

CAT 2025 Slot - I

SECTION: VERBAL ABILITY AND READING COMPREHENSION

DIRECTIONS for the question 1: *The given sentence is missing in the paragraph below. Decide where it best fits among the options 1, 2, 3, or 4 indicated in the paragraph.*

1. **Sentence:** "Everything is old-world, traditional techniques from Mexico," Ava emphasizes.

Paragraph: The sisters embrace the ways their great-grandfather built and repaired instruments.

___ (1) ___. When crafting a Mexican guitarrón used in mariachi music, they use tacote wood for the top of the instrument. Once the wood is cut, they carve the neck and heel from a single block using tools like hand saws, chisels and sandpaper rather than modern power tools - and believe that this traditional method improves the tone of the instrument. ___ (2) ___. Their store has a three-year waitlist for instruments that take months to create. ___ (3) ___. The family's artisanship has attracted stars like Los Lobos, who own custom guitars made by all three generations of the Delgado family. ___ (4) ___. For the sisters, involvement in the family business started at an early age. They each built their first instruments at age 9 .

1. Option 3
2. Option 2
3. Option 4
4. Option 1

Answer: Option 4 (Position 1)

Solution:

Directions: The given sentence is missing from the paragraph. Find where it best fits.

Approach: The missing sentence is Ava's quote emphasizing "old-world, traditional techniques from Mexico." This is a general, thematic statement, so it should appear **before** the paragraph gives specific examples of the technique.

- **Position 1** (right after the opening line about the sisters embracing their great-grandfather's ways): Ava's quote works as a bridge -it states the theme ("old-world, traditional") right before the paragraph gives concrete details (hand saws, chisels, sandpaper). This creates a natural flow from general idea → specific example.
- **Position 2** (after the technique is described): Feels like a repetition/afterthought rather than an introduction.
- **Positions 3 and 4:** Too far from the discussion of technique -by this point the paragraph has moved on to waitlists, clientele, and family history, so inserting the quote here would break the flow.

DIRECTIONS for questions 2-3: *The passage given below is followed by four summaries. Choose the option that best captures the essence of the passage.*

2. In the dynamic realm of creativity, artists often find themselves at the crossroads between drawing inspiration from diverse cultures and inadvertently crossing into the territory of cultural appropriation. Inspiration is the lifeblood of creativity, driving artists to create works that resonate across borders. The globalized nature of the modern world invites artists to draw from a vast array of cultural influences. When approached respectfully, inspiration becomes a bridge, fostering understanding and appreciation of cultural diversity. However, the line between inspiration and cultural appropriation can be thin and easily blurred. Cultural appropriation occurs when elements from a particular culture are borrowed without proper understanding, respect, or acknowledgment. This leads to the commodification of sacred symbols, the reinforcement of stereotypes, and the erasure of the cultural context from which these elements originated. It's essential to recognize that the impact of cultural appropriation extends beyond the realm of artistic expression, influencing societal perceptions and perpetuating power imbalances.
1. In today's world of creativity, artists have to decide between respectfully acknowledging works that are inspired by diverse cultures and appropriating elements without respect for their contexts.
2. Artists must navigate the thin line between inspiration and cultural appropriation, where respectful inspiration fosters cultural

understanding whereas appropriation involves borrowing without acknowledgement leading to commodification and reinforcement of stereotypes.

3. Artists in a globalised world must navigate between drawing inspiration from diverse cultures respectfully and cultural appropriation that involves borrowing without proper acknowledgement which has broader societal impacts including perpetuating power imbalances.
4. In a globalised world, artists must draw from diverse cultural influences to create works that appeal to all, and this results in instances of both inspiration and cultural appropriation.

Answer: Option 4 (Position 1)

Solution:

Approach: Compare each summary against the passage's actual scope -artists navigating inspiration vs. cultural appropriation in a globalized world, with broader societal consequences.

- **Option 1:** Wrong framing -it treats the choice as “acknowledging works” vs. appropriation, which misses the passage’s real focus (the *act* of drawing inspiration itself).
- **Option 2:** Captures inspiration vs. appropriation and lists negative outcomes, but misses two things the passage emphasizes -the *globalized* context and the *broader societal impact* (power imbalances).
- **Option 3:** Covers everything -the globalized setting, the inspiration/appropriation distinction, and the wider societal impact (power imbalances). The phrase “broader societal impacts” adequately stands in for the specific consequences (commodification, stereotyping) even without naming each one.

Option 4: Too simplistic -wrongly claims artists “must” draw from other cultures to appeal to everyone, and ignores the respectful-vs-disrespectful distinction entirely.

Question 3. Zombie cells may contribute to age-related chronic inflammation: this finding could help scientists understand more about the aging process and why the immune system becomes less effective as we get older. Zombie or "senescent" cells are damaged cells that can no longer divide and grow like normal cells. Scientists think that these cells can contribute to chronic health problems when they accumulate in the body. In younger people, the immune system is more effective at clearing senescent cells from the body through a

process called apoptosis, but as we age this process becomes less efficient. As a result, there is an accumulation of senescent cells in different organs in the body, either through increased production or reduced clearance by the immune system. The zombie cells continue to use energy though they do not divide, and often secrete chemicals that cause inflammation, which if persistent for longer periods of time can damage healthy cells leading to chronic diseases.

1. A younger person's immune system is healthy and is able to clear the damaged cells, but as people age, the zombie cells resist apoptosis, and start accumulating in the body.
2. Aging leads to less effective apoptosis, and therefore zombie cells start to accumulate in the body, causing inflammation, which accelerates aging and leads to chronic diseases.
3. Senescent "zombie" cells are inactive or malfunctioning cells that can be found throughout the body.
4. Dead cells accelerate chronic inflammation weakening the immune system and lead to aging.

Answer: Option 2

Solution:

Approach: Match each summary to the passage's actual cause-and-effect chain: aging → less effective apoptosis → zombie cells accumulate → inflammation → chronic disease.

- **Option 1:** Partly right, but claims cells "resist apoptosis" -the passage never says this. It only says the *immune system's clearing process* becomes less efficient with age.
- **Option 2:** Correct and complete -aging reduces apoptosis efficiency → cells accumulate → inflammation → chronic disease. This matches the passage's chain exactly.
- **Option 3:** Just defines the cells; misses the entire aging/accumulation/disease process that is the passage's main point.
- **Option 4:** Wrong on two counts -it calls the cells "dead" (they're senescent, i.e., alive but non-dividing), and it reverses the causality (says inflammation weakens immunity, when the passage says weakened immunity *causes* the inflammation).

DIRECTIONS for questions 4-5: *Five jumbled sentences (labelled 1, 2, 3, 4, and 5), related to a topic, are given below. Four of them can be put*

together to form a coherent paragraph. Identify the odd sentence out and key in the number of that sentence as your answer.

- Question 4.** 1. The Bayeux tapestry was, therefore, an obvious way to tell people about the downfall of the English and the rise of the Normans.
2. So if we take expert in Anglo-Saxon culture Gale Owen-Crocker's idea that the tapestry was originally hung in a square with certain scenes facing each other, people would have stood in the centre.
3. Art historian Linda Neagley has argued that pre-Renaissance people interacted with art visually, kinaesthetically (sensory perception through bodily movement) and physically.
4. That would make it an 11th-century immersive space with scenes corresponding and echoing each other, drawing the viewer's attention, playing on their senses and understanding of the story they thought they knew.
5. The Bayeux tapestry would have been hung at eye level to enable this.

Answer: Sentence 1 is the odd one out.

Solution:

Approach: Sentences 3, 5, 2, 4 form the coherent paragraph:

- Sentence 3 → introduces Linda Neagley's idea about how pre-Renaissance people experienced art.
- Sentence 5 → explains the tapestry was hung at eye level to enable that kind of interaction.
- Sentence 2 → adds Gale Owen-Crocker's idea that it was hung in a square arrangement.
- Sentence 4 → explains how that arrangement created an immersive 11th-century space.

Sentence 1 doesn't fit: it opens with "therefore," implying a conclusion from information the other four sentences don't provide, and it's about the tapestry's storytelling *purpose*, not its physical display -a different theme.

Question 5.

1. Developments both technological and sociocultural have afforded us far greater freedom over death than we had in the past, and while we are still adapting ourselves to that freedom, we now appreciate the moral importance of this freedom.
2. But I believe that a type of freedom we can call freedom over death - that is, a freedom in which we shape the timing and circumstances of how we die - should be central to this conversation.
3. Legalising assisted dying is but a further step in realising this freedom over death.
4. Many people endorse, through their opinions or their choices, our freedom over death encompassing a right to medical assistance in hastening our deaths.
5. Freedom is a notoriously complex and contested philosophical notion, and I won't pretend to settle any of the big controversies it raises.

Answer: Sentence 4 is the odd one out.

Solution:

Approach: Sentences 5, 2, 1, 3 form the coherent paragraph -introducing the idea of "freedom" generally, narrowing to "freedom over death," explaining how modern developments have expanded this freedom, and concluding that legalizing assisted dying is a natural next step.

Sentence 4 doesn't fit -it shifts to public *endorsement* of a right to medical assistance, which isn't needed to complete the core argument of the other four.

DIRECTIONS for questions 6-9: *The passage below is accompanied by four questions. Based on the passage, choose the best answer for each question.*

How can we know what someone else is thinking or feeling, let alone prove it in court? In his 1863 book, *A General View of the Criminal Law of England*, James Fitzjames Stephen, among the most celebrated legal thinkers of his generation, was of the opinion that the assessment of a person's mental state was an inference made with "little consciousness." In a criminal case, jurors, doctors, and lawyers could watch defendants scrutinizing clothing, mannerisms, tone of voice-but the best they could hope for were clues. . . . Rounding these clues up to a judgment about a defendant's guilt, or a

defendant's life, was an act of empathy and imagination. . . . The closer the resemblance between defendants and their judges, the easier it was to overlook the gap that inference filled. Conversely, when a defendant struck officials as unlike themselves, whether by dint of disease, gender, confession, or race, the precariousness of judgments about mental state was exposed.

In the nineteenth century, physicians who specialized in the study of madness and the care of the insane held themselves out as experts in the new field of mental science. Often called alienists or mad doctors, they were the predecessors of modern psychiatrists, neurologists, and psychologists. . . . The opinions of family and neighbors had once been sufficient to sift the sane from the insane, but a growing belief that insanity was a subtle condition that required expert, medical diagnosis pushed physicians into the witness box. . . . Lawyers for both prosecution and defense began to recruit alienists to assess defendants' sanity and to testify to it in court.

Irresponsibility and insanity were not identical, however. Criminal responsibility was a legal concept and not, fundamentally, a medical one. Stephen explained: "The question 'What are the mental elements of responsibility?' is, and must be, a legal question. It cannot be anything else, for the meaning of responsibility is liability to punishment." . . . Nonetheless, medical and legal accounts of what it meant to be mentally sound became entangled and mutually referential throughout the nineteenth century. Lawyers relied on medical knowledge to inform their opinions and arguments about the sanity of their clients. Doctors commented on the legal responsibility of their patients. Ultimately, the fields of criminal law and mental science were both invested in constructing an image of the broken and damaged psyche that could be contrasted with the whole and healthy one. This shared interest, and the shared space of the criminal courtroom, made it nearly impossible to consider responsibility without medicine, or insanity without law. . . .

Physicians and lawyers shared more than just concern for the mind. Class, race, and gender bound these middle-class, white, professional men together, as did family ties, patriotism, Protestantism, business ventures, the alumni networks of elite schools and universities, and structures of political patronage. But for all their affinities, men of medicine and law were divided by contests over the borders of criminal responsibility, as much within each profession as between them. Alienists steadily pushed the boundaries of their field, developing increasingly complex and capacious definitions of insanity.

Eccentricity and aggression came to be classified as symptoms of mental disease, at least by some.

6. The last paragraph of the passage refers to "middle-class, white, professional men". Which one of the following qualities best describes the connection among them?
1. The borders of criminal responsibility.
 2. Eccentricity and aggression.
 3. Empathy and imagination.
 4. The opinions of family and neighbours.

Answer: Their shared engagement with the borders of criminal responsibility best describes the connection.

Solution:

Approach: The final paragraph says physicians and lawyers were linked by class, race, gender, and social networks, but their *professional* bond centred on their shared concern with the mind and criminal responsibility. Even though they were "divided by contests over the borders of criminal responsibility," that very contest shows this was their common ground.

- **Option 2** ("Eccentricity and aggression") -these were symptoms some alienists used to classify mental disease, not a connecting factor.
- **Option 3** ("Empathy and imagination") -relates to how jurors made inferences (paragraph 1), not to the physician–lawyer bond.
- **Option 4** ("Opinions of family and neighbours") -describes the older, pre-expert method of assessing sanity, not the professional bond.

7. Study the following sets of concepts and identify the set that is conceptually closest to the concerns and arguments of the passage.
1. Judgement, Belief, Accounts, Patronage.
 2. Empathy, Prosecution, Knowledge, Business.
 3. Judgement, Insanity, Punishment, Responsibility.
 4. Assessment, Empathy, Prosecution, Patriotism.

Answer: Option 3

Solution:

Approach: The passage centres on: how mental states are judged in criminal law, the rising role of alienists (early psychiatrists) in defining insanity, and how these intersect with legal responsibility and punishment. Option 3 covers all four ideas:

- **Judgement** -discussed via inference, empathy, and imagination in court.
- **Insanity** -the alienists' diagnostic role (paragraphs 2 and 4).
- **Punishment** -tied explicitly to "liability to punishment" (paragraph 3).
- **Responsibility** -the recurring legal concept entangled with medical views of insanity.

The other options include ideas that are peripheral (patronage, business, patriotism) or only partly relevant (empathy, prosecution), and don't capture the full legal-medical debate.

8. According to the passage, who or what was an "alienist"?

1. Professionals who pushed the boundaries of their fields till they became unrecognisable in the nineteenth century.
2. Physicians and lawyers who were responsible for the condition of immigrants or 'aliens' in the nineteenth century.
3. Physicians and lawyers who were responsible for examining accounts of extraterrestrials or 'aliens' in the nineteenth century.
4. Physicians who specialised in the study of madness and the care of the insane in the nineteenth century.

Answer: Option 4 -an alienist was a physician specializing in mental illness.

Solution

Approach: The passage directly defines "alienist" in paragraph 2 as a specialist in mental science -the historical precursor to psychiatrists, neurologists, and psychologists.

- **Option 1** is too broad and misses the specific medical specialty.
- **Options 2 and 3** wrongly link "alienist" to immigrants or extraterrestrials - not supported by the text.

9. "Conversely, when a defendant struck officials as unlike themselves, whether by dint of disease, gender, confession, or race, the precariousness of judgments about mental state was exposed." Which one of the following best describes the use of the word "confession" in this sentence?

1. Referring to the gender, race or disease claimed as a defence by the defendant, here it is a synonym for 'professing' a gender, race, or disease.
2. Referring to the practice of 'confession' in some faiths, here it is a metaphor for the religion of the defendant.
3. The defendants struck out at the officials and then confessed to the act.
4. Referring to the defendant's confession of his or her crime as false, because 'dint' is an archaic form of 'didn't' or 'did not'.

Answer: “Confession” is used to mean the defendant’s religion.

Solution

Approach: In the sentence, “confession” is listed alongside disease, gender, and race -traits that could make a defendant seem “unlike” the judging officials. Here “confession” doesn’t mean admitting guilt; it means professing a religious faith (as in “the Protestant confession”). It suggests a defendant’s *religion*, like their gender, race, or health, could mark them as different from typically white, middle-class, Protestant officials.

- **Option 1** wrongly treats “confession” as a synonym for “professing” gender/race/disease.
- **Option 3** misreads “struck” as physical violence and brings in an unrelated legal confession.
- **Option 4** invents a false meaning for “dint” and misreads “confession” as a false admission of crime.

DIRECTIONS for questions 10-13: *The passage below is accompanied by four questions. Based on the passage, choose the best answer for each question.*

Studies showing that income inequality plays a positive role in economic growth are largely based on three arguments. The first argument focuses on investment indivisibilities wherein large sunk costs are required when implementing new fundamental innovations. Without stock markets and financial institutions to mobilize large sums of money, a high concentration of wealth is needed for individuals to undertake new industrial activities accompanied by high sunk costs . . . [One study] shows the relation between economic growth and income inequality for 45 countries during 1966-1995. [It was found] that the increase in income inequality has a significant positive relationship with economic growth in the short and medium term. Using system GMM, [another study estimated] the relation between income

inequality and economic growth for 106 countries during 1965-2005 period. The results show that income inequality has a positive impact on economic growth in the short run, but the two are negatively correlated in the long run. The second argument is related to moral hazard and incentives . . . Because economic performance is determined by the unobservable level of effort that agents make, paying compensations without taking into account the economic performance achieved by individual agents will fail to elicit optimum effort from the agents. Thus, certain income inequalities contribute to growth by enhancing worker motivation . . . and by giving motivation to innovators and entrepreneurs . . . Finally, [another study] point[s] out that the concentration of wealth or stock ownership in relation to corporate governance contributes to growth. If stock ownership is distributed and owned by a large number of shareholders, it is not easy to make quick decisions due to the conflicting interests among shareholders, and this may also cause a free-rider problem in terms of monitoring and supervising managers and workers. . . .

Various studies have examined the relationships between income inequality and economic growth, and most of these assert that a negative correlation exists between the two. . . . Analyzing 159 countries for 1980-2012, they conclude that there exists a negative relation between income inequality and economic growth; when the income share of the richest 20% of population increases by 1%, the GDP decreases by 0.08%, whereas when the income share of the poorest 20% of population increases by 1%, the GDP increases by 0.38%. Some studies find that inequality has a negative impact on growth due to poor human capital accumulation and low fertility rates . . . while [others] point out that inequality creates political instability, resulting in lower investment. . . . [Some economists] argue that widening income inequality has a negative impact on economic growth because it negatively affects social consensus or social capital formation. One important research topic is the correlation between democratization and income redistribution. [Some scholars] explain that social pressure for income redistribution rises as income inequality increases in a democratic society. In other words, when democratization extends suffrage to a wider class of people, the increased political power of low- and middle-income voters results in broader support for income redistribution and social welfare expansion. However . . . if the rich have more political influence than the poor, the democratic system actually worsens income inequality rather than improving it.

10. According to the incentive or moral hazard argument, which one of the designs below is most consistent with the claim that some inequality can raise growth?
1. A regime that concentrates stock ownership in relation to corporate governance.
 2. Wages are determined by tenure rather than output to ensure equity.
 3. Rents protected by market power that enlarge top incomes without linking pay to results.
 4. Pay rewards on verifiable performance for highly productive workers.

Answer: Option 4

Solution:

Approach: The passage's second argument links inequality to growth through incentives -paying strictly by performance (which creates income gaps between high and low performers) motivates effort and drives growth.

- **Option 1** -relates to the *third* argument (concentrated stock ownership/corporate governance), not the incentives argument.
 - **Option 2** (wages by tenure) -ignores performance and would *reduce* incentive to work hard, the opposite of the argument.
 - **Option 3** (rents protected by market power) -describes inequality unconnected to actual performance, so it doesn't fit.
 - **Option 4** -matches exactly: rewarding verifiable performance creates inequality but also aligns incentives with productivity, raising growth.
11. Which one of the options below best summarises the passage?
1. The passage argues that income inequality accelerates economic growth while also emphasising the significance of concerns regarding human capital accumulation, fertility rates, and political instability.
 2. The passage confines its discussion to financing gaps and corporate control while undercutting cross country evidence and overlooking the significance of concerns regarding human capital accumulation, fertility rates, and income redistribution under democratisation.
 3. The passage outlines investment, incentive, and governance channels through which income inequality may support economic growth and reports short-term gains while noting long term drawbacks.

4. The passage claims that evaluating the effect of income inequality on economic growth without considering both short- and long-term consequences is misguided.

Answer: Option 3

Solution:

Approach: Judge each option against the passage's actual structure and balance.

- **Option 1** -one-sided; the passage doesn't argue inequality *accelerates* growth, it presents both sides.
- **Option 2** -too narrow; the passage covers more than financing/corporate control (also incentives, human capital, political effects) and does use cross-country evidence.
- **Option 4** -too narrow; misses the passage's core structure (the three channels through which inequality may affect growth, presented with balanced evidence).
- **Option 3** -correctly captures the passage's balanced, survey-style structure: it lists the pro-growth channels, acknowledges short-term gains, and notes the long-term negative correlations found elsewhere.

12. The primary function of the three-part case for a positive income inequality-economic growth link in the first half of the passage is to show that:
 1. inequality can aid short-term growth in settings with high sunk costs, incentive alignment, and concentrated ownership.
 2. dispersed ownership speeds corporate decision-making and removes free rider problems.
 3. inequality boosts growth in every period and type of economy, regardless of finance or governance conditions.
 4. mature stock markets make wealth concentration unnecessary, yet they might still be harmful to investment.

Answer: The three-part case demonstrates the specific conditions under which inequality can temporarily support growth.

Solution:

Approach: The passage says the three-part case (high sunk costs, incentive alignment, concentrated ownership) shows a positive impact of inequality on growth in the *short-to-medium* term, with long-term correlations turning negative.

So the function of this case is to show the specific conditions under which inequality can support growth.

- **Option 2** -contradicts the passage (which says dispersed ownership *slows* decisions and creates free-rider problems).
- **Option 3** -overstates it; the passage doesn't claim this holds in "every period and type of economy."
- **Option 4** -loosely related but not the main point, and its second half (inequality "might still be harmful to investment") isn't supported.

13. The passage refers to "democratization". Choose the one option below that comes closest to the opposite of this process.

1. The coalition imposed term limits and strengthened judicial review in order to further entrench autocratic rule.
2. Corporate donations were capped and parties received public funding which was portrayed as establishing an oligarchy.
3. Municipalities adopted participatory budgeting and recall elections which a press release called totalitarianism.
4. After the emergency decree, the regime shifted toward authoritarianism as suffrage narrowed and opposition parties were deregistered.

Answer: The option describing reduced suffrage and suppressed political pluralism (de-democratization/autocratization) is correct.

Solution:

Approach: Look for the option describing a *reduction* in suffrage and suppression of political pluralism -the direct opposite of the expanding voting rights and inclusion the passage discusses.

- **Option 1** -entrenches autocracy but doesn't explicitly reduce suffrage.
- **Option 2** -discusses campaign-finance reform in the context of oligarchy, not a reversal of democratization.
- **Option 3** -mislabels democratic practices as authoritarian.

DIRECTIONS for the question 14: *The given sentence is missing in the paragraph below. Decide where it best fits among the options 1,2,3, or 4 indicated in the paragraph.*

14. Sentence: Historically, silver has been, and still is, an important element in the business of 'show' visible in private houses, churches, government and diplomacy.

Paragraph: ____ (1) ____ . Timothy Schroder put it succinctly in suggesting that electric light and eating in the kitchen eroded this need. As he explained to the author, 'Silver, when illuminated by flickering candlelight, comes alive and almost dances before the eyes, but when lit by electric light it becomes flat and dead.' ____ (2) ____ . Domestic and economic changes may have worked against the market, but the London silver trade remained buoyant, thanks to the competition of collectors seeking grand display silver at the top end, and the buyers of 'collectables', like spoons and wine labels and 'novelties', at the bottom. ____ (3) ____ . Another factor that came into play was the systematic collection building of certain American museums over the period. Boston, Huntington Art Gallery and Williamsburg, among others, were largely supplied by London dealers. ____ (4) .

1. Option 1
2. Option 2
3. Option 3
4. Option 4

Answer Position 3

Solution:

Approach: The paragraph explains that changing lighting and domestic habits reduced the *traditional* need for displaying silver, yet the trade stayed strong because of collector demand. The missing sentence -placed at **Position 3** - explains this by asserting silver's continuing role in the "business of show" across settings, which then leads naturally into the next point about systematic collecting by American museums (another form of "show").

Placing it earlier would break the logical flow from Schroder's specific observation to the broader market analysis.

DIRECTIONS for questions 15-16: *The four sentences (labelled 1, 2, 3, and 4) given below, when properly sequenced, would yield a coherent paragraph. Decide on the proper sequencing of the order of the sentences and key in the sequence of the four numbers as your answer.*

Question 15. 1. But man, woman or otherwise, there is no denying that the quality of our life and character will be significantly shaped by the way we handle our anger.

2. Once the taboos have been broken, women usually experience letting their fists fly as intensely liberating.

3. Though this might seem a stereotype, women-unlike men, who are frequently applauded for unbridled aggression—are often socialized to keep a lid on their ire.

4. Many of them are so at odds with their aggressive feelings that, as a coach, I often have to stop them from pulling their punches and encourage them to extend their arms so their blows might actually reach their fleshy target.

Answer Position 3

Solution:

Approach: The paragraph explains that changing lighting and domestic habits reduced the *traditional* need for displaying silver, yet the trade stayed strong because of collector demand. The missing sentence -placed at **Position 3** - explains this by asserting silver's continuing role in the "business of show" across settings, which then leads naturally into the next point about systematic collecting by American museums (another form of "show").

Placing it earlier would break the logical flow from Schroder's specific observation to the broader market analysis.

Question 16.

1. It can in fact be integrated into any function (education, medical treatment, production, punishment); it can increase the effect of this function, by being linked closely with it; it can constitute a mixed mechanism in which relations of power (and of knowledge) may be precisely adjusted, in the smallest detail, to the processes that are to be supervised; it can establish a direct proportion between 'surplus power' and 'surplus production'.

2. It's a case of 'it's easy once you've thought of it' in the political sphere.

3. The panoptic mechanism is not simply a hinge, a point of exchange between a mechanism of power and a function; it is a way of making power relations function in a function, and of making a function function through these power

relations.

4. In short, it arranges things in such a way that the exercise of power is not added on from the outside, like a rigid, heavy constraint, to the functions it invests, but is so subtly present in them as to increase

Answer: 3-1-4-2

Solution:

Approach: Arrange as **3-1-4-2**:

- Sentence 3 → introduces the panoptic mechanism (embedding power relations within functions).
- Sentence 1 → gives specific examples of how it's integrated into various functions.
- Sentence 4 → summarizes: power is subtly embedded, not externally imposed.
- Sentence 2 → closes with a reflective comment on the mechanism's apparent simplicity in politics.

This order moves logically from definition → examples → summary → broader observation.

DIRECTIONS for questions 17-18: *The passage below is accompanied by four questions. Based on the passage, choose the best answer for each question.*

Often the well intentioned music lover or the traditionally-minded professional composer asks two basic questions when faced with the electronic music phenomena: (1) . . . is this type of artistic creation music at all? and, (2) given that the product is accepted as music of a new type or order, is not such music "inhuman"? . . . As Lejaren Hiller points out in his book *Experimental Music* (co-author Leonard M. Isaacson), two questions which often arise when music is discussed are: (a) the substance of musical communication and its symbolic and semantic significance, if any, and (b) the particular processes, both mental and technical, which are involved in creating and responding to musical composition. The ever-present popular concept of music as a direct, open, emotional expression and as a subjective form of communication from the composer, is, of course still that of the nineteenth century, when composers themselves spoke of music in those terms . . . But since the third decade of our century many composers have preferred more objective definitions of music, epitomized in Stravinsky's description of it as "a form of speculation in terms of sound and time". An

acceptance of this more characteristic twentieth-century view of the art of musical composition will of course immediately bring the layman closer to an understanding of, and sympathetic response to, electronic music, even if the forms, sounds and approaches it uses will still be of a foreign nature to him.

A communication problem however will still remain. The principal barrier that electronic music presents at large, in relation to the communication process, is that composers in this medium are employing a new language of forms . . . where terms like 'densities', 'indefinite pitch relations', 'dynamic serialization', 'permutation', etc., are substitutes (or remote equivalents) for the traditional concepts of harmony, melody, rhythm, etc. . . . When the new structural procedures of electronic music are at last fully understood by the listener the barriers between him and the work he faces will be removed. . . .

The medium of electronic music has of course tempted many kinds of composers to try their hand at it . . . But the serious-minded composer approaches the world of electronic music with a more sophisticated and profound concept of creation. Although he knows that he can reproduce and employ melodic, rhythmic patterns and timbres of a traditional nature, he feels that it is in the exploration of sui generis languages and forms that the aesthetic magic of the new medium lies. And, conscientiously, he plunges into this search.

The second objection usually levelled against electronic music is much more innocent in nature. When people speak-sometimes very vehemently-of the 'inhuman' quality of this music they seem to forget that the composer is the one who fires the machines, collects the sounds, manipulates them, pushes the buttons, programs the computer, filters the sounds, establishes pitches and scales, splices tape, thinks of forms, and rounds up the over-all structure of the piece, as well as every detail of it.

17. What relation does the "communication problem" mentioned in paragraph 2 have to the questions that the author recounts at the beginning of the passage?
 1. Its unfamiliar "language of forms" and novel terms mean that we cannot see electronic music as music since it does not employ traditional musical concepts.

2. Unfamiliar forms and terms might get in the way of our seeing electronic music as music, but this can be overcome.
3. The communication problem is what allows us to see electronic music as music because music must be difficult to understand.
4. None; they are unrelated to one another and form parts of different discussions.

Answer: The communication problem is the specific (but surmountable) obstacle behind the initial skepticism about electronic music.

Solution:

Approach: The passage opens with two questions: is electronic music real “music,” and is it “inhuman”? The “communication problem” in paragraph 2 - caused by electronic music’s unfamiliar “language of forms” and technical terms - directly explains why people initially struggle to accept it as music, though the passage also says this barrier can be overcome once the new structures are understood.

18. From the context in which it is placed, the phrase “sui generis” in paragraph 3 suggests which one of the following?

1. Indescribable
2. Particular
3. Unaesthetic
4. Generic

Answer: “Particular” best captures the meaning of “sui generis” here.

Solution:

Approach: “Sui generis” (Latin: “of its own kind”) describes electronic composers exploring forms unique to the medium, distinct from traditional structures -i.e., something particular/distinctive.

- **Option 1** (“Indescribable”) -wrong; the passage suggests these forms *can* be understood and explored.
- **Option 3** (“Unaesthetic”) -contradicts the passage’s mention of “aesthetic magic.”
- **Option 4** (“Generic”) -the opposite of “sui generis.”

19. The goal of the author over the course of this passage is to:

1. differentiate the modern composer from the nineteenth century composer.
2. defend electronic music from certain common charges.
3. differentiate between electronic music and other forms of music.
4. defend the "serious-minded composer" from Lejaren Hill and Stravinsky.

Answer: The overarching goal is to defend electronic music against the charges of being non-musical and inhuman.

Solution:

Approach: The passage systematically answers the two opening questions (is electronic music real music? Is it inhuman?) across its four paragraphs -modern understanding of music (1), overcoming communication barriers (2), the composer's creative exploration (3), and the composer's essential human role (4). Comparisons between composers or musical eras only serve this larger defense; they aren't the goal in themselves.

20. The mention of Stravinsky's description of music in the first paragraph does all the following EXCEPT:

1. complicate our notion of what is communicated through music.
2. allow us to classify electronic music as music.
3. respond to and expand upon earlier understandings of music.
4. help us determine which sounds are musical and which are not.

Answer: Option 4 (it does not provide a way to distinguish musical from non-musical sounds).

Solution:

Approach: Stravinsky's line -music as "a form of speculation in terms of sound and time" -serves several purposes in the passage:

- Complicates the traditional (19th-century, emotion-expression) idea of what music communicates.
- Lets us classify electronic music as music, since this broader, more abstract definition accommodates non-traditional forms.
- Expands on earlier (Romantic-era) understandings of music with a more 20th-century view.

What it does **not** do is give a *criterion* for distinguishing musical from non-musical sounds -it redefines composition in general but doesn't provide a test for which sounds qualify as music.

DIRECTIONS for questions 21-24: *The passage below is accompanied by four questions. Based on the passage, choose the best answer for each question.*

Understanding the key properties of complex systems can help us clarify and deal with many new and existing global challenges, from pandemics to poverty . . . A recent study in Nature Physics found transitions to orderly states such as schooling in fish (all fish swimming in the same direction), can be caused, paradoxically, by randomness, or 'noise' feeding back on itself. That is, a misalignment among the fish causes further misalignment, eventually inducing a transition to schooling. Most of us wouldn't guess that noise can produce predictable behaviour. The result invites us to consider how technology such as contact-tracing apps, although informing us locally, might negatively impact our collective movement. If each of us changes our behaviour to avoid the infected, we might generate a collective pattern we had aimed to avoid: higher levels of interaction between the infected and susceptible, or high levels of interaction among the asymptomatic.

Complex systems also suffer from a special vulnerability to events that don't follow a normal distribution or 'bell curve'. When events are distributed normally, most outcomes are familiar and don't seem particularly striking. Height is a good example: it's pretty unusual for a man to be over 7 feet tall; most adults are between 5 and 6 feet, and there is no known person over 9 feet tall. But in collective settings where contagion shapes behaviour - a run on the banks, a scramble to buy toilet paper - the probability distributions for possible events are often heavy-tailed. There is a much higher probability of extreme events, such as a stock market crash or a massive surge in infections. These events are still unlikely, but they occur more frequently and are larger than would be expected under normal distributions.

What's more, once a rare but hugely significant 'tail' event takes place, this raises the probability of further tail events. We might call them second-order tail events; they include stock market gyrations after a big fall and earthquake aftershocks. The initial probability of second-order tail events is so tiny it's almost impossible to calculate - but once a first-order tail event occurs, the rules change, and the probability of a second-order tail event increases.

The dynamics of tail events are complicated by the fact that they result from cascades of other unlikely events. When COVID-19 first struck, the stock market suffered stunning losses followed by an equally stunning recovery. Some of these dynamics are potentially attributable to former sports bettors, with no sports to bet on, entering the market as speculators rather than investors. The arrival of these new players might have increased inefficiencies and allowed savvy long-term investors to gain an edge over bettors with different goals....

One reason a first-order tail event can induce further tail events is that it changes the perceived costs of our actions and changes the rules that we play by. This game-change is an example of another key complex systems concept: nonstationarity. A second, canonical example of nonstationarity is adaptation, as illustrated by the arms race involved in the coevolution of hosts and parasites [in which] each has to 'run' faster, just to keep up with the novel solutions the other one presents as they battle it out in evolutionary time.

21. All of the following inferences are supported by the passage EXCEPT that:

1. learning can change the rules that actors face. So, a rare shock can alter payoffs and raise the odds of subsequent large disturbances within the same system, which supports the idea of second-order tail events.
2. the text attributes the COVID-19 pandemic rebound in financial markets solely to displaced sports bettors and treats their entry as the overriding cause of the rapid recovery across assets and time horizons.
3. examples like runs on banks and toilet paper scrambles illustrate how contagion can amplify local choices into system-wide cascades that surprise participants and lead to patterns they did not intend to create.
4. heavy-tailed events make extreme outcomes more frequent and larger than bell curve expectations. This complicates forecasting and risk management in collective settings shaped by contagion and copying behaviour.

Answer: Option 2 is NOT supported -the passage never claims the bettors were the sole/overriding cause.

Solution:

Approach: The passage discusses the stock-market rebound during COVID-19 in speculative, tentative language (“potentially attributable to,” “might have increased”) -presenting new sports bettors as *one possible factor among others*, not the sole cause of the market’s rapid recovery.

- **Option 1** -supported: a rare shock changing the “rules” and raising odds of second-order tail events is discussed.
- **Option 3** -supported: contagion amplifying individual choices into system-wide cascades (bank runs, toilet-paper shortages).
- **Option 4** -supported: heavy-tailed distributions make extreme outcomes more frequent, complicating forecasts.

22. Which one of the following observations would most strengthen the passage's claim that a first-order tail event raises the probability of further tail events in complex systems?

1. After a major equity crash, researchers find dense clusters of large daily moves for several weeks, with extreme days occurring far more often than in normal circumstances for assets with customarily low volatility profiles.
2. Following large earthquakes, regional seismic activity returns to baseline within hours with no aftershock sequence once data are adjusted for reporting effects, which suggests independence across events rather than any elevation in subsequent tail probabilities.
3. In epidemic networks, initial super-spreading episodes are isolated spikes after which outbreak sizes match the baseline distribution from independent contact models across comparable cities with no rise in the frequency or size of later extreme clusters.
4. River discharge records show water levels fit a normal distribution with thin tails that match laboratory data, regardless of storms or floods.

Answer: Option 1

Solution:

Approach: The passage claims a first-order tail event (e.g., a crash) raises the odds of further (second-order) tail events.

- **Option 1** -directly strengthens this: after a major crash, large daily moves cluster together and extreme days become more frequent -matching the claim exactly.

- **Option 2** -describes a return to baseline with no aftershocks, which weakens (not strengthens) the claim.
- **Option 3** -shows initial extreme episodes *not* raising the frequency of later extremes -also weakens the claim.
- **Option 4** -describes normal (thin-tailed) distributions, irrelevant to the tail-event claim.

23. Which one of the options below best summarises the passage?

1. The passage explains how speculative entrants always produce inefficiency after health shocks. Therefore, long-term investors invariably profit when new participants push prices away from fundamentals under pandemic conditions and comparable crises.
2. The passage explains how social outcomes generally follow normal distributions. So, extreme events are negligible, and policy should stabilise averages rather than learn from large shocks in fast-changing collective settings.
3. The passage explains how nonstationarity works in evolutionary biology and rejects applications in markets or public health because adaptation is exclusive to parasite-host systems and cannot arise in technology-mediated social dynamics.
4. The passage explains how noise can create order, then shows why complex systems with contagion are vulnerable to heavy-tailed cascades. It also explains why early shocks change rules through nonstationarity with a market illustration during the COVID-19 disruption.

Answer: Option 4 accurately captures this three-part progression and scope; the other options misrepresent it.

Solution:

Approach: The passage develops three key ideas about complex systems, in this order: 1. Noise can create order (fish-schooling, contact-tracing apps). 2. Vulnerability to heavy-tailed/extreme events in collective, contagion-driven settings (bank runs, infection surges). 3. Cascades and rule-changes -an initial tail event raises the odds of further tail events by changing perceived costs/rules (e.g., COVID-19 market rebound, host–parasite arms race).

24. The passage suggests that contact tracing apps could inadvertently raise risky interactions by altering local behaviour. Which one of the assumptions below is most necessary for that suggestion to hold?
1. Individuals base movement choices partly on observed infections and on the behaviour of others. So, local responses interact, which turns many small adjustments into large scale patterns that can frustrate the intended aim of risk reduction.
 2. Most users uninstall apps within a week, which leaves only highly exposed individuals participating. This neutralises any systematic bias in routing decisions and prevents any predictable change in aggregate contact patterns.
 3. App alerts always include precise location to within one metre and deliver real time updates for all users, which ensures that the data feed is perfectly accurate regardless of privacy settings, power limits, or network conditions.
 4. Urban networks have uniform traffic conditions at all hours, which allows perfectly predictable routing independent of personal choices, social signals, or crowd reactions and, therefore, makes interdependence negligible in city movement decisions.

Answer: Option 1

Solution:

Approach: The passage's suggestion -that contact-tracing apps could unintentionally *increase* risky interactions -relies on the system showing interdependence and feedback: people's movement choices are shaped both by infection data and by others' behaviour, so many small individual adjustments can aggregate into a large, unintended collective pattern (similar to how "noise" among schooling fish produces order).

- **Option 1** -states this necessary assumption directly.
- **Option 2** (fast uninstalls) -would actually *prevent* any systematic pattern from forming.
- **Option 3** (perfect app accuracy) -not required; imperfect data can still drive interacting behavioural adjustments.
- **Option 4** (uniform traffic making interdependence negligible) -undermines the suggestion, since it denies the very feedback mechanism the argument relies on.

SECTION: DATA INTERPRETATION & LOGICAL REASONING

DIRECTIONS for questions 25-29: *Read the information given below and answer the question that follows.*

A train travels from Station A to Station E, passing through stations B, C, and D, in that order. The train has a seating capacity of 200 . A ticket may be booked from any station to any other station ahead on the route, but not to any earlier station.

A ticket from one station to another reserves one seat on every intermediate segment of the route. For example, a ticket from B to E reserves a seat in the intermediate segments B – C, C – D, and D – E.

The occupancy factor for a segment is the total number of seats reserved in the segment as a percentage of the seating capacity. The total number of seats reserved for any segment cannot exceed 200.

The following information is known.

1. Segment C – D had an occupancy factor of 95%. Only segment B – C had a higher occupancy factor.
2. Exactly 40 tickets were booked from B to C and 30 tickets were booked from B to E .
3. Among the seats reserved on segment D – E, exactly four-sevenths were from stations before C .
4. The number of tickets booked from A to C was equal to that booked from A to E , and it was higher than that from B to E.
5. No tickets were booked from A to B , from B to D and from D to E .
6. The number of tickets booked for any segment was a multiple of 10 .

25. What was the occupancy factor for segment D – E ?

1. 35%

2. 70%
3. 84%
4. 77%

26. How many tickets were booked from Station A to Station E?
27. How many tickets were booked from Station C?
28. What is the difference between the number of tickets booked to Station C and the number of tickets booked to Station D?
29. How many tickets were booked to travel in exactly one segment?

Solutions and answers

Setup: Stations A, B, C, D, E lie in order on a route. Let the number of tickets booked between each pair of stations be represented by variables (as shown below).

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

Working:

- From point 3: $s + v = \frac{4}{7} \times (s + v + x + y) \Rightarrow (s + 30)/(x + y) = 4/3$
- From point 2: $t = 40$ and $v = 30$
- From point 5: $p = u = y = 0$
- Solving: $(s + 30)/(x + 0) = 4/3 \Rightarrow 3s + 90 = 4x$
- From point 4: $q = s > v = 30$
- From point 6: every segment's ticket count is a multiple of 10.

Testing values of s that are multiples of 10:

- $s = 40 \Rightarrow x = 52.5$ (rejected-not a multiple of 10)

- $s = 50 \Rightarrow x = 60$ (valid)
- $s = 60 \Rightarrow x = 67.5$ (rejected)
- $s = 70 \Rightarrow x = 75$ (rejected)
- $s = 80 \Rightarrow x = 82.5$ (rejected)
- $s = 90 \Rightarrow x = 90$, but then $s+v+x+y = 210 > 200$ (exceeds capacity - rejected)

So the only valid solution is $s = q = 50$, $x = 60$.

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

Using the constraint that segment C–D had an occupancy of 95% of 200 (=190):

- $50 + r + 30 + 0 + 60 + w = 190 \Rightarrow r + w = 50$

Using the constraint that segment B–C had an occupancy > 190 , so it must equal 200 (nearest multiple of 10):

- $50 + r + 50 + 30 + 0 + 40 = 200 \Rightarrow r = 30, w = 20$

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

Q25. Occupancy for segment D–E = $s + v + x + y = 140$. **Answer: Occupancy factor = $140/200 \times 100 = 70\%$**

Q26. Tickets booked from Station A to E = $s = 50$. **Answer: 50**

Q27. Tickets booked from Station C = $(C-D) + (C-E) + (D-E) = 20 + 60 + 0 = 80$. **Answer: 80**

Q28. Tickets booked to Station C = $(A-C) + (B-C) = 50 + 40 = 90$. Tickets booked to Station D = $(A-D) + (B-D) + (C-D) = 30 + 0 + 20 = 50$. **Answer: Difference = $90 - 50 = 40$**

Q29. Tickets booked to travel in exactly one segment = $(A-B) + (B-C) + (C-D) + (D-E) = 0 + 40 + 20 + 0 = 60$. **Answer: 60**

DIRECTIONS for questions 30-34: *Read the information given below and answer the question that follows.*

At InnovateX, six employees, Asha, Bunty, Chintu, Dolly, Eklavya, and Falguni, were split into two groups of three each: Elite led by Manager Kuku, and Novice led by Manager Lalu.

At the end of each quarter, Kuku and Lalu handed out ratings to all members in their respective groups. In each group, each employee received a distinct integer rating from 1 to 3.

The score for an employee at the end of a quarter is defined as their cumulative rating from the beginning of the year. At the end of each quarter the employee in Novice with the highest score was promoted to Elite, and the employee in Elite with the minimum score was demoted to Novice. If there was a tie in scores, the employee with a higher rating in the latest quarter was ranked higher.

1. Asha, Bunty, and Chintu were in Elite at the beginning of Quarter 1. All of them were in Novice at the beginning of Quarter 4.
 2. Dolly and Falguni were the only employees who got the same rating across all the quarters.
 3. The following is known about ratings given by Lalu:
 - Bunty received a rating of 1 in Quarter 2.
 - Asha and Dolly received ratings of 1 and 2, respectively, in Quarter 3.
-
30. What was Eklavya's score at the end of Quarter 2?
 31. How many employees changed groups more than once up to the beginning of Quarter 4?
 32. What was Bunty's score at the end of Quarter 3?
 33. For how many employees can the scores at the end of Quarter 3 be determined with certainty?

34. Which of the following statements is/are NECESSARILY true?

- I. Asha received a rating of 2 in Quarter 1.
- II. Asha received a rating of 1 in Quarter 2.

- 1. Only II
- 2. Only I
- 3. Both I and II
- 4. Neither I nor II

Solutions and answers

Setup: Employees move between “Elite” (led by Kuku) and “Novice” (led by Lalu) groups each quarter based on ratings.

Working:

- From point 3: Buntly got rating 1 from Lalu in Quarter 2 -meaning he was in Elite in Q1 (got lowest rating there) and got demoted to Novice in Q2. Asha and Chintu remain in Elite at the end of Q1 with rating 2 or 3.
- From point 2: Dolly and Falguni get identical ratings across all quarters; Dolly got rating 2 in Q3, so she got rating 2 throughout.
- If Falguni always got rating 1, she could never be promoted -but point 1 says Asha, Buntly, and Chintu are all in Novice at the start of Q4, meaning each must be demoted one by one, while Dolly, Eklavya, and Falguni are promoted one by one.
- So Falguni must have gotten rating 3 at the end of Q1 (promoted to Elite), while Eklavya got rating 1 at the end of Q1.
- End of Q2: among Novice, Buntly got 1 and Dolly got 2 (constant) $\Rightarrow$ Eklavya got 3. Eklavya's and Dolly's cumulative scores tie, but Eklavya has the higher *rating*, so he gets promoted to Elite in Q3.
- In Q3, Asha got rating 1 from Lalu (Novice manager) $\Rightarrow$ Asha must have been demoted from Elite at the end of Q2 with the *minimum* cumulative score among Elite members -meaning Asha got rating 1 in Q2, and Chintu got rating 2 in Q2 (with Asha's Q1 rating being 2 or 3, and Chintu's Q1 rating being 2 or 3, consistent with cumulative totals of 3–4 for Asha and 4–5 for Chintu).
- In Q3, Chintu is demoted to Novice with the minimum cumulative score (5 or 6), while Dolly is promoted to Elite with the highest cumulative score (6) after Q3.

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

Q30. Eklavya's score at the end of Quarter 2 = **4**

Q31. No employee changed group more than once up to the start of Quarter 4 - **True**, as shown by the table above.

Q32. Bunty's score at the end of Quarter 3 = **5**

Q33. Scores at the end of Quarter 3 can be determined with certainty for **4** employees.

Q34.

- Statement I (Asha received rating 2 in Quarter 1) -**Not necessarily true**; Asha could have received rating 2 or 3.
- Statement II (Asha received rating 1 in Quarter 2) -**True**.

DIRECTIONS for questions 35-38: *Read the information given below and answer the question that follows.*

A round table has seven chairs around it. The chairs are numbered 1 through 7 in a clockwise direction. Four friends, Aslam, Bashir, Chhavi, and Davies, sit on four of the chairs. In the starting position, Aslam and Chhavi are sitting next to each other, while for Bashir as well as Davies, there are empty chairs on either side of the chairs that are sitting on.

The friends take turns moving either clockwise or counter clockwise from their chair. The friend who has to move in a turn occupies the first empty chair in whichever direction (s)he chooses to move. Aslam moves first (Turn 1), followed by Bashir, Chhavi, and Davies (Turns 2, 3, and 4, respectively). Then Aslam moves again followed by Bashir, and Chhavi (Turns 5, 6, and 7, respectively).

The following information is known.

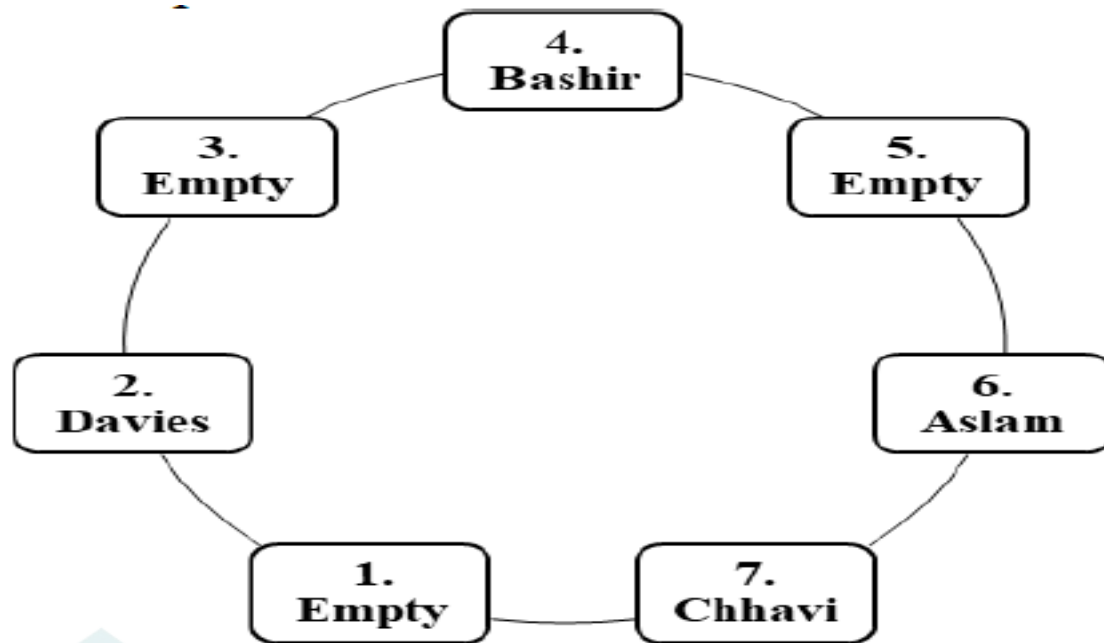
1. The four friends occupy adjacent chairs only at the end of Turn 2 and Turn 6.
 2. Davies occupies Chair 2 after Turn 1 and Chair 4 after Turn 5, and Chhavi occupies Chair 7 after Turn 2
35. What is the number of the chair initially occupied by Bashir?
36. Who sits on the chair numbered 4 at the end of Turn 3?
1. Bashir
 2. Chhavi
 3. Davies
 4. No one
37. Which of the chairs are occupied at the end of Turn 6?
1. Chairs numbered 1, 2, 6, and 7
 2. Chairs numbered 2, 3, 4, and 5
 3. Chairs numbered 1, 2, 3, and 4
 4. Chairs numbered 4, 5, 6, and 7
38. Which of the following BEST describes the friends sitting on chairs adjacent to the one occupied by Bashir at the end of Turn 7?
1. Davies only
 2. Chhavi and Davies
 3. Aslam and Chhavi
 4. Chhavi only

Solutions and Answers:

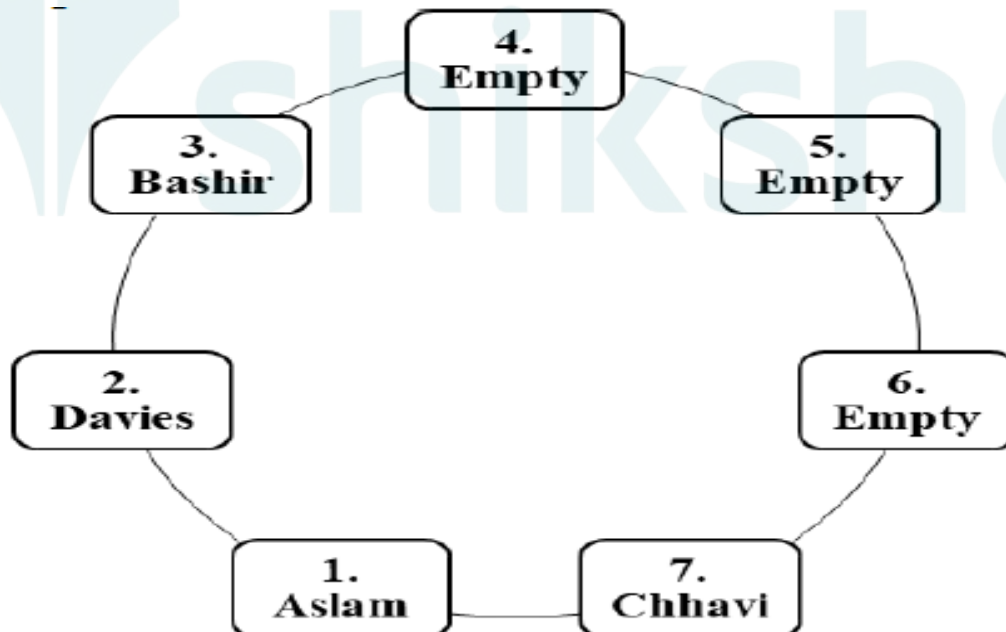
Setup: Four friends -Aslam, Bashir, Chhavi, Davies -occupy chairs around a circle, taking turns to move.

Working:

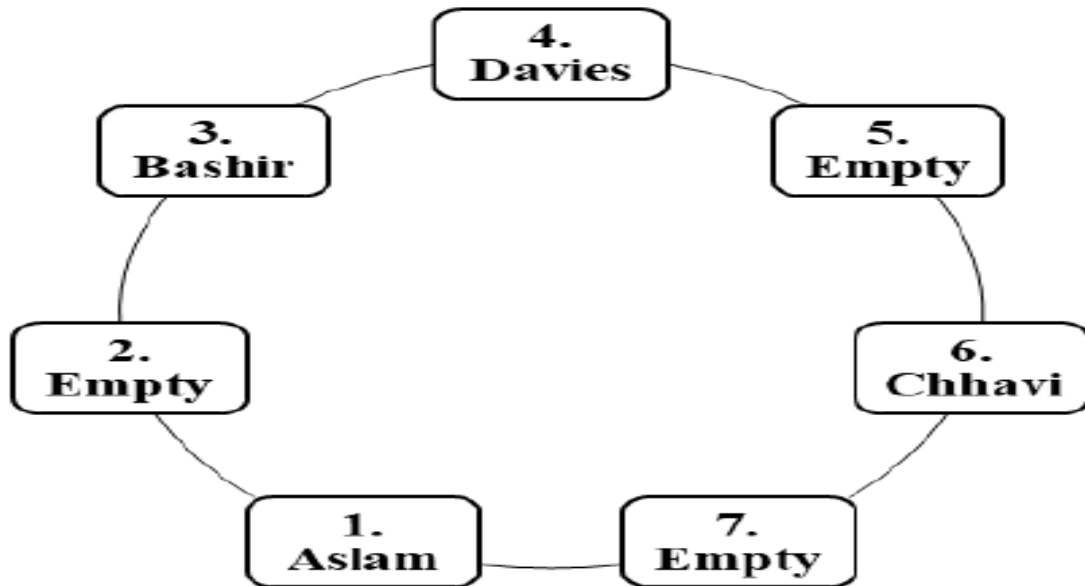
- From point 2: Davies is on Chair 2 after Turn 1 (moved by Aslam), so Davies must have started on Chair 2, with Chairs 1 and 3 empty initially.
- Chhavi is on Chair 7 after Turn 2 (moved by Bashir), so Chhavi started on Chair 7. Since Aslam and Chhavi sit next to each other initially, Aslam started on Chair 6. That leaves Bashir on Chair 4 initially.



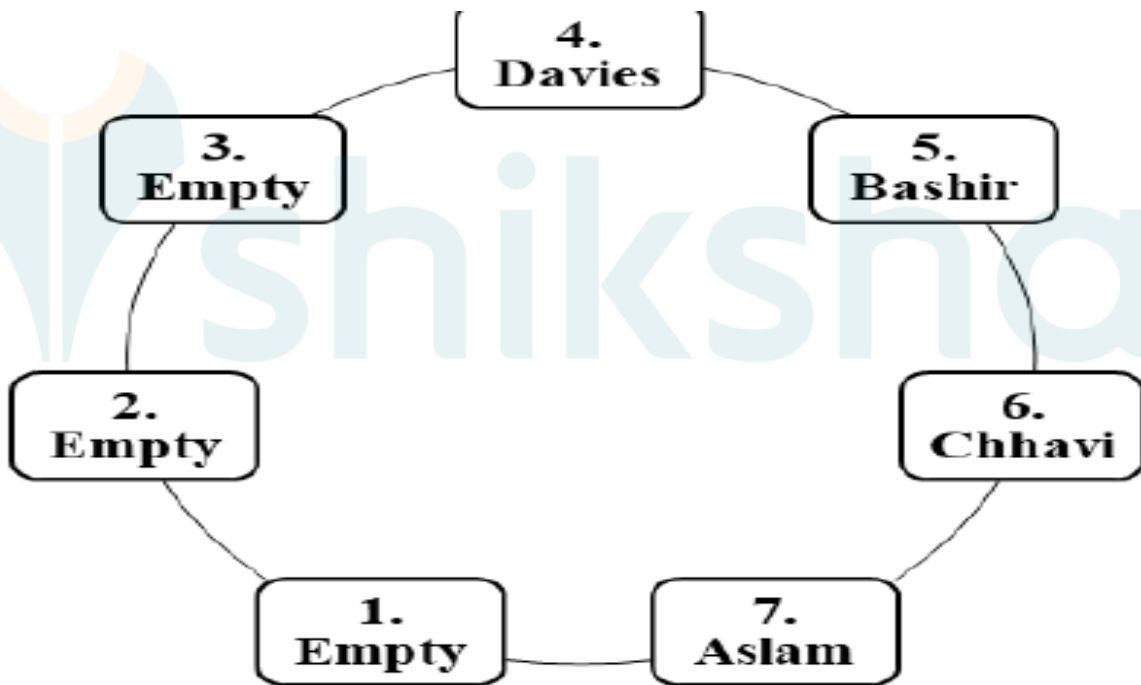
- From point 1: all four friends sit in adjacent chairs at the end of Turn 2. If Aslam (Turn 1) moved counter-clockwise to empty Chair 5, followed by Bashir (Turn 2) moving to Chair 3 or 6, they would *not* end up adjacent. So Aslam must have moved **clockwise to Chair 1**, and Bashir then moved to **Chair 3**, making the group adjacent.



- Davies is on Chair 4 after Turn 5 (point 2) $\Rightarrow$ Chhavi (Turn 3) moved to Chair 6, and Davies (Turn 4) moved to Chair 4.



- The group must again be adjacent at the end of Turn 6 (point 1) $\Rightarrow$ Aslam (Turn 5) moved counter-clockwise to Chair 7, and Bashir (Turn 6) moved clockwise to Chair 5.



Q35. Bashir's initial chair = **Chair 4**

Q36. Since Davies moved to Chair 4 on Turn 4, Chair 4 must have been empty at the end of Turn 3 -**no one** was sitting there.

Q37. Chairs occupied at the end of Turn 6 = **Chairs 4, 5, 6, and 7.**

Q38. At the end of Turn 7, Chhavi (from Chair 6) moves to empty Chair 1 or 3, and Bashir sits on Chair 5. The chairs adjacent to Bashir are Chair 4 (Davies) and Chair 6 (empty).

DIRECTIONS for questions 39-42: *Read the information given below and answer the question that follows.*

Alia, Badal, Clive, Dilshan, and Ehsaan played a game in which each asks a unique question to all the others and they respond by tapping their feet, either once or twice or thrice. One tap means "Yes", two taps mean "No", and three taps mean "Maybe".

A total of 40 taps were heard across the five questions. Each question received at least one "Yes", one "No", and one "Maybe."

The following information is known.

1. 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.
 2. Dilshan and Ehsaan tapped a total of 11 and 9 times respectively. Dilshan responded "No" to Badal.
 3. Badal, Dilshan, and Ehsaan received equal number of taps to their respective questions.
 4. No one responded "Yes" more than twice.
 5. No one's answer to Alia's question matched the answer that Alia gave to that person's question. This was also true for Ehsaan.
 6. Clive tapped more times in total than Badal.
39. How many taps did Clive receive for his question?
40. Which two people tapped an equal number of times in total?
41. What was Clive's response to Ehsaan's question?
1. Yes
 2. Maybe
 3. Cannot be determined
 4. No
42. How many "Yes" responses were received across all the questions?

Solutions and answers:

Setup: 5 players (A, B, C, D, E) each ask a question to the other 4 players. Total responses = $5 \times 4 = 20$. Responses are Yes (1 tap), No (2 taps), or Maybe (3 taps). Total taps heard = 40.

Working:

- Let Y, N, M = total Yes, No, Maybe responses. $Y + N + M = 20$ and $Y + 2N + 3M = 40 \Rightarrow$ solving gives **$Y = M$** , and $N = 20 - 2Y$.
- Since every question got at least one Yes, one No, and one Maybe (minimum 5 each across 5 questions):

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

- Additional clues: Alia tapped 6 times total and received 9 taps for her question; she said “Yes” to both Clive and Dilshan. Dilshan and Ehsaan tapped 11 and 9 times respectively; Dilshan said “No” to Badal. Badal, Dilshan, and Ehsaan received an equal number of taps. No one said “Yes” more than twice (so Alia must have said “No” to both Badal and Ehsaan).

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

- Total taps received = 40 $\Rightarrow 9 + 3p + q = 40 \Rightarrow 3p + q = 31$, giving $(p, q) = (7, 10), (8, 7),$ or $(9, 4)$.
 - $(9, 4)$ is rejected -every column (question) needs at least one Y, N, and M (minimum 6 taps).
 - $p = 7$ is rejected since Badal’s question already has 2 No’s, leaving no room.
 - So **$p = 8, q = 7$** .
- From the tap totals, Badal received 8 taps for her question, achievable only as one Yes, two No’s, one Maybe. Similarly for C, D, and E.
- Let B and C’s total taps given be s and w, with $s + w = 14$ and $w > s$. Testing $(w, s) = (8,6), (9,5), (10,4)\dots$ -if $s = 5$, the only way to total 5 is

(1,1,1,2), which needs a “Yes” said more than twice by someone -a contradiction. So **s = 8, w = 6**. Alia’s total of 9 works only as Y, N, M, M.

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

Q39. Clive received **7 taps** for his question.

Q40. Alia and Badal tapped an **equal number** of times in total.

Q41. D’s total taps = 11, with 2 taps given in response to B’s question, so D’s pattern must be (3,3,3,2). B’s total = 6, achievable only as (1,1,2,2) (since no one says “Yes” more than twice).

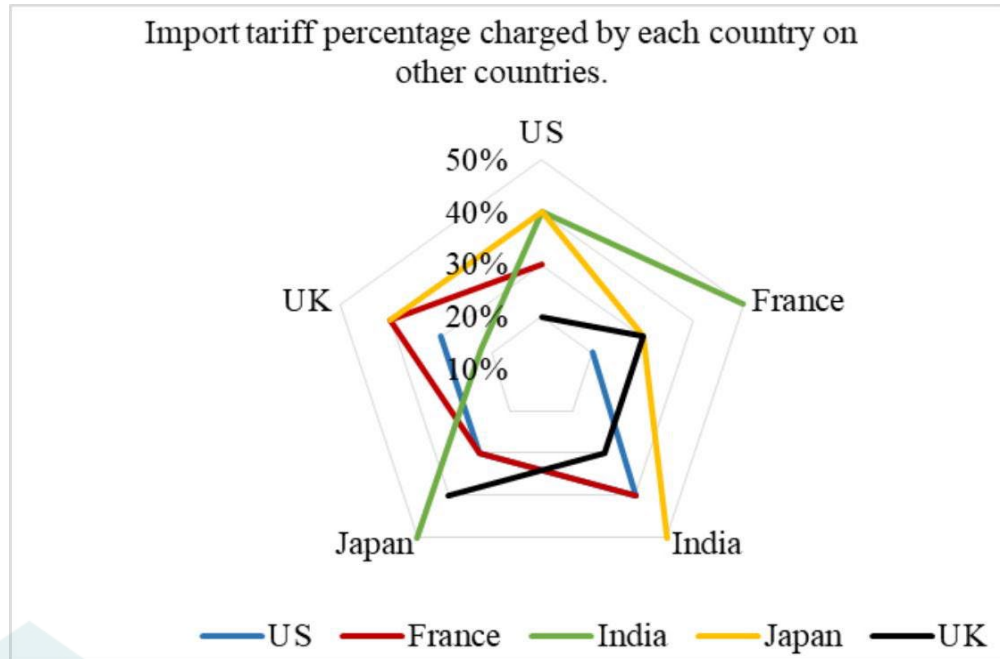
Respondents	A	B	C	D	E	Taps Tapped
A	-	N (2)	Y (1)	Y (1)	N (2)	6
B (1,1,2,2)	1	-	2	2	1	s = 6
C	2	1	-	3	2	w = 8
D	3	N (2)	3	-	3	11
E	3	3	1	2	-	9
Taps recieved	9 (Y, N, M, M)	8 (Y, N, N, M)	7 (Y, Y, N, M)	8 (Y, N, N, M)	8 (Y, N, N, M)	40

Q42. Total “Yes” responses across all questions = **6**.

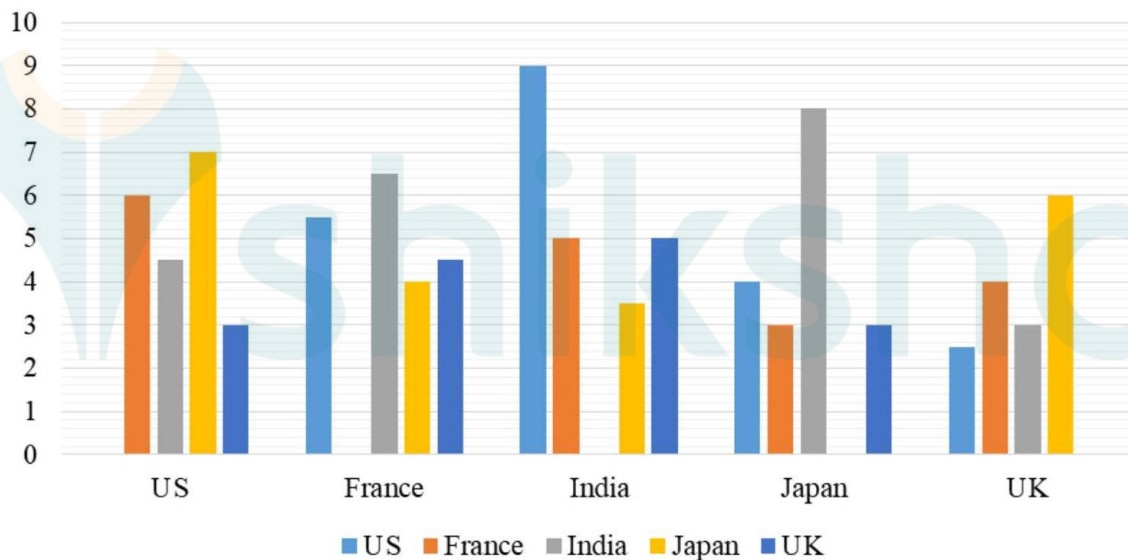
DIRECTIONS for questions 43-45: Read the information given below and answer the question that follows.

Five countries engage in trade with each other. Each country levies import tariffs on the other countries. The import tariff levied by Country X on Country Y is calculated by multiplying the corresponding tariff percentage with the total imports of Country X from Country Y .

The radar chart below depicts different import tariff percentages charged by each of the five countries on the others. For example, US (the blue line in the chart) charges 20%, 40%, 30%, and 30% import tariff percentages on imports from France, India, Japan, and UK, respectively. The bar chart depicts the import tariffs levied by each county on other countries. For example, US charged import tariff of 3 billion USD on UK.



Import tariff in Billion USD charged by each country on other countries.



Assume that imports from one country to another equals the exports from the latter to the former.

The trade surplus of Country X with Country Y is defined as follows.

Trade surplus = Exports from Country X to Country Y – Imports to Country X from Country Y .

A negative trade surplus is called trade deficit.

43. How much is Japan's export to India worth?

1. 8.5 Billion USD
 2. 7.0 Billion USD
 3. 16.0 Billion USD
 4. 1.75 Billion USD
44. Which among the following is the highest?
1. Exports by France to Japan
 2. Imports by France from India
 3. Imports by US from France
 4. Exports by Japan to UK
45. What is the trade surplus/trade deficit of India with UK?
1. Deficit of 10.0 Billion USD
 2. Surplus of 15.0 Billion USD
 3. Surplus of 10.0 Billion USD
 4. Deficit of 15.0 Billion USD
46. Among France and UK, who has/have trade surplus(es) with US?
1. Neither France nor UK
 2. Both France and UK
 3. Only France
 4. Only UK

Solutions and Answers

Setup: Using the tariff-rate chart, compute actual trade values. E.g.: Imports from France by US $\times$ Tariff rate = Import Tariff $\Rightarrow$ Imports from France by US $\times 20\%$ = 6 Billion USD $\Rightarrow$ Imports from France by US = $6/20 \times 100 = \mathbf{30 \text{ Billion USD}}$.

	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	—

The same method gives the full trade matrix:

	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	–

Q43. Japan's exports to India = India's imports from Japan = **7 Billion USD**

Q44. Checking each option: 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 **-the highest** 4. Exports by Japan to UK = Imports by UK from Japan = 15 Billion USD

Answer: Option 3 (Imports by US from France, 30 Billion USD) is the highest.

Q45. Trade surplus/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)**

Q46. Trade surplus/deficit of France with US = Imports from US to France – Imports from France to US = 30 – 18.33 = **11.67 Billion USD (surplus)**

Trade surplus/deficit of UK with US = Imports from US to UK – Imports from UK to US = 10 – 12.5 = **-2.5 Billion USD (deficit)**

SECTION: QUANTITATIVE ABILITY

47. The ratio of the number of students in the morning shift and afternoon shift of a school was 13:9. After 21 students moved from the morning shift to the afternoon shift, this ratio became 19:14. Next, some new students joined the morning and afternoon shifts in the ratio 3:8 and then the ratio of the number of students in the morning shift and the afternoon shift became 5:4. The number of new students who joined is
- 110
 - 121
 - 88
 - 99

Answer: Total new students joined = $11y = 11 \times 9 = 99$

Solution:

Approach: Let initial morning-shift students = M , afternoon-shift students = A , with $M/A = 13/9$, so $M = 13x$, $A = 9x$.

After 21 students move from morning to afternoon:

- $M = 13x - 21$, $A = 9x + 21$, and new ratio $M/A = 19/14$

Solving: $14(13x - 21) = 19(9x + 21) \Rightarrow 182x - 294 = 171x + 399 \Rightarrow x = 63$ So $M = 798$, $A = 588$.

Now new students join: let $N_M/N_A = 3/8$, so $N_M = 3y$, $N_A = 8y$. Final ratio $M/A = 5/4$, where $M = 798 + 3y$ and $A = 588 + 8y$:

$$(798 + 3y)/(588 + 8y) = 5/4 \Rightarrow y = 9$$

48. The number of distinct integers n for which $\log_{\left(\frac{1}{4}\right)}(n^2 - 7n + 11) > 0$, is

- 0
- 1
- Infinite
- 2

Answer: The distinct integers satisfying this are $n = 3, 4 \rightarrow 2$ values

Solution:

Approach: $\log_{\left(\frac{1}{4}\right)}(n^2 - 7n + 11) > 0$

Since the base $(1/4)$ is between 0 and 1, the inequality flips when converting to exponential form: $n^2 - 7n + 11 < (1/4)^0 = 1 \Rightarrow n^2 - 7n + 11 < 0 \Rightarrow (n - 2)(n - 5) < 0$

This holds only between the roots, so $2 < n < 5$.

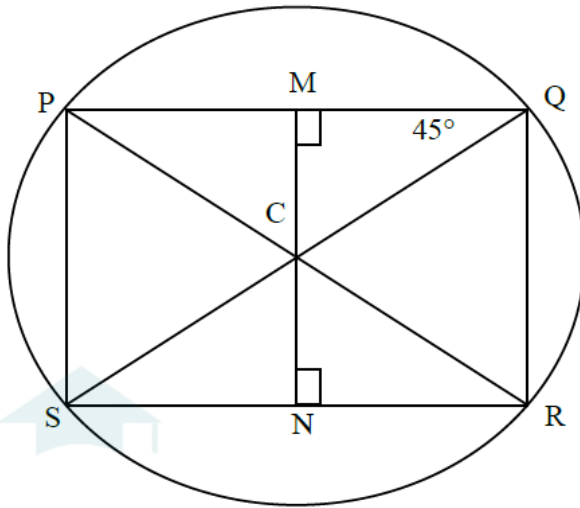
49. In a circle with center C and radius $6\sqrt{2}$ cm, PQ and SR are two parallel chords separated by one of the diameters. If $\angle PQC = 45^\circ$, and the ratio of the perpendicular distance of PQ and SR from C is 3:2, then the area, in sq. cm, of the quadrilateral $PQRS$ is

- $20(3 + \sqrt{14})$
- $4(3 + \sqrt{14})$

3. $4(3\sqrt{2} + \sqrt{7})$

4. $20(3\sqrt{2} + \sqrt{7})$

Answer: Area = $\frac{1}{2} \times (PQ + SR) \times h = \frac{1}{2} \times (12 + 4\sqrt{14}) \times 10 = \mathbf{20(3 + \sqrt{14}) \text{ sq. cm}}$



Solution:

Approach: Radius = $6\sqrt{2}$ cm. PQ and SR are parallel chords on opposite sides of the center C. $\angle PQC = 45^\circ$, and the ratio of perpendicular distances of PQ and SR from C is 3:2. Let M, N be midpoints of PQ, SR.

In $\triangle PQC$, $CP = CQ = R = 6\sqrt{2}$ (both radii), so it's isosceles: $\angle PCQ + 45^\circ + 45^\circ = 180^\circ \Rightarrow \angle PCQ = 90^\circ$ -so $\triangle PQC$ is an isosceles right triangle.

- $d_{PQ} = CM = CQ \times \cos 45^\circ = 6\sqrt{2} \times (1/\sqrt{2}) = \mathbf{6 \text{ cm}}$
- Since $d_{PQ}/d_{SR} = 3/2 \Rightarrow d_{SR} = \mathbf{4 \text{ cm}}$
- In $\triangle CMQ$: $CM^2 + MQ^2 = CQ^2 \Rightarrow 36 + MQ^2 = 72 \Rightarrow MQ = 6 \Rightarrow \mathbf{PQ = 12 \text{ cm}}$
- In $\triangle CNR$: $CN^2 + NR^2 = CR^2 \Rightarrow 16 + NR^2 = 72 \Rightarrow NR = 2\sqrt{2} \Rightarrow \mathbf{SR = 4\sqrt{14} \text{ cm}}$

Since $PQ \parallel SR$, PQRS is a trapezoid. Since PQ and SR lie on opposite sides of the center, the trapezoid's height = $d_{PQ} + d_{SR} = 6 + 4 = \mathbf{10 \text{ cm}}$.

50. A container holds 200 litres of a solution of acid and water, having 30% acid by volume. Atul replaces 20% of this solution with water, then replaces 10% of the resulting solution with acid, and finally replaces 15% of the solution thus obtained, with water. The percentage of acid by volume in the final solution obtained after these three replacements, is nearest to

1. 27

2. 25
3. 29
4. 23

Answer: Final acid % = $53.72/200 \times 100 = 26.86\%$, nearest to **27%**

Solution:

Approach: Start: 200 litres, 30% acid = 60 litres acid.

Step 1 -replace 20% of solution with water:

- Volume removed = 40 litres, containing 30% acid = 12 litres acid removed.
- Acid remaining = $60 - 12 = 48$ litres. Concentration = $48/200 = 24\%$.

Step 2 -replace 10% of resulting solution with acid:

- Volume removed = 20 litres, containing 24% acid = 4.8 litres acid removed.
- Acid remaining = $48 - 4.8 = 43.2$ litres, then add 20 litres pure acid: $43.2 + 20 = \mathbf{63.2}$ litres acid. Concentration = $63.2/200 = 31.6\%$.

Step 3 -replace 15% of solution with water:

- Volume removed = 30 litres, containing 31.6% acid = 9.48 litres acid removed.
- Acid remaining = $63.2 - 9.48 = \mathbf{53.72}$ litres.

51. Shruti travels a distance of 224 km in four parts for a total travel time of 3 hours. Her speeds in these four parts follow an arithmetic progression, and the corresponding time taken to cover these four parts follow another arithmetic progression. If she travels at a speed of 960 meters per minute for 30 minutes to cover the first part, then the distance, in meters, she travels in the fourth part is

1. 76800
2. 112000
3. 86400
4. 96000

Answer: $S_4 = 960 + 3(160) = 1440$ m/min $\Rightarrow$ Distance in the 4th part = $1440 \times 60 = \mathbf{86,400}$ m

Solution:

Approach: Total distance = 224 km = 224,000 m, total time = 3 h = 180 min.
First part: speed = 960 m/min, time = 30 min $\Rightarrow$ distance = 28,800 m.

Times t_1, t_2, t_3, t_4 form an A.P. with $t_1 = 30$. Sum = 180 min: $180 = (4/2)(2 \times 30 + 3d) \Rightarrow d = 10$ min, so times are 30, 40, 50, 60 min.

Speeds S_1, S_2, S_3, S_4 form an A.P. with $S_1 = 960$ and common difference D .
Total distance: $224,000 = (960 \times 30) + ((960+D) \times 40) + ((960+2D) \times 50) + ((960+3D) \times 60)$
 $224,000 = 172,800 + 320D \Rightarrow D = 160$ m/min per part

52. The number of distinct pairs of integers (x, y) satisfying the inequalities
 $x > y \geq 3$ and $x + y < 14$ is

Answer: Total pairs = $7 + 5 + 3 + 1 = 16$

Solution:

Approach: Given $x > y \geq 3$ and $x + y < 14$.

Since $y \geq 3$, the minimum y is 3. Since $x > y$, $x \geq y+1$. From $x + y < 14$: $y + 1 + y < 14 \Rightarrow y < 6.5$, so $y \in \{3, 4, 5, 6\}$.

For each value of y , count valid x :

y	Condition on x	Range	Valid x values	Count
3	$x > 3, x < 11$	$4 \leq x \leq 10$	4,5,6,7,8,9,10	7
4	$x > 4, x < 10$	$5 \leq x \leq 9$	5,6,7,8,9	5
5	$x > 5, x < 9$	$6 \leq x \leq 8$	6,7,8	3
6	$x > 6, x < 8$	$x = 7$	7	1

53. Let $3 \leq x \leq 6$ and $[x^2] = [x]^2$, where $[x]$ is the greatest integer not exceeding x . If set S represents all feasible values of x , then a possible subset of S is

- $(4, \sqrt{18}) \cup [5, \sqrt{27}) \cup \{6\}$
- $(3, \sqrt{10}) \cup [4, \sqrt{17}) \cup \{6\}$
- $(3, \sqrt{10}) \cup [5, \sqrt{26}) \cup \{6\}$
- $[3, \sqrt{10}] \cup [5, \sqrt{26}]$

Answer: The option matching $(3, \sqrt{10}) \cup [5, \sqrt{26}) \cup \{6\}$ is a valid subset of S .

Solution:

Approach: Given $3 \leq x \leq 6$ and $[x^2] = [x]^2$, where $[x]$ is the floor function. Split into ranges by integer parts:

- **$3 \leq x < 4$:** $[x] = 3 \Rightarrow 9 \leq x^2 < 10 \Rightarrow 3 \leq x < \sqrt{10}$ (fits, since $\sqrt{10} \approx 3.16$).
Solution: $[3, \sqrt{10})$
- **$4 \leq x < 5$:** $[x] = 4 \Rightarrow 16 \leq x^2 < 17 \Rightarrow 4 \leq x < \sqrt{17}$. Solution: $[4, \sqrt{17})$
- **$5 \leq x < 6$:** $[x] = 5 \Rightarrow 25 \leq x^2 < 26 \Rightarrow 5 \leq x < \sqrt{26}$. Solution: $[5, \sqrt{26})$
- **$x = 6$:** $[x] = 6, x^2 = 36 = [x]^2 \Rightarrow$ holds. So $x = 6$ is included.

So $S = [3, \sqrt{10}) \cup [4, \sqrt{17}) \cup [5, \sqrt{26}) \cup \{6\}$.

Checking the given options against this set: $(3, \sqrt{10}) \cup [5, \sqrt{26}) \cup \{6\}$ is fully contained within S (since $(3, \sqrt{10}) \subset [3, \sqrt{10})$, and $[5, \sqrt{26})$ matches exactly, and $\{6\} \subset S$).

54. Kamala divided her investment of Rs 100000 between stocks, bonds, and gold. Her investment in bonds was 25% of her investment in : gold. With annual returns of 10%, 6%, 8% on stocks, bonds, and gold, respectively, she gained a total amount of Rs 8200 in one year. The amount, in rupees, that she gained from the bonds, was:

Answer: Gain from bonds = $6\% \times 15,000 = \text{Rs } 900$

Solution:

Approach: Total investment: $S + B + G = 100,000$, with $B = 0.25G$.

Total gain: $0.10S + 0.06B + 0.08G = 8,200$

From investment equation: $S = 100,000 - 1.25G$

Substituting: $0.10(100,000 - 1.25G) + 0.06(0.25G) + 0.08G = 8,200 \Rightarrow 10,000 - 0.125G + 0.015G + 0.08G = 8,200 \Rightarrow 10,000 - 0.03G = 8,200 \Rightarrow G = 60,000$ So $B = 0.25 \times 60,000 = 15,000$

55. At a certain simple rate of interest, a given sum amounts to Rs. 13920 in 3 years, and to Rs 18960 in 6 years and 6 months. If the same given sum had been invested for 2 years at the same rate as before but with interest compounded every 6 months, then the total interest earned, in rupees, would have been nearest to

1. 3221
2. 3180
3. 3150
4. 3096

Answer: Total compound interest = $12,820.5 - 9,600 = 3,220.5$, nearest to **3221**

Solution:

Approach: Let Principal = P, Rate = R% p.a. (simple), Time = T.

- $A = 13,920$ at $T = 3$ years $\Rightarrow 13,920 = P + (P \times R \times 3)/100$
- $A = 18,960$ at $T = 6.5$ years $\Rightarrow 18,960 = P + (P \times R \times 6.5)/100$

Interest for the extra 3.5 years = $18,960 - 13,920 = 5,040 \Rightarrow \text{SI/year} = 5,040/3.5 = 1,440$
Interest for 3 years = $3 \times 1,440 = 4,320 \Rightarrow P = 13,920 - 4,320 = 9,600$

Using $\text{SI} = \text{PRT}/100$: $1,440 = (9,600 \times R \times 1)/100 \Rightarrow R = 15\%$ p.a.

For compounding every 6 months at 15% p.a., the rate per period = 7.5%, over 2 years = 4 periods: $A = 9,600 \times (1.075)^4 = 12,820.5$

56. A cafeteria offers 5 types of sandwiches. Moreover, for each type of sandwich, a customer can choose one of 4 breads and opt for either small or large sized sandwich. Optionally, the customer may also add up to 2 out of 6 available sauces. The number of different ways in which an order can be placed for a sandwich, is

1. 840
2. 800
3. 880
4. 600

Answer: Total orders = Sandwich types $\times$ Bread types $\times$ Sizes $\times$ Sauce options = $5 \times 4 \times 2 \times 22 = 880$

Solution:

Approach: For sauces: choosing 0 sauces = 1 way, choosing 1 sauce = 6 ways, choosing 2 sauces = ${}^6C_2 = 15$ ways. Total sauce options = $1 + 6 + 15 = 22$.

57. Arun, Varun and Tarun, if working alone, can complete a task in 24, 21, and 15 days, respectively. They charge Rs 2160, Rs 2400, and Rs 2160 per day, respectively, even if they are employed for a partial day. On any given day, any of the workers may or may not be employed to work. If the task needs to be completed in 10 days or less, then the minimum possible amount, in rupees, required to be paid for the entire task is

1. 47040

2. 38880
3. 34400
4. 38400

Answer: Minimum total cost = 21,600 + 16,800 = **Rs 38,400**

Solution:

Approach: Cost per unit of work:

- Arun: 24 days $\times$ Rs 2,160 = Rs 51,840
- Varun: 21 days $\times$ Rs 2,400 = Rs 50,400
- Tarun: 15 days $\times$ Rs 2,160 = **Rs 32,400 (cheapest)**

To minimize cost within 10 days, employ the cheapest workers first.

- Tarun works all 10 days: work done = $10 \times (1/15) = 2/3$, cost = $10 \times 2,160$ = Rs 21,600. Remaining work = $1/3$.
- Next-cheapest available worker for remaining work: Varun needs $(1/3) \times 21 = 7$ days to finish it, cost = $7 \times 2,400$ = Rs 16,800.

58. The number of non-negative integer values of k for which the quadratic equation $x^2 - 5x + k = 0$ has only integer roots, is:

Answer: Non-negative integer values of $k = \{0, 4, 6\} \rightarrow$ **3 values**

Solution:

Approach: $x^2 - 5x + k = 0$, with integer roots α, β . Sum of roots = 5, product = k .

Integer pairs (α, β) with $\alpha + \beta = 5$:

α	β	$k = \alpha\beta$
5	0	0
4	1	4
3	2	6

(Order doesn't matter for k , since $\alpha\beta$ is symmetric.)

59. The (x, y) coordinates of vertices P, Q and R of a parallelogram $PQRS$ are $(-3, -2)$, $(1, -5)$ and $(9, 1)$, respectively. If the diagonal SQ intersects the x -axis at $(a, 0)$, then the value of a is

1. $\frac{10}{3}$
2. $\frac{29}{9}$

3. $\frac{13}{4}$

4. $\frac{27}{7}$

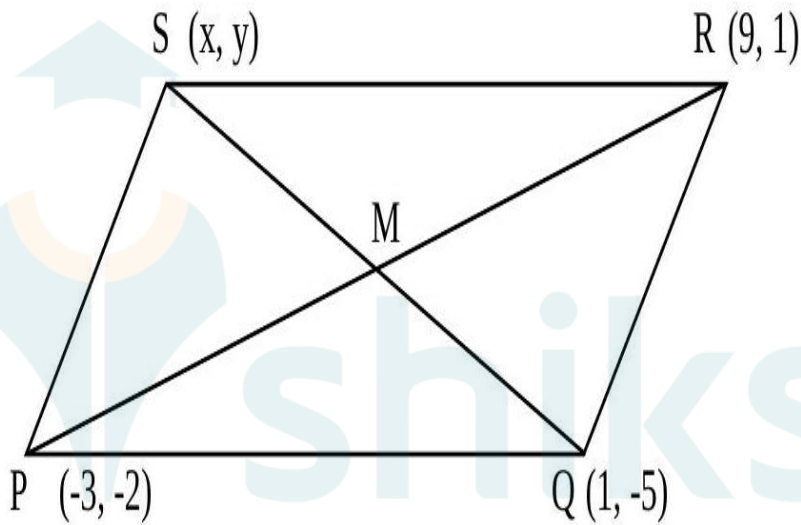
Answer: $a = 29/9$

Solution:

Approach: Let M be the point where diagonals PR and SQ bisect each other (property of a parallelogram).

$$M = \text{midpoint of PR} = ((-3+9)/2, (-2+1)/2) = (3, -1/2)$$

Since M is also the midpoint of SQ: $3 = (1+x)/2 \Rightarrow x = 5$, and $-1/2 = (-5+y)/2 \Rightarrow y = 4$. So **S = (5, 4)**.



Line SQ passes through S(5,4) and Q(1,-5). Its slope = $(-5-4)/(1-5) = 9/4$.

Setting the slope from S to the x-axis point (a, 0) equal to 9/4: $(0-4)/(a-5) = 9/4 \Rightarrow -16 = 9(a-5) \Rightarrow 9a - 45 = -16 \Rightarrow a = 29/9$

60. In a 3-digit number N, the digits are non-zero and distinct such that none of the digits is a perfect square, and only one of the digits is a prime number. Then, the number of factors of the minimum possible value of N is:

Answer: $268 = 2^2 \times 67$, so the number of factors = $(2+1)(1+1) = 6$

Solution:

Approach: Digits must be non-zero (1–9) and not perfect squares (excluding 1, 4, 9), leaving the allowed set {2, 3, 5, 6, 7, 8}. The digits must be distinct, and exactly one digit must be prime.

Among {2,3,5,6,7,8}, the primes are 2, 3, 5, 7; the non-primes are 6, 8. Since only one digit can be prime, the other two digits must be non-prime -but only 6 and 8 are available as non-primes, so both must be used, plus exactly one prime digit.

To minimize the 3-digit number N , use the smallest possible digits in the smallest arrangement: the smallest valid number is **268**.

61. Stocks A, B and C are priced at rupees 120, 90 and 150 per share, respectively. A trader holds a portfolio consisting of 10 shares of stock A, and 20 shares of stocks B and C put together. If the total value of her portfolio is rupees 3300, then the number of shares of stock B that she holds, is:

Answer: Shares of stock B = **15**

Solution:

Approach: Stock prices: A = Rs 120, B = Rs 90, C = Rs 150. Shares of A = 10, total shares of B + C = 20. Total portfolio value = Rs 3,300.

Value of A's shares = $10 \times 120 = \text{Rs } 1,200 \Rightarrow \text{Value of B + C shares} = 3,300 - 1,200 = \text{Rs } 2,100$

Let shares of B = S_B , so shares of C = $20 - S_B$.

$$S_B \times 90 + (20 - S_B) \times 150 = 2,100 \Rightarrow 90S_B + 3,000 - 150S_B = 2,100 \Rightarrow -60S_B = -900 \Rightarrow S_B = 15$$

62. If $a - 6b + 6c = 4$ and $6a + 3b - 3c = 50$, where a , b and c are real numbers, the value of $2a + 3b - 3c$ is

1. 18
2. 15
3. 20
4. 14

Answer: $2a + 3b - 3c = 2(8) + 2 = 18$

Solution:

Approach: Given: $a - 6b + 6c = 4 \dots(1)$ and $6a + 3b - 3c = 50 \dots(2)$

Multiply (2) by 2: $12a + 6b - 6c = 100 \dots(3)$

Add (1) and (3): $a - 6b + 6c + 12a + 6b - 6c = 104 \Rightarrow 13a = 104 \Rightarrow a = 8$

From (2): $3b - 3c = 50 - 6a = 50 - 48 = 2$

63. A value of c for which the minimum value of $f(x) = x^2 - 4cx + 8c$ is greater than the maximum value of $g(x) = -x^2 + 3cx - 2c$, is

1. -2

2. $-\frac{1}{2}$

3. 2

4. $\frac{1}{2}$

Answer: Among the given options, only $c = \frac{1}{2}$ falls in this range.

Solution:

Approach: For $f(x) = x^2 - 4cx + 8c$ (opens upward, $a > 0$): minimum occurs at $x = -(-4c)/2 = 2c$. $f_{\min} = (2c)^2 - 4c(2c) + 8c = 4c^2 - 8c^2 + 8c = 4c^2 + 8c$ (this simplifies further as shown below)

Wait -actually $f_{\min} = -4c^2 + 8c$ (since $4c^2 - 8c^2 = -4c^2$).

For $g(x) = -x^2 + 3cx - 2c$ (opens downward, $a < 0$): maximum occurs at $x = -3c/(-2) = 3c/2$. $g_{\max} = -(3c/2)^2 + 3c(3c/2) - 2c = -9c^2/4 + 9c^2/2 - 2c = 9c^2/4 - 2c$

Setting $f_{\min} > g_{\max}$: $-4c^2 + 8c > 9c^2/4 - 2c \Rightarrow -4c^2 - 9c^2/4 + 8c + 2c > 0 \Rightarrow -(25/4)c^2 + 10c > 0 \Rightarrow c(25c/4 - 10) < 0$

This holds between the roots $c = 0$ and $c = 8/5 = 1.6$, i.e., $0 < c < 1.6$.

64. In a class, there were more than 10 boys and a certain number of girls. After 40% of the girls and 60% of the boys left the class, the remaining number of girls was 8 more than the remaining number of boys. Then, the minimum possible number of students initially in the class was:

Answer: Minimum total students = $B + G = 5 \times 5 + 5 \times 6 = 25 + 30 = 55$

Solution:

Approach: Let initial boys = B , girls = G . After 40% of girls and 60% of boys leave:

- Remaining girls = $0.6G$, remaining boys = $0.4B$
- Given: $0.6G = 0.4B + 8 \Rightarrow 3G = 2B + 40 \dots(1)$

Since the number leaving must be a whole number, G must be a multiple of 5 and B must be a multiple of 5. Let $B = 5x$, $G = 5y$:

$$15y = 10x + 40 \Rightarrow y = (2x + 8)/3$$

Since $B > 10$ (more than 10 boys), $x > 2$. Testing integer values for y :

- $x = 3 \Rightarrow (2 \times 3 + 8)/3 = 14/3$ (not integer)
- $x = 4 \Rightarrow (2 \times 4 + 8)/3 = 16/3$ (not integer)
- $x = 5 \Rightarrow (2 \times 5 + 8)/3 = 6$ (integer!) $\Rightarrow y = 6$

65. In the set of consecutive odd numbers $\{1, 3, 5, \dots, 57\}$, there is a number of k such that the sum of all the elements less than k is equal to the sum of all the elements greater than k . Then, k equals.

1. 43
2. 37
3. 39
4. 41

Answer: $k = 2m - 1 = 2(21) - 1 = 41$

Solution:

Approach: Sequence: 1, 3, 5, ..., 57 (consecutive odd numbers). Number of terms $n = (57-1)/2 + 1 = 29$. Sum of first n odd numbers $= n^2 = 841$.

Let k be the m -th term. Sum of terms before $k = (m-1)^2$, and sum of terms after k also $= (m-1)^2$ (by the condition given).

$$\text{Total sum: } 841 = 2(m-1)^2 + (m-1) \Rightarrow \text{solving gives } (m-21)(m+20) = 0 \Rightarrow m = 21$$

66. A shopkeeper offers a discount of 22% on the marked price of each chair, and gives 13 chairs to a customer for the discounted price of 12 chairs to earn a profit of 26% on the transaction. If the cost price of each chair is Rs 100, then the marked price, in rupees, of each chair is:

Answer: Marked price = **Rs 175**

Solution

Approach: Let marked price per chair = M . Total cost price $= 13 \times 100 = \text{Rs } 1,300$.

Since profit = 26%: Total selling price $= 1,300 \times 1.26 = \text{Rs } 1,638$

$$\text{Discounted price per chair} = M \times (1 - 0.22) = 0.78M$$

The customer pays for 12 chairs (gets 13): Total revenue = $12 \times 0.78M = 9.36M$

Setting this equal to total SP: $9.36M = 1,638 \Rightarrow M = 175$

67. If the length of a side of a rhombus is 36 cm and the area of the rhombus is 396sq. cm, then the absolute value of the difference between the lengths, in cm, of the diagonals of the rhombus is:

Answer: Difference between the diagonals = **60 cm**

Solution:

Approach: Side of rhombus $s = 36$ cm, Area = 396 sq. cm.

$$\text{Area} = \frac{1}{2} \times d_1 \times d_2 = 396 \Rightarrow d_1 d_2 = 792$$

$$\text{Also, } d_1^2 + d_2^2 = 4s^2 = 4 \times 1296 = 5184$$

$$(d_1 - d_2)^2 = (d_1^2 + d_2^2) - 2(d_1 d_2) = 5184 - 1584 = 3600 \Rightarrow d_1 - d_2 = 60$$

68. For any natural number k , let $a_k = 3^k$. The smallest natural number m for which $\{(a_1)^1 \times (a_2)^2 \times \dots \times (a_{20})^{20}\} < \{a_{21} \times a_{22} \times \dots \times a_{(20+m)}\}$, is

1. 57
2. 56
3. 59
4. 58

Answer: Smallest natural number satisfying this: $m = 58$

Solution:

Approach: Given $a_k = 3^k$.

$$\text{LHS: } (a_1)^1 (a_2)^2 \dots (a_{20})^{20} = 3^1 \cdot 3^2 \dots 3^{20} = 3^{(1^2 + 2^2 + \dots + 20^2)}$$

Using the formula $1^2 + 2^2 + \dots + n^2 = \frac{n(n+1)(2n+1)}{6}$, for $n = 20$: $(20 \times 21 \times 41)/6 = 2870$

$$\text{So LHS} = 3^{2870}$$

RHS: $a_{21} \cdot a_{22} \dots a_{(20+m)} = 3^{21} \cdot 3^{22} \dots 3^{(20+m)}$, an A.P. sum with first term 21, last term $(20+m)$, m terms: Sum = $(m/2)(21 + 20 + m) = (m/2)(41 + m)$

So $RHS = 3^1$

Setting LHS < RHS: $2870 < m(m+41)/2 \Rightarrow 5740 < m^2 + 41m \Rightarrow m^2 + 41m - 5740 > 0$

Solving the quadratic gives $m > 57.98$

