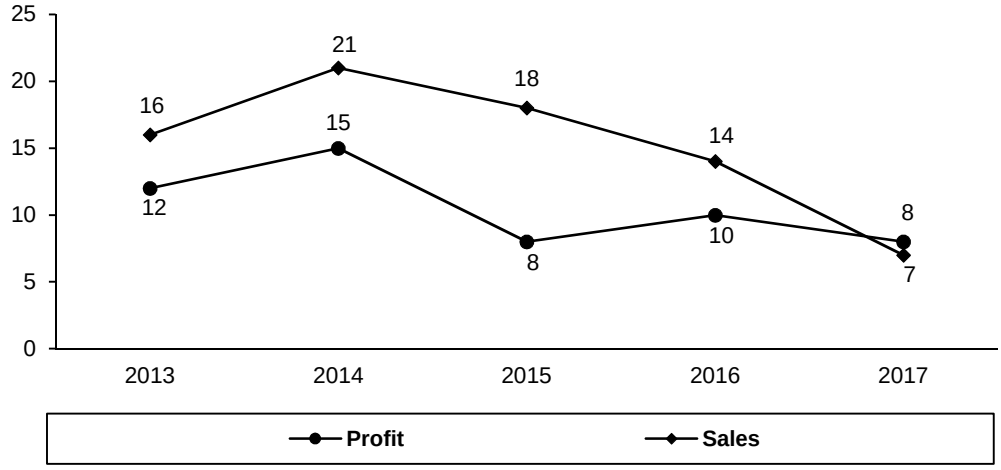
19. Find the maximum number of emails (in billion) which is expected to be sent from hotmail to yahoo in the year 2020.
(A) 1816 (B) 1454
(C) 1284 (D) 1586

20. Find the maximum number of emails expected to be sent from any email account to any other email account.
(A) 2072 (B) 3805
(C) 2554 (D) None of these

Exercise – 8(b)

Directions for questions 1 to 3: These questions are based on the following information.

The following line graph shows the percentage increase in sales and profit, both when compared to that of the previous year, of company XYZ for five years starting from 2013.



Note : The company made a profit in each of the given years.

1. If the sales in the year 2013 were ₹120 crores, then what was the approximate value of the sales in 2016 (in ₹Crores)?
(A) 162 (B) 176
(C) 198 (D) 208

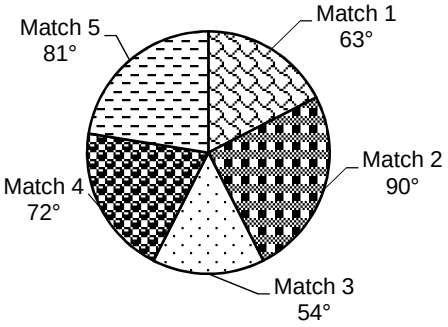
2. In which of the given years were the increase in sales, the highest?
(A) 2014 (B) 2015
(C) 2016 (D) Cannot be determined

3. If profitability is defined as $\frac{\text{profit}}{\text{sales}}$, then in which year was the profitability the least?
(A) 2014
(B) 2015
(C) 2016
(D) 2017

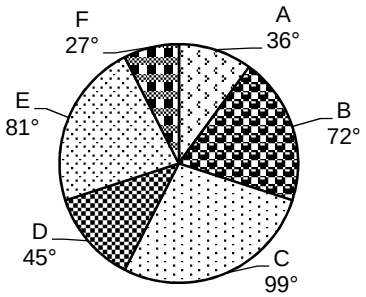
Directions for questions 4 to 7: These questions are based on the following information.

The performance of 6 batsmen – A, B, C, D, E and F playing for a team in a recently conducted cricket series is given in the following pie charts. The series consisted of five one-day matches and all the six batsmen played in each one of them. The first pie chart gives the percentage distribution of total runs scored by the team in those five matches whereas the second pie chart gives the percentage distribution of the total runs scored by each batsman in the entire series. It is also known that the sum of the individual scores of the six batsmen in the entire series constitutes 90% of the total runs scored by the team.

Distribution of runs scored in the five matches



Distribution of Individual scores in the five matches together



4. If C scored at least 20% of the total runs scored by the team in each of the 5 matches, then the runs scored by C in a match as a percentage of the total runs scored in that match is at most
(A) 43.75% (B) 36.66%
(C) 41.11% (D) 51.66%

5. If the difference between the total runs scored in Match 2 and the total runs scored by C in the entire series is 4, then what is the total runs scored by A and D together, in the series?
(A) 162 runs (B) 243 runs
(C) 324 runs (D) 360 runs

6. If each of the 6 batsmen contributed at least 16% of the total runs scored in match 2, then the total runs scored by one of the 6 batsmen in match 2 as a percentage of the total runs scored by that batsmen in the entire series is at most
(A) 74.07% (B) 55.55%
(C) 51.26% (D) 83.33%

7. If the minimum runs scored by the team in any single match in the given series was 180, then what is the total runs scored by B in the entire series?
(A) 216 runs (B) 144 runs
(C) 288 runs (D) 360 runs

Directions for questions 8 to 12: These questions are based on the following information.

The following table gives the number of students who passed in four subjects – Maths, Physics, Chemistry and Biology in the three sections A, B and C in class X of a school. Each section had a student strength of 40.

Section	Maths	Physics	Chemistry	Biology
A	28	31	39	26
B	34	32	37	33
C	26	34	31	29

Directions for questions 8 to 12: Type in your answer in the input box provided in the question.

8. The number of students in section A who passed in all the four subjects is at most [ ] .

9. The number of students in section C who passed in all the four subjects is at least [ ] .

10. At most how many students in section B passed in exactly one of the four subjects [ ] .

11. The number of students who passed in both Physics and Chemistry in the three sections combined is at most [ ] .

12. A student has to pass in all the four subjects to clear the class X exam. The least number of students in the school who failed to clear the exam is [ ] .

Directions for questions 13 to 16: These questions are based on the following information.

The table below gives the percentage share of expenses of Mr. Dubey on different items in the years from 2015 to 2018.

Expense type	2015	2016	2017	2018
Rent	14	12	13	12
Food	15	17	15	12
Clothing	10	12	11	14
Entertainment	17	15	15	13
Medical	6	5	8	10
Education	27	29	25	26
Travel	11	10	13	13

13. If the total expenses in 2018 was more than that in 2015, then the expenses under which head showed the highest percentage increase from 2015 to 2018?
(A) Clothing (B) Entertainment
(C) Medical (D) Travel

14. If the expenses under each head in 2017 was more than the corresponding value in 2015, then the percentage increase in total expenses from 2015 to 2017 was at least
(A) 10% (B) 13.33% (C) 15% (D) 17.5%

15. If the medical expenses in 2018 was 25% more than that in 2016, then the expenses on clothing in 2018 was what percentage of the entertainment expenses in 2016?
(A) 37.5% (B) 42.8% (C) 52.5% (D) 58.3%

16. If the expenses on rent increased by 10% every year from 2015 to 2018, by what percentage did the expenses on food increase from 2015 to 2018?
(A) 18% (B) 24.3%
(C) 27.5% (D) 32%

Directions for questions 17 to 20: These questions are based on the following information.

The following table gives the marks scored by four students – Anand, Balu, Chetan and Deepak in the three areas – Verbal, Quant and Reasoning of a mock CAT paper. The four students are disguised in the tables as A, B, C and D in no particular order.

Student / Section	A	B	C	D
Verbal	24	41	40	27
Quant	34	36	35	32
Reasoning	36	31	36	32

It is also known that, in reasoning, none of the other three students scored more than Chetan.
Balu's total score in the three sections differs from that of Anand's by 3 marks.

17. What can be said regarding the following two statements?
Statement I : Deepak scored the lowest marks in the reasoning section.
Statement II: Anand's total score in the three sections is more than that of Deepak.
(A) If statement I is true, then statement II is necessarily true.
(B) If statement I is true, then statement II is necessarily false.
(C) Both statement I and statement II are true.
(D) Neither statement I nor statement II is true.

18. What can be said regarding the following two statements?
Statement I : Balu's lowest score is in the reasoning section.
Statement II : Anand's lowest score is in the quantitative section.
(A) if statement II is true, then statement I is necessarily false.
(B) if statement I is false, then statement II is necessarily true.
(C) if statement I is true, then statement II is necessarily true.
(D) None of the above

19. What can be said regarding the following two statements?
Statement I : Anand had the highest score in the verbal section.
Statement II : Balu had the highest score in the quant section.
(A) Both the statements could be true.
(B) At least one of the statements must be true.
(C) At most one of the statements must be true.
(D) None of the above

20. If Deepak got his lowest score in the verbal section, then which of the following is true?
(A) Chetan's lowest score is in the reasoning section.
(B) Chetan's lowest score is in the quant section.
(C) Chetan's lowest score is in the verbal section.
(D) No definite conclusion is possible.

Key

Exercise – 8(a)

1. 60	5. 9	9. D	13. D	17. A
2. 20	6. B	10. D	14. C	18. C
3. 141	7. B	11. B	15. B	19. B
4. 410	8. D	12. C	16. D	20. D

Exercise – 8(b)

1. C	5. C	9. 0	13. C	17. B
2. B	6. A	10. 8	14. B	18. C
3. C	7. A	11. 94	15. D	19. C
4. D	8. 26	12. 36	16. B	20. C