Actual CAT 2025

Slot – I

hitbullseye

BULLS EYE KNOWLEDGE SYSTEM LIMITED

Answer Key Actual CAT Slot - I

Q. No	Key	Q. No	Key	Q. No	Key
1.	4	25.	2	47.	4
2.	3	26.	50 (TITA)	48.	4
3.	2	27.	80 (TITA)	49.	1
4.	1 (TITA)	28.	40 (TITA)	50.	1
5.	4 (TITA)	29.	60 (TITA)	51.	3
6.	1	30.	4 (TITA)	52.	16 (TITA)
7.	3	31.	0 (TITA)	53.	3
8.	4	32.	5 (TITA)	54.	900 (TITA)
9.	2	33.	4 (TITA)	55.	1
10.	4	34.	1	56.	3
11.	3	35.	4 (TITA)	57.	4
12.	1	36.	4	58.	3 (TITA)
13.	4	37.	4	59.	2
14.	3	38.	1	60.	6 (TITA)
15.	3421 (TITA)	39.	7 (TITA)	61.	15 (TITA)
16.	3142 (TITA)	40.	4	62.	1
17.	2	41.	4	63.	4
18.	2	42.	6 (TITA)	64.	55 (TITA)
19.	2	43.	2	65.	4
20.	4	44.	3	66.	175 (TITA)
21.	2	45.	4	67.	60 (TITA)
22.	1	46.	3	68.	4
23.	4				
24.	1				

Explanation Actual CAT Slot - I

Q. No	Explanation
1.	The sentence to be inserted is a direct quote from Ava that summarizes the core theme of the paragraph: the use of historic, manual techniques from Mexico. To maintain logical flow and coherence, the quote should be placed where it can immediately introduce or emphasize this theme before specific details are provided. Position 1 follows the opening sentence, which states that the sisters "embrace the ways their great-grandfather" worked. Inserting Ava's quote here allows her statement to act as a thematic bridge, emphasizing the "old-world, traditional" nature of those ways before the paragraph elaborates with concrete examples (using hand saws, chisels, sandpaper, etc.). This creates a natural progression from general principle to specific practices. Position 2 comes after the description of techniques. While not entirely illogical, placing the quote here makes it feel more like an afterthought or repetition rather than an introductory emphasis. Position 3 and 4 are too far removed from the discussion of techniques. The paragraph shifts to topics like waitlists, clientele, and personal history, so inserting the quote there would disrupt the flow and weaken the connection to the relevant context. Therefore, Option 1 provides the most coherent and effective placement for the given sentence.
2.	Option 1 is incorrect because it misstates the choice as being between "respectfully acknowledging works" and appropriation, which does not accurately reflect the passage's focus on the act of drawing inspiration itself. Option 2 captures the contrast between inspiration and appropriation and lists specific negative outcomes, but it omits the globalized context and the broader societal impacts (power imbalances) highlighted at the end of the passage. Option 3 successfully incorporates all key elements: the globalized setting, the need to navigate between respectful inspiration and appropriation, the definition of appropriation, and—most importantly—the extension of its impact to societal power imbalances. While it does not enumerate every specific consequence (e.g., commodification, stereotypes), the phrase "broader societal impacts" effectively encompasses them. Option 4 is too simplistic and misleading; it suggests artists "must" draw from diverse cultures to appeal to everyone, which is not stated, and it fails to address the distinction between respectful and disrespectful borrowing or the serious consequences of appropriation.
3.	Option 1: This is partially correct but incomplete and slightly misleading. It correctly states that a younger immune system clears the cells and that aging leads to accumulation. However, it says the cells "resist apoptosis," which the passage does not claim. The passage states the immune system's clearance process becomes less efficient, not that the cells actively resist. Option 2: This is the most accurate and complete summary. It correctly links aging to less effective apoptosis, which leads to accumulation, which in turn causes inflammation and chronic diseases. It captures the essential cause-and-effect chain described in the passage. Option 3: This is merely a definition of the cells. It fails entirely to address the main point of the passage, which is the process of how their accumulation with age leads to health problems. Option 4: This is incorrect on several points. It calls the cells "dead" (they are senescent/alive but not dividing). It also reverses causality, suggesting inflammation weakens the immune system, while the passage states that a weakened immune system (less effective apoptosis) allows the cells to accumulate and cause inflammation.
4.	Sentences 3, 5, 2, and 4 form a coherent paragraph discussing how the Bayeux tapestry was displayed to create an immersive viewer experience. The logical flow is: Sentence 3 introduces Linda Neagley's argument about how pre-Renaissance people interacted with art. Sentence 5 explains that the Bayeux tapestry was hung at eye level to enable such interaction. Sentence 2 presents Gale Owen-Crocker's idea about the tapestry being hung in a square arrangement. Sentence 4 describes how that arrangement created an immersive 11th-century space. Sentence 1, which states the tapestry's purpose as a storytelling medium about the Norman conquest, does not fit this sequence. It begins with "therefore," implying a conclusion from prior information not present in the other sentences, and its focus on the tapestry's narrative function is separate from the paragraph's theme of physical display and viewer interaction.
5.	Sentences 5, 2, 1, and 3 form a coherent paragraph that introduces the philosophical concept of freedom, narrows it to "freedom over death," explains how developments have increased this freedom, and concludes that legalizing assisted dying is a further step in realizing it. Sentence 4, while related, introduces the specific idea of public endorsement of a right to medical assistance in hastening death, which disrupts the logical flow and is not necessary for the core argument presented in the other four sentences.
6.	The last paragraph states that physicians and lawyers were bound together by shared class, race, gender, and various social networks, but their professional connection centered on their shared concern with the mind and criminal responsibility. Although the passage notes they were "divided by contests over the borders of criminal

	responsibility," this very contestation indicates that this domain was their common professional ground. The other options are incorrect: Option 2 ("Eccentricity and aggression") refers to symptoms some alienists classified as mental disease, not a connecting quality. Option 3 ("Empathy and imagination") relates to how jurors made inferences in the first paragraph, not to the connection between physicians and lawyers. Option 4 ("The opinions of family and neighbours") describes pre-expert methods of assessing sanity mentioned earlier, not a bond between these professionals. Thus, their shared engagement with the borders of criminal responsibility best describes their connection among the given choices.
7.	The passage's central concern is the challenge of assessing a defendant's mental state in criminal law, the evolving role of medical experts (alienists) in defining insanity, and how these intersect with legal notions of responsibility and punishment. Each concept in option 3 is directly and repeatedly addressed in the text: Judgement: The passage begins by discussing how judgements about mental state are made through inference, empathy, and imagination, especially in court. Insanity: The role of alienists (early psychiatrists) in diagnosing insanity and testifying in court is a major theme in the second and fourth paragraphs. Punishment: Criminal responsibility is explicitly linked to "liability to punishment" in the third paragraph. Responsibility: The passage repeatedly examines the legal concept of criminal responsibility and its entanglement with medical views of insanity. The other options include concepts that are either peripheral (patronage, business, patriotism) or only partially relevant (empathy, prosecution) without capturing the core legal-medical debate that defines the passage's argument.
8.	The passage explicitly defines the term "alienist" in the second paragraph: "In the nineteenth century……….neurologists, and psychologists." This directly matches option 4. The other options misinterpret the term: Option 1 is too broad and does not capture the specific medical specialty. Options 2 and 3 incorrectly associate "alienist" with immigrants or extraterrestrials, which is not supported by the passage. Therefore, according to the passage, an alienist was a physician specializing in mental illness.
9.	In the sentence, "confession" is listed alongside disease, gender, and race as characteristics that could make a defendant appear "unlike" the officials judging them. In this context, "confession" does not refer to admitting guilt (a legal confession) but rather to professing a religious faith—a meaning rooted in its historical use to denote religious affiliation or creed (e.g., "the Protestant confession"). The sentence suggests that a defendant's religion, like their gender, race, or health, could mark them as different from the typically white, middle-class, Protestant legal officials of the era, thereby making judgments about their mental state seem more precarious. Thus, the word is used metaphorically to stand for the defendant's religion. The other options are incorrect: Option 1 incorrectly treats "confession" as synonymous with "professing" gender, race, or disease, which distorts the list of distinct categories. Option 3 misreads "struck" as physical violence and inserts an unrelated legal confession. Option 4 invents a false etymology for "dint" and misinterprets "confession" as a false admission of crime, which does not fit the context.
10.	The passage's second argument links inequality to growth through incentives and moral hazard. It states that when compensation is not tied to economic performance, agents may not provide optimum effort. Therefore, performance-based pay — which naturally creates income differences between more and less productive workers — is seen as a way to enhance motivation and spur growth. Option 4 directly embodies this idea: rewarding verifiable performance creates inequality (higher pay for high performers) but aligns incentives with productivity, thereby raising growth. Option 1 refers to the third argument in the passage (concentration of stock ownership for corporate governance), not the incentive/moral hazard argument. Option 2 (wages by tenure) ignores performance and would likely reduce incentives for effort, contradicting the argument. Option 3 (rents protected by market power) describes inequality that is not linked to results, so it does not fit the incentive rationale described. Thus, only option 4 is consistent with the claim that some inequality can raise growth by improving incentives.
11.	Option 1 is one-sided. The passage does not "argue that income inequality accelerates economic growth"; it neutrally presents both supporting and opposing evidence. Option 2 is inaccurate. The passage does not confine itself to financing and corporate control; it covers a broader range of factors (incentives, human capital, political effects). It also explicitly uses cross-country evidence and

	discusses human capital, fertility, and democratization, so it does not overlook these concerns. Option 4 is too narrow. While the passage does mention short- and long-term consequences, this option misses the passage's core structure—the systematic outlining of the three channels through which inequality might affect growth, as well as the balanced presentation of both positive and negative evidence. Option 3 correctly captures the passage's balanced, survey-like structure: it outlines the pro-growth channels, acknowledges short-term gains, and notes the long-term drawbacks and negative correlations reported in other studies.
12.	The passage explicitly notes that empirical studies associated with these arguments show a positive impact of inequality on growth in the short or medium term (with long-term correlations turning negative). Thus, the primary function of this three-part case is to demonstrate the contextual mechanisms and settings—high sunk costs, incentive alignment, and concentrated ownership—through which inequality may temporarily support growth. Why the other options are incorrect: Option 2 directly contradicts the passage, which argues that dispersed ownership slows decision-making and creates free-rider problems. Option 3 is an overstatement; the passage does not claim inequality boosts growth in "every period and type of economy" but specifies certain conditions and notes the effect reverses in the long run. Option 4 mentions mature stock markets making wealth concentration unnecessary—a point loosely related to the first argument—but this is not the primary function of the three-part case; moreover, the option's second clause ("might still be harmful to investment") is not supported by the presented case for a positive link.
13.	This option directly describes a reduction in suffrage and suppression of political pluralism—key features of de-democratization or autocratization, the clear opposite of the expansion of voting rights and inclusion highlighted in the passage. The other options either mislabel democratic practices as authoritarian (option 3), focus on entrenching autocracy without explicitly reducing suffrage (option 1), or discuss campaign finance reforms in the context of oligarchy (option 2), which do not as directly capture the reversal of the democratization process described.
14.	The paragraph first discusses how changes in lighting and domestic habits reduced the traditional need for silver display, yet the trade remained buoyant due to collector demand. The missing sentence, placed at position (3), effectively explains this sustained interest by asserting silver's enduring role in the "business of 'show'" across various settings. It then naturally leads into the next factor—systematic collecting by American museums—which is another manifestation of silver's continued importance for display and status. Placing the sentence earlier (e.g., at Option 1) would disrupt the logical flow from Schroder's specific observation to the broader market analysis.
15.	Sentence 3 introduces the main idea: the social expectation that women suppress anger, unlike men. Sentence 4 continues this idea by providing a concrete example from a coach's experience, showing how this suppression manifests (women "pull their punches"). Sentence 2 presents the next step: the sense of liberation women feel when they do express their anger ("letting their fists fly"). Sentence 1 concludes by broadening the focus, stating that how we handle anger shapes our life and character—a point that applies to everyone, regardless of gender. When read in the order 3-4-2-1, the paragraph flows logically from describing a socialized behavior, to its practical effect, to the release from that behavior, and finally to a universal observation about anger management.
16.	Sentence 3 introduces the panoptic mechanism as a way of embedding power relations within functions. Sentence 1 elaborates with specific examples of how it can be integrated into various functions and increase their effects. Sentence 4 summarizes the idea, emphasizing that power is subtly embedded rather than externally imposed. Sentence 2 concludes with a reflective comment on the mechanism's apparent simplicity in the political sphere. When arranged as 3-1-4-2, the paragraph logically progresses from definition to detailed examples, then to a concise summary, and ends with a broader observation.
17.	The two basic questions recounted at the start of the passage reflect a listener's potential difficulty in recognizing electronic music as legitimate music and in accepting it as human expression. The "communication problem" in paragraph 2—caused by electronic music's unfamiliar "language of forms" and technical terms—directly addresses the first of those questions. It explains why people might initially struggle to see electronic music as music, but the paragraph also states that this barrier can be overcome once the new structural procedures are understood. Thus, the communication problem is the specific obstacle that underlies the initial skepticism, but one that is surmountable.
18.	The phrase "sui generis" (Latin for "of its own kind") is used in the context of electronic music composers exploring new languages and forms that are unique to the medium—distinct from traditional musical structures.

	The term implies something particular, distinctive, and not derived from existing models. "Indescribable" (option 1) is not accurate, as the passage suggests these forms can be understood and explored, not that they are beyond description. "Unaesthetic" (option 3) contradicts the passage, which mentions "aesthetic magic." "Generic" (option 4) is the opposite of "sui generis," which denotes uniqueness. Thus, "particular" best captures the meaning of "sui generis" in this context.
19.	The passage is structured as a direct response to the two basic questions posed at the outset: whether electronic music qualifies as genuine music and whether it is "inhuman." The author systematically addresses these charges by explaining how a modern understanding of music (paragraph 1), overcoming communication barriers through familiarity (paragraph 2), the serious composer's creative exploration (paragraph 3), and the composer's essential human role in the process (paragraph 4) all counter these criticisms. While the passage does touch on distinctions between modern and 19th-century composers and between electronic and traditional music, these points serve the larger purpose of defending electronic music against the initial doubts. The author does not aim primarily to differentiate composers or musical forms, nor to defend composers from Hiller or Stravinsky (indeed, the author cites them supportively). Therefore, the overarching goal is to defend electronic music from the common charges of being non-musical and inhuman.
20.	Stravinsky's description of music as "a form of speculation in terms of sound and time" serves in the passage to: Complicate our notion of what is communicated through music (option 1) by shifting from a 19th-century emotional-expression model to a more abstract, speculative one. Allow us to classify electronic music as music (option 2) because this broader, objective definition accommodates non-traditional forms. Respond to and expand upon earlier understandings of music (option 3) by offering a characteristically 20th-century view that contrasts with the earlier Romantic ideal. However, Stravinsky's definition does not provide a criterion for distinguishing musical from non-musical sounds (option 4). It redefines the nature of musical composition but does not establish a test for which specific sounds qualify as music. Therefore, option 4 is the one that Stravinsky's mention does not accomplish according to the passage.
21.	The passage discusses the stock-market rebound during COVID-19 as follows: "Some of these dynamics are potentially attributable to former sports bettors … The arrival of these new players might have increased inefficiencies…" The language is speculative and tentative, presenting the bettors' entry as one possible factor among others. It does not state or imply that this was the sole or overriding cause of the rapid recovery across all assets and time horizons. Therefore, the inference drawn in option 2 is not supported by the passage. The other options are supported: Option 1 reflects the discussion of how a rare shock can change rules and raise the odds of second-order tail events. Option 3 captures the idea that contagion can amplify local choices into unintended system-wide cascades, illustrated by runs on banks and toilet-paper scrambles. Option 4 accurately summarizes the passage's point about heavy-tailed distributions making extreme outcomes more frequent and complicating forecasting.
22.	The passage claims that a first-order tail event (e.g., a stock-market crash) raises the probability of further tail events (second-order tail events). Option 1 directly supports this by describing empirical evidence: after a major crash, large daily moves cluster together and extreme days occur much more frequently than usual. This matches the passage's description of how an initial tail event changes the rules and increases the likelihood of subsequent extreme events. The other options do not strengthen the claim: Option 2 describes a return to baseline with no elevated aftershocks, which contradicts the claim. Option 3 states that initial super-spreading episodes do not raise the frequency or size of later extreme clusters, again weakening the claim. Option 4 discusses normal distributions with thin tails, which is irrelevant to the claim about tail events increasing subsequent tail-event probability. Thus, only option 1 provides observational evidence that would strengthen the passage's claim.
23.	The passage systematically develops three key ideas about complex systems: Noise can create order – illustrated by the fish-schooling example and the unintended consequences of contact-tracing apps. Vulnerability to heavy-tailed events – in collective settings where contagion shapes behavior, extreme events (like bank runs or infection surges) occur more frequently than a normal distribution would predict. Cascades and rule-changes – a first-order tail event raises the probability of further tail events (second-order events) because it changes the perceived costs and rules of the system (nonstationarity), exemplified by the COVID-19 stock-market rebound and the coevolutionary arms race of hosts and parasites. Option 4 accurately captures this progression and scope. The other options misrepresent the passage:

	Option 1 overstates the role of speculative bettors and claims long-term investors "invariably profit," which the passage does not assert. Option 2 contradicts the passage, which emphasizes that extreme events are not negligible in complex systems. Option 3 incorrectly limits the concept of adaptation to parasite-host systems and denies its relevance to technology-mediated social dynamics, whereas the passage uses the coevolution example to illustrate a general complex-systems concept. Thus, option 4 provides the most complete and accurate summary of the passage.
24.	The passage's suggestion that contact-tracing apps could inadvertently raise risky interactions rests on the idea that individual responses to local information can interact and produce unintended collective outcomes—similar to how noise (misalignment) among fish feeds back on itself to produce orderly schooling. For this to happen, the system must exhibit interdependence and feedback: people's movement choices must be influenced both by infection information and by others' behavior, so that many small adjustments aggregate into a large-scale pattern that may counter the app's goal. Option 1 explicitly states this necessary assumption. The other options are not necessary for the suggestion to hold: Option 2 (most users uninstall apps quickly) would likely prevent the emergence of any systematic collective pattern. Option 3 (perfect technical accuracy of apps) is not required; even with imperfect data, local behavioral adjustments could still interact. Option 4 (uniform traffic conditions making interdependence negligible) would actually undermine the suggestion, as it denies the feedback mechanism central to the passage's reasoning.
25 - 29.	Let the number of tickets booked from various stations are as follows:

Station		Destination				
		A	B	C	D	E
Start	A	–	p	q	r	s
	B	–	–	t	u	v
	C	–	–	–	w	x
	D	–	–	–	–	y
	E	–	–	–	–	–

Considering point 3, s + v = 4/7 × (s + v + x + y)
=> (s + 30)/(x + y) = 4/3
Considering point 2, t = 40 and v = 30
Considering point 5, p = u = y = 0
Solving, (s + 30)/(x + 0) = 4/3
=> 3s + 90 = 4x
Considering point 4, q = s > v = 30
Also in point 6, the number of tickets booked for any segment = multiple of 10
Let s = 40 => x = 52.5 (not possible)
Let s = 50 => x = 60 (possible)
Let s = 60 => x = 67.5 (not possible)
Let s = 70 => x = 75 (not possible)
Let s = 80 => x = 82.5 (not possible)
Let s = 90 => x = 90, but that makes s + v + x + y = 210 > 200 (maximum seating capacity (not possible)
So, only possibility, s = 50 = q and x = 60

Station		Destination				
		A	B	C	D	E
Start	A	–	0	50	r	50
	B	–	–	40	0	30
	C	–	–	–	w	60
	D	–	–	–	–	0
	E	–	–	–	–	–

Considering point 1, segment C – D had an occupancy factor = 95% of 200
So, Tickets (A-E + A-D + B-E + B-D + C-E + C-D) = 190
=> 50 + r + 30 + 0 + 60 + w = 190
=> r + w = 50
Also, segment B – C had an occupancy factor > 190 = 200 (only multiple of 10)

	So, Tickets (A-E + A-D + A-C + B-E + B-D + B-C) = 200 => 50 + r + 50 + 30 + 0 + 40 = 200 => r = 30 and => w = 20

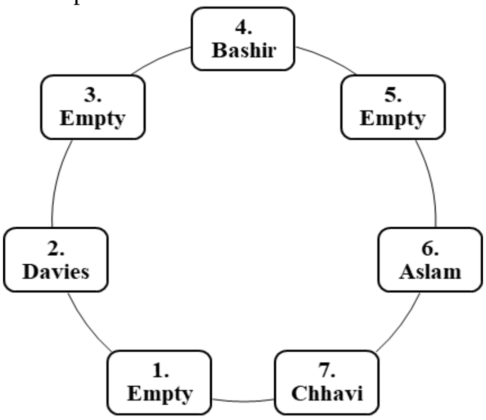
Station		Destination				
		A	B	C	D	E
Start	A	–	0	50	30	50
	B	–	–	40	0	30
	C	–	–	–	20	60
	D	–	–	–	–	0
	E	–	–	–	–	–

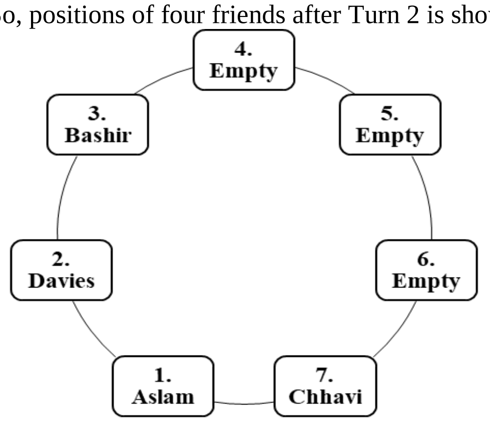
25.	The occupancy for segment D – E = s + v + x + y = 140 Hence, the occupancy factor = 140/200 × 100 = 70%
26.	Number of tickets booked from Station A – E = s = 50
27.	Number of tickets booked from station C = Tickets (C-D + C-E + D-E) = 20 + 60 + 0 = 80
28.	Number of tickets booked to station C = Tickets (A-C + B-C) = 50 + 40 = 90 Number of tickets booked to station D = Tickets (A-D + B-D + C-D) = 30 + 0 + 20 = 50 Required difference = 90 – 50 = 40
29.	Number of tickets booked to travel in exactly one segment = Tickets (A-B + B-C + C-D + D-E) = 0 + 40 + 20 + 0 = 60

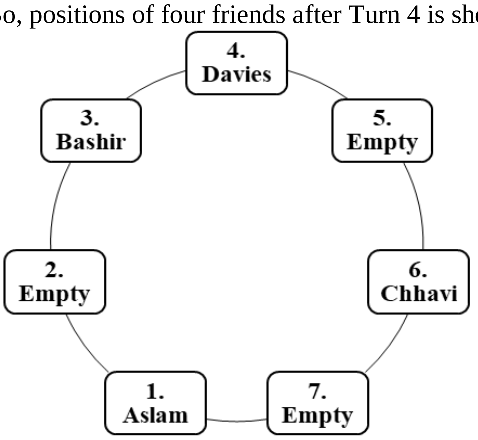
30 - 34. Considering point 3, Bunty received a rating of 1 from Lalu in Quarter 2. But in Quarter 1, he was in group Elite led by Kuku, so he must got the lowest rating and was demoted to Novice led by Lalu in Quarter 2. Asha and Chintu is still part of group Elite at the end of Quarter 1 with rating either 2 or 3.
Considering point 2, Dolly and Falguni got the same rating across all the quarters, and Dolly received ratings of 2 in Quarter 3 by Lalu. So, she must received rating 2 throughout each Quarter.
Now if Falguni got the rating of 1 at the end of each Quarter, she will not able to promote to Elite group, but considering point 1, Asha, Bunty and Chintu, all are part of Novice group at the beginning of Quarter 4. So, each one of them must demoted to Novice group one by one. Similarly, Dolly, Eklavya and Falguni must be promoted to Elite group one by one.
So, Falguni must get the rating of 3 at the end of Quarter 1 and promoted to Elite group and Eklavya got the rating of 1 at the end of quarter 1.
At the end of Quarter 2, among Novice group, Bunty received rating 1, Dolly received rating 2 (being same throughout). So, Eklavya received rating 3. Now the cumulative score of Dolly and Eklavya becomes same, but Eklavya has he higher rating at the end of Quarter 2, so he must be promoted to Elite group in Quarter 3.
Also in Quarter 3, Asha received rating of 1 from Lalu (manager of Novice group). So, at the end of Quarter 2, among Elite group, Asha must be demoted to Novice with minimum cumulative score.
Now for Asha having minimum cumulative score, Asha must has rating 1 and Chintu must has rating 2 in Quarter 2. Also, rating of Asha in Quarter 1 can be 2 or 3 and rating of Chintu in Quarter 1 can be 2 or 3 such that cumulative score after Quarter 2 of Asha is 3 or 4 and Chintu is 4 or 5.
Now in Quarter 3, Chintu demoted to Novice group with minimum cumulative score, so his cumulative score can be 5 or 6 after Quarter 3 having rating 1 in Quarter 3 and Dolly promoted to Elite group having highest cumulative rating 6 after Quarter 3.
The rest of the information can be gathered as follows:

Employee		Asha	Bunty	Chintu	Dolly	Eklavya	Falguni
Quarter 1	Group	Elite	Elite	Elite	Novice	Novice	Novice
	Rating	2/3	1	3/2	2	1	3
Quarter 2	Group	Elite	Novice	Elite	Novice	Novice	Elite
	Rating	1	1	2	2	3	3
Cumulative Rating		3/4	2	4/5	4	4	6
Quarter 3	Group	Novice	Novice	Elite	Novice	Elite	Elite
	Rating	1	3	1	2	2	3
Cumulative Rating		4/5	5	5/6	6	6	9
Quarter 4	Group	Novice	Novice	Novice	Elite	Elite	Elite
	Rating				2	1	3

30.	Eklavya’s score at the end of Quarter 2 is 4
31.	No employee changed group more than once up to the beginning of Quarter 4
32.	Bunty’s score at the end of Quarter 3 is 5
33.	The scores at the end of Quarter 3 can be determined with certainty for 4 employees

<table>
<tr><td>34.</td><td>Statement I. Asha received a rating of 2 in Quarter 1 is not true as she received either rating 2 or 3 in Quarter 1
Statement II. Asha received a rating of 1 in Quarter 2 is true</td></tr>
<tr><td>35 - 38.</td><td>Considering point 2, Davies occupies Chair 2 after Turn 1 (which is moved by Aslam), so Davies must be seated on Chair 2 initially. Also, initially the chairs on either side of Davies are empty. So, Chair 1 and Chair 3 are empty initially. Chhavi occupies Chair 7 after Turn 2 (which is moved by Bashir), so Chhavi must be seated in Chair 7 initially. Also, initially Aslam and Chhavi are seated next to each other, so Aslam must be seated on Chair 6 initially. So, Bashir must be seated on Chair 4 initially (only empty chairs left on either side)
Initial positions of four friends is shown as follows:


Considering point 1, the four friends occupies adjacent chairs at the end of Turn 2. Now if Aslam (having Turn 1) moved counterclockwise to the empty Chair 5 followed by Bashir (having Turn 2) moved to either Chair 3 (counterclockwise) or Chair 6 (clockwise), the four friends would not be occupying adjacent chairs. So, Aslam (having Turn 1) must moved clockwise to occupy the Chair 1 followed by Bashir (having Turn 2) moved to Chair 3such that the four friends occupies adjacent chairs.
So, positions of four friends after Turn 2 is shown as follows:


Again considering point 2, Davies occupies Chair 4 after Turn 5. So, Chhavi having Turn 3 must move to Chair 6 followed by Davies having Turn 4 must move to Chair 4.
So, positions of four friends after Turn 4 is shown as follows:

</td></tr>
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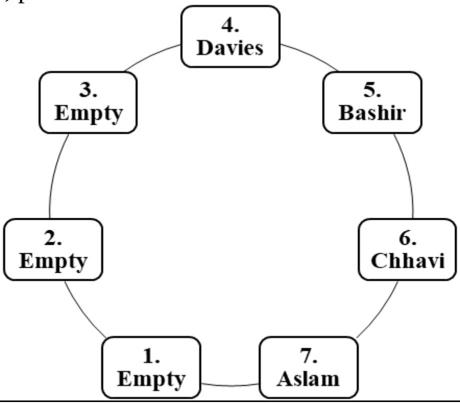
Again considering point 1, the four friends occupy adjacent chairs at the end of Turn 6. So, Aslam (having Turn 5) must move counterclockwise to occupy Chair 7 and Bashir (having Turn 6) must move clockwise to occupy Chair 5 such that the four friends occupy adjacent chairs at the end of Turn 6.

So, positions of four friends after Turn 6 is shown as follows:



35. The number of the chair initially occupied by Bashir is Chair 4

36. Since, Davies moved to Chair 4 having Turn 4, so at the end of Turn 3, Chair 4 must be empty and no one sits on the Chair numbered 4

37. At the end of Turn 6, chairs occupied are Chairs numbered 4, 5, 6, and 7

38. At the end of Turn 7, Chhavi from Chair 6 moved to either empty Chair 1 or empty Chair 3 and Bashir is sitting on Chair 5. So, the friends sitting on chairs adjacent to Bashir are Chair 4 occupied by Davies and Chair 6 must be empty

39 - 42. Following points are given:

1. 5 players (A, B, C, D, E) asks a unique question to the other players.
2. Total Responses = 5 × 4 = 20
3. Responses: Yes (1Tap), No (2 Taps), Maybe (3 Taps)
4. Total taps heard = 40

Let Y, N, M be the total number of Yes, No and Maybe responses respectively.

So, $Y + N + M = 20$ and $Y + 2N + 3M = 40$

By solving these 2 equations, we can get $Y = M$

So, $Y + N + M = 20$ implies $N = 20 – 2Y$.

Now, use the constraint: **Each question received at least one "Yes", one "No", and one "Maybe."** This means that for the **4 responses** to any question (i.e., for any column in the response matrix), Since there are 5 questions, minimum values of Y, N and M are 5 each.

So there can be following possible cases:

Y	N	M
5	10	5
6	8	6
7	6	7

Now let us consider remaining informations:

Alia tapped a total of 6 times and received 9 taps to her question. She responded "Yes" to the questions asked by both Clive and Dilshan.

Dilshan and Ehsaan tapped a total of 11 and 9 times respectively. Dilshan responded "No" to Badal.

Badal, Dilshan, and Ehsaan received equal number of taps to their respective questions.

No one responded "Yes" more than twice i.e. every row can have at most two Y's. It also implies that Alia must have said two No's for B's and E's question.

Respondents	A	B	C	D	E	Taps Tapped
A	-	N (2)	Y (1)	Y (1)	N (2)	6
B		-				
C			-			
D		N (2)		-		11
E					-	9
Taps recieved	9	p	q	p	p	40

	Now total taps received are 40. Hence 9 + 3p + q = 40 i.e. 3p + q = 31. (p, q) = (7, 10) or (8, 7) or (9, 4). Since Each question received at least one "Yes", one "No", and one "Maybe" means every column should contain at least one Y, N and M i.e. total of 6. So (9, 4) is rejected. Since B's question already has got 2 N's and every column should contain at least one Y, N and M; So, p cannot be 7. Hence p = 8, q = 7. Also, By observing the taps received we can judge taps given to each player's question. e.g. Badal received 8 taps for her question. By taking all above conditions in mind, it is possible only if he got one Y, two N's, 1 M. Similarly we can judge for C, D and E. Let us assume total taps responded by B and C are s and w. So, s + w = 14 where w > s. So, (w, s) = (8, 6); (9, 5); (10, 4)….and so on. But if we consider s = 5, there is only one way to make B's row's total as 5 i.e. (1, 1, 1, 2) which is a contradiction to the given fact that No one responded "Yes" more than twice. So, s = 8; w = 6. Also, alia can get 9 taps in only one way i.e. Y, N, M, M. Let us update the table:

Respondents	A	B	C	D	E	Taps Tapped
A	-	N (2)	Y (1)	Y (1)	N (2)	6
B	1/3	-				s = 6
C	2/3	1/3	-			w = 8
D	2/3	N (2)		-		11
E	1/3	3/1			-	9
Taps recieved	9 (Y, N, M, M)	8 (Y, N, N, M)	7 (Y, Y, N, M)	8 (Y, N, N, M)	8 (Y, N, N, M)	40

39.	Clive received 7 taps for his question.
40.	Alia and Badal tapped an equal number of times in total
41.	D's total taps are 11. D tapped twice in response to B's question. That means the only possible way is (3, 3, 3, 2). B's total taps are 6 i.e. 1, 1, 2, 2 is the only way to get a 6 (Keep in mind that No one responded "Yes" more than twice). So, we can fill in the remaining table as follows:

Respondents	A	B	C	D	E	Taps Tapped
A	-	N (2)	Y (1)	Y (1)	N (2)	6
B (1,1,2,2)	1	-	2	2	1	s = 6
C	2	1	-	3	2	w = 8
D	3	N (2)	3	-	3	11
E	3	3	1	2	-	9
Taps recieved	9 (Y, N, M, M)	8 (Y, N, N, M)	7 (Y, Y, N, M)	8 (Y, N, N, M)	8 (Y, N, N, M)	40

So, Clive's response to Ehsaan's question is No.

42.	6 "Yes" responses were received across all the questions.
43 - 46.	The given information in the charts can be gathered as follows:

	Import tariff % on country				
By ↓	**US**	**France**	**India**	**Japan**	**UK**
US	–	20%	40%	30%	30%
France	30%	–	40%	30%	40%
India	40%	50%	–	50%	20%
Japan	40%	30%	50%	–	40%
UK	20%	30%	30%	40%	–

	Import tariff in Billion USD charged on country				
By ↓	**US**	**France**	**India**	**Japan**	**UK**
US	–	6	4.5	7	3
France	5.5	–	6.5	4	4.5
India	9	5	–	3.5	5
Japan	4	3	8	–	3
UK	2.5	4	3	6	–

Imports from France by US × Tariff rate = Import Tariff

⇒ Imports from France by US × 20% = 6 Billion USD

⇒ Imports from France by US = 6/20 × 100 = 30 Billion USD

Similarly, it can be calculated for others as follows:

	Imports from country in Billion USD				
By ↓	**US**	**France**	**India**	**Japan**	**UK**
US	–	30	11.25	23.33	10
France	18.33	–	16.25	13.33	11.25
India	22.5	10	–	7	25
Japan	10	10	16	–	7.5
UK	12.5	13.33	10	15	–

43. Japan's export to India worth = India's import from Japan = 7 Billion USD

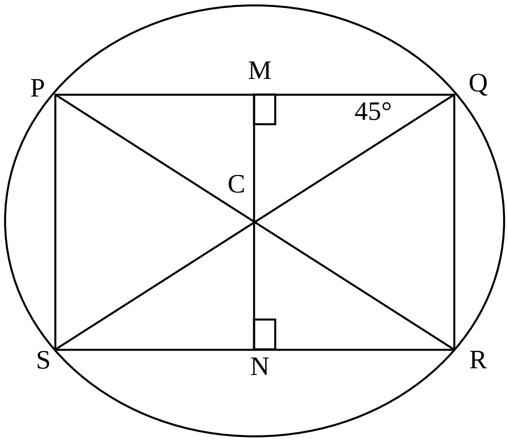
44. Going by options,
1. Exports by France to Japan = Imports by Japan from France = 10 Billion USD
2. Imports by France from India = 16.25 Billion USD
3. Imports by US from France = 30 Billion USD, highest
4. Exports by Japan to UK = Imports by UK from Japan = 15 Billion USD

45. Trade surplus/trade deficit of India with UK = Exports from India to UK – Imports from India from UK
= Imports from UK to India – Imports from India to UK
= 10 – 25 = -15 Billion USD (deficit)

46. Trade surplus/trade deficit of France with US = Exports from France to US – Imports from France to US
= Imports from US to France – Imports from France to US
= 30 – 18.33 = 11.67 Billion USD (surplus)
Trade surplus/trade deficit of UK with US = Exports from UK to US – Imports from UK to US
= Imports from US to UK – Imports from UK to US
= 10 – 12.5 = -2.5 Billion USD (deficit)

47. Let the initial number of students in the morning shift be M_1 and the initial number of students in the afternoon shift be A_1
ATQ: $M_1/A_1 = 13/9$
So, $M_1 = 13x$, $A_1 = 9x$
21 students moved from the morning shift to the afternoon shift. The new number of students in the morning shift, M_2, is:
$M_2 = M_1 - 21 = 13x – 21$
The new number of students in the afternoon shift, A_2, is:
$A_2 = A_1 + 21 = 9x + 21$
The new ratio is given as 19 : 14,
$M2/A2 = 19/14 \Rightarrow \dfrac{13x-21}{9x-21} = \dfrac{19}{14}$
$\Rightarrow 14(13x - 21) = 19(9x + 21)$
$\Rightarrow 182x - 294 = 171x + 399$
$\Rightarrow 182x - 171x = 399 + 294$
$\Rightarrow x = 63$
So, $M_2 = 798$ and $A_2 = 588$
Let N_M be the number of new students who joined the morning shift, and N_A be the number of new students who joined the afternoon shift.
AT Q $N_M/ N_A = 3/8 \Rightarrow N_M = 3y$ and $N_A = 8y$
The total number of new students is 3y + 8y = 11y
The final number of students in the morning shift, M_3, is:
$M3 = M2 + N_M = 798 + 3y$, The final number of students in the afternoon shift, A3, is:
$A3 = A2 + N_A = 588 + 8y$.
As final ratio is 5 : 4 $\Rightarrow$ M3/A3 = 5/4
$\dfrac{798+3y}{588+8y} = \dfrac{5}{4} \Rightarrow y = 9$
The number of new students who joined = 11y = 11 × 9 = 99

48. $\log_{1/4}(n^2 - 7n + 11) > 0$
Since the base of the logarithm, b = 1/4 is between 0 and 1, the inequality sign must be reversed when converting the logarithm to an exponential form
$n^2 - 7n + 11 < (1/4)^0 \Rightarrow n^2 - 7n + 11 < 1$
$\Rightarrow n^2 - 7n + 11 < 0$

	$\Rightarrow$ (n - 2)(n - 5) < 0 This quadratic is negative only between its roots, n = 2 and n = 5. Therefore, the solution for the inequality is 2 < n < 5 So, distinct integers n, the possible values are n = 3, 4 The distinct integers are 3 and 4, so the count is 2.
49.	Since radius = $6\sqrt{2}$ cm PQ and SR are parallel and separated by a diameter. This means they lie on opposite sides of the center C. Also $\angle$ PQC = 45° and ratio of perpendicular distance of PQ and SR from C is 3:2. Let M be the midpoint of PQ, and N be the midpoint of SR, then CM $\perp$ PQ and CN $\perp$ SR. Consider Δ PQC. Since CP and CQ are both radii, CP = CQ = R = $6\sqrt{2}$. Thus, ΔPQC is an isosceles triangle. In Δ PQC, the sum of angles is 180° $\angle$ PCQ + $\angle$ CPQ + $\angle$ PQC = 180°. Since CP = CQ, $\angle$ CPQ = $\angle$ PQC = 45° $\angle$ PCQ + 45° + 45° = 180° $\Rightarrow$ $\angle$ PCQ = 180° – 90° = 90° ΔPQC is an isosceles right triangle. CM is the altitude to the base PQ in the isosceles ΔPQC. cos ($\angle$MQC) = CM/CQ $\Rightarrow d_{PQ}$ = CM = CQ × cos 45° = $6\sqrt{2} \times 1/\sqrt{2}$ = 6 cm As $d_{PQ}/d_{SR} = 3/2 \Rightarrow 6/d_{SR} = 3/2 \Rightarrow d_{SR}$ = 4cm In triangle CMQ, $CM^2 + MQ^2 = CQ^2 \Rightarrow 6^2 + MQ^2 = (6\sqrt{2})^2$ $\Rightarrow$ MQ = 6cm PQ = 2MQ = 12 cm  In ΔCNR, $CN^2 + NR^2 = CR^2 \Rightarrow CR = R = 6\sqrt{2} \Rightarrow 4^2 + NR^2 = (6\sqrt{2})^2 \Rightarrow NR = 2\sqrt{14}$ The length of chord SR is 2 NR $\Rightarrow$SR = $4\sqrt{14}$ The quadrilateral PQRS is a trapezoid because PQ is parallel to SR. The height of the trapezoid is the distance between the parallel chords, which is h = $d_{PQ} + d_{SR}$ since they are on opposite sides of the center. h = 6 + 4 = 10 cm The area of a trapezoid = 1/2 (PQ + SR) × h = ½(12 + $4\sqrt{14}$) × 10 = 20(3 + $\sqrt{14}$) sq cm
50.	The initial volume of the solution is 200 litres, and it is 30% acid by volume. So. acid volume is 60lt and volume of water is 200 - 60 = 140lt. Atul replaces 20% of the 200lt solution with water. Vol removed is 40lt. The removed solution has the same concentration as the initial solution (30% acid). Acid removed= 30% of 40 = 12 lt. Now after removal acid is 60-12 = 48lt 40 lt of pure water is added back. Since pure water is added, the amount of acid does not change in this step. Acid vol. after step I = 48 lt. The total volume is back to 200 lt. The concentration of acid is now 48/200 = 24% Atul replaces 10% of the current 200 lt solution with pure acid. So, vol. removed is 20lt. The removed solution has a concentration of 24% acid (from Step 1). So, acid removed is 24% of 20 = 4.8 lt. Acid remaining after removal = 48 - 4.8 = 43.2lt. Acid volume after Step 2 = 43.2 + 20 = 63.2 lt. The concentration of acid is now 63.2/200 Atul replaces 15% of the current 200 lt solution with pure water. Volume removed = 15% of 200 = 30lt. Acid concentration = 63.2/200 = 31.6% Acid removed = 31.6% of 30lt = 9.48 lt. Acid remaining after removal = 63.2 - 9.48 = 53.72 lt The final volume of the solution is 200 litres, and the final volume of acid is 53.72 litres. The final percentage of acid by volume = $\frac{53.72}{200} \times 100$ = 26.86% which is nearest to 27%.
51.	Total Distance = 224km = 224000m. Total Time = 3h = 180min. speed in first part S1 = 960 m/min. Time taken in first part t1 = 30min. First part Distance D1 = = 960 × 30 = 28800 m Let the times be t1, t2, t3, t4 with first term t1 = 30 and common difference d. The sum of the four terms is the total time = 180 minutes. Also Sn = $\frac{n}{2}(2t1 + (n-1)d)$

$\Rightarrow 180 = \frac{4}{2}(2\times30+(4-1)d) \Rightarrow d = 10$ min
Since time covered is A.P. So, time will be 30, 40, 50, 60, 70
Let the speeds be S1, S2, S3, S4 with first term S1 = 960 and common difference D.
Total distance = $S_1t_1 + S_2t_2 + S_3t_3 + S_4t_4 = 224000$ m
Substitute the known values $S_i = 960 + (i -1)D$
224000 = (960 × 30) + ((960 + D) × 40) + 48000 + 2D) ×50) + ((960 + 3D) × 60)
224000 = 28800 + 38400 + 40D + 48000 + 100D+ 57600 + 180D
224000 = 172800 + 320D ⇒ 320D = 51200 ⇒ D = 160 m/min^2
Now speed for 4th part = $S_4 = S_1 + 3D$ = 960 + 3(160) = 960 + 480 = 1440 m/min
Distance for the fourth part = 1440 × 60 = 86400 m

52. Here x > y …..(1), y≥ 3 ….. (2), x + y < 14 …..(3)
From inequality (2), smallest possible integer value for y is 3. From inequality (1), we know that x must be strictly greater than y, so x ≥ y + 1.
Substituting y with its minimum value, the smallest possible integer for x is x ≥ 3 + 1 = 4.
From inequality (3), x + y < 14 ⇒ y + 1 + y < 14 ⇒ y < 6.5
Since y is an integer, the largest possible value for y is 6.
Combining this with inequality (2), the possible integer values for y are 3, 4, 5, 6.

y	Conditions for x	Range for x	Possible values for x	Number of pairs (x, y)
3	x > 3 and x < 14 - 3 ⇒ x < 11	4 < x < 11	4, 5, 6, 7, 8, 9, 10	10 - 4 + 1 = 7
4	x > 4 and x < 14 - 4 ⇒ x < 10	5 < x < 10	5, 6, 7, 8, 9	9 - 5 + 1 = 5
5	x > 5 and x < 14 - 5 ⇒ x < 9	6 < x < 9	6, 7, 8	8 - 6 + 1 = 3
6	x > 6 and x < 14 - 6 ⇒ x < 8	7 < x < 8	7	7 - 1 + 1 = 1

The total number of distinct pairs (x, y) is the sum of the number of pairs found in the table = 7 + 5 + 3 + 1 = 16

53. Given, $3 \le x \le 6$, $[x^2] = [x]^2$
Since $[x]$ is constant on each interval between consecutive integers, we split [3, 6] into [3, 4), [5, 6), {6}
Case 1: $3 \le x < 4$, Here, $[x] = 3$, so$[x]^2 = 9 \Longrightarrow 9 \le x^2 < 10$, $3 \le x < \sqrt{10}$.
This lies inside [3, 4) since $\sqrt{10} \approx 3.16$. So solutions in this case $[3, \sqrt{10})$.
Case 2: $4 \le x < 5$, Here, $[x] = 4$, so $[x]^2 = 16 \Longrightarrow 16 \le x^2 < 17 \Longrightarrow 4 \le x < \sqrt{17}$. So, solution is $[4, \sqrt{17})$
Case 3: $5 \le x$ 6, Here, $[x] = 5$, so $[x]^2 = 25 \Rightarrow 25 \le x^2 < 26$, $5 \le x < \sqrt{26}$, solution is $[5, \sqrt{26})$
Case 4: x = 6, $[x] = 6$, $[x]^2 = 36$, $x^2 = 36 \Rightarrow [x^2] = 36$, so the equality holds and x = 6 is a solution.
Option (A): $(3, \sqrt{10})$ is contained in $[3, \sqrt{10})$; $[5, \sqrt{26})$ matches exactly a part of S; {6} is ins S.
Hence (A) ⊆ S; valid

54. The total investment = S + B + G = 100000 ….(1)
Also B = 0.25G, The annual returns are 10% on stocks, 6% on bonds, and 8% on gold, and the total gain was Rs 8200
⇒ 0.10S + 0.06B + 0.08G = 8200 …(2)
From (1): S + 0.25G + G = 100000 ⇒ S + 1.25G = 100000 ….(3)
From (2): 0.10S + 0.06(0.25G) + 0.08G = 8200 ⇒ 0.10S + 0.095G = 8200 ….(4)
From (3): S = 100000 - 1.25G
Substituting value of S in (4), 0.10(100000 - 1.25G) + 0.095G = 8200
10000 - 0.125G + 0.095G = 8200 ⇒ 10000 - 0.03G = 8200
⇒ G = 60000 ⇒ B = 0.25G = 0.25 × 60000 = 15000
Since, the annual return on bonds is 6% of the investment. Gain from Bonds = 0.06 B
Gain from Bonds = 0.06×15000 = 900
The amount that she gained from the bonds was Rs 900.
Ans. 900

55. Let the Principal be P, the Simple Rate of Interest be R% (per annum), and the Time be T.
Amount A_1 = Rs13920 when T_1 = 3years. ⇒ $13920 = P+\frac{P\times R\times 3}{100}$
Amount A_2 = Rs 18960 when T_2 = 6years and 6 months = 6.5 years

$18960 = P+\frac{P\times R\times 6.5}{100}$
Time difference = 6.5 - 3 = 3.5 years. Interest earned in 3.5 years= $A_2 - A_1$ = 18960 - 13920 = 5040

Simple Interest = 5040/3.5 = 1440
Interest for 3 years = 3 × 1440 = Rs 4320
P = A_1 – Si (for 3years) = 13920 - 4320 = 9600

$$SI = \frac{PRT}{100} \Rightarrow 1440 = \frac{9600 \times R \times 1}{100} \Rightarrow R = 15\%$$

Rate per period R = 15% p.a, compounded semi-annually. So, interest = 7.5%
A = $P(1+int)^n = 9600(1 + 0.075)^4 = 12820.5$
Total CI earned = A-P = 12820.5 – 9600 = 3220.5, which is nearest to 3221.

56. The customer can add up to 2 out of 6 available sauces, meaning they can choose 0, 1, or 2 sauces. Now, to choose '0' sauces there is 1way. To choose '1' sauces there are 6 ways. To choose '2' sauces there is $^6C_2$ = 15 ways. So, total number of ways = 1 + 6 + 15 = 22 ways
Total Ways = Sandwich Types × Breads types × Sizes × Sauce = 5 × 4 × 2 × 22 = 880 ways

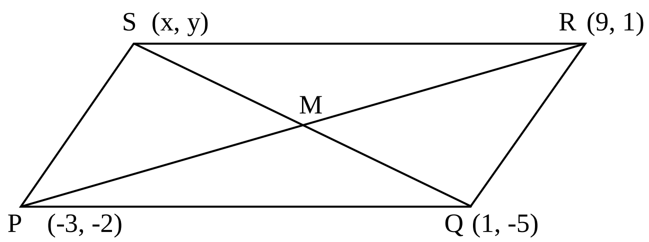
57. Arun, Varun and Tarun, if working alone, can complete a task in 24, 21, and 15 days, respectively.
Arun's cost for per unit work =24 × 2160 = 51840
Vrun's cost for per unit work =21 × 2400 = 50400
Tarun's cost for per unit work =15 × 2160 = 32400
To minimize the total cost, we must prioritize employing the worker(s) who have the lowest cost per unit of work. The task must be completed in 10 days or less. We should employ the cheapest worker first until the 10-day limit is reached or the work is done. Tarun is the cheapest worker. We must employ him every day for the maximum possible work until the 10-days limit.
Work done by Tarun in 10 days = 10 × 1/15 = 2/3
Cost = 10 × 2160 = Rs 21600, Remaining work = 1/3
Days needed for Varun to complete 1/3 of the task = 1/3 × 21 = 7 days
Cost for Varun= 7 × 2400 = 16800
Total Minimum Cost = Cost (Tarun) + Cost (Varun) = 21600 + 16800 = 38400

58. The eq is $x^2 - 5x + k = 0$. let α and β be the roots of this eq.
Sum of roots = 5 and Product of roots = k
The possible pairs of integers α and β that satisfy α + β = 5 are:

α	β	α + β	αβ = k
5	0	5	0
4	1	5	4
3	2	5	6

Since αβ = k, the order of the roots doesn't matter, e.g. (4, 1) and (1, 4) both give k = 4.
The possible values for k = αβ that are non-negative integers are (0, 4, 6).
So, 3 values.

59. Let M be the bisecting point of PR and SQ. $M = \left(\frac{-3+9}{2}, \frac{-2+1}{2}\right)$ = (3, -1/2)



Now, equate M to midpoint of SQ. $3 = \frac{1+x}{2} \Rightarrow x = 5$ and $-1/2 = \frac{-5+y}{2} \Rightarrow y = 4$
The coordinates of S are (5, 4). The diagonal SQ passes through S(5, 4) and Q(1, -5). The line SQ intersects the x-axis at a point (a, 0). The slope from S to Q must equal the slope from S to (a, 0).

Slope SQ = $\frac{-5-4}{1-5} = \frac{9}{4}$, Slope S at (a, 0) = $\frac{0-4}{a-5} = \frac{-4}{a-5}$

$\Rightarrow \frac{-4}{a-5} = \frac{9}{4} \Rightarrow 9(a - 5) = 4(-4)$

$\Rightarrow 9a - 45 = -16 \Rightarrow a = 29/9$.

60. The digits of must be non-zero, so they come from 1 to 9. The digits cannot be perfect squares i.e., 1, 4, 9. The set of allowed digits (digits that are not perfect squares) is {2, 3, 5, 6, 7, 8}. The digits must be distinct and

	exactly one of them must be a prime number. Since we need two distinct non-prime digits, and the only available non-prime digits are 6 and 8, and the smallest number that following the given condition is 268. The prime factors of 268 are $2^2 \times 67$. So, the total factors are 3 × 2 = 6. Answer is 6
61.	Price of stocks A, B and C is Rs 120, Rs 90 and Rs 150 respectively. Shares of stock A =10. Total portfolio value = Rs 3300. Total shares of B and C = 20. Now, the value of the shares of Stock A = 10×120 =Rs 1200 The total value of the shares of Stocks B and C = 3300 -1200 = Rs 2100 Let the shares of stock B be S_b and price of B is P_b. P_c is the price of stock C and S_c is the shares of stock C. So, $S_c = 20 - S_b$ Now, total value of the shares of Stocks B and C = $S_b \times P_b + S_c \times P_c$ $\Rightarrow 2100 = S_b \times 90 + (20 - S_b) \times 150 \Rightarrow 2100 = 90 S_b + 3000 - 150 S_b \Rightarrow S_b = 900/60 = 15$ Answer is 15
62.	Equations are: a – 6b + 6c =4 ….(1) and 6a + 3b – 3c = 50 ….(2) From (2), 3b - 3c = 50 – 6a Now, 2a + 3b - 3c = 2a + 50 – 6a = 50 - 4a Multiplying eq (2) by 2, 12a + 6b – 6c = 100 ….(3) Now adding (1) and (3) we have, a – 6b + 6c + 12a + 6b – 6c = 104 ⇒ 13a =104 ⇒ a =8 Now, 2a + 3b - 3c = 50- 4a ⇒2a + 3b - 3c = 50-32 = 18
63.	The general form of a quadratic function is $ax^2 + bx + d$. The extreme value (minimum if a > 0, maximum if a < 0, occurs at the vertex, where x = -b/2a. The extreme value is the function evaluated at this x is $a\left(-\frac{b}{2a}\right)^2 + b\left(-\frac{b}{2a}\right) + d$ The quadratic function $f(x) = x^2 - 4cx + 8c$. Since a > 0, the function has a minimum value. Then, x_f = = -b/2a = -(-4c)/2 = 2c. So, mini value is 2c. $f_{min} = (2c)^2 - 4c(2c) + 8c$ $f_{min} = 4c^2 - 8c^2 + 8c$ $f_{min} = 4c^2 + 8c$ Now, g(x) = -x2 + 3cx -2c. Since a < 0, the function has a maximum value. x_g = = -b/2a = -3c/-2. So, max value is = 3c/2. $g_{max} = -\left(\frac{3c}{2}\right)^2 + 3c\left(\frac{3c}{2}\right) - 2c$ $g_{max} = -\frac{9c^2}{4} + \frac{9c^2}{2} - 2c$ $g_{max} = -\frac{9c^2}{4} + \frac{18c^2}{4} - 2c$ $g_{max} = \frac{9c^2}{4} - 2c$ Since, $f_{min} > g_{max}$ $-4c^2 + 8c > \frac{9c^2}{4} - 2c$ $-4c^2 - \frac{9c^2}{4} + 8c + 2c > 0$ $\left(-4 - \frac{9}{4}\right)c^2 + 10c > 0$ $-\frac{25}{4}c^2 + 10c > 0,\ c\left(\frac{25}{4}c - 10\right) < 0$ The critical points where the expression equals zero are c = 0 and when 25c/4 -10 = 0 ⇒ c = 8/5 = 1.6 So, 0 < c < 1.6. From options, only 4^{th} option is in this range.
64.	Let the initial number of boys be *B* and girls be *G*. After some students leave, Remaining girls = (1−0.40)G = 0.6G Remaining boys=(1−0.60)B = 0.4B Given that the remaining number of girls is 8 more than the remaining number of boys.

	$0.6G = 0.4B + 8 \Rightarrow 6G = 4B + 80 \Rightarrow 3G = 2B + 40$ Since 40% of girls and 60% of boys leave, the numbers leaving must be integers. $0.4G = 2G/5 \Longrightarrow G$ is a multiple of 5, $0.6B = 3B/5 \Longrightarrow B$ is a multiple of 5 Let B = 5x and G = 5y Eq (1) $\Rightarrow 3(5y) = 2(5x) + 40 \Rightarrow 15y = 10x + 40 \Rightarrow y = \frac{2x+8}{3}$ Total initial students = 5(x + y) To find the mini possible students, we have to minimize (x + y). $B > 10 \Longrightarrow 5x > 10 \Longrightarrow x > 2$ and y must be an integer. $x=3 \Rightarrow 2(3) + 8 = 14$ (not divisible by 3) $x=4 \Rightarrow 2(4) + 8 = 16$ (not divisible by 3) $x=5 \Rightarrow 2(5) + 8 = 18 \Rightarrow y = 6$ So, total students = B + G = 5 × 5 + 5 × 6 = 55 Answer is 55
65.	The sequence is 1,3,5,……,57 Number of terms $n = (57-1)/2 + 1 = 29$. Sum of first n odd numbers = $29^2 = 841$ Let k be the mth term. Sum of terms before k is $(m-1)^2$. Sum of terms after k also $(m-1)^2$. Total sum is $841 = 2(m-1)^2 + (m - 1) \Rightarrow (m-21)(m+20) = 0$ So, m = 21. Then, k = 2m−1 = 41
66.	Let the marked price of one chair be M. Total CP = 13 × 100 = 1300 Since profit is 26%. Total SP = 1300 × 1.26 = 1638 Discounted price per chair = M(1−0.22) = 0.78M Total amount =12 × 0.78M = 9.36M. This must equal the total SP $\Rightarrow$ 9.36M = 1638 M = 1638/9.36 = 175 Answer is 175
67.	s = 36cm, Area = 396 sq cm Area = $1/2d_1d_2 \Rightarrow 396 = 1/2d_1d_2 \Rightarrow d_1d_2 = 792$ $d_1^2 + d_2^2 = 4s^2 = 4 \times (36)^2 = 4 \times 1296 = 5184$ $(d_1 - d_2)^2 = (d_1^2 + d_2^2) - 2(d_1d_2) \Rightarrow (d_1 - d_2)^2 = 5184 - 2(792) = 3600 \Rightarrow d_1 - d_2 = 60$ The absolute value of the difference between the lengths of the diagonals is 60 cm. Answer is 60
68.	Given $a_k = 3^k$ $(a_k)^k = (3^k)^k$ $(a_1)^1 (a_2)^2 \ldots (a_{20})^{20} = 3^{1^2} \cdot 3^{2^2} \ldots\ldots 3^{20^2} = 3^{1^2+2^2+\ldots,+20^2}$ $1^2 + 2^2 + \ldots\ldots + n^2 = \frac{n(n+1)(2n+1)}{6}$ For n = 20, $\frac{20\times21\times41}{6} = 2870$ Thus LHS = 3^{2870} RHS = $a_{21}\, a_{22} \ldots a_{20+m} = 3^{21}.3^{22}\ldots.3^{20+m}$ The exponent is the sum of an A.P. with first term = 21 last term = 20 + m, number of terms = m $21 + 22 + 23 + \ldots\ldots + (20 + m) = \frac{m}{2}(21 + (20 + m)) = \frac{m}{2}(41 + m)$ So, RHS = $3^{\frac{m(m+41)}{2}}$ $3^{2870} < 3^{\frac{m(m+41)}{2}}$ i.e. $2870 < \frac{m(m+41)}{2} \Rightarrow 5740 < m^2 + 41m$ or $m^2 + 41m - 5740 > 0$ On solving this inequality, m > 57.98 The quadratic is positive for m > 57.98, so the smallest natural number that satisfying the inequality $2870 < \frac{m(m+41)}{2}$ is m = 58