Solutions

Exercise – 1

Solutions for questions 1 to 4:

1. Scores the marks in the following manner
47 = 8 x 4 + 3 x 1 + 2 x 6
49 = 8 x 4 + 3 x 1 + 2 x 7
52 = 8 x 5 + 2 x 6
But, 51 is not possible to score with the given marking scheme Choice (C)

2. Only possible way is 43 = 8 x 4 + 3 x 1 + 2 x 4
So, Sangha scored marks from all the questions of part- B
So, (A) is false. Choice (A)

3. Highest possible marks with eight questions:
5 x 8 + 3 x 2 = 46
4 x 8 + 1 x 3 + 3 x 2 = 41
Sum = 87
Lowest possible marks with eight questions:
1 x 3 + 7 x 2 = 17
2 x 3 + 6 x 2 = 18
Sum = 35
Difference of sums = 87 – 35 = 52. Choice (C)

4. Highest possible marks with nine questions:
5 x 8 + 4 x 2 = 48
Lowest possible marks with nine questions:
2 x 3 + 7 x 2 = 20
Difference = 28. Choice (D)

Solutions for questions 5 to 8:

There could be either 2, 4, 6 and 12 number of books or there could be 2, 4, 8 and 10 number of books.
As per this point (5) no of maths books should be a multiple of 6. It could either be 6 or 12. If the number of maths books is 12, then total number of books misplaced would be at least 16, which contradicts point (1). Hence there are 6 maths books.
The only possible number of books in different shelves is 2,4,6,12
(3) $\Rightarrow$ the no. of books in physics and chemistry shelves are 2 and 4 respectively because the number of chemistry books are double of number of physics books.
Now there should be 12 biology books as this is the only number left.

As per the question, either one or none of the physics books were jumbled.

If four maths books are on the biology shelf, then maximum of one chemistry book could be in the physics shelf and vice versa. In this case, less than 12 books would be jumbled, which is against the condition given.
Hence four chemistry books must be on the biology shelf and four maths books must be on the chemistry shelf. None of the Physics books are jumbled.

From the above, we get the following table.

Shelf	Books after jumbling
Physics	2 physics books
Chemistry	4 maths books
Maths	4 biology books,2 maths books
Biology	8 biology books,4 chemistry books

5. Four chemistry books are kept in biology shelf Choice (A)

6. Two physics books are kept in physics shelf Choice (B)

7. Four biology books were kept in maths shelf Choice (B)

8. The books in Physics shelf were not jumbled at all. Choice (A)

Solutions for questions 9 to 12:

From the given data we know that P has a trip on July 2nd and august 3rd. The gap is 32 days.
So, frequency of flight P is a factor of 32. But factors should not exceed 7 and cannot be 1 from the given data.
So, frequency of P = 2 or 4
Q has trips on July 3rd and august 2nd. The gap is 30 days.
Frequency of Q is a factor of 30.
So, frequency of Q = 2 or 3 or 5 or 6.
Similarly, frequencies of R, S and T are factors of 28, 26 and 24 respectively.
So, frequency of R = 2 or 4 or 7, frequency of S = 2 and frequency of T = 2 or 3 or 4 or 6

9. Only frequency of S is uniquely determined. Choice (D)

10. If each flight has different frequency then frequency of P = 4, frequency of R =7
Hence frequencies of P, R and S can be uniquely determined. Choice (A)

11. Frequency of S is 2, the least. Choice (D)

12. If each flight has different frequency and Q has a trip every 3 days, then frequency of T is 6. So, we can determine the frequencies of all the flights. Choice (A)

Solutions for questions 13 to 16:

(2) $\Rightarrow$ no. of people who purchased bananas is a multiple of 2. So, it can be either 174 or 200
(3) $\Rightarrow$ no. of people who purchased oranges is a multiple of 3. So, it can be either 174 or 183
(1) $\Rightarrow$ no. of people who purchased exactly 2 is a multiple of 2.
(3) $\Rightarrow$ the number of people who purchased oranges is a multiple of 6.
So, it can only be 174 and not 183.
$\Rightarrow$ no. of people who purchased bananas has to be 200
$\Rightarrow$ no. of people who purchased apples has to be 183
no. of people who purchased exactly 2 = 174/3 = 58
(1) $\Rightarrow$ no. of people who purchased exactly 3 = 58/2 = 29

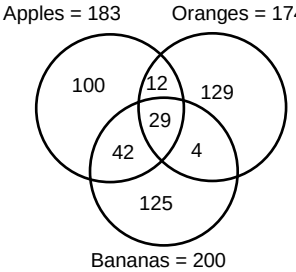
It is mentioned that the number of people who eat only apple is half the number of people who eat bananas.

Number of people who eat only apple is 100 and number of people who eat all three fruits is 29. Hence the number of people who eat oranges and bananas is 4 (100 + 29 + 58 – 183).

Let us assume number of people who eat only apple is “a”, the number of people who eat only apple and orange is “b”, the number of people who eat only orange is “c”, the number of people who eat only banana is “g” and the number of people who eat only apple and banana is “d”.
g = c + 4

c – 4 + d + 29 + 4 = 200 ---------- (1)
c + b + 29 + 4 = 174 ----------(2)
we also know that b + d = 54 ---------- (3)
equating the value of (1), (2) and (3), we get the value of d as 42.
Hence the value of b would be 12.

Now we get the following venn diagram.



13. X = 200 + 183 + 179 – (58 + 58) = 441. Ans: (441)

14. 42 purchase Apple and Banana but not Orange
Ans: (42)

15. Difference = 125 – 100 = 25 Ans: (25)

16. 83 people purchase at least two fruits. Ans: (83)

Solutions for questions 17 to 20:

This can be solved by starting with end amount with each of the four. In the last round everyone had 24000 each and Surya lost in the last round, that means the other 3 have 12000 each at the end the end of 3rd round as their amount has to be doubled in the last round and Surya should have 60000 with him at the end of 3rd round and he gives 12000 each to the other 3 in the 4th round.

Similarly based on whoever lost in different rounds ,we can calculate the amounts with the 4 people at the end of different rounds as shown in the table.

After the round	loser	Surya	Akhil	Guru	Sai
4	Surya	24000	24000	24000	24000
3	Akhil	60000	12000	12000	12000
2	Guru	30000	54000	6000	6000
1	Sai	15000	27000	51000	3000
Initial amount		7500	13500	25500	49500

17. Akhil has 60000 at the end of the third round.
Choice (B)

18. 49500 was the initial amount with Sai Choice (C)

19. 51000 was the amount with Guru at the end of 1st round.
Choice (D)

20. Lowest amount is 3000. Choice (A)

Solutions for questions 21 to 25:

A	B	C	D	E
F	G	H	I	J
K	L	M	N	O
P	Q	R	S	T
U	V	W	X	Y

In the row of V at least one of the houses is of the height a. If any house is of the height a other than V, then that house would be visible from V. But no house is visible from V. Hence, the height of V must be 'a'. Similarly, from (i), the height of F must be 'e' and the heights of G, H, I and J are d, c, b and a respectively.
In the left most column also, all the houses will be visible from F. It is possible, only if K is shorter than P which in turn should be shorter than U.
$\therefore$ The height of U will be a or b.
As, height of V is 'a', height of U cannot be 'a'.
$\therefore$ The height of K and P are d and c respectively.
$\therefore$ Height of A will be a.
As the number of houses, which can be seen from N is 3. The height of N cannot be a, if it is b then only two houses can be seen from it. If it is e, then at least four houses can be seen from it.
$\therefore$Height of N is c or d. But height of K = d.
Thus, the height of N = c.
If height of N = b, then height of either L or O must be 'a', which is not possible. Thus, the height of M = a.
From (ii), 6 houses are visible from 'C'.
$\therefore$ At least two houses must be visible in the row and as the height of M is 'a' it cannot be seen from C, thus its height should be less than that of H but if its height is d, then the house with height e cannot be seen from it thus c's height is e and the heights of R and W are b and d respectively.
Now, heights of Q is e, then B's height is c and D's height is d and E's height is b.
Heights of L and O are b and e respectively.
Similarly, we can get the heights of every house which is shown below.

a^A	c^B	e^C	d^D	b^E
e^F	d^G	c^H	b^I	a^J
d^K	b^L	a^M	c^N	e^O
c^P	e^Q	b^R	a^S	d^T
b^U	a^V	d^W	e^X	c^Y

21. Q is the house of the height e. Choice (C)

22. Height of T is d. Choice (C)

23. Five houses P, R, S, V and G are visible from Q.
Choice (C)

24. H – 3 is the only correct combination. Choice (D)

25. Height of house E is b. Choice (B)

Exercise – 2

Solutions for questions 1 to 4:

1. V overlaps with W and R. W and R also overlap with each other. Q overlaps with all these three. Hence, at least four rooms are required. Choice (C)

2. Since no two seminars among Q, R, V and W can be held in one room, we can't adjust all the seminars by cancelling any one of the sessions.
At least 2 seminars are to cancelled to conduct the remaining all the seminars in two rooms. Choice (D)

3. If Q didn't overlap with W, then we need at least 3 rooms as shown in the below diagram.

Room-1	Room-2	Room-3
P,S,R	Q,W,T,X,U	V

Choice (B)

4. V, R cannot be held in the same room. Choice (B)

Solutions for questions 5 to 8:

d = g x h or g + h = 624 or 50
a = d x c or d + c
If d = 624 a cannot be (d x c) or (d + c)
Hence, d = 50 and a = 2500.
Now, b = d x e or d + e = 4450 or 139
As 11 is not a factor of 24,11+m=24
$\Rightarrow$ m=13
As 11 is not a factor of 26,11+k=26
$\Rightarrow$ k=15
Similarly, 24+i=89
$\Rightarrow$ i = 65
c = 50 $\Rightarrow$ f must be 24
so, j=9
i = (m x n) or (m + n). Since m = 13, n = 5 or 52
b = (d x e) or (d + e) = 4450 or 139

(a) 2500			(b) 4450/139	
(c) 50		(d) 50		(e) 89
(f) 24	(g) 26		(h) 24	(i) 65
(j) 9	(k) 15	(i) 11	(m) 13	(n) 5/52

5. The lowest value of any column in row 3 is 24 and hence the highest value of any column in row 4 could be maximum of 23. Hence, the value that (n) is 5.
Ans: (5)

6. so, the maximum possible value is 4450. Ans: (4450)

7. The value of d is 50. Ans: (50)

8. Since, all numbers in a row are obtained by the same operation, then (i) should be the sum of (m) and (n). Hence, (n) = 52. Ans: (52)

Solutions for questions 9 to 12:

There are four possible cases from the given conditions
If Balu's friend in point 3 is Omar (Table 1)

Name	Bag colour
Murali	Purple
Balu	Orange
Omar	Blue
Puneet	White
Williams	Magneta

If Balu's friend in point 3 is Williams (Table 2)

Name	Bag colour
Murali	Purple
Balu	White
Omar	Magneta
Puneet	Orange
Williams	Blue

If Balu's friend in point 3 is Murali and Puneet has white colour bag (Table 3)

Name	Bag colour
Murali	Blue
Balu	Magneta
Omar	Purple
Puneet	White
Williams	Orange

If Balu's friend in point 3 is Murali and Puneet has orange colour bag (Table 4)

Name	Bag colour
Murali	Blue
Balu	Magneta
Ormar	White
Puneet	Orange
Williams	Purple

9. From tables 1 and 2, we can see that Williams can have magenta or blue bag. Out of the given option, only option B matches. Choice (B)

10. From tables 3 and 4, we can see that Omar has white or purple bag. Out of the given option, option D matches. Choice (D)

11. The given situation is possible in table 4 only.
From the above table, we can see that Murali has blue bag. Choice (C)

12. In any of the cases Murali didn't have an orange bag. Choice (C)

Solutions for questions 13 to 16:

From (iv), (v) E is ranked 5 in HI.
(ii) $\Rightarrow$ D is ranked 4th in HI.
From (i), (v) F is ranked 3rd in HI and A is ranked 1or 2 in HI.

And from the given information we get the following table**:**

Country	CI	HI
A		1/2
B		
C	5	y
D	Not 2	4
E	y	5
F	4/6	3

As the sum of ranks cannot be greater than 8 rank of F in CI has to be 4
As the sum of ranks cannot be greater than 8, y can be a maximum of 3
But as the rank of f in HI is 3 y cannot be 3
y can only be 1 or 2.
Assume y = 2
Then rank of A and B will be 1 and 6 respectively
(iii) $\Rightarrow$ rank of a cannot be 6
As the sum of ranks cannot be greater than 8, rank of D in CI cannot be 6
So, rank of B in CI should be 6 which is a contradiction as the sum of ranks cannot be greater than 8.
So, y cannot be 2
So, y must be 1
So, ranks of A and B will be 2 and 6 respectively
As the sum of ranks cannot be greater than 8, the ranks of A, B and C must be 6, 2 and 3 respectively.
We get the following table.

Country	CI	HI
A	6	2
B	2	6
C	5	1
D	3	4
E	1	5
F	4	3

13. B is ranked 2nd in CI. Choice (B)

14. D is ranked third in CI. Choice (D)

15. A and B have sum of their ranks as 8. Choice (B)

16. Countries A, C and F follow the condition given in the question. Choice (B)

Solutions for questions 17 to 20:

Actor	1st movie	Director	2nd movie	Director
P				
Q	1	C	5	
R				
S	4		8	D

Movies 1,2,3 and 4 are directed by different directors
B can direct either 4, 5 or 5, 6 or 6, 7
But 5, 6 and 6, 7 violates (v)
So, B directs movies 4 and 5
To satisfy (v) C has to direct 6; A has to direct movies 2 and 7; D has to direct movie 3
C has to direct movie 6, (i) $\Rightarrow$ P acted in movie 6
$\Rightarrow$ R acted in movie 7 because that is the only 2nd movie left.
We are left with movies 2 and 3 and we have to find which of these was acted by P and R
Assume R acted in movie 2 then both the movies of R were directed by A which is a contradiction.
Therefore P, R acted in movies 2 and 3 respectively.

We get the following table

P	2	A	6	C
Q	1	C	5	B
R	3	D	7	A
S	4	B	8	D

17. D directed third movie. Choice (D)

18. C and D directed movies 6 and 3 respectively. Choice (A)

19. Movie 7 is directed by A is true. Choice (C)

20. D directed movie 3 is a false statement. Choice (C)

Solutions for questions 21 to 25:

In the given diagram, there are five possible ways to transfer the no dues forms.
(a) X – A – C – D
(b) X – A – C – B – D
(c) X – C – B – D
(d) X – C – D
(e) X – B – D

In case (e), the forms will not be signed by C. Hence, from (ii) the forms of department M_5 must be signed by only B and D.

From (4), the possibilities (a) and (b) are for departments M_1 and M_2 in any order.
Possibility (a) must be for M_4 and (c) for M_3.

From the given information (v), as the number of forms signed by A, B and C are 40, 70 and 80 respectively.

From (iv), $M_1 = M_2 = 20$.

Now C has signed the forms of the students of four departments M_1, M_2 and M_4.

$M_1+M_2+M_3+M_4 = 80$
$\therefore M_3+M_4 = 40$
B has signed only the forms of one department among M_1 and M_2 and that of one among M_3 and M_5.
$\therefore M_3+M_5 = 70 - 20 = 50$
The number of students in each department can be as follows.

	M_1	M_2	M_3	M_4	M_5
Case (i)	20	20	10	30	40
Case (ii)	20	20	20	20	30
Case (iii)	20	20	30	10	20

21. The highest number of students can be either in department M_3 or department M_5. Choice (D)

22. The number of students in M_5 will be minimum, when the number of students in M_3 is maximum, i.e.,30.
$\therefore$ Minimum possible value of M_5 must be $50 - 30 = 20$.
Choice (C)

23. Total students be maximum when the number of students in M_3 is minimum, i.e., 10.
$\therefore M_4 = 30$
$M_5 = 40$.
$\therefore$ Total number students $= 20 + 20 + 10 + 30 + 40 = 120$.
Choice (A)

24. From case (ii), The number of students in M3 is 30 and M4 is 10 which is least. Choice (C)

25. Possible values of M4 are 10, 20 and 30
So, median is 20. Choice (A)

Exercise – 3

Solutions for questions 1 to 4:

Carry-over from the previous addition can be a maximum of 1.
$\Rightarrow S = 1$
As P + P = P, only possible value for P = 9 (given P can't be 0) and there is a carry-over of 1 from R + Q.
P + S = 10
T can be 0 or 1 based on the carry-over.
Here, S = 1.
$\Rightarrow T = 0$.
T + R + 1 = Q (1 is carry-over from P + P).
Q = R + 1
Hence R and Q are either 5 and 6, 6 and 7 or 7 and 8 respectively
If R is 5, then Q would be 6 and X would be 1, which clashes with the value of S. hence R and Q cannot be 5 and 6 respectively.
If R and Q are 6 and 7 respectively, the value of X would be 3, the value of U would be 3 which is a contradiction to the given condition.
If R and Q are 7 and 8 respectively, then U is 2 and X is 5.

	Q(8)	U(2)	S(1)	T(0)	P(9)	R(7)
+	U(2)	R(7)	P(9)	R(7)	P(9)	Q(8)
Carry-over	+1	+1	+0	+1	+1	+0
S(1)	S(1)	T(0)	T(0)	Q(8)	P(9)	X(5)

$\Rightarrow$ V, W and Y should be 3, 4and 6 in any order.

1. X represents 5. Choice (C)

2. U represents 2. Choice (B)

3. W can be 3 or 6 or 4, but not 8. Choice (D)

4. Y can be 3 or 6 or 4, but not 7. Choice (D)

Solutions for questions 5 to 8:

5. Given, except the first child, each child takes at least twice as many chocolates taken by the preceding child. Given, first child takes one chocolate of type A. The second child can take 199 chocolates of type B. Total number of chocolates taken out is 200. So, the minimum possible number of different types of chocolates is 2. Choice (B)

6. We will have to take the minimum possible number of chocolates that every person took.
The number of chocolates taken by the 1^{st} ,2^{nd}, …, 7^{th} child can be 1, 2, 4, 8, 16, 32 and 64 respectively. The sum of the number of chocolates taken out is 127. 63 chocolates are remaining, 8^{th} child cannot take 63 chocolates. Given, after all the children took the chocolates from the box, there were no chocolates remaining in the box.
$\Rightarrow$ 7^{th} child took all the remaining chocolates. Hence the maximum possible number of different types of chocolates is 7. Choice (B)

7. Choice (A): 1^{st} child took 1 chocolate of type A.
2^{nd} child took 57 chocolates of type B.
The third child can take all the remaining chocolates.
This case is possible.
Choice (B): The third child took 81 chocolates of type C.
The second child can take 40 chocolates of type B.
The first child can take one chocolate.
A total of 78 chocolates are remaining which cannot be taken by anyone.
Choice (C): This is similar to choice (A) which is a possible case.
Choice (D): The fourth child took 120 chocolates.
The third child can take 60 chocolates.

The second child can take 19 chocolates.
The first child took one chocolate.
This is a possible case. Choice (B)

8. The chocolates taken by the 1st, 2nd, 3rd, 4th, …. 6th can be 1, 2, 4, …, 32, the sum of which is equal to 63. The seventh child takes chocolates of type G, and he can take all the remaining 137 chocolates.
The sum of the number of chocolates of type B and F = 2 + 32 = 34 Choice (D)

Solutions for questions 9 to 12:

Since Ashana visited Bandipur, which is a national park in South, she must have rafted on an East flowing river. Since Adis visited Dudhwa, which is a national park in South, he must have rafted on a West flowing river.
Since Sinchan rafted on Tapti, Adis must have rafted on Narmada as it is the other West flowing river given.
Similarly, Tamang must have visited Silent Valley and rafted on Godavari, Sinchan must have visited Sivpuri and Ashana must have rafted on Kaveri. Rest of the data is in the table below.

	Ashana	Sinchan	Tamang	Adis
Park	Bandipur	Shivpuri	Silent valley	Dudhwa
River	Kaveri	Tapti	Godavari	Narmada
Port	Tuticorin	JNPT/Mumbai	Mangalore	Mumbai/JNPT

9. Ashana visited the Tuticorin port. Choice (A)

10. The one who rafted on Tapti river, either visited port JNPT or Mumbai. Choice (D)

11. The one who rafted on Godavari visited the Silent Valley National Park. Choice (D)

12. If the one who visited Shivpuri also visited JNPT, then Adis visited Mumbai. Choice (A)

Solutions for questions 13 to 16:

There are three discount rates, 10%, 20% and 30%. M got a discount of 20%, since two people got a discount of 10% and other two (apart from M) got a discount of 30%. Now using the given information, we get the following arrangement.

Now the discount that Q got is Rs 700. Since all the values have to be integers, the discount rate that Q got cannot be 30%.

Also, we can determine that Q and O the got same discount rate, since N and P got same discount rate. So, Q and O got 10% discount and P and N got 30% discount. As, the discount rate for Q and O is 10%, the pre-discount price of items bought by Q and O are 7000 and 9000 respectively. Given, the ratio of discounts of M and O is 4:3. So, the discount of M is 1200. As M got 20% discount, M's pre- discount price is 6000. As the post discount price of the item purchased by P is two times the pre-discount price of the item purchased by Q, P's pre-discount price is 14000.
From the above, we get the following table

Person	M	N	O	P	Q
Pre discount price	6000	1500	9000	20000	7000
Discount (%)	20%	30%	10%	30%	10%
Discount (₹)	1200	450	900	6000	700
Post discount price	4800	1050	8100	14000	6300

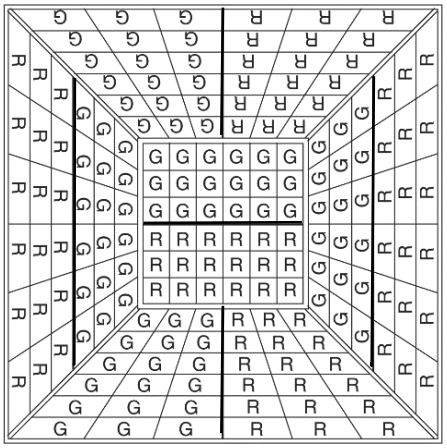
13. There is a difference of ₹450 in the amounts of discount received by N and O. Ans: (450)

14. They all received a total of ₹9250 discount.
Ans: (9250)

15. There is a difference of ₹5250 in the post discount price of items purchased by N and Q. Ans: (5250)

16. The post discount price of the item purchased by O is ₹6900 more than the amount of discount received by M.
Ans: (6900)

Solutions for questions 17 to 20:



'=' means edge
'-' means line drawn on a face.

The other face of the cube which is not visible in the figure will be same as the face at the middle of the figure.

17. On each of the six faces, 16 cubes have only one colour on them. 8 of those are painted in red colour.
$\therefore 8 \times 6 = 48$ smaller cubes have one face painted in red.
Among the eight cubes at the corners, one cube is painted only in red and one cube is painted only in green. Remaining corners have both red and green on them.
Now, we have to look for the cubes, painted only on two faces with red colour. Among the twelve edges only 6 edges have two cubes painted only with red colour.
$\therefore 6 \times 2 = 12$ cubes on edges have only red on them.
$\therefore$ Total number of cubes painted only in red
$= 48 + 12 + 1 = 61$. Ans: (61)

18. Among the 8 cubes at the corners, 4 cubes have atleast two faces painted in green colour.
Now among the edges, there are 6 such edges where each has two smaller cubes painted only with green.
$\therefore$ Total number of cubes which have at least two green faces
$= 2 \times 6 + 4 = 16$. Ans: (16)

19. Along the 12 edges $=12 \times 2 = 24$ and
++at the corners six cubes are painted with only red and green.
$\Rightarrow 24 + 6 = 30$. Ans: (30)

20. Number of cubes with different colors on three faces painted. i.e. corners.
1.GGG 2.RRR 3.RRG 4.GGR
5.GGR 6.RRG 7.RRG 8.GGR
There are total six smaller cubes which have different colors.
Ans: (6)

Solutions for questions 21 to 25:

From the given information:
Ajay waited zero days for first voucher.
Sujay waited 1 day for his twelfth voucher.

Let us represent the given information in the following table:
Wait (in days) for Ajay and Sujay for receiving the vouchers:

Voucher	1	2	3	4	5	6	7	8	9	10	11	12
Ajay	0	1						13				
Sujay								5				1

From (vi), we can say that, Ajay's waiting period to receive sixth voucher is 5 days and Sujay's waiting period to receive sixth voucher is 13 days.

From (iv), we can understand that the pattern of wait period is a Fibonacci series.
By combining (iv) and (vi) the wait period for Sujay for his first voucher is dependent on the pattern arranged in the reverse order and this wait period is 89 days for the second voucher
The final table is as below:

Voucher	1	2	3	4	5	6	7	8	9	10	11	12
Ajay	0	1	1	2	3	5	8	13	21	34	55	89
Sujay	133	89	55	34	21	13	8	5	3	2	1	1

In order to that the same pattern is followed, counting the number of days Sujay waits for each gift in the reverse order as that of Ajay, Sujay will not wait 89+55 = 144 days, but waits for 133 days for this first voucher.

If Sujay waits for 144 days, the total of 12 vouchers cannot be given within the year 2017.

The dates on which both of them received the vouchers will be as follows:

Ajay		**Sujay**			
Wait (days)	**Date dd/mm**	**Wait (days)**	**Date dd/mm**	**Month**	**Completed days**
0	01/01	133	13/05	January	31
1	02/01	89	10/08	February	59
1	03/01	55	04/10	March	90
2	05/01	34	07/11	April	120
3	08/01	21	28/11	May	151
5	13/01	13	11/12	June	181
8	21/01	8	19/12	July	212
13	03/02	5	24/12	August	243
21	24/02	3	27/12	September	273
34	30/03	2	29/12	October	304
55	24/05	1	30/12	November	334
89	21/08	1	31/12	December	365

21. Ajay receives seven vouchers in January. Sujay received seven vouchers in December. Maximum = 7.
Choice (B)

22. Ajay receives last voucher on 233rd day, while Sujay receives his first voucher on 133rd day.
Difference = 99. Choice (A)

23. In all given months, but October two vouchers are given by the company. Choice (C)

24. Vouchers were given in the eight months January, February, March, May, August, October, November and December. Vouchers were not given in four months. Choice (A)

25. Ajay receives sixth voucher on 13th day and Sujay receives his fifth voucher on 332nd day
So, there's a gap of 318 days. Choice (C)

Exercise – 4

Solutions for questions 1 to 4:

First, we place the person who stands in the middle.
Then we place the person who prefers dates at a corner. It does not matter which corner we place him as it is irrelevant.
The owner of ford can be placed next to the one who prefers Dates.
The owner of Tata is from Assam and he is adjacent to the person who prefers banana. The one who prefers banana cannot be the owner of Ford because he then won't be adjacent to the person from Assam hence, he must be on the other side of the person from Telangana. The person who prefers banana is from UP.

State			Telangana	UP	Assam
Fruits	Dates			Banana	
Cars		Ford			Tata

The person who prefers kiwi and owns Maruti must be from Telangana. Hence the person who prefers dragon fruit is from Assam as he must be adjacent to person who is from UP. The one who prefers dates is from Gujarat. Hence, the one who prefers apple is from Karnataka.
However, the one who owns a Mahindra, or a Honda cannot be determined.

State	Gujarat	Karnataka	Telangana	UP	Assam
Fruits	Dates	Apple	Kiwi	Banana	Dragon fruit
Cars	Mahindra/ Honda	Ford	Maruti	Honda/ Mahindra	Tata

1. The one who is from UP is adjacent to the owner of Tata. Choice (C)

2. The one who owns a Ford is from Karnataka. Choice (D)

3. The one from Gujarat prefers dates. Choice (B)

4. The one who prefers Dragon fruit is adjacent to the one who owns a Maruti is false. Choice (D)

Solutions for questions 5 to 8:

Since, F neither attempted any transferred question nor he transferred any question, from condition (3), he attempted two questions and his total points are 2.

∴ He scored 3 and –1 for two different questions.
From condition (3), since D attempted five questions, with one transferred question, his score is 3, 3, 2, –1 and 0 for five different attempts.
As, from (4) there are exactly two contestants who gave two wrong answers.
A cannot be that person, as total points 5 cannot be attained in 5 attempts.
E also cannot be that person, as his total points are 8 and that we cannot get within 5 attempts and 2 wrong answers.
Hence B and C must be those two persons each of who gave exactly two wrong answers.

The exact scores for B is 3, 2, 3, –1, –1 and that for C is 3, 0, 2, –1 and –1.
∴The score of E must be 3, 3, 2 and 0 and that of A must be 3, 2, 0, 0.
∴The final distribution of points is as follows.

A	3, 2, 0, 0
B	3, 2, 3, –1, –1
C	3, 2, –1, –1, 0
D	3, 3, 2, –1, 0
E	3, 3, 2, 0
F	3, –1

5. E did not give wrong answer to any question. Choice (A)

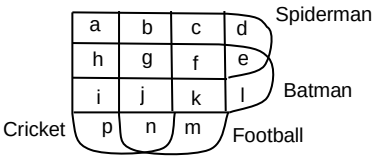
6. Each of A, D and E transferred questions. Choice (D)

7. A and C together attempted nine questions. Choice (D)

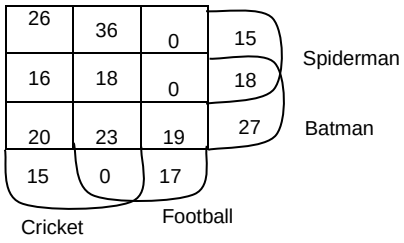
8. Choice (D)

Solutions for questions 9 to 12:

The given data can be represented in the following Venn diagram.



It is given that 18 students like both the superheroes but do not like any of the games, which is same as those who like both the games and both the superheroes.
e = 18 and g = 18
The number of students, who like only football, but do not like any of the two superheroes is 17.
m = 17
It is also given that every student who like to play both cricket and football likes at least one of the two superheroes.
n = 0
Of the students, who like only football, none of the students like Spiderman.
c = 0, f = 0
52 students like both the superheroes i.e.,
h + g + f + e = 52 ------- (1)
h = 16
It is given that 77 students like only cricket which as same as that who like only spiderman.
a + b + c + d = a + h + i + p = 77 ------- (2)
The number of students, who do not like any of the two superheroes is 32.
p + n + m = 32 ------- (3)
p = 15
Since, it is given that p is equal to d
d = 15
It is also given that j = 23 and
i + j + k + l = 89 ------- (5)
And the number of students who do not like any of the two games is 60 i.e., d + e + l = 60
l = 27
It is also given that b + g + j + m = 77
b = 36
From equation ---- (2)
a + b + c + d = 77
a = 26
And
a + h + i + p = 77
i = 20
Thus we get the following diagram.



9. Nineteen students like batman and football but neither superman nor cricket. Ans (19)

10. Twenty students like batman and cricket but neither football nor superman. Ans: (20)

11. Thirty six students like football but not cricket. Ans: (36)

12. Only statement I is true. Choice (A)

Solutions for questions 13 to 16:

Here as any person is either a truth teller or a liar, while telling about himself, a truth teller tells that he is a truth teller, (i.e., Day community). The Liar (Night) will always make the statement false i.e., he tells he is a truth teller. Hence those people who told that any other person introduced himself as a liar (Night) are liars. Thus Bright and Sprite are liars. Light and White are truth tellers.

According to the statements of White, Bright is an Architect, Sprite is an Engineer and from the second statement of Bright, it can be known that White is a Manager.

Profession	Name	I	II
Architect	Bright	F	F
Manager	White	T	T
Professor	Light	T	T
Engineer	Sprite	F	F

13. Sprite is the engineer. Choice (D)

14. White is the manager. Choice (C)

15. Light is a professor. Choice (A)

16. White and Light belong to Day community. Choice (C)

Solutions for questions 17 to 20 :

As each of A, G, T and H has only one possible place, we can straight away place them in their corresponding teams. As H is in team I of history, F cannot be in the team [only one boy can be there in that team]
$\therefore$ F in is team I of physics.
Now, we have the following possible cases:

(a) If Q is selected for history [team II]
$\Rightarrow$ P must be in chemistry [team II]
$\therefore$ S must be is chemistry [team I]
Also, O must be in physics [team I]
$\Rightarrow$ One of C and D is in physics [team I] and the other is in chemistry [team II]
Depending on who (between B and E) is selected for history [team II] we have the following possibilities:

		(i)	(ii)	(iii)
Physics	Team I	F,O,C/D	F,O,C/D	F,O,C/D
	Team II	G,N,E	G,R,E	G,N,R
Chemistry	Team I	A,S,M	A,S,N	A,B,S
	Team II	T,P,D/C	T,P,D/C	T,P,D/C
History	Team I	H,R	H,M	H,M
	Team II	Q,B	Q,B	Q,E

(b) If P is selected for history [team I]
$\Rightarrow$ M must be selected for chemistry [team I] and R must be selected for Physics [team II]
$\therefore$ Q must be selected for physics [team I]
$\therefore$ C and D must be selected for chemistry [team II]
$\Rightarrow$ O must be selected for physics [team I]
Depending on who have to be selected (among B and F) for history we have the following possibilities

		(iv)	(v)
Physics	Team I	F,Q,O	F,Q,O
	Team II	G,R,E	G,R,N
Chemistry	Team I	A,M,N	A,M,B
	Team II	T,C,D	T,C,D
History	Team I	H,P	H,P
	Team II	S,B	S,E

(c) Neither P nor Q is selected for history
$\Rightarrow$ P is selected for chemistry [team II] and Q is selected for physics [team I] $\Rightarrow$ S must be selected for history [team II] physics [team I].
$\Rightarrow$ One of C and D is selected for chemistry [team II] and the other is selected for physics [team I]
$\therefore$ O is selected for physics [team II].
Depending on who (between B and E) is selected for history [team II] we have the following possibilities.

		(vi)	(vii)	(viii)
Physics	Team I	F,Q,C/D	F,Q,C/D	F,Q,C/D
	Team II	G,O,E	G,O,N	G,O,R
Chemistry	Team I	A,N,M	A,B,M	A,B,N
	Team II	T,P,D/C	T,P,D/C	T,P,D/C
History	Team I	H,R	H,R	H,M
	Team II	S,B	S,E	S,E

17. It is case (v) in which A and M are in the same team as B. Choice (D)

18. It is case (i) or (ii) or (iii) in which only A, S and N can be a team. Choice (D)

19. It is possible in case (i), (ii), (iii), (vi), (vii) and (viii), where physics-team I has only one girl. Choice (A)

20. It is possible in case (iv) and (v) where H and P are in the same team. Choice (B)

Solutions for questions 21 to 25:

C_2 will show the correct time between 6 AM to 12 noon and 6 PM to midnight. Rest of the time it will be 6 hours ahead of the correct time.

C_3 will gain half an hour in every half an hour. (i.e., gains 12 hours in 12 hours)

C_4 will gain half an hour in every half an hour from 6 PM to 9 PM and also gains an additional six hours every three hours. (i.e., gains 18 hours in six hours)

21. On any day from 6:00 AM. to 12:00 noon C_2 shows the correct time. Hence, 8:20 PM is the correct time. Choice (D)

22. Since C_3 gains half an hour for every half an hour, every morning 6:00 AM (correct time) C_3 will have gained a multiple of 24 hours, and hence be at 6:00 AM again. Hence, as we know that it is the evening of Thursday, by 12:00 noon (correct time) on Thursday (i.e. after 6 hours from 6:00 AM) C_3 would have gained another six hours and thus show 6:00 PM. Now in the next three hours (by 3:00 PM correct time) C_3 will move from 6:00 AM to 12:00 noon. And again at 5:01 PM (or exactly after 5:00 PM., correct time) C_3 will show 4:31 PM. Choice (C)

23. C_3 will show correct time between 5:30 and 6:00 AM/PM (correct time). Choice (C)

24. C_4 will rotate through 12 hours in every three hours of correct time. Hence, in six hours of correct time, it would have revolved through 24 hours.
$\therefore$ At 12:00 noon on Sunday morning C_4 will show 12:00. It can be observed that it shows the correct time between 11:31 AM. and 12:00 noon. Similarly, this will happen between every 11:30 and 12:00 AM/PM. As concluded above, C_2 will show the correct time between 6:00 to 12:00 AM/PM. Hence, eliminating the other choices only choice (D) is the correct choice. Choice (D)

25. If C_2 showed 8:30 in the afternoon, then the time should have been 2:30, as it is 6 hrs ahead.
C_3 gains half an hour in every half an hour.
So, it gains 2hr:30 minutes in 2hr:30 minutes
So, it shows 5:00. Choice (B)

Exercise – 5

Solutions for questions 1 to 4:

(3), (4) $\Rightarrow$ M, L, C, B and J are physics books and they are placed in shelves 16-20 in the same order
(1), (5) $\Rightarrow$ N, G, F and H are maths books
(5), (6) $\Rightarrow$ A and K are chemistry books.
A and K are chemistry books and that there are only three chemistry books; E and I are maths books $\Rightarrow$ D has to be a chemistry book.
We get the following two cases.

20	J	Phy
19	B	
18	C/L	
17	L/C	
16	M	
15		
14	K/D	Che
13	D/K	
12	A	
11		
10		
9		
8	N	Math
7	G	
6	F	
5	I	
4	E	
3	H	
2		
1		

20	J	Phy
19	B	
18	C/L	
17	L/C	
16	M	
15		
14	N	Math
13	G	
12	F	
11	I	
10	E	
9	H	
8		
7		
6	K/D	Che
5	D/K	
4	A	
3		
2		
1		

1. 1, 2 and 15 are empty in arrangement. Choice (D)

2. D is a chemistry book. Choice (D)

3. In the second arrangement Maths books are kept in higher number shelves than the chemistry books. Here, (C,L) can be arranged in two ways and (D, K) can be arranged in two ways.
Therefore, a total of 4 ways. Choice (A)

4. In both the cases only option (D) is valid. Choice (D)

Solutions for questions 5 to 8:

From the given data we can conclude that the twelve persons were living in the building as follows.

Guitarist	Singer	Violinist	Drummer	Singer	Drummer	Keyboard player	Singer	Guitarist	Guitarist	Singer	Violinist
F	S	B	E/G	T	G/E	Q	C	R	D	P	A
Floor 1	Floor 2	Floor 3	Floor 4	Floor 5	Floor 6	Floor 7	Floor 8	Floor 9	Floor 10	Floor 11	Floor 12

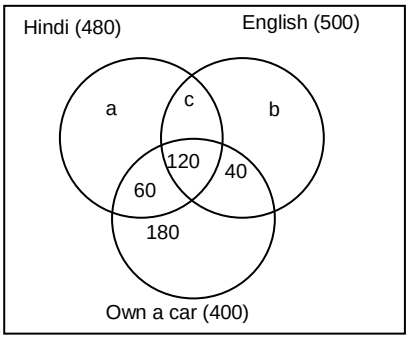
5. The four singers are S, T, C and P. C is the only male singer in the band. Choice (A)

6. There are 6 or 8 floors above G's floor. Choice (D)

7. S stays in the second floor. Choice (B)

8. S is a singer. Choice (A)

Solutions for questions 9 to 12:



As per the data provided in the question,
a + b + c + 120 + 60 + 40 + 180 = 800
a + c + 120 + 60 = 480
b + c + 120 + 40 = 500
∴a = 60, b = 100 and c = 240

9. Number of persons who can speak in both Hindi and English = 240 + 120 = 360

The required percentage = $\frac{360}{500} \times 100 = 72\%$

Ans : (72)

10. Proportion of people in the locality who do not own a car or cannot speak in English = $\frac{a+b+c+60+180}{800} = \frac{640}{800}$

= 0.8. Ans: (0.8)

11. Sixty persons speaks in only Hindi. Ans: (60)

12. 240 persons speak Hindi and English only.

Ans: (240)

Solutions for questions 13 to 16:

From (i), (ii), we get the following possible case

Child	Toy	Colour
Amrutha		
Sathwik		
Asresh	Train	White
Chetan	Car	
Rishitha		Green

From (iii) and (iv), Sathwik selects Yellow toy and it is not a Truck. Hence, Amrutha does not select Truck. Rishitha selects Truck and Amrutha selects Bus. Sathwik selects Barbie. From (v), Chetan selects Blue colour Car and Amrutha selects a Red colour toy.
∴ The final distribution is as follows.

Child	Toy	Colour
Amrutha	Bus	Red
Sathwik	Barbie	Yellow
Asresh	Train	White
Chetan	Car	Blue
Rishitha	Truck	Green

13. Asresh selects a White coloured toy. Choice (C)

14. Sathwik selects Barbie. Choice (B)

15. Asresh-White. Choice (B)

16. Chetan selects a Blue colour toy. Choice (B)

Solutions for questions 17 to 20:

From (i), we can say that, the number of biscuits in the box which is marked B_1 can be 12 or 13. Hence, the number of biscuits in the boxes which marked B_2 and B_3 can be 11 and 13 in any order (when B_1 = 12). The number of biscuits in the boxes which are marked B_2 and B_3 can be 12 and 14 in any order (when B_1 = 13)
And also given that P is not marked as B_1
From (i) and (ii), we can say that, the boxes which are marked B_1 and B_3 have 12 and 11 biscuits respectively, since the box which is marked B_2.has 13 biscuits. Hence the box which is marked B_4 has 14 biscuits.
From (iii) and above, we have

Box name	P	Q	R	S
No of biscuits	13	11	14	12
Marked as	B_2	B_3	B_4	B_1

17. Choice (C) is true. Choice (C)

18. Choice (C) is correct. Choice (C)

19. From the given information, we have

Box name	P	Q	R	S	T	U
No. of biscuits	13	11	14	12	$\frac{13+11}{2}$ =12	$\frac{14+12}{2}$ = 13
Fat (2 gms)	13 × 2 = 26	11 × 2 = 22	14 × 2 = 28	12 × 2 = 24	12 × 2 = 24	13 × 2 = 26

Average fat content in all the six boxes = $\frac{26+22+28+24+24+26}{6} = \frac{150}{6} = 25.$ Choice (C)

20. Box P contains 13 biscuits. Choice (A)

Solutions for questions 21 to 25:

The given information can be tabulated as below:

	A	B	C	D	E	F
BEST CAPTAIN	z		x		x + 1	5
BEST PALYER	1		3	5		
TOTAL Points						
Rank						1

Under BEST CAPTAIN, D's score cannot be 4, in which case, D will not have less total score than that of F.
Also from (3), under, at least one of the heads E's score is 3.
From (1), under BEST PLAYER, the points must be 1, 2, 3, 3, 4 and 5.
From (3), B's rank must be either 2 or 3
From (2), under BEST CAPTAIN, B's points must be either 3 or 4.
If B got 3 points, then the points of other players must be 1, 1, 2, 3, 4, 5 or 1, 2, 2, 3 , 4, 5. If other players points are 1, 1, 2, 3, 4, 5 then x + 1 cannot be equal to 2 or 3 or 4 as more than are person will have one point less than E.
$\therefore$ This case is not possible.
If other players points are 1, 2, 2, 3, 4, 5 then x + 1 must be equal to 2.
Also; E's score under BEST player must be 3.
F's score under BEST PLAYER cannot be 2 in which case, F will not have the total score more than that of D.
$\therefore$ F's score under BEST PLAYER must be 4.
$\Rightarrow$ B's score under BEST PLAYER is 2.
But D, E, and F will have total score not less than that of B
$\therefore$ B's points under BEST CAPTAIN must be 4.
$\therefore$ The other players points under BEST CAPTAIN must be 1, 2, 3, 4, 5.
$\therefore$ As E's score under BEST CAPTAIN cannot be 3 points his score under BEST PLAYER must be 3.
If F's score under BEST PLAYER cannot be 2, If so F's total score cannot be more than that of all other players.
$\therefore$ Under BEST PLAYER, score is 4 and B's score is 2.
Now under BEST CAPTAIN, if E's score is 4 or 3, then the total points of each of D, E and F is not more than that of B.
$\therefore$ Under BEST CAPTAIN, E's score is 2 and C's score is 1.
Now exactly one of A and D must get at least 6 points in total. It is possible only for D.
$\therefore$ Under BEST CAPTAIN, D's score is 3 and A's score is 4.
$\therefore$ The final distribution is as follows:

	A	B	C	D	E	F
BEST CAPTAIN	4	4	1	3	2	5
BEST PLAYER	1	2	3	5	3	4
TOTAL POINTS	5	6	4	8	5	9
RANK	4	3	5	2	4	1

21. C got the fifth rank. Choice (B)

22. Under BEST CAPTAIN, B got four points. Choice (A)

23. E got the fourth rank. Choice (C)

24. A and B got the same points under the head – BEST CAPTAIN. Choice (B)

25. B is awarded even number of points under both the heads: BEST PLAYER AND BEST CAPTAIN. Choice (B)

Exercise – 6

Solutions for questions1 to 4:

The given information can be represented in the following table.

	Only physics correct	Only chemistry correct	Both correct	Neither correct
Easy	21	a	b	c
Difficult	d	e	1	f

20 chemistry based difficult questions are not correct.
In 45 questions physics based sub questions are wrong.
$\therefore$ d + f = 20 $\rightarrow$ (1)
$\therefore$ a + c + e + f = 45 $\rightarrow$ (2)
In 23 questions both sub questions are right.
$\therefore$ b + 1 = 23
$\therefore$ b = 22 $\rightarrow$ (3)
d + e + 1 + f = 30 $\Rightarrow$ d + e + f = 29 $\rightarrow$ (4)
from (1) and (4), we get e = 9.
As there are 100 questions, from (2)
21 + d + b + 1 = 55 $\Rightarrow$ b + d = 33
From (3), d = 11
From (4) and the above explanation,
f = 29 – 9 – 11 = 9.
Now from (2), we get,
a + c = 45 – 9 – 9
it is also given that, c = 2
$\therefore$ a = 25

1. a = 25
Only in 25 easy questions, chemistry based sub questions are correct. Ans: (25)

2. d + 21 = 32
In only 32 questions physics based sub questions are correct. Ans: (32)

3. The number of questions, in which both the sub questions are correct or neither of the sub questions are correct.
= 22 + 2 + 9 + 1 = 34. Ans: (34)

4. D = 11.
11 difficult questions, of only physics based sub questions
Ans: (11)

Solutions for questions 5 to 8:

First, we place the person who stands in the middle.
Then we place the person who prefers cars at a corner. It does not matter which corner we place him as it is irrelevant.
The owner of zebra can be placed next to the one who prefers cars.
The owner of Snake is from Nigeria and he is adjacent to the person who prefers bus. The one who prefers bus cannot be the owner of Zebra because in that case he won't be adjacent to the person from Nigeria hence, he must be on the other adjacent side of the person from Afghanistan. The person who prefers bus is from Turkey.

State			Afghanistan	Turkey	Nigeria
Fruits	Cars			Bus	
Cars		Zebra			Snake

The person who prefers scooter and owns Octopus has to be from Afghanistan. Hence the person who prefers train is from Nigeria. The one who prefers cars is from Lebanon. Hence the one who prefers bike is from North Korea.
However, the one who owns a Bird, or a Fox cannot be determined.

State	Lebanon	North Korea	Afghanistan	Turkey	Nigeria
Fruits	Cars	Bike	Scooter	Bus	Train
Cars	Bird/ Fox	Zebra	Octopus	Fox/Bird	Snake

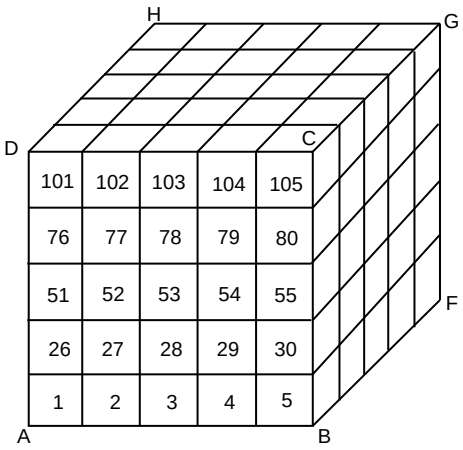
5. The Person from North Korea prefers motorbike.
Choice (C)

6. The one who is two places away from the person who is from Nigeria owns an octopus. Choice (B)

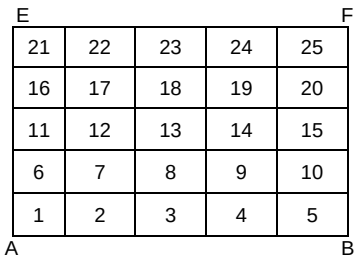
7. The person who owns a bird is either from Lebanon or from Turkey. Choice (C)

8. All of the options mentioned could be next to the person who prefers motorbike Choice (D)

Solutions for questions 9 to 12:



The bottom layer of the cube is as shown below:



9. The numbers on the cubes forming the edge are
10 + 35 + 60 + 85 + 110 = 300 Ans: (300)

10.

101	102	103	104	105
76	77	78	79	80
51	52	53	54	55
26	27	28	29	30
1	2	3	4	5

The sum of the said diagonal is
= 101 + 77 + 53 + 29 + 5 = 265 Ans: (265)

11. The numbers on the cube immediately above bottom layer front face of the layer
= 26 + 27 + 28 + 29 + 30 = 140 Ans: (140)

12. The sum of the numbers on the small cubes that form body diagonal is.
= 1 + (25 + 5 + 2) + (50 + 2 × 5 + 3) + (75 + 3 × 5 + 4)
+ (100 + 4 × 5 + 5)
= 1 + 32 + 63 + 94 + 125 = 315 Ans: (315)

Solutions for questions 13 to 16:

It is given that C get the highest possible points, which is 17.
For this, the possible cases are as follows:

Maths	Physics	Chemistry
8(1)	6(2)	3(3)
6(3)	7(1)	4(2)
8(1)	5(3)	4(2)

It is given that C's rank in Maths and Physics is betters than Chemistry, which is possible only if his ranks in Maths, physics and Chemistry are 1, 2 and 3 respectively.

Since A got the fourth rank in Chemistry, and D cannot be ranked 1st or 2nd in Chemistry, he got 5th rank in Chemistry.
Since B got 15 points and he did not get 2nd rank in any of the three subjects. B has obtained 3rd, 4th and 1st ranks in Maths, Physics and Chemistry respectively.

Since A got 13 points and A got 2 points in Chemistry. A got 5th, 1st and 4th rank in Maths, Physics and Chemistry respectively.
Since E did not get 3rd rank in any of the three subjects. He obtained 4th and 5th ranks in Maths and Physics respectively.

We get the following arrangement:

	Maths	Physics	Chemistry
A	5	1	4
B	3	4	1
C	1	2	3
D	2	3	5
E	4	5	2

13. A got 5th rank in Maths. Choice (A)

14. E got 2nd rank in Chemistry. Choice (B)

15. Sum of the ranks of B is 8. Choice (D)

16. Sum of the ranks of A is 10 and sum of the ranks of D is 10.
Hence the difference is 0. Choice (A)

Solutions for questions 17 to 20:

Topper of Mathematics is sitting adjacent to A. A and roll number 16 are sitting adjacent and roll number 16 is not sitting at the extreme end. Also, A is sitting three places to the left of C. From all these conditions we get the following arrangement.

___ A __ __ C __

Mathematics
16

The person who topped in Physics is sitting at the left end. The sum of roll numbers of the toppers of History and Biology is 28. There are two possibilities.
(1) 16 and 12
(2) 15 and 13
Possibility (1) is not possible as roll number of the topper of Mathematics is 16.

Also, it is given that C is sitting adjacent to the topper of English. Biology and History toppers are adjacent to each other. So, C is the topper of Biology or History,
∴ C's roll number is either 15 or 13.
But from condition (5), we can say that C's roll number is 15 and is a topper of History.
∴ Roll number 13 is the topper of Biology.
From condition (4), we can say that A is the topper of Chemistry and B is sitting at the extreme left and is the topper of Physics.
From condition (1),
Roll number of C + Roll number of B = 26.
⇒ Roll number of B = 26 – 15 = 11.
∴ D's roll number is 16 and is the topper of Mathematics.

From condition (6), we can say that roll number of A is 14.
The final arrangements are as follows:

B	A	D	E	C	F
Physics	Chemistry	Mathematics	English	History	Biology
11	14	16	12	15	13

or

B	A	D	E	C	F
Physics	Chemistry	Mathematics	Biology	History	English
11	14	16	13	15	12

17. A is the topper in Chemistry. Choice (A)

18. E's or F's roll number is 12. Choice (D)

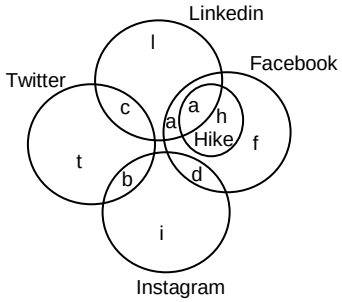
19. Roll number 11 is the topper of Physics. Choice (B)

20. Either E or F is the topper in English. Choice (D)

Solutions for questions 21 to 25:

The given information can be represented in the following Venn diagram.

Let f, l, t, i represent the number of users of only Facebook, only Linkedin, only Twitter and only Instagram respectively.
Let h represent the number of users of only Facebook and Hike.



Among the users of exactly two networks, the five different pairs of networks are (Twitter, Linkedin), (Twitter, Instagram), (Facebook, Linkedin), (Facebook, Instagram), and (Facebook, Hike).
This implies none among a, h, b, c and d can be zero.

Further from the given information,
b + c = a.
a + h + d = 2a
$\Rightarrow$ h + d = a.
Also given that f + l + t + l = 60 = a + a + b + c + d + h
From above, b + c = d + h = a.
Thus 4a = 60 $\Rightarrow$ a =15.

21. Only 'a' represents the number of students of exactly three networks. Minimum value for a = 15. Ans: (15)

22. As one user is in each network b = 0 and d = 0 is not possible hence minimum value of l = 0.
If b = d = l = 1. Two users will be on Instagram.
Ans: (2)

23. We know a = 15, maximum value of l = 60.
Maximum value of b = 14 (c cannot be zero).
Thus a maximum of 104 users can be on Linkedin.
Ans : (104)

24. Students on exactly two networks
= a + b + c + d + h = 3a = 45. Choice (C)

25. As the value of d cannot be zero, it has to be minimum 1.
Choice (B)

Exercise – 7

Solutions for the questions 1 to 4:

Each arm of the assembler/ disassembler has two functions.
Let P represents the input which is partially assembled.
Let A represents the input/ output which is fully assembled.
Let D represents the input/ output which has fully disassembled parts.

The function of the arm:

INPUT	PROCESS	OUTPUT
P	→	D
A	→	D
D	→	A

Any input tray results in either D or A.

It is given that at any time, both arms must work on two adjacent trays. Two different types of outputs are possible based on the inputs as above.

1. Each input tray has a completely assembled unit. When both the arms work on adjacent trays, any number of times, in any step, only even number of input trays will have completely disassembled parts.
A → D
D → A
Thus if all the trays in the input have been converted to desired output, it implies that each batch has only even number of input trays. Hence II and III are not possible.
Choice (B)

2. With each batch having different even number of input trays, the only possible combination is
30 = 2 + 4 + 6 + 8 + 10. Total five batches. Choice (A)

3. Each batch having equal number of input trays, i.e. nine.
Each batch has at most two input trays with completely disassembled parts.
If it has exactly two D trays, then there will be odd number of P trays, and if the batch has exactly one D tray, there will be even number of P trays.
If there is only one D tray and rest are all P trays, then desired output cannot be obtained. Let us check this with one D and one P tray.
DP→FD→DF→FD ---
If there are two D trays and the rest are all P trays, output of all A trays can be obtained.
DDP→FFP→FDD→FFF
Hence Choice (A) is necessarily false. Choice (A)

4. Exactly three batches have equal number of input trays $\Rightarrow$ three batches of 10 trays each and one batch of six trays. As explained above exactly two tray must be D. Hence, Choice (B) is necessarily true. Choice (B)

Solutions for questions 5 to 8:

As per the given conditions, we get the following arrangement. Let us represent their names with their first letter.

Mon	Tues	Wed	Thurs	Fri	Sat	
B		C	D		C	Morning
	A			B		Evening

As per condition (iii), C has to work in morning and evening slots alternately, and C works on Wednesday morning and Saturday slots, hence C must work on Thursday evening slot, which also mean that C cannot work in any other slot as C has worked in three slots (condition (v)). As neither B nor C nor A can work in the Tuesday morning slot, hence D must work in the Tuesday morning slot. Also, neither B nor C nor D can work in the Monday evening slot, hence A can work in the Monday evening slot. Alternately, A may work in the Wednesday evening slot, as neither B nor C nor D can do so.
As A cannot work in three consecutive shifts (condition (v)). Hence A works either in the Monday evening shift or in the Wednesday evening shift, but not both. This means that either the Monday evening shift or the Wednesday evening shift is vacant. Friday morning shift cannot be occupied by A, C or B, hence must be occupied by D. Also, A works in the Saturday evening shift, as neither B nor C nor D can work in that shift. Hence, we get the following arrangement.

Mon	Tues	Wed	Thur	Fri	Sat
B	D	C	D	D	C
(A)	A	(A)	C	B	A

One of these is vacant

5. As observed, either the Wednesday evening or the Monday evening shift will be vacant. Choice (D)

6. As can be seen from the table, if Cabra works in the morning shift, only Abra can work in the evening shift. Choice (B)

7. Babra may work with Abra on Monday and also Babra definitely works with Dabra on Friday. Hence, Babra cannot work with Cabra on any single day. Choice (B)

8. Dabra works in the morning shift on Friday. Choice (A)

Solutions for questions 9 to 12:

From (v), (vi), (vii) and (viii) we get the following table.

Rank	Height	Strength	Speed	Accuracy
1				
2			A	C
3	C	B		
4	F			G
5		A		
6			B	
7	G			
8				I
9				A
10		D		

Now from (ii), C must get 1st and 10th ranks, but in strength D got 10th rank, thus C got 1st rank in strength and 10th rank in speed.

From (ii), A, D, F, G, H and I must get exactly one rank between 1st and 10th in any parameter. A can get either 1st or 10th rank only in height and I can not get 1st rank in speed, thus A and I can get 1st or 10th ranks in height in any order.

As the best rank of H is 6th.

∴ H cannot get the first rank.

∴ H should get the last rank in accuracy, where as F got the first rank in the same parameter. G got the 1st rank in speed.

From (iii), in speed F got better rank then J, I & E and also B got a better rank than D & H and the available ranks are 3rd, 4th, 5th, 7th, 8th and 9th. As B got the 6th rank, D and H can get the 7th or the 8th or the 9th, F, J, I got 3rd, 4th and 5th ranks respectively and E may get 8th /9th rank.

B got better rank than D and H in any parameters. As B cannot get 3rd or 6th rank in accuracy. He got the 5th rank in accuracy.

In height, the remaining ranks are 2nd, 5th, 6th, 8th and 9th.

B must get better rank than D and thus it cannot get 8th or 9th ranks.

∴ B must get the second rank.

As D and H did not get adjacent ranks with G, in height the ranks of D and H would be the 5th and the 9th respectively.

∴E and J got the 6th and the 8th ranks in any order.

As, H must get the 6th rank, that must be in strength.

∴ G must get the 8th rank in strength.

∴F must get the second rank in strength.

The table will be as follows:

Rank	Height	Strength	Speed	Accuracy
1	A/I	C	G	F
2	B	F	A	C
3	C	B	F	E/J
4	F	E/I	J	G
5	D	A	I	B
6	E/J	H	B	D/J/E
7	G	J	D/H/E	D/E
8	E/J	G	D/H/E	I
9	H	E/I	D/E	A
10	A/I	D	C	H

9. F got the second rank in strength. Choice (C)

10. If E's rank is 8th in height, then J's rank will be 6th in height and 3rd in accuracy. Choice (A)

11. E and D can get 9th rank in strength and speed respectively F, I, J and G are the persons, who got the fourth ranks. In any order. Choice (C)

12. A's rank is better than H, the selected nomination can be
A, B, C, E, F, G or
A, B, C, F, G, J Choice (D)

Solutions for questions 13 to 16:

A played 4 rounds, thus he played with each of the other boys and won two games, one of which is against D and lost two games, one of which is against E.

As B won against C, he lost against A. Therefore A lost the game against C. As B won a single round, i.e. over C. In the remaining games he lost against E. Therefore, C played against D and won the game.

A, B – (W, L)
A, C – (L, W)
A, D – (W, L)
A, E – (L, W)
B, C – (W, L)
B, E – (L, W)
C, D – (W, L)

As E scores 5 points and concedes 1 point, the scores in the rounds are (3, 0) (2, 1) or (2, 0) (3, 1).

As B scores 5 points and his opponents scored a total of 8 points and scores in one of the rounds is (3, 2) in the remaining rounds the scores can be (1, 3) and (1, 3), or (2, 3) and (0, 3).

If B scores (0, 3) with E then with A it should score (2, 3). Therefore E scores 2 points against A, which results in two persons scoring the same points against A which is not possible.

(A, B) – (3, 1)
(A, C) – (0, 1)
(A, D) – (3, 0)
(A, E) – (1, 2)
(B, C) – (3, 2)
(B, E) – (0, 3)
(C, D) – (4, 1)

C cannot gain 4 points, thus B should not score (0, 3) in the round with E.

In the round in which B and E participated the score should not be (2,3). Thus the scores in the matches in which B and E and B and A participated are (3, 1) and (3, 1) and the scores in all other rounds will be as follows:

(A, B) – (3, 1)
(A, C) – (2, 3)
(A, D) – (1, 0)
(A, E) – (0, 2)
(B, C) – (3, 2)
(B, E) – (1, 3)
(C, D) – (2, 1)

13. B and D do not compete with each other. Choice (D)

14. A scored 2 points against C. Choice (B)

15. In the round in which B and C participated, the total score is 5. Choice (D)

16. A lost the games against E and C and in these games he scored 2 points. Choice (A)

Solutions for questions 17 to 20:

According to the given information, the maximum possible point is 10, when a brand gets, rank 5th in cost price and rank 1st in popularity.

It is given that Peter England got 9 points in total.

As Siyaram got the first rank in popularity.
∴ Peter England got the second rank in popularity, hence it must get the 5th rank in cost price.

Similarly, the minimum possible total points is 2(1 + 1), i.e., the 1st rank in cost price and the 5th rank in popularity.
Hence the total points of S. Kumar are 3.
Hence in cost price the rank of S. Kumar must be 1 or 2. 2 is not possible as Koutons got that.
∴ The rank of S. Kumar in cost price is 1 and in popularity is 4.
As, it is also given that Koutans did not get any of the top three ranks in popularity and also it cannot get the 4th rank.
∴ Kouton must get the 5th rank in popularity.
∴ Mayur got the 3rd rank in popularity.
Hence in cost price, the rank of Siyaram is the 3rd and that of Mayur is the 4th. Following table shows the ranks of each of the brands in each category.

	Cost price	Popularity	Points
Siyaram	3	1	8
S. Kumars	1	4	3
Mayur	4	3	7
Peter England	5	2	9
Koutons	2	5	3

17. Koutons is least popular Choice (B)

18. S.Kumars is the costliest brand Choice (C)

19. Siyaram is the second most suitable Choice (A)

20. Mayur scored 7 points. Choice (D)

Solutions for questions 21 to 25:

Mathematical	Erdos number	
A		
B		Not highest Not lowest
C		
D		Not highest Not lowest
E	2	lowest point

Let us say mathematician X has x as an Erdos (x > 2) number.
When he co-authors with E his Erdos number would be 3.
∴ decrease x – 3 = 6 (given) or x = 9
∴ The highest Erdos number is 9.
If E had coauthored with the closest Erdos number, then the closest Erdos number is decreased by 1.
This implies that closest Erdos number = 2 + 1 + 1 = 4.
From (d) the sum of Erdos number of the group = 30
i.e. 2 + 4 + 9 + a + b = 30 or a + b = 15
Since, all mathematicians have distinct numbers the only possibility is 7 or 8. So B = 8 and D = 7 from (c)
The value can be tabulated as below:

Mathematician	Erdos number
A	$\frac{9}{4}$
B	8
C	$\frac{4}{9}$
D	7
E	2

21. If Erdos number of B is between A and D,
⇒ A = 9, ∴ C's Erdos number is 4. Choice (A)

22.

A	B	C	D	E
9	8	4	7	2

We have to minimize the average. A co authors with E, and B coauthors with C, and this would result in the following numbers.

A	B	C	D	E
3	5	4	7	2

= 21
So the minimum average = $\frac{21}{5}$ = 4.2 Ans: (4.2)

23.

A	B	C	D	E
9	8	4	7	2

To get the lowest average with the minimum number of papers
(1) A and E
(2) B and E
(3) C and E
(4) D and E
∴ Four papers have to be written. Ans: (4)

24. Let the Erdos number of F be 11 or 10.
Then we have the following

F	A	B	D	C	E
11⁄10	9	8	7	4	2

Only F, A, B and D can collaborate among them selves and a maximum of three can get equal Erdos number.
The next possible values are 5 and 6.
In both the cases, they can collaborate and come to a situation where five can have equal Erdos number as explain below.

A	B	D	F	C	E
9	8	7	6⁄5	4	2

Now, they can collaborate among them selves and five of them finally achieve an Erdos number of 3 each.
Hence, F can have two different values. Ans: (2)

25. If the Erdos number of C is greater than that of E but less than that of B, then the Erdos number of C and A should be 4 and 9 respectively.
So, the difference is 9 - 8 = 1 Choice(A)

Exercise – 8

Solutions for questions 1 to 4:

There are seven team members each in '7–star' and 'Superstar' team, and the number of filmstars is greater than the number of cricketers. This can happen in the following ways:

(1) 4FS, 3CS (2) 5FS, 2CS

(3) 6FS, 1CS

* FS = film stars CS = Cricketers
At least one bowler has to be part of the team and the number of batsmen must be greater than the bowlers among the total cricketers selected in any team. From the options above, (2) and (3) can be dropped. Therefore, the composition of each team would be as follows:
(a) Four filmstars in each team;
(b) Three cricketers, out of which exactly 1 is a bowler.

1. From the given information,
7–stars

Case 1: Q U/V _ _ E F I/J
FS CS

FS	P	Q	R	S	T	U	V	W	X	Y
	×	✓		×						
CS	A	B	C	D	E	F	G	H	I	J
	×	×	×	×	✓	✓	×	×	×	×

From (1) E and F have to be selected.
No other batsman can be selected.
Also, A is not selected implies either U or V is selected.

Case 2: Q U/V _ _ | E F H/J

FS CS

FS	P	Q	R	S	T	U	V	W	X	Y
	×	✓		×						
CS	A	B	C	D	E	F	G	H	I	J
	×	×	×	×	✓	✓	×		×	

In the 7-star team we are sure about E and F.

Superstars
From (1) if P is selected, then superstars coach would like to have H or I, i.e two cases.

Case 1: P _ _ _ | A _ _ | H

FS CS

FS	P	Q	R	S	T	U	V	W	X	Y
	✓	×		×	×					
CS	A	B	C	D	E	F	G	H	I	J
	✓	×			×	×	×	✓	×	×

From (2) if A has to be selected, B has to be dropped. We have only C and D left to fill the cricketers in superstars team, but from condition (3) if only one between C and D is selected, we would have to take I, this means there will be two bowlers and this case needs to be dropped.

Case 2: P _ _ _ | C/D A/B I

FS CS

FS	P	Q	R	S	T	U	V	W	X	Y
	✓	×		×						
CS	A	B	C	D	E	F	G	H	I	J
					×	×	×	×	✓	×

Here we are sure of the selection of I in superstars.
Therefore, E,F and I are definitely selected in are of the teams. Choice (A)

2. 7–Stars

U V _ _ | B _ _

FS CS

FS	P	Q	R	S	T	U	V	W	X	Y
	×	×	✓	✓		✓	✓			
CS	A	B	C	D	E	F	G	H	I	J
	×						✓	×	×	×

'R' can play in '7 stars'

Superstars

T W/Y P Q | C/D _ I

FS CS

FS	P	Q	R	S	T	U	V	W	X	Y
	✓	✓	×	×	✓	×	×			
CS	A	B	C	D	E	F	G	H	I	J
							×	×	✓	×

From (5) R cannot play in Superstars Choice (A)

3. Here, based on condition (2) one of 'U' or 'V' has to be selected in the filmstars selected; for 7–stars option (A) is the only choice that has 'U' in it Choice (A)

4. 7–Stars

FS	P	Q	R	S	T	U	V	W	X	Y
	✓	✓		✓						
CS	A	B	C	D	E	F	G	H	I	J
					×	×	✓			

Superstars

male female

FS	P	Q	R	S	T	U	V	W	X	Y
	×	×	✓	✓	✓					
CS	A	B	C	D	E	F	G	H	I	J
	×	×	×	×	✓	✓	×			

_ _ _ _ | E F _

FS CS

Since RT cannot be selected based on condition (5), the 7-stars team cannot be formed with the given conditions. The team can be formed only if condition (5) is relaxed. Choice (D)

Solutions for questions 5 to 8:

5. If Sunil's statement is true, the second statements of both Anil and Pranil will be false.
If Anil is liar,

Groceries	Pranil
Home	Anil
Match	Sunil

If Anil is the liar, Pranil' statements would be false, false and true respectively which is not possible.

If Pranil is the liar, his statements would result in the following deduction.

Groceries	Anil
Home	Pranil
Match	Sunil

In this case, Anil statements will be false, false and true respectively which is not possible.

Hence Sunil cannot be the truth teller. Choice (D)

6. If we observe the statements of Anil and Pranil, the first and the third statements of Anil contradict the second and the third statements of Pranil respectively, while the second statement of Anil is the same as the first statement of Pranil. We have the following cases.

Case – I:

Statements	Anil	Pranil
1		False
2	False	
3		False

Anil cannot be a TFT alternator, because, Pranil would not be doing any of the three activities, which is not possible.
If Anil is the liar, and if Pranil is also the liar, Then Pranil will be both who bought groceries and the one who stayed home, which is not possible.

Case – II:

Statements	Anil	Pranil
1		True
2	True	
3		True

If Pranil's third statement is true, Anil's third statement must be false, and Thus Anil must be FTF alternator, But Pranil cannot be TFT alternator because, Sunil would not be doing any of the three activities, which is not possible.
From the solution to the next question, all the three can be observed to belong to three different categories or two different categories considering Sunil to liar of alternator respectively.
Thus all the three cannot belong to the same category. Choice (A) is definitely false. Choice (A)

7. We have seen that Sunil cannot be the truth teller. This implies if any of the other two is a truth teller, Pranil must have visited the stadium. This implies the third statement of Pranil must be true, which contradicts the third statement of Anil.
Now, we have
Pranil = T, ? , T
Anil = F, T F
Sunil = F.
If three belong to three different categories, Pranil must be truth teller, as only statement of Sunil is available, Sunil would be the liar. Choice (B)

8. From the above, If Anil is the liar, Pranil cannot be a liar or truth teller. Pranil must be an alternator. Choice (C)

Solutions for questions 9 to 12:

With the given pattern, the numbers on the cube will be in the pattern shown below;

It can be visualised that the cube is built using 4 cuboids which include 16 columns of bricks.
Each column has four consecutive numbers.

Note that all numbers on any diagonal of the cube will be in arithmetic progression. Each diagonal has four cubes.

Sum of numbers on the diagonal

$= \frac{4}{2} * (\text{oneend} + \text{otherend})$.

= 2(sum of numbers on the end cubes)

9. The diagonal on the front face connecting bottom left cube to the top right cube is the required diagonal.
Top right cube is the cube numbered 1.
Bottom left cube is the first cube in the last cubiod, implies it would be numbered 16.
Sum of numbers on diagonal = 2(17) = 34. Ans: (34)

10. Top right cube on front face = Number 1.
Opposite corner will have the first cube of the larger cube = Number 64.
Sum of numbers on diagonal = 2(65) = 130. Ans: (130)

11. First cube in the third wall = 17^{th} cube from the start = number 32

Last cube in the third wall = 17.
Total number of cubes = 16 cubes

Sum of numbers = $\frac{16}{2} * (32 + 17)$

= 8 x 79 = 392 Ans: (392)

12. All the bottom layer cubes are the first cubes of all the 16 columns. All of them will be in an arithmetic progression with a difference of 4.
One end = 4
Other end = 64.
Total number of cubes = 16.
Sum = 8 x (68) = 544. Ans: (544)

Solutions for questions 13 to 16:

It is given that no guard can be posted on three consecutive days. Given information is as follows.

Day	Rohini	Sagarika
Monday	G_2	
Tuesday	G_3	
Wednesday	G_4	G_3
Thursday		
Friday		G_4
Saturday		
Sunday		G_2

Here, there are total 14 slots by the same guard (7 days and 2 houses), no house was guarded more than four times in a week. Three of the guards have been posted for 4 times and one is posted twice in a week.

As it is given that G_1 and G_2 have posted same number of days i.e., each of the houses was guarded by them for two times. G_2 cannot Guard Sagarika on Monday, since he was guarding for Rohini on the same day, also he cannot guard on Tuesday and Saturday as he guarded on Monday and Sunday.

$\therefore$ He can guard Sagarika on Thursday and Rohini on Friday.
Now G_1 must guard four times during a week. (twice Rohini, and twice Sagarika)
One person cannot guard same house on two consecutive days.
Hence G_1 must guard Rohini on Thursday and Sagarika on Saturday.

$\therefore$ G_1 guarded Sagarika either on Monday or Tuesday and similarly he guarded Rohini either on Saturday or Sunday.
One among G_3 and G_4 must guard for 4 times in a week.

If G_3 was posted for four times in a week he must guard Sagarika either on Monday or Tuesday.

As G_3 guarded Sagarika and Rohini on Wednesday and Tuesday respectively. G_3 cannot guard Sagarika either on Monday or Tuesday.

Hence G_4 must be posted four times. Now G_1 cannot guard Rohini on Saturday. Hence G_4 should guard Rohini on Saturday and G_1 should guard Rohini on Sunday.
So, G_1 must guard Sagarika on Tuesday.
$\therefore$ G_4 must guard Sagarika on Monday.
The final distribution is as follows.

	Rohini	Sagarika
Monday	G_2	G_4
Tuesday	G_3	G_1
Wednesday	G_4	G_3
Thursday	G_1	G_2
Friday	G_2	G_4
Saturday	G_4	G_1
Sunday	G_1	G_2

13. G_1 is the guard at Rohini on Sunday. Choice (C)

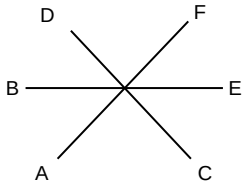
14. G_1 is the guard at Sagarika on Tuesday. Choice (A)

15. G_1 is the guard at Rohini on Thursday. Choice (C)

16. There are four such occasions Choice (D)

Solutions for questions 17 to 20:

It is given that C takes admission in college S.
From condition (4),
Since $\sim q \Rightarrow \sim p$
E takes admission in college U.
From condition (3),
Since $p \Rightarrow q$ and r
B takes admission in polytechnic and A takes admission in B.Sc.
From condition (7),
Since F does not want to take admission in engineering.
He takes admission in medical course.
From condition (5),
D takes admission in engineering.
From conditions (6) and (8),
D takes admission in college P and F takes admission in college Q.
From condition (1),
Since $\sim q \Rightarrow \sim p$
E takes admission in engineering and C takes admission in medical course.
From condition (2),
Since $p \Rightarrow q$ and r
B takes admission in college R and hence A takes admission in college T.
From conditions (8) and (2), we get the following arrangement and the distribution.



Person	Course	College
A	B.Sc	T
B	Polytechnic	R
C	Medicine	S
D	Engineering	P
E	Engineering	U
F	Medicine	Q

17. D takes admission in college P. Choice (C)

18. C is sitting opposite D. Choice (C)

19. F wants to take admission in college Q. Choice (B)

20. Only II and III are true. Choice (D)

Solutions for questions 21 to 25:

From (3) and the table it is clear that the order of adding new product lines is as follows:
$A \rightarrow D \rightarrow C \rightarrow B$
From (4) it is clear that the employees of department A in 2017 were 40.
Using (1) $\frac{1^{th}}{5}$ of 40 = 8 were transferred to D, so 13 new recruits were in department D.
From (4) it is clear that the total number of employees is 68.
From (2) 8 from D and 8 from A are transferred to C. Since the total for 2019 is 68, we can say that there four new recruits in department C.
From (5), the total for 2020 is 99.

Year	A	B	C	D	Total
2017	40				40
2018	32			8 + 13 new 21	53
2019	24		8 + 8 + 4 new 20	13 + 11 new 24	68
2020	18+ 7 new 25	6 + 8 + 2 + 10 new 26	12 + 14 new 26	22	+31 99

21. Since the employee's strength is only 99, the new canteen will not be opened. Choice (D)

22. The latest department started is B and six employees were transferred. Choice (A)

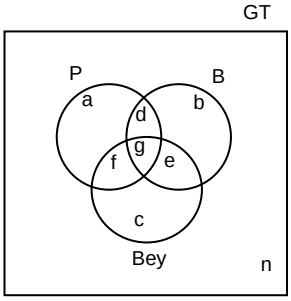
23. 2018 – New recruit = 13 (D)
2019 - New recruit = 4(C) + 11(D)
2020 – New recruit = 7(A) + 10 (B) + 14(C). Choice (B)

24. Four new recruitments joined department C in 2019. Choice (C)

25. 13 recruiters joined department D in 2108 which is the 2nd highest. Choice(B)

Exercise – 9

Solutions for questions 1 to 4:



Given GT = 800
a + d + g + f = 323
b + e + d + g = 439
c + e + f + g = 412
g = 91
n = 40
we know
GT = Exactly 1 + Exactly 2 + Exactly 3 + n ——— (1)
P + B + Bey = Exactly 1 + 2 Exactly 2 + 3 Exactly 3 —(2)
$\Rightarrow$ From both these equations we get,
Exactly 2 + 2 Exactly 3 = 414.
$\therefore Ex_2 = 232$.
From (1) we get $Ex_1 = 437$.

1. Given here f = 84.
We know Ex2 = 232.
So, d + e = 148.
(given) b + d + e + g = 439.
$\therefore$ b = 439 – 91 – 148 = 200.
$\therefore$ The number of children who buy only Ben10 is 200. Ans: (200)

2. Given a = 97.
We know a + g + d + f = 323.
$\Rightarrow$ d + f = 135.
And we also know Ex_2 = d + e + f = 232.
$\Rightarrow$ e = 232 – 135 = 197.
Now the individuals who buy both Beyblade toys Ben10 toys are
e + g = 97 + 91 = 188. Ans: (188)

3. Given b > c > a and we require maximum number of children who bought both Ben10 and Beyblade toys.
As e should be maximum b should be minimum at the same time it should also satisfy the above condition.
So the value for b = 147c = 146a = 144.
Now the maximum value for e = 144. Ans: (144)

4. From the previous questions
We get b = 147, c = 146, a = 144.
Now we require minimum number children who have no toys to play which is b + n = 147 + 40 = 187. Ans: (187)

Solutions for questions 5 to 8:

With the given information,
If P = Q= R = true, then S = False.
If P = Q = R = false, then S = false.
Thus Ravi cannot be a truth teller.
Ravi can be a liar.

We have to check the cases where Ravi is an alternator.

If there are at least one true and one false statements among P, Q or R, Then S = true,
Then only case possible will be PQRS = FTFT.

Thus, there are only two possible cases:
Ravi is alternator: PQRS = FTFT
Ravi is a liar: PQRS = FFFF

5. In both cases above, statement R must be false. Choice (D)

6. Only Choice (A) is not logical because, with the given conditions, P cannot be true. Choice (A)

7. From the known information, if the statement prior to P is:
(A), then PQR must be TFT, not possible.
(B), then PQR must be FTF, possible.
(C), then PQR = TTT $\Rightarrow$ S = F, not possible.
Hence only Choice (B) is true. Choice (B)

8. He will be an alternator with the first statement false. Choice (A)

Solutions for questions 9 to 12:

From (i), if one of G is selected in R, then we have the following possibility.

(a)

P	Q	R
B, I, J	A, C, H	E, F, G, D

If H is selected in R, then R must have four children.
But none of E, F, G, I, J can be in R.
Also, I must be with B [$\because$ From (ii)]
$\therefore$ A, C, D, H must be in R, in which case one of P and Q do not have any girls.
$\therefore$ Not possible.
If I is selected in R, then B must be in that team.
If H is selected in group P, than we have the following possibilities.

	P	Q	R
(b)	A, H, C, E	G, F, D	I, B, J
(c)	A, H, D, F	G, C, E	I, B, J
(d)	A, M, F, E	C, G, D	I, B, J

If H is selected in group Q, then R must have four children. But none of C, D, E, F, H, A, G can be in R.
$\therefore$ This case is not possible.

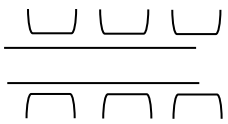
9. It is possible only in case (b) and I must be selected in R Choice (B)

10. It is possible only in case (b) and D must be selected in Q Choice (C)

11. It is possible only in case (a) Choice (D)

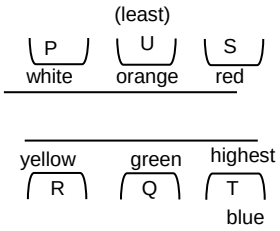
12. It is possible in case (b), case (c) and case (d). Choice (D)

Solutions for questions 13 to 16:



(1) T (highest capacity) $\leftrightarrow$ Red
(2) (least capacity) $\leftrightarrow$ Green
(3) $\frac{P}{S}$ U (orange) $\frac{S}{P}$
(4) R(yellow) $\leftrightarrow$ P

(5) Q (green) ↔ U
(6) T > S & Q > P > R > U



13. Diagonally opposite red is yellow. Choice (B)

14. Cannot be determined. Choice (D)

15. Highest-capacity godown holds blue colour. Choice (B)

16. T > S, Q > P > R > U
Let the sum of capacity of (P, U, S) = the sum of capacity of (T, Q, R)
i.e. P + U + S = T + Q + R
R > U, Q > U and T > S
∴ They can never be equal. Choice (C)

Solutions for questions 17 to 20:

Given that the number of ₹2 coins with Ram is six less than that of ₹1 coins with Mohan, let us look at the possibilities.

	₹1	₹2	₹5	Total
Ram		1		32
Shyam				43
Mohan	7			46

In this case, the number of ₹5 coins with Mohan has to be an odd number. But for any of the three possible values of 5, 1 or 9, there will be repetitions. Similarly, no arrangement is possible for the values of 3 and 9 also. The only possible arrangement is:

	₹1	₹2	₹5
Ram	3	2	5
Shyam	6	1	7
Mohan	8	9	4

17. Difference = 4 – 2 = 2 Ans: (2)

18. 16 ₹5 coins are there with Ram, Shyam and Mohan altogether Ans: (16)

19. 14 coins are there with Shyam Ans: (14)

20. Mohan has 9 two-rupee coins with him. Ans: (9)

Solutions for questions 21 to 25:

From (i), only one key from box A and one key from box C can be selected or two keys from box A and one key from box C can be selected.
From (ii), only T or only R or only Z or only R and Z or none among them can be selected.
From (iii), only Z or only R or only Q and S or none among them can be selected.
From (iv), only U or only Y and U or none among them can be selected.
From (v), only P or only X or none among them can be selected.

The possible selections are,
(i) QSTX (ii) QSUX (iii) QSUY (iv) QSUZ
(v) PQSZ (vi) QRSX (vii) PRUY (viii) TUPY
(ix) RSUQ (x) QTUS

21. None of the given choices. Choice (D)

22. P must be selected if Y and R are selected together. Choice (B)

23. In ten ways, the four keys can be selected. Choice (B)

24. U must be selected if P and T are selected together. Choice (C)

25. The possible selections are QSUX, QSUY, QSUZ, PQSZ, QRSX, PRUY, RSUQ
So, a total of 7 ways. Choice (D)

Exercise – 10

Solutions for questions 1 to 4:

It is given that each student got at least one question correct in each section. Thus, the possible combinations of the number of correct, wrong answers and score in section I are (Correct = 5, Wrong = 0, Score = 15), (4, 1, 11), (3, 2, 7), (2, 3, 3) and (1, 4, –1). In section II the possible combinations are (3, 0, 15), (2, 1, 8) and (1, 2, 1).
Given B scored 15 marks. The only possible combination is – seven marks in section I and eight marks in section II.
From statements I and V, B + D = Topper A.
Since, B = 15 and that each one scored at least 10 marks. A's total score should be at least 25. Hence, A's score can be (Sec-I 15 + Sec-II 15) 30 or (section I 11 + section II 8) 26. If A = 30, then D = 15. This is not possible because it is given that no two students scored the same total marks. Hence, A = 26 and D = 11.
A = 26 is possible only in one combination. i.e. section I score - 15 + section II score - 15.
D = 11 is possible in the combination (section I score – 3 + section II score – 8).
From statement I, E = A – 3= 23 (i.e. section I score 15 + section II score 8). Thus, E is the student who got all questions correct in section I.
C's total score should be at least ten. But he scored only one mark (from statement III in section II. Hence, his score in section I should be either 15 or 11. But 15 is not possible, because only one student got all questions of section I correct and that student is E. Hence, C's total score in section I is 11.
The topper could have scored 26 with all the questions of section II correctly marked and four questions of section I marked correctly, or he could have got 23 with all the questions of section 1 marked correctly and two questions of section 2 marked correctly.

But since the score of the topper is the sum of the marks scored by B and D, and B has got 15 marks already, so the topper must have scored at least 25 marks (as minimum marks secured by C is at least 10)
Hence the topper must have scored 26 marks.

Hence, E must have scored 23 marks.
The only possibility for E scoring 23 is by getting all questions correct in section-1 and 2 questions correct in section-2.
D must have scored 11 marks. (from i)

Since C has marked two questions wrong in section 2, he must have correctly marked four questions in section 1 to not to score less than 10 points.
Hence, he must have scored 12 marks.
And from iii we get the following table.

Person	Section 1	Section 2	Total
A	3, 3, 3, 3, -1	5, 5, 5	26
B	3, 3, 3, -1, -1	5, 5, -2	15
C	3, 3, 3, 3, -1	5, -2, -2	12
D	3, 3, -1, -1, -1	5, 5, -2	11
E	3, 3, 3, 3, 3	5, 5, -2	23

1. C scored one mark more than the student who scored the least marks. Ans: (1)

2. B got two questions of section I wrong and D got one section II questions wrong. Ans: (1)

3. The lowest score is 11 and the second highest score is 23. Difference=12. Ans: (12)

4. B marked three questions wrong and C also marked three questions wrong. Ans: (0)

Solutions for questions 5 to 8:

As E and D belong to class VI, only one of them will have a shovel. From 5, to ensure that project 4 has a shovel one among I and G will have a shovel.
Since, C, I and G belong to class XII, C will not be given the shovel.
From 4, as only D and C work on project 5, and that C will not be given a shovel, D must have the shovel to complete project 5. Thus, there will also be a student with shovel on project 2. Now, we should ensure that projects 1, 3 and 4 also have at least one student with a shovel.
From 5, we know that one among I and G must be given a shovel to complete project 4. If I is given the shovel, then projects 1 and 4 will have a shovel. To complete project 3, B should be given a shovel.
If G is given shovel, then projects 3 and 4 will have a student with shovel. Now, A should be given a shovel to complete project 1.
Thus, we get the following combinations.
(i) Student D, class VI, projects 5, 2
Student G, class XII, projects 4, 3
Student A, class X, project1
(ii) Student D, class VI, projects 5, 2
Student I, class XII, projects 4, 1
Student B, class X, project 3

5. As explained above, D will always have shovel from his class. Choice (B)

6. As shown in the solution above, F, E and H would not have a shovel. So, out of the given options, (A) is the answer. Choice (A)

7. From class VI, D will always have the shovel and E will never get the shovel.
From class X, F and H will never get the shovel. Rest all the children may get the shovel.
and from class XII, C will never get the shovel.
So, a total of four children will never get a shovel. Choice (C)

8. No project in any of the cases can have more than one student with a shovel. Choice (D)

Solutions for questions 9 to 12:

From the given information, the number followers for the four persons are 1, 3, 4 and 5 lacs. From the first and the fifth clues, B, the youtuber, has 5 lac followers and uses Nikon. From the fourth and the sixth clues, neither A nor C has one lac followers. Hence, D has one lac followers. Thus, A and C have three and four lac followers, not necessarily in that order.
From the second clue, filmmaker uses Red. From the third and the sixth clues D uses neither Canon nor Red. Hence, D uses Sony. Now, from the second clue it can be concluded that D is the wildlife photographer.
It is not known whether A is a film maker or C is a film maker. So, we have two cases based on who the film maker is.

Case I

A	B	C	D
Filmmaker	Youtuber	Wedding Photographer	Wildlife Photographer
Red	Nikon	Cannon	Sony
4	5	3	1

Case II

A	B	C	D
Wedding Photographer	Youtuber	Filmmaker	Wildlife Photographer
Cannon	Nikon	Red	Sony
3	5	4	1

9. If A is filmmaker, C would have 3 lac followers. Choice (A)

10. Wedding photographer will have 4 lac followers in both the cases. Choice (B)

11. None of the given statements is true. Choice (D)

12. "D is the film maker" is false. Choice (C)

Solutions for questions 13 to 16:

From the given table the following can be calculated.

(i)	NAN – 010	Amount	₹300
(ii)	PAN – 033	Unit price	₹100
(iii)	KOF – 047	Quantity	₹30
(iv)	BIR – 066	Unit Price	₹150
(v)	BIR – 011	Unit price	₹100
(vi)	CBC – 029	Amount	₹100
(vii)	CBC – 026	Quantity	₹15
(viii)	CBC – 026	Amount	₹1800

13. The quantity to CBC026 is 15. Ans: (15)

14. The costliest among the non-vegetarian items (other than CBC081 and CBC071) and vegetarian items (other than BIR066 and BIR011) are to be removed. Based on the condition, the two items are PAN036 and KOF053. Choice (B)

15. Number of plates of Malai Kofta
= Number of plate of Veg Kofta = $\frac{4500}{150}$ = 30.
Ans: (30)

16. Total number of plates = $30 \times 2 + 30 \times 1 = 90$
Each plate has 4 puri = $90 \times 4 = 360$
$\therefore$ Cost per puri = $\frac{600}{360}$ = 1.66 Ans: (1.7)

Solutions for questions 17 to 20:

In the year 2017 all the companies, either surpassing or getting surpassed by only three of its rivals. Since each company aims at over taking a different company in every quarter. i.e. In the year 2017- we have Q2,Q3 and Q4.
The information regarding 2017 can be tabulated as shown below.

In 2017

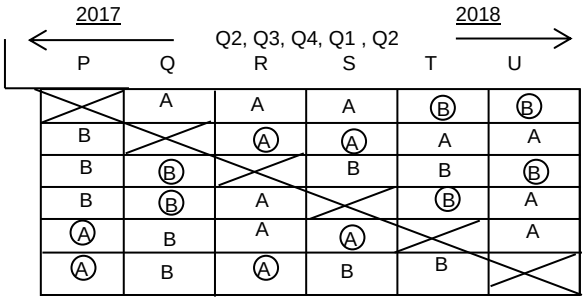
	P	Q	R	S	T	U
P				✓		
Q				✓		
R				×	×	
S	×		✓			✓
T		×	✓			✓
U				×	×	

From (4), Q cannot be the company which surpassed all three rivals. Thus 'P' surpassed all three rivals, E and U were surpassed by all their rival companies.
From (5), P and U did not compete against each other in 2017. Also, we can say, T did not compete with P, since T has competed with Q, R and U.
Thus, P surpassed Q and R.
$\therefore$ Q surpassed U.

From the above and from the given information, in 2018, Q competes with R and S, R competes with Q and U, S competes with Q and , T competes with P and R.

∴We can say that P is surpassed by T and U from (1).
From (2) and the above, we can say that U surpassed P and R, Thus R was surpassed by Q and U.

From (3), S must be surpassed by Q and T.
We can represent this information in the table below.



~~A~~	A	A	A	(B)	(B)
B	~~A~~	(A)	(A)	A	A
B	(B)	~~B~~	B	B	(B)
B	(B)	A	~~A~~	(B)	A
(A)	B	A	(A)	~~B~~	A
(A)	B	(A)	B	B	~~A~~

A = AHEAD, B = BEHND, ◯ = 2018

17. T and U surpassed P in 2018. Choice (B)

18. Q, T, U are the three companies. Choice (D)

19. S and U are the companies that surpassed exactly two rivals in the period Q2, 2017 to Q2, 2018. Choice (D)

20. Q and T have surpassed most of their rivals in the period Q2, 2017 to Q2, 2018. Choice (D)

Solutions for questions 21 to 25:

Here there are 10 students and among them, none identified all the four fruits correctly. At most 3 fruits was identified correctly by each of them. From (vi), there are 29 correct sheets, hence, there are 9 students who identified exactly 3 sheets correctly and one student identified exactly 2 sheets correctly. Now as the total number of students identifying each fruit is different and as the number cannot be 10. The numbers must be $9 + 8 + 7 + 5 = 29$.

From (ii), It is clear that the number of students, who identified apple correctly is less than the number of students who identified Banana correctly and also the number of students who identified Banana correctly must be 9. Otherwise, there will be more than one student who identified exactly 2 fruits correctly.

From (vi), Tulsi is the only student who cannot identify Banana correctly.

Now from (v), Orange is identified correctly by 8 students, Mango is identified correctly by 7 students and Apple is identified correctly by 5 students.

Now from (iii), only Mamta, Arnab and Suneeta identified same combination of fruits correctly. That combination is Mango, Apple and Orange.

From (iv), Kalyan and Lakshmi cannot identify Orange correctly.

∴ Ganesh, Nishant, Harsh, Rishi and Tulsi are the students who cannot identify Apple correctly.

The following table gives the complete list.

Fruits	Correctly identified by
Banana	Mamta, Kalyan, Arnab, Suneeta, Lakshmi, Ganesh, Nishant, Harsh, Rishi
Orange	Mamta, Arnab, Suneeta, Ganesh, Nishant, Harsha, Rishi, Tulsi
Mango	Kalyan, Lakshmi, Ganesh, Nishant, Harsha, Rishi, Tulsi
Apple	Mamta, Kalyan, Arnab, Suneeta, Lakshmi

21. There are nine students who identified Banana correctly. Choice (C)

22. Lakshmi did not identify Orange correctly. Choice (C)

23. Choice (D) gives the complete list. Choice (D)

24. Kalyan identified both mango and apple correctly. Choice (A)

25. Tulsi identified neither banana nor apple correctly. Choice(A)