Solutions

Chapter – 1
(Tables)

Exercise – 1(a)

Solutions for questions 1 to 5:

1. Density of population in Madhya Pradesh

$= \dfrac{603 \times 10^5}{308,144} = 195/\text{sq.km}$

In Andhra Pradesh $= \dfrac{761 \times 10^5}{275,068} = 276/\text{sq.km}$

In Orissa $= \dfrac{384 \times 10^5}{155,707} = 237/\text{sq.km}$

In Maharashtra $= \dfrac{968 \times 10^5}{307,713} = 314/\text{sq.km}$

In Tamil Nadu $= \dfrac{624 \times 10^5}{130,058} = 480/\text{sq.km.}$

The least density is in M.P. **Choice (A)**

2. Rural population in Orissa

$= 384 \times \dfrac{10^5 \times 72}{100} = 2,76,48,000$

Number of females $= \dfrac{49}{100} \times 2,76,48,000 = 1,35,47,520$

Choice (D)

3. Female population In Uttar Pradesh in 2001
$= (1660 - 875) \times 10^5 = 785$
That in 2006 = 1731 – 911 = 820

Percentage increase $= \dfrac{35}{785} \times 100 = 4.5\%$ **Choice (A)**

4. The ratio of rural population in 2001 to 2006 for

Madhya Pradesh $= \dfrac{0.72 \times 603}{0.71 \times 674} = 0.907$

For Orissa $= \dfrac{0.73 \times 368}{0.72 \times 384} = 0.97$

For Maharashtra $= \dfrac{0.68 \times 968}{0.66 \times 1013} = 0.98$

For Andhra Pradesh $= \dfrac{0.69 \times 761}{0.67 \times 823} = 0.952$

For Tamil Nadu $= \dfrac{0.70 \times 624}{0.68 \times 697} = 0.922$

The least is for Madhya Pradesh. **Choice (A)**

5. In 2006, average number of males per state, for the given
states $= \dfrac{\text{total male population}}{\text{total number of states}} = \dfrac{3192}{7} = 456$

The male population in U.P. and Maharashtra is more than
the average. **Choice (B)**

Solutions for questions 6 to 10:

6. Number of students who did not pass in school B
$= \dfrac{1100 \times 66}{100} = 726$

Number of students, who did not pass in school C
$= \dfrac{1100 \times 44}{100} = 484$
726 + 484 = 1210 **Choice (B)**

7. Ratio of the total number of students in A and F $= \dfrac{8}{13}$

Ratio of the number of students, who failed, in both the

schools $= \dfrac{8 \times 52}{13 \times 42} = 16 : 21$ **Choice (C)**

8. Let us assume that the total number of students in school D
in 1998-1999 = 100
In 1999-2000 it is 120
Now given, number of students who failed in 1999-2000

$= \dfrac{70 \times 120}{100} = 84$
Number of students who failed in 1998-1999

$= \dfrac{100 \times 84}{120} = 70$

Required ratio $= \dfrac{70}{84} = 5 : 6$ **Choice (A)**

9. Total number of students appeared in exam in school D

$= \dfrac{140 \times 100}{70} = 200$ **Choice (D)**

10. Let us assume that the total number of students appeared
for exams in the given six schools = 10000
Number of students who appeared for exams in school A
= 2000
That in school E = 2500

Number, of students who failed in school

A $= \dfrac{2000 \times 52}{100} = 1040$
Number of students who failed in school

E $= \dfrac{2500 \times 55}{100} = 1375$

Required ratio $= \dfrac{1040}{1375} = \dfrac{208}{275} \cong \dfrac{3}{4}$ **Choice (C)**

Solutions for questions 11 to 15:

The number of seats won by any party in a election is. Number
estimated in next election – (Estimated Change)
$\Rightarrow$ (X – Y) of next election.

11. In 1952, the number of seats won in different states is
(X – Y) of 1957.
P in Madhya Pradesh = 16 – (2) = 14
P in Maharashtra = 13 – (2) = 11
P in Bihar = 15 – (–3) = 18
P in U.P = 18 – (3) = 15
It was the highest in Bihar. **Choice (B)**

12. In Bihar, the number of seats won by R (in different years):
1952 = 18 – 2 = 16
1957 = 15 + 4 = 19
1962 = 20 – 3 = 17
1967 = 19 – 1 = 18
It is highest in 1957. **Choice (B)**

13. The difference between estimation and actual seats won is
difference between {(X of a year) and ((X – Y) of next
year)}. For eg: In 1957 election, for party P, the estimated
number of seats is 13 and the actual seats won is (11 – 1)
= 10.

∴ The difference is 13 – 10 = 3
Similarly by calculation for other parties and for different
years, we find it is the highest for S in 1962 i.e., {11 and 20}
i.e., 9. **Choice (D)**

14. The perfect estimation occurs when X of a year = (X – Y) of
next year. It happened for P in Madhya Pradesh – 1967
and U.P – 1957.

For Q in Maharashtra – 1957 and 1967 and U.P. → 1967.
For R in U.P → 1962 and 1967
For S in Bihar – 1957 and U.P → 1957.
It is the highest for Q. **Choice (B)**

15. The number of seats won by party R in 1967 in the different states are
Madhya Pradesh – 7
Maharashtra – 14
Bihar – 18
Uttar Pradesh – 20
Total = 59   Choice (C)

Solutions for questions 16 to 20:

16. The units sold as a percentage of that manufactured in the different years are.

$2013 = \dfrac{1080}{1260} \times 100 = 85.7$

$2014 - \dfrac{1160}{1420} \times 100 = 81.7$

$2015 - \dfrac{1250}{1550} \times 100 = 80.6$

$2016 - \dfrac{1320}{1650} \times 100 = 80.0$

The highest is in 2013.   Ans: (2013)

17. The selling price per unit in the different years are

$2013 = \dfrac{1560000}{1080} = 1444.$

$2014 - \dfrac{1710000}{1160} = 1474$

$2015 - \dfrac{1820000}{1250} = 1456$

$2016 - \dfrac{1930000}{1320} = 1462$

The selling price per unit was the lowest in 2013.
                                             Ans: (2013)

18. Number of units of sold in the four years together
= 180 = 260 + 300 = 330 = 1070.   Ans: (1070)

19. The cost of manufacturing the item in the different years are

$2013 - \dfrac{13,20,000}{1260} = 1048$

$2014 - \dfrac{14,50,000}{1420} = 1021$

$2015 - \dfrac{17,20,000}{1550} = 1110$

$2016 - \dfrac{18,40,000}{1650} = 1115$

The highest value is ₹1115 in 2016.   Ans: (1115)

20. As the selling price in 2014 was ₹1,474 and the cost price was ₹1,021, the profit would have been 453 × 1420 = ₹6,43,260.   Ans: (6,43,260)

Exercise – 1(b)

Solutions for questions 1 to 5:

1. The percentage growth in population from 2003 to 2007 would be the highest for Bangladesh, as the population growth of Bangladesh in any year is higher than all the other countries.   Choice (A)

2. Given population of Pakistan in 2003 is 25 million.
Population of Bangladesh in 2003 is 15 million.

Population of Bangladesh in 2004 is $15 \times \left(\dfrac{100 + 15}{100}\right)$

= 15 × 1.15 = 17.25 million
Population of Bangladesh in 2005 is

$17.25 \times \left(100 + \dfrac{18}{100}\right) = 17.25 \times 1.18 = 20.35$ million

Population of Bangladesh in 2006 is

$20.35 \times \left(100 + \dfrac{21}{100}\right) = 20.35 \times 1.21 = 24.62$ million.

                                             Choice (B)

3. Give the population of Malaysia in 2008 = 175 million.
If the population of Malaysia in 2007 is x then in 2008 it would be 1.25 x i.e., $\dfrac{5}{4}$x

∴ The population in 2007 would be $\dfrac{4}{5} \times 175 = 140$ million

Similarly in 2006, the population could be

$= 140 \times \dfrac{5}{6} = 116.66$ million

Similarly in 2005, the population would be

$= 116.66 \times \dfrac{100}{115} = 101.45$ million .   Choice (C)

4. Let the population in 2004 be 100

	2004	2005	2006	2007	2008
India	100	115	135.7	162.84	200.3
China	100	110			

Difference between the population of India in 2008 and China in 2005 = 200.3 – 110 = 90.3

Required percentage = $\dfrac{90.3}{110} \times 100 = 82.09\%$

                                             Choice (A)

5. As the exact population of any of the countries in any of the years is not given, the ratio of populations in any of the years cannot be determined.   Choice (D)

Solutions for questions 6 to 10:

As it is given that a student who passes the final exams gets promoted to the next class, we can see that only 42 of the 45 students in class 8 in the year 2000, reached class 9, which means that three students had failed in the class that year. As the number of students in class 8 in 2001 is 50, 47 new students (50 – 3 failed students) joined class 8 in that year.

In 2002, 36 students passed out of class 10, which means of the 42 students in class 9 in 2001, only 36 passed and six failed. This six students will remain in class 9 in 2002 also and as these are 52 students in class 9 in that year, 46 students were newly promoted, i.e. of the 50 students in class 8 in 2001.

Similarly we can find the values for other years

Year \ Class	8	9	10
2000	45	–	–
2001	47 + 3 (failed)	42	–
2002	42 + 4 (failed)	46 + 6 (failed)	36
2003	47 + 7 (failed)	39 + 7 (failed)	45
2004	45 + 5 (failed)	49 + 3 (failed)	43

6. The number of students who joined the school
= 45 + 47 + 42 + 47 + 45 = 226   Choice (C)

7. Of the 46 students in class 8 in 2002, 39 got promoted to class 9 in 2003, i.e., $\dfrac{39}{46} \times 100 = 84.8\%$ Choice (D)

8. Of the 46 students in class 9 in 2003, only 43 got promoted to class 10, i.e. 3 students failed.   Choice (B)

9. The total number of students who failed
= 3 + 4 + 7 + 5 = 19   Choice (D)

10. Number of students who joined from 2000 to 2002
= 45 + 47 + 42 = 134
Number of students who passed only by 2004
= 36 + 45 + 43 = 124

Required percentage = $\dfrac{124}{134} \times 100 = 92.5\%$

                                             Choice (A)

Solutions for questions 11 to 15:

11. Just by observation we can see that in the value in 2014 $\left(\dfrac{131}{196}\right)$ has to be greater than that in 2012 $\left(\dfrac{112}{168}\right)$ and in 2013 $\left(\dfrac{118}{175}\right)$. So also value in 2015 $\left(\dfrac{108}{152}\right)$ has to be greater than 2014 $\left(\dfrac{131}{196}\right)$.

∴ Only value in 2016 $\left(\dfrac{113}{161}\right)$ need to be compared.

Pass percentage in 2015 $=\dfrac{108}{152}\times 100 = 71.05$ and that in 2016 $=\dfrac{113}{161}\times 100 = 70.2\%$.

The highest is in 2015. Ans: (2015)

12. As the pass percentage in all the schools are close to 2/3 (66.67%) check for schools with more than 70%.
The 70% values for the different schools are 340 − 238, 175 − 132, 542, 685 − 479 and 482 − 337. As the number of student who passed in school R is much higher then its 70% value, it will have the highest value.
Ans: (R)

13. Number of students who passed in school S
= 537 + 489 + 512 + 527 + 496 = 2573
Number of students who passed in school P
= 238 + 227 + 150 + 172 + 168 = 955.
The difference = 1618. Ans: (1618)

14. The number of students who passed in 2013
= 227 = 118 + 407 + 489 + 341 = 1532
The number of students who passed in 2015
= 172 + 108 + 454 + 527 + 364 = 1625
The difference = 43.
The required percentage $=\dfrac{43}{1625}\times 100 = 2.65\%$.
Ans: (2.65)

15. The pass percentage in the five schools together in the different years are

$2012 - \dfrac{238+112+418+537+318}{360+168+526+768+465} = \dfrac{1623}{2287}$

$2013 - \dfrac{227+118+407+489+341}{340+175+542+685+482} = \dfrac{1582}{2224}$

$2014 - \dfrac{150+131+437+512+347}{245+196+583+723+511} = \dfrac{1577}{2258}$

$2015 - \dfrac{172+108+454+523+364}{290+152+611+711+526} = \dfrac{1625}{2290}$

$2016 - \dfrac{168+113+471+496+343}{286+161+618+653+508} = \dfrac{1591}{2226}$

It can be seen that the value for 2016 would be higher than the value in 2013 and 2014 and the value in 2012 is greater than 2015 (for 2012 the fraction is greater than 2/3 and 2 (in numerator) and 3 (in denominator) is added to it to arrive at the 2015 fraction).

The value in 2012 $- \dfrac{1623}{2287}\times 100$

The value in 2016 $- \dfrac{1591}{2226}\times 100$

Here we can see that 2016 is definitely higher as 2012 value is $\dfrac{1591+32}{2226+61}$ and $\dfrac{1591}{2226}$ is much more than half. Ans: (2013)

Solutions for questions 16 to 20:

16. The earnings per share $=\dfrac{\text{Price}}{\text{P/E ratio}} = \dfrac{1090}{11.5} = 94.8$
Choice (B)

17. The earnings per share in 2012 $=\dfrac{1280}{14.5} = 88.3$
The earnings per share in 2013 $=\dfrac{1351}{14.2} = 95.15$
The required percentage $=\dfrac{6.85}{88.3}\times 100 = 7.8\%$.
Choice (A)

18. The number of shares of the company in 2012 $=\dfrac{62,400}{1280}$
= 48.75 cr
The number of shares in 2016 $=\dfrac{69,100}{1380} = 50.07$
The required percentage $=\dfrac{1.32}{48.75}\times 100 = 2.7\%$.
Choice (D)

19. Number of shares in 2014 $=\dfrac{55600}{1090} = 51$ cr
Number of shares in 2015 $=\dfrac{72600}{1465} = 49.56$.
Earnings per share in 2014 $=\dfrac{1090}{11.5} = 94.8$
Earnings per share in 2015 $=\dfrac{1465}{13.8} = 106.2$
Total earnings in 2014 = 94.8 × 51 = 4835
Total earnings in 2015 = 106.2 × 49.56 = 5263.
The required percentage $=\dfrac{428}{4865}\times 100 = 8.8\%$.
Choice (B)

20. The market capitalization changed by more than 5% in 2013, 2014, and 2015. Choice (C)

Chapter – 2
(Bar Graphs)

Exercise – 2(a)

Solutions for questions 1 to 5:

1. The percentage increase in sales for the different companies from 2013 to 2016 is as follows:
P = 1.25 × 1.4 × 1.1 = 1.925 = 92.5%
Q = 1.50 × 1.20 × 1.25 = 2.25 = 125%
R = 1.20 × 1.25 × 1.40 = 2.10 = 110%
S = 1.20 × 1.10 × 1.30 = 1.716 = 71.6%
The highest increase was for company Q. Choice (B)

2. The sales of company R in 2015 was
= 120 × 1.2 × 1.25 = 180 crores. Choice (C)

3. Let the sales of P and S in 2012 be 200 and 100 respectively.
Increase in sales of P from 2012 to 2016
= 200 × 1.2 × 1.25 × 1.4 × 1.1
Increase in sales of S from 2012 to 2016
= 200 × 1.25 × 1.2 × 1.1 × 1.3
∴ Required ratio $=\dfrac{2000\times 1.4}{100\times 1.3} = \dfrac{28}{13}$ Choice (D)

4. As the expenses of company R in 2013 was 60% of its sales and it increased by 100% from 2013 to 2016, while the sales increased by 110% in the same period, we can conclude that the profits would have increased from 2013 to 2016. Choice (A)

5. Increase in sales of Q from 2012 to 2016
= 1.1 × 1.5 × 1.2 × 1.25 = 2.475 ⇒ 147.5%
Increase in sales of R from 2012 to 2016
= 1.05 × 1.2 × 1.25 × 1.4 = 2.205 ⇒ 120.5%
∴ Had the sales of Q and R in 2012 been 100 and 200 respectively, their sales in 2016 would has been respectively 247.5 and 441.

∴ Sales of company Q has to increase by $\frac{441 - 247.5}{247.5} \times 100$

= $\frac{193.5}{247.5} \times 100 \cong 78\%$ in 2017 to match the sales figure of company R in 2016. Choice (C)

Solutions for questions 6 to 10:

6. Average of runs scored by B, C, D, E and J
= $\frac{(5000 + 10200 + 9000 + 10000 + 9500)}{250 \times 5} = \frac{43,700}{250 \times 5} \approx 35$.
Ans: (35)

7. Maximum average of I = $\frac{4000}{50} = 80$. Ans: (80)

8. Number of times dismissed = $\frac{7 \times 11200}{400} = 7 \times 28 = 196$.
Ans: (196)

9. Required difference = 14400 – 3500 = 10900.
Ans: (10900)

10. Since, we don't know the number of dismissals, the required ratio cannot be determined. Choice (D)

Solutions for questions 11 to 15:

11. The marks scored by the given students in test D are
P – 270 – 195 = 75
Q – 260 – 175 = 85
R – 230 – 165 = 65
S – 230 – 175 = 55 Choice (B)

12. 60% of 120 = 72
∴ To score 60% in a test, he has to score 72 marks. He scored more than 72 marks only in tests D and E.
Choice (C)

13. The marks scored by the given students in the tests are
Test A = 80 + 70 + 50 + 40 = 240
Test B = 60 + 40 + 70 + 30 = 200
Test C = 55 + 65 + 45 + 105 = 270
Test D = 75 + 85 + 65 + 55 = 280
Test E = 95 + 85 + 75 + 65 = 320
Test F = 35 + 55 + 70 + 80 = 240
The highest is in test E. Choice (C)

14. The difference between the marks scored by any two of the given students was the maximum in test C, 105 – 45 = 60
Choice (D)

15. Only P and Q scored more than 50 marks in at least five of the given six tests. Choice (C)

Solutions for questions 16 to 20:

16. Import of crude from Egypt in 1995
= $\frac{100 \times 250}{125} = 200$ (in US $ million)
Given that, it is 25% of the total import,
∴ Total import = 800
∴ Required difference = 950 – 800 = 150. Choice (C)

17. Average value of crude imported from Iraq in the given years = $\frac{200 + 100 + 150 + 100 + 200}{5} = 150$. Choice (D)

18. Average important from Iran
= $\frac{150 + 250 + 100 + 200 + 150}{5} = 170$
Average import from Iraq = 150
Average import from Egypt = 170
Average import from Saudi Arabia = 160
Average import from Singapore = 150
Average import from Oman = 160
In 1997 the import from Iran and Saudi Arabia was more than the average import from the respective countries in the given years. Choice (B)

19. Average annual percentage decrease
∴ $\frac{(250 - 150)}{250} \times \frac{1}{4} \times 100 = 10\%$ Choice (D)

20. Given, in 1996 the import from Saudi Arabia = 100
∴ Total import = $\frac{100 \times 100}{5} = 2000$
Similarly,
Total import in 1999 = $\frac{250 \times 100}{10} = 2500$
Required % = $\frac{(2500 - 2000) \times 100}{250} = 20\%$. Choice (D)

Exercise – 2(b)

Solutions for questions 1 to 5:

1. Total number of units produced in 2007 is 450 thousands.
Target in 2008 = $450 \times \left(100 \times \frac{20}{100}\right)$
= 450 × 1.2 = 540 thousand
Deficit = Target – actual produced = 540 – 520 = 20
Percentage deficit = $\frac{20}{540} \times 100 = \frac{1}{27} \times 100$ < 4% and > 3%
Choice (D)

2. Total number of all the vehicles produced in 2008
= $\left(100 + \frac{15}{100}\right)$ × (total number of all the vehicles produced in 2007) = 1.15 × 450 = 517.5 thousand production of vehicles A, B C and D in 2008 = 275(1.1) = 302.5
For the total no of all the vehicles to be 517.5 thousand, number of vehicles of type E which are produced in 2008 = 517.5 – 302.5 = 215 thousand.
Increase over the previous year = 215 – 175 = 40 thousand
Choice (A)

3. Percentage of vehicles of type C in the total number of vehicles in 2006 = $\frac{100}{375} \times 100 = 26.66\%$
Percentage of vehicles of type C in the total number of vehicles in 2007 = $\frac{100}{450} \times 100 = 22.22\%$
∴ 26.66 – 22.22 = 4.44 percentage points. Choice (C)

4. Percentage decrease in production of vehicles of type B from 2006 to 2007 = $\frac{25}{75} \times 100 = 33.33\%$
Price of vehicle 'B' in 2007 = 2 × 1.33 = $2 \times \frac{4}{3} = 2.66$ lakh
Choice (D)

5. Total number of vehicles produced by the company in 2005 = 225 thousand
Total number of vehicles produced by the company in 2007 = 450 thousand
Percentage increase = $\frac{225}{225} \times 100 = 100\%$. Choice (A)

Solutions for questions 6 to 10:

6. No of executives in section C = $\dfrac{5}{100} \times 2400 = 120$

No of managers in section C = $(100 - 30)\% \times \dfrac{25}{100} \times 120 = 21$

∴ There are seven managers for every 40 executives.

Choice (D)

7. No of executives in section E = $\dfrac{25}{100} \times 2400 = 600$

No of executives left = 300
Total number of executives in the company = 2100

∴ Required percentage = $\dfrac{300}{2100} \times 100 = 14.28\%$

Choice (D)

8. Team leaders in section D = $\dfrac{25}{100} \times 300 = 75$

Executives in section C = $\dfrac{5}{100} \times 2400 = 120$

Managers in section C = $\dfrac{25}{100} \times 2400 = 30$

Executives in section F = $\dfrac{10}{100} \times 2400 = 240$

Managers in section B = $\dfrac{20}{100} \times 120 = 24$

∴ Executives in section F is the maximum. Choice (D)

9. Amount paid to all the managers in section E

= $30000 \times \dfrac{15}{100} \times 120 = 18 \times 30,000 = ₹540$ thousand

Amount paid to all the executives in section E

= $\dfrac{25}{100} \times 2400 \times 1000 = ₹600$ thousand

Required percentage = $\dfrac{600}{540} \times 100 = \dfrac{10}{9} \times 100 = 111.11\%$.

Choice (A)

10. Total number of executives in section E, F and G

= $\dfrac{50}{100} \times 2400 = 1200$

Total number of managers in section, A, B, C and D is

= $\dfrac{(10 + 20 + 25 + 10)}{100} \times 120 = \dfrac{65}{100} \times 120 = 78$

Required ratio = $1200 : 78 = 400 : 26 \Rightarrow 200 : 13$.

Choice (B)

Solutions for questions 11 to 15:

11. Percentage growth in 2003 = $\dfrac{5}{50} \times 100 = 10\%$

Percentage growth in 2004 = $\dfrac{20}{55} \times 100 = 36\%$

Percentage growth in 2005 = $\dfrac{3}{75} \times 100 = -4\%$

Percentage growth in 2006 = $\dfrac{13}{72} \times 100 = 18\%$

Percentage growth in 2007 = $\dfrac{60}{85} \times 100 = 70\%$

∴ The second highest increase is in 2004. Ans: (2004)

12. Total number of branches in 2003 = 57
Total number of branches in 2007 = 339
The growth rate of the number of branches from 2003 to

2007 = $\dfrac{339 - 57}{51} \times 100$

∴ Simple average annual growth rate

= $\dfrac{1}{4} \times \dfrac{339 - 57}{51} \times 100 = \dfrac{1}{4} \times \dfrac{282}{57} \times 100 = \dfrac{494.7}{4} \cong 124$

Approximately = 124%. Ans: (124)

13. The percentage increase in number of customers is same as the percentage increase in number of branches, as the number of customers is proportional to the number of branches.

∴ Percentage increase in the number of branches from

2005 to 2007 = $\dfrac{339 - 158}{158} \times 100 = 114.5\%$. Ans: (115)

14. Number of customers for the bank in 2006
= 233 × 800 = 1,86,400

Average deposits per customer = $\dfrac{85,000}{1,86,400} = 0.45$ crores

⇒ 45 Ans: (45)

15. Total number of branches in 2007 = 339
Number of branches in 2009 is 339 × 1.2 × 1.2 ≅ 488

Ans: (488)

Solutions for questions 16 to 20:

16. The required values

In 2013 = $\dfrac{1000 \times 30}{100} - 80 = 300 - 80 = 220$

In 2014 = 400 − 100 = 300
In the year 2015 = 200 − 130 = 70
In the year 2016 = 300 − 120 = 180
220 + 300 + 70 + 180 = 770 students received interview calls but were not selected. Choice (B)

17. Since, we don't know that how many students were studying in institutes B and C in 2016, we cannot answer this question. Choice (D)

18. Required ratio = $\dfrac{(110 + 120 + 100 + 140)}{180 + 190 + 240 + 230} = \dfrac{470}{840} = 47 : 84$.

Choice (A)

19. Choice (D)

20. Required % = $\dfrac{310}{370} \times 100 = 83.78\%$. Choice (B)

Chapter – 3
(Pie Charts)

Exercise – 3(a)

Solutions for questions 1 to 5:

1. Total angle made by the students who were placed in software and manufacturing sector = 36° + 54° = 90°
Angle made by the total number of students = 360°

∴ $\dfrac{90°}{360°} \times 100 = 25\%$. Choice (B)

2. Angle made by the Banking sector = 54°.

∴ Total students = $\dfrac{360°}{54°} \times 51 = 340$ Choice (A)

3. Let the total number of students be 360.
Number of students who would have been placed in retail are 72 + 18 = 90

Required percentage = $\dfrac{90}{360} \times 100 = 25\%$ Choice (C)

4. Consulting – Software = 72° − 36° = 36°
36° = 72
∴ Students placed in manufacturing companies
= 54° = 108 Choice (C)

5. Let the total number of students be 100.
∴ Students who were placed in software companies = 10
Students who opted out = 2.

∴ Required percentage = $\dfrac{10 - 2}{100 - 2} = \dfrac{8}{98} = 8.2\%$

Choice (D)

Solutions for questions 6 to 10:

Let us represent the production of different crops in a table

Crops	Rice	Wheat	Jowar	Bajra	Maize	Gram
	135°	100°	45°	30°	35°	15°
	$135 \times \dfrac{72}{360} = 27$	$100 \times \dfrac{72}{360} = 20$	$45 \times \dfrac{72}{360} = 9$	$30 \times \dfrac{72}{360} = 6$	$35 \times \dfrac{72}{360} = 7$	$15 \times \dfrac{72}{360} = 3$

6. Given, 188% of production (Rice + Wheat) = 47 million tonnes.

Production of Rice and Wheat in 2000 $= \dfrac{47 \times 100}{188} = 25$.

Choice (C)

7. Required % $= \dfrac{(27-20)}{(20)} \times 100 = 35\%$.   Choice (D)

8. Production of rice in 2017 = 33.75
Total production of major crops in 2017 = 82.8
∴ 82.8 − 33.75 = 49.05   Choice (D)

9. Wheat which is not spoiled
= 20 − 10 − 2.5 = 7.5 million tones
Total quantity of major crops 72 − 12.5
= 59.5 million tones

Angle made by wheat $= \dfrac{7.5}{59.5} \times 360 \cong 45°$

Choice (D)

10. Give, 60% (Actual production of rice) = 135°
∴ Actual production of rice = 225°
∴ The total share of production is
= 360 + (225 − 135) = 360 + 90 = 450
Percentage share of wheat $= \dfrac{100}{450} \times 100 = 22.22\%$.

Choice (D)

Solutions for questions 11 to 15:

11. Number of votes cast for BJP in 2017
$= \dfrac{244000 \times 30}{100} = 73200$

Number of votes cast for BJP in the previous election
$= \dfrac{73200 \times 100}{120} = 61000$

Required difference = 73200 − 61000 = 12200

Ans: (12200)

12. Number of valid votes cast for the Congress party
$= \dfrac{24 \times 244000}{100} - 6000 = 58560 - 6000 = 52560$

Ans: (52560)

13. Required % $= \dfrac{(24-15)}{15} \times 100 = \dfrac{9}{15} \times 100 = 60\%$

Ans : (60)

14. Required % $= \dfrac{9}{12} \times 100 = 75\%$ Ans: (75)

15. The number of votes cast for TDP in 2017 = 24400
The number of votes cast for TDP in the previous election
$= \dfrac{24400 \times 100}{80} = 30500$
Total number of votes cast in the previous election
= 305000   Ans: (305000)

Solutions for questions 16 to 20:

16. As the total production of Iron ore from 2005-2006 to 2006-2007 has increased, the state which has the highest percentage increase in the production share over the previous year will have the maximum percentage increase in the production of Iron ore. By observation Andhra Pradesh has the highest percentage increase.

Choice (A)

17. The production of iron ore by the different states are

State	2005-06	Production (million tonnes)	2006-07	Production (million tonnes)
West Bengal	20%	144	15%	162
Jharkhand	25%	180	20%	216
MP	10%	72	10%	108
Bihar	15%	108	15%	162
Uttaranchal	15%	108	15%	162
Uttar Pradesh	10%	72	5%	54

It can be seen that the percentage increase for West Bengal is less than 20% while for all others it is much more or even decrease.   Choice (B)

18. Amount of iron ore exported in 2005-2006
= 0.4 × 720 = 288 million tons.
Amount of iron ore exported in 2006-2007
= 0.4 × 1080 = 432 million tons.
Percentage increase
$= \dfrac{432-288}{288} \times 100 = \dfrac{144}{288} \times 100 = 50\%$
Alternately, as the share is equal in both the years,
percentage increase $= \dfrac{1080-720}{720} \times 100 = 50\%$

Choice (C)

19. Amount of Iron ore produced in Andhra Pradesh in 2005-2006 $= \dfrac{5}{100} \times 720 = 36$ million tons
Amount of Iron ore produced in Andhra Pradesh in 2006-2007 $= \dfrac{20}{100} \times 1080 = 216$ million tons
Percentage increase $= \dfrac{180}{36} \times 100 = 500\%$.

Choice (D)

20. Iron produced in West Bengal as given in the pie chart
= 15% of 1080 = 162 million tones.

Actual production in West Bengal
= 162 × 2 = 324 million tones.
Total production in India = 1080 + 162 = 1242 million tones.
∴ Required percentage $= \dfrac{324}{1242} \times 100 \cong 26\%$

Choice (C)

Solutions for questions 1 to 5:

1. Men who were of age 35 years or above

$= \dfrac{80}{100} \times 7200 = 5760$ Ans: (5760)

2. Total businessmen in the colony

$= \dfrac{50}{360} \times 7200 = 1000$

Number of people with age less than 25 years

$= \dfrac{10}{100} \times 7200 = 720$

∴ Maximum number of businessmen aged less than 25 = 720

Required percentage = 72%   Ans: (72)

3. As the number of men aged 75 or above is 20% and all of them had the same profession, they have to be either engineers or doctors as the number of people in other professions is less than 20% of the total.   Choice (D)

4. Percentage of engineers $= \dfrac{80}{360} \times 100 = 22.22\%$

At most 20% can be less than 35.

∴ At least 2.22%

i.e., $\dfrac{2.22}{22.22} \times 100 = 10\%$ of engineers were of age 35 or

above and less than 45 years.   Ans: (10)

5. Men who were of age 75 years or above = 20%
Men who were either Doctors or Engineers
$= 100 + 80 = 180° = 50\%$

∴ The maximum number of people in the given categories
$= 20\% + 50\% = 70\%$ (when none of the Doctors or Engineers is 75 or above).

∴ At least $100 - 70 = 30\%$ of the men were less than 75 years of age and neither doctors nor engineers.
      Ans: (30)

Solutions for questions 6 to 10:

6. Let the total number of schools in 2016 and 2017 be x and y respectively
Given that, 18% of x = 15% of y

$\dfrac{x}{y} = \dfrac{15}{18} = \dfrac{5}{6}$

X = 5k, y = 6k

The required percentage increase $= \dfrac{k}{5k} \times 100 = 20\%$

      Choice (B)

7. Let the number of schools in 2016 and 2017 be 700 and 800 respectively. The percentage increase in the number of schools in different categories is as follows:

$A = \dfrac{35\% \text{ of } 800 - 30\% \text{ of } 700}{30\% \text{ of } 700} \times 100$

$= \dfrac{280 - 210}{210} \times 100 = \dfrac{70}{210} \times 100 = 33.33\%$

For $B = \dfrac{20}{140} \times 100 = 14.28\%$

For $C = \dfrac{128 - 126}{126} \times 100 = \dfrac{2}{126} \times 100 < 2\%$

For $D = \dfrac{128 - 119}{119} \times 100 = \dfrac{9}{119} \times 100 < 10\%$

For $E = \dfrac{144 - 105}{105} \times 100 = \dfrac{39}{105} \times 100 > 33.33\%$

Alternately, the percentage increase will be the highest for the category, which has the highest increase in its share from 2016 to 2017 i.e., for E.   Choice (D)

8. In 2016, let the total number of schools be x, 30% of x ≤ 50
As the number of schools of each type is an integer
x = 100.
Therefore the total number of schools in 2017 > 100
As in 2017 also, the number of schools of each type has to be an integer, the least value of total number of schools

$= 200 = \dfrac{35}{100} \times 200 = 70.$ Choice (C)

9. The least number of schools in 2017 is 100. The least number of schools in the categories A, B, C, D and E are 35, 15, 16, 16 and 18 respectively
The least number of students in category A Schools
$= 35 \times 1 = 35$
In category B Schools = $15 \times 500 = 7500$
In category C = $16 \times 1000 = 16,000$
In category D Schools = $16 \times 1500 = 24000$
In category E Schools = $18 \times 2000 = 36000$
The total number of students is at least
$= 35 + 7500 + 16000 + 24000 + 36000 = 83535$
      Choice (A)

10. In the year 2016, the least number of schools = 100
Maximum number of students in schools with students 1000 or more but less than 1500 = 16×1499
The least number of students in schools with 1500 or more but less than 2000 students = 16×1500
The required difference = 16   Choice (B)

Solutions for questions 11 to 15:

11. Let the income of Mr. Iyer be ₹400 and that of Mrs. Iyer be ₹300.
Savings of Mr. Iyer = ₹80
Savings of Mrs. Iyer = ₹75
Total savings = ₹155

Investment in equities $= \dfrac{20}{100} \times 155 = ₹31$

Required percentage $= \dfrac{31}{700} \times 100 = 4.43\%$ Choice (B)

12. Let the total savings of the family be ₹100.
The money invested in Fixed deposits = ₹30

Mrs. Iyer's income $= \dfrac{30}{15} \times 100 = ₹200$

∴ Savings of Mrs. Iyer $= \dfrac{25}{100} \times 200 = ₹50$

Savings of Mr. Iyer = ₹100 − ₹50 = ₹50

∴ Income of Mr. Iyer $= \dfrac{50}{20} \times 100 = ₹250$

Ratio of their incomes = 5 : 4   Choice (D)

13. Let the income of Mr. Iyer be 100x and Mrs. Iyer be 100y.
Given that, 15x > 20y
⇒ 3x > 4y
Multiplying the above inequality with 9, we get
27x > 36y ⇒ 27x > 15y (medicines)
Multiplying 3x > 4y with 2.66,
We get 8x > 10.64y
⇒ 8x > 10y, (others)
Multiplying 3x > 4y with 6.66, we get 20x > 26.66y
⇒ 20x > 5y (Entertainment)   Choice (C)

14. Let the total incomes of Mr. Iyer and Mrs. Iyer be 100x and 100y respectively.
Now their total savings will be
∴ 20% of 100x + 25% of 100y
Now the amount invested in equities from 20% of total savings i.e., 20% of (20x + 25y) = 4.55 (x + y)

∴ $0.45y = 0.55x \Rightarrow \dfrac{y}{x} = \dfrac{11}{9}$

∴ Mrs. Iyer's salary forms $\dfrac{11}{9} \times 100 = 122.22\%$ of that of

Mr. Iyer's.   Choice (C)

15. Let the total savings be ₹100
Money invested in savings accounts = 20
∴ money spent by Mr. Iyer on Groceries = 20

Total income of Mr. Iyer = $\frac{20}{10} \times 100 = ₹200$

Total savings of Mr. Iyer = ₹40
∴ Total savings of Mrs. Iyer = ₹60

Required ratio is $\frac{20}{20} \times 40 : \frac{5}{25} \times 60 = 40 : 12 = 10 : 3$

Choice (A)

Solutions for questions 16 to 20:

Let us assume that the production of wheat in 1998 is 8000 and therefore the export of wheat in 1998 is 1500
The total production in the given five years

$= \frac{8000 \times 100}{20} = 40000$

Total export in the given five years = $\frac{1500 \times 100}{10} = 15000$

16. Production of wheat in 1999 = 9600
Export of wheat in 1999 = 3750

Required ratio = $\frac{9600}{3750} = \frac{64}{25}$ Choice (A)

17. Given,
Export of wheat in 1999 = 200 million tones

Total export in five years = $\frac{200 \times 100}{25} = 800$ million tonnes

Export in 1998 = 80 million tonnes

Production of wheat in 1998 = $80 \times \frac{16}{3} = 426.67$

Total production in the five years

$= \frac{426.67 \times 100}{20} = 2133.33$

Production of wheat in 1999 = $2133.33 \times \frac{24}{100} = 512$

= 512 million tonnes   Choice (C)

18. Production of wheat in 1997 = $40000 \times \frac{20}{100} = 8000$

Export of wheat in 1997 = $15000 \times \frac{15}{100} = 2250$

Required % = $\frac{2250}{8000} \times 100 = 28.12\%$ Choice (D)

19. Required % = $\frac{(24-10)}{10} \times 100 = 140\%$ Choice (C)

20. Given, production of wheat in 1998

Export of wheat in 1998 = $1272 \times \frac{3}{16} = 238.5$

Export in 1997 = 238.5 × 1.5
= 357.75 million tonnes   Choice (D)

Chapter – 4
(Line Graphs)

Exercise – 4(a)

Solutions for questions 1 to 5:

1. Profit = ₹15 per unit
Profit made by X = 15 × 15 = ₹225 thousand
Profit made by Y = 10 × 15 = ₹150 thousand
Profit made by Z = 20 × 15 = ₹300 thousand
∴ Total profit = ₹675 thousand
i.e. 0.675 million = 6 lakh 75 thousand   Choice (B)

2. No of units sold by X in 04-05 and 05-06 = 30 thousand
No of units sold by Y in 04-05 and 05-06 = 20 thousand
No of units sold by Z in 04-05 and 05-06 = 40 thousand
Revenue generated by X in 04-05 and 05-06
= 30 × 12 = ₹360 thousand
Revenue generated by Y in 04-05 and 05-06
= 20 × 18 = ₹360 thousand
Revenue generated by Z in 04-05 to 05-06
= 40 × 8 = ₹320 thousand
∴ Maximum revenue is generated by X and Y.

Choice (D)

3. As the number of units produced by company X, and company Z are directly proportional, the revenues of both the companies would also be directly proportional.

Choice (C)

4. Ratio of profits generated by company X, company Y and company Z in 2003-04 is
5000 × 15 : 20000 × 5 : 15000 × 8
= 75 : 100 : 120 = 15 : 20 : 24   Choice (A)

5. As the selling price and the manufacturing cost is not given, the growth rate in profits cannot be determined.

Choice (D)

Solutions for questions 6 to 10:

Let us represent the given information in tabular form.

	A	B	C	D	E	F	G	H
Total income	20000	24000	22000	18000	16000	26000	22000	16000
House hold expenses	14000	12000	12000	10000	6000	16000	10000	8000
Education expenses	4000	8000	6000	2000	8000	6000	8000	4000
Savings	2000	4000	4000	6000	2000	4000	4000	4000

6. By observation, we can say that the ratio of savings to education expenses is more than 0.6 for families C, D, F and H.   Choice (A)

7. Savings % of B = $\frac{4000}{24000} \times 100 = 16.67\%$

Savings % of H = $\frac{4000}{16000} \times 100 = 25\%$

Required difference = 25 – 16.67 = 8.33%.   Choice (D)

8. Required % = $\frac{(6000-2000)}{2000} \times 100 = \frac{4000}{2000} \times 100 = 200\%$.

Choice (A)

9. By observation, we can say that the percentage of household expenses for families B, E, G and H is 50% or less than 50%. Required percentage for

$A = \frac{14000}{20000} \times 100 = 70\%$

$C = \frac{12000}{22000} \times 100 = 54.54\%$

$D = \frac{10000}{18000} \times 100 = 55.55\%$

$F = \frac{16000}{26000} \times 100 = 61.53\%$

∴ For families A, D and F, it is more than 55%.

Choice (B)

10. Savings % of A = $\frac{2000}{20000} \times 100 = 10\%$

Savings % of B = $\frac{4000}{24000} \times 100 = 16.67\%$

Savings % of C = $\frac{4000}{22000} \times 100 = 18.18\%$

Savings % of D $= \dfrac{6000}{18000} \times 100 = 33.33\%$

Savings % of E $= \dfrac{2000}{16000} \times 100 = 12.5\%$

Savings % of F $= \dfrac{4000}{26000} \times 100 = 15.38\%$

Savings % of G $= \dfrac{4000}{22000} \times 100 = 18.18\%$

Savings % of H $= \dfrac{4000}{16000} \times 100 = 25\%$

∴ It is highest for family D. Choice (C)

Solutions for questions 11 to 15:

The values can be tabulated as follows

(in '000s)

Year	Income	Savings	Expenditure
2010	70	20	50
2011	80	30	50
2012	90	30	60
2013	60	5	55
2014	60	15	45
2015	90	50	40

11. The expenditure of the family was the highest in 2012.
  Choice (C)

12. The ratio of income and savings is the least in 2015, which is $\dfrac{9}{5}$ i.e., 1.8. Choice (B)

13. The expenditure decreased in 2013, 2014 and 2015. The highest percentage decrease was in 2014. Choice (C)

14. Income and savings increased simultaneously in 2011 and 2015 and decreased simultaneously in 2013.
Savings and expenditure decreased simultaneously in 2013.
Income and expenditure increased simultaneously in 2012 and decreased simultaneously in 2013. Choice (A)

15. Total savings = 20 + 30 + 30 + 5 + 15 + 50 = 150
Total Income = 70 + 80 + 90 + 60 + 60 + 90 = 450

∴ Percentage savings $= \dfrac{150}{450} \times 100 = 33\dfrac{1}{3}\%$
  Choice (C)

Solutions for questions 16 to 20:

16. The expenses of company B in 2013 = 162 – 24 = ₹138 cr
  Ans: (138)

17. The profit percentage of company A in 2014
$= \dfrac{51}{198} \times 100 = 25.75\%$ Ans: (25.75)

18. The profit percentage of company A in the different years are
2012 $= \dfrac{35}{185}$
2013 $= \dfrac{42}{205}$
2014 $= \dfrac{51}{198}$
2015 $= \dfrac{53}{230}$
2016 $= \dfrac{60}{226}$.
Only in 2014 and 2016 is the value more than 25%. So only these two values need to be computed.
2014 $= \dfrac{51}{198} \times 100 = 25.75\%$ and 2016 $= \dfrac{60}{226}$ x 100
= 26.5%
The highest is in 2016. Ans: (2016)

19. The expenses of company B in the five years
(155 – 18) + (162 – 24) + (170 – 27) + (174 – 31) + (180 – 39)
= 137 + 138 + 143 + 143 + 141 = ₹702 cr. Ans: (702)

20. The expenses of companies A and B together in the different years are
2012 = 185 + 155 – 35 – 18 = 287
2013 = 205 + 162 – 42 – 24 = 301
2014 = 198 + 170 – 51 – 27 = 290
2015 = 230 + 174 – 53 – 31 = 320
2016 = 226 + 180 – 60 – 39 = 307
The lowest was in 2012. Ans: (2012)

Exercise – 4(b)

Solutions for questions 1 to 5:

1. $\dfrac{1}{12} + \dfrac{1}{5} = \dfrac{5+12}{60} = \dfrac{17}{60}$

In $\dfrac{60}{17} = 3\dfrac{9}{17}$ hours, B and D together can finish the task.
  Choice (C)

2. Work done in 3 hours $= 3\left(\dfrac{1}{6} + \dfrac{1}{10}\right)$

$= 3\left(\dfrac{5+3}{30}\right) = 3 \times \dfrac{8}{30} = \dfrac{8}{10}$ or $\dfrac{4}{5}$

Remaining work $= \dfrac{1}{5}$

Time taken by A to complete the remaining work
$= 6 \times \dfrac{1}{5} = 1.2$ hours Choice (A)

3. Work done in one hour $= \left(\dfrac{1}{15} + \dfrac{1}{18} + \dfrac{1}{15}\right)$

$= \dfrac{(6+5+6)}{90} = \dfrac{17}{90}$

Remaining work $= 1 - \dfrac{17}{90} = \dfrac{73}{90}$

Time taken by F and G, to complete the remaining work
$= \dfrac{73/90}{\left(\dfrac{1}{18} + \dfrac{1}{15}\right)} = \dfrac{73}{90} \times \dfrac{90}{11} = \dfrac{73}{11}$ or $6\dfrac{7}{11}$ hours

  Choice (D)

4. Time taken by A C, D and F to finish the task
$= \dfrac{1}{6} + \dfrac{1}{10} + \dfrac{1}{5} + \dfrac{1}{18} = \dfrac{15+9+18+5}{90} = \dfrac{47}{90}$

It will take $\dfrac{90}{47}$ or 1.9 hours to finish the task A.

  Choice (D)

5. A's work for 2.5 hours $= 2.5 \times \dfrac{1}{6} = \dfrac{5}{12}$ th part of the work

The remaining $\dfrac{7}{12}$ th part of the work was done by A and E together.

Work done by A and E in an hour $= \dfrac{1}{6} + \dfrac{1}{15} = \dfrac{7}{30}$

Number of hours they worked together $= \dfrac{7/12}{7/30} = \dfrac{30}{12}$

= 2.5 hours Choice (B)

Solutions for questions 6 to 10:

6. Expenditure of D on food $= \dfrac{20}{100} \times 30000 = 6000$

∴ Average expenditure on food for all the six persons
$= \dfrac{6000}{1.2} = 5000$ Ans: (5000)

7. Total expenses on Rent, Education and Telephone and Electricity bills

$$= \frac{15+16+10}{100} \times 30,000 = \frac{41}{100} \times 30,000 = ₹12,300$$

Ans: (12,300)

8. Expenses of B on clothes $= \frac{10}{100} \times 28000 = ₹2,800$

Expenses of F on clothes $= \frac{15}{100} \times 32000 = ₹4,800$

Required percentage $= \frac{4800-2800}{2800} \times 100 = 71.4\%$

Ans: (71.4)

9. As the monthly expenses on fuel for each of them is $\frac{5}{100} \times 30,000 = ₹1,500$, it would be more than 5% of their monthly expenses for all those whose monthly expenses is less than ₹30,000, i.e., for A, B, C and E. Ans: (4)

10. Expenses on 'Others' for D $= \frac{22}{100} \times 30,000 = 6,600$

∴ Expresses on 'Others' for A = 6,600 × 1.1 = ₹7,260

∴ Required percentage $\frac{7260}{24000} \times 100 = 30.25\%$

Ans: (30.25)

Solutions for questions 11 to 15:

11. Sales in 2012 = ₹850 cr

Sales in 2013 $= 850 \times \frac{120}{100} = 1020$ cr.

∴ sales $= \frac{120}{100} \times$ expenses = 1.2 expenses

Expenses $= \frac{1020}{1.2} = 850$ cr   Choice (C)

12. Let sales in 2012 be 100.
Sales in 2013 = 120

Expenses in 2013 $= \frac{120}{1.2} = 100$

Sales in 2014 = 125

Expenses in 2014 $= \frac{125}{1.23} = 101.62$

% increase = 1.62%   Choice (B)

13. If the sales in 2013 was ₹1,380 cr, sales in 2012 would be ₹1,150cr.

∴ Sales in 2015 would be $1150 \times \frac{140}{100} = 1610$ cr.

As sales in 2015 = 1.21 × expenses

Expense in 2015 $= \frac{1610}{1.21} = 1330$ cr.

Profit in 2015 = 1610 – 1330 = ₹280 cr.   Choice (A)

14. Let the sales in 2012 be ₹100.

Expenses in 2012 $= \frac{100}{1.18} = 84.75$

Expenses in 2013 $= \frac{120}{1.2} = 100$

Expenses in 2014 $= \frac{125}{1.23} = 101.62$

Expenses in 2015 $= \frac{140}{1.21} = 115.5$

Expenses in 2016 $= \frac{130}{1.26} = 103$

The percentage increase was the highest in 2013.

Choice (A)

15. Expenses in 2014 = 1033
Sales in 2014 = 1033 × 1.23 = 1270

Sales in 2016 $= \frac{130}{125} \times 1270 = ₹1321$ cr.   Choice (D)

Solutions for questions 16 to 20:

16. The numbers of units sold in 2013 was 3500 × 1.1 × 1.13 = 4350.   Choice (B)

17. As the price is continuously increasing we need to only check for 2015 and 2016.
Assume the price of the item in 2014 be ₹100.
Price in 2015 = 112

Price in 2016 $= 112 \times \frac{111}{100} = 124.32$

The increase from 2014 to 2015 = ₹12
The increase from 2015 to 2016 = ₹12.32
The increase was the highest in 2016.   Choice (D)

18. The number of units sold in 2014 $= 4350 \times \frac{109}{100} = 4742$

The price of the item in 2014 $= 160 \times \frac{106}{100} \times \frac{108}{100} \times \frac{110}{100}$
= 201.5
The sales (by value) in 2014 = 4742 × 201.5 = ₹955513
Choice (C)

19. Assume the price of each item to be ₹100 and the number of unit sold to be 100.
Total sales (by values) in 2015 = 100 × 100 = 10,000.
Price of the item in 2016 = 111
Number of unit sold in 2016 = 108
Total sales (by values) in 2016 = 111 × 1.8 = 119.88
The percentage increase = 19.88%   Choice (A)

20. Assume the price in 2012 to be ₹100.
The price in 2016
$= 100 \times \frac{108}{100} \times \frac{110}{100} \times \frac{112}{100} \times \frac{111}{100} = 148$.
The required percentage = 48%   Choice (A)

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Chapter – 5
(Caselets)

Exercise – 5(a)

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Solutions for questions 1 to 5:

The number of females in all the departments together

$= \frac{1600}{2} = 800$

⇒ Total number of employees = 1600 + 800 = 2400
Let the number of employees in the Marketing, Operations, Production and Accounts departments be 3x, x, 7y and y respectively.
⇒ 3x + x + 7y + y = 2400 ⇒ x + 2y = 600 → (1) and
$|3x - 7y| = 865$ → (2)

From (1) and (2) : y = 205 ⇒ x = 190
Number of males in the Marketing department

$= y \left(\frac{100+80}{100}\right) = 205 \frac{180}{100} = 369$

⇒ Number of females in the Marketing department
= 3x – 369 = 3 (190) – 369 = 201

Number of males in the accounts department $= \frac{1}{3}(201) = 67$

The distribution of employees is as shown below.

Department	Marketing	Operations	Production	Accounts	Total
Males	369	164	1000	67	1600
Females	201	26	435	138	800
Total	570	190	1435	205	2400

1. Required percentage $= \frac{164}{205} \times 100 = 80\%$ Choice (C)

2. Number of males in the production department = 1000
Choice (A)

3. Required ratio = 570 : 435 = 38 : 29   Choice (A)

4. The number of males is less than that of females only in the Accounts department.   Choice (B)

5. Percentage of males in

Marketing = $\dfrac{369}{570} < 80\%$

Operations = $\dfrac{164}{190} > 80\%$

Production = $\dfrac{1000}{1435} < 80\%$

Accounts = $\dfrac{67}{205} < 80\%$ Choice (B)

Solutions for questions 6 to 10:

Total number of students who opted for Finance and HR
= $\dfrac{240}{2}$ = 120

$\Rightarrow$ Number of students who opted for Marketing = 120
Number of girls who opted for Marketing = 120 (0.425) = 51
Number of boys who opted for Marketing = 120 − 51 = 69

Number of girls who opted for Finance = $\dfrac{1}{3}$ (69) = 23

Number of girls who opted for HR = 28

Let the number of boys who opted for Finance and HR be x and y respectively.
$\Rightarrow$ x + y = 240 − (23 + 28 + 51 + 69) = 69 -------------- (1)
and 23 − y = ± (28 − x) $\Rightarrow$ x − y = 5 ---------------- (2)
Solving (1) and (2): x = 37 and y = 32
The distribution of students is as shown below

	Finance	**HR**	**Marketing**	**Total**
Boys	37	32	69	138
Girls	23	28	51	102
Total	60	60	120	240

6. Number of students who opted for Finance = 60
Ans: (60)

7. Total number of boys = 138   Ans: (138)

8. Required percentage = $\dfrac{51}{60} \times 100$ = 85%   Ans: (85)

9. Required ratio = (28 + 23) : 51 = 51 : 51 = 1 : 1
Choice (D)

10. Required percentage = $\dfrac{69-60}{60} \times 100$ = 15%
Choice (A)

Solutions for questions 11 to 15:

Type	Amount of the beginning	Value at the end of first year	Amount at the end of the second year
Bank	₹1 lakhs	₹1.1 lakhs	₹1.21 lakhs
Shares	₹1.75 lakhs	₹2.1 lakhs	₹1.89 lakhs
Land	₹2.25 lakhs	₹2.475 lakhs	₹2.7225 lakhs

11. Total value at the end of the first year
= ₹ (1.1 + 2.1 + 2.475) lakhs = ₹5.675 lakhs Choice (A)

12. The ratio of the amount in shares and the bank together to the price of the land = ₹(1.21 + 1.89) lakhs : ₹(2.475) lakhs
= 3.1 : 2.475 = 5 : 4   Choice (C)

13. The increase in the amount with Kirit from the beginning of the first year to the end of the second year
= ₹(1.21+ 1.89 + 2.7225) − ₹5 lakhs = ₹82,250
Choice (D)

14. The percentage increase in the amount with Kirit

= $\dfrac{(₹5.675\,\text{lakhs} - ₹5\,\text{lakhs})}{₹5\,\text{lakhs}} \times 100\%$ = 13.5%

Choice (A)

15. The ratio of the increase in the amount from the beginning of the first year to the end of the first year to the increase in the amount from the end of the first year to the end of the second year = [₹(5.675 − 5) lakhs] : [₹(5.8225 − 5.675) lakhs] = 6750 : 1475 = 270 : 59.   Choice (B)

Solutions for questions 16 to 20:

Let his total investment in shares, NSCs, FDs and land be 100x. The following table shows the amount invested by him and their respective values at the end of the first year and the second year.

Amount	Shares	NSC	FDs	Land
Invested	30x	25x	22.5x	22.5x
At end of first year	36x	26.25x	23.5125x	25.875x
At end of second year	32.4x	27.3x	24.2649x	26.91x

$\Rightarrow$ 26.91x = ₹8,61,120
₹ x = ₹32,000

16. The value of the amount invested by him in FDs
= (23.125) (32,000) = ₹7,52,400.   Choice (B)

17. The total returns obtained by him from NSC's by the end of the second year = (27.3 − 25) (₹32,000) = ₹73,600
Choice (A)

18. Clearly from the table, the returns from shares was the highest by the end of the first year.   Choice (A)

19. The required ratio of returns from shares to the increase in the price of the land = (32.4 − 30) x : (26.91)x − 22.5x
= 2.4x : 4.41x = 80 : 147.   Choice (D)

20. Value of his investment in shares by the end of the second

year = $\left(1 + \dfrac{15}{100}\right)$(36) (₹32,000) = ₹13,24,800 Choice (A)

Exercise – 5(b)

Solutions for questions 1 to 5:

C – Commerce
H – Humanities
M – Medicine
S – Science

As students can specialize in only 1 or 2 of the areas, 5 areas representing the intersection of 3 or more courses become zero automatically. Everyone specializing in Science also specialized in Commerce, let that be 'a'.

Adding up all the areas,
50 + a + b + (50 + a + b) + x +y = 300
2a + 2b + x + y = 200

1. 2a + 2b + x + y = 200
   To maximize x, put a = 10; y = 10; b = 0
   $\Rightarrow$ x = 170   Choice (C)

2. In 2a + 2b + x + y = 200, if we put x = 4 = 0, we can see that its possible for a maximum of 300 students to specialize in Commerce.
   Similarly, by going for a = b = 0, we get the value of x + y = 200 which means, when x = 0, Y can have a maximum value of 200 difference = 300 − 200 = 100   Choice (C)

3. Required ratio = $\dfrac{a+b}{50+a+b}$

   We know that a + b lies between 0 and 100

   $\therefore$ $\dfrac{a+b}{50+a+b}$ or $\dfrac{1}{1+\dfrac{50}{a+b}}$ lies between 0 and 2/3

                                   Choice (C)

4. In 2a + 2b + x + y = 200, we can afford to make x and y zeroes, thereby the required value will be at least
   50 + 0 + 0 + 0 = 50   Choice (D)

5. Maximum value of a = 100   Choice (A)

Solutions for questions 6 to 10:

Let the total amount with 'M' initially be ₹x

Amount distributed to his sons = ₹$\dfrac{x}{3}$

Amount given to N = $\left(x - \dfrac{x}{3}\right) \times \dfrac{3}{4} = ₹\dfrac{x}{2}$

Amount left with M = $\left(x - \dfrac{x}{2} - \dfrac{x}{3}\right) = ₹\dfrac{x}{6} = ₹3750$

$\Rightarrow$ x = ₹22,500
let the amounts received by P, Q, R, S, T be ₹p, ₹q, ₹r, ₹s, ₹t respectively

p + q + r + s + t = $\dfrac{x}{3} = \dfrac{22500}{3} = ₹7,500 \rightarrow$ (1)

p = t + r $\rightarrow$ (2)
t = q + r $\rightarrow$ (3)
s = p + r $\rightarrow$ (4)
(2) + (3) + (4) : p + t + s = t + r + q + r + p + r
$\Rightarrow$ s = 3r + q $\rightarrow$ (5)
From (1) and (5) : r can take only one value i.e., ₹500
From (2), (3) and (4): S received the maximum amount i.e., ₹2,500
   $\Rightarrow$ q = s − 3r = 2500 − 3(500) = ₹1,000
(2) $\Rightarrow$ t = q + r = ₹1000 + ₹500 = ₹1,500
(1) $\Rightarrow$ p = t + r = ₹1500 + ₹500 = ₹2,000

6. 'S' received the highest amount.   Choice (D)

7. The amount received by N = $\dfrac{x}{2} = \dfrac{22500}{2} = ₹11,250$

                                   Choice (B)

8. Required difference = ₹2,500 − ₹500 = ₹2,000
                                   Choice (B)

9. If P gives ₹500 to Q, then p = q = t = ₹1,500 Choice (D)

10. Required ratio = 2500 : 11250 = 2 : 9   Choice (B)

Solutions for questions 11 to 15:

Let a, b, c, d and e be the weights of different types of bags the Shopkeeper has packed, such that
a < b < c < d < e --------- (1)
Observing the given information we have,

a + b + c = 95 kg ------ (1)
a + b + d = 120 kg ------ (3)
c + d + e = 225 kg ----- (4)
b + d + e = 200 kg ------ (5)
$\Rightarrow$ d − c = 25 kg c − b = 25 kg.
$\Rightarrow$ c + (175) = 225 kg
$\Rightarrow$ c = 225 − 175 = 50 kg
$\Rightarrow$ d = 25 + c = 25 + 50 = 75 kg
b = c − 25 kg = 50 − 25 = 25 kg
a + 25 + 50 = 95 from (2)
$\Rightarrow$ a = 20 kg
$\Rightarrow$ 50 + 75 + e = 225 from (4)
$\Rightarrow$ e = 225 − 125 = 100 kg

11. The lightest bag weighed 20 kg.   Ans: (20)

12. The heaviest bag weighed 100 kg.   Ans: (100)

13. The average weight of all the bags
   $= \dfrac{(a+b+c+d+ce)}{5} = \dfrac{(20+25+50+75+100)}{5}$

   $= \dfrac{270}{5} = 54$ kg.   Ans: (54)

14. The weight of the required bag = c = 50 kg   Ans: (50)

15. The required difference = d − b = 75 − 25 = 50 kg
                                   Ans: (50)

Solutions for questions 16 to 20:

Let the annual salary of Mr. Alex be ₹x.
Taxable income = ₹(x − x/3 − 40000) = ₹(2x/3 − 40000).
Now, tax = 20% of ₹(2x/3 − 40000) = ₹(2x/15 − 8000).
As he saves ₹60,000, rebate = 20% of ₹60,000 = ₹12,000.
Tax after rebate = ₹(2x/15 − 8000 − 12000) = ₹(2x/15 − 20000).
Surcharge = 5% of ₹(2x/15 − 20000) = ₹5,000
$\Rightarrow$ x = 900000
Therefore, the annual salary of Mr. Alex = ₹9,00,000.

16. The monthly salary of Mr. Alex = ₹9,00,000/12 = ₹75,000
                                   Choice (C)

17. Total amount to be paid = tax + surcharge
   = ₹(2x/15 − 20000) + ₹5,000 = ₹1,05,000 (where x = 900000)
   The amount to be paid in the last month of the financial year = ₹(105000 − 11 x 8000) = ₹17,000.
   The percentage required = (17000/75000)100% = 22.6% (approx.)   Choice (D)

18. As Mr. Alex is a senior citizen, he gets additional rebate of ₹20,000 which can be deducted from his tax.
   Tax after rebate = ₹(2x/15 − 8000 − 12000 − 20000)
   = ₹(2x/15 − 40000).
   Surcharge = 5% of ₹(2x/15 − 40000) = ₹5,000
   $\Rightarrow$ x = 1050000
   Annual salary = ₹10,50,000.   Choice (A)

19. Income from savings = 10% of ₹60,000 = ₹6,000.

   Tax on the interest = $16\dfrac{2}{3}\%$ of ₹6,000 = ₹1,000

   As the total amount paid as tax remained the same, his salary was actually less then that computed before. As the tax rate is 20% and ₹1,000 is the decrease in tax on his

   salary, his salary was less by $\dfrac{1000}{20} \times 100 = ₹5,000$

                                   Choice (C)

20. Taxable income = ₹(x − x/6 − 40000) = ₹(5x/6 − 40000).
   Now, tax = 20% of ₹(5x/6 − 40000) = ₹(x/6 − 8000).
   Tax after rebate = ₹(x/6 − 8000 − 12000) = ₹(x/6 − 20000).
   Surcharge = 5% of ₹(x/6 − 20000) = ₹5,000
   $\Rightarrow$ x = 720000
   Monthly salary = 720000/12 = ₹60,000   Choice (B)

Chapter – 6
(Games and Tournaments)
Exercise – 6(a)

Solutions for questions 1 to 5:

1. As we are starting round 1 with 128 members, in every round till the last-but-one round, an even number of players are eliminated and the same number of players advance to the next round.

∴ The only prime number will be 2 in the 6th round.

Choice(C)

2. 127 players are eliminated in 127 matches.

Choice (A)

3. As these are no upsets, at the end of the 4th round, we have players ranked 1 to 8 remaining. In round 5, anything can happen and any of them can go to the 6th round.

Choice (B)

4. 1 plays 128, 2 plays 127…64 plays 65. As there is no upset, the 64th ranked player defeats the 65th ranked player.

Choice(C)

5. If there are no upsets, the 8th ranked player wins against 9th, 25th, 57th, and 121st ranked players. Of them, the 9th player can win the most games (3 games).

Choice(C)

Solutions for questions 6 to 10:

6. Williams (2 overs/wicket) bowled the fewest balls per wicket taken.

Choice (D)

7. Macaulay (3.3 runs/over) conceded the least runs per over.

Choice (C)

8. India scored 215 runs through the batting efforts of 11 batsmen. Average = $\frac{215}{11}$ = 19.54 runs/batsman.

Choice (B)

9. Kumar, Aaron, and Jadeja have an economy rate of 6.

Choice (A)

10. Overall over economy rate = $\frac{511}{100}$ = 5.11

Millis, Mc lead, Henry, Macaulay and Williams had an economy rate lower than 5.11.

Choice (B)

Solutions for questions 11 to 15:

As the number of coins to be removed in each round is a minimum of 2 and a maximum of 6, the sum of these two (2 + 6 = 8) is called the controlling factor.

11. As the person who picks up the last coin loses the game, Kapil should make sure that just before Sachin plays, the number of coins on the table is of the form 8n + 1 or 8n + 2. Since there are 60 coins, Kapil can pick up 2 or 3 coins.

Choice (D)

12. If the number of coins before Kapil's turn to play is of the form 8n + 1 or 8n + 2, he cannot win the game. Only 97 is of that form.

Choice (C)

13. If Sachin can win the game after picking 5 coins, the number of coins before Sachin picked up the coins should be of the form 8n + 1 + 5 or 8n + 1 + 6 = 8n + 6 or 8n + 7. Only 38 is of that form.

Choice (A)

14. As the player who picks up the last coin wins the game, Kapil has to make sure that the number of coins on the table before Sachin's turn is of the form 8n or 8n −1. As there are 900 coins on the table, Kapil should pick up either 4 or 5 coins.

Choice (D)

15. The number of coins after Sachin's turn should be of the form 8n or 8n −1. As he picked up two coins, the number of coins before his turn was of the form 8n + 2 or 8n + 1. Only 49 satisfies the given condition.

Choice (A)

Solutions for questions 16 to 20:

For pool I, the maximum difference between the points scored by any two teams is 30.

⇒ The points scored by the teams are 15, 5, −5, −15.

For pool II, the maximum difference between the points scored by any two teams is 10.

⇒ The points scored by the teams are 5, 5, −5, −5.

After semi-finals the maximum difference is 20

⇒ The points scored by the teams are 20, 10, 0, 0.

Team A from pool I won the tournament.

⇒ The points scored by the teams are 25, 5.

16. According to the given information

Team	Points
D	15
A	5
C	−5
B	−15

The team which scored 15 points in the pool stage won the tournament.

Choice (D)

17. In the pool stage since A won against B and C, it is team D which scored 15 points. A scored 5 points in the pool stage. Since the teams which entered the finals are from different pools, A would have lost the match in the semi-finals.

∴ Finally A's score = 0 points.

Ans: (0)

18. According to given: E won 3 matches (2 – pool stage, 1 – semi-final) and lost 2 matches (1 – pool stage. 1 – final).

∴ B's score = 15 – 10 = 5 points.

Ans: (5)

19. Required number of points = 25

Ans: (25)

20. The total number of matches won by the team which won the tournament = 5 (3 – pool stage, 1 – semi-final, 1 – final).

Ans: (5)

Exercise – 6(b)

Solutions for questions 1 to 5:

W – Win, D – Draw, L – Loss

Sweden won all the 5 matches and U.S. lost all 5 matches it played. Russia or Czech Republic scored 7 points.

Since it is known that both of them lost to Sweden, only WWDLL is possible. Similarly, Canada also wins at least one match (against U.S) and losses at least 1 match (with Sweden) in one-way → WDLLL.

As total wins in the tournament should be equal to total losses, Finland won 3 and lost one.

Team	Played	Won	Loss	Draw	Points
Russia	5	2	2	1	7
Czech Republic	5	2	2	1	7
Canada	5	1	3	1	4
U.S	5	0	5	0	0
Sweden	5	5	0	0	15
Finland	5	3	1	1	10

We can see that 2 matches ended in a draw. As Finland defeated Czech Republic, the 2 sets of possible draws are
(i) Finland - Canada (Draw)
Russia - Czech Republic (Draw)
(ii) Finland - Russia (D)
Canada - Czech Republic (D)
As it is given that Russia and Czech Republic didn't draw the match, the first case is not possible.

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∴The match summaries are: (✓ - win × - loss)
Sweden won against all 5

	✓ ×
Finland - Russia (D)	Finland - Czech Republic
	✓ ×
Czech Republic-Canada (D)	Finland - U.S
	✓ ×
	Finland - Canada

✓   ×
Russia - Canada
✓   ×   ✓   ×
Russia - U.S   Canada - U.S
✓   ×
Czech Republic - Russia
✓   ×
Czech Republic - U.S

1. As Czech Republic beat Russia, Russia is 4th.

Choice (B)

2. Finland scored 10 points. Ans: (10)

3. 43 points were scored by all the teams together.

Ans: (43)

4. Two matches ended in draws. Ans: (2)

5. Russia and Czech Republic defeat only U.S in common.

Ans: (1)

Solutions for questions 6 to 10:

By checking rows and columns, we can fill all the cells in the table except the outcomes of 3 matches: India – New Zealand, Pakistan – New Zealand, West Indies – New Zealand.

Team	South Africa	India	Australia	England	Pakistan	Sri Lanka	West Indies	New Zealand	Total
South Africa		2	1	2	2	2	2	1	12
India	0		2	2	1	2	0		
Australia	1	0		1	2	2	1	2	9
England	0	0	1		2	0	1	2	6
Pakistan	0	1	0	0		2	1		
Sri Lanka	0	0	0	2	0		2	0	4
West Indies	0	2	1	1	1	0			
New Zealand	1		0	0		2			

Using statement (i) West Indies win the same number or more matches as compared to New Zealand but definitely not less. As West Indies can win 1 or 2 matches, New Zealand also can win 1 or 2 matches at most.
Since we know that India didn't win against New Zealand, India could've drawn the match or lost to New Zealand. Therefore, India gets 7 or 8 points and still doesn't come 3rd in the final ranking.
The partial scores of the 8 teams are as follows.

S.A	IND	AUS	ENG	PAK	SL	WI	NZ
12	7+	9	6	4+	4	5+	3+

The possible scenarios are:
IND – 7/8; PAK – 4/5/6; WI – 5/6/7; NZ – 4/5/6/7

The total of the 4 scores should be 25 (Total scores of 28 matches = 56) India cannot get 8 points, as 8 points would mean that India comes third in the final ranking, which cannot happen. ∴ India has 7 points and NZ won against India.
IND – 7; PAK – 4/5/6; WI – 5/6/7; NZ – 5/6/7
As NZ won 2 matches already, WI also must win their last match against NZ to have 2 wins.

IND – 7; PAK – 5/6; WI – 7; NZ – 5/6 (∵ NZ cannot win more than 2)
NZ can get 5 or 6 points but it's mentioned that NZ has the same score as another team, so NZ has a score of 6. Final scores:

	SA	IND	AUS	ENG	PAK	SL	WI	NZ
Points	12	7	9	6	5	4	7	6
Rank	1	4	2	5	7	8	3	6

6. 8 matches ended in a draw. Choice (A)

7. 4 upsets happened in the tournament. Choice (B)

8. Pakistan's score of 5 points is the second lowest.

Choice (C)

9. Only South Africa retained the same rank. Choice (B)

10. Only (ii) and (iii) are true. Choice (D)

Solutions for questions 11 to 15:

11. The lowest seeded player who can win the tournament without himself causing an upset is seed 16. All players below seed 16 would face a higher seeded player in the first round itself and will not advance to the next round without an upset. Choice (D)

12. If seed 9 reached the finals, he would have beaten seed 24 in the first round, seed 8 in the second round, seed 1 in the quarter-final and seed 4 in the semi-finals, assuming that seeds 8, 1 and 4 were not upset in any of the previous rounds. Hence, none of these players would have reached the finals. Choice (C)

13. If seed 25 reached the finals and if only he caused upsets, there would be at least four upsets. Choice (C)

14. The winner would have caused only a single upset, while there is no restriction in the number of upsets caused by the other players. Assume all the matches in the first round result in upsets. Players seeded from 17 to 32 would go to the second round. Now 24 would be the lowest seed among players who are higher seeded in their matches. If all the matches except that of seed 24 result in upsets, seed 24 would be the highest seed left and he can win the tournament without causing any more upsets.

Choice (C)

15. Seed 2 could have been eliminated in the very first round and it can be the only upset in the tournament.

Choice (D)

Solutions for questions 16 to 20:

16. From the tally of the total points given in the table,

The possible outcomes of the matches of each of the teams are tabulated, below

Team	Total points	Possible outcomes
Brazil	5	(WB) + (LB)
		(W) + (L)
Argentina	11	(WB) + (W)
Germany	0	(L) + (L)
France	2	(D) + (L)
Italy	7	(W) + (D)
Portugal	14	(W) + (LB)
		(D) + (D)

(W) → Won (5 points)
(WB) → Won gaining bonus points (6 points)
(L) → Lost (0 points)
(LB) → Lost earning negative points (−1 point)
(D) → Draw (2 points)

Now, the result of Brazil's matches could have been one win (W) + one loss (L)
OR
one win with a bonus points (WB) + one loss by giving the opponent bonus points (LB)

If it is (W) + (L), then the goals scored by Brazil must be same as that it conceded (because then the win and loss should have been by exactly one goal each). But in the table the goals scored by Brazil are less than the goals it conceded. Hence the result of Brazil matches is (WB) + (LB). And the margin with which it lost one game must be one more than the margin with which it won the other game.

Now, referring to the table above the only possibility is that Brazil should have played its first round match against Argentina.

The margin with which Brazil won one game can be 2 or 3 and the margin with which Brazil lost the other game can be 3 or 4 respectively. Difference in the number of goals scored by Brazil compared to that scored by the opponent (margins) can be

−3	2	or	−4	+3

As there are no bonus points in one of the matches, Argentina won that match with a margin of only one goal and it should have won the other match with a margin of 3 goals.

Margins of Argentina must be

+3	+1

Hence Brazil lost its first round match to Argentina by 1 − 4. Hence, we can see that only statements II and III are true. **Choice (C)**

17. Germany lost both the matches but it did not give any bonus points to the opponents. Hence, the margins with which it lost the games are

−1	−1

France scored two points in both the matches together. Hence, the only possibility is
1 loss + 1 draw

The margins of the draw match will be zero.
∴ the margin of the match that it lost is −1.

0	−1

Italy scored 7 points, the only possibility is (1 draw + 1 win). The margin for a draw will be zero and the margin for a win is one.

+1	0

Portugal scored 4 points, the possibilities are 2 draws (or)
1 win + 1 loss by giving bonus points to the opponent.

If it is two draws, the number of goals scored by Portugal must be equal to the number of goals it conceded. But in the given data the number of goals scored is one less than that conceded. Hence, the only possibility is
1 W + 1 LB

The possible margins are

+1	−2

Now if we tabulate the possible margins of each team,

Brazil	+2 and −3
Argentina	+3 and +1
Germany	−1 and −1
France	−1 and 0
Italy	+1 and 0
Portugal	+1 and −2

As already concluded from the above table, Argentina won over Brazil 1 − 4.

∴ Brazil won the other match against Portugal with a margin of +2 goals i.e. it won with the score 2 − 0. Portugal scored 4 − 3 in the other match played by it. But it cannot be against France or Italy.

∴ As none of the teams has conceded 4 goals in two matches together also. Hence, Portugal won 4 − 3 against Germany. Germany lost the other game 0 − 1. That cannot be against Argentina as Argentina won the other game with 2 − 1.
∴ Germany must play against Italy.
Italy has a draw in the other match with a score 1 − 1. The following table will be obtained if all the results are tabulated.

I round

Teams	Score
Argentina − Brazil	4 − 1
Portugal − Germany	4 − 3
France − Italy	1 − 1

II round

Teams	Score
Brazil − Portugal	2 − 0
Argentina − France	2 − 1
Italy − Germany	1 − 0

Hence we can see that all the three statements are true. **Choice (D)**

18. France scored only one goal in its first round match. **Choice (B)**

19. After the first round, Brazil stood the last. **Choice (D)**

20. As Argentina beat Brazil 4 − 1, the goal difference is +3. **Choice (C)**

Exercise – 7(a)

Solutions for questions 1 to 5:

The city wise sales revenue of the companies are given below.

	P	Q	R	S	T	Total
A	50	90	75	105	168	488
B	100	90	45	210	48	493
C	100	120	30	35	24	309
Total	250	300	150	350	240	1290

1. The difference between the sales of A and B
= ₹(493 – 488) = ₹5 crore   Choice (A)

2. Net profit of P = 250 – (170 +24) = ₹56 crore
Net profit as a percentage of its sales

= $\frac{56}{250} \times 100$

Similarly net profit as percentage of sales for

Q = $\frac{28}{300} \times 100$

For R = $\frac{24}{150} \times 100$

For S = $\frac{42}{350} \times 100$

For T = $\frac{57}{240} \times 100$

By observation, we can say that the percentage is less than 20 for Q, R and S. Therefore, P or T must have the greatest percentage

P = $\frac{56}{250} \times 100 = 22.4\%$

T = $\frac{57}{240} \times 100 = 23.75\%$

It is highest for company T.   Choice (D)

3. The required percentage = $\frac{20}{120} \times 100 = 16.66\%$

          Choice (C)

4. Ratio of gross profit to expenses

For P = $\frac{80}{170} > 0.4$

For Q = $\frac{60}{240} < 0.4$

For R = $\frac{40}{110} < 0.4$

For S = $\frac{80}{270} < 0.4$

For T = $\frac{80}{160} > 0.4$ Choice (B)

5. By observing the values from the table we can conclude that statements (I) and (III) are true.   Choice (C)

Solutions for questions 6 to 10:

6. 2 BHK's flats in the different cities.

A : 62.5% of 800000 = $\frac{5}{8} \times 800000$ = 5,00,000

B : 25% of 900000 = $\frac{1}{4} \times 900000$ = 2,25,000

C : 25% of 7,00,000 = $\frac{1}{4} \times 7,00,000$ = 1,75,000

D : 37.5% of 1,00,000 = $\frac{3}{8} \times 10,00,000$ = 3,75,000

H : 12.5% of 11,00,000 = $\frac{1}{8} \times 11,00,000$ = 1,37,500

K : 37.5% of 6,00,000 = $\frac{3}{8} \times 6,00,000$ = 2,25,000

Highest number of 2 BHK's = 5,00,000
Lowest number of 2 BHK's = 1,37,500
          6,37,500

          Choice (A)

7. 3 BHK flats is Hyderabad
= 87.5% of 11,00,000 = 7 × 1,37,500 = 9.62,500
2 BHK flats in Ahmedabad
= 62.5% of 8,00,000 = 5 ×1,00,000 = 5,00,000
Required number = 4,62,500   Choice (B)

8. 3 BHK flats in Delhi
= 62.5% of 10,00,000 = 6,25,000
2 BHK flats in Ahmedabad
= 62.5% of 8,00,000 = 5,00,000

Required % = $\frac{500000}{625000} \times 100 = 80\%$ Choice (C)

9. A : 12.5% of 800000 = 1,00,000
B : 25% of 9,00,000 = 2,25,000
C : 50% of 7,00, 000 = 3,50,000
D : = 0
H : = 0
K : 62.5% of 6,00,000 = 3,75,000
          10,50,000

          Choice (A)

10. Total number of 2 BHK flats = 16,37,500
Total number of 1 BHK flats = 10,50,000

Required percentage = $\frac{5,87,500}{16,37,500} \times 100 = 35.9\%$

          Choice (C)

Solutions for questions 11 to 15:

11. The total requirement at all the tanks = 600 + 500 + 450 + 550 + 700 = 2800.
As the capacity of each pipeline is 1000 kls, at least 800 kls has to flow through the pipeline connecting A and C as the pipeline connecting A and B and the pipeline connecting A and D can carry 1000 kls each.   Ans: (800)

12. The minimum flow in the pipeline connecting A and B is 800 kls. 600 kls would be stored at B and only 200 kls would flow from B to E.
The slack = 1000 – 200 = 800 kls.   Ans: (800)

13. For minimum slack, we need to have the maximum flow.
∴ The flow in A, C should be 1000 kls and after 500 kls being consumed at C, all the remaining 500 kls can flow through CE. The minimum slack is 1000 – 500 = 500.
          Ans: (500)

14. A minimum of 800 kls must be sent through AC. After 500 kls are consumed at C, the remaining can be sent through CE and no water need to flow through CF.
          Ans: (0)

15. To find the maximum slack, we need to send the water through the minimum number of pipelines. Water can reach B, A and D directly from A. E can be reached from B or C (two pipelines A – B – E or A – C – E). F can be reached in two through C or D (A – C – E or A – D – F).
The slack = 8 × 1000 (total pipelines × capacity) – (6000 × 1 + 500 × 1 + 500 × 1 + 450 × 1 + 550 × 2 + 700 × 2)
= 8000 – 4050 = 3950.   Ans: (3950)

Solutions for questions 16 to 20:

The following table can be drawn to show the number of people who read different news papers in the different localities.

Newspaper \ Localities	Times of India	The Hindu	Hindustan Times
A	$5600 \times \dfrac{20}{100} = 1120$	$5600 \times \dfrac{40}{100} = 2240$	$5600 \times \dfrac{40}{100} = 2240$
B	$7800 \times \dfrac{30}{100} = 2340$	$7800 \times \dfrac{40}{100} = 3120$	$7800 \times \dfrac{30}{100} = 2340$
C	$7000 \times \dfrac{40}{100} = 2800$	$7000 \times \dfrac{20}{100} = 1400$	$7000 \times \dfrac{40}{100} = 2800$
D	$6400 \times \dfrac{50}{100} = 3200$	$6400 \times \dfrac{30}{100} = 1920$	$6400 \times \dfrac{20}{100} = 1280$
E	$5000 \times \dfrac{20}{100} = 1000$	$5000 \times \dfrac{20}{100} = 1000$	$5000 \times \dfrac{60}{100} = 3000$

16.   Choice (D)

17. Required ratio = $\dfrac{(2800+3200)}{(1400+1000)} = \dfrac{6000}{2400} = 5:2$.

Choice (B)

18. In the next year in locality D,

Circulation of the Times of India = $\dfrac{3200 \times 120}{100} = 3840$

The circulation of The Hindu = $\dfrac{1920 \times 130}{100} = 2496$

The circulation of The Hindustan Times

= $\dfrac{1280 \times 140}{100} = 1792$

∴ Total number of people = 8128.   Choice (B)

19. (2240 + 3120 + 1400 + 1920 + 1000) = 9680.

Choice (D)

20. The total circulation of The Times of India
= (1120 + 2340 + 2800 + 3200 + 1000) = 10,460.
The total circulation of The Hindustan Times
= 2240 + 2340 + 2800 + 1280 + 3000 = 11660

∴ Required % = $\dfrac{(11660 - 10460)}{11660} \times 100$

= $\dfrac{1200}{11660} \times 100 = 10\%$.   Choice (D)

<center>Exercise – 7(b)</center>

Solutions for questions 1 to 5:

<center>**Percentage contribution to Annual Sales**</center>

Employee	2008	2009	2010	2011	2012	2013
A	20%	30%	25%	40%	20%	30%
B	35%	40%	15%	20%	30%	40%
C	1 - 44%	1 - 29%	1 - 59%	1 - 39%	1 - 49%	1 - 29%
D	44 - 1%	29 - 1%	59 - 1%	39 - 1%	49 - 1%	29 - 1%
Total	100%	100%	100%	100%	100%	100%

<center>**Rupee contribution to Annual Sales (in ₹ cr)**</center>

Employee	2008	2009	2010	2011	2012	2013
A	4	7.5	7.5	8.8	6.8	12
B	7	10	4.5	4.4	10.2	16
C+D	9	7.5	18	8.8	17	12
C/D Max	8.8	7.25	17.7	8.58	16.66	11.6
Min	0.2	0.25	0.3	0.22	0.34	0.4

1. From ₹9 cr in 2008 to ₹12 cr in 2013, the increases is 33^1/$_3$%.   Choice (B)

2. For the change to be maximum possible, C's contribution should be 1% in 2009 and 39% in 2011.
Increases = 38 percentage points.   Choice (B)

3. D's maximum possible contribution in 2011 = ₹8.58 cr
D's minimum possible contribution in 2012 = ₹0.34 cr
Maximum drop = ₹8.24 cr   Choice (A)

4. The highest difference variation in contribution can be seen in 2010-2011 when either of C or D contribution ₹17.7 cr in one year and ₹0.22 cr in the other.   Choice (A)

5. Average sales growth rate

= $\dfrac{1}{5}\left(\dfrac{5}{20} + \dfrac{5}{25} - \dfrac{8}{30} + \dfrac{12}{22} + \dfrac{6}{34}\right) \times 100 = 18.1\%$

Projected sales of 2014 = 40(1 + 0.181) = ₹47.24 cr of which, C or D would contribute a maximum of 29% of 47.24 cr = ₹13.7 cr.   Choice (A)

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Solutions for questions 6 to 10:

Number of students in each school is as follows
School A – 30% of 12000 = 3600
School B – 25% of 12000 = 3000
School C – 21% of 12000 = 2520
School D – 24% of 12000 = 2880

The following table can be drawn to show the number of students who opted for different subjects in the given schools.

School \\ Subject	A	B	C	D
Science	$\frac{25}{100}\times3600=900$	$\frac{25}{100}\times3000=750$	$\frac{37.5}{100}\times2520=945$	$\frac{37.5}{100}\times2880=1080$
Arts	$\frac{25}{100}\times3600=900$	$\frac{50}{100}\times3000=1500$	$\frac{25}{100}\times2520=630$	$\frac{12.5}{100}\times2880=360$
Commerce	$\frac{50}{100}\times3600=1800$	$\frac{25}{100}\times3000=750$	$\frac{37.5}{100}\times2520=945$	$\frac{50}{100}\times2880=1440$

6. 900 + 750 + 945 + 1080 = 3675.   Choice (B)

7. Required ratio = $\frac{360}{630}=4:7$.   Choice (A)

8. Required % = $\frac{(900-750)}{900}\times100=16.67\%$.

Choice (C)

9. Average number of science students in the four schools

$= \frac{3675}{4}\approx918$

∴ In schools C and D, the number of science students is more than the average.   Choice (B)

10.   Choice (C)

Solutions for questions 11 to 15:

11. Assuming that the maximum slack (600 ℓ) is possible and drawing the network, we get
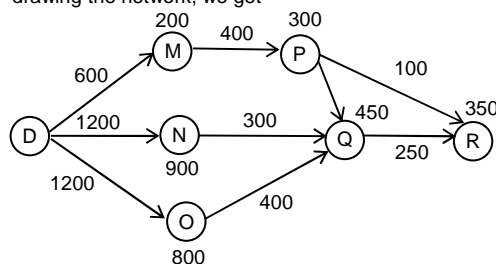
Therefore, we see that a slack of 600 is possible.
Note: we have disconnected O and R because a slack of 600 ℓ means that no milk is flowing any way. Choice (A)

12.
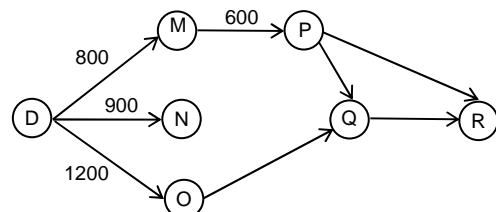
O can pump out 400 at the most, while P can pump out only 300.
∴ we only have 700 ℓ supplies for a requirement of 800 ℓ (Q + R). Deficit = 100 ℓ.   Choice (C)

13. If the demand at R becomes 560, we can try to satisfy the demand in this way
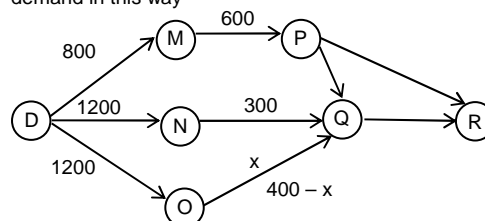
For P, Q and R, whose requirement is 1310 ℓ, we can provide at most 600 + 300 + 400 = 1300 ℓ.
∴ deficit = 10 ℓ.   Choice (C)

14. D needs pump at least 800 to O, so 50% slack is not possible. Similarly D needs to pump at least 900 to N, so DN is also ruled out. MP can't have a 50% slack as P needs to pump at least 100 ℓ to either Q and R (∵ N can pump at most 300 and O can pump at most 400, but demand at Q + R = 800).   Choice (C)

15. When P and N pump to Q, O can pump 350 ℓ to R. When P and Q pump to R, O can pump only to Q and nothing to R
Max = 350 ℓ   Min = 0 ℓ   Choice (D)

Solutions for questions 16 to 20:

16. The requirement at all the places
= 600+ 800 + 400 + 750 + 750 + 700 = 4000 kls.
maximum of 1500 kls can flow through the pipeline connecting X and P, and a maximum of 1400 kls can flow through the pipeline connecting X and S. (The requirement at S is 400 and as the capacity of the pipeline connecting S and T is 1000 kls, only 1400 and not 1500 kls can flow through X S).
∴ 1100 kls has to flow through X – R and so the slack is 1500 – 1100 = 400 kls.   Ans: (400)

17. The requirement of Q, R, S, T and U together 3400 kls.
1500 kls can flow through X – R and 1400 kls through X – S.
∴ The flow in the pipeline connecting P and Q can be 500 kls.   Ans: (500)

18. For maximum slack, the flow must be minimum. Though 1500 kls can flow through each of X – P and X – R, the requirement at S and T are 400 and 750 respectively and so at least 1150 kls must flow through X – S. After 400 kls is consumed at S, the remaining 750 kls would be connected at T. The slack in (1500 – 1150) + 1000 – 750 = 350 + 250 = 600 kls.   Ans: (600)

19. As depot P is under repair oil can only flow through X – R and X – S. For maximum quantity to reach U, oil should flow through X – R – U and X – S – T – U. In this case 700 kls can flow to U. **Ans: (700)**

20. Maximum slack = 10500 – ((600 + 800 + 400) + (750 + 750 + 700)2) = 10500 – (1800 + 4400) = 4300 kls.

Ans: (4300)

Chapter – 8
(Reasoning – Based DI)

Exercise – 8(a)

Solutions for questions 1 to 5:

1. Let the expense of the company in 2013 be 100x.
∴Total expenses in the units B and E together in 2013

$= \left(\frac{18+9}{100}\right) \times 100x = 27x$.

Expense of the company in 2014

$= (100x)\left(1 + \frac{10}{100}\right) = 110x$.

Total expense in the units B and E together in 2014

$= (110x)\left(\frac{15+18}{100}\right) = 36.3x$.

∴The percentage increase in the expense of the two units

together $= \frac{36.3x - 27x}{27x} \times 100\%$

$= \frac{9.3x}{27} \times 100\% = \frac{310}{9}\% = 34\frac{4}{9}\%$ Choice (C)

2. Let 100x be the total expense of the company in 2013.

Expenses of unit E $= \frac{9}{100} \times 100x = 9x$

Expenses of unit E in 2015 $= 9x\left(1 + \frac{120}{100}\right) = 19.8x$

∴Total expenses of the company in 2015

$= \frac{19.8x}{0.16} = 123,75x$

∴Percentage increase in the expenses of unit G

$= \frac{6,14(123,75x) - 0.149(100x)}{0.14(100x)} \times 100\% = 23.75\%$

Choice (D)

3. Let the total expense of the company in 2013 be 100x.
⇒ Total expense of the company in 2016

$= 100x\left(1 + \frac{40}{100}\right) = 140x$

Observing the table carefully we can say that for unit C,

increase in the expenses $= \frac{18}{100} \times 140x - \frac{11}{100} \times 100x$

$= 25.2x - 11x = 14.2x$, which is the highest.

Choice (A)

4. Let the total expenses of the company in 2013 be 100x.

⇒ Expenses of the unit G in 2013 $= \frac{14}{100} \times 100x$.

Expenses of the unit G in 2016 $= 14x\left(1 + \frac{20}{100}\right)^3 = 24.192x$.

∴Total expense of the company in 2016 $= \frac{24.192x}{0.16} = 151.2x$

∴The percentage increase in the expenses of the company

from 2013 to 2016 $= \frac{151.2x - 100x}{100x} \times 100\% = 51.2\%$

Choice (C)

5. Let the total expense of the company in 2014 be 100x.
⇒ Total expense of the company in

$2015 = 100x\left(1 + \frac{12}{100}\right) = 112x$

Observing the table clearly we can say that for the units B, C, E, and G there was decrease in the share of expense.

Unit	Expense in 2014	Expense in 2015
B	14x	14.56x
C	11x	11.2x
E	18x	17.92x
G	17x	15.58x

Clearly the expense of the units B, E and G only decreased.

Choice (D)

Solutions for questions 6 to 10:

Let the number of students in the college 100 n.
Let F: Foot ball and C: Cricket given that.

Given that

$n(C \cup F) = \frac{75}{100} \times 100\,n = 75\,n$.

$n(C) = \frac{40}{100} \times 100\,n = 40\,n$.

$n(F) = \frac{60}{100} \times 100\,n = 60\,n$.

∴ $n(C \cap F) = n(C) + n(F) - n(C \cup F) = 40\,n + 60\,n - 75\,n = 25\,n$
$n(\overline{C \cup F}) = \mu - n(C \cup F) = 100\,n - 75\,n = 25\,n$

Number of girls who like neither of the games $= \frac{8}{11}(25\,n) = 80$

⇒ 25 n = 110
∴ 100 n = 4 (25 n) = 4(110) = 440.

6. Number of girls who like Football

$= \left(1 - \frac{50}{100}\right)60\,n = \frac{50}{100} \times 60 \times \frac{440}{100} = 132$ **Ans: (132)**

7. Number of boys who like only one of the two games

$= \frac{75}{100} \times 40\left(\frac{110}{25}\right) + \frac{50}{100} \times 60\left(\frac{110}{25}\right) - 2 \times \frac{8}{11}\left(25\left(\frac{110}{25}\right)\right)$

$= 132 + 132 - 160 = 104$ **Ans: (104)**

8. Total number of girls in the college

$= \frac{25}{100} \times 40\left(\frac{110}{25}\right) + \frac{50}{100} \times 60 \times \frac{110}{25} - \frac{3}{11} \times 110 + 80$

$= 44 + 132 - 30 + 80 = 226$ **Ans: (226)**

9. The ratio of the number of boys to the girls who like only

cricket $= \left(\frac{70}{100} \times 40\left(\frac{110}{25}\right) - \frac{8}{11} \times 25 \times \frac{110}{25}\right)$

$: \left(\frac{25}{100} \times 40\left(\frac{110}{25}\right) - \frac{3}{11} \times 25 \times \frac{110}{25}\right)$

$= (132 - 80) : (44 - 30) = 52 : 14 = 26 : 7$ Choice (B)

10. Number of boys who like at most one of the two games

$= \left[\frac{75}{100} \times 40\left(\frac{110}{25}\right) - \frac{8}{11} \times 110\right] + \left[\frac{50}{100} \times 60\left(\frac{110}{25}\right) - \frac{8}{11} \times 110\right]$

$+ \frac{3}{11} \times 110 = (132 - 80) + (132 - 80) + (132 - 80)$

$+ 30 = 52 + 52 + 30 = 134$.   Choice (D)

Solutions for questions 11 to 15:

11. Number of persons who were not offered ≥ 5 lakhs by
Company A = 240 – 212 = 28
Company B = 240 – 168 = 72
Company C = 240 – 195 = 45
Company D = 240 – 175 = 65

210

If all these 210 members are different, then the number of persons who were offered ≥ 5 lakhs by all the four companies will be least.
$\therefore$ Least number of persons = 240 – 210 = 30
Choice (A)

12. Required number = least of {134, 120, 105, 115} = 105
Choice (C)

13. Number of students who did not get placed
= 240 – 212 = 28. Choice (D)

14. Number of students who were offered a salary between ₹8 lakhs and ₹10 lakhs by:
Company A = 134 – 80 = 54
Company B = 120 – 64 = 56
$\therefore$ Required number = least of {54, 56} = 54.
Choice (B)

15. Number of students who were offered a salary between ₹8 lakhs and ₹10 lakhs = Number of students who were offered a salary between ₹10 lakhs and ₹12 lakhs by company D = 54. Choice (C)

Solutions for questions 16 to 20:

16. As it is given that Anju won 1 gold and 1 bronze, she won the medals in chess and Jaspal, who won two bronze medals, must have won in Athletics. The two golds each in athletics and weight lifting were won by Sania or Tania in any order. Hari won two silver medals and that must be in shooting while Selvaraj, who won one silver, won it in tennis. The gold medal in tennis and shooting was won by Mahesh or Neelam in any order. Choice (C)

17. Neelam won the medal in tennis or shooting.
Choice (D)

18. The number of athletes who won medals for India was two (Jaspal and one of Sania or Tania). Choice (B)

19. None of the events can have three persons winning medals
Choice (A)

20. Among the given persons, only Jaspal won medal for India in Athletics. Choice (B)

Exercise – 8(b)

Solutions for questions 1 to 5:

Let the number of runs scored in the first match be K.

	Match I	Match II	Match III	Match IV
Number of runs scored in	k	K + 1 / K – 1	K + 3, K – 1 / k + 1, k – 3	K + 6, k / k + 2, k – 4 / k + 4, k – 2 / k, k – 6
Total number of runs upto	K	2k + 1 / 2k – 1	3k + 4 / 3k / 3k – 4	4k + 10 / 4k + 4 / 4k + 2 / 4k – 2 / 4k – 4 / 4k – 10

1. X can take six different values. Choice (A)

2. $4k – 10 = 70 \Rightarrow k = 20$. Choice (C)

3. k = 20. The possible values of X are
4(20) + 10, 4(20) + 4, 4(20) + 2, 4(20) – 2, 4(20) – 4, 4(20) – 10
Choice (D)

4. $3k – 4 = 59 \Rightarrow 3k = 63 \Rightarrow k = 21$
Number of runs scored in the second match = k – 1 = 20.
Choice (C)

5. The total number of runs in the last three matches should be in the form 3k + 10, 3k + 4, 3k + 2, 3k – 2, 3k – 4, 3k – 10.
$\therefore$ 60 is not possible. Choice (C)

Solutions for questions 6 to 10:

Based on the given data the possible distribution is as follows.

No. of dependants	No. of persons	Possible ages of the persons	
0	2	34, 35	1m, 1w
1	3	28, 30, 36	2m, 1w
2	12	19, 20, 21, 22, 23, 24, 25, 26, 27, 29, 31, 38	7m, 5w
3	8	32, 33, 37, 39, 41, 42, 43, 44	6m, 2w
> 3	6	Any four of these values 40, 45, 46, 47, 48, 49, 50, 51, 52	3m, 3w

6. Required number of respondents = 2 + 3 + 12 + 8 + 3 = 28
Ans: (28)

7. Required number of women = 1 + 1 + 2 + 2 + 3 = 9
Ans: (9)

8. Required number of men = 5 Ans: (5)

9. Required number of women = 0 + 0 + 0 + 0 + 0 = 0
Ans: (0)

10. Required number of men = 0 + 0 + 5 = 5 Ans: (5)

Solutions for questions 11 to 15:

11. The maximum number of employees in company Y who have accounts in all the four banks = 120, as the number of employees having accounts in bank A are the least and so 120 could be the maximum number of employees having accounts in all the four banks. Choice (A)

12. The number of employees who have accounts in the banks Q and R are 180 and 120 respectively. If the employees who have accounts in Q does not have accounts in R, then the minimum number of employees who can have accounts in all the four banks = 0 Choice (A)

13. The following venn diagram shows the number of employees of company Z, when the employees who can have account in only one of the four banks is maximum.
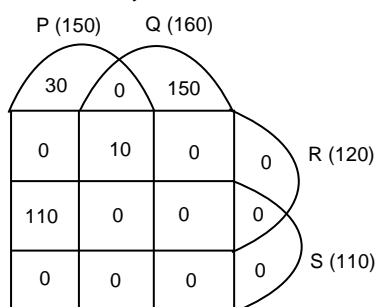
∴Maximum number of employees = 150 + 30 = 180

Choice (B)

14. Maximum number of employees in company Y who can have accounts in both the banks P and Q = min (120, 150) = 120.
Minimum number of employees in company Z who can have accounts in both the banks P and Q = 150 + 160 − 300 = 10
∴Required ratio = 120 : 10 = 12 : 1   Choice (D)

15. Maximum number of employees who do not have any account in the given banks in
Company X : 300 − 200 = 100
Company Y : 300 − 180 = 120
Company Z : 300 − 160 = 140
∴Required maximum = 100 + 120 + 140 = 360

Choice (C)

Solutions for questions 16 to 20:

16. The number of students who scored more than 90% in at least two subjects = students who scored more than 90% in (exactly two + exactly three + exactly four + exactly five) subjects. The number of students will be the least when maximum students score more than 90% in exactly one subject and the other students score more than 90% in all the five subjects. Total instances = 95. If p is the number of students who scored more than 90% in exactly one subject and q is the number of students who scored more than 90% in all the five subjects, p + q = 35 and p + 5q = 95
∴ p = 20 and q = 15   Choice (B)

17. We have to find the maximum possible number of students who scored more than 90% in class 10.
Total instances = 15 + 25 + 21 + 29 + 16 = 106.

∴ required value = $\dfrac{106}{3}$ = 35

i.e., 35 students scored more than 90% in exactly three subjects and one student scored more than 90% in a single subject.   Choice (C)

18. The maximum number of students in the different classes who scored more than 90% in all the five subjects is
Class 6 – 12 (the lowest value among all the five)
Class 7 – 15
Class 8 – 7
Class 9 – 10
Class 10 – 15
Total = 59
∴ at most 59 students would have won the scholarship.   Choice (D)

19. To find the maximum number of students who satisfy a certain criteria in exactly 'n' subjects, add up all the values and divide by 'n'. If the answer obtained is less than 'x' values which were added where x < n, ignore the 'x' values, add up the rest and divide by n − x.
The maximum number of students who scored more than 90% in exactly four subjects in each of the classes are

Class 6 = $\dfrac{12 + 16 + 15 + 22 + 18}{4}$ = 20, as 22 > 20

$\dfrac{12 + 16 + 15 + 18}{3}$ = 20

Class 7 = $\dfrac{15 + 22 + 22 + 21 + 15}{4}$ = 23

Class 8 = $\dfrac{7 + 18 + 16 + 23 + 17}{4}$ = 20

as 23 is greater then 20, $\dfrac{7 + 18 + 16 + 17}{3}$ = 19

Class 9 = $\dfrac{10 + 19 + 15 + 22 + 18}{4}$ = 21,

$\dfrac{10 + 19 + 15 + 18}{3}$ = 20

Class 10 = $\dfrac{15 + 25 + 21 + 29 + 16}{4}$ = 26,

$\dfrac{15 + 25 + 21 + 16}{3}$ = 25

∴ Total students who scored more than 90% in exactly four subjects = 20 + 23 + 19 + 20 + 25 = 107.   Choice (D)

20. The number of students who scored 90% in a maximum of two subjects will be maximum when we assume that all the students in the class secured more than 90% in at least one subject. Number of instances in class 6 = 83.
As we need to maximize the number of students who scored more than 90% is at most 2 subjects, (0 subjects, 1 subject and 2 subjects), we should minimize the other possibilities, i.e., we assume 8 students got more than 90% is 5 subjects.
∴ 83 can be written as $8 \times 5 + 21 \times 2 + 1 \times 1$
∴ At most two = 22 (21 + 1)   Choice (C)

Chapter – 9
(Omet Based DI)

Exercise – 9(a)

Solutions for questions 1 to 5:

1. We don't have sufficient data to answer the question.   Choice (D)

2. Total number of students in college B = 1080

Number of students from Delhi = $\dfrac{1080 \times 20}{100}$ = 216

Total number of students in college E = 1200

Number of students from Delhi = $\dfrac{1200 \times 12}{100}$ = 144

Difference = 72   Choice (B)

3. Number of students pursuing Computer science
= 250 + 120 + 220 + 180 + 240 + 160 = 1170
Number of students, pursuing Mechanical = 948
Required difference = 1170 − 948 = 222   Choice (A)

4. Number of students from Punjab in college B

= $\dfrac{1080 \times 10}{100}$ = 108

Number of students from Maharashtra in college E

= $\dfrac{1200 \times 15}{100}$ = 180

Required % = $\dfrac{(180 - 108)}{180} \times 100$ = 40%   Choice (D)

5. Total number of students in colleges A, B and D
= 1280 + 1080 + 890 = 3250
Total number of students in college F = 1010

Required % = $\dfrac{1010}{3250} \times 100$ = 31.07%   Choice (A)

Solutions for questions 6 to 10:

Let the total amount spent by A and B be 'a' and 'b' respectively,
⇒ 30% of a + 22.5 % of b = 27% of b = 27% of (a + b)

⇒ 3% of a = 4.5% of b ⇒ $\dfrac{a}{b} = \dfrac{3}{2}$

Let a = 300k ⇒ b = 200k and a + b = 500k

Expense type	A	B	A & B together
Rent	90k	45k	135k
Food	60k	40k	(100k)
Clothing	36k	(34k)	70k
Medical	(54k)	26k	80k
Education	33k	(47k)	(80k)
Entertainment	(27k)	(8k)	35k
Total	300k	200k	500k

6. Required (%) = $\dfrac{47k}{200k} \times 100 = 23.5\%$ Choice (A)

7. Given : 135k = 6750 ⇒ k = 50
⇒ 54 k = 54 (50) = ₹2,700.   Choice (B)

8. Required ratio = (33k + 27k) : (47k + 8k)
= 60k : 55k = 12 : 11   Choice (D)

9. Required number = 5   Choice (C)

10. (A) = 35k
(B) = 36k
(C) = 33k
(D) = 47k   Choice (C)

Solutions for questions 11 to 15:

11. Given average expenditure of five persons = 46000
Expenditure of C = 5(46000) – (44000 + 50000 + 30000 + 60000) = 46,000

Total expenditure on Food and Loan payments
= 46000 × (20% + 25%)

= $46000 \times \dfrac{45}{100} = 20,700$ Choice (C)

12. Expenditure of C = 46000.

Loan payments of C = $46000 \times \dfrac{25}{100} = 11,500$

Loan payments of E = $11,500 \times \dfrac{110}{100} = 12,650.$

Required percentage = $\dfrac{12,650}{60000} \times 100 = 21.08\%$

Choice (C)

13. Expenditure on Rent for A = $44000 \times \dfrac{17}{100} = 7480$

Expenditure on Rent for E = $60,000 \times \dfrac{23}{100} = 13800$

Required percentage = $\dfrac{13800 - 7480}{7480} \times 100 = 84.4\%.$

Choice (C)

14. Expenditure of C = 46000.

Expenditure of C on Education = $46000 \times \dfrac{20}{100} = 9200$

Percentage of expenditure on education for

A = $\dfrac{9200}{44000} \times 100 = 20.9\%$

For B = $\dfrac{9200}{5000} \times 100 = 18.4\%$

For C = 20%

For D = $\dfrac{9200}{30000} \times 100 = 30.6\%$

For E = $\dfrac{9200}{60000} \times 100 = 15.3\%$ Choice (C)

15. Expenditure of C on others = $46000 \times \dfrac{10}{100} = 4600$

∴Expenditure on 'others' for E = $46000 \times \dfrac{130}{100} = 5980$

Required percentage = $\dfrac{5980}{60,000} \times 100 = 9.96\%$

Choice (A)

Solutions for questions 16 to 20:

16. Chander's marks in Chemistry must be more than 27 and less than 30.
∴Only 28 is possible.   Choice (B)

17. Given that the marks scored by Chander and Shyam in Chemistry and Biology are the same. From the given data, for Chander, these values must be more than 27 and by observing Shyam's data these values must be less than 30.
∴The values must be 28 and 29.
∴Total marks of Shyam is
31 + 35 + 30 + 29 + 28 = 153.   Choice (A)

18. The person who got the highest marks in English is Chander.   Choice (A)

19. The students who obtained their highest mark in Maths are Chander, Hrishitha, Jahna and Shyam.   Choice (C)

20. All the given statements except statement 4 are true. From the given statements, Nayana's marks in Maths are same as Arun's marks in Biology, which must be less than 35.
Choice (D)

Exercise – 9(b)

Solutions for questions 1 to 5:

Let the total number of employees be 100x, and the total number of men be 100y. The distribution of employees is as shown below.

Department	Total number of employees	Number of men	Number of women
A	10x	9y	10x – 9y
B	26x	25y	26x – 25y
C	24x	26y	24x – 26y
D	18x	17y	18x – 17y
E	22x	23y	22x – 23y

1. Given : (26x – 25y) – (10x – 9y) = 32
⇒ 16 (x – y) = 32 ⇒ x – y = 2
∴Number of women in D and E = (18x – 17y) + (22x – 23y)
= 40 (x – y) = 40 (2) = 80.   Choice (B)

2. Number of women in the five departments is given below.
A = 10x – 9y = 9 (x – y) + x
B = 26x – 25y = 25 (x – y) + x
C = 24x – 26y = 24 (x – y) – 2y
D = 18x – 17y = 17 (x – y) + x
E = 22x – 23y = 22(x – y) – y   Choice (B)

3. Number of girls in all the departments together
= 100x − 100y = 100 (x − y)
For it to be least x = 1.5 and y = 1
∴ 100 (x − y) = 100 (1.5 − 1) = 50. Choice (C)

4. Given : 100x = 300 ⇒x = 3 → (1)
18x − 17y = 22x − 23y ⇒ 4x = 6y
(1) ⇒ 4 (3) = 6y ⇒ y = 2.
Total number of men in the departments C and D
= 26 y + 17y = 43 (y) = 43 (2) = 86. Choice (D)

5. The percentage of men in the given departments is as follows.

A : $\frac{9y}{10x} \times 100 < 105 \left(\frac{y}{x}\right)$%

B : $\frac{25y}{26x} \times 100 < 105 \left(\frac{y}{x}\right)$%

C : $\frac{26y}{24x} \times 100 > 105 \left(\frac{y}{x}\right)$%

D : $\frac{17y}{18x} \times 100 < 105 \left(\frac{y}{x}\right)$% Choice (B)

Solutions for questions 6 to 10:

Let the total market size in 2012 be x and the total market size in 2013 be y.

Market	2012	2013
Nokia	0.15 x	0.06 y
Samsung	0.3 x	0.34 y
Sony	0.15 x	0.13 y
Blackberry	0.16 x	0.08 y
Micromax	0.15 x	0.19 y
Others	0.09 x	0.2 y
Total	x	y

6. 0.34y − 0.3x = 0.15x − 0.06y

⇒ 0.4y = 0.45x ⇒ $\frac{x}{y} = \frac{8}{9}$

Blackberry's market declined from 0.16x to 0.08 × $\frac{9}{8}$ x = 0.09x

Decline = $\frac{0.07x}{0.16x}$ = 43.75% Choice (C)

7. 0.15x + 0.15x + 0.15x = 0.19y + 0.2y + 9000
0.45x = 0.39y + 9000
From this equation, neither x nor y can be determined, hence the question can't be answered. Choice (D)

8. 0.16x + 0.15x + 0.09x = 0.13y + 0.08y + 0.19y
0.4x = 0.4 y ⇒ x = y
Samsung grew from 0.3x to 0.34x

⇒ $\frac{0.04x}{0.3x}$ = 13.33% Choice (A)

9. Essentially, Nokia's market falls to (0.06y) (0.7) while all others remain the same. The total market size reduces by a small amount and becomes 0.94y + 0.06y × 0.7 = 0.982y

Blackberry's market share = $\frac{0.08y}{0.982y}$ = 8.15%

Choice (B)

10. In 2013, market share of Samsung + Micromax
= 0.53 (or) 53%
In 2014, market share of Samsung + Micromax

= $\frac{0.53y}{0.982y}$ = 54% (approx)

Increase = 1 percentage point Choice (B)

Solutions for questions 11 to 15:

Let the total quantity extracted be 200x.

Place	Total quantity extracted	Quantity of pure iron
A	25x	6x
B	28x	10.5x
C	40x	12x
D	48x	12x
E	15x	3x
F	44x	12.1x

11. Quantity of pure iron extracted is the largest from F.
Choice (D)

12. Given : 200x = 200 million tones
∴ Required quantity = 6x + 10.5x + 12x + 12x + 3x + 12.1x
= 55.6x = 55.6 million tones. Choice (B)

13. Concentration of pure iron in the mixture

C and F = $\frac{12x + 12.1x}{40x + 44x} \times 100 < 32\%$

B and F = $\frac{10.5x + 12.1x}{28x + 44x} \times 100 < 32\%$

D and F = $\frac{12x + 12.1x}{48x + 44x} \times 100 < 32\%$

B and C = $\frac{10.5x + 12x}{28x + 40x} \times 100 > 32\%$ Choice (D)

14. Given : 12x = 48 ⇒ x = 4 million tonnes.
∴ Total quantity extracted from B, C, D and F are more than 100 million tones. Choice (A)

15. Required (%) = $\frac{10.5}{55.6}$ x 100 = 18.88% ≈ 19%

Choice (B)

Solutions for questions 16 to 20:

	Profit of A	Profit of B
2011	125x	375x
2012	150x	350x
2013	200x	1050x
2014	275x	1925x
2015	330x	1670x
2016	363x	1287x

16. Increase in the profit for product B is highest in 2014 when compared to 2013. Choice (C)

17. Given: 275x = ₹1.1 cr
⇒ 1050x = ?

? = $\frac{1050x \times 1.1}{275x}$ = 4.2 cr. Choice (A)

18. The average profit of product A over the given years

= $\frac{125x + 150x + 200x + 275x + 330x + 363x}{6}$ = 240.5x

In 2014, 2015 and 2016 the profit for product A is more than 240.5x. Choice (C)

19. Required (%) = $\frac{1050x - 350x}{350x}$ x 100 = 200%

Choice (A)

20. Profit in 2010 = 100x × $\frac{60}{40}$ = 150x

∴ Required ratio = 150x : 375x = 2 : 5 Choice (D)