

Answers and Explanations

1	1	2	3	3	4	4	5	5	5	6	3	7	1	8	1	9	4	10	5
11	4	12	2	13	2	14	2	15	3	16	3	17	2	18	1	19	5	20	4
21	5	22	2,3	23	1	24	4	25	3	26	5	27	1	28	2	29	3	30	4
31	2	32	1	33	4	34	5	35	3	36	3	37	2	38	5	39	1	40	4
41	3	42	1	43	4	44	2	45	4	46	3	47	5	48	4	49	2	50	1
51	1	52	2	53	1	54	2	55	5	56	2	57	2	58	4	59	2	60	4
61	2	62	4	63	1	64	4	65	4	66	3	67	2	68	5	69	1	70	5
71	5	72	5	73	2	74	5	75	3										

	Question number	Total questions	Total attempted	Total correct	Total wrong	Net Score	Time Taken
LRDI	1 to 25	25					
EU + RC	26 to 50	25					
QA	51 to 75	25					
Total		75					

For questions 1 to 5:

From statement one, team would include exactly one among P, R, S

⇒ P (or) R (or) S.

From statement two, team would include either M, or Q

⇒ M but not Q

(or) Q but not M

From statement three, if a team includes K, it will include L or vice versa.

⇒ K, L always accompany each other.

From statement four, if one of S, U, W is included, then the other two also have to be included.

⇒ S, U, W are always together.

From statement five, L and N cannot be included together

⇒ L, N are never together.

From statement six, L and U cannot be included together.

⇒ L, U are never together.

1. 1 From statements one and two;
one of P, R, S and
one of M, Q are to be selected. We require one more member.
But from statement three; (K, L) are always together.
Hence 'L' cannot be included in a team of 3 members.

2. 3 Again, from statement one;
one of P, R, S has to be selected.

To make a team of '5'

'S' will be chosen (which leaves out P and R)

⇒ If 'S' is chosen 'U' and 'W' have to be chosen (statement four)

⇒ If 'U' is chosen 'L' cannot be chosen (statement five)

⇒ K cannot be chosen (statement three)

And from statement two; one of M (or) Q has to be chosen.

3. 4 From statements one and two
Two members are to be selected.
Of the remaining seven;

To maximize the size of the team.

We would chose S,

⇒ U and W are included in the team (statement four)

We cannot include K (or) L because we would then have to leave out N and U (from statements five and six)

4. 5 If 'K' is included, 'L' has to be included (statement (3))
If 'L' is chosen, neither N nor U can be chosen (statements (5) and (6))

⇒ S, W are also not included because S, U, W have to be always together. (Statement (4))

Hence one of P (or) R would be selected (statement (1)) and one of M (or) Q would be selected (statement (2))

(K, L) and two of the above five have to be included.

5. 5 If a team includes N, it cannot include 'L', and therefore, not even 'K'. (from statement five and three)

According to statement (1), one of P or R or S has to be included.

According to statement (2), one of M or Q has to be selected.

So the following cases are possible

P Q N,

R Q N

P M N,

R M N

If 'S' is selected, then S U W M N and S U W Q N are the only possible cases.

Hence, in all $4 + 2 = 6$ teams can be constituted.

For questions 6 to 10:

6. 3 Let Dipan get x marks in paper II.
Dipan's average in PCB group = 98
Maths group = 95
S.S. group = 95.5
Vernacular group = 95

$$\text{English group} = \left(\frac{96 + x}{2} \right)$$

Sum of all = 96×5

$$\text{So } 95.5 + 96 \times 3 + 48 + \frac{x}{2} = 96 \times 5$$

$$\Rightarrow \frac{x}{2} = 96 \times 2 - 95.5 - 48$$

$$x = 2(96.5 - 48) = 2 \times 48.5 = 97$$

So (3) is the correct option.

7. 1 The only boy getting 95 in atleast one of the subjects of the group among all the groups is Dipan.
So (1) is the correct option.

8. 1 A group score of 100 in Social Science would have increased the scores as follows:

	Score Increase	Group Score	Final Score Increase	Final group Score
Pritam	22	11	$\frac{11}{5} = 2.2$	96.1
Joseph	9	4.5	$\frac{4.5}{5} = .9$	95.9
Trina	21	10.5	$\frac{10.5}{5} = 2.1$	95.8
Agni	9	4.5	$\frac{4.5}{5} = .9$	95.2

So the order is Pritam > Joseph > Trina > Agni.
So option (1) is the correct choice.

9. 4 The student having atleast 95 in every group is Dipan, so the answer is Dipan, option (4).
10. 5 Let us increase the score in one of the subjects of the following candidates

	Least Scores	Contribution in net Score	Final Score
Ram	94 in group of 2	3 in 5 groups	$96.1 + .6 = 96.7$
Agni	82 in group of 2	9 in 5 groups	$94.3 + 1.8 = 96.1$
Pritam	83 in group of 2	8.5 in 5 groups	$93.9 + 1.7 = 95.6$
Ayesha	93 in group of 2	3.5 in 5 groups	$96.2 + .7 = 96.9$
Dipan	95 in group of 1	5 in 5 groups	$96 + 1 = 97.0$

So, Dipan will end with a highest total.
So the answer is option (5).

For questions 11 to 15:

As only Paul Erdős was having an Erdős number of zero, so the minimum Erdős number among A, B, C, D, E, F, G, H should be 1 or greater than one. At the end of the third day, F co-authored a paper with A and C. F had the minimum Erdős number among the 8 people. So if F's Erdős number is y, then A and C's Erdős number should change to (y + 1) after third day. As A and C decreased the average by maximum possible extent, it means C had the second-height Erdős number among all eight, as A had an Erdős number of infinity. Suppose Erdős numbers of A, B, C, D, E, F, G, H are y + 1, b, y + 1, c, d, e, y, g, h respectively at the end of third day.

$$\therefore (y + 1 + b + y + 1 + c + d + e + y + g + h) = 24 = (3 \times 8)$$

$$\Rightarrow 3y + 2 + b + d + e + g + h = 24$$

When E co-authored with F, the average Erdős number reduced again, it means, E's Erdős number was not the same with A &

C initially. As at the end of third day, 5 people had same Erdős number, they should be A, C and any 3 out of B, D, G, H. Suppose those 3 people are B, D, G. Then
 $(3y + 2 + y + 1 + y + 1 + y + 1 + e + h) = 24$
 $\Rightarrow 6y + h + e = 19 \quad \dots(i)$

On the fifth day, E co-authored a paper with F and hence, Erdős number of E changed to (y + 1). Also the average decreased by 0.5 which means the total decreased by 4.

$$\text{Hence, } e - (y + 1) = 4$$

$$\Rightarrow e - y = 5$$

Putting the value of e in equation (i), we get

$$6y + h + (5 + y) = 19$$

$$\Rightarrow 7y + h = 14$$

Only possible value of y = 1 as h cannot be zero.

So after 3rd round Erdős number of A, C, E, F were 2, 2, 6, 1 respectively.

11. 4 Only A, C, E changed their Erdős number, rest 5 did not change their Erdős number.
12. 2 At the end of conference 6 people including E were having an Erdős number of 2 and F was having 1 as Erdős number. So 8th person was having an Erdős number of $[20 - (2 \times 6 + 1)] = 7$
13. 2 At the end of 3rd round, 5 people were having same Erdős number. A and C changed their Erdős number after coauthoring with F. So, the other 3 will have same Erdős number in the beginning.
14. 2 2
15. 3 After co-authoring with F, E was having Erdős number of 2, which was 4 less than initial Erdős number of E. So answer is $2 + 4 = 6$.

For questions 16 to 20:

The MCS share price at the beginning of first day is Rs.100 and at the close of day 5 is Rs.110.

The following cases of the closing prices can be derived.

At the end of	Day 1	Day 2	Day 3	Day 4	Day 5
1	90	80	90	100	110
2	90	100	90	100	110
3	90	100	110	120	110
4	90	100	110	100	110
5	110	100	90	100	110
6	110	100	110	100	110
7	110	120	110	100	110
8	110	120	110	120	110
9	110	120	130	120	110
10	110	120	110	100	110

16. 3 As Chetan sold 10 shares on three consecutive days, therefore, of the five days, there must be an increase for three of the five days and a decrease for the remaining two days. It is given that Michael sold 10 shares only once. Hence, the price is more than 110

for only one day and on all the remaining days, it cannot exceed 110. The only satisfying case is (3). Hence, the price at the end of Day 3 is Rs.110.

17. 2 The satisfying cases are (1), (2), (4), (5), (6). Hence, the price at the end of Day 4 is Rs.100.

18. 1 Let Chetan and Michael start with x number of shares initially.
From case (1), we get that the number of shares with Michael = $x + 10$
and number of shares with Chetan = $x + 10 + 10 - 10 - 10 = x - 10$.
So Michael has 20 more shares than Chetan. This is the only satisfying case.
Hence, the share price at the end of Day 3 is Rs.90.

19. 5 Consider cases (3) and (7). Only these two satisfies the condition that Michael had Rs.100 less than Chetan at the end of day 5.

For case (3),

Number of shares with Chetan = $x + 10 - 10 - 10 - 10 + 10 = x - 10$

And with Michael = $x - 10$

For case (7),

Number of shares with Chetan = $x - 10 - 10 + 10 + 10 - 10 = x - 10$

And with Michael = $x - 10$

In either case, number of shares with Michael and Chetan are the same.

20. 4 To maximise the amount gathered by both of them, we need to look into those cases wherein we have maximum number of 110 excess figures. It is only then that Michael and Chetan both will make money. So we check for case (9).

For case (9),

Extra cash with Chetan by the end of day 5 = $1100 + 1200 + 1300 - 1200 - 1100 = \text{Rs.}1300$

And that with Michael = $1200 + 1300 + 1200 = \text{Rs.}3700$

Total extra cash with both of them = $1300 + 3700 = \text{Rs.}5000$

For questions 21 to 25:

In this set, the fuel cost for each of the path is given. In addition, there are four toll collection junctions.

21. 5 No traffic flows on the street from D to T.
Now, we have fuel cost on different paths as
SAT : $9 + 5 = \text{Rs. } 14$ + toll at junction A
SBAT : $2 + 2 + 5 = \text{Rs. } 9$ + toll at junction B and A
SBCT : $2 + 3 + 2 = \text{Rs. } 7$ + toll at junction B and C
SDCT : $7 + 1 + 2 = \text{Rs. } 10$ + toll at junction D and C
Now, checking the options we find that toll at junction A is 0 or 1.
When toll is 0, fuel cost on SAT = $14 + 0 = \text{Rs. } 14$
When toll is 1, fuel cost on SAT = $14 + 1 = \text{Rs. } 15$
The fuel cost on all the paths should be equal.

Options (1), (2), (3) can be ruled out as in all these options toll at C and D add up to more than Rs. 5. As fuel cost on SDCT is Rs. 10 without toll, so with toll it cannot exceed Rs. 15 (i.e. toll of path SAT).

Option (4) is ruled out as in this option SAT comes out to be Rs. 14 and SDCT sums up to Rs.15.

So correct answer is option (5).

22. 2 & 3

Note: Both the options b and c are correct.

Available routes are:

SAT → Rs. 14

SBAT → Rs. 9

SDCT → Rs. 10

SDT → Rs. 13

Now, fuel cost of SAT - fuel of SDT = $14 - 13 = \text{Rs. } 1$.
Hence toll at junction D should be 1 more than the toll at A. So option (a), (d) and (e) are ruled out.

Now, fuel cost of SAT - fuel cost of SBAT = $14 - 9 = \text{Rs. } 5$. So toll at junction B should be Rs. 5. So answer could be either (2) or option (3).

23. 1 Available paths considering no toll are

SAT → Rs. 14

SBCT → Rs. 7

SBAT → Rs. 9

SDCT → Rs. 10

SDT → Rs. 13

It is very likely that option (4) is selected. But, if all the five routes have the same cost, then there will be an equal flow on all the five routes i.e., 20% on each route. But, then the percentage of traffic. on

$S - A \rightarrow 20\%$

$S - B \rightarrow 40\%$ (As there are two routes involving $S - B$.)

$S - D \rightarrow 40\%$ (As there are two routes involving $S - D$.)

But, it is given that traffic on $S - A = \text{traffic on } S - B = \text{traffic on } S - D$.

24. 4 Available routes are

SAT → Rs. 14

SBAT → Rs. 9

SBCT → Rs. 7

SDCT → Rs. 10

SDT → Rs. 13

Fuel cost on path SAT - fuel cost on path SDT = $14 - 13 = \text{Rs. } 1$.

So the toll at junction D should be 1 more than toll at junction A. So option a and c are ruled out.

Fuel cost on path SAT - fuel cost on path SBCT = $14 - 7 = \text{Rs. } 7$.

So sum of toll at junction B and C should be 7 more than the toll at A. Hence, only option (d) matches.

25. 3 We have to find a path on which minimum cost is incurred and such that total traffic through B does not exceed 70%.

So option (5) is ruled out because we can send all the traffic through SDCT or SDT and meet all conditions. Option (1) is also ruled out as in that case all traffic will

be passed through SBCT [not possible as traffic at B can't be more than 70%]

Option (2) is also ruled out as it is possible only when toll at junction C is 2. In that case also all traffic will pass through B.

Option (3) can be the answer, when toll at junction B is 4 and toll at junction C is 0. Then SDCT will have toll equal to Rs. 10.

As Rs. 10 is less than Rs. 13, so option (4) is also ruled out.

Hence, option (3) is the correct choice.

26. 5 The paragraph stresses on the relationships between the factories, dealers and the consumers. Every entity has certain short-term expectations from each other. This makes these relationships strenuous. This strain leads to feelings of mistrust and lack of commitment. So the longer this continues, the more the chances of everyone succumbing to this vicious trap and they would soon realize that they have sacrificed long-term stability and gain for short-term benefits. Hence Option (5). Option (4) is too specific to industry (at the cost of the other players – dealers and customers), option (2) suffers from the same short-comings together with throwing the technical (unexplained) jargon 'supply chain' to us. Option (1) takes into account only 2 players and repeats what is stated in the passage about "dealers adjusting prices and making deals" in the term 'Deal making'; option (3) seems close but can be eliminated as the word 'adversary' is too strong. The passage implies that everyone tries to maximize his benefits, not that they 'oppose' one another.

27. 1 The passage heads towards describing the functions that bad / good maps (and therefore theories) serve. Just as a 'Bad theory' does not help us understand a problem, a 'good theory' is invaluable to us, though it may be simplified. 'Simplified' here implies that less valuable information is left out. According to this logic, option (2), (3), (4), get eliminated. Option (5) is close but more negative in tone than required. The word 'limitation' here indicates a short coming whereas the passage implies that it is a simplification as it would not be of practical use otherwise.

28. 2 Going with the direction of the passage, the last line is stating 'now all players "profess" to seek only peace'. Profess means to mask or to pretend. Thus option (2) which talks about the veil being lifted is the most logical statement that completes the passage. More so this also follows from the source of the text.

29. 3 The answer is very direct. With every statement of his, the author seeks to show how foolish those people are who call his advice 'rules'. After his first statement he has posed the rhetorical question "Call that a rule?" The same should follow after his second "scarcely a rule!"

30. 4 In the first part of the passage, the author seeks to explain why one who is young would exploit an entrepreneurial opportunity. Thus, in the second part of the passage once the "however" is established, evidence will seek to show how older people will be reluctant to exploit entrepreneurial opportunity. Option (2) seems correct but it only gives a general statement that with age, people become reluctant to new ideas. Between option (2) and (4), option (4) goes in continuation with the text as it states that at a mature age, people are unwilling to utilize entrepreneurial opportunities. So option (4) is correct.

31. 2 According to the passage, "A critical attitude needs for its raw material, as it were, theories or beliefs which are held more or less dogmatically". Therefore, our critical attitude is the tool by which we shape our dogmatic beliefs. Thus, the relationship of dogmatic beliefs and critical attitude is equivalent to that of a chisel and that of a marble stone.

32. 1 Option (3), (4) and (5) are ruled out because they are not supported by the passage. (negative, neutral, inferior) - Option (1) and (2) are close but (1) is better because the question is about the role of dogmatic behaviour with respect to the development of science. In the third paragraph, 8th line, it is mentioned that dogmatic attitude is pseudo/pre-scientific attitude. Science needs dogmatic beliefs for their critical revision. Beginning of fourth paragraph states that science begins with myths and criticism of myths. Thus, dogmatic behavior is required to develop science because the former serves as the base on which science is made.

33. 4 Refer to the last sentence of the second paragraph. It is clear from the context (especially from the words - 'experience', 'maturity') that time has a direct effect on the evolution of thinking. Option (4) is the only option which takes into account the element of time (the word - 'stages').

34. 5 Option (5) is correct because this statement suggests that critical attitude is a process of questioning which leads to tentative hypothesis. A critical attitude by itself is not opposed to conviction, but it tries to modify the conviction according to reason.

35. 3 Refer to the third last paragraph of the passage; dogmatic attitude is pseudo-scientific because its aim is only to verify its laws and schemata even if it has to neglect the refutations. Whereas critical attitude is flexible enough to change, refute or falsify its tenets and therefore has a questioning attitude.

36. 3 We refer to the tenth line of the third paragraph. Here Mr. Goran Lindblad admits that communism did commit brutalities but it also had positive consequences like rapid industrialization. Hence option (3) is the best answer.

37. 2 Option (4) is very blatant, but is not the 'real' reason for the attack. The reason that the West repeatedly attacks communism (as stated by the author in the last para) is that they want to establish the current capitalist order as supreme i.e. they idealise 'global capitalism'. Option (5) is close, but wrongly states that communist nations might overtake the capitalists. This is not given in the passage.
38. 5 The answer can be found in the first line of the last paragraph, which in essence implies that it is important to go beyond and look at the motives of atrocities perpetrated by different regimes. The motive is global capitalism as described in the last paragraph. Therefore, Option (5) is correct.
39. 1 (1) is the correct answer. In the fourth paragraph the author explains the 'intimate link' between colonialism and Nazism. A peripheral view of this relationship suggests that the answer should be (3) which explains the terms and ideas that were imported and used by the Nazi party. But the next few lines explain the deeper relationship that exists between the two. These lines refer to the atrocities that one race has committed upon the other. The British imposed their rule on the Indian people. Similarly, the Belgian forced labour and mass murder led to the death of 10 million Congolese. These references are clearly race centric. Therefore, (1) is correct.
40. 4 On the basis of the given choices the best answer is option (4). In the second last paragraph, the author attempts to portray the magnitude of the atrocities committed by the European Colonialists. In doing so he mentions in a sarcastic tone "Presumably European lives count for more." Thus, this is not an inference that can be drawn from the passage. The rest of the statements can be easily inferred from the passage.
41. 3 A careful scrutiny of the second paragraph reveals that the concept of "justice as fairness" is a hypothetical situation in a real society. Thus options (1), (2) and (5) can be eliminated. The possible answers are (3) or (4). (3) is more specific in comparison to option (4). Thus (3) is the correct answer.
42. 1 Refer to para 1. "Rather, the idea is that the principles...initial position of equality." Associate these lines with paragraph 2. So, option (1) can be inferred from the passage.
43. 4 Refer to the latter half in the second paragraph. In essence it states that the principles of justice should be so chosen that they neither favour or disfavour a particular class of society. A law maker who chooses the principle of justice without being aware of his status in society in the next birth exemplifies the situation that has been described as choosing the principles of justice behind a veil of ignorance. Thus option (4) is the most appropriate choice. Option (1) is incorrect because if there is a possibility of return then the businessmen would obviously choose those principles which will favour their situation. Option (2) is incorrect because the reference to school children is quite vague. Option (3) is incorrect because if businessmen were to choose these principles then they might choose those which favour their family. Also, these businessmen are aware that there is no possibility of their return. Option (5) is incorrect because they may or may not migrate ('potential immigrants'). It also suggests that the current principles of justice in their society do not contribute to their success. If they are unsuccessful in their own society then why would they choose certain principles which do not favour their situation.
44. 2 Option (2) is correct because 'fair' in this option means 'just'. We cannot choose option (4) though it's a close choice because 'fairly' means 'gradually'. Here, the choice clearly depends upon the usage and the context of this word.
45. 4 When all children are provided free education, it indicates that the decision to do so has not been taken with any other consideration in mind, save the children's benefit. Thus, the children's family background and social status do not matter, in accordance with the passage's theme.
46. 3 Statement 3 is a fact because it is open to discovery or verification. This eliminates option (2). The words "has to be...." make statement 4 a judgement as it expresses a personal viewpoint. This eliminates options (4) & (5). As "... statistical indications..." have been referred to in statement 1, it is definitely an inference. This is because it is a conclusion about the unknown which is based on the known. The second statement is a judgement because this statement is open to debate. Therefore option (3) is the correct answer.
47. 5 Statement 3 is a judgement because it expresses a personal viewpoint regarding the consequences of red tape. This eliminates option (1). Statement 2 is a fact because the latter half of the sentence is given by way of an example and not by way of a conclusion. This eliminates option (3). Statement 1 describes what "we should...." do. This statement explains the speaker's disapproval regarding the consequences of red tape. Therefore, it is a judgement. This eliminates option (4). Statement 4 is an inference. It is known to us that a red tape procedure is a point of contact with an official. That this point of contact offers a potential opportunity is a conclusion based on this information. This makes option (5) correct.
48. 4 Statement 1 is a judgement as it is based on the author's opinion. This eliminates option (1) & (2). Statement 2 uses the general term "we". This makes it a judgement. If it had been about "I" or "us" then it would have been

a fact. Statements 3 and 4 are personal opinions. Hence, the correct answer is option (4).

49. 2 Looking at the 1st statement, if you mark the keywords 'is certainly' then it gives us a clear idea that it is a point of view expressed by the author. Therefore, it is a judgement. The 2nd statement is an inference as it arrives at a conclusion from a stated premise. The 3rd statement, where the author mentions 'is the only insurance' (although there may be other insurances, that the author negates) qualifies it as a judgement. The 4th statement is a pure fact. So, option (2) is correct.

50. 1 Statement 1 is a judgement because it expresses an approval/disapproval. It is a subjective opinion- an advice given to HIV affected patients. So, options (3) & (4) can be eliminated. Statement 2 is clearly factual. This eliminates option (2). Statement 3 is a conclusion about the future scenario which is based on the "recent initiatives". Hence, this statement is an inference. In statement 4, "But how ironic ..." shows the author's disapproval. So statement 4 is a judgement. Thus, option (1) is the correct answer.

51. 1 $\frac{a}{b} = \frac{1}{3}$ $\frac{b}{c} = \frac{2}{1}$
 $\Rightarrow a : b : c = 2 : 6 : 3$
 Similarly $a : b : c : d : e : f = 6 : 18 : 9 : 18 : 6 : 24$
 $\therefore \frac{abc}{def} = \frac{6 \times 18 \times 9}{18 \times 6 \times 24} = \frac{3}{8}$
 Hence, option (1) is the correct answer.

Alternate method:

$$\frac{a}{b} \times \frac{b}{c} \times \frac{c}{d} \times \frac{d}{e} \times \frac{e}{f} = \frac{a}{f} = \frac{1}{3} \times 2 \times \frac{1}{2} \times 3 \times \frac{1}{4} = \frac{1}{4}$$

$$\frac{b}{c} \times \frac{c}{d} = \frac{b}{d} = 2 \times \frac{1}{2} = 1$$

$$\frac{c}{d} \times \frac{d}{e} = \frac{c}{e} = \frac{1}{2} \times 3 = \frac{3}{2}$$

$$\text{So, } \frac{abc}{def} = \frac{a}{f} \times \frac{b}{d} \times \frac{c}{e} = \frac{1}{4} \times 1 \times \frac{3}{2} = \frac{3}{8}$$

52. 2 Going by options, we put $x = -\frac{1}{2}$

$$(1) 2^{-2} = \frac{1}{4}$$

$$(2) \frac{1}{x} \Rightarrow \frac{1}{-1/2} = -2$$

$$(3) \frac{1}{x^2} \Rightarrow \frac{1}{(-1/2)^2} = 4$$

$$(4) 2^{-1/2} = \frac{1}{\sqrt{2}}$$

$$(5) \frac{1}{\sqrt{-x}} = \frac{1}{\frac{1}{\sqrt{2}}} = \sqrt{2}.$$

Clearly, $\frac{1}{x}$ bears a negative value only and hence, is the smallest.

53. 1 $t_3 \times t_4 \times t_5 \times \dots \times t_{53}$
 $= \frac{3}{5} \times \frac{4}{6} \times \frac{5}{7} \times \dots \times \frac{51}{53} \times \frac{52}{54} \times \frac{53}{55} = \frac{3 \times 4}{54 \times 55} = \frac{2}{495}$
 Hence, option (1) is the correct answer.

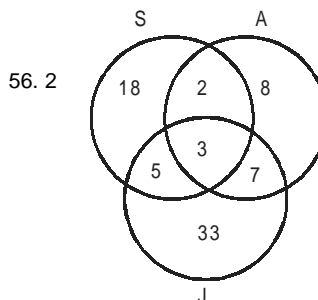
54. 2 LCM of 2, 3, 4, 6, 12 = 12
 We can rewrite the given surds as
 $12\sqrt[2]{6}, 12\sqrt[3]{4}, 12\sqrt[4]{3}, 12\sqrt[6]{2}, 12\sqrt[12]{1}$
 $\therefore 3^4$ is the greatest.
Note: $n^{1/n}$ is maximum when $n = e$ (2.718). Among the given options, $n = 3$ is closest to the value of e .

55. 5 Let the initial length, breadth and height of the room be $3x$, $2x$ and x respectively.
 Initial area of the four walls = $2(3x + 2x)x = 10x^2$
 The new dimensions are: length = $6x$, breadth = x and height = $\frac{x}{2}$.

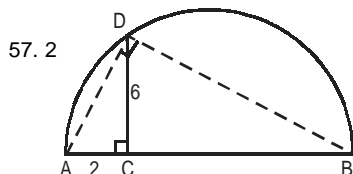
$$\text{New area of the four walls} = 2(6x + x) \frac{x}{2} = 7x^2$$

Therefore, percentage decrease

$$= \frac{10x^2 - 7x^2}{10x^2} \times 100 = 30\%$$



So, total people reading the newspaper in consecutive months i.e. July and August and August and Sept. is $2 + 7 = 9$ people.



$\angle ADB = 90^\circ$ (Angle in semicircle)

$$CD^2 = AC \times CB$$

$$(6)^2 = 2 \times CB$$

$$36 = 2 \times CB$$

$$CB = 18$$

$$\text{Hence } AB = AC + CB = 20$$

$$\text{Area of semicircle} = \frac{1}{2} \pi (10)^2 = 50\pi$$

Option is (2).

For questions 58 and 59:

Let for Raja allowed luggage be A and excess luggage be E

\therefore For Praja, his luggage must be $A + 2E$.

If all luggage belongs to one, $(A + 3E)$ is the excess.

E corresponds to Rs. 1200.

\therefore A must correspond to $(5400 - 3600) = \text{Rs. } 1800$

If $E = 2x$, $A = 3x$

So total weight $= 2(A) + 3E = 12x$

$$\Rightarrow x = 5$$

Hence, Praja's luggage weight $= 7x = 35$ kg

Alternate method:

Let, Raja = x kg Free allowance = F kg

Praja = $(60 - x)$ kg

According to the question,

$$(x - F)V = 1200 \quad \dots (i)$$

{V = rate of levy on excess luggage}

$$(60 - x - F)V = 2400 \quad \dots (ii)$$

$$(60 - F)V = 5400 \quad \dots (iii)$$

Dividing equation (ii) by (i),

$$\frac{60 - x - F}{x - F} = 2$$

$$\Rightarrow 60 - x - F = 2x - 2F$$

$$\Rightarrow 3x - F = 60 \quad \dots (iv)$$

Dividing (iii) by (i), we get

$$\Rightarrow \frac{60 - F}{x - F} = 4.5$$

$$\Rightarrow 60 - F = 4.5x - 4.5F$$

$$\Rightarrow 4.5x - 3.5F = 60 \quad \dots (v)$$

Multiplying equation (iv) by 1.5,

$$4.5x - 1.5F = 90$$

$$4.5x - 3.5F = 60$$

$$2F = 30$$

$$\Rightarrow F = 15$$

Putting value of F in (iv),

$$3x = 75 \Rightarrow x = 25$$

58. 4 Praja have 35 kg luggage

59. 2 15 kg.

60. 4 Let the no. of students in front row be x.

So, the no. of students in next rows be $x - 3$, $x - 6$, $x - 9$... so on

If n i.e. no. of rows be 3, then

$$x + (x - 3) + (x - 6) = 630$$

$$\Rightarrow 3x = 639$$

$$\Rightarrow x = 213$$

So possible.

Similarly, for $n = 4$,

$$x + (x - 3) + (x - 6) + (x - 9) = 630$$

$$\Rightarrow 4x - 18 = 630$$

$$\Rightarrow x = \frac{648}{4} = 162$$

$\therefore x = 4$ to possible.

If $n = 5$,

$$(4x - 18) + (x - 12) = 630$$

$$\Rightarrow 5x - 30 = 630$$

$$\Rightarrow x = 120$$

Again $n = 5$ is possible.

If $n = 6$,

$$(5x - 30) + (x - 15) = 630$$

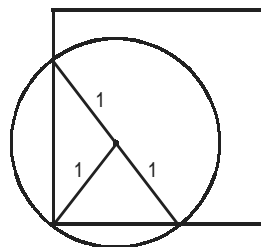
$$\Rightarrow 6x - 45 = 630$$

$$\Rightarrow 6x = 675$$

$$\Rightarrow x \neq \text{Integer}$$

Hence, $n \neq 6$.

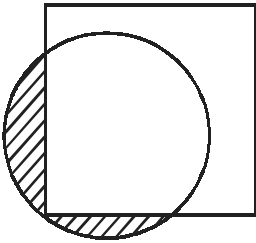
61. 2



$$\text{Remaining area} = 4 - \left(\frac{\pi}{2} + \frac{1}{2} \times 1 \times 2 \right) = \frac{6 - \pi}{2}$$

$$\text{Remaining proportion} = \frac{6 - \pi}{8}$$

62. 4



$$\text{Area} = \pi(1)^2 - \left(\frac{\pi}{2} + 1\right) = \pi - \frac{\pi}{2} - 1 = \frac{\pi - 2}{2}$$

63. 1 $x^{2/3} + x^{1/3} - 2 \leq 0$

$$\Rightarrow x^{2/3} + 2x^{1/3} - x^{1/3} - 2 \leq 0$$

$$\Rightarrow (x^{1/3} - 1)(x^{1/3} + 2) \leq 0$$

$$\Rightarrow -2 \leq x^{1/3} \leq 1$$

$$\Rightarrow -8 \leq x \leq 1$$

64. 4 Let number of elements in progression be n, then

$$1000 = 1 + (n-1)d$$

$$\Rightarrow (n-1)d = 999 = 3^3 \times 37$$

Possible values of d = 3, 37, 9, 111, 27, 333, 999

Hence, 7 progressions are possible.

65. 4 From the graph of $(y-x)$ vs. $(y+x)$, it is obvious that inclination is more than 45° .

$$\text{Slope of line} = \frac{y-x}{y+x} = \tan(45^\circ + \theta)$$

$$\Rightarrow \frac{y-x}{y+x} = \frac{1+\tan\theta}{1-\tan\theta}$$

By componendo-dividendo, $\frac{y}{x} = -\tan\theta$ which is

nothing but the slope of the line that shows the graph of y Vs. x.

And as $0^\circ < \theta < 45^\circ$, absolute value of $\tan\theta$ is less than 1.

$$\frac{-1}{\tan\theta} \text{ is negative and also, greater than 1.}$$

\Rightarrow The slope of the graph y Vs. x must be negative and greater than 1. Accordingly, only option (d) satisfies.

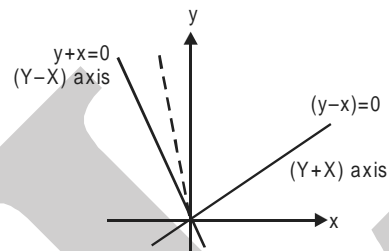
We can also try by putting the values of $(y+x) = 2$ (say) and $(y-x) = 4$ (anything more than 2 for that matter). We can solve for values of y and x and cross check with the given options.

Alternate method:

In the normal X-Y coordinate plane the X-axis corresponds to $y = 0$

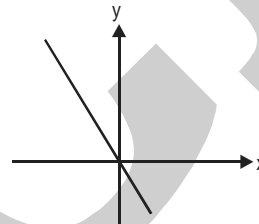
And Y-axis corresponds to $x = 0$

$y+x=0$ and $y-x=0$ are perpendicular lines on this plane.



And $y-x=0$ is the axis Y+X and $y+x=0$ is the axis Y-X

So, the dotted line is the graph drawn in the question. When you observe w.r.t to X-axis it looks like



66. 3 By option (3), if four consecutive odd numbers are 37, 39, 41 and 43, then sum of these 4 numbers is 160. When divided by 10, we get 16, which is a perfect square.

\therefore 41 is one of the odd numbers.

67. 2 $2x + y = 40$

$$x \leq y$$

$$\Rightarrow y = 40 - 2x$$

Values of x and y that satisfy the equation

x	y
1	38
2	36
3	34
.	.
.	.
.	.
13	14

\therefore 13 values of (x, y) satisfy the equation such that $x \leq y$

68. 5 Using options, the sum of the numerator and denominator of the ratio should be a prime number.
Only option (5) satisfies $[97 + 84 = 181]$

69. 1 Task 2 can only be given to two persons i.e. (3 and 4)
 \therefore Number of ways = 2 ways
 First task can be done in 3 ways by 3 persons.
 Third task can be done by 4 persons.
 \therefore 4 ways similarly for fourth, five and six tasks,
 number of ways is 3, 2 and 1 respectively.
 \therefore Total number of ways = 144 ways

70. 5 $\log_y^x = a, \log_z^y = b, \log_x^z = a \times b$

$$a = \frac{\log_y^x}{\log_z^y} \text{ and } b = \frac{\log_z^y}{\log_x^z}$$

$$\Rightarrow a \times b = \frac{\log_y^x}{\log_z^y} \times \left(\frac{\log_z^y}{\log_x^z} \right)$$

$$= \left(\frac{\log_k^x}{\log_k^y} \right) \times \left(\frac{\log_k^y}{\log_k^z} \right) \quad [\text{For some base } k]$$

$$= \left(\frac{\log_k^x}{\log_k^y} \right)^3 = (\log_y^x)^3 = (ab)^3$$

$$\text{So, } ab - a^3b^3 = 0$$

$$a \times b(1 - a^2b^2) = 0$$

$$\Rightarrow ab = \pm 1$$

Only option (5) does not satisfy.

71. 5 Equation (ii) can be written as

$$4^{0.3x} \times 9^{0.2y} = 8 \times (81)^{1/5}$$

$$\Rightarrow (2^2)^{0.3x} (3^2)^{0.2y} = 8 \cdot (81)^{1/5}$$

$$\Rightarrow 2^{0.6x} 3^{0.4y} = 2^3 \cdot (3^4)^{1/5} = 2^3 \cdot 3^{4/5}$$

$$\Rightarrow 0.6x = 3 \Rightarrow x = 5$$

$$\text{and } 0.4y = \frac{4}{5}$$

$$\Rightarrow y = 2$$

If we put the values of x and y in first equation these values satisfy the first equation also.

So the answer is $x = 5, y = 2$

Hence, option (5) is the correct option.

72. 5 $f(x) = \max(2x + 1, 3 - 4x)$

So, the two equations are $y = 2x + 1$ and $y = 3 - 4x$
 $y - 2x = 1$

$$\Rightarrow \frac{y}{1} + \frac{x}{-1/2} = 1$$

Similarly, $y + 4x = 3$

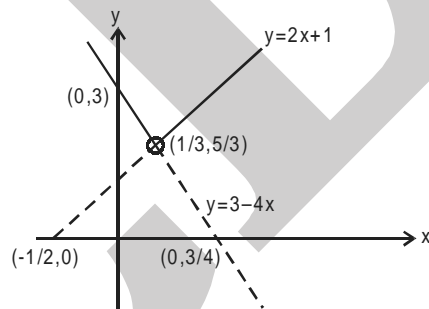
$$\Rightarrow \frac{y}{3} + \frac{x}{3/4} = 1$$

Their point of intersection would be

$$2x + 1 = 3 - 4x$$

$$\Rightarrow 6x = 2$$

$$\Rightarrow x = \frac{1}{3}$$



So when $x \leq \frac{1}{3}$, then $f(x)_{\max} = 3 - 4x$

and when $x \geq \frac{1}{3}$, then $f(x)_{\max} = 2x + 1$

Hence, the minimum of this will be at $x = \frac{1}{3}$

$$\text{i.e. } y = \frac{5}{3}$$

Alternative method:

As $f(x) = \max(2x + 1, 3 - 4x)$

We know that $f(x)$ would be minimum at the point of intersection of these curves

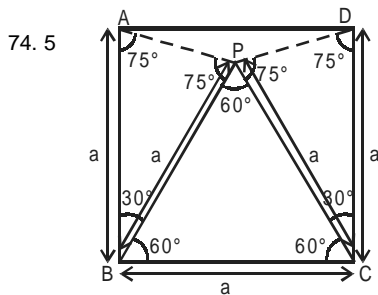
$$\text{i.e. } 2x + 1 = 3 - 4x$$

$$\Rightarrow 6x = 2$$

$$\Rightarrow x = \frac{1}{3}$$

Hence, $\min f(x)$ is $\frac{5}{3}$

73. 2 Let the number be $10x + y$ so when number is reversed the number becomes $10y + x$. So, the number increases by 18
Hence $(10y + x) - (10x + y) = 9(y - x) = 18$
 $y - x = 2$
So, the possible pairs of (x, y) is $(3, 1)$ $(4, 2)$ $(5, 3)$ $(6, 4)$ $(7, 5)$ $(8, 6)$ $(9, 7)$
But we want the number other than 13 so, there are 6 possible numbers, i.e. 24, 35, 46, 57, 68, 79.
So total possible numbers are 6.



$\angle PBC = \angle CPB = \angle BPC = 60^\circ$ (L's of equilateral triangle)

$PC = CD$ (both a)

$$\text{Also } \angle CPD = \angle PDC = \frac{180^\circ - 30^\circ}{2} = 75^\circ$$

Similarly, $\angle BAP = \angle BPA = 75^\circ$

$$\angle APD = 360^\circ - 75^\circ - 75^\circ - 60^\circ = 150^\circ$$

75. 3 Let us assume that Arun started running at 10 a.m. and Barun started at 12 noon. So, in these two hours distance traveled by Arun is 60 km and the relative speed of Barun w.r.t Arun is 10 km/hr. So Barun will

$$\text{overtake Arun after} = \frac{60}{10} = 6 \text{ hours}$$

So, Barun reaches there at 6 p.m.

So, Kiranmala also overtakes Arun at 6 p.m.

Let us assume Kiranmala takes 't' time to overtake Arun and the relative speed of Kiranmala w.r.t Arun is 30 km/hr and Arun ran for 8 hrs.

So, distance travelled by Arun is $= 30 \times 8 = 240$ km while distance travelled by Kiranmala $= 60t$

$$\therefore 240 = 6t \Rightarrow t = 4$$

Hence, Kiranmala start running 4 hours after Arun had started off.