

CATapult Courseware

Module 3

DI-LR

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DI-3.1 DATA INTERPRETATION MISCELLANEOUS SETS



CLASS EXERCISE

Answer questions 1 – 4 based on the data below:

QT Holiday resort has a total of 50 rooms of 3 types – Comfort (20 rooms), AC Deluxe (20 rooms) and Suite (10 rooms). The following table lists the daily tariffs at QT for the period January - June 2013:

	Rent per room (Rs)		Daily expenditure per room (Rs)	
	Single occupancy	Double occupancy	Unoccupied	Occupied
Comfort	1500	2000	200	500
AC Deluxe	2000	2500	300	800
Suite	2500	3500	500	1000

The resort owner also has a stake in a company CST Inc, and hence has offered CST a tie-up so that the employees of CST can avail certain discounts when staying at the resort (No other company has any such tie-up with the resort):

Employees of CST can book an AC Deluxe room for Rs. 1000 per night (both single/double occupancy) for official visit and Rs. 1500 per night for personal visit. If there are no AC Deluxe rooms available, then they can book a Comfort room at the same rates. The Suite rooms would cost Rs 500 extra per room per night.

Profit is calculated on the basis of room tariffs and room costs only.

- What is the maximum profit the resort can earn in April 2013 if all rooms are occupied?
1) Rs 8.9 lakhs 2) Rs 18.72 lakhs 3) Rs 26.7 lakhs 4) Rs 31.2 lakhs
- What is the minimum profit the resort can earn in March 2013 if all rooms are occupied?
1) Rs 2.1 lakhs 2) Rs 19 lakhs 3) Rs 5.7 lakhs 4) Rs 5.89 lakhs
- What is the maximum profit the resort can earn in June 2013 if all the AC Deluxe rooms are occupied by employees of CST on official work and all the other rooms are occupied by non-CST guests?
1) Rs 17.7 lakhs 2) Rs 1.77 lakhs 3) Rs 13.7 lakhs 4) Rs 13.3 lakhs
- If the resort remains empty during the month of January 2013, what will be the loss incurred?
1) Rs 1.5 lakhs 2) Rs 0.15 lakhs 3) Rs 4.65 lakhs 4) Rs 0.45 lakhs

Data for questions 5 to 11: Perfect Institute of Technology and Science is planning to felicitate the top students from the five local schools who have performed the best in the recently held Board Exams. The Awards Committee has received a list of students from each of the schools, shown below:

Student	School	Total	PCM
Rajesh P	APS	641	295
Chitra H	APS	637	295
Paresh P	APS	633	281
Raghu N	APS	629	274
Sarvesh K	APS	622	269
Salim S	APS	622	269
Vivek K	APS	620	257
Manoj M	APS	619	256
Archana K	BBV	633	291
Seema L	BBV	632	283
Samarth F	BBV	630	285
Priti G	BBV	629	288
Akhil P	BBV	626	277
Rahul K	BBV	625	278
Kunal C	BBV	621	270
Maria N	DMC	636	288
Amit K	DMC	635	295
Rajani M	DMC	635	289
Haresh S	DMC	629	274
Sreejith S	DMC	623	272
Shreya L	DMC	622	273
Aman N	KV	638	297
Anthony G	KV	630	282
Annu A	KV	624	261
Payal P	KV	623	271
Srihari K	KV	619	264
Sridevi N	RMS	635	291
Ishant F	RMS	629	283
Shafi Q	RMS	629	281
Reshma P	RMS	619	261

The awards committee is now desirous of making a consolidated list of these 30 students. They decide on the following criteria:

- The final merit list will be prepared in decreasing order of the Total score (so Rank 1 is the highest).
- If two students tie on Total, the one with a higher score in PCM will be awarded the higher rank.
- If even then there is a tie, both students will be awarded the same rank. For example, if two students tie for the 5th position, they will be listed alphabetically by first name with both having a rank 5, and the next student will be awarded rank 7.

5. In the consolidated list, what is the rank of Akhil P?
1) 16th 2) 17th 3) 18th 4) 20th
6. What will be the position of Sarvesh K. on the consolidated list?
1) 23rd 2) 24th 3) 25th 4) 26th
7. How many people will be between Seema L. and Haresh S. in the consolidated list?
1) 5 2) 6 3) 7 4) 8
8. In the consolidated list, how many students from APS will rank lower than any student from DMC but higher than at least one student from KV?
1) 0 2) 1 3) 2 4) 3
9. * How many people are between Raghu N. and Salim S. on the consolidated list?
1) 5 2) 6 3) 7 4) 8
10. * If on re-evaluation, Srihari gets 5 marks more in Sanskrit (other students' marks remaining unchanged) then what will be his new rank in the consolidated list?
1) 18 2) 19 3) 20 4) 21
11. * How many additional marks (minimum) would Rahul K. need to reach the top ten (assuming all other students' marks remain unchanged)
1) 5 2) 6 3) 7 4) 8

Answer questions 12 – 17 based on the following information:

Invidious, a software company, conducts a nation-wide aptitude test for recruitment. 5,000 people appeared for the test. Swati received the following final scorecard:

Section Number	Section Description	Score (Maximum)	Percentile
Section I	Quantitative Skills	58 (100)	97.08
Section II	Computer Proficiency	118 (200)	95.42
Section III	Verbal Ability	88 (100)	99.84
Overall		264 (400)	99.68

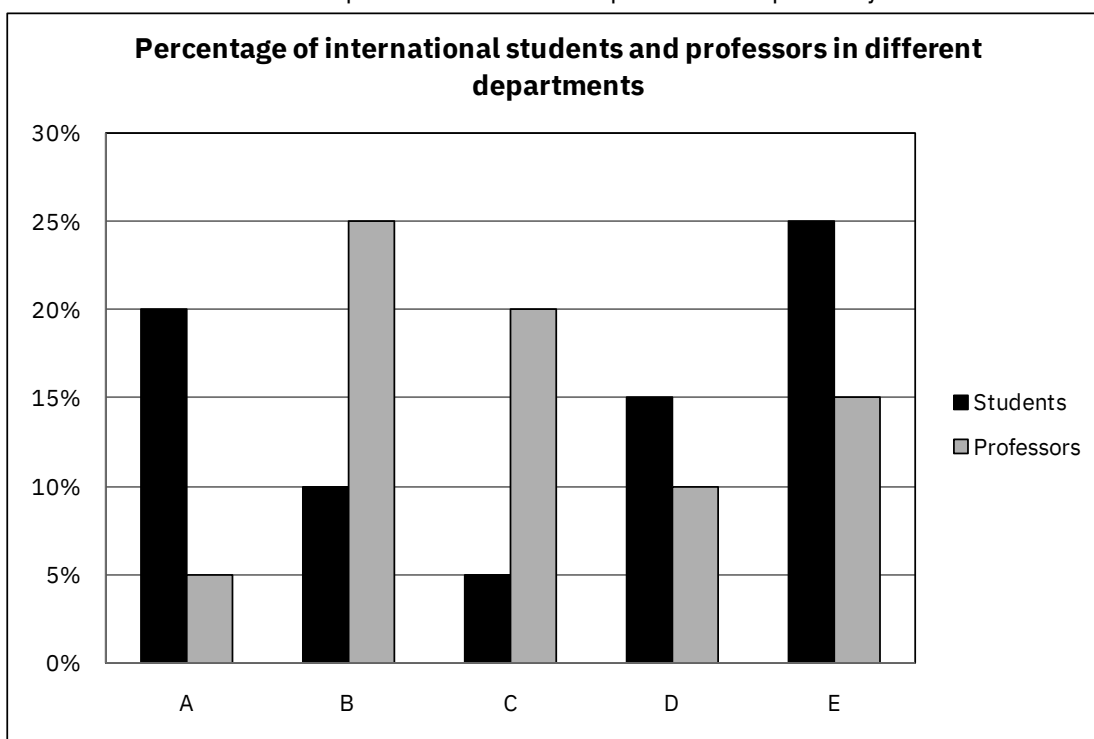
12. How many candidates scored less than Swati in Verbal Ability?
 1) 4996 2) 4988 3) 4992 4) Cannot be determined
13. How many candidates exceeded Swati's score in Computer Proficiency?
 1) 228 2) 229 3) 230 4) Cannot be determined
14. How many candidates (including Swati) exceeded or equalled Swati's score in the Quantitative Skills section?
 1) 143 2) 145 3) 146 4) Cannot be determined
15. If the company gives an interview call to every candidate who is among the top 50 overall as well as in the top 200 in each section, should Swati expect an interview call?
 1) Yes 2) No 3) Data insufficient 4) None of these
16. What is Swati's overall rank?
 1) 15 2) 16 3) 32 4) Cannot be determined
17. * If Swati's friend Swapnil scores a higher overall score than anyone else on the above test, what will be his percentile score?
 1) 100.00 2) 99.99 3) 99.98 4) 99.95

Directions for questions 18 to 21: Refer to the data and answer the following questions.

Norwegian School of Business, Finance and Economics (NSBFE), located at Bergen, has in all five departments, namely A, B, C, D and E. Students as well as professors in the five departments can be Norwegians or International students/professors.

The number of students in the five departments A, B, C, D and E, when expressed as a percentage of total students, is 10%, 20%, 30%, 24% and 16% respectively. Similarly, the number of professors in the five departments A, B, C, D and E, when expressed as a percentage of total number of professors, is 10%, 20%, 25%, 25% and 20% respectively.

The following bar graph shows the number of International Students as well as the number of International Professors in the five departments, when expressed as a percentage of the number of students and the number of professors in that department respectively.



Each person (student or professor) is associated with only one department.

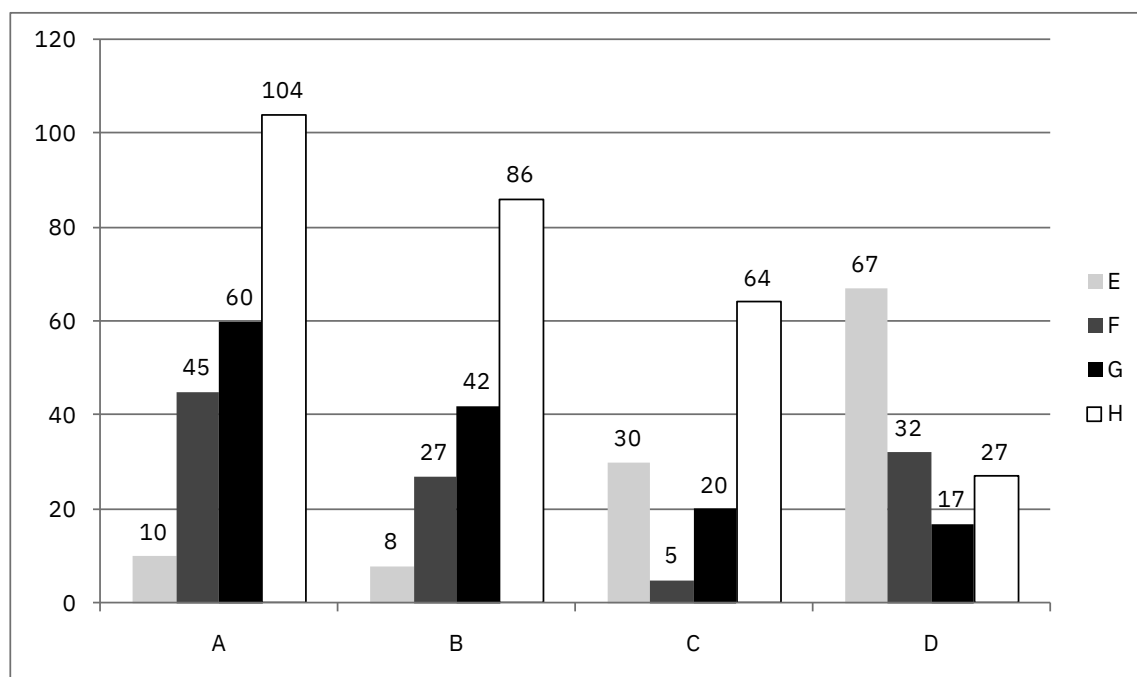
18. Which of the following departments has the highest ratio of Norwegian students to Norwegian professors?
 1) Department A 2) Department B 3) Department C 4) Department D

19. If the total number of professors and the total number of students in NSBFE are the minimum possible numbers, what is the ratio of total number of students to the total number of professors in NSBFE?
 1) 4 : 1 2) 5 : 1 3) 7 : 1 4) 8 : 1

20. Suppose A = The maximum number of Norwegian professors among the number of Norwegian professors in the five departments
And B = the minimum number of Norwegian students among the number of Norwegian students in the five departments
If A = B, what is the ratio of the total number of students to the total number of professors in NSBFE?
- 1) 45 : 16 2) 3 : 1 3) 160 : 131 4) 7 : 1
21. If the total number of students is 10 times the total number of professors, then what is the ratio of the number of total international students to the number of total international professors in NSBFE?
- 1) 12 : 1 2) 25 : 3 3) 1600 : 131 4) 131 : 16

Directions for questions 22 to 25: Refer to the data and answer the following questions.

A, B, C, D, E, F, G and H are eight students who appeared for a competitive examination. The following bar graph outlines the differences in the number of marks of A, B, C and D in comparison with the marks scored by E, F, G and H. Marks scored by all the students were positive integers.



For example, the difference in the marks scored by A and E is 10, the difference in the marks scored by A and F is 45 and so on.

The student who scored highest marks was ranked 1st, the student who scored 2nd highest marks was ranked 2nd and so on.

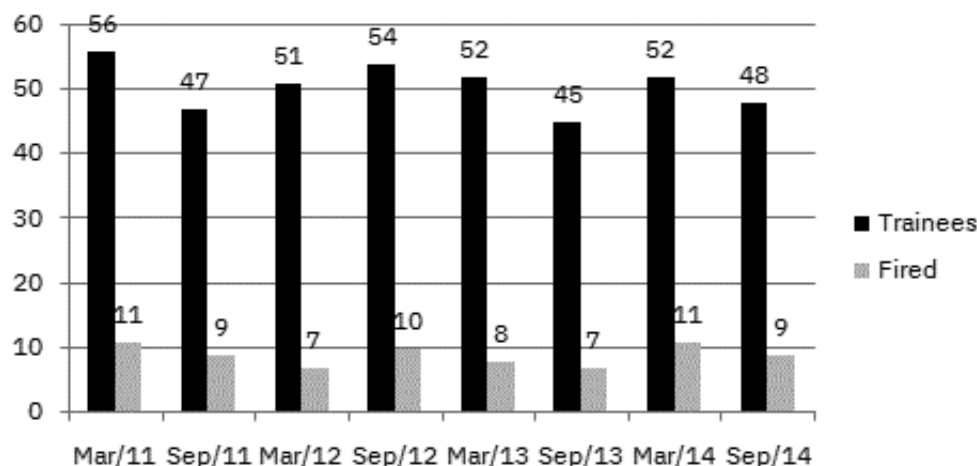
22. Who among the following can be the student who was ranked 3rd?
 - 1) C
 - 2) B
 - 3) F
 - 4) E
23. If one student scored 56 marks and F was ranked 4th, which of the following can be the score of one of the other students?
 - 1) 43
 - 2) 110
 - 3) 76
 - 4) 145
24. If one student scored 8 marks and D was ranked 7th, which of the following cannot be the score of any student?
 - 1) 102
 - 2) 52
 - 3) 35
 - 4) 70
25. What is the difference between the marks scored by F and G?
 - 1) 15
 - 2) 35
 - 3) 50
 - 4) Cannot be determined

Challengers

Answer questions 1 – 4 based on the given information:

An oil company hires a group of trainees every 6 months (in March and September every year). A new group of trainees goes through a 6-month learning cycle, after which they are tested on their progress. The top 25 candidates in each testing cycle are promoted to executives, while the rest are given one more chance, undergoing the training again along with the next batch and being tested again after another 6 months. A candidate who fails a second time round is fired. Thus no candidate is allowed to remain a trainee for longer than one year.

The chart below gives the number of trainees taking a test in a particular month (during the period March 2011 to September 2014), and the number of people fired in that month based on the test result. It is also known that in the test taken in September 2010, 24 candidates failed for the first time and 9 for the second time.



- In which of the given months was the maximum number of new trainees hired?
1) Sep-12 2) Mar-11 3) Mar-12 4) Sep-13 5) Mar-14
- In how many 6-month cycles from March 2011 to March 2014 were less than 30 new trainees hired?
1) 0 2) 1 3) 2
4) 3 5) Cannot be determined
- If 28 new candidates joined in September 2014, how many candidates would be expected to appear in the test in March 2015?
1) 42 2) 45 3) 58
4) 38 5) Cannot be determined
- In which test did the minimum number of trainees pass in the second attempt?
1) Sep-14 2) Mar-14 3) Mar-13 4) Sep-12 5) Mar-12



PRACTICE EXERCISE-1

DIRECTIONS for questions 1 to 4: Refer to the data and answer the questions that follow.

Doodha Singh, the coach of the Indian Athletic team, had to select two athletes to represent India in the Rio Olympics of 2016. He identified five potential athletes, named Anil, Bhaskar, Chandrakant, Dattu and Eknath for consideration. He rated them on three criteria, namely Speed, Stamina and Strength. Each athlete could get an integer score between 1 and 5 (both included) on each criterion, with 1 being the lowest score and 5 being the highest score. After the evaluation, he took the sum of the scores of each athlete on the three criteria. The athletes with the top two total scores were selected to represent India in the Rio Olympics. If two athletes were tied for the second position, he planned to conduct rigorous stress test on them to decide who between the two would represent India in Rio Olympics in addition to the one who was ranked first.

The following points are known:

- 1] The scores in Speed, Stamina and Strength (in that order) of both Anil and Dattu were in Arithmetic Progression.
 - 2] The total scores of two athletes was equal.
 - 3] Dattu's score in Strength was 3, which was also equal to Anil's score in Speed.
 - 4] Chandrakant's score in Speed was 1, which was also equal to Eknath's score in Stamina.
 - 5] No two athletes got equal scores in any criterion. Similarly no athlete got equal scores in any two criteria.
 - 6] Dattu's score in Strength was equal to the average of the scores of Chandrakant and Eknath in Strength.
 - 7] Finally, Doodha Singh could select the two athletes to represent India in Rio Olympics without any rigorous stress test.
-
1. What was the difference between the highest score and the lowest score among the five athletes?
 2. In how many criteria did Bhaskar score more than Chandrakant?
 3. In how many criteria did Eknath score more than 3?
 4. The scores of how many athletes in all the three criteria can be uniquely determined using the information given?

DIRECTIONS for questions 5 to 8: Refer to the data and answer the questions that follow.

Four students, named Anup, Bhushan, Chitra, Dennis and Ekta appeared for preliminary exam for 12th standard HSC exam in a college.

Graph-1 shows the marks scored by the five students in different subjects (out of 100). In this graph, the four subjects are disguised as S1, S2, S3 and S4. Information on marks scored by some students in some subjects has been hidden.

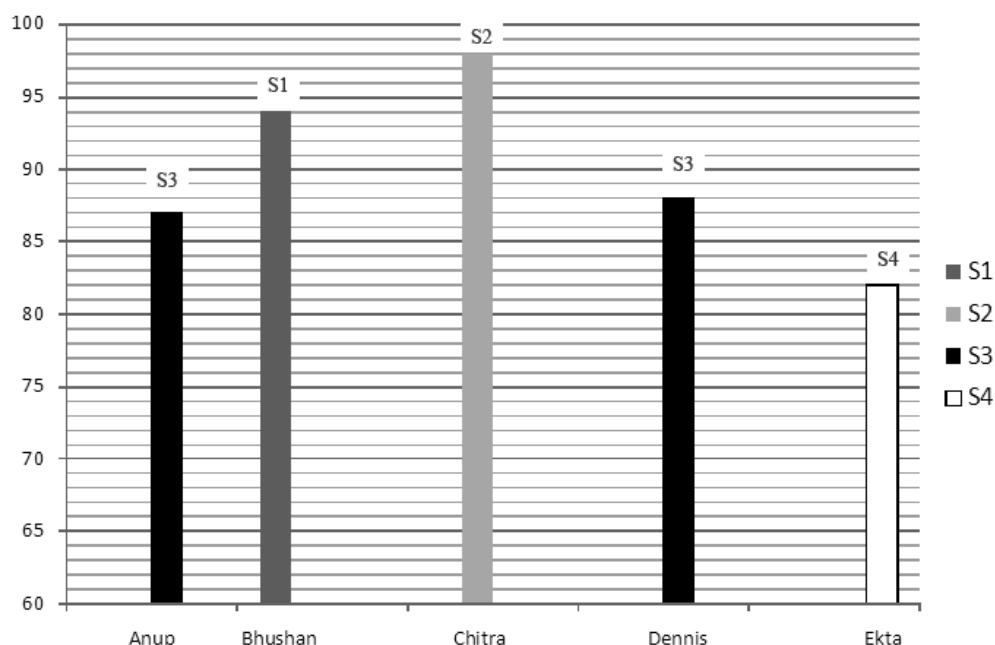


Table-1 shows the marks scored by the five students in the four subjects. In this table, the names of the five students have been disguised as A1, A2, A3, A4 and A5. Information on marks scored by some students in some subjects has been hidden.

	A1	A2	A3	A4	A5	Total
Physics		78	87	88	90	434
Chemistry		82				434
Mathematics	93		86		94	447
Biology	98			99		429

Additionally following points are known:

- 1] No two scores of any two students in any two subjects were equal. Also, each student scored unique marks in each of the four subjects.
- 2] Anup scored total 327 marks in the four subjects taken together while Chitra scored 378 marks in the four subjects taken together.
- 3] Bhushan scored 17 marks more in Chemistry than in Biology.
- 4] Dennis scored 2 marks more in Mathematics than in Chemistry.
- 5] Ekta's marks in Biology were 11 more than Anup's marks in Biology.
- 6] Ekta's marks in Mathematics were 4 more than Dennis' marks in Mathematics.

5. What was the total score of Dennis in the four subjects taken together?
1) 333 2) 355 3) 351 4) Cannot be determined
6. How many marks did Bhushan score in Chemistry?
1) 92 2) 82 3) 86 4) Cannot be determined
7. In which subject did Anup score the lowest marks?
1) Mathematics 2) Physics 3) Chemistry 4) Biology
8. What was the total percent score of Ekta in the four subjects taken together?
1) 83.25% 2) 87.75% 3) 82.75% 4) Cannot be determined

DIRECTIONS for questions 9 to 12: Refer to the data and answer the following questions.

XYZ bank announced a free investment consultation at 9 a.m. on Sunday. Three consultants C1, C2 and C3 were available from 9 a.m. to 10:30 a.m. Customers were allocated a token number in order of arrival. The first appointments started at 9 sharp; after that, when a consultant became free, the next customer in order would meet him. If more than one consultant was free when a customer arrived, the customer was sent to the first available free consultant (i.e. C1 would get first priority, then C2 and then C3). At 10 a.m., entry was closed and no new customers were accepted after that.

The table below lists the arrival times of the customers and the time required by each with the consultant (assume that the time required would be the same, whichever consultant the customer approached).

Customer	A	B	C	D	E	F	G	H	I	J	K	L	M
Arrival Time	8:53	8:55	8:59	9:09	9:13	9:19	9:23	9:29	9:30	9:37	9:45	9:51	9:59
ConsTime (minutes)	15	12	13	17	12	17	11	16	11	17	11	12	11

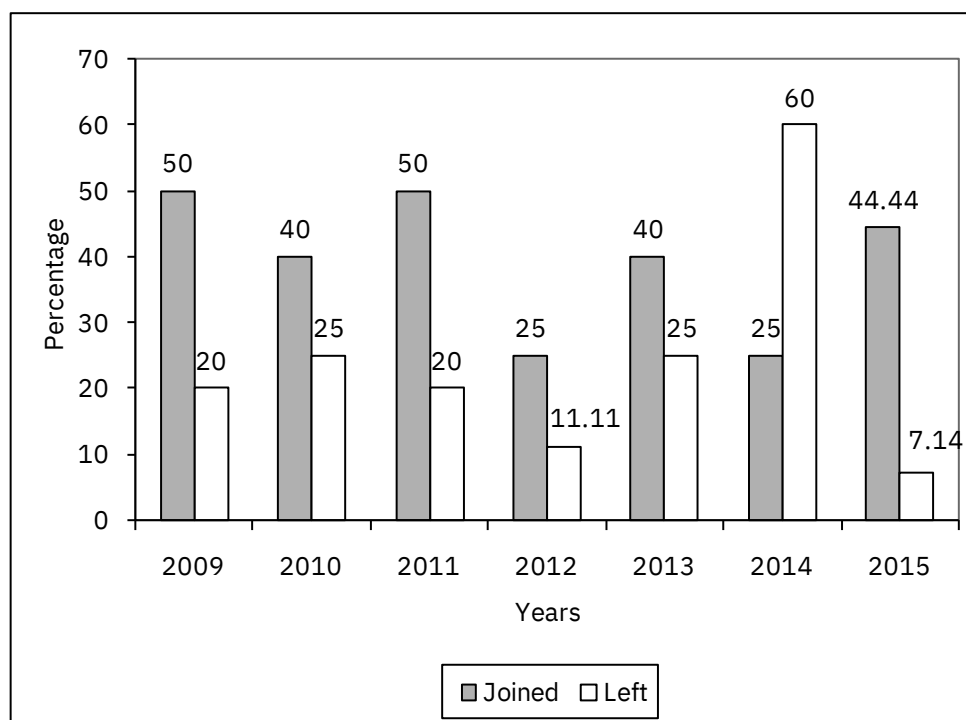
- The Wait Time for a customer is measured as the total time from the moment the customer arrived to the moment the customer met a consultant (for example, customer A would have a waiting time of 7 minutes as he would have to wait from 8:53 to 9:00).
- The Slack Time for a consultant is measured as the total time (out of his designated shift timing) that a consultant was free.

9. What is the total wait time, in minutes, for all the customers taken together?
10. What is the total slack time, in minutes, for all the consultants taken together?
11. How many customers were advised by C1?
12. If consultant C3 had not turned up, what would have been the total slack time, in minutes, for all the consultants taken together?

DIRECTIONS for questions 13 to 16: Refer to the data and answer the following questions.

Generic Software Technologies Pvt. Ltd is an IT company that was founded by IIM alumni. The company has a distinct HR policy. New employees join only on 30th June of every year while the employees who leave the company leave only on 31st December of every year. On 1st January 2009, a total of 1000 employees were working with the company.

The following graph shows the number of employees who joined the company on 30th June of every year between 2009 and 2015, as a percentage of the number of employees working for the company on 1st January of the same year. Similarly, the graph also shows the number of employees who left the company on 31st December of every year between 2009 and 2015, as a percentage of the number of employees working on 1st July of the same year.



13. In how many years was the number of new employees who joined the company more than 500?
1) 0 2) 1 3) 2 4) More than 2
14. The number of employees in the company on 1st July of two different years was equal. Which of the following were those two years?
1) 2010 and 2012
2) 2011 and 2012
3) 2013 and 2014
4) No two years had equal number of employees working on 1st July
15. On 1st January of which of the following years was the number of employees in the company the highest?
1) 2012 2) 2013 3) 2014 4) 2015
16. What was the ratio of the number of employees working in the company on 1st January 2013 to the number of employees working in the company on 1st July 2014?
1) 91 : 108 2) 25 : 49 3) 40 : 63 4) 16 : 21



PRACTICE EXERCISE-2

DIRECTIONS for questions 1 to 4: Refer to the data and answer the following questions.

A one-day international cricket match is played between two teams each having 50 overs and 10 wickets in hand. The team batting first (Team 1) scores runs to set a target for the team batting second (Team 2). The team that scores more runs is said to have won the match. If the runs scored by the two teams are equal, the match is said to be tied. Sometimes, because of rain, the entire 50 overs cannot be played. The Duckworth-Lewis Method (called D/L method hereafter) is a mathematical formulation to decide the result of matches that are so interrupted.

The essence of the D/L method is 'resources'. At any point of time, each team has 'resources' in the form of overs and wickets at its disposal to score runs. For example, if a team has lost 2 wickets and 10 overs have been completed, it is said to have unutilized resources of 8 wickets (= 10 – 2) and 40 overs (= 50 – 10), which it can use to score runs. At any point, the ability of a team to score runs depends on the combination of these two resources.

The values of unutilized resources of a team at different times during the match are given in the following table:

Overs Left	Wickets Lost									
	0	1	2	3	4	5	6	7	8	9
50	100	93.4	85.1	74.9	62.7	49	34.9	22	11.9	4.7
45	95	89.1	81.8	72.5	61.3	48.4	34.8	22	11.9	4.7
40	89.3	84.2	77.8	69.6	59.5	47.6	34.6	22	11.9	4.7
35	82.7	78.5	73	66	57.2	46.4	34.2	21.9	11.9	4.7
30	75.1	71.8	67.3	61.6	54.1	44.7	33.6	21.8	11.9	4.7
25	66.5	63.9	60.5	56	50	42.2	32.6	21.6	11.9	4.7
20	56.6	54.8	52.4	49.1	44.6	38.6	30.8	21.2	11.9	4.7
15	45.2	44.1	42.6	40.5	37.6	33.5	27.8	20.2	11.8	4.7
10	32.1	31.6	30.8	29.8	28.3	26.1	22.8	17.9	11.4	4.7
5	17.2	17	16.8	16.5	16.1	15.4	14.3	12.5	9.4	4.6
0	0	0	0	0	0	0	0	0	0	0

At the beginning of the inning, unutilized resources = 100. From the table, if a team has lost 6 wickets and there are 20 overs left to play, the unutilized resources of the team are 30.8.

If Team 1 scores 'S' runs, normally the target for Team 2 to win the match is 'S+1'. However, if the match is interrupted due to rain, the target for Team 2 to win the match is revised as per the following formulation:

R1 refers to the resources used by Team 1.

R2 refers to the resources available to Team 2 for its use.

If the inning of Team 1 is also truncated, we calculate G_{50} (the number of runs Team 1 would have scored if the inning was not truncated) as $G_{50} = S \times \left(\frac{100}{R_1} \right)$ (ignoring the decimal)

The revised target score T for Team 2 to win the match is calculated as follows:

If $R_2 < R_1$, $T = S \times \frac{R_2}{R_1} + 1$ (ignoring the decimal).

If $R_2 = R_1$, $T = S + 1$

If $R_2 > R_1$, $T = S + (R_2 - R_1) \times \frac{G_{50}}{100} + 1$ (ignoring the decimal).

If team 2 scores more than the revised target, it wins the match.

If team 2 scores less than the revised target, it loses the match.

1. Team 1 scored 240 runs in its untruncated inning. Before Team 2 could start batting, rain forced truncation of Team 2's inning to only 30 overs. Calculate the revised target for Team 2.

1) 145 2) 144 3) 182 4) 181

2. At the end of 40 overs, the score of Team 1 was 220 for the loss of 5 wickets, when the rains interrupted the play. After that, Team 1 could not continue its inning and Team 2 was scheduled to bat only for 25 overs. Calculate the target score for Team 2.

1) 198 2) 141 3) 187 4) 173

3. At the end of 45 overs when rain interrupted the play, Team 1 scored 280 for the loss of 2 wickets. The team batting second was scheduled to bat for 40 overs only. Calculate the target for Team 2.

1) 271 2) 263 3) 292 4) 301

4. In the Australia vs. South Africa cricket match at Johannesburg, Australia batted first and scored 356 runs in its 50-over innings. South Africa started batting and scored 292 runs for the loss of 4 wickets in 45 overs. At that time, it started raining and as a result, the inning of South Africa was truncated to 45 overs.

Who won the match?

- 1) Australia
- 2) South Africa
- 3) It was a tie
- 4) More information is needed to answer the question

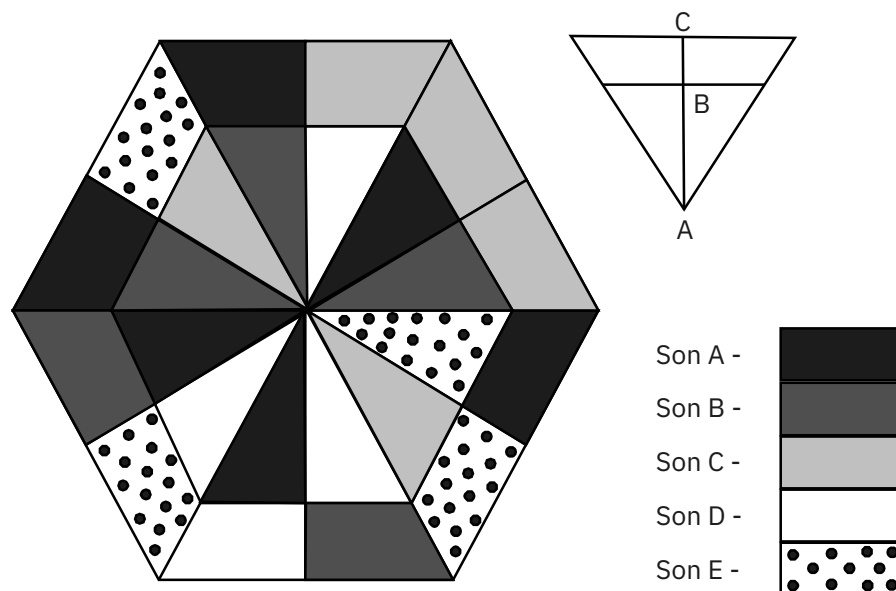
DIRECTIONS for questions 5 to 8: Refer to the data given below and answer the questions that follow:

Nayar Pistons Pvt. Ltd manufactures pistons required for automobiles. The company receives a large order from a leading automobile company abroad. The company has only 6 days to manufacture the required number of pistons. The company employs 4 workers on the 1st day and 5 workers on the 6th day on this order. The number of workers working on this order starting 2nd day is either one more than or one less than the number of workers working on this order the previous day. All the workers work for 8 hours per day and manufacture equal number of pistons every hour. The company pays a uniform wage of Rs. 100 per hour to each worker.

5. What is the minimum number of workers required to finish the job in one day?
6. If the total amount spent by the company on the wages for this order is Rs. 21,600, how many workers worked on this order on the 3rd day?
7. If only 4 workers were employed on this order on the 5th day, what could be the maximum amount spent by the company on the wages of the workers over 6 days?
8. The number of pistons manufactured by each worker everyday is such that the required number of pistons can be manufactured if only 2 workers work on this order on some day. Accordingly, the company assigns workers for this order. If the company had decided to assign 7 workers on this order everyday, in how many days would the order have been completed?

DIRECTIONS for questions 9 to 11: Refer to the data and answer the following questions.

Murarilal was a farmer who loved geometrical shapes. He designed his farm in the shape of a regular hexagon. Just before his death, he divided his farm into 6 equal equilateral triangular regions. He further divided each equilateral triangular region into 4 sub-regions such that $AB : AC = 2 : 3$, as shown. He then assigned these sub-regions to his five sons as shown.



His sons' names were Janak, Kishan, Lallan, Manoj and Natwar. However, who got which sector is disguised in the figure. It is known that the area of the total farmland received by Lallan, Janak and Manoj form an AP in that order. Also, Natwar received the least total area of the farm.

9. What percentage of the total farmland was allotted to Janak and Kishan?
 - 1) 36.11%
 - 2) 37.03%
 - 3) 41.67%
 - 4) Cannot be determined
10. Which of the following can be the percentage of total farmland allotted to Natwar and Lallan?
 - 1) 27.33%
 - 2) 30.67%
 - 3) 33.33%
 - 4) 41.67%
11. If Manoj was assigned the largest percentage of farm land among all his brothers, then which of the following is the highest?
 - 1) Difference between the total farmland assigned to Janak and Natwar
 - 2) Difference between the total farmland assigned to Kishan and Natwar
 - 3) Difference between the total farmland assigned to Kishan and Lallan
 - 4) Difference between the total farmland assigned to Lallan and Manoj

DIRECTIONS for questions 12 to 15: Refer to the data and answer the following questions.

Students from five different schools, named School A, School B, School C, School D and School E, participated in competitions on six different subjects, namely Physics, Chemistry, Biology, Mathematics, History and Civics.

In each competition, students from other schools also participated. However, the first five ranks in each competition were won by the students from the five schools mentioned above. In each competition, the student who gets the first rank is awarded 5 points, the student who gets the second rank is awarded 4 points, the student who gets the third rank is awarded 3 points, the student who gets the fourth rank is awarded 2 points and the student who gets the fifth rank is awarded 1 point. All students who fail to get a rank among the top 5 ranks are awarded -1 point (i.e. 1 point is deducted from their total points). There are no ties for the first five ranks in any competition.

The following table shows the number of students from these five schools who participated in the different competitions. Each student participated in only one competition.

	Physics	Chemistry	Biology	Mathematics	History	Civics
School A	1	3	2	3	2	3
School B	2	1	2	2	3	4
School C	4	3	2	2	3	1
School D	1	2	3	4	2	1
School E	2	2	1	2	1	4

The following table shows the total points earned by the students of each school in different competitions:

	Physics	Chemistry	Biology	Mathematics	History	Civics
School A	3	-1	3	2	4	0
School B	-2	5	2	-2	5	-4
School C	4	4	1	2	-3	1
School D	2	-2	5	-1	0	4
School E	3	3	-1	6	3	6

We define success ratio for different schools as the ratio of the sum of the number students who got some rank (between 1 and 5, both included) in the five competitions to the number of students from that school who participated in the five competitions.

12. Which of the following schools had the highest success ratio?
 1) School A 2) School B 3) School C 4) School E
13. For how many schools can the points scored by all the students in all the competitions be uniquely determined?
 1) 5 2) 4 3) 3 4) 2

14. Which of the following schools got first ranks in more than one competition?
1) School A 2) School B 3) School E 4) Both School C and D
15. How many students from school C did not secure any rank in the different competitions?
1) 6 2) 8 3) 5 4) Cannot be determined



PRACTICE EXERCISE-3

DIRECTIONS for questions 1 to 5: Refer to the data and answer the following questions.

Anderson Public Library is the only library in the small town of Maryville, USA. The library is open in two slots: 9 AM to 12 noon (morning slot) and 3 PM to 6 PM (evening slot). The library has books on two subjects: science and literature. The following information is known.

- 1] On a particular day, a total of 180 people visited the library.
 - 2] In all, 30 people who visited the library in both the slots read books only on literature.
 - 3] The number of people who visited the library in both the slots and read books on both the subjects was one-fifth of the number of people who visited only in the morning slot and read books only on science.
 - 4] The number of people who visited only in the evening slot and read books on both the subjects was three times the number of people who visited only in the morning slot and read books on both the subjects.
 - 5] The sum of the number of people who visited only in the morning slot and read books only on literature and the number of people who visited only in the evening slot and read books on both the subjects was equal to the sum of the number of people who visited in both the slots and read books only on literature and the number of people who visited only in the evening slot and read books only on science.
 - 6] The number of people who visited only in the morning slot and read books only on literature was 18 times the number of people who visited only in the morning slot and read books on both the subjects.
 - 7] The number of people who visited in the morning slot was one less than the number of people who visited in the evening slot.
 - 8] The number of people who visited in both the slots was 45.
1. What was the ratio of the number of people who visited the library in both the slots and read books only on literature to the number of people who visited the library only in the evening slot and read books only on science?
 - 1) 10 : 11 2) 11 : 10 3) 10 : 9 4) 9 : 10
 2. What was the absolute difference between the number of people who visited the library only in the morning slot and read books only on literature and the number of people who visited the library only in the evening slot and read books only on literature?
 - 1) 44 2) 26 3) 28 4) 21
 3. On that day, how many people read books on science?
 - 1) 110 2) 70 3) 56 4) 68

4. What was the absolute difference between the number of people who visited the library only in the evening slot and read books only on science and the number of people who visited the library only in the evening slot and read books on both the subjects?
- 1) 24 2) 33 3) 7 4) 17
5. Which of the following is the largest?
- 1) The number of people who visited the library only in the morning slot and read books only on science.
 - 2) The number of people who visited the library only in the evening slot and read books only on science.
 - 3) The number of people who visited the library only in the evening slot and read books only on literature.
 - 4) The number of people who visited the library only in the morning slot and read books only on literature.

DIRECTIONS for questions 6 to 9: Refer to the data and answer the following questions.

Speed Infotech runs batches training students in Java. A new batch starts on the 1st of every month and every batch lasts for exactly 3 months (thus at any given time, the students of exactly 3 batches will be present concurrently). The table below gives the information for the total number of students studying at Speed Infotech in each month of 2015 (some values have intentionally been left blank).

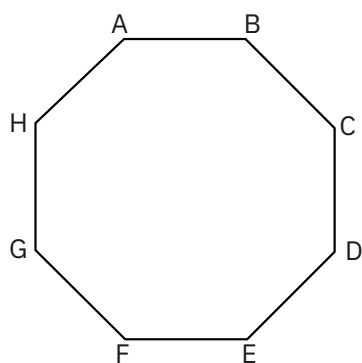
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Total Students	283	284	286	284	282	284		283	276	273	278	279

It is also known that 95 new students joined in May, while 91 new students joined in September.

6. Among the following months, in which month did the maximum number of new students join Speed Infotech?
- 1) February 2) April 3) June 4) December
7. The average number of students joining Speed Infotech per month over the given 12 months is:
- 1) 92.5 2) 93.75 3) 94.33 4) Cannot be determined
8. If 97 new students joined in November, in all how many students were studying at Speed Infotech during the month of July?
- 1) 286 2) 285 3) 284 4) 287
9. How many students joined in December 2014?
- 1) 93 2) 94 3) 95 4) Cannot be determined

DIRECTIONS for questions 10 to 13: Refer to the data and answer the following questions.

A theme park on Paradise Island is in the shape of a regular octagon ABCDEF, as shown below.



The length of each side of the octagon is 10 units. The diagonals AE, BF etc are the longest diagonals each of length 26.13 units. The diagonals AD, BE etc are the 'middle' diagonals each of length 24.14 units. The diagonals AC, BD etc are the shortest diagonals each of length 18.48 units. In all 8 attractions, numbered from 1 to 8, are located at each of the vertices of the octagon. The following table gives the distance between the different pairs of attractions. Some entries have been intentionally kept blank.

	1	2	3	4	5	6	7	8
1	X		18.48	10		26.13		10
2		X	24.14	18.48	10	10	18.48	26.13
3			X	24.14			10	10
4				X	10		26.13	18.48
5					X			24.14
6						X	10	
7							X	
8								X

The following points are known:

- 1] Attraction 1 is located at D.
 - 2] Each attraction is connected with every other attraction by means of connecting roads.
10. What is the distance between tourist attractions 6 and 8 along the road that directly connects them?
 - 1) 10 units 2) 18.48 units 3) 24.14 units 4) 26.13 units
 11. Which of the following pairs of attractions are definitely located along the ends of one of the longest diagonals?
 - 1) 1 and 7 2) 2 and 4 3) 1 and 6 4) 2 and 3
 12. What can be the maximum distance between tourist attractions 4 and 7 if one were to reach attraction 7 from attraction 4 through only one other intermediate attraction?
 - 1) 36.96 units 2) 42.60 units 3) 4.14 units 4) Cannot be determined
 13. Which of the following attractions can be at location G?
 - 1) 6 2) 4 3) 3 4) 2

DIRECTIONS for questions 14 to 17: Refer to the data and answer the following questions.

Four cities named A, B, C and D are located along a straight line from West to East in that order are in different time zones. B is located at a distance of 2000 km to the east of A, C is located at a distance of 4000 km to the east of B and D is located at a distance of 2000 km to the east of C.

The following table shows the schedule of some of the planes flying non-stop between these cities. All the times indicated are local and on the same day. All times are indicated in 24 hours format i.e. 5 PM would be indicated as 1700 hours.

Sr. No	City of departure and local time	City of arrival and local time
1	A at 0800 hours	B at 1130 hours
2	B at 0800 hours	C at 1500 hours
3	C at 0800 hours	D at 1200 hours
4	D at 0800 hours	C at 0830 hours
5	C at 0800 hours	B at 1000 hours
6	B at 0800 hours	A at 0900 hours

Assume that planes cruise at the same speed in both directions. However, the effective speed is influenced by a steady wind blowing from east to west at 100 km per hour.

Assume that the times taken for take-off and landing are negligible. The time differences between any two cities are multiples of 30 minutes.

14. What is the cruising speed of the planes in kmph?
 1) 700 2) 900 3) 1000 4) 950
15. What is the time difference between city A and city D (in hours)?
 1) 3.5 2) 4 3) 4.5 4) 5
16. Suppose a plane takes off from A for D at 0800 hours. At the same time another plane takes off from D to A. Suppose they meet at point P. What can be said about point P?
 1) P is between 1200 km and 1300 km from B.
 2) P is between 1300 km and 1400 km from B.
 3) P is between 1400 km and 1500 km from B.
 4) P is between 1500 km and 1600 km from B.
17. If a plane takes off from D for A at 0800 hours and flies non-stop to A, what will be the local time at A when it will reach?
 1) 1130 hours 2) 1200 hours 3) 1100 hours 4) 1030 hours

LR-3.1 | TOURNAMENTS



CLASS EXERCISE

Introduction

Sometimes Logical Reasoning sets in CAT and other exams are based on tournaments. In this class, we will solve total six sets based on tournaments.

Teaser

In celebration of India's Twenty-Twenty World Cup victory, the city cricket association decided to organise a "Twenty-Twenty Knockout" tournament. 25 local teams registered for the event. Given that exactly 2 matches were played in a day, for how many days did the tournament last?

DIRECTIONS for questions 1 to 4: Refer to the data below and answer the questions that follow.

A recent study tried to understand what qualities potential management students rated as most important when choosing a B-school to attend. The survey was conducted in 6 countries and rated 5 parameters – Placements (P), Infrastructure (I), Faculty (F), Location (L) and Alumni Network (A). The following table gives the rank order of the various parameters in each country:

Rank	Country					
	USA	Australia	UK	Singapore	India	Brazil
1	A	L	F	P	P	L
2	P	P	I	I	F	P
3	L	F	A	A	L	I
4	I	I	P	F	I	A
5	F	A	L	L	A	F

Note: The “Level of Dissimilarity” (LoD) between two countries is measured by finding the positive differences in position number for all parameters for those two countries, and adding them up. The smaller the level of dissimilarity, the more similar the countries are said to be. (For example, the US and Australia have differences of A – 4, P – 0, L – 2, I – 0 and F – 2 and hence an LoD of $4 + 0 + 2 + 0 + 2 = 8$.)

- Which country has the least similarity with India?
1) USA 2) Australia 3) UK 4) Singapore 5) Brazil
- Which two countries have an LoD of 9?
1) USA-UK 2) UK- Brazil 3) UK- India
4) Brazil-India 5) None of the above
- Which country is the most similar to Singapore?
1) UK 2) Australia 3) India 4) USA 5) Brazil
- Which country has the highest cumulative LoD with respect to the other 5 countries?
1) Singapore 2) Australia 3) USA 4) UK 5) Brazil

DIRECTIONS for questions 5 to 8: Refer to the data below and answer the questions that follow.

Four teams, namely Uruguay, Paraguay, Mexico and Venezuela, were in group A of the Copa America Football tournament of 1995. In the first round of the tournament, each team played exactly once against every other team. The following partially-filled table shows the information about the results of the matches in the first round in group A:

Team	Matches played	Matches won	Matches drawn	Matches lost	Total goals scored by the team	Total goals scored against the team
Uruguay	3	2	1		6	2
Paraguay	3		0		5	4
Mexico	3	1	1		5	4
Venezuela	3		0	3	4	10

Additionally, the following information is known:

- 1] Only one team scored 4 goals against another team in one match. In all other matches, the number of goals scored by the teams was less than 4.
- 2] Uruguay scored 1 goal each against two other teams.
- 3] Venezuela scored at least 1 goal against each opponent.
- 4] Venezuela lost all 3 matches by a different margin.
5. The number of goals scored by both the teams in how many matches can be uniquely determined?
6. How many matches did Paraguay win?
7. By what goal margin did Venezuela lose to Uruguay?
8. In how many matches did the losing team fail to score any goal?

DIRECTIONS for questions 9 to 13: Refer to the data below and answer the questions that follow.

Four teams named A1, A2, A3 and A4 are in group A while four teams named B1, B2, B3 and B4 are in group B of a cricket tournament. In the tournament, each team in group A plays exactly one match against each of the teams in group B. No team plays any match against any other team in the same group.

The following table gives the information on the number of matches won by each of the 8 teams:

Team	A1	A2	A3	A4	B1	B2	B3	B4
Matches won	3	2	1	2	2	3	2	1

The following partially-filled table gives information about the winners of some matches.

	A1	A2	A3	A4
B1		A2		
B2			B2	
B3				B3
B4	A1			

Consider the following statements:

1. B1 beats A1.
 2. B2 beats A4.
 3. A2 beats B3.
 4. A4 beats B4.
9. How many combinations of the four statements given, taken two at a time, are sufficient to determine the winners of all the matches?
- 1) 0 2) 1 3) 2 4) 3
10. Consider the following two statements:
- A: If statement 2 is correct, statement 4 does not give any new information and is therefore redundant.
- B: If statement 3 is correct, statement 4 does not give any new information and is therefore redundant.
- Which of the following is correct?
- 1) Statement A is correct; Statement B is wrong
 - 2) Statement B is correct; Statement A is wrong
 - 3) Both statements A and B are correct
 - 4) Neither statement A nor statement B is correct

11. If only statements 1 and 2 are known and both of them are correct, the result of how many matches cannot be determined?
- 1) 0 2) 2 3) 3 4) More than 3
12. Suppose only statements 1 and 3 are known and both of them are correct. Consider the following statements:
- A: A3 lost to B3
B: B4 lost to A4
- Which of the following is correct?
- 1) Both statements A and B are definitely correct.
2) Both statements A and B are definitely incorrect.
3) One of A and B is definitely correct. Nothing can be said about the other statement.
4) One of A and B is definitely incorrect. Nothing can be said about the other statement.
13. Suppose only statements 2 and 3 are known and both of them are correct. Consider the following statements:
- A: A3 lost to B2
B: A4 lost to B4
- Which of the following is correct?
- 1) Both statements A and B are definitely correct.
2) Both statements A and B are definitely incorrect.
3) Statement A is definitely correct. Statement B is definitely incorrect.
4) Statement B is definitely correct. Statement A is definitely incorrect.

DIRECTIONS for questions 14 to 19: Refer to the data below and answer the questions that follow.

The African Baseball Championships are underway and there is a close fight in Division 2. The 6 teams in Division 2 (Angola, Benin, Chad, Djibouti, Ethiopia and Gabon) are playing a double round robin, wherein each team plays every other team twice (once at home and once away). After the completion of the penultimate (9th) round, the results are as follows:

	Angola	Benin	Chad	Djibouti	Ethiopia	Gabon
Angola		22-17	27-25		31-13	15-14
Benin	19-23		15-17	23-18	21-19	19-18
Chad	23-18	14-17		21-17		19-23
Djibouti	23-18	27-16	22-24		15-18	27-16
Ethiopia	20-19	18-11	16-15	14-19		20-23
Gabon	19-15		19-13	13-23	24-17	

Notes:

- Interpreting the above table: for example, in Angola's home match v/s Chad, Angola won 27-25 and in Angola's away match v/s Chad, Chad won 23-18. In all, Angola has therefore won 5 matches so far)
 - No individual match can end in a tie.
 - Cumulative Margin of Victory (CMV) is defined for a given team as the sum of all margins of victory less the sum of all margins of defeat for that team. For example the Cumulative Margin of Victory for Angola till 9th round is $5 + 2 + 18 + 1 + 4 - 5 - 5 - 1 - 4 = +15$.
 - The teams are ranked in decreasing order of total number of wins.
 - If the teams are tied, then the team with the higher Cumulative Margin of Victory will be ranked higher.
 - In case there is still a tie, then the team with the higher number of "Away" wins will be ranked higher.
14. If in the last round, Djibouti beats Angola by 18 points and Ethiopia beats Chad by 14 points, then by how much (at the minimum) must Benin beat Gabon to come third overall?
 1) 15 points 2) 16 points 3) 10 points 4) 9 points
 15. If in the last round, Benin beats Gabon by 20 points and Djibouti beats Angola by 5 points, then what is the minimum by which Chad must beat Ethiopia to achieve second place?
 1) 12 points 2) 13 points 3) 11 points 4) 10 points
 16. If in the last round, Angola defeats Djibouti by 35 points, what is the best position in which Djibouti could finish?
 1) Second 2) Third 3) Fourth 4) Fifth
 17. If exactly two teams finish on 5 wins, then which of the following cannot be one of them?
 1) Benin 2) Chad 3) Djibouti 4) Ethiopia
 18. If exactly two teams finish on 5 wins, and Angola wins the tournament, then which team finishes second overall?
 1) Benin 2) Gabon 3) Djibouti 4) Cannot be determined
 19. Which of the following outcomes is mathematically possible?
 1) Exactly three teams finish on 5 points
 2) Exactly three teams finish on 4 points
 3) Ethiopia wins the tournament
 4) Djibouti finishes 5th in the tournament

DIRECTIONS for questions 20 to 23: Refer to the data below and answer the questions that follow.

A chess tournament was held at Potsdam, Germany, in which five chess players, named Churchill, Hitler, Mussolini, Roosevelt and Stalin participated. The FIDE ratings of the five players in no specific order were 2018, 2087, 2232, 2377 and 2446.

In the tournament, each player played against every other player only once. The match could end in either player winning or in a draw. If the match ended in a draw, both players were awarded one point. In a match that did not end in a draw, the winning player was awarded 3 points and the losing player was awarded 0 points. If a player defeated another player with FIDE rating which is at least 200 more than his own rating, additional two bonus points were awarded to the winning player.

Additionally following points were known:

- 1] The difference between the FIDE ratings of Churchill and Mussolini was 359.
- 2] The difference between the FIDE ratings of Mussolini and Roosevelt was 214.
- 3] The difference between the FIDE ratings of Hitler and Roosevelt was 145.
- 4] The match between the players with FIDE ratings 2377 and 2446 was the only match that ended in a draw. All other matches ended in either player winning the match.
- 5] The player with FIDE rating of 2377 lost all other matches while the player with FIDE rating of 2446 won all other matches.
- 6] Hitler topped the points chart by winning more points than all other players.

20. Results of how many matches can be known with certainty?

- 1) All 2) All except 1 3) All except 2 4) All except 3

21. How many pairs of players scored equal number of points in the tournament?

- 1) 0 2) 1 3) More than 1 4) Cannot be determined

22. How many players did not win a single match?

- 1) 0 2) 1 3) 2 4) Cannot be determined

23. How many players won points that were multiples of 3?

- 1) 0 2) 1 3) 2 4) Cannot be determined

Challengers

DIRECTIONS for questions 1 to 4: Refer to the data below and answer the questions that follow.

In the year-ending women's singles tournament being conducted by the BWF (Badminton World Federation) in December 2010, the top 16 players are scheduled to play against each other. In a 4-round knockout tournament. In the first round (Pre-quarters), the 1st seed (highest rank) will play the 16th seed in match 1, the 2nd seed will play the 15th seed in match 2, and so on. In the second round (Quarters), match 1 will feature the winner of match 1 from the Pre-quarters against the winner of match 8, match 2 will feature the winner of match 2 against the winner of match 7, and so on. The same pattern is followed in the Semi-finals and the Finals. If a lower seeded player beats a higher seeded one in any round it is termed as an upset (for example, seed 16 (Ji) beats seed 1 (Xin) in Round 1).

Table 1 below gives the list of participants in alphabetical order, with their countries, current ranks and cumulative rating points. Table 2 gives the increase in rating points for each position in the tournament.

Rank	Country	Name of Player	BWF Rating
12	RUS	Ella Diehl	45961.18
13	JPN	Eriko Hirose	44623.69
9	FRA	Hongyan P	48661.92
16	KOR	Ji Hyun Sung	39674.97
6	CHN	Jiang Yanjiao	52321.1
14	NED	Jie Yao	42980
7	GER	Juliane Schenk	51029.87
15	BUL	Petya Nedelcheva	41164.43
10	HKG	Pui Yin Yip	47274.38
4	IND	Saina Nehwal	63811.26
2	CHN	Shixian Wang	67176.4
5	DEN	Tine Baun	60400.1
1	CHN	Xin Wang	71192.4
11	CHN	Xuerui Li	46050
3	CHN	Yihan Wang	65308.91
8	KOR	Youn Joo Bae	49350.71

Table 1

Position	Points
Winner	5000
Runner Up	4250
3rd and 4th	3500
5th to 8th	2750
9th to 16th	1920

Table 2

1. If there are no upsets in the 1st round and only the odd numbered games in the 2nd round are upsets, who is the lowest ranked player Jiang Yanjiao could play in the Final, assuming she reaches the Final?
1) Youn Joo Bae 2) Juliane Schenk 3) Hongyan P 4) Saina Nehwal
2. If all the even-numbered seeds win the 1st round, who could meet Jie Yao in the Finals?
1) Shixian Wang 2) Jiang Yanjiao 3) Pui Yin Yip 4) Saina Nehwal
3. If there is only one upset in the tournament, who could play Yihan Wang in the Semi-finals?
1) Xin Wang 2) Jiang Yanjiao 3) Juliane Schenk 4) Petya.Nedelcheva
4. If Hongyan P loses in the Semi-final round, which of the following players cannot end the tournament rated above her?
1) Jiang Yanjiao 2) Juliane Schenk 3) Youn Joo Bae 4) Pui.Yin.Yip



PRACTICE EXERCISE-1

DIRECTIONS for questions 1 to 4: Refer to the data below and answer the questions that follow.

Five players, named A, B, C, D and E participated in the tournament of Moon Badminton held on the Moon. Each player played exactly one match against every other player. The rules of the game are as follows:

1. Two players are separated by a net and they hit a shuttlecock back and forth over the net using a racquet.
2. A toss decides who out of the two players will serve first. The player who wins the toss serves first.
3. If the shuttlecock touches the ground in the court of the player who is not currently serving, the player who is serving scores three points and continues to serve for the next service.
4. If the shuttlecock touches the ground in the court of the player who is currently serving, the opponent scores two points. Further, the player who is currently serving loses the opportunity to continue to serve and the opponent now gets an opportunity to serve. This is called a 'break serve'.
5. The first player to score at least 26 points wins the match.

The following table shows the information on the total number of serve changes in the matches and the total points scored by each player after all the matches.

	A	B	C	D	E	Total points
A		5	4	9	8	93
B			3	4	2	104
C				5	4	103
D					6	102
E						83

It is known that the minimum points scored by any player in any match are 17 and that were scored by E in the match against B.

1. In how many matches did E win the toss if it is known that he lost all the matches?
2. If B won the toss in all his matches except in the match against A, how many points did B score in the match against E?
3. What can be the highest number of points scored by the winner in any match?
4. If D scored 28 points against A, how many times did D serve in the match against A?

DIRECTIONS for questions 5 to 8: Refer to the data below and answer the questions that follow.

Four teams—Australia, Bangladesh, Canada and Denmark—participated in a three-game tournament. The three games in the tournament are named Game I, Game II and Game III. In each game, all the four teams participated. In each game, there is only one winner, which wins 5 points. The first runner up wins 3 points, the second runner up wins 1 point and the third runner up does not win any point. It is known that there are no ties in any of the three games in the tournament.

The following partially-filled table gives information on the number of points won by the four teams in the three games:

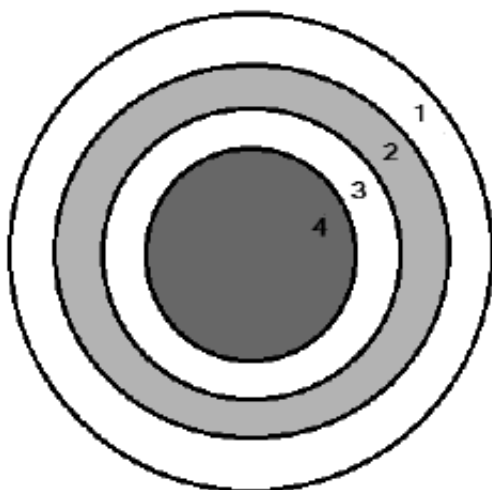
	Game I	Game II	Game III	Total
Australia	5		1	
Bangladesh		0		
Canada				
Denmark		3		11

The team with the highest total score in the tournament was given 1st rank and the team that scored the lowest total points was given 4th rank.

5. If there was a tie for the first position, which of the following cannot be the total number of points won by Canada?
 - 1) 1 2) 2 3) 3 4) 4
6. If Canada scored 0 in exactly two games, which team was ranked 4th?
 - 1) Canada 2) Bangladesh 3) Australia 4) Cannot be determined
7. If Bangladesh scored 0 in all the games, what is the sum of points scored by Canada in the three games?
 - 1) 5 2) 9 3) 7 4) Either 5 or 9
8. If the sum of points scored by Bangladesh in the three games was 4, which of the following can be Canada's total score?
 - 1) 1 2) 2 3) 3 4) 4

DIRECTIONS for questions 9 to 12: Refer to the data below and answer the questions that follow.

A dart board consists of 4 regions marked as 1, 2, 3 and 4, as shown in the figure below.



Anna, Bella, Chelsea and Diana played the game of darts which consists of 4 rounds. In the first round, hitting region 1 fetches 4 points, hitting region 2 fetches 3 points, hitting region 3 fetches 2 points and hitting region 4 fetches 1 point. In the second round, hitting region 1 fetches 3 points, hitting region 2 fetches 4 points, hitting region 3 fetches 3 points and hitting region 4 fetches 2 points. In the third round, hitting region 1 fetches 2 points, hitting region 2 fetches 3 points, hitting region 3 fetches 4 points and hitting region 4 fetches 3 points. In the fourth round, hitting region 1 fetches 1 point, hitting region 2 fetches 2 points, hitting region 3 fetches 3 points and hitting region 4 fetches 4 points.

The following partially-filled table shows the points scored and regions hit by the four players in each round. The number outside the bracket indicates the points scored and the number inside the brackets indicates the region hit.

	Round 1	Round 2	Round 3	Round 4	Total
Anna	3 (2)	3 ()	2 (1)		
Bella		3 ()		2 (2)	8
Chelsea				2 ()	
Diana	1 (4)		2 (1)	3 ()	

All the 4 players hit exactly one region in each round.

It is known that no player hit the same region more than once in the different rounds. It is also known that exactly one player scored 4 points in each round.

9. What were the total points scored by Chelsea at the end of the four rounds?
10. Which region did Diana hit in Round 2?
11. What were the total points scored by all the four players in round 2?
12. Which region did Bella hit in Round 3?

DIRECTIONS for questions 13 to 16: Refer to the data below and answer the questions that follow.

In a chess tournament, a total of 32 players participated. Each of the players had a unique FIDE rating. These players in the decreasing order of their FIDE ratings are A1, A2, ... A8, B1, B2, ... B8, C1, C2, ... C8, D1, D2, ... D8. Players A1, A2, ... A8 are in group A, players B1, B2, ... B8 are in group B, players C1, C2, ... C8 are in group C and players D1, D2, ... D8 are in group D. Thus, player A1 is ranked 1 in group A, player A2 is ranked second in group A, player C3 is ranked third in group C, player D8 is ranked 8th in group D, and so on.

In any round of the tournament, no player plays against another player from the same group in that round.

The tournament is held as follows:

- 1] In the first round, a player ranked 1 in one group plays a match against another player who is ranked 8th in some other group. Similarly, a player ranked 2 in one group plays a match against another player who is ranked 7th in some other group, and so on.
 - 2] Similarly, for the second round, the winners of the 16 matches in the first round are arranged in the decreasing order of their FIDE ratings. Then, the 4 players with the highest FIDE rating are grouped together, followed by the next 4 and so on. Thus, in all, 4 groups having 4 players each are formed and the players in each group are ranked 1 to 4.
 - 3] In the second round, a player ranked 1 in one group plays a match against another player who is ranked 4th in some other group. Similarly, a player ranked 2 in one group plays a match against another player who is ranked 3rd in some other group, and so on.
 - 4] Similarly for the third round, the winners of the 8 matches in the second round are again arranged in 4 groups having 2 players each and are ranked 1 or 2 in their respective groups.
 - 5] In the third round, a player ranked 1 in each group plays a match against another player who is ranked 2nd in some other group. The four winners from the third round move to the fourth round.
 - 6] In the fourth round, the player with maximum FIDE rating plays with a player with minimum FIDE rating. The remaining two players play the second match of the fourth round.
 - 7] In the fifth and final round, the winners of the two matches in the fourth round play against each other.
 - 8] For the first three rounds, when a player with lower rank in a group beats a player with higher rank in another group, that is called an 'upset'. For example, if a match is played between B1 and C8 in the first round, which C8 wins, that is called an 'upset'.
13. If there are no upsets in the tournament till the third round, then the final match cannot be played between
- 1) A1 and B1 2) A2 and D1 3) C1 and D1 4) B1 and D1
14. If all the 8 teams in the group A of the first round (A1,A2,...,A8) reach the third round, then the minimum number of upsets in the first two rounds is
- 1) 6 2) 8 3) 10 4) 12

15. If A8, B8, C8 and D8 reach the fourth round, what is the maximum number of upsets that could have taken place in the first three rounds combined?
- 1) 24 2) 28 3) 26 4) 20
16. If all the matches are won by the even-ranked players in the first two rounds and by odd-ranked players in the third round, then which of the following player will reach the fourth round?
- 1) A5 2) B4 3) C6 4) D8



PRACTICE EXERCISE-2

DIRECTIONS for questions 1 to 4: Refer to the data below and answer the questions that follow.

The final leg of the reality show Mega Mindsport Marathon is on. There are 6 contestants (A, B, C, D, E and F) and 6 rounds (each round lasting for 5 minutes). In each round, the contestants are given a task or puzzle to complete. The first person to complete the task correctly gets 5 points, the second gets 4 and so on with the last person to complete the task getting a score of 0 for that round. There were no ties in any round and all the contestants completed every task within the time limit. The person with the highest score overall at the end of six rounds is declared the winner of the Grand Prize.

The following table gives the cumulative scores of the participants after 3 rounds and after all 6 rounds. Some values have intentionally been left blank.

	1	2	3	Total	4	5	6	Total
A				4				10
B				11				15
C				7				18
D				3				11
E				12				
F								19

In addition it is known that:

- In each of the sets of first three and last three rounds, no contestant got the same score in any two rounds.
- C finished 1st in round two and A finished 1st in round six.

- Who won the game show?
 - 1) F
 - 2) E
 - 3) either E or F
 - 4) Cannot be determined
- Which of the following scores was not achieved twice by any participant throughout the event?
 - 1) 1
 - 2) 3
 - 3) 5
 - 4) No such score
- Which of the following did not finish first in a single round?
 - 1) B
 - 2) F
 - 3) E
 - 4) D
- Which of the following did not finish in the same position in any two rounds out of the six?
 - 1) D
 - 2) E
 - 3) B
 - 4) No such contestant

DIRECTIONS for questions 5 to 8: Refer to the data below and answer the questions that follow.

Prashant and Prakash participated in gambling in two separate events in Las Vegas over each of the 6 days between Monday and Saturday (both included). The rules of the event are such that each player in both the events pledged \$10 and there is only one winner of each of the two gambling events everyday. All the players who do not win in the event have to forfeit their \$10 and the winner gets all the amount pledged by all the players.

The following points are known:

- 1] The number of players in both the events (in which Prashant and Prakash participated) on each of the days was equal.
 - 2] The number of players in both the events (in which Prashant and Prakash participated) on Monday was 4. The number of players in both the events either increased by 1 or decreased by 1 everyday with respect to the previous day.
 - 3] There were 5 players on Saturday.
 - 4] Prashant won only on those days on which the number of players was more than that on the previous day.
 - 5] Prakash won only on those days on which the number of players decreased for two or more consecutive days. That means if the number of players on Tuesday is 3 and on Wednesday is 2, we have a situation of decrease in the number of players on two or more consecutive days. In that case, Prakash won only on Wednesday. If the number of players registered a decrease on Thursday as well, Prakash would win on Thursday as well.
 - 6] Both Prashant and Prakash started with equal amounts with them on Monday. Both of them lost on Monday.
-
5. On how many days did Prashant win? (Write 7 if your answer is cannot be determined)
 6. What could be maximum difference between the final amounts with Prashant and Prakash on Saturday? (Write 0 if your answer is cannot be determined)
 7. If the difference between the final amounts with Prashant and Prakash on Saturday was \$150, how many players participated on Wednesday? (Write 0 if your answer is cannot be determined)
 8. If 7 players participated on Thursday, what was the difference between the final amounts with Prashant and Prakash on Saturday?

DIRECTIONS for questions 9 to 12: Refer to the data below and answer the questions that follow.

In a tournament, 6 players named A, B, C, D, E and F participated. In the tournament, every player played a single match with 4 other players. The tournament was held over 4 days with equal number of matches being played on each day.

The following points are known:

- 1] B played 2 matches each on the 1st and the 4th days.
 - 2] C played 2 matches on the 3rd day while E played 2 matches on the 2nd day.
 - 3] C did not play a single match on the 4th day while E did not play a single match on the 1st day.
 - 4] C played with D on the 1st day and both of them did not play any other match on that day.
 - 5] A played with D on the 2nd day and both of them did not play any other match on that day.
 - 6] D played with E on the 3rd day and both of them did not play any other match on that day.
 - 7] A played with F on the 4th day and both of them did not play any other match on that day.
9. For how many players can the four other players with whom each player played can be determined?
 10. On which day did B play with F? (Write 0 if your answer is "Cannot be determined" or if B did not play with F)
 11. How many players played one match everyday? (Write 0 if your answer is "Cannot be determined")
 12. On which day did A play E? (Write 0 if your answer is "Cannot be determined" or if A did not play with E)

DIRECTIONS for questions 13 to 17: Refer to the data below and answer the questions that follow.

6 teams A, B, C, D, E and F are taking part in a quiz competition. The rules are as follows:

- The initial stage is a league wherein every team competes once against each of the other 5 teams.
- There are no ties in individual matches.
- Teams are ranked in the league on the basis of number of wins.
- If two or more teams have the same number of wins then the team with a higher cumulative margin of victory is ranked higher (All scores are multiples of 10).
- If even after this the teams are tied, a coin is tossed to decide the higher ranked team.
- The top four teams from the league stage will proceed to the semi-finals
- In the semi-finals, the team ranked 1st in the league stage will face the team ranked 4th, while the team ranked 2nd will face the team ranked 3rd. There will be no third-place playoff.

At the end of 4 rounds, the table of scores was as follows (for example, in the match between A and B, A lost to B by a margin of 10 points, so A's cumulative score changes by -10 for that round and B's by +10).

	A	B	C	D	E	F
A	–	230-240	250-210	210-260		270-190
B	240-230	–	260-190	150-220	180-230	
C	210-250	190-260	–		160-180	140-280
D	260-210	220-150		–	230-210	240-180
E		230-180	180-160	210-230	–	290-190
F	190-270		280-140	180-240	190-290	–

13. If A beats E in the league match, what is the minimum margin of victory over B which will guarantee F a place in the semi-finals?
 - 1) 60 points 2) 40 points 3) 30 points
 - 4) 20 points 5) 70 points

14. If F plays E in the semi-finals, which of the following must be true?
 - I) F beats B in the league match
 - II) C beats D in the league match
 - III) E beats A by at least 140 points in the league match
 - 1) I only 2) II only 3) III only
 - 4) I and III 5) II and III

15. If A got eliminated in the league rounds and E went on to win the tournament, which team could have won the maximum number of matches throughout the tournament?
 - 1) F 2) D 3) E 4) D or E 5) E or F

16. If A wins its last league match against E by 10 points, then what is the minimum margin by which B must beat F in their match so that they will definitely not have to face D in the semi-final?
 - 1) 60 points 2) 100 points 3) 130 points 4) 20 points 5) 120 points

17. If at the end of the league stage, all the 6 teams had a different number of wins, then which of the following is a possible match up in the final?
 - 1) E v/s B 2) D v/s F 3) A v/s D 4) D v/s E 5) B v/s F

LR-3.2 | PUZZLES

CLASS EXERCISE

Introduction

Sometimes Logical Reasoning sets in CAT and other exams are based on puzzles. In this class, we will solve set based as well as Standalone questions based on puzzles.

Teaser

The True Lies corporation has two types of employees. Truthsayers always tell the truth and Falsifiers always tell a lie. Five employees of the company, Adam, Ben, Charlotte, Desmond and Edith, were standing talking at the water cooler. When asked whether they were Truthsayers or Falsifiers, these were their responses:



Adam: Exactly one of us is a Falsifier

Ben: Exactly two of us are Falsifiers

Charlotte: Exactly three of us are Falsifiers

Desmond: Exactly four of us are Falsifiers

Edith: All five of us are Falsifiers

Which of the five employees are speaking the truth?

- 1.(a) A man has 250 gold coins. He wishes to distribute them into bags such that he can pay any sum from 1 to 250 by handing over some bags. What is the minimum number of bags required?
 - (b) A goldsmith has a pan balance and a set of 7 weights. He puts the weights in one pan, and the jewellery to be weighed in the other; and claims that he can weigh any positive integral weight up till 127 g. What must be the denominations of the weights?
 - (c) A goldsmith has a pan balance and a set of 5 weights. Using these, he claims that he can weigh any positive integral weight up till 121 g. What must be the denomination of these weights?
- 2.(a) You have a standard weighing balance, but no weights. You are given 27 coins and told that 26 of them have the same weight, but one is a fake and thus is very slightly lighter. You have to identify the faulty one by using the balance as few times as possible. How many operations will be required?
 - (b) You have a standard weighing balance, but no weights. You are given 27 coins and told that 26 of them have the same weight, but one is a fake and thus is the wrong weight. However, you do not know whether it is lighter or heavier. You have to identify the faulty one by using the balance as few times as possible. How many operations will be required?
 - (c) You have an electronic weighing machine with a single pan, which can measure accurately any weight from 1 gm to 1000 gm (in steps of 1 gm). You have ten sacks of coins in front of you, each containing between 100 and 200 coins (there needn't be the same number in every bag!). You are informed that the coins in nine of the bags are identical, weighing 10 gm each, but the coins in the tenth one are all forgeries, weighing 9 gm each. How many weighings will be required to identify the sack containing the forgeries?
- 3.(a) There are 3 toggle switches, all currently at "off". One of them lights a bulb in the next room, the rest do nothing. From the room with the switches in it, you can't see whether the light in the next room is turned on or off. You may flip the switches as often and as many times as you like, but once you open the door of the next room to check on the light, you cannot flip any further switches. How can you determine which switch controls the light?
 - (b) There are 4 toggle switches, all currently at "off". One of them lights a bulb in the next room, the rest do nothing. From the room with the switches in it, you can't see whether the light in the next room is turned on or off. You may flip the switches as often and as many times as you like, but once you open the door of the next room to check on the light, you cannot flip any further switches. How can you determine which switch controls the light?

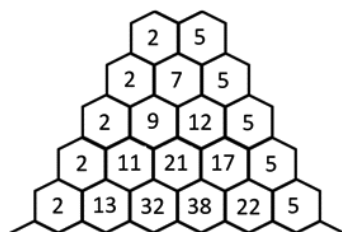
Answer questions 4 – 7 based on the given information

A cube of dimensions $6 \times 6 \times 6$ is painted red. Then it is cut into smaller cubes of dimensions $1 \times 1 \times 1$. The smaller cubes are assigned numbers from 1 to 216 in the following manner:
The front row of the bottom layer is numbered from 1 to 6 from left to right. Then the row behind them is numbered from 7 to 12 from left to right. In this manner the cubes in the bottom layer are numbered up to 36. Then the cubes in the layer above are numbered from 37 to 72. This process is continued till the cubes in the top layer are numbered from 181 to 216.

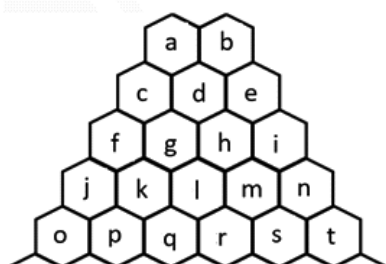
211	212	213	214	215	216
205	206	207	208	209	210
199	200	201	202	203	204
193	194	195	196	197	198
187	188	189	190	191	192
181	182	183	184	185	186
175	176	177	178	179	180
169	170	171	172	173	174
163	164	165	166	167	168
157	158	159	160	161	162
151	152	153	154	155	156
145	146	147	148	149	150
139	140	141	142	143	144
133	134	135	136	137	138
127	128	129	130	131	132
121	122	123	124	125	126
115	116	117	118	119	120
109	110	111	112	113	114
103	104	105	106	107	108
97	98	99	100	101	102
91	92	93	94	95	96
85	86	87	88	89	90
79	80	81	82	83	84
73	74	75	76	77	78
67	68	69	70	71	72
61	62	63	64	65	66
55	56	57	58	59	60
49	50	51	52	53	54
43	44	45	46	47	48
37	38	39	40	41	42
31	32	33	34	35	36
25	26	27	28	29	30
19	20	21	22	23	24
13	14	15	16	17	18
7	8	9	10	11	12
1	2	3	4	5	6

- What is the sum of the numbers of the cubes which are painted on 3 sides?
- What is the sum of the numbers of the cubes which are not painted on any side?
- What is the sum of the numbers of the cubes which lie on the body diagonals of the large cube?
- What is the sum of the numbers of the cubes which lie on the face diagonals of the large cube?

Answer questions 8 – 11 based on the given information



A generalised Pascal's triangle is a triangular array of numbers in which the first row contains two numbers and each subsequent row contains one number more than the one above. In each row, the numbers at the ends of the row are the original two numbers and each of the intermediate numbers is the sum of the nearest two numbers in the row above. The adjacent figure shows a generalised Pascal's triangle with starting numbers 2 and 5.



Consider a generalised Pascal's triangle of 5 rows as shown, with the 1st row containing two starting numbers "a" and "b".

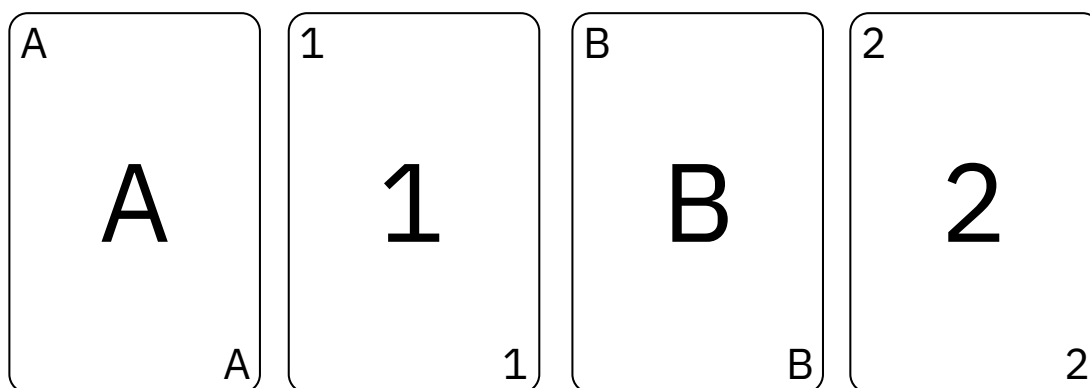
It is known that $p = 23$ and $r = 58$

8. Find the value of $a+b$
9. Find the value of q
10. If we exclude the numbers at the end of each row, and then find the numbers among the rest which are multiples of either a or b , find the sum of all such numbers.
11. Suppose the given triangle is extended further to 10 rows. Let us define Σn as the sum of the elements in the n th row of the triangle. (For example, $\Sigma 2 = c + d + e$ and $\Sigma 4 = j + k + l + m + n$). Find the ratio of $\frac{\Sigma 10}{\Sigma 8}$.

Answer questions 12 – 20 independently:

12. A state tennis tournament attracts 100 entries. The champion is chosen for this tournament by the usual elimination scheme. That is, the participants are divided into pairs, who play against each other. The loser between each pair is eliminated, while the winner proceeds to the next round. If there is an odd number of participants in a round, one of them gets a bye and progresses to the next round. In the next round, the same procedure is followed and the process continues until a single champion emerges. How many games must be played to determine the champion?

13. Below are four cards. It is known that each card bears a letter on one side and a number on the other.



“A card with a vowel on it always has an even number on the other side”.

Which two cards will you turn over to test the above proposition for the given set of cards?

14. You are walking along a road trying to get to a city A. You come to a fork in the road, and you know that one road leads to A and the other to B, but you have no idea which is which. There are two huge soldiers standing guard at the fork. One of them always tells the truth and the other always lies (again, you don't know which is which). You are allowed to ask one of the guards one question, and with that you have to determine which road goes to A. What should you ask?
15. There are 26 children sitting in a circle, their names, in clockwise order, being A, B, C...Y, Z. They start counting clockwise from A, alternately saying 1, 2, 1, 2... Every child who says 2 leaves the circle immediately (So B is the first to leave, followed by D and F and so on). If they keep counting till only 1 child is left, who will that child be?
16. A snail is at the bottom of a 30 foot well. Every hour the snail is able to climb up 3 feet. Then it has to stop for rest for one hour, during which it slides back down 2 feet. How many hours will it take for the snail to get out of the well?

17. A clock takes 12 seconds to strike 4 o'clock. How long will it take for the clock to strike 8 o'clock?
18. What are the next three letters in the series J A S O N D J?
19. Where should the number 17 be placed in the following series: 18 11 15 14 19 16 10 13 12 20?
20. What is the number of letters in the answer to this question?

THEORY

CLASS EXERCISE

PRACTICE EXERCISE

Challengers

DIRECTIONS for questions 1 to 4: Read the following information and answer the questions that follow:

Inspired by the legendary Triwizard Tournament, 4 schools in Baghdad decided to organise a Quadgenius Tournament. Each of them nominated a student as their representative and the 4 selected students - Abu, Rajah, Jafar and Dahlia - were administered 4 tests of 10 marks each, 2 of Science (S1 and S2) and 2 of Maths (M1 and M2). In each test, the top 2 were awarded medals. The following results were noted:

- a) No two of the students got the same rank in any subject. Also, no student got the same rank in any two subjects (though they may have scored the same marks in more than one subject).
- b) All the scores of the 4 students in the 4 tests were integers between 1 and 9 inclusive. Thus, none of the students got either a full score of 10 or a score of 0 in any of the papers.
- c) Each of the students managed to get exactly 1 medal each in Maths and Science.
- d) In S1, all the four students secured an even number of marks. Also, Abu got a medal but Dahlia did not. S2 was topped by Jafar, while Abu came third in M2.
- e) Rajah topped the M2 paper but finished last in M1. However, he scored 2 more marks in M1 than in M2.
- f) Jafar and Abu did not get medals in the same paper.
- g) Rajah scored the same marks in 3 out of the 4 papers, and thus ended with the highest total marks out of 40. Dahlia came second, while Abu and Jafar shared the third spot.

1. Who won medals in S2?

1) Jafar and Dahlia	2) Jafar and Rajah
3) Jafar and Abu	4) Cannot be determined
2. What percent of the total possible marks did Rajah get?

1) 50%	2) 52.5%	3) 55%	4) 45%
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3. What was the total score of all 4 students in S2?
4. Which score between 1 and 9 (inclusive) was not achieved by any of the 4 students in any of the tests?



PRACTICE EXERCISE-1

DIRECTIONS for questions 1 to 4: Refer to the data and answer the following questions.

6 friends—A, B, C, D, E and F—took part in a running race and secured unique positions. Each person was asked about the result. They made the following statements:

A's statement: B came 6th.

B's statement: C came 4th.

C's statement: F came 5th.

D's statement: E came 1st.

E's statement: A came 3rd.

F's statement: D came 2nd.

It is known that the ones who secured the 1st, 2nd and 3rd positions are honest people (who always speak the truth) and the ones who secured the 4th, 5th and 6th positions are liars (who always speak lies).

1. Who secured the 3rd position?
1) E 2) A 3) F 4) D
2. Which position did C secure?
1) 4th 2) 3rd 3) 2nd 4) 1st
3. Which of the following statements could A make?
1) E secured the 3rd position. 2) D secured the 4th position.
3) B secured the 1st position. 4) C secured the 6th position.
4. Which of the following statements could F make?
1) I finished 3 positions after A. 2) I finished before B.
3) I finished 4 positions after C. 4) I finished just after D.

DIRECTIONS for questions 5 to 8: Refer to the data and answer the following questions.

5. A set of 125 small $1 \times 1 \times 1$ cubes are arranged to form a $5 \times 5 \times 5$ cube. How many cubes (including the original) can be formed with vertices chosen from these points such that their faces are parallel to those of the original cube?
6. A set of 125 small $1 \times 1 \times 1$ cubes are arranged to form a $5 \times 5 \times 5$ cube. How many cuboids (including the original) can be formed with vertices chosen from these points such that their faces are parallel to those of the original cube? (A cuboid is a figure whose six faces are all rectangles)
7. A set of 120 small $1 \times 1 \times 1$ cubes are arranged to form a $6 \times 5 \times 4$ cuboid. How many cubes can be formed with vertices chosen from these points such that their faces are parallel to those of the original cuboid?
8. A set of 120 small $1 \times 1 \times 1$ cubes are arranged to form a $6 \times 5 \times 4$ cuboid. How many cuboids (including the original) can be formed with vertices chosen from these points such that their faces are parallel to those of the original cuboid? (A cuboid is a figure whose six faces are all rectangles)

DIRECTIONS for questions 9 to 11: Refer to the data and answer the following questions.

A cardboard game in Sumatra has a cardboard consisting of 25 identical squares placed next to one another so as to form a larger square with length of each side equal to 5 times the side of each identical small square. All the 25 squares are numbered as shown below:

21	22	23	24	25
20	19	18	17	16
11	12	13	14	15
10	9	8	7	6
1	2	3	4	5

A coin is placed on the square numbered 1. Two unbiased dice (each with 6 faces) are rolled simultaneously. The coin is moved to a square numbered higher than its current position based on the numbers appearing on the two dice, subject to the following rules with the intention of reaching 25 at the earliest:

Suppose the numbers appearing on the two dice are 'a' and 'b' (in no particular order):

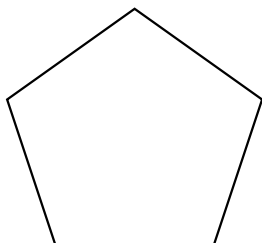
Rule Number	Conditions for 'a' and 'b'	Movement in the position of the coin
1	Both odd	Coin moves ahead by $a + b - 1$
2	Both even	Coin moves ahead by $a + b + 1$
3	Both prime	Coin moves ahead by $a + b + ab$
4	Both composite	Coin moves ahead by $ab - a - b$
5	One is prime and the other is composite	Coin moves ahead by ab
6	All other cases	Coin stays where it is

If the numbers 'a' and 'b' on the two dice fall under more than one of the rules given above, the coin moves ahead by a value, which is greater of the numbers given by the individual rules. For example, if the numbers on the dice are 4 and 6, both rules 2 and 4 apply. In that case, the coin moves ahead by greater of the number given by rule 2 and the number given by rule 4. If a coin has to move forward such that it will cross 25, the coin retraces back its position so that it covers the required number of steps. For example, if the coin is currently at 24 and it has to move ahead by 4 steps, this movement will take it past 25. Therefore, the coin moves by 4 steps as: 24-25-24-23-22 and moves to 22.

9. If the coin is currently at 1, what is the minimum number of throws of the dice needed for the coin's final position to be 25?
 1) 1 2) 2 3) 3 4) 4
10. Suppose the coin is currently at 17. Its final position becomes 25 in exactly one throw. In how many ways can this be done?
 1) 0 2) 1 3) 3 4) 4
11. If the coin is currently at 1 and the two dice are rolled only once, how many distinct possibilities of the final position of the coin exist?
 1) 14 2) 15 3) 16 4) 17

DIRECTIONS for questions 12 to 15: Refer to the data and answer the following questions.

There is a table in the shape of a pentagon with five bulbs installed at the five vertices of the pentagon as shown. Each light bulb is given a unique number between 1 and 5 (both included) in no specific order.



There is only one button to switch on the five bulbs. When the button is switched on, the electric current flows and the bulbs are switched on according to the following rules:

First bulb to be switched on	The user can decide which bulb he/she wants to switch on first. Suppose the number of the first bulb to be switched on is ' N_1 '.
Second bulb to be switched on	The second bulb that will be switched on will be located ' N_1 ' positions away from the first bulb in anti-clockwise direction. Suppose the number of the second bulb to be switched on is ' N_2 '.
Third bulb to be switched on	The third bulb that will be switched on will be located ' N_2 ' positions away from the second bulb in clockwise direction. Suppose the number of the third bulb to be switched on is ' N_3 '.
Fourth bulb to be switched on	The fourth bulb that will be switched on will be located ' N_3 ' positions away from the third bulb in clockwise direction. Suppose the number of the fourth bulb to be switched on is ' N_4 '.
Fifth bulb to be switched on	The fifth bulb that will be switched on will be located ' N_4 ' positions away from the fourth bulb in clockwise direction.

Thus the user can decide only the first bulb he/she wants to switch on. Other bulbs are switched on according to the rules given above.

If all the five bulbs can be switched on, the system of bulbs works well. However, if due to any reason, all the five bulbs cannot be switched on, an error occurs, which leads to a short circuit. The bulbs are to be placed on the vertices in such a way that a rational user will be able to switch on all the five bulbs and avoid a short circuit.

12. If a rational user arranges the five bulbs in such a way that a short circuit is avoided and the fourth bulb to switch on was bulb 3, which was the second bulb that was switched on?
 - 1) 1
 - 2) 2
 - 3) 4
 - 4) Such a situation is not possible
13. If a rational user arranges the five bulbs in such a way that a short circuit is avoided and the bulbs 1 and 2 are next to each other, which of the following is the second bulb to be switched on?
 - 1) 1
 - 2) 2
 - 3) 3
 - 4) Such a situation is not possible

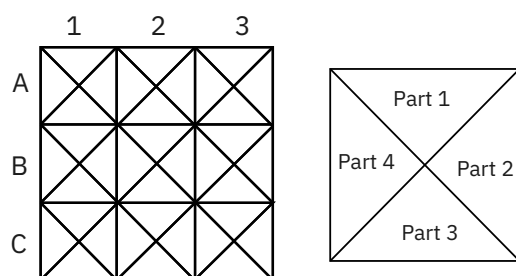
14. If a rational user arranges the five bulbs in such a way that a short circuit is avoided and the bulbs 5 and 3 are next to each other, which of the following is the second bulb to be switched on?
- 1) Only 2 2) Only 3 3) Only 4 4) Either 3 or 4
15. If all the five bulbs are to be switched on and a short circuit is to be avoided, the bulb bearing which of the following numbers cannot be the first bulb switched on by a rational user?
- 1) 1 2) 5 3) 3 4) 4



PRACTICE EXERCISE-2

DIRECTIONS for questions 1 to 4: Refer to the data and answer the following questions.

The six surfaces of a cube are numbered 1 to 6. Each surface is divided into 9 squares of equal area and each smaller square is further divided into 4 parts of equal area. Thus, a surface of the cube looks as shown in the diagram.



Surfaces 1 & 6, 2 & 5 and 3 & 4 are opposite to each other.

The 4 parts of top-left square of a surface are labelled Part 1, Part 2, Part 3 and Part 4 clockwise starting from the top. Part 1 is coloured red, part 2 is coloured blue, part 3 is coloured green and part 4 is coloured yellow. Similar colouring pattern is followed in all other squares.

Each part is now given a number as per certain rules for each surface. The numbering starts from square A1 (part 1 followed by parts 2, 3 and 4) and goes through all the squares from left to right in each row (A1 to A3, B1 to B3 & C1 to C3) and ends at C3.

The small squares of Surface 1 have consecutive odd numbers starting from 1, for example: The A1 has numbers 1, 3, 5, 7 on part 1, part 2, part 3 and part 4 respectively. A2 has 9, 11, 13 & 15 on part 1, part 2, part 3 and part 4 respectively and so on. This numbering starts from A1 to A3, followed by B1 to B3 and finally C1 to C3 on all surfaces.

Similarly other surface have the numbers/letters in the following pattern:

Surface No	Pattern
1	Consecutive odd numbers in ascending order starting from 1
2	Consecutive even numbers in ascending order starting from 2
3	All prime numbers in ascending order starting from 2
4	Numbers in ascending order such that each number is either a multiple of 3 or 7, but not both
5	All letters from A to Z in that order, and after Z, it starts from A again
6	Consecutive natural numbers in ascending order starting with 5

1. If we define a parameter X for each surface as the number of odd multiples of 7 appearing in red coloured parts of that surface, what is the sum of parameters X for the six surfaces of the cube?

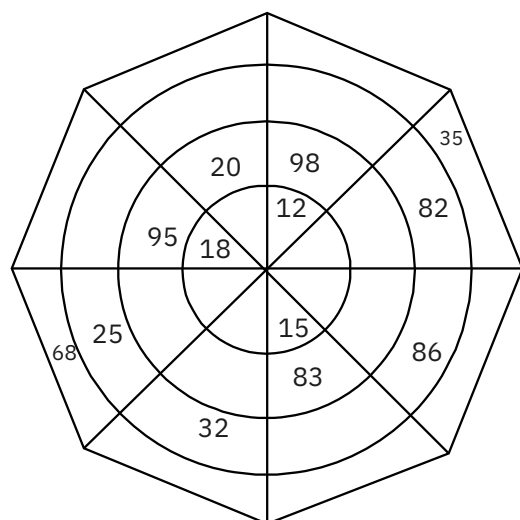
2. If we define a parameter Y for each surface as the number of prime numbers appearing in yellow coloured parts of that surface, what is the sum of parameters Y for the six surfaces of the cube?
3. If A = Number of different colours of the parts of the surface of the cube in which number 7 appears.
and B = number of different colours of the parts of the surface of the cube in which number 21 appears.
What is the value of A – B?
4. How many letters will be placed in more than one different coloured parts?

DIRECTIONS for questions 5 to 8: Refer to the data and answer the following questions.

An octagon is cut into 8 isosceles triangles as shown in the diagram by joining all its diagonals. Further, three concentric circles are drawn from the centre of the octagon in such a way that all the circles are inside the octagon. Thus, the octagon is divided in 32 small parts. It is filled using numbers from 11 to 99 (used at most once) in the following manner:

- 1] While filling an isosceles triangle, each digit is used exactly once.
- 2] Each isosceles triangle contains exactly one number divisible by 3.
- 3] The sum of all four numbers in each isosceles triangle is always 200.
- 4] In eight parts of the innermost circle, only the numbers up to 20 are used.
- 5] In the innermost circle, the sum of the numbers which are in exactly opposite sector, always add up to 31.
- 6] The outermost part (the part between the octagon and the outermost circle will henceforth be called as outermost part) doesn't contain any multiple of 3.

Furthermore, the following numbers are given:



5. If the area between the octagon and the outermost circle is colored red, green and blue clockwise in that order, starting from the isosceles triangle which contains 17. What will be the color of the part containing the number 35?
 - 1) Red
 - 2) Blue
 - 3) Green
 - 4) Cannot be determined
6. How many of the 32 numbers are multiples of 5?
 - 1) 5
 - 2) 9
 - 3) 12
 - 4) None of these
7. If the isosceles triangles are numbered from 1 to 8 clockwise starting from the triangle containing 12; what will be the number appearing in the outermost part of triangle number 5?
 - 1) 65
 - 2) 84
 - 3) 62
 - 4) Cannot be determined
8. If the isosceles triangles are numbered from 1 to 8 clockwise starting from the triangle containing 12; what will be the sum numbers in outermost part of triangle 3 & 8?
 - 1) 167
 - 2) 148
 - 3) 138
 - 4) 168

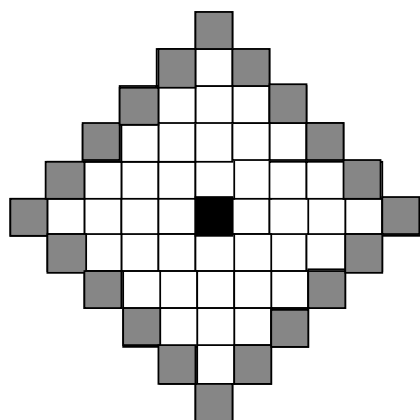
DIRECTIONS for questions 9 to 11: Refer to the data and answer the following questions.

Eight friends, named A, B, C, D, E, F, G and H, each have 25 one-rupee coins with them. They exchanged coins among themselves as follows:

- 1] B took 2 coins from D.
 - 2] H received coins from two of his friends.
 - 3] G gave one coin to D.
 - 4] H took 5 coins from A.
 - 5] F received 3 coins from C.
 - 6] Exactly 3 friends did not give any coins. Exactly 4 other friends did not receive any coins.
 - 7] There were five transactions in all involving a different number of coins between 1 and 5 (both included).
 - 8] Only one friend was involved in giving as well as taking coins.
9. What was the difference in the number of coins with F and the number of coins with C at the end of the five transactions?
 - 1) 5
 - 2) 3
 - 3) 7
 - 4) 6
 10. Who had the least coins at the end of the five transactions?
 - 1) A
 - 2) E
 - 3) C
 - 4) Both A and E
 11. At the end of the five transactions, exactly two friends had equal number of coins. Who were they?
 - 1) A and E
 - 2) B and F
 - 3) C and D
 - 4) D and G

DIRECTIONS for questions 12 to 15: Refer to the data and answer the following questions.

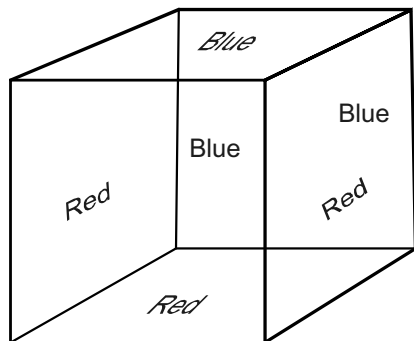
Shravya is playing a game on the gameboard shown alongside. She starts the game by placing a coin on the central black square. Then she rolls an unbiased tetrahedral die with four faces marked N, S, E and W, and moves a single square North, South, East or West accordingly. The objective is to reach any of the 20 grey squares on the edge of the board.



12. How many different squares can the coin be on after 4 rolls of the die?
1) 16 2) 20 3) 25 4) 36
13. Shravya could achieve the objective after any of the following number of moves except:
1) 27 2) 64 3) 81 4) 125
14. If Shravya rolls the die exactly 5 times, how many different sequences of rolls will enable her to achieve the objective?
1) 124 2) 125 3) 128 4) 127
15. If after 6 rolls of the die, the coin arrives back at the central black square, how many different sequences of rolls could have occurred?
1) 100 2) 200 3) 300 4) 400

DIRECTIONS for questions 16 to 19: Refer to the data and answer the following questions.

Three sides of a cube (having each side equal to 4 cm) are painted using red colour and the remaining three sides are painted using blue colour. As shown in the following diagram, the bottom surface, the right vertical surface and the left vertical surface have been painted using red colour whereas the top surface, the front vertical surface and the back vertical surface have been painted using blue colour.



The cube is cut into 64 identical small cubes having side 1 cm each.

16. How many small cubes have none of the six sides painted?
 1) 4 2) 8 3) 16 4) 32
17. How many small cubes have one face painted in red and two faces painted in blue?
 1) 4 2) 8 3) 16 4) 32
18. How many small cubes have two faces painted in red and one face painted in blue?
 1) 4 2) 8 3) 16 4) 32
19. How many small cubes have only two of their faces painted and both of them using the same colour (either red or blue)?
 1) 4 2) 8 3) 16 4) 32

The Sports Association for MBA colleges (SAMBA) organised a knockout singles tennis tournament. In this format, any player was eliminated with a single loss. The tournament was played in multiple rounds subject to the following rules:

- (a) If the number of players, say n , in any round was even, then the players were grouped into $\frac{n}{2}$ pairs. The players in each pair played a match against each other and the winner moved on to the next round.
- (b) If the number of players, say n , in any round was odd, then one of them was given a bye, that is, he automatically moved on to the next round. The remaining $(n - 1)$ players were grouped into $\frac{n-1}{2}$ pairs. The players in each pair played a match against each other and the winner moved on to the next round. No player got more than one bye in the entire tournament.

It was noted that the eventual champion, Shashank, played 7 matches in all and did not receive a bye at any stage.

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