



Answer Key Actual CAT Slot - I

| Q. No | Key | Q. No | Key | Q. No | Key |
|-------|-----|-------|-----|-------|-----|
| 1. | D | 25. | 8 | 47. | C |
| 2. | D | 26. | 4 | 48. | B |
| 3. | D | 27. | B | 49. | 15 |
| 4. | A | 28. | 3 | 50. | 31 |
| 5. | A | 29. | 5 | 51. | A |
| 6. | B | 30. | 3 | 52. | B |
| 7. | B | 31. | 2 | 53. | 38 |
| 8. | C | 32. | 4 | 54. | 31 |
| 9. | A | 33. | C | 55. | B |
| 10. | A | 34. | D | 56. | B |
| 11. | C | 35. | D | 57. | B |
| 12. | D | 36. | C | 58. | B |
| 13. | B | 37. | D | 59. | A |
| 14. | B | 38. | 45 | 60. | D |
| 15. | B | 39. | C | 61. | A |
| 16. | C | 40. | 2 | 62. | B |
| 17. | A | 41. | C | 63. | 10 |
| 18. | B | 42. | D | 64. | 66 |
| 19. | B | 43. | C | 65. | B |
| 20. | 1 | 44. | C | 66. | B |
| 21. | D | 45. | B | 67. | 6 |
| 22. | 2 | 46. | B | 68. | 217 |
| 23. | B | | | | |
| 24. | B | | | | |

Explanation Actual CAT Slot - I

| Q. No | Explanation |
|-------|--|
| 1. | <p>Option A: While it mentions the mutable nature of digital art, the focus is on how such practices undermine trust in streaming services as custodians of cultural artifacts, not just on technological changes. Too broad.</p> <p>Option D: Correctly identifies the example's purpose: to validate fears about streaming services' reliability in preserving the integrity of cultural works. Best aligns with the context.</p> <p>Option B: Discusses control over the cultural commons, which is a broader theme of the passage but not the direct purpose of this specific example. Less precise.</p> <p>Option C: Suggests unsubstantiated reports lead to distrust, but the example is presented as evidence of real concerns, not baseless speculation. Misinterprets the example.</p> |
| 2. | <p>Option B: VPNs solve geo-blocking but don't address DRM restrictions or content ownership. Partially weakens, not invalidates.</p> <p>Option C: Blu-ray shelf life strengthens the case for physical media but doesn't address streaming issues or data decay. Limited impact.</p> <p>Option A: Cloud storage addresses data decay but doesn't resolve DRM or ownership issues. Partially weakens.</p> <p>Option D: Perpetual, platform-independent access resolves the core issues of ownership and access restrictions, directly invalidating the argument.</p> |
| 3. | <p>Option D: Accurately reflects the main argument, highlighting that digital art is paradoxically less accessible because of technology's rapid evolution and platform constraints. Best captures the passage's argument.</p> <p>Option B: Mentions retroactive changes to art, a minor point in the passage, but does not align with its overall focus on access and impermanence. Too narrow.</p> <p>Option C: While idealistic, the passage does not argue that art should universally belong to the cultural commons. The focus is on the limitations imposed by platforms, not ownership philosophies. Misaligned.</p> <p>Option A: Suggests rethinking art's immutability and accessibility, which is tangential to the passage's core argument about technological and platform constraints. Misses the main point.</p> |
| 4. | <p>Option D: True historically but not the central point being made in the sentence. It doesn't contrast past and present expectations. Incomplete.</p> <p>Option C: Focuses on criticizing studios for removing access but isn't suggested by the given sentence, which highlights the shift in expectations, not current practices. Irrelevant.</p> <p>Option A: Captures the core idea: the shift from cinema's earlier ephemerality to today's expectation of long-term availability. Best aligns with the sentence.</p> <p>Option B: While technology has improved, the sentence does not directly reference technical advancements. It focuses on changing perceptions of film availability. Misinterprets the sentence.</p> |
| 5. | <p>blank 1: This sentence follows a discussion of the madrigal boom and the golden age of music. Inserting the missing sentence here disrupts the flow, as it doesn't connect with the historical context being described. Not suitable.</p> <p>blank 2: The sentence following this point discusses how the rebirth of literature and music originated in Italy. Adding the missing sentence here would also feel out of place because it shifts focus to emotional balance in Renaissance music, which does not connect with the cultural migration theme. Not suitable.</p> <p>blank 3: This position follows the discussion of polyphonic texture in Renaissance music. The missing sentence, which focuses on the portrayal of emotions, ties well with this idea of Renaissance music's structural and expressive qualities. It transitions smoothly into the subsequent discussion about the lack of extreme dynamics, rhythm, or tone color contrasts. Best fit.</p> <p>blank 4: This position follows a detailed description of Renaissance rhythms, emphasizing smooth and soft flows. Adding the missing sentence here would interrupt the logical progression of ideas about rhythm and dynamics. Not suitable.</p> |
| 6. | <p>This summary directly captures the essence of the passage, emphasizing that technological developments have made it necessary for cartographers to consider the usability of maps—something that was less of a concern in the past.</p> <p>Option D: "Modern mapmakers evaluate a map's effectiveness, efficiency, and satisfaction of the user through a series of experiments." This option is somewhat true, but it focuses too heavily on experiments, which is not the main emphasis of the passage. The passage talks more about the shift in focus due to societal and technological changes, rather than detailing experiments.</p> <p>Option C: "New technological developments have prompted cartographers to experiment with their maps by applying these new innovations."</p> |

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| | <p>This is not the core message of the passage. While the passage acknowledges that technological developments are influencing cartographers, it does not focus on experimentation. The key shift mentioned is in cartographers' need to consider usability rather than just the tools or innovations themselves.</p> <p>Option A: "Maps are being used for a variety of reasons and therefore map readers have become more demanding."</p> <p>While this is true to some extent, this summary is too vague and does not adequately capture the full essence of the passage. The passage emphasizes how technological advancements have made cartographers more concerned with usability, not just the variety of reasons maps are used.</p> |
| 7. | <p>Option C: "Workers made redundant by automation are unlikely to opt for crafts-related work." – The passage doesn't imply that workers would be unwilling to switch to crafts-related work. The primary concern is about whether the craft industry, as a whole, can accommodate such workers, not whether they would choose it.</p> <p>Option D: "The low scale of crafts production will not be able to absorb the mass of redundant labour." – While the passage acknowledges that the scale of craft production may be low, the primary issue raised regarding employment is regulatory challenges, which affect the viability of small businesses, rather than the scale of production itself.</p> <p>Option A: "Crafts guilds tend to resist new entrants and are unlikely to accept large numbers of trainees." – This refers more to historical issues with guilds and does not directly address current challenges to creating employment in the craft industry today.</p> <p>Therefore, Option B is the best fit as it reflects the challenge that regulatory requirements pose to small craft businesses, <u>hindering their ability to compete and create substantial employment opportunities</u>.</p> |
| 8. | <p>Option A: Craft guilds may have focused on quality, but mass production emphasizes standardization, not necessarily quality. Inaccurate.</p> <p>Option D: Both systems were hierarchical, but the focus of the comparison is on creativity, not egalitarian processes. Partially relevant but not the main idea.</p> <p>Option C: Correctly identifies the similarity between both systems: their failure to promote creativity. Best choice.</p> <p>Option B: Restricting entry is true for craft guilds, but mass production systems do not inherently discourage entry or innovation through strict rules. Inaccurate.</p> |
| 9. | <p>Option D: Correctly reflects the passage's discussion about environmental concerns being a motivator for the renewed interest in crafts. Relevant.</p> <p>Option C: Matches the passage, which mentions consumers wanting to support local workers or reduce their environmental impact. Relevant.</p> <p>Option B: Accurately reflects the niche market described for premium-quality craft goods. Relevant.</p> <p>Option A: While the passage emphasizes the human touch in crafts, it does not explicitly state that the revival is due to support for individual creations over mass production. Not explicitly mentioned.</p> |
| 10. | <p>Option D: The agile movement in software is linked to modern craftsmanship and creativity, not the restrictive and hierarchical tenets of medieval craft guilds. Inconsistent.</p> <p>Option C: The passage emphasizes the importance of retaining creativity but does not explicitly state that support for crafts is the only way to preserve it. Inconsistent.</p> <p>Option A: Matches the passage's argument that over-organization could stifle creativity, as seen in historical examples like craft guilds. Consistent.</p> <p>Option B: The passage states that the Arts and Crafts movement was a reaction to the "American system" of production, not inspired by it. Inconsistent.</p> |
| 11. | <p>Option D: Focuses on animals' intelligence in sensing danger and diseases, which is a minor point in the passage. Too narrow.</p> <p>Option C: Accurately links the similarity in brain structure to the emotional capabilities shared by animals and humans. Best choice.</p> <p>Option D: Mentions animals showing emotions, but it doesn't explain the underlying reason (shared brain structures). Incomplete.</p> <p>Option B: Misattributes animals' emotional abilities to their advanced sensory and motor skills, which the passage does not state. Incorrect.</p> |
| 12. | <p>Option A: While the bandicoots are part of a revival effort, the flattering name is specifically linked to their environmental impact, not the species preservation.</p> <p>Option D: Correctly reflects that the nickname recognizes their role in altering and improving the desert environment.</p> <p>Option B: The passage attributes the recent rainfall surge to natural patterns, not the bandicoots.</p> <p>Option C: The bandicoot population has increased, but this is not linked to their nickname.</p> |
| 13. | <p>Option C: Refers to making islands predator-free, but the enclosures are on the mainland desert, not islands.</p> |



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| | <p>Incorrect.</p> <p>Option B: Accurately describes the purpose of enclosures as fencing areas to bar invasive species like rabbits and feral cats. Correct.</p> <p>Option A: While feral cats were excluded, large bilbies are part of the Wild Training Zone and not barred by enclosures. Partially accurate but incorrect focus.</p> <p>Option D: The enclosures contribute to environmental restoration, but their primary purpose is to exclude invasive species, not directly restore the landscape. Misleading.</p> |
| 14. | <p>Option C: "Look of a rat but with a baby pouch and a slender snout" – This is consistent with the description in the passage, where the bandicoot was nicknamed the "zebra rat" due to its striped back and long, slender snout.</p> <p>Option A: "Shallow diggers having an elongated muzzle" – This is also correct, as the passage mentions that the western barred bandicoot has a long snout (elongated muzzle) and digs shallow, camouflaged shelters.</p> <p>Option D: "Long, thin nose, black striped back, pouch for joey" – This is an accurate description. The passage describes the bandicoot's long, thin nose (snout) and mentions its striped rump, as well as its pouch for carrying its babies.</p> <p>Option B: "Smallest black striped marsupial that uses camouflage and digs" – This is incorrect because the description in the passage doesn't call the western barred bandicoot the "smallest black striped marsupial." While it is the smallest bandicoot, the "black striped" characteristic is specifically about its back, not a defining trait of the entire species, and it doesn't mention being the "smallest black-striped marsupial." The use of "smallest" could apply to its size as a bandicoot, but the specific combination of "black striped marsupial" and "camouflage" in this option is misleading compared to how the bandicoot is described in the passage.</p> |
| 15. | <p>Option B: Accurately summarizes the bandicoot's near extinction due to invasive species and the hope placed on the island population for conservation. Best choice.</p> <p>Option D: Overstates the extinction claim. The bandicoot wasn't entirely wiped out, as Shark Bay populations survived. Partially accurate but not the gist.</p> <p>Option A: Suggests that colonists' attitudes and naming caused the bandicoot's decline, which is inaccurate; invasive species caused the damage. Incorrect.</p> <p>Option C: Generalizes the issue to all marsupials and vegetation destruction, missing the specific focus on the bandicoot. Too broad and misleading.</p> |
| 16. | <p>Option D: Suggests economists guarded their discipline from others, but the critique is about their refusal to integrate other perspectives into their analyses, not "poaching." Too broad.</p> <p>Option C: Accurately describes Becker's approach—applying economic tools to non-market behaviors while ignoring insights from other disciplines. Best choice.</p> <p>Option B: Suggests a benefit from applying economics to non-economic phenomena, but the passage focuses on the limitations of this one-sided approach. Misleading.</p> <p>Option A: Suggests borrowing concepts from other disciplines, which the passage explicitly states Becker did not do. Incorrect.</p> |
| 17. | <p>Option C: Implies that the author is judgmental about economics failing to manage crises. However, the focus is on how economists' approaches have changed, not their ability to handle crises. Too narrow.</p> <p>Option D: Suggests the author is disparaging economists' predictive failures. While prediction failures may be implied, the tone is more sarcastic about their newfound openness to other disciplines. Not the main focus.</p> <p>Option A: Correctly captures the sarcasm about economists' earlier reluctance to engage with other fields and their current embrace of interdisciplinary approaches. Best choice.</p> <p>Option B: Suggests criticism of interdisciplinary borrowing, but the author does not criticize this shift. Instead, the tone is ironic and observational. Incorrect.</p> |
| 18. | <p>Option A: Suggests Shiller denigrates institutions, but the critique is about their omission, not deliberate denigration. Inaccurate.</p> <p>Option D: Focuses on storytelling, but the author doesn't criticize Shiller for overusing storytelling—rather, for ignoring the mediating role of institutions. Misleading.</p> <p>Option B: Correctly identifies the critique: Shiller links emotions and behavior but overlooks how institutions mediate these dynamics. Best choice.</p> <p>Option C: Misrepresents the author's argument; the author sees media and politics as central, not marginal, to the mediation of perceptions. Incorrect.</p> |
| 19. | <p>Option D: Suggests independence from others' preferences, but the focus of "homo economicus" is on individual rationality, not isolation. Too narrow.</p> <p>Option C: Suggests interdisciplinary collaboration, but "homo economicus" refers specifically to rational behavior, not borrowing ideas from other fields. Incorrect.</p> <p>Option A: Refers to nonmarket choices, but "homo economicus" typically involves market-like decision-</p> |

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| | <p>making based on individual preferences. Misleading.</p> <p>Option B: Correctly describes homo economicus as someone who makes rational decisions based on their preferences, aligning with the passage. Best choice.</p> |
| 20. | <p>Sentence 2 introduces Peter Singer’s philosophical perspective on animal rights, presenting his utilitarian view and contrasting it with other indirect positions like welfareism.</p> <p>Sentence 3 follows up by explaining why Singer argues for extending moral consideration to animals, focusing on the idea that animals, like humans, have significant interests that deserve attention.</p> <p>Sentence 5 reinforces this point, concluding that humans have direct moral duties towards animals, treating their interests as equal to human interests.</p> <p>Sentence 4 provides historical context, explaining how Singer’s <i>Animal Liberation</i> (1975) text publicly established animal rights as a legitimate issue within contemporary philosophy.</p> <p>However, Sentence 1 is an outlier because it introduces a general statement about animals having basic needs and avoiding suffering. While the idea of moral consideration is central to the passage, Sentence 1 does not directly connect with the specific philosophical argument or the historical context provided by the other sentences. Instead, it is a broad statement that could be more fitting as an introduction to a different argument or a different part of the passage.</p> |
| 21. | <p>Option D: Correctly states that language and visual signs are codes, some of which seem naturally given due to widespread use and early learning, while also highlighting the concealment of the coding mechanism. Best choice.</p> <p>Option C: Accurately notes the naturalization of codes but misrepresents ideology as a primary aim to hide the coding mechanism, which is not explicitly stated in the passage. Overgeneralized.</p> <p>Option B: Focuses on early-age learning but oversimplifies the broader process of naturalization and its concealment of coding practices. Too narrow.</p> <p>Option A: Incorrectly claims that all codes have a natural origin, which the passage does not imply. It focuses on naturalization, not natural origins. Inaccurate.</p> |
| 22. | <p>Sentence 5 introduces the central idea: the puzzling decline in the use of urban public transport.</p> <p>Sentence 3 explains why this decline is happening, citing issues such as worsening services, terrorist attacks, and rising fares.</p> <p>Sentence 4 builds on this, suggesting that the decline in public transport is part of a structural shift due to changes in people's travel needs (smartphones, videoconferencing, etc.).</p> <p>Sentence 1 then explains that urbanites now have better alternatives (like Uber, dockless bikes, and scooters), which support the idea that public transport is less necessary.</p> <p>Sentence 2, however, is about public transportation improving when more people use it, which doesn't fit the theme of decline in usage or alternatives. It seems out of place in this context.</p> |
| 23. | <p>blank 1: Serves as a fitting introduction, contrasting intuitive organization (like a home office) with the brain's evolutionary complexity. Best choice.</p> <p>blank 2: Placing the sentence here disrupts the flow, as the paragraph already transitions into describing the brain's architecture. Misplaced.</p> <p>blank 3: This position focuses on the lack of harmony in the brain’s systems, which builds on the earlier discussion and doesn’t suit the introductory nature of the sentence. Not suitable.</p> <p>blank 4: The metaphor of the brain as a “big, old house” concludes the paragraph. Adding the sentence here would weaken the strong ending. Unsuitable.</p> |
| 24. | <p>Placing the sentence at blank 1 would interrupt the natural flow of thought. The paragraph at this point is introducing the idea that Silk Roads nations, despite being seen as "developing countries," have historically been crucial to global civilization. Adding the provided sentence here would make the transition feel abrupt and disconnected, as it would shift from describing the specific importance of the Silk Roads nations to a broader statement about understanding developments globally. The placement is not ideal because the context here does not yet call for such a global perspective.</p> <p>Blank 2: At this stage, the paragraph is focusing on the specific roles that the Silk Roads have played historically, particularly their function as networks for exchange—of people, goods, and ideas. Inserting the provided sentence here would feel out of place, as it does not directly build on this idea of exchanges along the Silk Roads. Instead, the sentence shifts focus toward the broader implications of understanding Central Asia's historical role in shaping global developments, which makes it mismatched for this location.</p> <p>Blank 3: Here, the paragraph discusses the dual nature of the Silk Roads—bringing both benefits and challenges. Inserting the provided sentence at this juncture would create a thematic mismatch. The sentence about understanding Central Asia’s role does not naturally follow the ideas of destruction or disaster mentioned here. It fails to provide a logical connection or bridge between the existing ideas.</p> <p>Blank 4: This is the most suitable placement for the provided sentence. The paragraph is discussing the Silk Roads as a crucial and unifying global network, describing how they connect various regions and cultures. The provided sentence extends this idea by emphasizing the broader relevance of Central Asia’s role in</p> |

global history, helping us see connections not only across Asia but also in other continents. This placement reinforces and expands on the main point, maintaining coherence and adding depth to the argument about the Silk Roads' significance.

25-29.

It is given that the 6 teams are divided into two groups containing 3 teams each. As each team in the same group plays every other team once and in the other group twice, so there would be 3 matches among teams of same group and 6 matches among teams of different group. Hence we can find the total matches in the tournament as $3 + 3 + 6 + 6 + 6 = 24$.

Also every team plays exactly one game in one round means each round will have 3 matches involving each team. Hence there will be 8 rounds in the tournament.

Now we will further analyse the given information:

As we can see that Team 3 played against Team 6 twice, Team 2 played against Team 5 twice and Team 1 played against Team 4 twice, so Teams 3 & 6, 2 & 5 and 1 & 4 are of different groups.

Now considering points 3 and 4, we get the information that Teams 4 and 6 are of different groups and Teams 1 and 5 are of same group.

Hence we can say that Teams 1, 5 and 6 make a group (say Group I) and correspondingly Teams 2, 3 and 4 (say Group II) make the other group.

So we can list down the matches which will be played among teams of Group I and Group II

| Group I | Group II |
|------------------|------------------|
| Team 1 Vs Team 6 | Team 2 Vs Team 3 |
| Team 1 Vs Team 5 | Team 2 Vs Team 4 |
| Team 5 Vs Team 6 | Team 3 Vs Team 4 |

Also we can make a list of matches which were played between teams of different groups::

| |
|------------------|
| Team 3 Vs Team 6 |
| Team 2 Vs Team 5 |
| Team 1 Vs Team 4 |
| Team 3 Vs Team 5 |
| Team 1 Vs Team 3 |
| Team 2 Vs Team 6 |
| Team 1 Vs Team 2 |
| Team 4 Vs Team 6 |
| Team 4 Vs Team 5 |

From point 6, it is given that Team 3 played Team 8 and Team 2 played Team 5. Clubbing this information with the information in point 1 that each team played against a team from the other group in Round 8, we can surely conclude that the 3rd match of Round 8 must have been played between Team 1 and 4.

Also as per point 2, match ups of Round 5 and Round 8 were identical. Hence we get the details of matches played in Round 5.

Now using information given in points 3, 4, 5 and 6, we will find the details of matches played in various rounds and put the information in a table where alphabet T stands for Team:

| Round 1 | Round 2 | Round 3 | Round 4 | Round 5 | Round 6 | Round 7 | Round 8 |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| T4 Vs T6 | T4 Vs T6 | T3 Vs T4 | | T3 Vs T6 | T1 Vs T6 | | T3 Vs T6 |
| | T1 Vs T5 | | | T2 Vs T5 | | | T2 Vs T5 |
| | | | | T1 Vs T4 | | | T1 Vs T4 |

As it is given that every team plays exactly one game in each round, so we can see that T6 would be definitely there in Round 4 and Round 7. Considering the list of matches given for different groups, only T2 is left to play against T6. Hence T2 and T6 would play against each other in Round 4 and 7.

Also match between T2 and T4 is to be played only once. This will be necessarily played in Round 6 as T4 is already playing in Rounds 1, 2 and 3.

Also match between T1 and T2 is to be played twice. This will be necessarily played in Round 1 and Round 3. It means match between T5 and T6 which is to be played only once will be in Round 3.

Also match between T4 and T5 is to be played twice. This will be necessarily played in Round 4 and Round 7. It means match between T1 and T3 which is to be played twice would also be played in Round 4 and Round 7.

So after filling all the above information, we get the final table as follows :

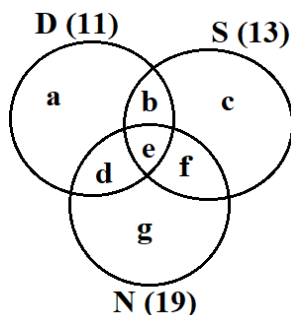
| Round 1 | Round 2 | Round 3 | Round 4 | Round 5 | Round 6 | Round 7 | Round 8 |
|----------|----------|----------|----------|----------|----------|----------|----------|
| T4 Vs T6 | T4 Vs T6 | T3 Vs T4 | T1 Vs T3 | T3 Vs T6 | T1 Vs T6 | T1 Vs T3 | T3 Vs T6 |
| T3 Vs T5 | T1 Vs T5 | T5 Vs T6 | T2 Vs T6 | T2 Vs T5 | T2 Vs T4 | T2 Vs T6 | T2 Vs T5 |
| T1 VS T2 | T2 Vs T3 | T1 Vs T2 | T4 Vs T5 | T1 Vs T4 | T3 Vs T5 | T4 Vs T5 | T1 Vs T4 |

Now all the questions can be answered.

25. As shown, there were 8 Rounds in the tournament.
26. As shown, Team 4 played Team 1 in Round 5.
27. We can see that Team 5 was not part of the same group as Teams 2,3 and 4. Hence option B.
28. As shown, Team 3 played Team 1 in Round 7.
29. As shown, Team 5 played Team 6 in Round 3.
- 30 - 33. As per the bar graph given in the question, we can make a table of number of countries visited by the 3 people::

| | Dheeraj | Samantha | Nitesh |
|--------------|-----------|-----------|-----------|
| Asia | 3 | 0 | 1 |
| Europe | 7 | 9 | 6 |
| Row | 1 | 4 | 12 |
| Total | 11 | 13 | 19 |

Now we can make Venn Diagram of all the information given and solving the equations to get the values of various variables.



As it is given that 32 countries were visited by at least one of them, we get the equations as

$$a + b + c + d + e + f + g = 32 \dots\dots\dots(1)$$

$$a + c + g + 2(b + d + f) + 3e = 43 \dots\dots(2)$$

$$a + b + d + e = 11$$

$$b + c + e + f = 13$$

$$d + e + f + g = 19$$

As per point 2, USA is the only country that was visited by all three of them, so values of $e = 1$

As per point 3, China is the only country that was visited by both Dheeraj and Nitesh, but not by Samantha, so $d = 1$.

As per point 4, France is the only country outside Asia, which was visited by both Dheeraj and Samantha, but not by Nitesh, so $b = 1$.

$$\text{As } a + b + d + e = 11, \text{ so } a + 1 + 1 + 1 = 11, \text{ so } a = 8$$

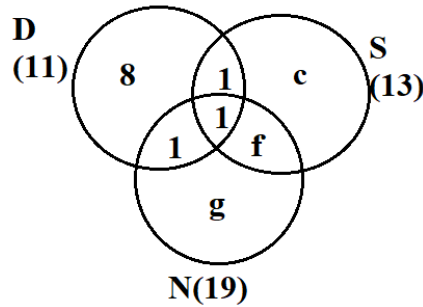
Also number of people visiting exactly 3 countries = 1

$$(2) - (1) \text{ gives us } b + d + f + 2e = 11. \text{ Putting } e = 1 \text{ gives } b + d + f = 9$$

Hence number of people visiting exactly 2 countries = 9

Since total given is 32, so Exactly 1 + Exactly 2 + Exactly 3 = 32

So number of people visiting exactly 1 countries = $32 - 1 - 9 = 22$



As exactly 2 = 9, so $1 + 1 + f = 9$

$\Rightarrow f = 7$

Also $b + c + e + f = 13$

$\Rightarrow 1 + c + 1 + 7 = 13$

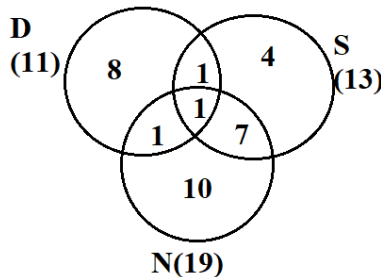
$\Rightarrow c = 4$

As number of people visiting exactly 1 countries is 22, so $8 + c + g = 22$

$\Rightarrow 8 + 4 + g = 22$

$\Rightarrow g = 10$

So we can make the final Venn Diagram as follows



Now we need to make a final table of countries visited by these 3 people in various domains given::

| | Only D | Only S | Only N | Only D & S | Only S & N | Only D & N | D & S & N | Total |
|--------------|----------|----------|-----------|------------|------------|------------|-----------|-----------|
| Asia | 2 | 0 | 0 | 0 | 0 | 1 (China) | 0 | 3 |
| Europe | 6 | 4 | 2 | 1(France) | 4 | 0 | 0 | 17 |
| ROW | 0 | 0 | 8 | 0 | 3 | 0 | 1(USA) | 12 |
| Total | 8 | 4 | 10 | 1 | 7 | 1 | 1 | 32 |

As per point 5, half of the countries visited by both Samantha and Nitesh are in Europe, so number of countries visited by Samantha and Nitesh alone would be $\frac{(7+1)}{2} = 4$.

Now we can answer all the questions:

30. As shown in the table above, 3 countries in Asia were visited by at least one of Dheeraj, Samantha and Nitesh.

31. As shown in the table above, Nitesh visited 2 countries in Europe alone.

32. As shown in the table above, $3 + 1 = 4$ countries in ROW were visited by both Nitesh and Samantha.

33. As shown in the table above, $6 + 4 + 2 = 12$ countries in Europe were visited by exactly one of Dheeraj, Samantha and Nitesh. Hence option C.

34. Daily Share Price Variability (SPV) for A = $\frac{2400 - 1200}{2000} = \frac{1200}{2000} = \frac{3}{5}$
 Daily Share Price Variability (SPV) for C = $\frac{1400 - 800}{1000} = \frac{600}{1000} = \frac{3}{5}$
 Daily Share Price Variability (SPV) for F = $\frac{2000 - 1200}{1700} = \frac{800}{1700} = \frac{8}{17}$
 Daily Share Price Variability (SPV) for D = $\frac{1200 - 300}{750} = \frac{900}{750} = \frac{6}{5}$

We can see that value of Daily Share Price Variability (SPV) for D is max as it is the only value which is greater than 1. All other values are less than 1. Hence option D.

35. Daily Share Price Variability (SPV) for A = $\frac{2400 - 1200}{2000} = \frac{1200}{2000} = \frac{3}{5} = 0.6$
 Daily Share Price Variability (SPV) for C = $\frac{1400 - 800}{1000} = \frac{600}{1000} = \frac{3}{5} = 0.6$
 Daily Share Price Variability (SPV) for F = $\frac{2000 - 1200}{1700} = \frac{800}{1700} = \frac{8}{17} = 0.47$
 Daily Share Price Variability (SPV) for D = $\frac{1200 - 300}{750} = \frac{900}{750} = \frac{6}{5} = 1.2$
 Daily Share Price Variability (SPV) for B = $\frac{2000 - 1400}{1850} = \frac{600}{1850} = \frac{12}{37} = 0.32$
 Daily Share Price Variability (SPV) for E = $\frac{1400 - 1100}{1200} = \frac{300}{1200} = \frac{1}{4} = 0.25$
 Daily Share Price Variability (SPV) for G = $\frac{1900 - 1000}{1450} = \frac{900}{1450} = \frac{18}{29} = 0.62$

From the above table, we can see that value of SPV of 4 shares i.e A, C, D and G is greater than 0.5. Hence D is the answer.

36. Daily Loss for A = $\frac{2200 - 1800}{2200} = \frac{400}{2200} = \frac{4}{22} = \frac{2}{11} = 0.18$
 Daily Loss for B = $\frac{2000 - 1700}{2000} = \frac{300}{2000} = \frac{3}{20} = 0.15$
 Daily Loss for F = $\frac{1800 - 1600}{1800} = \frac{200}{1800} = \frac{2}{18} = \frac{1}{9} = 0.11$
 Daily Loss for G = $\frac{1200 - 1700}{1200} = -\frac{500}{1200} = -\frac{5}{12} = -0.42$

From the above table, we can see that value of Daily Loss for A is maximum. Hence option C.

37. As seen from the graph, the bullish shares are C, D and G.
 Let us assume he purchases one share each of C, D and G.
 CP of one share of C = 800 and SP of one share of C = 1400
 CP of one share of D = 500 and SP of one share of D = 1200
 CP of one share of G = 1200 and SP of one share of G = 1900
 So Total Cost of purchasing one share of each of C, D and G = $800 + 500 + 1200 = 2500$
 Total Selling Price of one share of each of C, D and G = $1400 + 1200 + 1900 = 4500$.
 Hence Percentage Gain = $\frac{4500 - 2500}{2500} \times 100 = \frac{2000}{2500} \times 100 = 80\%$. Hence option D.

- 38-41. It is given that all the six web surfers each had 30 stars. Hence total number of stars = $30 \times 6 = 180$.
 As per the given information and analysing the graph, we can make the initial table::

| | M | N | O | P | X | Y | Total |
|-------|----|----|----|----|----|----|-------|
| A | 10 | 25 | 0 | 5 | 0 | 5 | 45 |
| B | 0 | 0 | 0 | 25 | 0 | 20 | 45 |
| C | | | | 0 | | | 45 |
| D | | | | 0 | | | 45 |
| Total | 30 | 30 | 30 | 30 | 30 | 30 | 180 |

As it is given that the numbers of stars received by the bloggers from the surfers were all multiples of 5 (including 0), so possible values of stars given to the all the bloggers were any of the values 0 or 5 or 10 or 15 or 25 or 30.

From the 4th point, we can say that the two surfers who gave all their stars to a single blogger must be O and X. Also that blogger is C and D in any order.

As per point 5, D received more stars than C from Y. This tells us that D got 5 stars from Y and C got 0 stars from Y.

As per point 3, C and D could receive 5 and 15 stars from M in any order.



Now let us assume that C received 5 stars from M. So D received 15 stars from M. Hence either O or X gave 30 stars to C. Then N has to give 10 stars to C which is not possible as total stars of N will exceed 30 and total stars of D would exceed 45.

This case is shown below in the table::

| | M | N | O | P | X | Y | Total |
|--------------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| A | 10 | 25 | 0 | 5 | 0 | 5 | 45 |
| B | 0 | 0 | 0 | 25 | 0 | 20 | 45 |
| C | 5 | 10 | 30/0 | 0 | 0/30 | 0 | 45 |
| D | 15 | | 0/30 | 0 | 30/0 | 5 | 45 |
| Total | 30 | 30 | 30 | 30 | 30 | 30 | 180 |

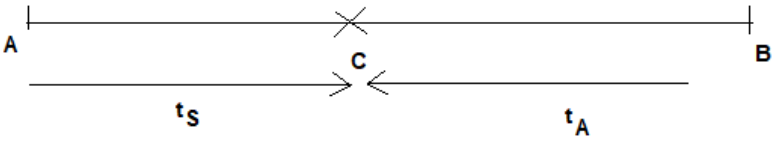
So we will the other case which would be valid in which C received 15 stars from M. So D received 5 stars from M. Hence either O or X gave 30 stars to C and D in any order.

So we get the final table as follows

| | M | N | O | P | X | Y | Total |
|--------------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| A | 10 | 25 | 0 | 5 | 0 | 5 | 45 |
| B | 0 | 0 | 0 | 25 | 0 | 20 | 45 |
| C | 15 | 0 | 30/0 | 0 | 0/30 | 0 | 45 |
| D | 5 | 5 | 0/30 | 0 | 30/0 | 5 | 45 |
| Total | 30 | 30 | 30 | 30 | 30 | 30 | 180 |

As this table is satisfying all the conditions, so now all the questions can be answered.

- 38. As it is given in the information that total number of stars received by the bloggers is the same, so each would receive $180/4 = 45$ stars. Hence answer is 45.
- 39. As shown in the table, D would receive 5 stars from Y. Hence option C.
- 40. From the table, we can infer that 2 surfers N and P distributed their stars among exactly 2 bloggers. (N distributed his stars to A and D only and P distributed his stars to A and B only).
- 41. As shown in the table, the number of stars received by C from M can be uniquely determined as 15. But we cannot determine the number of stars received by D from O. They could be either 0 or 30. Hence option C.
- 42. If both of them run staid campaigns focussing on issues, then the percentage of students voting in the election will be 20 times the sum of the levels of campaigning of the two students. So the percentage would be $20(1 + 1) \% = 40\%$.
But as both of them run staid campaigns attacking the other, then 10% of 40% will not vote at all. Hence answer would be 90% of 40% which is equal to 36%. Hence option D.
- 43. Minimum percentage of students who will vote will be obtained when they run staid campaign as it of level 1.
Also if they run staid campaigns attacking the other, then percentage voting would be further reduced. So minimum percentage will be obtained as 90% of $20(1 + 1)\% = 90\%$ of $40\% = 36\%$. Hence option C.
- 44. If both of them run vigorous campaigns focussing on issues, then the percentage of students voting in the election will be 20 times the sum of the levels of campaigning of the two students. So the percentage would be $20(2+2) \% = 80\%$. Hence each of them would get 40% votes.
It is given that Amiya runs a campaign focusing on issues. To maximise percentage of votes she gets, will be obtained when Ramya run a campaign attacking their opponent.
So the reduction in the percentage of votes obtained by Ramya would be 20% of $40\% = 8\%$ which would be added to percentage of votes of Amiya. So Amiya would get $40\% + 8\% = 48\%$ votes. Also 5% who would have otherwise voted for Ramya, will not vote at all. Hence total reduction in the percentage of votes for Ramya would be $8\% + 5\%$ of $40\% = 10\%$. So answer of this question is 48%. Hence option C.
- 45. Minimum percentage of students who will vote will be obtained when they run staid campaign as it of level 1.
If both of them run staid campaigns focussing on issues, then the percentage of students voting in the election will be 20 times the sum of the levels of campaigning of the two students. So the percentage would be $20(1 + 1) \% = 40\%$. Hence each of them would get 20% votes.
It is given that Ramya runs a campaign attacking their opponent. So the reduction in the percentage of votes obtained by Ramya would be 20% of $20\% = 4\%$ which would be added to percentage of votes of Amiya.

| | |
|-----|--|
| | <p>Also 5% who would have otherwise voted for Ramya, will not vote at all. Hence total reduction in the percentage of votes for Ramya would be $4\% + 5\%$ of $20\% = 4\% + 1\% = 5\%$. So minimum percentage of votes that she is guaranteed to get will be $20\% - 5\% = 15\%$. Hence option B.</p> |
| 46. | <p>Maximum possible voting margin with which one of the candidates can win will be obtained when one of them runs vigorous campaign and the other runs staid campaign.</p> <p>If Amiya runs vigorous campaign focussing on issues and Ramya runs staid campaigns focussing on issues, then the percentage of students voting in the election will be 20 times the sum of the levels of campaigning of the two students. So the percentage would be $20(2+1)\% = 60\%$. Hence Amiya would get 40% votes and Ramya would get 40% votes.</p> <p>Now if Ramya runs a campaign attacking their opponent. So the reduction in the percentage of votes obtained by Ramya would be 20% of 20% = 4% which would be added to percentage of votes of Amiya. So Amiya would get $40\% + 4\% = 44\%$ votes.</p> <p>Also 5% who would have otherwise voted for Ramya, will not vote at all. Hence total reduction in the percentage of votes for Ramya would be $4\% + 5\%$ of $20\% = 4\% + 1\% = 5\%$. So minimum percentage of votes that she is guaranteed to get will be $20\% - 5\% = 15\%$. Hence maximum voting margin will be $44\% - 15\% = 29\%$. Hence option B.</p> |
| 47. | <p>By Euler theorem, $\frac{10^{100}}{7} = \frac{(10^6)^{16} \times 10^4}{7} = \frac{1 \times 10^4}{7} \Rightarrow 10000/7$ remainder is 4.</p> |
| 48. |  <p>Let's assume after meeting at point C Anil takes time t_A and Sunil takes t_s.</p> <p>As we know, $t = \sqrt{t_A \times t_S}$</p> <p>As given $t = \frac{3}{2}$, then $t_s = x$, let $t_A = x + \frac{5}{4}$ hours as Anil reaches B exactly 1 hour 15 minutes after Sunil reaches A, $\frac{3}{2} = \sqrt{(x + \frac{5}{4}) \times x}$</p> <p>Taking square on both sides and simplify it we have $4x^2 + 5x - 9 = 0$</p> <p>$\Rightarrow (4x + 9)(x - 1) = 0$, so, $x = -\frac{9}{4}$ and $x = 1$</p> <p>As we cannot take the negative value, so $x=1$</p> <p>Now, $t_A = x + \frac{5}{4} = 1 + \frac{5}{4} = \frac{9}{4}$</p> <p>Anil's total time was $\frac{3}{2} + \frac{9}{4} = \frac{15}{4}$ h</p> <p>Speed of Anil = $\frac{45}{\frac{15}{4}} = 12$ km/h</p> |
| 49. | <p>Let the four numbers be p, q, r, and s.</p> <p>By first condition, $\frac{p+q}{2} = p + 1$</p> <p>$\Rightarrow q = p + 2$</p> <p>By second condition, $\frac{p+q+r}{3} = \frac{p+q}{2} + 2$</p> <p>$\Rightarrow r = p + 7$</p> <p>By third condition, $\frac{p+q+r+s}{4} = \frac{p+q+r}{3} + 3$</p> <p>$\Rightarrow s = p + 15$</p> <p>Thus the numbers are p, p + 2, p + 7 and p + 15.</p> <p>So, the difference between the largest and the smallest number = $p + 15 - p = 15$.</p> |
| 50. | <p>Here to form all 4-digit numbers using the distinct non-zero digits a, b, c, d and each digit appears exactly</p> |

| | |
|-----|---|
| | <p>once in each position across all permutations. The total number of 4 – digit numbers is $4! = 24$ Each digit appears $\frac{24}{4} = 6$ times in each place (thousands, hundreds, tens, and units) For a given digit x, its total contributions are, $x \times (1000 + 100 + 10 + 1) \times 6 = x \times 1111 \times 6 = 6666x$. The sum of all numbers is: $6 \times 1111 \times (a + b + c + d) = 6666 (a + b + c + d)$. $6666 (a + b + c + d) = 153310 + n$, where n is a single-digit natural number. Divide 153310 by 6666 $\Rightarrow a + b + c + d = \frac{153310}{6666} = 23$ (aprox.) $\Rightarrow 6666 \times 23 = 153318 \Rightarrow 153310 + n = 153318$ $\Rightarrow n = 153318 - 153310 = 8$ The value of $a + b + c + d + n = 23 + 8 = 31$</p> |
| 51. | <p>Let the incomes of Kamal, Amal and Vimal in September be proportional to 8k, 6k, 5k respectively. The house rent paid by Kamal is 15% of 8k = 1.2k The house rent paid by Amal is 12% of 6k = 0.72k The house rent paid by Vimal is 18% of 5k = 0.9k Their total house rent = 1.2k + 0.72k + 0.9k = 2.82k In October their house rent remains same while their incomes increase by 10%, 12% and 15% respectively. Kamal's increased income = 8k \times 1.1 = 8.8k Amal's increased income = 6k \times 1.12 = 6.72k Vimal's increased income = 5k \times 1.15 = 5.75k Total income in October = 8.8k + 6.72k + 5.75k = 21.27k The house rent remains the same at 2.82k. The percentage of their total income paid as rent in October = $\frac{2.82k}{21.27k} \times 100 = 13.26\%$ (aprox.)</p> |
| 52. | <p>Since in bank A, P = 10000 rate of interest = 5% and let time be T. $\Rightarrow SI = \frac{PRT}{100} = \frac{10000 \times 5 \times T}{100} = 500 T$. Maturity amount = 10000 + 500 T Now for bank B, Sum = 10000 + 500 T, rate of interest = 6% and time = 6 years $\Rightarrow SI = \frac{(10000 + 500T) \times 6 \times 5}{100} = 3000 + 150 T$ Also, the interests received from bank A and bank B are in the ratio 10 : 13 $\frac{\text{Interest of bank A}}{\text{Interest of bank B}} = \frac{10}{13} \Rightarrow \frac{500 T}{3000 + 150 T} = \frac{10}{13}$ $\Rightarrow 13 \times 500 T = 10 \times (3000 + 150 T) \Rightarrow T = 6$ years</p> |
| 53. | <p>If the equations $x^2 + mx + 9 = 0$, $x^2 + nx + 17 = 0$ and $x^2 + (m + n)x + 35 = 0$ have a common negative root, then the value of $(2m + 3n)$ is Let α be the common negative root, then substitute it into each equation we have $\alpha^2 + m\alpha + 9 = 0 \dots$ (i), $\alpha^2 + n\alpha + 17 = 0 \dots$ (ii) and $\alpha^2 + (m + n)\alpha + 35 = 0 \dots$ (iii) Subtracting eq. (i) and (ii) we get $\alpha^2 + n\alpha + 17 - \alpha^2 - m\alpha - 9 = 0$ $\Rightarrow (n - m)\alpha + 8 = 0$ $\alpha = -\frac{8}{n - m}$ $\alpha^2 + m\alpha + 9 + \alpha^2 + n\alpha + 17 = 0$ $\Rightarrow 2\alpha^2 + (m + n)\alpha + 26 = 0$ Subtract the third equation from the sum of the first and second equations, we get $2\alpha^2 + (m + n)\alpha + 26 - \alpha^2 - (m + n)\alpha - 35 = 0$ $\alpha^2 - 9 = 0 \Rightarrow \alpha^2 = 9$ $\Rightarrow \alpha = \pm 3$, Since α is negative, $\alpha = -3$ As $\alpha = -\frac{8}{n - m}$</p> |

$$\Rightarrow -3 = -\frac{8}{n-m} \Rightarrow n-m = \frac{8}{3}$$

Substitute, $\alpha = -3$ into the first equation, we get $\alpha^2 + m\alpha + 9 = 0$

$$\Rightarrow 9 - 3m + 9 = 0 \Rightarrow m = 6$$

$$\text{Substitute } m = 6 \text{ in } n - m = \frac{8}{3} \Rightarrow n - 6 = \frac{8}{3} \Rightarrow n = \frac{26}{3}$$

$$\text{Now } 2m + 3n = 2 \times 6 + 3 \times \frac{26}{3} = 12 + 26 = 38$$

54. $4 \log_{10} x + 4 \log_{100} x + 8 \log_{1000} x = 13$

$$\Rightarrow 4 \log_{10} x + \frac{4}{2} \log_{10} x + \frac{8}{3} \log_{10} x = 13$$

$$\Rightarrow 4 \log_{10} x + 2 \log_{10} x + \frac{8}{3} \log_{10} x = 13$$

$$\text{Let } \log_{10} x = k \Rightarrow 4k + 2k + \frac{8}{3}k = 13$$

$$\text{or } 12k + 6k + 8k = 39 \Rightarrow k = \frac{3}{2}$$

$$\text{or } \log_{10} x = \frac{3}{2} \Rightarrow x = 10^{\frac{3}{2}} = \sqrt{1000} = 31.62$$

So, the greatest integer not exceeding 31.62 = 31

55. Since, $4(x^2 + y^2 + z^2) = a$ and $4(x - y - z) = 3 + a$

On subtracting both equations we have, $4x^2 - 4x + 4y^2 + 4y + 4z^2 + 4z = -3$

Adding 1 to make it perfect square, we get,

$$(4x^2 - 4x + 1) + (4y^2 + 4y + 1) + (4z^2 + 4z + 1) = 0$$

$$(2x - 1)^2 + (2y + 1)^2 + (2z + 1)^2 = 0$$

$$\Rightarrow x = \frac{1}{2}, y = -\frac{1}{2}, z = -\frac{1}{2}$$

Now, $4(x^2 + y^2 + z^2) = a$

$$\Rightarrow 4\left(\frac{1}{4} + \frac{1}{4} + \frac{1}{4}\right) = a$$

$$\Rightarrow a = 3$$

56. Clearly we have equation of circle

$$x^2 + y^2 + 2gx + 2fy + c = 0$$

$$x^2 + y^2 + 4x - 4y + 4 \geq 0$$

$$x^2 + y^2 + 2 \times 2x + 2 \times (-2)y + 4 \geq 0$$

$$\text{Centre} = (-g, -f) = (-2, 2)$$

$$\text{Radius} = \sqrt{g^2 + f^2 - c}$$

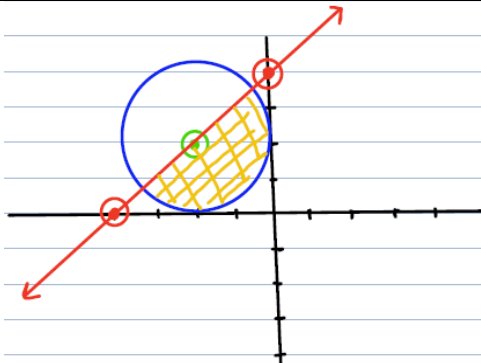
$$\sqrt{(-2)^2 + 2^2 - 4} = \sqrt{4} = 2 \text{ units}$$

Now, we have equation of line

$$y \geq x + 4$$

$$x - y \leq -4$$

| | | |
|---|---|----|
| x | 0 | -4 |
| y | 4 | 0 |



$$\text{Area of shaded region} = \frac{(\pi \times r^2)}{2} = 2\pi$$

57.

By dilution method, Milk left after nth operation / Total mixture = $\left(1 - \frac{y}{x}\right)^n$

The process repeatedly replaces $\frac{2}{3}$ of the glass's contents with water.

$$\Rightarrow \text{Milk left after nth operation / Total mixture} = \left(1 - \frac{2}{3}\right)^4 = \left[\frac{1}{3}\right]^4 = \frac{1}{81}$$

Initially, the milk fraction is 1 (all milk). After four repetitions, the milk fraction becomes $\frac{1}{81}$

$$\Rightarrow \text{the fraction of water} = 1 - \frac{1}{81} = \frac{80}{81}$$

The final ratio of milk to water is $\frac{1}{81} : \frac{80}{81} = 1 : 80$

58.

Basically we are looking for onto function from A to B.

Let $n(A) = m$, $n(B) = n$

So, number of onto functions

$$= n^m - {}^n C_1(n-1)^m + {}^n C_2(n-2)^m - {}^n C_3(n-3)^m$$

$$= 3^6 - {}^3 C_1(2)^6 + {}^3 C_2(1)^6 - {}^3 C_3(0)$$

$$= 540$$

59.

Total surface area of cuboid = $2(lb + bh + hl)$

$$\Rightarrow 2(lb + bh + hl) = 846 \text{ cm}^2$$

The sum of lengths of all the edges = $4(l + b + h) = 144$

$$\Rightarrow l + b + h = 36 \text{ cm}$$

$$\text{Now, } (l + b + h)^2 = l^2 + b^2 + h^2 + 2(lb + bh + hl)$$

$$\Rightarrow l^2 + b^2 + h^2 = (l + b + h)^2 - 2(lb + bh + hl)$$

$$\Rightarrow l^2 + b^2 + h^2 = 36^2 - 846 = 1296 - 846 = 450$$

Diameter of the sphere = body diagonal of the cuboid = $\sqrt{l^2 + b^2 + h^2} = \sqrt{450} \text{ cm}$

And the radius is $\sqrt{\frac{450}{2}} \text{ cm}$

$$\text{Volume of sphere} = \frac{4}{3}\pi R^3 = \frac{4}{3}\pi \left(\frac{\sqrt{450}}{2}\right)^3 = 1125\pi\sqrt{2} \text{ cm}^3$$

60.

Let the Initial CP = 100, Initial SP = Initial CP \times 140% = 140.

New CP = 60% of 100 = 60, New SP = 150% of 60 = 90.

Difference between the Initial and New selling price is $140 - 90 = 50$

Now we need to compare it with actual information as per the question, our 50 is representing 5 Rs as per question. 10 is representing 1Rs, 140 will represent 14 Rs.

61.

The best way to solve such questions is to move backwards. In the end

he is left with nothing. Just see that to the last person he has given $\frac{1}{2}$

of the grains and then 0 grains.

In general person sells $\frac{1}{2}$ of the grains and 3 kg more, so the person left with $\frac{1}{2}$ of the grains and 3 kg less.

$$\frac{x}{2} - 3 = 0$$

$x = 6$ (before giving to third person)

$$\frac{x}{2} - 3 = 6$$

$X = 18$ (before giving to second person)

$$\frac{x}{2} - 3 = 18$$

$x = 42$ (before giving to first person)

So the person initially have 42 kg of grains

62.

$$(29 - 12\sqrt{5}) = (a + b\sqrt{n})^2$$

$(29 - 12\sqrt{5})$ must be a square of $(x - y)^2$

$$(x - y)^2 = x^2 + y^2 + 2xy$$

$$2xy = 12\sqrt{5}$$

$$xy = 6\sqrt{5}$$

If we take $x = 6$ and $y = \sqrt{5}$

$$(6 - \sqrt{5})^2 = 36 + 5 - 12\sqrt{5} = 41 - 12\sqrt{5} \text{ (not possible)}$$

If we take $x = 3$ and $y = 2\sqrt{5}$

$$(3 - 2\sqrt{5})^2 = 9 + 20 - 12\sqrt{5} = 29 - 12\sqrt{5} \text{ (possible)}$$

If we take $x = 2\sqrt{5}$ and $y = 3$

$$(2\sqrt{5} - 3)^2 = 20 + 9 - 12\sqrt{5} = 29 - 12\sqrt{5} \text{ (possible)}$$

If we take $x = \sqrt{20}$ and $y = 3$

$$(\sqrt{20} - 3)^2 = 20 + 9 - 12\sqrt{5} = 29 - 12\sqrt{5} \text{ (possible)}$$

If we take $x = \sqrt{20}$ and $y = 3$

$$(3 - \sqrt{20})^2 = 20 + 9 - 12\sqrt{5} = 29 - 12\sqrt{5} \text{ (possible)}$$

$$\text{Positive root: } (a + b\sqrt{n})^2 = (3 - 2\sqrt{5})^2 = a + b + n = 3 - 2 + 5 = 6$$

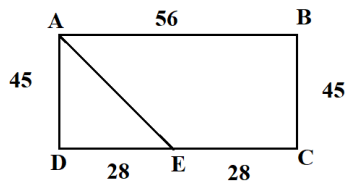
$$\text{Negative root: } (a + b\sqrt{n})^2 = (2\sqrt{5} - 3)^2 = a + b + n = 2 + 5 - 3 = 4$$

$$\text{Positive root: } (a + b\sqrt{n})^2 = (-3 + \sqrt{20})^2 = a + b + n = -3 + 1 + 20 = 18 \text{ (Answer)}$$

$$\text{Negative root: } (a + b\sqrt{n})^2 = (3 - \sqrt{20})^2 = a + b + n = 3 - 1 + 20 = 22$$

As the question asked maximum possible value of positive root so answer is 18.

63.



ABCD is a rectangle, E is a mid-point of D and C.

$\triangle ADE$ is a right angle triangle by applying Pythagorean theorem, $AE = 53$.

Using the formula to calculate area of triangle = radius of incircle \times Semi perimeter.

$$\frac{1}{2} \times 28 \times 45 = r \times \left(\frac{45 + 28 + 53}{2} \right)$$

$$r = 10$$

64.

| | Apple | Mangos | Oranges |
|------------------|-------|--------|-------------------------------------|
| Number of fruits | $5x$ | $2x$ | $187 - 7x$ |
| Sells | 75 | 26 | $\left(\frac{187 - 7x}{2} \right)$ |

Ratio unsold fruits to unsold oranges = 3 : 2

$$\frac{5x - 75}{187 - 7x} = \frac{3}{2}$$

$$20x - 300 = 561 - 21x$$

$$41x = 861$$

$$x = 21$$

Apple Mangos Oranges



| | |
|-----|---|
| | <p>Number of fruits 105 42 40</p> <p>Sells 75 26 20</p> <p>Left 30 + 16 + 20 = 66</p> |
| 65. | $\left(\frac{1}{8}\right)^k \times \left(\frac{1}{32768}\right)^{1/3} = \left(\frac{1}{8}\right) \times \left(\frac{1}{32768}\right)^{1/k}$ $\left(\frac{1}{8}\right)^k \times \left(\frac{1}{8^5}\right)^{1/3} = \left(\frac{1}{8}\right) \times \left(\frac{1}{8^5}\right)^{1/k}$ $\left(\frac{1}{8}\right)^{k-1} = \left(\frac{1}{8^5}\right)^{5/k-5/3}$ $k - 1 = \frac{5}{k} - \frac{5}{3}$ $3k^2 + 2k - 15 = 0$ <p>Sum of roots = $-\frac{2}{3}$.</p> |
| 66. | <p>$x_5 = -4$</p> <p>$a + 4d = -4 \dots (i)$</p> <p>$2x_6 + 2x_9 = x_{11} + x_{13}$</p> <p>$2(x_6 + x_9) = x_{11} + x_{13}$</p> <p>$x_6 + x_9 = \frac{(x_{11} + x_{13})}{2}$</p> <p>$x_6 + x_9 = x_{12}$</p> <p>$a + 5d + a + 8d = a + 11d$</p> <p>$a + 2d = 0 \dots (ii)$</p> <p>Solving equation (i) and (ii),</p> <p>$a = 4$ and $d = -2$</p> <p>$x_{100} = a + 99d = 4 + 99 \times (-2) = 4 - 198 = -194$</p> |
| 67. | <p>Total number of hours for which Renu worked is $15 \times 4 = 60$ hrs</p> <p>Total number of hours for which Seema worked is $8 \times 5 = 40$ hrs</p> <p>Total work is taken as LCM of $(60, 40) = 120$ units</p> <p>Efficiency of Renu is $\frac{120}{60} = 2$ units/hours</p> <p>Efficiency of Seema is $\frac{120}{40} = 3$ units/hours</p> <p>As per the question Renu works 2 hours per day, So Seema works for 4 hours per day.</p> <p>Total work completed by Renu is $2 \times 2 = 4$ units/day</p> <p>Total work completed by Seema is $3 \times 4 = 12$ units/day</p> <p>As per the question number of day taken by Renu is double of Seema.</p> <p>Let number of day taken by Seema is 'x' so number of days taken by Renu is '2x'.</p> <p>Total work will be completed by $4 \times 2x + 12x = 120$ $x = 6$ days.</p> |
| 68. | <p>Question is based on GINT, largest integer not exceeding \sqrt{n}. Find the value of $a_1 + a_2 + \dots + a_{50}$.</p> <p>When $n = 1, \sqrt{1} = 1$</p> <p>$n = 2, \sqrt{2} = 1$</p> <p>$n = 3, \sqrt{3} = 1$</p> <p>$n = 4, \sqrt{4} = 2$</p> <p>So, we need to count it like this,</p> <p>from 1 to 3 we have 1 three times so total will be $1 \times 3 = 3$</p> <p>from 4 to 8 we have 2 five times so total will be $2 \times 5 = 10$</p> <p>from 9 to 15 we have 3 seven times so total will be $3 \times 7 = 21$</p> <p>from 16 to 24 we have 4 nine times so total will be $4 \times 9 = 36$</p> <p>from 25 to 35 we have 5 eleven times so total will be $5 \times 11 = 55$</p> <p>from 36 to 48 we have 6 thirteen times so total will be $6 \times 13 = 78$</p> <p>from 49 to 50 we have 7 two times so total will be $7 \times 2 = 14$</p> <p>Hence, answer will be $3 + 10 + 21 + 36 + 55 + 78 + 14 = 217$</p> |



Answer Key Actual CAT Slot - II

| Q. No | Key | Q. No | Key | Q. No | Key |
|-------|-----|-------|------|-------|------|
| 1. | C | 25. | 4 | 47. | C |
| 2. | A | 26. | B | 48. | D |
| 3. | D | 27. | A | 49. | B |
| 4. | B | 28. | 2 | 50. | B |
| 5. | A | 29. | 26 | 51. | 11 |
| 6. | B | 30. | A | 52. | B |
| 7. | A | 31. | D | 53. | 139 |
| 8. | 4 | 32. | 5100 | 54. | C |
| 9. | B | 33. | 3500 | 55. | C |
| 10. | D | 34. | 150 | 56. | A |
| 11. | A | 35. | A | 57. | 340 |
| 12. | D | 36. | 4 | 58. | 2160 |
| 13. | C | 37. | D | 59. | B |
| 14. | D | 38. | A | 60. | C |
| 15. | A | 39. | B | 61. | B |
| 16. | C | 40. | A | 62. | D |
| 17. | A | 41. | B | 63. | B |
| 18. | A | 42. | A | 64. | 7 |
| 19. | D | 43. | 4 | 65. | 2 |
| 20. | C | 44. | 5 | 66. | 14 |
| 21. | B | 45. | 6 | 67. | 7 |
| 22. | 2 | 46. | C | 68. | A |
| 23. | A | | | | |
| 24. | A | | | | |

Explanation Actual CAT Slot - II

| Q. No | Explanation |
|-------|--|
| 1. | <p>The text's primary focus is physicists collaborating with experts from other fields to answer questions about our world. Their approaches might have some differences they nevertheless have resulted in benefits (means important findings, which is their objective).</p> <p>Option C includes this core.</p> <p>Option A says they have "buried their differences in research methods applied in other fields", which has not been mentioned. In spite of their differences, they have been somewhat successful.</p> <p>Option B There is no mention of large data sets and mathematical models in physics combined with research methods of other fields.</p> <p>Option D There's no desire to diversify their research. There have been differences in approaches and that have stayed yet some benefits have been seen.</p> |
| 2. | <p>The sentence, "[T]he Europeans did not invent globalisation" hints that if they didn't invent it then it was already there. We need a context that what was there before the Europeans made the big leap. It was the trade that was going on between China and peoples of Southeast Asia.</p> <p>In the first blank, there's no gap. People of Southeast Asia supplied goods to the Chinese and the same thing is mentioned after the blank...these exchanges.</p> <p>Before the second blank, it has been mentioned that the exchanges of the year 1000 opened some of the routes...and after the blank a contrast pair is made with the use of 'Yet' that means something different from what has been said or opposite to what has been said. So, the second blank is not suitable for that sentence.</p> <p>After the third blank, it is given, "they changed and augmented what was already there since 1000". It goes perfectly well with "The Europeans did not invent it but they just changed and made it greater.</p> <p>There's no gap even in the fourth option as the words, "If the globalisation hadn't yet begun..." must have a fixed time before it, which is there in the previous sentence.</p> |
| 3. | <p>The para talks about how states conduct warfare using the DIME model (Diplomacy, information, military, and economics). The states try or do everything before deploying the military. Then the focus shifts to information, how the states monitor telecom data and communications and also use cyber troops on social media to influence public opinion.</p> <p>Option D includes the main focus.</p> <p>Option A is incorrect as it says governments primarily use the DIME model to deploy cyber troops, which is not true. The DIME model includes diplomacy, information, military and economics. Using cyber troops is just further part of the information tool and not all of them.</p> <p>Option B is incorrect as it is also confusing the trajectory of thought in the text and mismatching different parts. Further, the focus is lost amid other details.</p> <p>Option C is incorrect as using the DIME Model and military simultaneously has not been talked about.</p> <p>Military is a part of the DIME model.</p> |
| 4. | <p>We have to select an option that states what would happen if a trader brought white peppercorns from India to medieval Europe. During those time, Europeans thought pepper in India grew on trees guarded by serpents, "The only way to harvest pepper was to burn the trees, which would drive the snakes underground. Of course, this bit of lore would explain the shriveled black peppercorns, but not white, pink or other colors." So, they would doubt the story of pepper harvesting.</p> <p>Option A, C and D are beyond the scope of the given text.</p> |
| 5. | <p>The third paragraph states why the spices were highly prized in Europe, "Medieval purchasers consumed meat much fresher than what the average city-dweller in the developed world of today has at hand. However, refrigeration was not available, and some hot spices have been shown to serve as an anti-bacterial agent. Salting, smoking or drying meat were other means of preservation. Most spices used in cooking began as medical ingredients, and throughout the Middle Ages spices were used as both medicines and condiments. Above all, medieval recipes involve the combination of medical and culinary lore in order to balance food's humeral properties and prevent disease." Spices acted both as medicines as well as condiments. From here it can be inferred that Option B, C and D contributed to a decline in the allure of spices but their increased availability has not much to do with it.</p> |
| 6. | <p>The people who had heard the story of pepper trees being guarded by snakes evokes a sense of fear and its resultant limited supply.</p> <p>Option A, C and D logically follow from these reasons.</p> <p>However, Option B is least likely to be arrived at.</p> |

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| 7. | <p>The conclusion, “India was colonised for its spices and gold” is not directly supported by the passage. The East has been mentioned but direct reference to India being colonised for this is not there.</p> <p>Option B can be concluded from the last paragraph. Refer to the line, “Spices never had the enduring allure or power of gold and silver or the commercial potential of new products such as tobacco, indigo or sugar.”</p> <p>For Option C and D, refer to the line, “Still, demand was great enough to inspire the voyages of Christopher Columbus and Vasco Da Gama, launching the first fateful wave of European colonialism.”</p> |
| 8. | <p>The correct order here is 1532 and option 4 is the odd-one out. This order flows from a general statement about the UK’s leadership, to the benefits of cultivated meat, to the current status of the technology, and finally, the need for continued investment.</p> <p>Sentence 1 sets the stage by introducing the UK’s leadership in the development of cultivated meat and highlights an important milestone, the approval of cultivated pet food.</p> <p>Sentence 5 follows logically, explaining the potential benefits of cultivated meat, particularly in terms of reducing the negative impacts of traditional animal agriculture, which is a key motivator for developing this technology.</p> <p>Sentence 3 provides a specific update on the status of cultivated meat applications, mentioning that the first UK applications for human consumption are under review by the Food Standards Agency.</p> <p>Sentence 2 concludes the paragraph by suggesting that government investment in research and infrastructure is essential for realizing the full benefits of cultivated meat.</p> |
| 9. | <p>The sentence to be fitted in is, “Yet each day the flock produced eggs with calcareous shells though they apparently had not ingested any calcium from land which was entirely lacking in limestone.” The sentence starts with ‘Yet’. It means something totally different or opposite should come before it as it makes for a contrast pair. In blank 1, the previous sentence just talks about Louis Kervran’s childhood and him noticing a strange fact in his father’s poultry yard.</p> <p>In blank 2, the sentence that comes before it and after it both talk about mica. There seems to be no gap.</p> <p>In blank 3, the sentence that comes before it states the hens consumed mica and not calcium and the sentence starting with ‘Yet’ makes for a contrast pair. The observation, “why the chickens selected the mica, or why each time a bird was killed for the family cooking pot no trace of the mica could be found in its gizzard”, makes for an interesting contrast as chickens had mica but what they delivered was calcium. The sentence that follows offers an explanation for it. So, nothing is required in Blank 4.</p> |
| 10. | <p>We have to pick the option that is not a reason why academics choose to review other scholars work. Option A, B and C can be traced to these lines, “Some do it as a way to keep abreast with developments in their field; some simply see it as a duty to the discipline” and “In recent years, some scientists have begun posting their reviews online, mainly to claim credit for their work.”</p> <p>Option D is neither directly stated nor it can be derived as a reason for...</p> |
| 11. | <p>Option A can be inferred throughout the passage from the author’s line of thought and especially from the last line, “But the norm should shift from opacity in all cases to opacity only when necessary.”</p> <p>Option B, C and D can’t be inferred – peer review data has been mentioned but in a different context; option C and D are clearly beyond what has been stated.</p> |
| 12. | <p>Here, we have to pick an option that is not the reason for making peer review data public. Option A, B and C are mentioned in the passage. Refer to lines, “Sharing peer review data could help journals stamp out fraud, inefficiency, and systemic bias in academic publishing.....”; “Peer review data could also help root out bias. Last year, a study based on peer review data for nearly 24,000 submissions to the biomedical journal eLife found that women and non- Westerners were vastly underrepresented among peer reviewers”; and “Openly publishing peer review data could perhaps also help journals address another problem in academic publishing: fraudulent peer reviews.”</p> <p>However, Option D does not favour making peer review data public as it talks about the problem of selecting appropriately qualified peer reviewers.</p> |
| 13. | <p>Here, we need to pick an option that does not carry the reason why some are supposed to making peer reviews public. Option A, B and D can be found in the passage as reasons. Refer to lines, “Opponents of open peer review commonly argue that confidentiality is vital to the integrity of the review process; referees may be less critical of manuscripts if their reports are published, especially if they are revealing their identities by signing them. Some also hold concerns that open reviewing may deter referees from agreeing to judge manuscripts in the first place, or that they’ll take longer to do so out of fear of scrutiny....”</p> |
| 14. | <p>It’s not given anywhere or hinted at that technological advances in the past have always had innocuous or beneficial outcomes. They may have it sometimes. Refer to lines in the first para, “Sometimes those consequences are innocuous ones, or even beneficial.”</p> <p>For Option A, refer to lines, “as it becomes increasingly possible for individuals or small groups to create new scientific advances through chemistry or biotechnology or materials science setting off unintended consequences that reverberate on a global scale”.</p> |

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| | For Option B and C, refer to lines, “Ethyl (leaded fuel) and Freon belonged to the same general class of secondary effect: innovations whose unintended consequences stem from some kind of waste by-product that they emit. But the potential health threats of Ethyl (unleaded fuel) were visible in the 1920s, unlike, say, the long-term effects of atmospheric carbon build up in the early days of the Industrial Revolution....” So, the author supports Option A, B and D. |
| 15. | The first paragraph focuses on what economists sometimes call ‘externalities’ or the unintended consequences and secondary effects. The para also carries an example to support it. The printing press leads to a chain of effects. Option B is incorrect as it’s not about judging an invention or about holistic impacts. Option C is incorrect as there’s is no mention that the secondary effects of most major technological advances have been beneficial. The author has used the word ‘sometimes’. Option D is incorrect as the word ‘entire’ here makes it a bit extreme and secondly, there’s no mention of evaluating it by the boost it gives to generating further technological advancements. |
| 16. | By externalities, the author means unintended consequences or secondary effects. We need to pick an option that is not a secondary effect but it should be the primary invention. Here, the invention of Air Conditioners for a specific purpose is primary. Refer to the lines, “When Willis Carrier hit upon the idea of air-conditioning, the technology was primarily intended for industrial use: ensuring cool, dry air for factories that required low-humidity environments.” Option A, B and D are secondary effects. For option A, refer to the last paragraph. For option B, refer to lines, “Edison famously thought his phonograph, which he sometimes called "the talking machine," would primarily be used to take dictation....But then later innovators... discovered a much larger audience willing to pay for musical recordings made on descendants of Edison's original invention. In other cases, the original innovation comes into the world disguised as a plaything...” For option D, “In other cases, the original innovation comes into the world disguised as a plaything...the way the animatronic dolls of the mid-1700s inspired Jacquard to invent the first "programmable" loom...” |
| 17. | These inventors had their own individual objectives. The hardly had any idea regarding the externalities. The secondary effects or unintended consequences might have taken place after a big span of time like the Industrial Revolution and its effects on the environment. Consider the words, “Oftentimes the secondary effects seem to belong to an entirely different sphere of society”; “Sometimes the unintended consequence comes about when consumers use an invention in a surprising way. Edison famously thought his phonograph, which he sometimes called "the talking machine," would primarily be used to take dictation....But then later innovators... discovered a much larger audience willing to pay for musical recordings made on descendants of Edison's original invention.” Option B is incorrect as the unintended consequences were largely beneficial is not supported by the passage. Option C is incorrect as “inventions being used for entirely different purposes” is not right in all the cases that have been mentioned. Option D is incorrect as the author is not trying to prove that past inventions mostly resulted in creation of new inventions. |
| 18. | Option A is supported by the lines, “...Penteriani's team believes 50% could have been avoided if humans reacted differently. A 2017 study co-authored by Penteriani found that engaging in risky behaviour around large carnivores increases the likelihood of an attack.” Two of the most common risky behaviours are parents leaving their children to play outside unattended and walking an unleashed dog, according to the study. Wilkinson says 66% of coyote attacks involve a dog. “[People] end up in a situation where their dog is being chased, or their dog chases a coyote, or maybe they're walking their dog near a den that's marked, and the coyote wants to escort them away,” says Wilkinson. Option B is incorrect as attempting to photograph wild animals from within secured areas would not exacerbate the attacks. Option C is incorrect as addressing the impact of climate change would also not increase the attacks as climate change is also cited to be one of the reasons behind the increasing number of attacks. Option D is incorrect as implementing food waste management strategies would likely decrease the attacks. |
| 19. | Option D is inconsistent with the passage, which mentions that climate change plays a part in escalating human-carnivore conflicts, although the exact correlation is still being studied. It highlights that scarcity of resources due to climate change leads to more frequent encounters between humans and carnivores, which could increase conflict. Therefore, stating that climate change has negligible effects directly contradicts this information. Option A: “Predatory attacks by carnivores are a common occurrence and have steadily increased over the past few decades.” This statement is incorrect because the passage states that predatory attacks are rare, accounting for only 17% of attacks in North America since 1955. Therefore, it would be inconsistent with the passage to say they are common or steadily increasing. |



| | <p>Option B: "Human efforts to avoid risky behaviours around large carnivores have proven effective in reducing conflict incidents."</p> <p>This statement is consistent with the passage, which refers to a 2017 study by Penteriani that found 50% of carnivore-human conflicts could have been avoided if humans had reacted differently, especially by avoiding risky behaviors like leaving children unattended or walking an unleashed dog.</p> <p>Option C: "Carnivores lose their instinctive fear of humans when consistently exposed to human food sources."</p> <p>This statement is consistent with the passage, which describes how carnivores that come to associate humans with food (e.g., from campsites or rubbish bins) lose their instinctive fear of humans, leading to dangerous situations where the animals are often put down.</p> | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------|---|----------|----------|----------|----------|----------|-------|---|---|---|---|-------|--|---|---|---|-------|--|--|---|---|-------|--|--|--|---|
| 20. | <p>For option C, "The diversity and interspersion of working landscapes with carnivore habitats in rural areas increase the statistical probability of encounters between humans and carnivores", refer to the lines in the last paragraph, "There are a lot of working landscapes in the Global South that are really heterogeneous, that are interspersed with carnivore habitats, forests and savannahs, which creates a lot more opportunity for these encounters, just statistically."</p> <p>Option A goes against the passage as low-income countries are more prone to human-carnivore conflict.</p> <p>Option B is incorrect as it's not homogenous but it's heterogeneous landscapes that are more likely to experience such conflicts.</p> <p>Option D is incorrect as it also goes against what is mentioned in the passage.</p> | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21. | <p>For option B "The reduction in carnivores' instinctive fear response, resulting from their reliance upon human-provided food", refer to lines, "Carnivores that recognise humans as a means to get food, are a different story. As they become more reliant on human food they might find at campsites or in rubbish bins, they become less avoidant of humans."</p> <p>Option A, C and D state reasons that could lead to more conflicts between animals and humans rather than lead to 'habituation' (becoming used to something), which is asked in the question.</p> | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22. | <p>The theme of the paragraph is gender and whether it is a social or a biological construct.</p> <p>Sentence 1 introduces the idea that gender is neither purely biological nor purely social, setting up the context for the discussion.</p> <p>Sentence 3 acknowledges people's discomfort with the idea that gender may not be purely social.</p> <p>Sentence 4 adds that researchers studying the biological aspects of gender face political opposition, connecting to the earlier sentence on discomfort.</p> <p>Sentence 5 elaborates on the political preference for viewing gender as a social construct, explaining why such pushback occurs.</p> <p>"We should be complacent in the face of sexism" is taking the line of thought in a different direction.</p> <p>So, the correct order is 1345 and sentence 2 is the odd-one out.</p> | | | | | | | | | | | | | | | | | | | | | | | | | |
| 23. | <p>The sentence, "Science has officially crowned us superior to our early-rising brethren" hints at there's something to be happy about. It also suggests that the early-rising brethren were considered superior earlier.</p> <p>The sentence before the first blank is just an introduction and doesn't call for the announcement. However, after the blank, a context has been made and it's taken to the peak with the words "we are having the last laugh". Now is the time to announce why, which is answered in the sentence to be filled in. The sentences before and after blank three talk about a study and there's no gap here. The sentences after that are further elaborating the study and why it's reliable.</p> | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24. | <p>The paragraph talks about how freedom is essential for comedians and when they are denied it, their creativity is stifled.</p> <p>Option A carries the crux of the paragraph.</p> <p>Option B is incorrect as it is shifting the focus of the paragraph, "They must go where no one has gone before."</p> <p>Option C is incorrect as it doesn't talk about freedom that is essential for comedians to move on.</p> <p>Option D is incorrect as this option too is missing the theme that is freedom is essential for the comedians to survive.</p> | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25 - 29. | <p>Let each of the ten slots is represented by the letters A to J as shown below-</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th></th> <th>Column 1</th> <th>Column 2</th> <th>Column 3</th> <th>Column 4</th> </tr> </thead> <tbody> <tr> <td>Row 1</td> <td>A</td> <td>B</td> <td>C</td> <td>D</td> </tr> <tr> <td>Row 2</td> <td></td> <td>E</td> <td>F</td> <td>G</td> </tr> <tr> <td>Row 3</td> <td></td> <td></td> <td>H</td> <td>I</td> </tr> <tr> <td>Row 4</td> <td></td> <td></td> <td></td> <td>J</td> </tr> </tbody> </table> <p>Now considering point 1 and 2, A, E, H, J < B, F, I < C, G < D So, definitely the value of D = 10</p> | | Column 1 | Column 2 | Column 3 | Column 4 | Row 1 | A | B | C | D | Row 2 | | E | F | G | Row 3 | | | H | I | Row 4 | | | | J |
| | Column 1 | Column 2 | Column 3 | Column 4 | | | | | | | | | | | | | | | | | | | | | | |
| Row 1 | A | B | C | D | | | | | | | | | | | | | | | | | | | | | | |
| Row 2 | | E | F | G | | | | | | | | | | | | | | | | | | | | | | |
| Row 3 | | | H | I | | | | | | | | | | | | | | | | | | | | | | |
| Row 4 | | | | J | | | | | | | | | | | | | | | | | | | | | | |



The value of C or G = 8 or 9
 The value of B, F or I = 5, 6 or 7
 The value of A, E, H or J = 1, 2, 3 or 4
 From point 3, 1 is placed either in the same row or in the same column as 10
 So, either A = 1 or J = 1
 From point 4, neither 2 nor 3 is placed in the same row or in the same column as 10.
 So, A, B, C, G, I and J cannot have value 2 or 3.
 So, E, F or H can have value 2 or 3, but F cannot have value 2 or 3.
 So, either E or H = 2 or 3. So, A or J have value 1 or 4.
 Also, from point 6, 4 and 6 are placed in the same row.
 So, J cannot have value 4 as that is the only slot in Row 4.
 So, A = 4 and J = 1
 So, the value of B = 6 (only possibility) as C cannot have value 6
 Now, from point 5, neither 7 nor 8 is placed in the same row or in the same column as 9.
 So, if G = 9, either F or I has to be 7 which is placed in the same row or column of G, not possible. So, C is definitely 9 and G is 8 and I is 7 and F is 5
 Regarding E and H, we have following two possibilities-

Case I: If E = 2 and H = 3

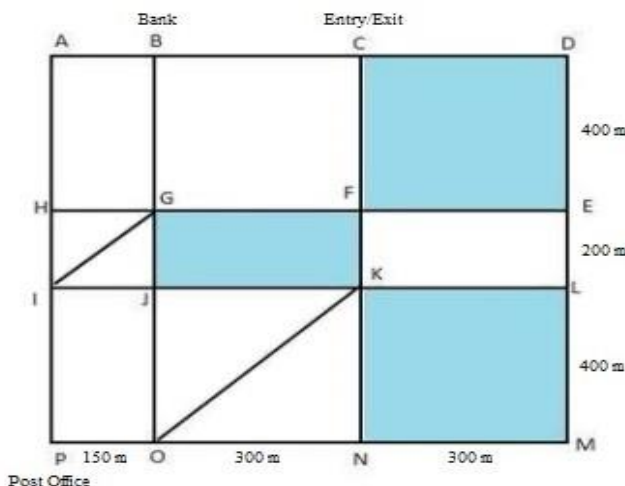
| | Column 1 | Column 2 | Column 3 | Column 4 |
|-------|----------|----------|----------|----------|
| Row 1 | 4 | 6 | 9 | 10 |
| Row 2 | | 2 | 5 | 8 |
| Row 3 | | | 3 | 7 |
| Row 4 | | | | 1 |

Case II: If E = 3 and H = 2

| | Column 1 | Column 2 | Column 3 | Column 4 |
|-------|----------|----------|----------|----------|
| Row 1 | 4 | 6 | 9 | 10 |
| Row 2 | | 3 | 5 | 8 |
| Row 3 | | | 2 | 7 |
| Row 4 | | | | 1 |

- 25. The row number which has the least sum of numbers is placed in row 4
- 26. Statement I. 10 is placed in a slot in Row 1, true
 Statement II. 1 is placed in a slot in Row 4, true
 Hence, both statement I and II are true
- 27. Statement I. 2 is placed in a slot in Column 2, may be or may not be true
 Statement II. 3 is placed in a slot in Column 3, may be or may not be true
 Hence, neither statement I nor II is true
- 28. For 2 slots (Row 2, Column 2 and Row 3, Column 3) in the grid where the placement of numbers cannot be determined with certainty
- 29. The sum of the numbers placed in Column 4 = 10 + 8 + 7 + 1 = 26

30-33.



In right angled triangle KNO, $KN^2 + ON^2 = KO^2$



| | | | | | | | | | | | | | |
|---------------|---|---------------|----|----|----|---|---|---------------|----|----|----|----|----|
| | <p>KN = ML = 400 m and ON = 300 m So, $KO^2 = 400^2 + 300^2 = 250000$ $\Rightarrow KO = 500$ m Similarly, in right angled triangle GJI, $IG^2 = GJ^2 + IJ^2 = 200^2 + 150^2 = 62500$ $\Rightarrow IG = 250$ m</p> | | | | | | | | | | | | |
| 30. | <p>The shortest path required would be L – K – O – P – I – G – B – C – F – E – L The minimum distance walked = LK + KO + OP + PI + IG + GB + BC + CF + FE + EL $= 300 + 500 + 150 + 400 + 250 + 400 + 300 + 400 + 300 + 200 = 3200$ m</p> | | | | | | | | | | | | |
| 31. | <p>The possible path would be C – D – E – F – K – L – M – N – K – J – G – F – C The distance walked = $300 + 400 + 300 + 200 + 300 + 400 + 300 + 400 + 300 + 200 + 300 + 400$ $= 3800$ m</p> | | | | | | | | | | | | |
| 32. | <p>The possible path would be A – B – G – F – C – D – E – L – M – N – K – J – O – P – I – H – A The maximum distance walked = $150 + 400 + 300 + 400 + 300 + 400 + 200 + 400 + 300 + 400 + 300 + 400 + 150 + 400 + 200 + 400 = 5100$</p> | | | | | | | | | | | | |
| 33. | <p>The possible path would be C – D – E – F – K – N – O – P – I – J – G – B – C The maximum distance walked = $300 + 400 + 300 + 200 + 400 + 300 + 150 + 400 + 150 + 200 + 400 + 300 = 3500$ m</p> | | | | | | | | | | | | |
| 34. | <p>From the Bar Chart, the total sum of ratings given on Day 2 by all the buyers $= 5 \times 1 + 10 \times 2 + 5 \times 3 + 20 \times 4 + 10 \times 5 = 170$ Total number of ratings given by buyers on Day 2 = $5 + 10 + 5 + 20 + 10 = 50$ So, the average rating on Day 2 = $\frac{170}{50} = 3.4$ Let the number of ratings given by buyers on Day 1 = x Sum of ratings on Day 1 = 3x Also given, $\frac{(3x + 170)}{(x + 50)} = 3.1$ Solving, $3x + 170 = 3.1x + 155$ $\Rightarrow x = 150$ The number of buyers gave ratings on Day 1 = 150</p> | | | | | | | | | | | | |
| 35. | <p>On Day 3, The total number of buyers gave ratings = 100 Let the number of buyers gave product ratings of 1 = 10y = ratings of 2 So, the number of buyers gave product ratings of 3 = 20y Also, the modes of the product ratings were 4 and 5 Let the number of buyers gave product ratings of 4 = 10z = ratings of 5 Solving, $10y + 10y + 20y + 10z + 10z = 100$ $\Rightarrow 4y + 2z = 10$ $\Rightarrow 2y + z = 5$ Now, 10z to be mode, z = 3 and y = 1 (only possibility)</p> <table border="1"> <tr> <td>Rating</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td>Buyers</td> <td>10</td> <td>10</td> <td>20</td> <td>30</td> <td>30</td> </tr> </table> <p>Total sum ratings on Day 3 = $10 \times 1 + 10 \times 2 + 20 \times 3 + 30 \times 4 + 30 \times 5 = 360$ The daily average rating on Day 3 = $\frac{360}{100} = 3.6$</p> | Rating | 1 | 2 | 3 | 4 | 5 | Buyers | 10 | 10 | 20 | 30 | 30 |
| Rating | 1 | 2 | 3 | 4 | 5 | | | | | | | | |
| Buyers | 10 | 10 | 20 | 30 | 30 | | | | | | | | |
| 36. | <p>On Day 3, The total number of buyers gave ratings = 100 Let the number of buyers gave product ratings of 1 = 10y = ratings of 2 So, the number of buyers gave product ratings of 3 = 20y Also, the modes of the product ratings were 4 and 5 Let the number of buyers gave product ratings of 4 = 10z = ratings of 5 Solving, $10y + 10y + 20y + 10z + 10z = 100$ $\Rightarrow 4y + 2z = 10$ $\Rightarrow 2y + z = 5$ Now, 10z to be mode, z = 3 and y = 1 (only possibility)</p> <table border="1"> <tr> <td>Rating</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td>Buyers</td> <td>10</td> <td>10</td> <td>20</td> <td>30</td> <td>30</td> </tr> </table> <p>The median of all the ratings given on Day 3 will be the average of 50th and 51st value which is same = 4</p> | Rating | 1 | 2 | 3 | 4 | 5 | Buyers | 10 | 10 | 20 | 30 | 30 |
| Rating | 1 | 2 | 3 | 4 | 5 | | | | | | | | |
| Buyers | 10 | 10 | 20 | 30 | 30 | | | | | | | | |
| 37. | <p>From the Bar Chart, the total sum of ratings given on Day 2 by all the buyers $= 5 \times 1 + 10 \times 2 + 5 \times 3 + 20 \times 4 + 10 \times 5 = 170$</p> | | | | | | | | | | | | |

Total number of ratings given by buyers on Day 2 = $5 + 10 + 5 + 20 + 10 = 50$

So, the average rating on Day 2 = $\frac{170}{50} = 3.4$

Let the number of ratings given by buyers on Day 1 = x

Sum of ratings on Day 1 = $3x$

Also given, $\frac{(3x + 170)}{(x + 50)} = 3.1$

Solving, $3x + 170 = 3.1x + 155$

$\Rightarrow x = 150$

On Day 3,

The total number of buyers gave ratings = 100

Let the number of buyers gave product ratings of 1 = $10y$ = ratings of 2

So, the number of buyers gave product ratings of 3 = $20y$

Also, the modes of the product ratings were 4 and 5

Let the number of buyers gave product ratings of 4 = $10z$ = ratings of 5

Solving, $10y + 10y + 20y + 10z + 10z = 100$

$\Rightarrow 4y + 2z = 10 \Rightarrow 2y + z = 5$

Now, 10z to be mode, $z = 3$ and $y = 1$ (only possibility)

| Rating | 1 | 2 | 3 | 4 | 5 |
|--------|----|----|----|----|----|
| Buyers | 10 | 10 | 20 | 30 | 30 |

Total sum ratings on Day 3 = $10 \times 1 + 10 \times 2 + 20 \times 3 + 30 \times 4 + 30 \times 5 = 360$

The cumulative average rating of Day 2 = 3.1 (given)

The cumulative average rating of Day 3 = $\frac{(450 + 170 + 360)}{(150 + 50 + 100)} = \frac{49}{15}$

Percentage change from Day 2 to Day 3 = $(\frac{49}{15} - 3.1)/3.1 \times 100 \approx 5.38\%$

Hence, the cumulative average of Day 3 increased by a percentage between 5% and 8% from Day 2.

38-41.

The corresponding values of PAT and ES can be directly noted

For PRD

In 2019, let the area corresponding to firm D = $P\%$, then the area corresponding to

$C = B = 9P\%$, $A = F = 4P\%$ and $E = 16P\%$

Similarly, in 2023, $D = C = F = A = 4P\%$ and $B = E = 9P\%$

The rest of the given information can be gathered as follows-

| Year \rightarrow | 2019 | | | 2023 | | |
|--------------------|------------------|------|---------|------------------|------|---------|
| Firm \downarrow | PAT (Rs. Crores) | ES | PRD (%) | PAT (Rs. Crores) | ES | PRD (%) |
| A | 3000 | 800 | 4P | 3900 | 1300 | 4P |
| B | 2800 | 1000 | 9P | 3800 | 1000 | 9P |
| C | 2400 | 600 | 9P | 3000 | 800 | 4P |
| D | 3900 | 600 | P | 2400 | 800 | 4P |
| E | 2400 | 1200 | 16P | 3500 | 1400 | 9P |
| F | 2500 | 800 | 4P | 3200 | 1000 | 4P |

38.

Let A, B, C and E be the ARG of the respective firms from 2019 to 2023

For A, $3900 = 3000 \left(\frac{1+A}{100} \right)^4$

So, $\left(\frac{1+A}{100} \right)^4 = \frac{3900}{3000} = 1.3$

Considering, rest of the factors same and we need to compare and not required the actual value, we need not to solve further

For B, $\left(\frac{1+B}{100} \right)^4 = \frac{3800}{2800} \approx 1.36$

For C, $\left(\frac{1+C}{100} \right)^4 = \frac{3000}{2400} \approx 1.25$



| | |
|--------|---|
| | <p>For E, $\left(\frac{1+E}{100}\right)^4 = \frac{3500}{2400} \approx 1.46$</p> <p>Hence, firm E had the highest ARG</p> |
| 39. | <p>The amount of money spent by firm C on R&D in 2019 = $\frac{9P}{100} \times 2400$</p> <p>The amount of money spent by firm C on R&D in 2023 = $\frac{4P}{100} \times 3000$</p> <p>Required ratio = $\frac{9P}{100} \times 2400 : \frac{4P}{100} \times 3000$</p> <p>= 9 : 5</p> |
| 40. | <p>PAT per employee in 2023 among A, C, E and F,</p> <p>Firm A = $\frac{3900}{1300} = 3$</p> <p>Firm C = $\frac{3000}{800} = 3.75$</p> <p>Firm E = $\frac{3500}{1400} = 2.5$</p> <p>Firm F = $\frac{3200}{1000} = 3.2$</p> <p>Hence, firm C had the maximum PAT per employee in 2023 among the firms A, C, E and F</p> |
| 41. | <p>PRD per employee in 2023 among the firms C, D, E and F</p> <p>Firm C = $(4P/100 \times 3000)/800 = 0.15P$</p> <p>Firm D = $(4P/100 \times 2400)/800 = 0.12P$</p> <p>Firm E = $(9P/100 \times 3500)/1400 = 0.225P$</p> <p>Firm F = $(4P/100 \times 3200)/1000 = 0.128P$</p> <p>Hence, firm D had the least PRD per employee in 2023 among the firms C, D, E and F</p> |
| 42-46. | <p>Considering Yuki trained only even numbered players, so Yuki would not be training odd numbered player. Similarly, Zara trained only odd numbered players, so Zara would not be training even numbered players.</p> <p>From point 2, Player 1 and Player 4 were trained by same coach, this is not possible for Yuki and Zara, so both of them are trained by Xena</p> <p>From point 3, Player 5 and Player 7 were trained by same coach, which is possible either for Xena or Zara. But if Xena coaches player 5 and player 7, the only possible player left for Zara to coach would be player 3, but it is given that each coach trained at least two players. So, Zara coached player 5 and player 7.</p> <p>From point 2, Player 2, Player 3 and Player 5 trained by different coaches. So, player 3 wouldn't be coached by Zara as Zara coached player 5. So, player 3 must be coached by Xena and player 2 must be coached by Yuki.</p> <p>From point 3, Player 5 and Player 7 got the same rating = r (let) and rest all 6 players got unique ratings. Also, from point 4, the average ratings of all the players = 4</p> <p>So, the sum total of ratings of all the 8 players = $8 \times 4 = 32$</p> <p>Sum of 7 unique integer values from 1 to 7 = 28</p> <p>So, the value of same rating, $r = 32 - 28 = 4$</p> <p>From point 5, player 2 got the highest rating = 7</p> <p>From point 6, average of the ratings of the players trained by Zara = $\frac{(4+4)}{2} = 4$</p> <p>So, average of the ratings of the players trained by Yuki = $4 + 2 = 6$ and average of the ratings of the players trained by Xena = $\frac{6}{2} = 3$</p> <p>Let the sum total of the ratings of Xena = X and the number of players coached</p> <p>From point 7, player 4's rating = $2 \times$ player 8's rating and player 4's rating < player 5's rating = 4</p> <p>So, only possibility that player 4's rating = 2 and player's 8 rating = 1</p> |

The information till here can be gathered as follows-

| Player | Xena | Yuki | Zara | Rating |
|---------------------------------------|------|------|------|--------|
| 1 | ✓ | × | × | |
| 2 | × | ✓ | × | 7 |
| 3 | ✓ | × | × | |
| 4 | ✓ | × | × | 2 |
| 5 | × | × | ✓ | 4 |
| 6 | | | × | |
| 7 | × | × | ✓ | 4 |
| 8 | | | × | 1 |
| Sum total of the ratings (S) | | | 8 | 28 |
| Number of players coached (n) | | | 2 | |
| Average of the Ratings (= S/n) | 3 | 6 | 4 | |

Now, let the number of the players coached by Xena = m

So, the sum total of the ratings of the players coached by Xena = $3 \times m = 3m$

Also, the number of the players coached by Yuki = $8 - 2 - m = 6 - m$

So, the sum total of the ratings of the players coached by Yuki = $6 \times (6 - m) = 36 - 6m$

Also we know, $3m + 36 - 6m + 8 = 32$

Solving, $m = 4$

So, the number of the players coached by Yuki = $6 - m = 2$ and the sum total of the ratings of the players coached by Yuki = $36 - 6m = 12$

Now one among the 2 players coached by Yuki is player 2 who had a rating of 7, so the other player must have rating $12 - 7 = 5$. So, that player must be player 6 who had a rating of 5.

So, player 8 must be coached by Xena along with player 1, player 3 and player 4 and the rating of player 1 and player 3 would be either 3 or 6 in any order.

The rest of the information can be gathered as follows-

| Player | Xena | Yuki | Zara | Rating |
|---------------------------------------|------|------|------|--------|
| 1 | ✓ | × | × | 3/6 |
| 2 | × | ✓ | × | 7 |
| 3 | ✓ | × | × | 6/3 |
| 4 | ✓ | × | × | 2 |
| 5 | × | × | ✓ | 4 |
| 6 | × | ✓ | × | 5 |
| 7 | × | × | ✓ | 4 |
| 8 | ✓ | × | × | 1 |
| Sum total of the ratings (S) | 12 | 12 | 8 | 32 |
| Number of players coached (n) | 4 | 2 | 2 | |
| Average of the Ratings (= S/n) | 3 | 6 | 4 | |

42. Zara coached exactly 2 players (Player 5 and Player 7)

43. The rating of player 7 = 4

44. The rating of player 6 = 5

45. For 6 players the ratings can be determined with certainty

46. The players trained by Xena are Player 1, Player 3, Player 4 and Player 8

47. In 2022,

Let the sum of employees (1-10) = a

Let the sum of employees (11-30) = b

Let the sum of employees (31-40) = c

Given $a + b = 30 \times 40000 = 12$ lakhs and $b + c = 30 \times 60000 = 18$ lakhs

Also given, $a + c = 20 \times 50000 = 10$ lakhs

Adding all 3 equations, $2(a + b + c) = 40$ lakhs

$\Rightarrow a + b + c = 20$ lakhs

Solving, $a = 2$ lakhs, $b = 10$ lakhs and $c = 8$ lakhs

Now, if average is increased by certain percentage, sum will also increased by the same percentage

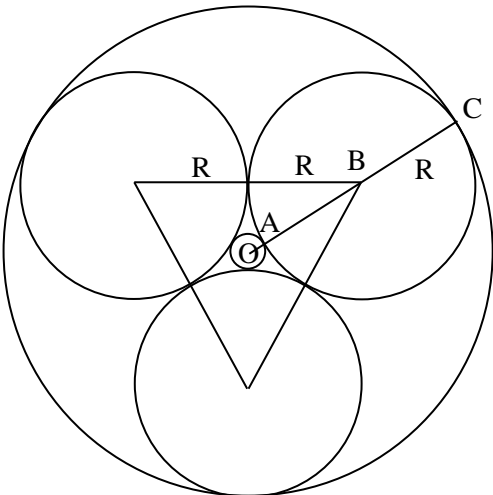
In 2023,



| | |
|-----|---|
| | <p>Sum of employees (1-10) = 2 lakhs \times 2 = 4 lakhs and sum of employees (31-40) = 8 lakhs \times 3 = 24 lakhs Sum of employees (11-30) = 10 lakhs (remains unchanged) Total sum = 4 + 10 + 24 = 38 lakhs The new average of all employees in 2023 = $3800000/40 = 95000$</p> |
| 48. | <p>Remainder $\frac{[3^1]}{11} = 3$ Remainder $\frac{[3^2]}{11} = 9$ Remainder $\frac{[3^3]}{11} = 5$ Remainder $\frac{[3^4]}{11} = 4$ Remainder $\frac{[3^5]}{11} = 1$</p> <p>So, the remainder cycle $\frac{3^n}{11}$ is of 5 (3, 9, 5, 4, 1)</p> <p>Hence, remainder $\frac{[3^{333}]}{11} = \text{remainder } \frac{[3^3]}{11} = 5$</p> |
| 49. | <p>Since m and n are natural numbers and $n > 1$ $m^n = 2^{25} \times 3^{40}$ $m^n = (2^5)^5 \times (3^8)^5$ $m^n = (32)^5 \times (6561)^5$ $m^n = (209952)^5$ So, $m = 209952$ and $n = 5$ $\Rightarrow m - n = 209947$</p> |
| 50. | <p>Let the initial water = w and initial acid = a Given, a = 50% (a + w + 2) $\Rightarrow a = w + 2$ Also, a + 15 = 80% (a + 15 + w + 2) $\Rightarrow 5a + 75 = 8a + 60$ $\Rightarrow a = 5$ and $w = 3$ Hence, initially water : acid = 3 : 5</p> |
| 51. | <p>$(x + 6\sqrt{2})^{\frac{1}{2}} - (x - 6\sqrt{2})^{\frac{1}{2}} = 2\sqrt{2}$ Squaring both sides, $(x + 6\sqrt{2}) + (x - 6\sqrt{2}) - 2(x + 6\sqrt{2})^{\frac{1}{2}}(x - 6\sqrt{2})^{\frac{1}{2}} = 8$ $2x - 2[x^2 - (6\sqrt{2})^2]^{\frac{1}{2}} = 8$ $x - 4 = [x^2 - 72]^{\frac{1}{2}}$ Again squaring both sides, $x^2 + 16 - 8x = x^2 - 72$ Solving, $x = 11$</p> |
| 52. | <p>Amount received by Anil = $22000 \left(1 + \frac{(4/2)}{100}\right)^{6 \times 2} = 22000 (1.02)^{12}$ Let the amount invested by Sunil = P Amount received by Sunil = $P \left(1 + \frac{(4/2)}{100}\right)^{5 \times 2} \left(1 + \frac{10}{100}\right)^1 = P (1.02)^{10} (1.1)$ Given, $22000 (1.02)^{12} = P (1.02)^{10} (1.1)$ Solving, $P = \text{Rs } 20808$</p> |
| 53. | <p>Given, $A + V = W/150$ and $V + S = W/100$ Let work, $W = 300$ units</p> |

| | |
|-----|---|
| | <p> $A + V = 2$ units/day and $V + S = 3$ units/day Also, $75A + 135V + 45S = 300$ $\Rightarrow 75A + 75V + 15V + 45V + 45S = 300$ $\Rightarrow 75 \times 2 + 15V + 45 \times 3 = 300$ $\Rightarrow V = 1$ unit/day $\Rightarrow A = 1$ unit/day and $S = 2$ units/day Now A works every day, while V works on every 2nd day and S works on every 3rd day, that makes the cycle of 6 days Work done by A on 1st day = 1 unit Work done by A and V on 2nd day = 1 + 1 = 2 units Work done by A and S on 3rd day = 1 + 2 = 3 units Work done by A and V on 4th day = 1 + 1 = 2 units Work done by A on 5th day = 1 unit Work done by A, V and S on 6th day = 1 + 1 + 2 = 4 units Work completed in 6 days = 1 + 2 + 3 + 2 + 1 + 4 = 13 units After that the cycle will repeat Work done in $(6 \times 23 = 138$ days) = 299 Next day, work done by A = 1 unit Hence, total number of days = 139 </p> |
| 54. | <p> Let the usual time taken = t hours Given, distance, $d = 60 \times (t + 3.5)$ Next day, $2d/3$ of the distance covered in $t/3$ of the time Remaining distance, $d/3 = 40 \times 2t/3$ $\Rightarrow d = 80t$ $\Rightarrow 80t = 60t + 210$ $\Rightarrow t = 10.5$ hours The usual scheduled arrival time = 9 AM + 10.5 hrs = 7:30 PM </p> |
| 55. | <p> $f(xy) = f(x)f(y) + f(x) + f(y)$ Given, $f(p) = 1$ where p is a prime number $\Rightarrow f(2) = 1$ and $f(5) = 1$ $\Rightarrow f(10) = f(2 \times 5) = f(2)f(5) + f(2) + f(5) = 1 \times 1 + 1 + 1 = 3$ $\Rightarrow f(100) = f(10 \times 10) = f(10)f(10) + f(10) + f(10) = 3 \times 3 + 3 + 3 = 15$ $\Rightarrow f(10000) = f(100 \times 100) = f(100)f(100) + f(100) + f(100) = 15 \times 15 + 15 + 15 = 255$ Now, $f(4) = f(2 \times 2) = f(2)f(2) + f(2) + f(2) = 1 \times 1 + 1 + 1 = 3$ $\Rightarrow f(16) = f(4 \times 4) = f(4)f(4) + f(4) + f(4) = 3 \times 3 + 3 + 3 = 15$ Now, $f(160000) = f(10000 \times 16) = f(10000)f(16) + f(10000) + f(16)$ $= 255 \times 15 + 255 + 15 = 4095$ </p> |
| 56. | $\frac{1}{5} \left(\frac{1}{5} - \frac{1}{7} \right) + \left(\frac{1}{5} \right)^2 \left[\left(\frac{1}{5} \right)^2 - \left(\frac{1}{7} \right)^2 \right] + \left(\frac{1}{5} \right)^3 \left[\left(\frac{1}{5} \right)^3 - \left(\frac{1}{7} \right)^3 \right] + \dots \infty$ $= \left(\frac{1}{5} \right)^2 - \left(\frac{1}{5} \right) \left(\frac{1}{7} \right) + \left(\frac{1}{5} \right)^4 - \left(\frac{1}{5} \right)^2 \left(\frac{1}{7} \right)^2 + \left(\frac{1}{5} \right)^6 - \left(\frac{1}{5} \right)^3 \left(\frac{1}{7} \right)^3 + \dots \infty$ $= \left(\frac{1}{5} \right)^2 + \left(\frac{1}{5} \right)^4 + \left(\frac{1}{5} \right)^6 + \dots \infty - \left[\left(\frac{1}{5} \right) \left(\frac{1}{7} \right) + \left(\frac{1}{5} \right)^2 \left(\frac{1}{7} \right)^2 + \left(\frac{1}{5} \right)^3 \left(\frac{1}{7} \right)^3 + \dots \infty \right] = \frac{\left(\frac{1}{5} \right)^2}{1 - \left(\frac{1}{5} \right)^2} - \frac{\left(\frac{1}{5} \right) \left(\frac{1}{7} \right)}{1 - \left(\frac{1}{5} \right) \left(\frac{1}{7} \right)}$ $= \frac{1}{24} - \frac{1}{34} = \frac{5}{408}$ |
| 57. | <p> At the beginning, let the total number of fruits = $5x$ \Rightarrow Mangoes at the beginning = 40% of $5x = 2x$ Let the Apples at the beginning = $5a \Rightarrow$ Bananas at the beginning = $3x - 5a$ At the end of the day, Mangoes sold = $\frac{2x}{2} = x$, Bananas sold = 96 and Apples sold = 40% of $5a = 2a$ Given, $x + 96 + 2a = 50\%$ of $5x$ $\Rightarrow 1.5x = 2a + 96$ $\Rightarrow 3x = 4a + 192$ The smallest possible value of $a = 3$ (at least 1 fruit of each type) </p> |



| | | | | | |
|--|--|--|---|--|---|
| | <p>Solving, $x = 68$ (smallest) Hence, the smallest possible total number of fruits at the beginning = $5x = 340$</p> | | | | |
| 58. | <p>Let the cost price of Bina = $100x$ Given, $100x - 19\%$ of $100x = \text{Rs } 4860$ $\Rightarrow x = 60$ So, the cost price of Bina = $100x = \text{Rs } 6000$ Certain Price = $6000 + 17\%$ of $6000 = \text{Rs } 7020$ Profit of Shyam = $7020 - 4860 = \text{Rs } 2160$</p> | | | | |
| 59. | <p>The given shape can be drawn as follows. Due to symmetry, the center of both the circles X and Y coincides at O (let) Let the radius of e circles of equal radii = R Let the radius of smaller circle Y = OA And radius of larger circle X = $OC = OA + AC = OA + 2R$ Also, joining the center of 3 circles having radius R forms an equilateral triangle with each side = $2R$</p>  <p>Now, OB is circum-radius of equilateral triangle thus formed $OB = OA + AB = OA + R = \frac{2}{\sqrt{3}} \times R$ $\Rightarrow OA = 2R/\sqrt{3} - R = (2 - \sqrt{3})R/\sqrt{3}$ Also, $OC = OA + 2R = (2 - \sqrt{3})R/\sqrt{3} + 2R = (2 + \sqrt{3})R/\sqrt{3}$ Required ratio = $OC : OA = (2 + \sqrt{3})R/\sqrt{3} : (2 - \sqrt{3})R/\sqrt{3}$ $= (2 + \sqrt{3})^2 : (2 - \sqrt{3})(2 + \sqrt{3}) = 7 + 4\sqrt{3} : 1$</p> | | | | |
| 60. | <table border="1"> <tr> <td> <p>$x + x + y = 15$ and $x + y - y = 20$</p> <p>Case I $x \geq 0$ and $y \geq 0$ $2x + y = 15$ and $x = 20$ $\Rightarrow y = -25$ (not possible)</p> </td> <td> <p>Case III $x < 0$ and $y \geq 0$ $y = 15$ and $x = 20$ (not possible)</p> </td> </tr> <tr> <td> <p>Case II $x \geq 0$ and $y < 0$ $2x + y = 15$ and $x - 2y = 20$ $4x + 2y = 30$ and $x - 2y = 20$ $\Rightarrow x = 10$ and $y = -5$ $\Rightarrow x - y = 10 - (-5) = 15$</p> </td> <td> <p>Case IV $x < 0$ and $y < 0$ $y = 15$ and $x - 2y = 20$ $\Rightarrow x = 50$ and $y = 15$ (not possible)</p> </td> </tr> </table> <p>Hence, $x - y = 15$</p> | <p>$x + x + y = 15$ and $x + y - y = 20$</p> <p>Case I $x \geq 0$ and $y \geq 0$ $2x + y = 15$ and $x = 20$ $\Rightarrow y = -25$ (not possible)</p> | <p>Case III $x < 0$ and $y \geq 0$ $y = 15$ and $x = 20$ (not possible)</p> | <p>Case II $x \geq 0$ and $y < 0$ $2x + y = 15$ and $x - 2y = 20$ $4x + 2y = 30$ and $x - 2y = 20$ $\Rightarrow x = 10$ and $y = -5$ $\Rightarrow x - y = 10 - (-5) = 15$</p> | <p>Case IV $x < 0$ and $y < 0$ $y = 15$ and $x - 2y = 20$ $\Rightarrow x = 50$ and $y = 15$ (not possible)</p> |
| <p>$x + x + y = 15$ and $x + y - y = 20$</p> <p>Case I $x \geq 0$ and $y \geq 0$ $2x + y = 15$ and $x = 20$ $\Rightarrow y = -25$ (not possible)</p> | <p>Case III $x < 0$ and $y \geq 0$ $y = 15$ and $x = 20$ (not possible)</p> | | | | |
| <p>Case II $x \geq 0$ and $y < 0$ $2x + y = 15$ and $x - 2y = 20$ $4x + 2y = 30$ and $x - 2y = 20$ $\Rightarrow x = 10$ and $y = -5$ $\Rightarrow x - y = 10 - (-5) = 15$</p> | <p>Case IV $x < 0$ and $y < 0$ $y = 15$ and $x - 2y = 20$ $\Rightarrow x = 50$ and $y = 15$ (not possible)</p> | | | | |
| 61. | <p>Given, $3x^2 + \lambda x - 1 = 0$ $\alpha + \beta = -\lambda/3$ and $\alpha\beta = -1/3$</p> $\frac{1}{\alpha^2} + \frac{1}{\beta^2} = 15$ $\frac{\alpha^2 + \beta^2}{\alpha^2\beta^2} = 15$ $\frac{(\alpha + \beta)^2 - 2\alpha\beta}{(\alpha\beta)^2} = 15$ $\frac{(-\lambda/3)^2 - 2(-1/3)}{(-1/3)^2} = 15$ | | | | |

$$\begin{aligned} \Rightarrow \lambda^2 + 6 &= 15 \\ \Rightarrow \lambda &= \pm 3 \\ (\alpha^3 + \beta^3)^2 &= [(\alpha + \beta)^3 - 3\alpha\beta(\alpha + \beta)]^2 \\ &= [(-\lambda/3)^3 - 3(-1/3)(-\lambda/3)]^2 \\ &= (-\lambda^3/27 - \lambda/3)^2 \\ &= (\pm 2)^2 = 4 \end{aligned}$$

62.

$$\begin{aligned} \frac{1}{x+5} &\leq \frac{1}{2x-3} \\ \frac{1}{x+5} - \frac{1}{2x-3} &\leq 0 \\ \frac{2x-3-x-5}{(x+5)(2x-3)} &\leq 0 \\ \frac{x-8}{(x+5)(2x-3)} &\leq 0 \\ \frac{(x+5)(2x-3)(x-8)}{(x+5)^2(2x-3)^2} &\leq 0 \\ (x+5)(2x-3)(x-8) &\leq 0 \\ \text{such that } x &\neq -5 \text{ or } \frac{3}{2} \text{ as it makes denominator zero} \\ \text{Now using wavy curve method,} \\ x < -5 \text{ or } \frac{3}{2} < x &\leq 8 \end{aligned}$$

63.

Let the present age of Rajesh and Garima be R and G respectively
Also, let Rajesh's age was same as present age of Garima x years ago
 $\Rightarrow x = R - G \Rightarrow G = R - x$

$$\frac{R-x}{G-x} = \frac{3}{2}$$

$$\Rightarrow 2G = 3G - 3x$$

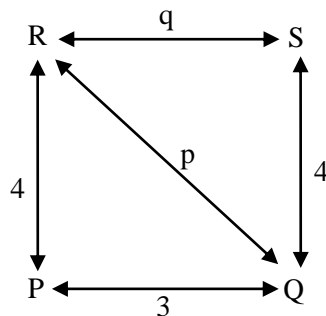
$$\Rightarrow G = 3x \text{ and } R = 4x$$

Now, Garima's age becomes present age of Rajesh

$$\text{Required ratio} = \frac{R+x}{G+x} = \frac{5x}{4x} = \frac{5}{4}$$

64.

Given, paths between P and Q = 3, Q and S = 4 and P and R = 4
Let the number of paths between Q and R = p and R and S = q



Given, paths between P to Q to S + paths between P to R to S + paths between P to Q to R to S = $3 \times 4 + 4 \times q + 3 \times p \times q = 62$
 $\Rightarrow 4q + 3pq = 50$
 $\Rightarrow q(4 + 3p) = 50$
Possible values, $q = 2$ and $p = 7$ or $q = 5$ and $p = 2$
Also, paths between Q to R + paths between Q to P to R + paths between Q to S to R = $p + 3 \times 4 + 4 \times q = 27$
 $\Rightarrow p + 4q = 15$
Now, $q = 2$ and $p = 7$ satisfies
Hence, the number of direct paths between Q and R = $p = 7$

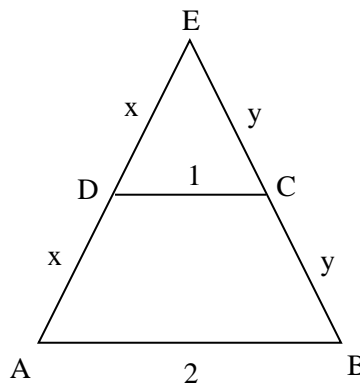


65. The given vertices are (1, 2), (7, 2) and (1, 10)
 The distance between (1, 2) and (7, 2) = 6 units
 The distance between (1, 2) and (1, 10) = 8 units
 The distance between (7, 2) and (1, 10) = 10 units
 So, the sides of the given triangle satisfies the Pythagoras Theorem, therefore forms a right angled triangle
 Area of the right angled triangle = $\frac{1}{2} \times 6 \times 8 = 24$ units
 Also, the area of the triangle = $r \times s$
 where r is the in-radius and s is the semi-perimeter, $s = \frac{(6+8+10)}{2} = 12$
 Hence, $r \times 12 = 24 \Rightarrow r = 2$ units

66. $\frac{\log_8(a+b)}{\log_2 c} + \frac{\log_{27}(a-b)}{\log_3 c} = \frac{2}{3}$
 $\frac{1}{3} \frac{\log_2(a+b)}{\log_2 c} + \frac{1}{3} \frac{\log_3(a-b)}{\log_3 c} = \frac{2}{3}$
 $\frac{\log_2(a+b)}{\log_2 c} + \frac{\log_3(a-b)}{\log_3 c} = 2$
 $\log_c(a+b) + \log_c(a-b) = 2$
 $\Rightarrow a^2 - b^2 = c^2$
 $\Rightarrow a^2 = b^2 + c^2$
 To maximize the value of a, we need to maximize the value of b and c
 Also, $a > 10 \geq b \geq c$
 So, a^2 (maximum) = $10^2 + 10^2 = 200$
 Hence, the maximum integral value of a = 14

67. $4x^2 + 4y^2 - 4xy - 6y + 3 = 0$
 $4x^2 + y^2 + 3y^2 - 4xy - 6y + 3 = 0$
 $4x^2 + y^2 - 4xy + 3y^2 - 6y + 3 = 0$
 $(2x - y)^2 + 3(y - 1)^2 = 0$
 $\Rightarrow 2x - y = 0$ and $y - 1 = 0$
 $\Rightarrow y = 1$ and $x = \frac{1}{2}$
 $4x + 5y = 4 \times \frac{1}{2} + 5 \times 1 = 7$

68. Given perimeter of trapezium ABCD = 6
 $\Rightarrow AB + BC + CD + DA = 6$
 Let BC = y and DA = x
 $\Rightarrow 2 + y + 1 + x = 6$
 $\Rightarrow x + y = 3$
 Since, AB//CD and CD = 1/2 AB
 \Rightarrow D is mid-points of AE
 and C is mid-point of BE
 So, DE = x = AD
 And CE = y = BC
 Perimeter of AEB
 = AB + BE + AE
 = 2 + 2y + 2x
 = 2 + 2(x + y)
 = 8 units



Answer Key Actual CAT Slot - III

| Q. No | Key | Q. No | Key | Q. No | Key |
|-------|-----|-------|-----|-------|-----|
| 1. | A | 25. | A | 47. | 2 |
| 2. | C | 26. | 3 | 48. | 8 |
| 3. | D | 27. | D | 49. | C |
| 4. | D | 28. | C | 50. | B |
| 5. | B | 29. | 3 | 51. | D |
| 6. | C | 30. | B | 52. | 9 |
| 7. | C | 31. | C | 53. | A |
| 8. | C | 32. | B | 54. | 70 |
| 9. | C | 33. | A | 55. | D |
| 10. | A | 34. | A | 56. | A |
| 11. | D | 35. | B | 57. | 90 |
| 12. | D | 36. | D | 58. | C |
| 13. | A | 37. | 0 | 59. | 2 |
| 14. | 2 | 38. | B | 60. | 30 |
| 15. | 1 | 39. | 34 | 61. | D |
| 16. | B | 40. | 42 | 62. | A |
| 17. | B | 41. | D | 63. | C |
| 18. | C | 42. | 10 | 64. | 378 |
| 19. | D | 43. | 5 | 65. | B |
| 20. | C | 44. | 12 | 66. | B |
| 21. | B | 45. | 24 | 67. | A |
| 22. | B | 46. | 12 | 68. | C |
| 23. | B | | | | |
| 24. | C | | | | |

Explanation Actual CAT Slot - III

| Q. No | Explanation |
|-------|---|
| 1. | <p>The line <i>“Through its mastery of language, AI could even form intimate relationships with people, and use the power of intimacy to change our opinions and worldviews”</i> clearly suggests that the author thinks AI can use the power of intimacy to shape people's worldviews. There is no implication that this emotional manipulation could exacerbate the polarization of world views.</p> <p>Option B is wrong as the lines <i>“AI can create completely new ideas, completely new culture...”</i> clearly indicate that AI has the ability to create completely new ideas and, therefore, new cultures which is a significant threat to human civilization.</p> <p>Option C is wrong as the author expresses a clear concern about AI's role in potentially subverting democratic processes, particularly through the generation of fake news and political content... Refer to the lines <i>“Think of the next American presidential race in 2024, mass-produce political content, fake-news stories and scriptures for the new cult.” “ Democracy is a conversation....., thereby destroying democracy.”</i></p> <p>Option D is wrong. Refer to the lines <i>“What would happen once a non-human intelligence becomes better than the average human at telling stories, composing melodies, drawing images, and writing laws and scriptures?”</i></p> |
| 2. | <p>Refer the lines, <i>“Unregulated AI.... which would benefit autocrats and ruin democracies. Democracy is a conversation When AI hacks language,thereby destroying democracy...”</i></p> <p>This clearly indicates that the author believes one of the greatest dangers posed by AI is its ability to disrupt the democratic process, making Option C the correct choice.</p> <p>Option A: The passage discusses the risks and dangers of unregulated AI, particularly its potential to manipulate culture, language, and democracy. The author does not discuss the positive impacts of AI making Option A incorrect.</p> <p>Option B: The author does not dismiss the fears about AI harming humanity. In fact, they highlight the significant dangers AI could pose, particularly in terms of language manipulation and its effects on society and democracy. The passage mentions that AI could form intimate relationships with humans and manipulate opinions, which implies real concerns about its negative impact. Therefore, Option B is also incorrect.</p> <p>Option D: The passage does mention concerns about AI being used by students (such as ChatGPT writing essays), however the author shifts the focus to much broader, more significant issues, such as the potential for AI to influence political processes and subvert democracy. The author does not argue that fears about AI in schools are unfounded; rather, they suggest that these concerns are a distraction from the larger issues. Therefore, Option D is incorrect as well.</p> |
| 3. | <p>Option D is correct as the author highlights how language is crucial in creating cultural artefacts, conveying human values, and influencing opinions, but does not suggest that language is the basis for AI tools like ChatGPT. While AI tools use language, the primary focus of the author is on how language underpins human society and culture and how its manipulation by AI can have terrible consequences for human civilization.</p> <p>Option A: Refer to the line, <i>“Human rights, for example, aren't inscribed in our DNA. Rather, they are cultural artefacts we created by telling stories and writing laws.”</i></p> <p>Option B: This is correct because the passage underscores how language is the key to expressing and spreading human values, culture, and societal norms. The author writes: <i>“Language is the stuff almost all human culture is made of.”</i></p> <p>Option C: Refer to line, <i>“AI could even form intimate relationships with people, and use the power of intimacy to change our opinions and worldviews.”</i></p> |
| 4. | <p>The author raises significant concerns over AI's potential to disrupt language, culture, democracy, and human relationships. The overall tone of the passage warns readers about the risks of these tools and calls for quick regulation. The author writes:</p> <p><i>“We can still regulate the new AI tools, but we must act quickly... Unregulated AI deployments would create social chaos, which would benefit autocrats and ruin democracies.”</i></p> <p>This tone of caution about the future impacts of AI is a defining characteristic of the passage.</p> <p>Option A: While the passage does contain a rhetorical question at the end, this is not the dominant tone of the passage. The focus is not on curiosity or uncertainty but on the dangers of AI and the need for regulation.</p> <p>Option B: The author raises significant concerns but does so with reason and logic, aiming to provoke thought and call for regulation, rather than inducing panic. The focus is on the adverse consequences and their implications, not on sensationalizing the threat.</p> <p>Option C: While the passage does discuss the future impact of AI tools, the tone is more focused on warning about the immediate need for regulation and action to avoid negative consequences. The author is not</p> |

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| | primarily forecasting the future but urging preventive measures against potential harms. |
| 5. | <p>The paragraph highlights the tension between lyric poetry's personal focus and Marxism's societal focus, while also suggesting that lyric poetry could still serve a critical purpose. It acknowledges that although lyric poetry is personal and often focused on the small scale, it can function as a form of resistance against a repressive culture — something the passage hints at when it discusses how poetry may be implicitly critical or utopian. Option B captures this idea.</p> <p>Option A: The focus of the passage is more on the possibility of lyric poetry serving a role in resisting oppression, rather than solely highlighting Marxism's internal contradictions.</p> <p>Option C: This option is not entirely correct because it suggests that the resolution of the tension between Marxism and lyric poetry is necessary for poetry to avoid being utopian. The passage does not argue that a resolution is required for poetry to be utopian; rather, it suggests that lyric poetry may inherently be utopian but can still serve a critical function.</p> <p>Option D: The passage does not suggest that Marxism makes "unreasonable demands" on lyric poetry. Neither does it argue that Marxism "ignores" the merits of poetry.</p> |
| 6. | <p>The sentence describes financial stress due to new and previously unincurred costs, which is directly related to the idea of workers experiencing increased expenses after a period of remote work. Blank 3 is the best fit as it discusses how workers were able to save during remote work, when the additional costs (like transportation, lunches, etc.) were absent, which aligns well with the sentence that talks about the stress of these newly incurred costs.</p> <p>Option A introduces the rising costs (petrol, food) but doesn't immediately connect with the stress of the added costs workers are now facing.</p> <p>Option B talks about wage stagnation, but it's not as directly related to the personal stress caused by the new return-to-office costs.</p> <p>Option D is about a specific example of spending return-to-office costs, but it's more about individual cases rather than the general sentiment about the costs employees are now facing.</p> |
| 7. | <p>Option C: This option works best because it connects directly to the earlier sentence about the horrifying photograph and gives more historical context and significance to the image, specifically about the title and nickname of the photograph.</p> <p>Option A: It's more focused on the children's reaction (terror, pain, confusion) and the visual details the sentence would break the flow of the narrative if it were placed right after the opening sentence.</p> <p>Option B: This too would break the flow in describing the terrifying visual of children fleeing from the ravages of destruction and weary soldiers following after them.</p> <p>Option D: The focus here is on the nickname of the 9-year-old girl at the center of the photo, which should come after the paragraph has discussed the photograph's historical and emotional impact.</p> |
| 8. | <p>Moutai's biggest market is drinkers in their mid-30s..... <i>"Its biggest market now is (male) drinkers in their mid-30s. Many..... which also means..... splash out on weddings and banquets. Moutai is often a guest of honor."</i> At the same time the author also says, <i>"In the long run, its biggest risk may be millennials. As they grow older.....the desire for more wholesome pursuits than binge-drinking..... curb heavy drinking..... on which so much of the demand for Moutai rests."</i> Thus, Option C is the correct choice.</p> <p>Option A: While appealing to the rich is a reason for success, it is not portrayed as a future threat. The passage suggests that targeting the wealthy market remains a good strategy for Moutai.</p> <p>Option B: This cultural factor contributes to Moutai's success, but it is not a threat. In fact, it is described as a strong foundation for Moutai's continued sales in the present and near future.</p> <p>Option D: While government involvement can pose risks, it is not both a reason for success and a threat in the same way the appeal to the older demographic is. The passage mainly discusses the government's control over pricing, which is presented as a risk, but not an immediate factor of success in the way the appeal to older consumers is.</p> |
| 9. | <p>Option C: The author contrasts Moutai's marketing strategy with typical Western business practices, such as digital marketing, environmental sustainability, and appeal to millennials. Moutai's marketing strategy is unconventional, ignoring Western business mantras in favor of appealing to Chinese nationalism, the super-rich, and older generations. The author refers to this combination as an "unholy trinity" because it contradicts the Western approach to business.</p> <p>Option A: While nationalism is a key factor in Moutai's success, it alone doesn't explain the term.</p> <p>Option B: The main focus of the passage is the contradiction between Moutai's strategy and Western practices, not the long-term risks directly.</p> <p>Option D: The author does not make any moral judgments on the marketing techniques of Moutai.</p> |
| 10. | <p>The author implies that Moutai's claimed ability to be hangover-proof is so remarkable that it could be considered revolutionary—much like gunpowder was a revolutionary invention. Thus, the lines has been used in a metaphorical sense.</p> <p>Option B: Moutai is not actually a chemical or invention like gunpowder, but a liquor with a claimed quality</p> |

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| | <p>(hangover-proof), which is an exaggeration for effect.</p> <p>Option C: The phrase is not focusing on the actual substance of Moutai or comparing its intrinsic properties to gunpowder. It is a figurative comparison, not a focus on tangible substance.</p> <p>Option D: Moutai and gun powder do not mean the same.</p> |
| 11. | <p>The author emphasizes that Moutai focuses on serving China's super-rich and not its middle class, as many firms have failed in the highly competitive market targeting the middle class... <i>"Second, it chose.... rather than its middle class. Markets.....could not competecut-throat battle for Chinese middle-class wallets.....and still less crowded with prestige brands than advanced economies."</i> Option D contradicts the passage and hence is the correct answer.</p> <p>Option A: This is directly supported by the passage, which notes that many firms have failed in the middle-class market due to the competitive nature of that segment.</p> <p>Option B: Option is consistent with the passage. It mentions that the premium market for liquor in China, catering to the super-rich, is massive and less crowded compared to the middle-class market, making it a lucrative target for Moutai.</p> <p>Option C: The passage mentions that the Chinese government is involved in Moutai's pricing, with the government being the largest shareholder and trying to keep prices stable, which could be seen as controlling the pricing.</p> |
| 12. | <p>Option D best summarises how the tradwife's actions, such as her commitment to vintage fashion and traditional roles, are depicted as exposing the superficial nature of modern life. The passage emphasizes how she challenges current societal norms by insisting on an idealized, seemingly "primitive" way of life, which contrasts sharply with modern, artificial values.</p> <p>Option A: The passage highlights how the tradwife's actions aren't just critiques of modern ideals, but are also a deliberate challenge to societal norms. It's more than just a critique; it's a direct confrontation with and mockery of those norms. This option misses the crucial idea of the tradwife "highlighting" and "challenging" those norms in a way that makes others feel "hollow" and "cheated."</p> <p>Option B: This option doesn't fully capture the idea of "challenging" or "mocking" societal norms, which is a key part of the passage. The word "reveal" here is too passive compared to the active, more confrontational role the tradwife plays in making others feel "hollow" and "cheated" by exposing the contradictions in modern values.</p> <p>Options 3: Option C is not the correct answer because it uses the passive term "exposes," which fails to capture the active confrontation central to the passage. The tradwife's behavior is not just about revealing superficiality, but about challenging and forcing others to confront the hollow nature of modern values. The passage emphasizes her role as a "troll," actively beating society at its own game, which is better captured by the word "challenges" in Option D.</p> |
| 13. | <p>The sentence talks about displacement, which ties in well with the context of "pastoralists" (people who rely on livestock for their livelihood) never being able to return home, which comes after blank 4. Hence Option A is correct.</p> <p>Option B: Inserting the sentence in blank 1 would break the continuity of describing the drought's severity.</p> <p>Option C: Blank 2 introduces the effects of the drought too early, while the displacement sentence works better after the broader context of food insecurity.</p> <p>Option D: The sentence before blank 3 discusses the far-reaching consequences of the drought, which logically flows into the next sentence about farmers and pastoralists. Inserting the sentence in blank 3 will break this continuity.</p> |
| 14. | <p>Sentence 2 talks about the early interest in forecasting from the intelligence community. While it's related to forecasting, it introduces historical context that doesn't fit smoothly with the focus of the other sentences, which deal more with the effectiveness and accuracy of forecasting.</p> <p>Sentence 1 introduces the idea of forecasting and how it doesn't require specialized expertise, making it accessible to a broader group.</p> <p>Sentence 5 adds to that idea by emphasizing that non-experts have performed better in forecasting than experts, aligning with the notion that forecasting can be effective even without specialized knowledge.</p> <p>Sentence 4 supports this idea by citing a study where non-experts performed better than experts in predicting geopolitical events.</p> <p>Sentence 3 fits as it contrasts the performance of non-experts with that of intelligence experts, even though experts had access to classified intelligence, further highlighting the surprising accuracy of non-expert predictions.</p> |
| 15. | <p>Sentence 1 introduces the creation of synapses and the role of the axon terminal, which describes how synapses are formed at a technical, biological level. However, it focuses more on the process of synapse creation rather than the developmental process of synapses which is the focus of the other sentences.</p> <p>Sentence 2: Talks about the importance of early neural connections and their role before the eyes begin functioning, which sets the stage for understanding the developmental process.</p> |

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| | <p>Sentence 5: Explains how synapses are generated excessively in a "rehearsal period", aligning with the developmental focus.</p> <p>Sentence 4: Continues the idea of neural connections forming before birth, which contributes to the process of a child being able to visualize immediately after birth.</p> <p>Sentence 3: Explains synaptic pruning, which is the process of refining these connections, removing weak ones, and reinforcing the important ones.</p> |
| 16. | <p>Option B is not mentioned in the passage. Instead, the author mentions how other countries (like China) have already sent probes to the Moon and experimented with growing plants, without the same level of protest seen in the U.S. There is no claim that probes have had little effect on the environment in the passage.</p> <p>Option A: Refer to paragraph 2.</p> <p>Option C: Refer to para 3... "It's important.....many international competitors will ignore....China recently sent...."</p> <p>Option D: Refer to para 4.... "U.S. lunar landings did not leave the campsites cleaner than they found it..."</p> |
| 17. | <p>: In the first paragraph, the author seems to be questioning and doubting the planetary protection advocates who push for sterilizing robotic probes to avoid contaminating possible, but not proven, biospheres. The author points out how much money NASA spends on cleaning these probes, and suggests that these efforts might be a bit over the top, especially since there's no solid evidence that life exists on Mars or any other planets yet.</p> <p>Option A: The author does not approve of the significant expenses involved in these efforts, but instead suggests that the costs are perhaps too high for uncertain benefits.</p> <p>Option C: The author is not indifferent. In fact, there is an implied critique of the elitist perspective of the planetary protection advocates, but the main focus is on the excessive efforts to sterilize space missions, not indifference to elitism.</p> <p>Option D: The tone is not equivocal (uncertain); the author is clear in their skepticism about these efforts and is questioning them, not presenting a balanced or indecisive view.</p> |
| 18. | <p>The passage highlights how the scientific communities in different countries (China and Israel) react differently to space contamination. While China's actions (sending a terrarium to the moon) sparked no protest, Israel's actions (smuggling tardigrades) led to a significant uproar. This suggests that national scientists may have varying sensitivities or approaches to issues like biosphere protection.</p> <p>Option A: The passage doesn't discuss the type of contamination (animal vs. plant) or its relative importance. The focus is on the reactions to the actions, not the severity of the contamination.</p> <p>Option B: While the reactions to China and Israel are different, the passage doesn't emphasize global biases. The focus is more on the scientific communities in each country, rather than on general global biases.</p> <p>Option D: The passage does not claim that China's actions are particularly reasonable. It contrasts the lack of protest over China's actions with the strong reaction to Israel's, but it doesn't suggest one is more reasonable than the other.</p> |
| 19. | <p>On simplifying, the question is asking what point the author is likely to disagree with. The author disagrees with the idea of placing heavy emphasis on minimizing contamination until life is ruled out. The author argues that life on Mars or other bodies has not been conclusively proven, and the emphasis on contamination should not outweigh the need for exploration and development.</p> <p>Option A: The author agrees with the idea of a compromise approach, where Mars is divided into different zones for science, habitation, and resource exploitation.</p> <p>Option B: The author acknowledges that earlier NASA missions, such as the Apollo missions, did not focus on sterility, but they also did not cause significant harm. The author suggests that the concerns about contamination in previous missions were somewhat exaggerated.</p> <p>Option C: The author argues that the costs of sterilizing probes and maintaining a pristine environment are unsustainable and that focusing too much on contamination could limit human exploration. "...scrubbing everything and hauling out all the trash, would destroy NASA's human exploration budget and encroach on the agency's other directorates, too. Getting future astronauts off Mars is enough of a challenge, without trying to tote weeks of waste along as well."</p> |
| 20. | <p>The passage doesn't mention anything about jobs or economic opportunities helping to save languages. It's more about physical destruction and forced cultural changes, not giving jobs to locals to help them survive.</p> <p>Option A: This could be true because in North America, European colonists took native children away from their families to boarding schools to erase their cultures. If this didn't happen as much in South America, it might explain why languages there survived a bit better.</p> <p>Option B: In North America, colonists were really successful in pushing their own culture and language onto the locals. If South American colonists weren't as successful at forcing locals to adopt their ways, it might have helped the local languages survive longer.</p> <p>Option D: The passage talks about how many Native American communities were wiped out, which led to many languages disappearing. If fewer people were killed in South America, that could explain why their</p> |



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| | languages stuck around longer. |
| 21. | <p>Option B goes against the main idea of the passage because it suggests that a liberal arts education should focus on mastering the top global languages, like English or Spanish. But the passage is all about valuing and preserving endangered languages, not just learning widely spoken ones. The idea is to encourage a deeper understanding of diverse cultures and languages, especially those at risk of disappearing, which wouldn't happen if the focus was only on the most common languages.</p> <p>Option A: The fact that most liberal arts students will pursue jobs in fields like publishing or HR instead of linguistics doesn't contradict the passage. The author is clear that even students who don't become linguistics experts can still play a role in preserving endangered languages through cultural awareness and empathy.</p> <p>Option C: The idea that schools teaching endangered languages might only preserve them for a generation doesn't go against the passage's central theme. The passage acknowledges that some endangered languages are hard to save, but it also shows that efforts, like teaching endangered languages in schools, can make a difference, even if it's only for one generation.</p> <p>Option D: The statement that recording a dying language freezes it in time doesn't directly challenge the passage's message. While the passage emphasizes the importance of actively preserving and revitalizing languages, it also notes the value of documenting them, even if that's just to capture a snapshot of the language before it's lost.</p> |
| 22. | <p>The passage focuses on the loss of cultural knowledge, worldview, and unique perspectives when a language becomes extinct. Option B discusses the loss of a group from a government list of indigenous tribes, which is more about legal or administrative status rather than the cultural and intellectual loss emphasized in the passage.</p> <p>Option A: This is exactly the kind of loss the passage talks about. The extinction of a language can lead to the loss of unique cultural knowledge, including how a group perceives and interacts with their environment.</p> <p>Option C: The passage stresses that languages carry with them unique cultural and emotional expressions that are tied to the way people think and experience the world. The passage highlights that when a language disappears, it doesn't just take the words with it, but also the feelings and meanings those words represent.</p> <p>Option D: This is another example of the kind of cultural and environmental knowledge the passage describes. The Nicobarese language, with its descriptions of 20 different moods of the ocean, reflects a unique way of understanding and interpreting the natural world.</p> |
| 23. | <p>While the passage mentions that some students may engage in language preservation (like recording dying languages), it does not suggest that the primary role of liberal arts students is to establish schools specifically for preserving languages. This is more of an extreme, specialized activity that only a few students might pursue.</p> <p>Option A: A liberal arts education helps students recognize and understand their own cultural biases and practices. By learning about other languages and cultures, they gain insights into their own. This is aligned with the passage's idea that students can become more empathetic and culturally aware.</p> <p>Option C: The passage discusses how studying different languages and cultures helps students navigate cultural differences and communicate more effectively across cultural lines. This is a clear benefit of a liberal arts education.</p> <p>Option D: The passage emphasizes the importance of learning languages, particularly those at risk of extinction, to understand and preserve different worldviews.</p> |
| 24. | <p>The passage discusses the outdated nature of the current regulatory framework for biotechnology, particularly in the context of regulating living organisms, which are unpredictable and unique. It questions whether regulation can ever keep up with the pace of innovation, particularly when it comes to the risks and variations that emerge when new biological entities are introduced.</p> <p>Option A: The option focuses too much on the impossibility of imagining all risks, which the passage does not emphasize. The passage discusses outdated regulation and the challenge of adapting to unpredictability, rather than the sheer impossibility of imagining outcomes.</p> <p>Option B: Doesn't capture the essence of the passage, which raises doubts about whether regulation can actually keep up with rapid innovation in biotechnology, especially considering the unpredictability of biological entities.</p> <p>Option D: It introduces the idea that scientists should shape the regulations, which is not directly suggested in the passage.</p> |
| 25 - 29. | <p>By keeping all conditions in mind, We can see There should be an ATM placed at intersection of V3 and R-C. Also, By condition (2), we can judge there is only one possibility to place ATM with second highest cash requirement at intersection of V2 and R-B. Because this is the only place which is 12 km away. Also, we cannot use distinct integers ranging from 7 to 15. So, By hit and trial, there are only two cases to arrange all 6 ATM's in following manner:</p> |

Case 1:

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|--------------|----|----|----|-----------|
| | V1 | V2 | V3 | Row total |
| R-A | 15 | 0 | 7 | 22 |
| R-B | 0 | 12 | 8 | 20 |
| R-C | 0 | 9 | 11 | 20 |
| column total | 15 | 21 | 26 | 62 |

Case 2:

| | | | | |
|--------------|----|----|----|-----------|
| | V1 | V2 | V3 | Row total |
| R-A | 7 | 0 | 15 | 22 |
| R-B | 8 | 12 | 0 | 20 |
| R-C | 0 | 9 | 11 | 20 |
| column total | 15 | 21 | 26 | 62 |

| 25. | Option (A) is correct as The ATM placed at the (R-C, V2) intersection has a cash requirement of Rs. 9 Lakh. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------|--|--------------|--------------|---------------|------|-------|-----|-----|-------|-------|-------|----------|------|-------|-------|--------------|--------------|--------------|--------------|-------|-----|------|-------|-------|----------|-------|-------|-------|--------------|--------------|--------------|--------------|--------|-----|--|--|--|----------|--|--|--|--------------|--------------|--------------|---------------|--------------|--|--------|--------|--------|
| 26. | In Case 1, ATMs with cash requirement of 15 L, 12 L, 11L are more than 10 L. In case (2), ATMs with cash requirement of 15 L, 12 L, 11L are more than 10 L. Hence there are 3 ATMs with cash requirements of Rs. 10 Lakh or more. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 27. | As we can see in both cases only statement (1) is right but statement (2) is wrong in case (1). Hence option (D) is the answer. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 28. | In case (1), ATMs (V2, R-B) and (V3, R-B) are the ATMs with second highest and second lowest requirements. Hence distance between them is 7 KM. In case (2), ATMs ((V1, R-B) and (V2, R-B) are the ATMs with second lowest and second highest requirements. Hence distance between them is 4 KM. So ans is either D or 7 KM. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 29. | We can determine only 3 ATMs' locations uniquely and they are (V2, R-B), (V2, R-C) and (V3, R-C). | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30-33. | <p>Let the total number of subscribers in 2023 = 100x From point 1, the total number of subscribers in 2024 = 100x + 10% of 100x = 110x In 2023, Total number of subscribers from Kid category = 15% of 100x = 15x From point 3 and 4, in 2023 Number of subscribers from Kid category using one app = 10000. So, number of subscribers from Kid category using multiple apps = 15x – 10000 = number of subscribers from Elder category using one app. Also, number of subscribers from Elder category using multiple apps = 15000 So, total number of subscribers from Elder category = 15x – 10000 + 15000 = 20% of 100x = 20x Solving, x = 1000 So, the total number of subscribers in 2023 = 100000 and in 2024 = 110000 The rest of the information can be gathered as follows-</p> <table border="1"> <thead> <tr> <th>Category</th> <th>App(s)</th> <th>2023</th> <th>2024</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td rowspan="3">Kid</td> <td>One</td> <td>10000</td> <td>11000</td> <td>21000</td> </tr> <tr> <td>Multiple</td> <td>5000</td> <td>11000</td> <td>16000</td> </tr> <tr> <td>Total</td> <td>15000</td> <td>22000</td> <td>37000</td> </tr> <tr> <td rowspan="3">Elder</td> <td>One</td> <td>5000</td> <td>22000</td> <td>27000</td> </tr> <tr> <td>Multiple</td> <td>15000</td> <td>11000</td> <td>26000</td> </tr> <tr> <td>Total</td> <td>20000</td> <td>33000</td> <td>53000</td> </tr> <tr> <td rowspan="3">Others</td> <td>One</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Multiple</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td>65000</td> <td>55000</td> <td>120000</td> </tr> <tr> <td>Total</td> <td></td> <td>100000</td> <td>110000</td> <td>210000</td> </tr> </tbody> </table> | Category | App(s) | 2023 | 2024 | Total | Kid | One | 10000 | 11000 | 21000 | Multiple | 5000 | 11000 | 16000 | Total | 15000 | 22000 | 37000 | Elder | One | 5000 | 22000 | 27000 | Multiple | 15000 | 11000 | 26000 | Total | 20000 | 33000 | 53000 | Others | One | | | | Multiple | | | | Total | 65000 | 55000 | 120000 | Total | | 100000 | 110000 | 210000 |
| Category | App(s) | 2023 | 2024 | Total | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Kid | One | 10000 | 11000 | 21000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Multiple | 5000 | 11000 | 16000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Total | 15000 | 22000 | 37000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Elder | One | 5000 | 22000 | 27000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Multiple | 15000 | 11000 | 26000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Total | 20000 | 33000 | 53000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | One | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Multiple | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Total | 65000 | 55000 | 120000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total | | 100000 | 110000 | 210000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30. | Number of subscribers belonged to the Others category in 2024 = 55000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 31. | Percentage of subscribers in the Kid category using multiple apps in 2023 = $\frac{5000}{15000} \times 100 = 33.33\%$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 32. | Percentage increase in the number of subscribers in the Elder category from 2023 to 2024 = $\frac{(33000 - 20000)}{20000} \times 100 = 65\%$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 33. | To minimize, let the number of subscribers in Others category using multiple apps in 2024 = 0 So, the minimum percentage of subscribers who used multiple apps in 2024 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



$$= \frac{(11000 + 11000 + 0)}{110000} \times 100 = 20\%$$

| Country | GDP | GDP/CAPITA | Population | GDP growth rate(in %) | Population growth rate(in %) |
|---------|------|------------|-------------------|-----------------------|------------------------------|
| C1 | 15x | 41y | $\frac{15x}{41y}$ | 0.2 | -0.12 |
| C2 | 14x | 25y | $\frac{14x}{25y}$ | 0.9 | -0.41 |
| C3 | 13x | 2y | $\frac{13x}{2y}$ | 6.5 | 0.7 |
| C4 | 12x | 38y | $\frac{12x}{38y}$ | 0.5 | 0.49 |
| C5 | 10x | 36y | $\frac{10x}{36y}$ | 0.7 | 0.31 |
| C6 | 8x | 8y | $\frac{8x}{8y}$ | 3.2 | 0.61 |
| C7 | 8x | 30y | $\frac{8x}{30y}$ | 0.7 | -0.11 |
| C8 | 7x | 41y | $\frac{7x}{41y}$ | 1.2 | 0.71 |
| C9 | 100x | ? | | | |
| C10 | ? | 100y | | | |

34. As is given GDP per capita = GDP/Population
 That implies population = GDP/GDP per capita
 Hence we can calculate population for each country.
 It's always time saving if we check only for given options.
 For C8: $\frac{7x}{41y}$
 For C5: $\frac{10x}{36y}$
 For C3: $\frac{13x}{2y}$
 For C7: $\frac{8x}{30y}$
 Since $\frac{x}{y}$ is a common expression, So, we can compare $\frac{7}{41}, \frac{10}{36}, \frac{13}{2}, \frac{8}{30}$.
 Out of these, C8 has the smallest population.

35. Required ratio = $12x(1 + \frac{0.5}{100})^2 : 10x(1 + \frac{0.7}{100})^2 = 1.195$

36. For C1, Population is $\frac{15x}{41y} \left(1 - \frac{0.12}{100}\right)^3 = \frac{365268x}{10^6 y}$
 For C4, Population is $\frac{12x}{38y} \left(1 + \frac{0.49}{100}\right)^3 = \frac{547x}{10^6 \cdot y}$
 For C5, Population is $\frac{10x}{36y} \left(1 + \frac{0.31}{100}\right)^3 = \frac{280369x}{10^6 \cdot y}$
 For C7, Population is $\frac{8x}{30y} \left(1 - \frac{0.11}{100}\right)^3 = \frac{265787x}{10^6 \cdot y}$
 So, for C1, population is maximum in 2027.

37. Since all the GDP growth rates are positive i.e., GDP is increasing. So, there is no country among C1 through C8 whose GDP per capita in 2027 be lower than that in 2024.

38. As per the graph, the AC must have been turned off 2 times (12 am and 1 pm, when the inside temperature started rising) between 11:01 pm and 1:59 am

39. Given that the AC was turned on for the first time that night at 11 pm. So the temperature inside the room = 38°C = the temperature outside the room.

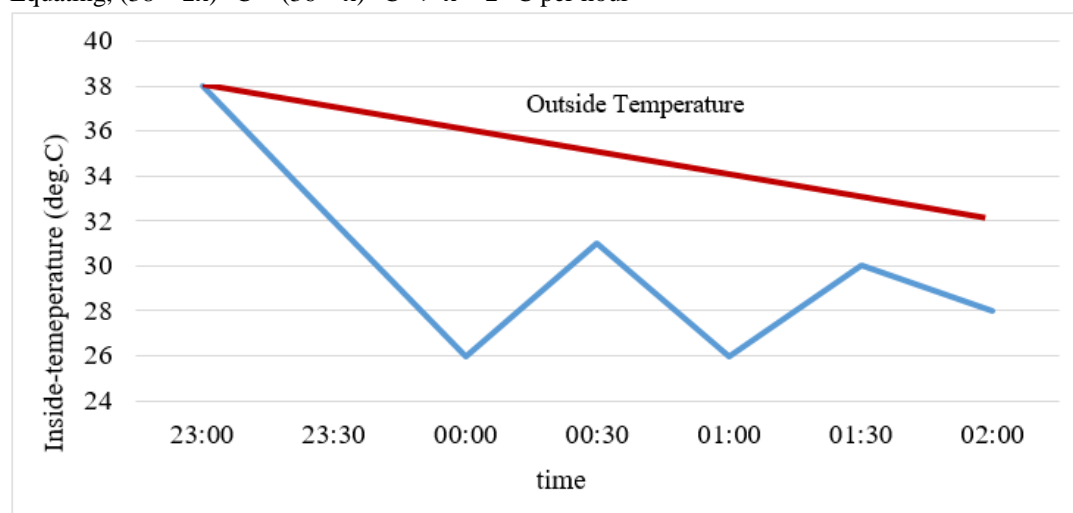
Let the falling rate of temperature outside the room per hour = $x^{\circ}\text{C}$

So, at 1 am (after 2 hours), the outside temperature = $(38 - 2x)^{\circ}\text{C}$

Also given that it takes 1 hour to reach the temperature outside while AC was switched off. Now, from 12 am to 12:30 pm, the temperature reached from 26°C to 31°C while AC was switched off, so it should have been reached from 31°C to 36°C from 12:30 pm to 1 pm (as per the constant rise in the rate), but along with that outside temperature is also falling at $x^{\circ}\text{C}$ per hour.

So, at 1 pm, the outside temperature should be = $(36 - x)^{\circ}\text{C}$

Equating, $(38 - 2x)^{\circ}\text{C} = (36 - x)^{\circ}\text{C} \Rightarrow x = 2^{\circ}\text{C}$ per hour



So, the temperature outside at 1 pm = $36 - 2 = 34^{\circ}\text{C}$

40. Given that the AC was turned on for the first time that night at 11 pm. So the temperature inside the room = 38°C = the temperature outside the room.

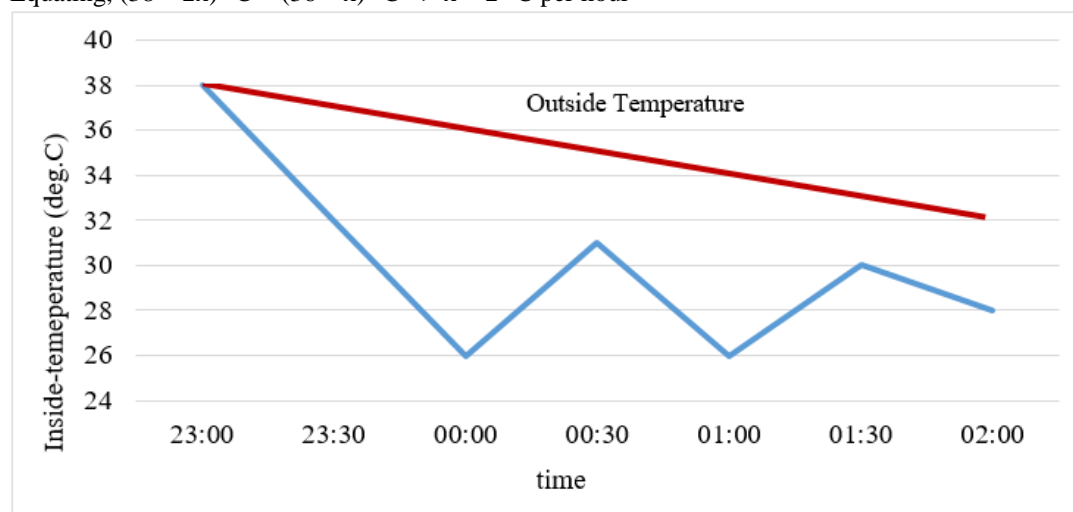
Let the falling rate of temperature outside the room per hour = $x^{\circ}\text{C}$

So, at 1 am (after 2 hours), the outside temperature = $(38 - 2x)^{\circ}\text{C}$

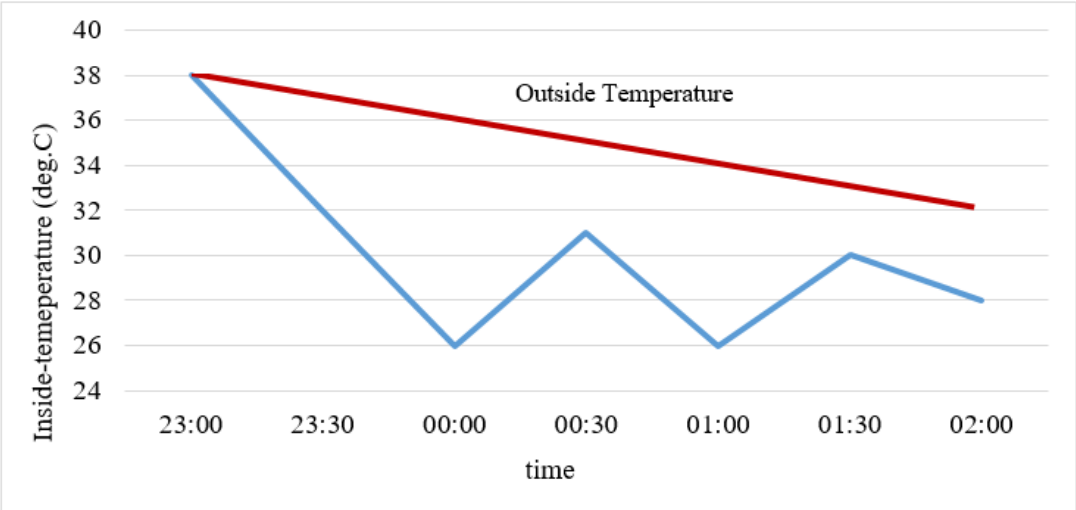
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So, at 1 pm, the outside temperature should be = $(36 - x)^{\circ}\text{C}$

Equating, $(38 - 2x)^{\circ}\text{C} = (36 - x)^{\circ}\text{C} \Rightarrow x = 2^{\circ}\text{C}$ per hour





| | |
|--------|---|
| 41. | <p>At 9 pm (2 hours prior to 11 pm), the temperature outside = $38 + 2x = 42$ °C</p> <p>Between 11:01 pm and 1:59 pm, the AC have been turned on at 12:30 am and 1:30 am, when the inside temperature starts falling.</p> <p>Along with that it is given that the AC used in POWER mode is for longer duration that in REGULAR mode during 11 pm to 2 am and this alteration can be done after every 30 minutes. This is possible as follows-</p> <p>From 11 pm to 11:30 pm – REGULAR mode From 11:30 pm to 12 pm – POWER mode From 12:30 pm to 1 pm – POWER mode From 1:30 pm to 2 pm – POWER mode</p> <p>So, there must be an alteration at 11:30 pm Hence, the number of time the AC must have been turned on or settings altered = $2 + 1 = 3$ (exactly)</p> |
| 42. |  <p>Between 11:01 pm and 11:59 am, the maximum difference between temperature outside and inside was at 12 am = $36 - 26 = 10$ °C</p> |
| 43-46. | <p>From point 1, 2 and 3, for all categories, Carbohydrate (Cereal) > Carbohydrate (Pseudo-cereal) > Carbohydrate (Millet) and all of these missing values are non-zero multiples of 5.</p> <p>Let C1 (carbohydrate) = A, C2 (carbohydrate) = B, M2 (carbohydrate) = C and P2 (carbohydrate) = D such that $A, B > 66, D > 62, C, 56$</p> <p>From point 4 and 5, all missing values of protein, fat and other nutrients are non-zero multiples of 4 such that $P1$ (protein) = $2 \times M3$ (protein)</p> <p>Let C1 (protein) = P, C2 (protein) Q, M2 (protein) = R, M3 (protein) = S and $P1$ (protein) = $2S$ such that $2S, 14 > 10, R, S$ (point 1)</p> <p>Let M1 (fat) = E, P1 (fat) = F and P2 (fat) = G</p> <p>Let M1 (other nutrients) = X and M3 (other nutrients) = Y</p> <p>Solving, $A + P + 0 + 12 = 100 \Rightarrow A + P = 88$</p> <p>Possible values of A (> 66 and multiple of 5) = 70, 75, 80 or 85</p> <p>But considering P is a multiple of 4, so A = 80 and P = 8 is the only possibility</p> <p>Solving, $B + Q + 3 + 10 = 100 \Rightarrow B + Q = 87$</p> <p>Possible values of B (> 66 and multiple of 5) = 70, 75, 80 or 85</p> <p>But considering Q is a multiple of 4, so B = 75 and Q = 12 is the only possibility</p> <p>Solving, $62 + 10 + E + X = 100 \Rightarrow E + X = 28$</p> <p>Solving, $C + R + 7 + 16 = 100 \Rightarrow C + R = 77$</p> <p>Possible values of R (< 14) = 12, 8 or 4, but considering C is a multiple of 5, only possible value of C = 65 and R = 12</p> <p>Solving, $56 + S + 12 + Y = 100 \Rightarrow S + Y = 32$</p> <p>Solving, $66 + 2S + F + 10 = 100 \Rightarrow 2S + F = 24$</p> <p>Considering, S is a multiple of 4, 2S must be a multiple of 8 and > 10</p> <p>The only possible values of $2S = 16$ and F = 8</p> <p>So, S = 8 and Y = 24</p> <p>Solving, $D + 14 + G + 8 = 100 \Rightarrow D + G = 78$</p> <p>Possible values of D (> 62 and multiple of 5) = 65, 70, 75</p> <p>But considering G is a multiple of 4, so D = 70 and G = 8</p> |

The rest of the information can be gathered as follows-

| Food grain Category | Code name of the food grain | Composition per hundred grams of nutrients in the food grains | | | | |
|---------------------|-----------------------------|---|---------|-------|-----------------|-------|
| | | Carbohydrate | Protein | Fat | Other nutrients | Total |
| Cereal | C1 | A = 80 | P = 8 | 0 | 12 | 100 |
| | C2 | B = 75 | Q = 12 | 3 | 10 | 100 |
| Millet | M1 | 62 | 10 | E | X | 100 |
| | M2 | C = 65 | R = 12 | 7 | 16 | 100 |
| | M3 | 56 | S = 8 | 12 | Y = 24 | 100 |
| Pseudo-cereal | P1 | 66 | 2S = 16 | F = 8 | 10 | 100 |
| | P2 | D = 70 | 14 | G = 8 | 8 | 100 |

43. The number of food grains having a higher amount of carbohydrate per 100 grams of nutrients than M1 = 5 (C1, C2, M2, P1 and P2)

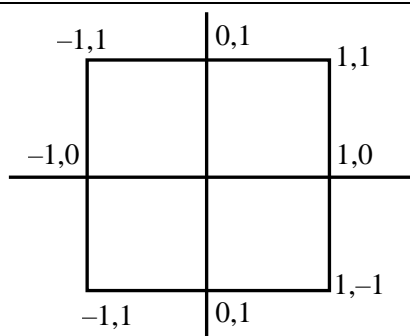
44. The amount of protein in 100 grams of nutrients in M2 = 12 grams

45. The amount of other nutrients in 100 grams of nutrients in M3 = 24 grams

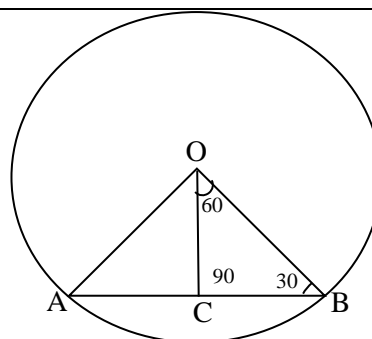
46. The numbers of grams of proteins in 100 grams of nutrients among given food grains in increasing order are 8, 8, 10, 12, 12, 14 and 16. The median value = 12

47. $8^f = 9$
 $7^{ef} = 9$
 $6^{def} = 9$
 $5^{cdef} = 9$
 $4^{bcdef} = 9$
 $3^{abcdef} = 9 = 3^2$
 So $abcdef = 2$

48. Putting $X = 0$, we get $y = 1$
 Putting $Y = 0$, we get $x = 1$
 Putting $X = -1$, we get $y = 1/-1$
 Putting $X = 1$, we get $y = 1/-1$
 So, in total there will be 8 integral solutions



49. In triangle OBC,
 $BC = 5\sqrt{3}$
 So $OB = 10 = \text{radius}$
 Area of smaller region
 = area of sector AOB - Area of triangle AOB
 $= \frac{120}{360} \pi \times 10 \times 10 - \frac{1}{2} \times 5 \times 10\sqrt{3}$
 $= \frac{1}{3} 100 \pi - 25\sqrt{3}$



50. Let the actual speed of the train be x km/hr and let the actual time taken be y hours.
 Distance covered is xy km
 If the speed is increased by 6 km/hr, then time of journey is reduced by 4 hours i.e., when speed is $(x + 6)$ km/hr, time of journey is $(y - 4)$ hours.
 \therefore Distance covered = $(x + 6)(y - 4)$
 $\Rightarrow xy = (x + 6)(y - 4)$
 $\Rightarrow -4x + 6y - 24 = 0$
 $\Rightarrow -2x + 3y - 12 = 0 \dots\dots\dots(i)$
 Similarly $xy = (x - 6)(y + 6)$
 $\Rightarrow 6x - 6y - 36 = 0$
 $\Rightarrow x - y - 6 = 0 \dots\dots\dots(ii)$

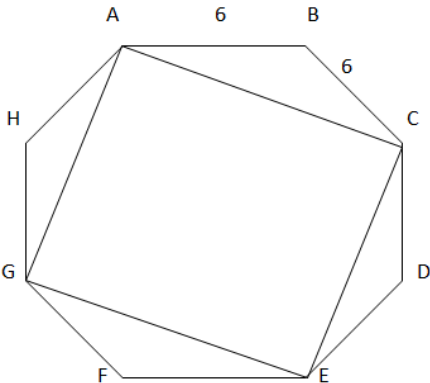


| | |
|-----|---|
| | <p>Solving (i) and (ii) we get $x = 30$ and $y = 24$ Putting the values of x and y in equation (i), we obtain Distance = (30×24) km = 720 km. Hence, the length of the journey is 720 km.</p> |
| 51. | <p>Vimal has total 30 hectares. The cultivation area of wheat and mustard in the land owned by Vimal are in the ratio of 5 : 3.</p> <p>Means Wheat = $\frac{5}{8} \times 30 = 18.75$ ad mustard = $\frac{3}{8} \times 30 = 11.25$</p> <p>Total area is $20 + 30 = 50$ hectares the total cultivation area of wheat and mustard are in the ratio 11 : 9</p> <p>Total Wheat $\frac{11}{20} \times 50 = 27.5$ and mustard = $\frac{9}{20} \times 50 = 22.5$</p> <p>Subtracting we get cultivation area of wheat and mustard in the land owned by Rajesh is, Wheat = $27.5 - 18.75 = 8.75$ Mustard = $22.5 - 11.25 = 11.25$ So the ratio of cultivation area of wheat and mustard in the land owned by Rajesh is = $8.75 : 11.25 = 7 : 9$</p> |
| 52. | <p>$\frac{\text{Amount after 5 years}}{\text{Amount after 3 years}} = \frac{36}{25} = \left(\frac{6}{5}\right)^2$</p> <p>Solving it for rate, we get rate = 20%</p> <p>$A = P \left(1 + \frac{r}{100}\right)^n$</p> <p>$20,000 = 4000 \left(1 + \frac{20}{100}\right)^n$</p> <p>Solving it we get $n = 9$.</p> |
| 53. | <p>Here 13 is a prime number, Euler of 13 will be 12, means $\frac{10^{12}}{13}$ will leave a remainder 1</p> <p>68 can be broken as $12 \times 5 + 8$</p> <p>We are left with = $\frac{10^8}{13}$</p> <p>= $\frac{10^{6+2}}{13}$ = $\frac{(10^6 \times 10^2)}{13}$ = $\frac{(1000 - 1)^2 \times (91 + 9)}{13}$ {Because $10^3 = 1000$ and $10^2 = 100$} = $(-1)^2 \times (9) = 9$</p> |
| 54. | <p>Here average of a, b, c is given as 28 where $a < b < c$</p> <p>$\frac{(a + b + c)}{3} = 28$ $a + b + c = 84$</p> <p>If the smallest number is increased by 7 and the largest number is reduced by 10, the order of the numbers remains unchanged, and the new arithmetic mean becomes 2 more than the middle number, means $(a + 7) + b + (c - 10) = 84$ $a + b + c = 81$ New average = $27 = b + 2$ $b = 2$ Means, $a + c = 59$ ----- {I} The difference between the largest and the smallest numbers becomes 64 $(c - 10) - (a + 7) = 64$ $c - a = 81$ ----- {II} Solving I and II, we get $c = 70$</p> |

| 55. | <p>In a group of 250 students, the percentage of girls was at least 44% and at most 60%.</p> <table style="margin-left: 40px;"> <thead> <tr> <th></th> <th>Min</th> <th>Max</th> </tr> </thead> <tbody> <tr> <td>Girl =</td> <td>110</td> <td>150</td> </tr> <tr> <td>Boy =</td> <td>140</td> <td>100</td> </tr> </tbody> </table> <p>Case I = Girl = 110, Boy = 140</p> <table style="margin-left: 40px;"> <thead> <tr> <th></th> <th>Swim</th> <th>Run</th> </tr> </thead> <tbody> <tr> <td>Girl =</td> <td>88</td> <td>66</td> </tr> <tr> <td>Boy =</td> <td>70</td> <td>98</td> </tr> <tr> <td>Total =</td> <td>158</td> <td>164</td> </tr> </tbody> </table> $S + R - S \cap R = 250$ $S \cap R = 72$ <p>Case II = Girl = 150, Boy = 110</p> <table style="margin-left: 40px;"> <thead> <tr> <th></th> <th>Swim</th> <th>Run</th> </tr> </thead> <tbody> <tr> <td>Girl =</td> <td>120</td> <td>90</td> </tr> <tr> <td>Boy =</td> <td>50</td> <td>70</td> </tr> <tr> <td>Total =</td> <td>170</td> <td>160</td> </tr> </tbody> </table> $S + R - S \cap R = 250$ $S \cap R = 80$ <p>So, the minimum and maximum possible number of students who opted for both swimming and running, are 72 and 80.</p> | | Min | Max | Girl = | 110 | 150 | Boy = | 140 | 100 | | Swim | Run | Girl = | 88 | 66 | Boy = | 70 | 98 | Total = | 158 | 164 | | Swim | Run | Girl = | 120 | 90 | Boy = | 50 | 70 | Total = | 170 | 160 |
|---------|---|-----|-----|-----|--------|-----|-----|-------|-----|-----|--|------|-----|--------|----|----|-------|----|----|---------|-----|-----|--|------|-----|--------|-----|----|-------|----|----|---------|-----|-----|
| | Min | Max | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Girl = | 110 | 150 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Boy = | 140 | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Swim | Run | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Girl = | 88 | 66 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Boy = | 70 | 98 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total = | 158 | 164 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Swim | Run | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Girl = | 120 | 90 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Boy = | 50 | 70 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total = | 170 | 160 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 56. | $(a + b\sqrt{3})^2 = 52 + 30\sqrt{3}$ $a^2 + 3b^2 + 2 \times \sqrt{3} \times ab = 52 + 30\sqrt{3}$ $a^2 + 3b^2 + 2 \times \sqrt{3} \times ab = 52 + 30\sqrt{3}$ <p>Means $a \times b$ must be 15 and $a^2 + 3b^2 = 52$</p> <p>Rewriting it</p> $a^2 + 3b^2 + 2 \times \sqrt{3} \times ab = 25 + 27 + 2 \times 5 \times 3\sqrt{3}$ <p>So $a = 5$ and $b = 3$</p> <p>So $a + b = 8$.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 57. | <p>In any triangle, the medians divide the triangle into six smaller triangles of equal area. The area of the medial triangle formed by the midpoints of the sides of the original triangle (in this case, $\triangle XYZ$) is exactly one-fourth of the area of the original triangle. Since the area of $\triangle ABC$ is given as 1440 sq cm, the area of $\triangle XYZ$, which is the medial triangle, is:</p> <p>Area of $\triangle XYZ = \frac{1}{4} \times 1440 = 360$ sq cm</p> <p>However, we must consider the area of the triangle formed by the medians, which is half the area of the medial triangle. Therefore, the area of $\triangle XYZ$ is: {90} sq cm</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 58. | <p>Let $10^x = A$</p> <p>We get</p> $A + \frac{4}{A} = \frac{81}{2}$ $2A^2 - 81A + 8 = 0$ <p>It's a quadratic equation, means 10^x will have 2 values, let it be 10^{x_1} and 10^{x_2}</p> <p>Product of roots = $\frac{8}{2} = 4$</p> $10^{x_1} \times 10^{x_2} = 4 = (2)^2$ $(10)^{x_1 + x_2} = (2)^2$ <p>Taking log base 10 on both sides</p> $\log_{10}(10)^{x_1 + x_2} = \log_{10} (2)^2$ $(x_1 + x_2) \log_{10}(10) = 2 \log_{10} (2)$ $(x_1 + x_2) = 2 \log_{10} (2)$ <p>So, sum of all distinct real values of x that satisfy the equation will be $2 \log_{10} (2)$</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 59. | <p>Here we need to check in three ranges</p> <p>Case 1 $\Rightarrow x \geq 2$, we get</p> $x - 2 = x + 2 - (x - 2)$ <p>$x = 6$ (Satisfied)</p> <p>Case 2 $\Rightarrow -2 \leq x < 2$, we get</p> $2 - x = x + 2 - [-(x - 2)]$ <p>$x = \frac{2}{3}$ (Satisfied)</p> <p>Case 3 $\Rightarrow x < -2$, we get</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



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| | $2 - x = -x - 2 + (x - 2)$ $x = 6$ (Not Satisfied) Number of distinct real values of x , satisfying the equation will be 2. |
| 60. | <p>Here if you think carefully and assume initially the whole container was filled with milk. Firstly x litre of milk was replaced with water. Second time $2x$ litre of mixture was replaced with water. Resultant milk left is 72%. So water is 28%.</p> $(-x) + (-2x) + (-x) \frac{(-2x)}{100} = -28$ $(-3x) + \frac{(2x^2)}{100} = -28$ <p>Solving it we get $x = 10\%$</p> <p>10% of 300 = 30. The amount of water, in litres, that was initially poured into the container was 30.</p> |
| 61. | <p>Given $f(x) + 2f\left(\frac{1}{x}\right) = 3x$ ----- {I}</p> <p>For $\frac{1}{x}$, we get $f\left(\frac{1}{x}\right) + 2f(x) = \left(\frac{3}{x}\right)$ ----- {II}</p> <p>Putting the value of $f(x) = 3$ in I, we get</p> $3 + 2f\left(\frac{1}{x}\right) = 3x$ $f\left(\frac{1}{x}\right) = \frac{(3x - 3)}{2}$ ----- {III} <p>Putting the value of $f(x) = 3$ in II, we get</p> $f\left(\frac{1}{x}\right) + 2(3) = \left(\frac{3}{x}\right)$ $f\left(\frac{1}{x}\right) = \frac{(3 - 6x)}{x}$ ----- {IV} <p>Equating III and IV, we get</p> $\frac{(3x - 3)}{2} = \frac{(3 - 6x)}{x}$ $x^2 + 3x - 2 = 0$ <p>Sum of roots = $\frac{-(-3)}{1} = -3$</p> <p>The sum of all possible values of x will be -3.</p> |
| 62. | <p>Ravi gets 10% discount on this marked price, and thus saves Rs 15 Means 10% of MP = 15Rs MP = 150 Rs.</p> <p>Discount is 15 Rs, SP = 150 - 15 = 135</p> <p>Gopi marks a price on a product in order to make 20% profit Means 1.2 CP = MP 1.2 CP = 150 CP = 125 Rs</p> <p>Profit = SP - CP Profit = 135 - 125 Profit = 10 Rs</p> |

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| 63. | <p>The sum $\frac{1}{t_2} + \frac{1}{t_4} + \frac{1}{t_6} + \dots + \frac{1}{t_{2022}} + \frac{1}{t_{2024}}$ is :</p> <p>At $n = 4$, $t_4 = \frac{4-3}{4-1} \times t_2 = \frac{-1}{3}$</p> <p>At $n = 6$, $t_6 = \frac{6-3}{6-1} \times t_4 = \frac{-1}{5}$</p> <p>And so on.</p> <p>$t_{2024} = \frac{-1}{2023}$</p> <p>$\frac{1}{t_2} + \frac{1}{t_4} + \frac{1}{t_6} + \dots + \frac{1}{t_{2022}} + \frac{1}{t_{2024}} = (-1 - 3 - 5 \dots - 2023)$</p> <p>$= -(1 + 3 + 5 + 7 \dots + 2023)$</p> <p>Total terms are $\frac{2024}{2} = 1012$</p> <p>Sum of first n odd natural number $= n^2$</p> <p>$-(1 + 3 + 5 + 7 \dots + 2023) = -(1012)^2 = -1024144$</p> |
| 64. | <p>We will consider the cases of 1 digit, 2 digit and 3 digit numbers satisfying the above condition separately.</p> <p>1 digit numbers with non-repeating digits = 9</p> <p>2 digit numbers with non-repeating digits = $9 \times 9 = 81$</p> <p>3 digit numbers with non-repeating digits = $4 \times 9 \times 8 = 288$</p> <p>Total 378 such numbers exist</p> |
| 65. | <p>If we go by the options using the formula for net % change $= a + b + \frac{ab}{100}$ i.e., $25 + 50 + 25 \times \frac{50}{100} = 87.5$.</p> <p>We can see that 25 satisfies the condition properly. Therefore it is the answer.</p> |
| 66. | <p>If Mohit is 2 times as efficient as Sam then Efficiency of Mohit : Efficiency of Sam = 2 : 1 i.e. (M : S = 2 : 1)</p> <p>If Mohit is 3 times as efficient as Ayna (M : A = 3 : 1) therefore S : M : A = 3 : 6 : 2</p> <p>Total work = $3 * 20 = 60$</p> <p>According to the question</p> <p>Sam & Mohit work on the 1st day (So, S + M will complete $3 + 6 = 9$ unit work in one day.)</p> <p>Sam & Ayna work on the 2nd day (So, S + A will complete $3 + 2 = 5$ unit work in one day.)</p> <p>Mohit & Ayna work on the 2nd day (So, M + A will complete $6 + 2 = 8$ unit work in one day.)</p> <p>So, in 3 days $9 + 5 + 8 = 22$ unit work gets finished</p> <p>& in 6 days $22 \times 2 = 44$ unit gets completed</p> <p>On 7th day S + M will complete 9 unit work</p> <p>On 8th day S + A will do 5 unit work</p> <p>On 9th day M + A will do 2 unit work.</p> <p>So, in total the work gets completed on the 9th day but S works on 6 days in total i.e. 1st, 2nd, 4th, 5th, 7th and 8th day</p> <p>Therefore the fraction of the work done by Sam in those 6 days will be $\frac{6 \times 3}{60} = \frac{3}{10}$</p> |
| 67. | <p>As per the given figure below</p>  <p>AC is the shortest diagonal of the octagon and the length of the short diagonal of an octagon is</p> |



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| | <p>$a\sqrt{2 + \sqrt{2}}$ where a is the side of a regular octagon. So, the length of AC will be $6\sqrt{2 + \sqrt{2}}$ And, the area of the square ACEG will be $(6\sqrt{2 + \sqrt{2}})^2 = 36(2 + \sqrt{2})$</p> |
| 68. | <p>The condition for a system of linear equations to have no solution is</p> $\frac{a_2}{a_2} = \frac{b_2}{b_2} \neq \frac{c_2}{c_2}$ <p>Therefore, $\frac{-4}{k} \neq \frac{2}{a}$</p> $\Rightarrow -4a \neq 2k$ $\Rightarrow 2a + k \neq 0$ |