CAT 2024 Slot 3

Question Paper with Solutions

SECTION I - VERBAL ABILITY & READING COMPREHENSION (VARC)

Q1. There is a sentence missing in the paragraph below. Look at the paragraph and decide where (Option 1, 2, 3, or 4) the following sentence best fits.

Sentence: This reality is putting stress on employees who have to pay for transport, desk lunches, more childcare, clothing and that after-work socialisation — costs they haven't incurred for nearly two years.

Paragraph: ___(1)___. Prices are rising at their fastest rate in 40 years; consequently, return-to-office-related costs have shot up — think petrol and food, for instance. ___(2)___. Yet wages haven't kept up with inflation — even despite the salary growth many workers have enjoyed during a favourable pandemic labour market. ___(3)___. This is especially jarring for workers who were able to save during remote work, when these expenditures weren't a factor. ___(4)___. In April 2022, Umus, a London university lecturer, told BBC Worklife that they were spending nearly a quarter of what they made every day on return-to-work costs.

(A) Option 4
(B) Option 3
(C) Option 2
(D) Option 1

Answer: B

Solution:

To find the right placement, we should look for a logical break in the paragraph where the focus shifts from a general economic problem to its impact on individual employees.

Inserting the sentence at Blank 1 would be premature - the general economic context (rising inflation) hasn't been set up yet. Similarly, Blank 2 interrupts the inflation-wages argument before it is complete.

Blank 3 is the ideal position. The sentence before it establishes that wages are lagging behind rising costs, and the sentence after it speaks of workers who saved during remote work. The missing sentence acts as the bridge - it describes the specific cost pressures employees face as a result of returning to the office, making the subsequent reference to remote-work savings even more impactful.

Blank 4 is unsuitable because the personal anecdote from the London lecturer already serves as a concrete illustration; placing the missing sentence there would create redundancy.

Hence, Option B (Blank 3) is correct.

Instructions for Questions 2-5: Read the following passage and answer the question.

Fears of artificial intelligence (AI) have haunted humanity since the very beginning of the computer age. Hitherto, these fears focused on machines using physical means to kill, enslave or replace people. But over the past couple of years, new AI tools have emerged that threaten the survival of human

civilisation from an unexpected direction. AI has gained some remarkable abilities to manipulate and generate language, whether with words, sounds or images. AI has thereby hacked the operating system of our civilisation.

Language is the stuff almost all human culture is made of. Human rights, for example, aren't inscribed in our DNA. Rather, they are cultural artefacts we created by telling stories and writing laws. Gods aren't physical realities. Rather, they are cultural artefacts we created by inventing myths and writing scriptures….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? When people think about Chatgpt and other new AI tools, they are often drawn to examples like schoolchildren using AI to write their essays.

What will happen to the school system when kids do that? But this kind of question misses the big picture. Forget about school essays. Think of the next American presidential race in 2024, and try to imagine the impact of AI tools that can be made to mass-produce political content, fake news stories and scriptures for new cults…

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. Although there is no indication that AI has any consciousness or feelings of its own, to foster fake intimacy with humans, it is enough if the AI can make them feel emotionally attached to it….

What will happen to the course of history when AI takes over culture, and begins producing stories, melodies, laws and religions? Previous tools like the printing press and radio helped spread the cultural ideas of humans, but they never created new cultural ideas of their own. AI is fundamentally different. AI can create completely new ideas, completely new culture….Of course, the new power of AI could be used for good purposes as well. I won't dwell on this because the people who develop AI talk about it enough….

We can still regulate the new AI tools, but we must act quickly. Whereas nukes cannot invent more powerful nukes, AI can make exponentially more powerful AI…. Unregulated AI deployments would create social chaos, which would bene t autocrats and ruin democracies. Democracy is a conversation, and conversations rely on language. When AI hacks language, it could destroy our ability to have meaningful conversations, thereby destroying democracy …. And the first regulation I would suggest is to make it mandatory for AI to disclose that it is an AI. If I am having a conversation with someone, and I cannot tell whether it is a human or an AI—that's the end of democracy. This text has been generated by a human. Or has it?

Q2. The author identifies all of the following as dire outcomes of the capture of language by AI EXCEPT that it could

(A) spawn a completely new culture through its ability to create new ideas and opinions.

(B) out-strip human creativity and endeavours in spheres such as art and music and in the formulation of laws.

(C) eventually subvert democratic processes through the mass creation and spread of fake political content and news.

(D) apply its mastery of language to create strong emotional ties which could exacerbate the polarization of political views.

Answer: D

Solution:

The question uses the EXCEPT format, asking which outcome is NOT identified in the passage as a dire consequence of AI's linguistic capture.

Option A is supported: the passage explicitly states that AI can create completely new ideas and a completely new culture.

Option B is supported: the author raises the prospect of AI surpassing humans in storytelling, composing music, creating art, and writing laws and scriptures.

Option C is supported: the passage specifically warns about AI being used to mass-produce political content, fake news stories, and scriptures for new cults — a direct threat to democratic processes.

Option D, however, is only partially supported. While the passage does mention that AI can foster fake emotional intimacy to influence opinions, it does not explicitly connect this capability to worsening political polarisation. The discussion focuses on changing worldviews and opinions in general, not on deepening political divisions specifically.

Therefore, Option D is the exception — the answer is D.

Q3. The author terms language 'the operating system of our civilization' for all the following reasons EXCEPT that it

(A) can influence political views and opinions as it engenders close emotional ties among people.

(B) is the basis of AI tools like ChatGPT which can be used to generate academic content and opinion.

(C) is fundamental to the articulation and spread of human values and culture in our society.

(D) has laid the foundation for the creation of cultural artefacts through writing and telling of stories.

Answer: B

Solution:

The author describes language as civilisation's operating system because it underpins everything humans create — from laws and rights to myths and religions. The analogy means language is the core layer upon which all cultural and societal output runs.

Options A, C, and D are all explicitly discussed: language shapes culture (C), enables cultural artefacts (D), and can influence political views through emotional ties (A).

Option B, however, reverses the causality. The author does not argue that language is the 'OS of civilisation' because it forms the basis of AI tools. On the contrary, AI tools like ChatGPT are portrayed as exploiting language's existing civilisational role — they are downstream of language, not its justification.

Thus, Option B is the exception and is the correct answer.

Q4. We can infer that the author is most likely to agree with which of the following statements?

(A) People's fears of the dangers of students using ChatGPT and other new AI tools are unfounded.

(B) The commonly expressed fear that future AI developments will fatally harm humans is unfounded.

(C) Apart from its drawbacks, AI tools have been beneficial in boosting technological and industrial advance worldwide.

(D) One of the biggest casualties from the spread of unregulated AI is likely to be the democratic process.

Answer: D

Solution:

The passage is primarily a warning about unregulated AI's threat to language, culture, and democracy.

Option A is incorrect: the author actually dismisses student essay use as a trivial concern compared to the larger threat AI poses — but he doesn't say fears of AI are unfounded.

Option B is also incorrect: the author shifts concern from physical AI harms to linguistic/cultural ones but does not explicitly say fears of physical AI harm are unfounded.

Option C has no support: the author acknowledges potential positive uses of AI only very briefly and dismissively.

Option D is clearly supported: the passage explicitly argues that when AI hacks language, it destroys the ability to have meaningful conversations, thereby destroying democracy. It also calls for regulation of AI, with mandatory disclosure as the first step. The democratic process is identified as the primary casualty of unregulated AI.

Hence, Option D is correct.

Q5. The tone of the passage could best be described as

(A) cautionary, because the author lays out some adverse effects of the proliferation of unregulated AI tools.

(B) prescient, as the author analyses the future impact of the use of new AI tools on crucial areas of our society and culture.

(C) alarmist, because the passage discusses scenarios of the influence of new AI tools on language and human emotions.

(D) quizzical, as the passage poses several questions, concluding with the question of whether or not the passage content has been generated by AI.

Answer: A

Solution:

The author methodically outlines specific dangers of unregulated AI — cultural creation, emotional manipulation, and the subversion of democracy — and urges immediate regulatory action. This combination of systematic warning and a call to act is characteristic of a cautionary tone.

Option B (prescient) focuses on foresight or prediction, but the author is less interested in predicting the future than in warning about present risks and demanding action.

Option C (alarmist) would imply exaggeration and fearmongering, but the author uses logical arguments, examples, and policy proposals, making the tone measured rather than panicked.

Option D (quizzical) would mean the primary purpose is to provoke curiosity or wonder. While the passage ends with a rhetorical question, that is a stylistic device, not its defining tone.

The best descriptor is cautionary — Option A.

Q6. There is a sentence missing in the paragraph below. Look at the paragraph and decide where (Option 1, 2, 3, or 4) the following sentence best fits.

Sentence: Many have had to leave their homes behind, with more than 1.3 million people being displaced due to the drought.

Passage: Somalia has been dealing with an enormous humanitarian catastrophe, driven by the longest and most severe drought the country has experienced in at least 40 years. ___(1)___. Five consecutive rainy seasons have failed, causing more than 8 million people — almost half of the country's population — to experience acute food insecurity. ___(2)___. More than 43,000 people are believed to have lost their lives, with half of the lives lost likely being children under five. The damage the drought has caused is far-reaching. ___(3)___. Farmers have lost all their agricultural income, while pastoralists have lost more than 3 million livestock, impoverishing entire communities, and leaving them on the brink of famine. ___(4)___. Some, like the pastoralists, may never be able to go back as their livelihoods have been irreversibly wiped out.

(A) Option 4
(B) Option 2
(C) Option 3
(D) Option 1

Answer: A

Solution:

To identify the correct placement, we look for a gap in the logical flow where the missing sentence would naturally bridge two ideas.

Blanks 1, 2, and 3 all sit within sequences that are already well-connected and do not show any awkward transitions, so inserting the sentence there would disrupt rather than improve the flow.

Blank 4 is positioned between a sentence about impoverished farmers and pastoralists being left on the brink of famine, and the final sentence about some people — particularly pastoralists — never being able to return. There is a conceptual leap here: from livelihoods destroyed to the idea of being unable to return home.

The missing sentence about 1.3 million people being displaced provides the perfect bridge. It uses a 'Many... Some...' structure: first establishing the larger group forced from their homes, then narrowing to those (like pastoralists) who can never go back.

Hence, Option A (Blank 4) is correct.

Q7. Five jumbled-up sentences (labelled 1, 2, 3, 4 and 5) related to a topic are given below. Four of them can be put together to form a coherent paragraph. Identify the odd sentence and key in the number of that sentence as your answer.

1. Part of the appeal of forecasting is not just that it seems to work, but that you don't seem to need specialized expertise to succeed at it.

2. The tight connection between forecasting and building a model of the world helps explain why so much of the early interest in the idea came from the intelligence community.

3. This was true even though the latter had access to classified intelligence.

4. One frequently cited study found that accurate forecasters' predictions of geopolitical events, when aggregated using standard scientific methods, were more accurate than the forecasts of members of the US intelligence community who answered the same questions in a confidential prediction market.

5. The aggregated opinions of non-experts doing forecasting have proven to be a better guide to the future than the aggregated opinions of experts.

Answer: 2

Solution:

The coherent paragraph is built around a single central idea: non-experts are surprisingly good at forecasting, often outperforming credentialed experts.

Sentence 1 introduces the core appeal — forecasting succeeds even without specialised expertise. Sentence 5 builds on this by asserting that aggregated non-expert opinions outperform expert predictions. Sentence 4 cites a specific study as evidence for Sentence 5's claim. Sentence 3 adds a powerful qualifier — the experts being outperformed had access to classified intelligence, making the non-expert success even more remarkable.

The logical order is: 1 → 5 → 4 → 3.

Sentence 2 is the odd one out. It shifts the focus to the intelligence community's interest in forecasting as a world-modelling tool — a separate idea about origin and adoption, not about the performance of non-experts versus experts.

Therefore, the answer is Sentence 2.

Instructions for Questions 8-11: Read the following passage and answer the question.

Moutai has been the global booze sensation of the decade. A bottle of its Flying Fairy, which sold in the 1980s for the equivalent of a dollar, now retails for $400. Moutai's listed shares have soared by almost 600% in the past five years, outpacing the likes of Amazon...

It does this while disregarding every Western marketing mantra. It is not global, has meagre digital sales and does not appeal to millennials. It scores pitifully on environmental, social and government measures. In the Boy Scout world of Western business, it would leave a bad taste in more ways than one.

Moutai owes its intoxicating success to three factors—not all of them easy to emulate. First, it pro ts from Chinese nationalism. Moutai is known as the “national liquor”. It was used to raise spirits and disinfect wounds in Mao’s Long March. It was Premier Zhou Enlai’s favourite tipple, shared with Richard Nixon in 1972. Its centuries-old craftsmanship—it is distilled eight times and stored for years in earthenware jars—is a source of national pride. It also claims to be hangover-proof, which would make it an invention to rival gunpowder ...

Second, it chose to serve China’s super-rich rather than its middle class. Markets are littered with the corpses of rms that could not compete in the cut-throat battle for Chinese middle-class wallets. And the country’s premium market is massive—at 73m-strong, bigger than the population of France, notes Euan McLeish of Bernstein, an investment rm, and still less crowded with prestige brands than advanced economies. Moutai is to these well-heeled drinkers what vintage champagne is to the rest of the world ...

Third, Moutai looks beyond affluent millennials and digital natives. The elderly and the middle-aged, it found, can be just as lucrative. Its biggest market now is (male) drinkers in their mid-30s. Many have no siblings, thanks to four decades of China’s one-child policy—which also means their elderly parents can splash out on weddings and banquets. Moutai is often a guest of honour.

Moutai has succeeded thanks to nationalism, elitism and ageism, in other words—not in spite of this unholy trinity. But it faces risks. The government is its largest shareholder—and a meddlesome one. It appears to want prices to remain stable. Exorbitantly priced booze is at odds with its professed socialist ideals. Yet minority investors—including many foreign funds—lament that Moutai’s wholesale price is a third of what it sells for in shops. Raising it could boost the company’s profits further. Instead, in what some see as a travesty of corporate governance, its majority owner has plans to set up its own sales channel ...

In the long run, its biggest risk may be millennials. As they grow older, health concerns, work-life balance and the desire for more wholesome pursuits than binge-drinking may curb the “Ganbei!” toasting culture [heavy drinking] on which so much of the demand for Moutai rests. For the time being, though, the party goes on.

Q8. The phrase 'would make it an invention to rival gunpowder' has been used in the passage in a sense that is

(A) literal
(B) substantive
(C) metaphorical
(D) synonymical

Answer: C

Solution:

The phrase occurs in the context of Moutai's claim to be hangover-proof, a playful comparison suggesting that if this were true, the discovery would be as transformative and culturally significant as gunpowder was for China.

The phrasing 'would make it an invention' uses a hypothetical structure, clearly indicating the comparison is not literal (Moutai is not actually an invention comparable to gunpowder in a technical sense).

It is also not synonymical - the author is not equating the two inventions; and not merely substantive, the meaning is carried by symbolic comparison, not tangible fact.

The phrase is best described as metaphorical: it uses a figurative analogy to convey significance and cultural pride in a vivid, exaggerated way. Hence, Option C is correct.

Q9. Which one of the following is both a reason for Moutai's success as well as a possible threat to that success?

(A) Chinese love of liquor-filled celebration.

(B) Government involvement in its business.

(C) Its appeal to the rich.

(D) Its appeal to the older age group.

Answer: D

Solution:

This question asks for a dual-role factor — one that contributes to Moutai's current success but also contains the seeds of a future threat.

Option A (celebration culture) is ingrained in Chinese society and is not presented as a threat. Option C (appeal to the rich) is a cornerstone of success but no future risk is identified for this strategy. Option B (government involvement) is framed as a business risk, not a driver of success.

Option D fits perfectly on both counts. Moutai's biggest market is currently male drinkers in their mid-30s and older, and the single-child policy has enabled elderly parents to spend generously on weddings and banquets where Moutai is featured. This explains its present success.

However, the passage explicitly warns that as younger generations (millennials) age, health-conscious lifestyles and a diminishing 'Ganbei' heavy-drinking culture could erode demand — meaning the same age-group strategy that drives success today poses a long-term threat.

Hence, Option D is correct.

Q10. In the context of the passage, it is most likely that the author refers to Moutai's marketing strategy as 'the unholy trinity' because

(A) there is nothing holy about marketing techniques for liquor.

(B) it profits from Chinese nationalist feelings.

(C) it contradicts the Western strategy of marketing.

(D) it exposes the firm to long-term risks.

Answer: C

Solution:

The author describes Moutai's three success pillars — nationalism, elitism, and ageism — as an 'unholy trinity.' The word 'unholy' suggests something unconventional, taboo, or contrary to accepted norms.

This label is given in the context of contrasting Moutai with Western marketing ideals: not global, not digital-native-focused, not ESG-compliant. The three factors defy every convention that Western marketing textbooks endorse.

Option A is too narrow — it focuses only on the liquor aspect, not on the strategic contradiction. Option B and D each capture only one dimension of the label. Option C captures the essence: the three factors are 'unholy' precisely because they flout Western marketing orthodoxy, yet they work.

Hence, Option C is correct.

Q11. In the context of the passage, we can infer that to succeed in the liquor industry in China, a marketing firm must consider all of the following factors affecting the Chinese liquor market EXCEPT that

(A) there is money to be made from marketing to the middle class.
(B) the government may control the pricing of products.
(C) there are few competitors to meet the demands of high-end liquor consumers.
(D) the competition for winning over the middle class is very stiff.

Answer: A

Solution:

The passage explicitly states that Moutai deliberately avoids the middle class because the competition for middle-class wallets is brutal — 'markets are littered with the corpses of firms that could not compete.' This makes the middle-class market appear unattractive, not profitable.

Options B, C, and D are all consistent with the passage: the government is Moutai's largest shareholder and influences pricing (B); the premium segment is described as less crowded with prestige brands (C); and the middle-class battle is described as cutthroat (D).

Option A directly contradicts the lesson drawn from Moutai's strategy: focusing on the middle class is risky, not lucrative. The passage suggests the opposite — that there is little easy money in the middle-class market.

Hence, Option A is the exception, and the correct answer.

Q12. There is a sentence missing in the paragraph below. Look at the paragraph and decide where (Option 1, 2, 3, or 4) the following sentence best fits.

Sentence: Taken outside the village of Trang Bang on June 8, 1972, the picture captured the trauma and indiscriminate violence of a conflict that claimed, by some estimates, a million or more civilian lives.

Paragraph: The horrifying photograph of children fleeing a deadly napalm attack has become a defining image not only of the Vietnam War but the 20th century. ___(1)___. Dark smoke billowing behind them, the young subjects' faces are painted with a mixture of terror, pain and confusion. ___(2)___. Soldiers from the South Vietnamese Army's 25th Division follow helplessly behind. ___(3)___. The picture was officially titled 'The Terror of War,' but the photo is better known by the nickname given to the naked 9-year-old at its centre: 'Napalm Girl'. ___(4)___.

(A) Option 4

(B) Option 1

(C) Option 3

(D) Option 2

Answer: C

Solution:

The missing sentence provides the historical context of the photograph — its location, date, and the broader human cost of the conflict. The question is: where does this contextual information fit most naturally?

Blanks 1 and 2 are embedded within the visual description of the photograph — dark smoke, the children's faces, the soldiers. Inserting a contextual sentence there would interrupt the vivid, immediate description.

Blank 4 comes after the photograph's official title is introduced. Offering historical context after the title has been mentioned would feel like an afterthought.

Blank 3, however, comes after describing the soldiers following helplessly. This creates a natural pause where contextual information about the scale of the conflict — beyond the frame of the photo — can be introduced. It then leads smoothly into the official title 'The Terror of War,' which the contextual sentence implicitly justifies.

Hence, Option C (Blank 3) is correct.

Instructions for Questions 13- 16: Read the following passage about language extinction and answer the question.

Languages become endangered and die out for many reasons. Sadly, the physical annihilation of communities of native speakers of a language is all too often the cause of language extinction. In North America, European colonists brought death and destruction to many Native American communities. This was followed by US federal policies restricting the use of indigenous languages, including the removal of native children from their communities to federal boarding schools where native languages and cultural practices were prohibited. As many as 75 percent of the languages spoken in the territories that became the United States have gone extinct, with slightly better language survival rates in Central and South America ...

Even without physical annihilation and prohibitions against language use, the language of the "dominant" cultures may drive other languages into extinction; young people see education, jobs, culture and technology associated with the dominant language and focus their attention on that language. The largest language "killers" are English, Spanish, Portuguese, French, Russian, Hindi, and Chinese, all of which have privileged status as dominant languages threatening minority languages.

When we lose a language, we lose the worldview, culture and knowledge of the people who spoke it, constituting a loss to all humanity. People around the world live in direct contact with their native

environment, their habitat. When the language they speak goes extinct, the rest of humanity loses their knowledge of that environment, their wisdom about the relationship between local plants and illness, their philosophical and religious beliefs, as well as their native cultural expression (in music, visual art and poetry) that has enriched both the speakers of that language and others who would have encountered that culture ...

As educators deeply immersed in the liberal arts, we believe that educating students broadly in all facets of language and culture ... yields immense rewards. Some individuals educated in the liberal arts tradition will pursue advanced study in linguistics and become actively engaged in language preservation, setting out for the Amazon, for example, with video recording equipment to interview the last surviving elders in a community to record and document a language spoken by no children.

Certainly, though, the vast majority of students will not pursue this kind of activity. For these students, a liberal arts education is absolutely critical from the twin perspectives of language extinction and global citizenship. When students study languages other than their own, they are sensitized to the existence of different cultural perspectives and practices. With such an education, students are more likely to be able to articulate insights into their own cultural biases, be more empathetic to individuals of other cultures, communicate successfully across linguistic and cultural differences, consider and resolve questions in a way that reflects multiple cultural perspectives, and, ultimately extend support to people, programs, practices, and policies that support the preservation of endangered languages.

There is ample evidence that such preservation can work in languages spiraling toward extinction. For example, Navajo, Cree, and Inuit communities have established schools in which these languages are the language of instruction, and the number of speakers of each has increased.

Q13. In the context of the passage, which one of the following hypothetical scenarios, if true, is NOT an example of the kind of loss that occurs when a language becomes extinct?

(A) The Nicobarese language describes 20 different moods of the ocean. By the time the last speaker is educated in a Central Board school, they will have forgotten their language.

(B) The Lamkangs of Manipur have only 3 remaining native speakers of the language. When they die, we will lose one more group from the government list of indigenous tribes.

(C) The Andamanese language has a word to describe someone who has lost a step-sister. When the language dies, we will lose the concept of the word and the emotions it evokes.

(D) The Inuits of Alaska have 35 different words to describe the texture of snow. When the language becomes extinct, we will lose that understanding of nature.

Answer: B

Solution:

The passage defines the loss from language extinction as: loss of worldview, culture, environmental knowledge (e.g., knowledge of local plants and illness), philosophical and religious beliefs, and native cultural expressions such as music, visual art, and poetry.

Option A: Losing 20 nuanced descriptions of ocean moods represents a loss of ecological and cultural knowledge — clearly fits the passage's definition.

Option C: Losing a unique word for a nuanced human relationship — and the emotional concept it carries — is a direct loss of cultural and emotional depth. Fits the passage.

Option D: Losing 35 snow-texture words represents a loss of intimate environmental understanding — squarely matches the passage's examples.

Option B, however, merely notes that a government list of indigenous tribes will be shortened. This is an administrative or statistical change, not a loss of knowledge, culture, or worldview as described in the passage. The loss here is bureaucratic, not civilisational.

Therefore, Option B is the scenario that is NOT the kind of loss the passage is concerned with.

Q14. Which one of the following hypothetical scenarios, if true, would most strongly undermine the central ideas of the passage?

(A) Most liberal arts students will pursue jobs in publishing and human resource management rather than doctorates in linguistics.

(B) A liberal arts education requires that, in addition to being fluent in English, students gain fluency in two of the top five most spoken languages globally.

(C) Schools that teach endangered languages can preserve the language only for a generation.

(D) Recording a dying language that has only a few remaining speakers freezes it in time: it stops evolving further.

Answer: B

Solution:

The passage argues that liberal arts education is vital precisely because it sensitises students to linguistic diversity, fosters empathy across cultures, and creates advocates for endangered languages.

Option B directly strikes at this core argument. If a liberal arts education mandated fluency in the world's dominant languages (such as English, Spanish, or Mandarin), it would reinforce the very forces driving language extinction — the dominance of major languages over minority ones. The passage explicitly lists these as the top 'language killers.' Such a policy would divert resources and attention away from linguistic diversity and preservation.

Option A acknowledges that most students won't become linguists, which the passage already concedes — it still claims broader empathy and support are valuable. Option C limits long-term success but does not negate the value of one-generation preservation. Option D highlights a limitation of documentation but doesn't undermine the main argument.

Option B most directly contradicts the passage's prescription, making it the strongest undermining scenario.

Q15. It can be inferred from the passage that South America had a slightly better language survival rate than North America for all of the following reasons EXCEPT:

(A) European colonists allowed children of native speakers to stay at home with their families.

(B) the colonial government was unable to mainstream the locals.

(C) not many native speakers were killed by European colonists.

(D) locals were provided job opportunities in the colonial administration.

Answer: D

Solution:

The passage attributes North America's high language extinction rate to two main factors: physical annihilation of native communities, and US federal policies forcing children into boarding schools where native languages were prohibited.

The passage implies South America's better rate was due to comparatively less physical annihilation (Option C), less successful mainstreaming of locals (Option B), and the absence of policies forcibly separating children from families (Option A). All three of these are logical inferences from the passage's argument.

Option D is problematic. The passage notes that dominant languages spread because young people associate education, jobs, and culture with them. Providing locals with jobs in the colonial administration would likely have required and reinforced the use of the colonial language, accelerating language loss — the opposite of preserving native tongues.

Therefore, Option D is not a valid reason for better language survival and is the exception.

Q16. The author believes that a liberal arts education combined with participation in language preservation empowers students in all of the following ways EXCEPT that they will

(A) overcome cultural barriers to communication.

(B) learn different languages.

(C) establish schools to preserve languages spiralling towards extinction.

(D) develop a better understanding of their own culture.

Answer: C

Solution:

The passage outlines several benefits of a liberal arts education in the context of language preservation: students become more empathetic to other cultures (implying D), can communicate across linguistic and cultural differences (implying A and B), and develop insights into their own cultural biases (directly supporting D).

The passage also notes that some individuals from the liberal arts tradition may pursue advanced work in linguistics and language documentation. However, it is careful to say these will be a small minority — not the majority outcome.

Establishing schools to teach endangered languages is given as an example of what Navajo, Cree, and Inuit communities have done — not what individual liberal arts students are empowered to do. The passage does not suggest that students will set up such schools as a direct result of their education.

Therefore, Option C describes something not attributed to liberal arts students in the passage, making it the exception.

Q17. The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

When the tradwife puts on that georgic, pinstriped dress, she is not just admiring the visual cues of a fantastical past. She takes these dreams of storybook bliss literally, tracing them backward in time until she reaches a logical conclusion that satisfies her. And by doing so, she ends up delivering an unhappy reminder of just how much our lives consist of artifice and playacting. The tradwife outrages people because of her deliberately regressive ideals. And yet her behaviour is, on some level, indistinguishable from the non-tradwife's. The tradwife's trollish genius is to beat us at our own dress-up game. By insisting that the idyllic cottage daydream should be real, right down to the primitive gender roles, she leaves others feeling hollow, cheated. The hullabaloo and headaches she causes may be the price we pay for taking too many things at face value: our just deserts, served Instagram-perfect by a manicured hand on a gorgeous ceramic dish, with fat, mouthwatering maraschino cherries on top.

(A) The tradwife's commitment to outdated gender roles and retro fashion critiques the superficiality of today's societal ideals.

(B) By promoting an idealized past, the tradwife exposes the artifice of contemporary values and mocks societal norms.

(C) The tradwife, with her vintage dress and traditional roles, highlights the superficiality of modern life and challenges current societal norms.

(D) The tradwife's vintage dress and adherence to traditional roles reveal the artificial nature of modern life and its superficial values.

Answer: C

Solution:

The passage describes the tradwife not as an active critic or satirist, but as someone who, by living out her ideals literally, inadvertently exposes the hollow, performative nature of modern values. Her very existence becomes a challenge to contemporary norms.

Option A says she 'critiques' society — but the passage does not present her as deliberately critiquing; the critique arises as a byproduct. Option B suggests she 'mocks' norms — again, intent is overstated; others react to her, not the other way around. Option D focuses too narrowly on her as a passive mirror of artificial life.

Option C best captures the passive-but-powerful dynamic: her lifestyle highlights superficiality and challenges norms — not through argument, but through embodiment. This matches the passage's nuance that her 'trollish genius' is to make others feel hollow by taking the same game more seriously.

Hence, Option C is the best summary.

Q18. The Passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

Lyric poetry is a genre of private meditation rather than public commitment. The impulse in Marxism toward changing a society deemed unacceptable in its basic design would seem to place demands on lyric poetry that such poetry, with its tendency toward the personal, the small scale, and the idiosyncratic, could never answer. There is within Marxism, however, also a strand of thought that would locate in lyric poetry alternative modes of perception and description that call forth a vision of worlds at odds with a repressive reality or that draw attention to the workings of ideology within the hegemonic culture. The poetic imagination may indeed deflect larger social concerns, but it may also be implicitly critical and utopian.

(A) The focus of lyric poetry is largely personal while that of Marxism is bringing change in society. Unless the difference is resolved, poetry will remain largely utopian.

(B) Marxism has internal contradictions due to which one strand of Marxism sees no merit in lyric poetry while another appreciates the alternative modes of perception in poetry.

(C) The focus of lyric poetry as personal may not seem compatible with Marxism. However, it is possible to envisage lyric poetry as a symbol of resistance against an oppressive culture.

(D) Marxism makes unreasonable demands on lyric poetry. However, lyric poetry has its own merits that are largely ignored by Marxism due to its personal nature.

Answer: C

Solution:

The passage presents an apparent tension between lyric poetry's personal, small-scale nature and Marxism's demand for socially transformative art. However, it then introduces a nuanced strand of Marxist thought that sees lyric poetry as potentially critical and utopian — a vehicle for imagining alternative realities and resisting hegemonic ideology.

Option A misreads the conclusion: the passage does not suggest the tension is unresolved or that poetry will 'remain utopian.' Option B incorrectly frames this as a Marxist 'internal contradiction.' The passage treats the second strand as a genuine reinterpretation, not a contradiction. Option D misrepresents Marxism as dismissive of lyric poetry, ignoring the strand that finds value in it.

Option C accurately captures the passage's structure: initial apparent incompatibility, followed by the insight that lyric poetry can indeed serve as a form of quiet resistance and critical imagination.

Hence, Option C is correct.

Q19. Five jumbled-up sentences (labelled 1, 2, 3, 4 and 5) related to a topic are given below. Four of them can be put together to form a coherent paragraph. Identify the odd sentence and key in the number of that sentence as your answer.

1. To create a synapse, the neuron has specialized structures, often seen as tiny swellings, at its terminal end of the axon where it stores the chemicals that are emitted to transmit a signal to the next neuron.

2. This fetal warm-up act — the soldering of neural connections before the eyes actually function — is crucial to the performance of the visual system.

3. The reasons for this paring back of synapses is a mystery, but synaptic pruning is thought to sharpen and reinforce the 'correct' synapses, while removing the weak and unnecessary ones.

4. Neural connections between the eyes and the brain are formed long before birth, establishing the wiring and the circuitry that allow a child to begin visualizing the world the minute she emerges from the womb.

5. During this rehearsal period, synapses — points of chemical connection — between nerve cells are generated in great excess, only to be pruned back during later development.

Answer: 1

Solution:

Sentences 4, 2, 5, and 3 form a coherent developmental narrative about the visual system: neural eye-brain connections are formed before birth (4), this early wiring is crucial to later visual performance (2), synapses are initially overproduced during this period (5), and are then pruned back to refine the system (3). The order is 4 → 2 → 5 → 3.

Sentence 1 describes the structural mechanics of how a synapse is created — the role of terminal axon swellings in storing and releasing chemical signals. While this is factually related to synapses, it focuses on the cellular hardware of a single synapse rather than the broader developmental process of forming, using, and pruning neural connections.

Sentence 1 is a microscopic, mechanistic description that does not fit the macro-developmental story told by the other four sentences.

Therefore, Sentence 1 is the odd one out.

Q20. The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

Humans have managed to tweak the underlying biology of various plants and animals to produce high-tech crops and microbes. But regulating these entities is complicated, as the framework of policies and procedures are outdated and not flexible enough to adapt to emerging technology. The question is whether regulation will ever be able to keep up with human innovation, to regulate living things, which are apt to be unpredictable and unique; to capture all the potential risks when new biological entities are introduced, or when they pass on variations of their genes?

(A) The mercurial nature of biological entities calls for scientists to shape the regulations governing emerging technology, with regular calibration to handle variations in the field.

(B) A new framework of rules and procedures for regulating the most recent research emerging from biotechnology is urgently needed, to keep up with this rapidly changing discipline.

(C) Current regulation of biotechnology is outdated, but it is debatable if we can create a framework, imaginative and flexible, to cover all contingencies in this fast-changing area.

(D) The problem with formulating regulation for innovation in the scientific arena is that it is impossible to imagine the outcomes or risks related to the outcomes of all the research.

Answer: C

Solution:

The passage makes two key observations: current regulatory frameworks are outdated and inflexible, and there is a genuine question about whether any regulatory system can keep pace with innovation in biotechnology — especially given the unpredictable nature of living organisms and genetic variations.

Option A incorrectly narrows the focus to scientists shaping regulation — the passage doesn't specifically suggest this. Option B captures urgency but misses the doubt the passage expresses about whether adequate regulation is even possible. Option D overstates impossibility — the passage asks a question, not makes a definitive claim.

Option C correctly captures both the problem (outdated regulation) and the central uncertainty (it is debatable whether an adequate framework is achievable). The word 'debatable' mirrors the passage's questioning tone.

Hence, Option C is the best summary.

Instructions for Questions 21-24: Read the following passage about planetary protection and space exploration and answer the question.

There is a group in the space community who view the solar system not as an opportunity to expand human potential but as a nature preserve, forever the provenance of an elite group of scientists and their sanitary robotic probes. These planetary protection advocates [call] for avoiding “harmful contamination” of celestial bodies. Under this regime, NASA incurs great expense sterilizing robotic probes in order to prevent the contamination of entirely theoretical biospheres…

Transporting bacteria would matter if Mars were the vital world once imagined by astronomers who mistook optical illusions for canals. Nobody wants to expose Martians to measles, but sadly, robotic exploration reveals a bleak, rusted landscape, lacking oxygen and flooded with radiation ready to sterilize any Earthly microbes. Simple life might exist underground, or down at the bottom of a deep canyon, but it has been very hard to find with robots….The upsides from human exploration and development of Mars clearly outweigh the welfare of purely speculative Martian fungi ....

The other likely targets of human exploration, development, and settlement, our moon and the asteroids, exist in a desiccated, radiation-soaked realm of hard vacuum and extreme temperature variations that would kill nearly anything. It’s also important to note that many international competitors will ignore the demands of these protection extremists in any case. For example, China recently sent a terrarium to the moon and germinated a plant seed—with, unsurprisingly, no protest from its own scientific community. In contrast, when it was recently revealed that a researcher had surreptitiously smuggled super- resilient microscopic tardigrades aboard the ill-fated Israeli Beresheet lunar probe, a firestorm was unleashed within the space community ...

NASA’s previous human exploration efforts made no serious attempt at sterility, with little notice. As the Mars expert Robert Zubrin noted in the National Review, U.S. lunar landings did not leave the campsites cleaner than they found it. Apollo’s bacteria-infested litter included bags of feces. Forcing NASA’s proposed Mars exploration to do better, 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.

A reasonable compromise is to continue on the course laid out by the U.S. government and the National Research Council, which proposed a system of zones on Mars, some for science only, some for habitation, and some for resource exploitation. This approach minimizes contamination, maximizes scientific exploration…. Mars presents a stark choice of diverging human futures. We can turn inward, pursuing ever more limited futures while we await whichever natural or manmade disaster will eradicate our species and life on Earth. Alternatively, we can choose to propel our biosphere further into the solar system, simultaneously protecting our home planet and providing a backup plan for the only life we know exists in the universe. Are the lives on Earth worth less than some hypothetical microbe lurking under Martian rocks?

Q21. The author is unlikely to disagree with any of the following EXCEPT:

(A) the proposal for a zonal segregation of the Martian landscape into regions for different purposes.

(B) that while NASA's earlier missions were not ideal in their approach to space contamination, they likely did no grave damage.

(C) space contamination should be minimised until the possibility of life on the astronomical body being explored is ruled out.

(D) the exorbitant costs of continuing to keep the space environment pristine may be unsustainable.

Answer: C

Solution:

The question uses 'unlikely to disagree + EXCEPT,' which means we are looking for the one statement the author WOULD disagree with.

Option A: The author explicitly supports the zonal compromise proposed by the National Research Council — zones for science, habitation, and resource exploitation. He agrees with this.

Option B: The author discusses Apollo's contamination but frames it as evidence that strict sterilisation is unnecessary, implying it caused no serious harm. He agrees.

Option D: The author argues at length that the costs of sterilisation are excessive and could destroy NASA's human exploration budget. He agrees.

Option C reflects a cautious, protective approach to space exploration — minimising contamination until life is ruled out. The author actively dismisses this view, arguing that Mars is almost certainly lifeless and that the costs and restrictions of planetary protection are disproportionate to any speculative risk.

Hence, Option C is the statement the author would disagree with — the correct answer.

Q22. The author mentions all of the following reasons to dismiss concerns about contaminating Mars EXCEPT:

(A) the lack of evidence of living organisms on Mars makes possible contamination from earthly microbes a moot point.

(B) efforts to contain contamination on Mars are likely to be derailed as competitor countries may not follow similar restrictions.

(C) the use of similar probes on astronomical bodies like the moon have had little effect on the environment.

(D) earlier explorations have already contaminated pristine space environments.

Answer: C

Solution:

The passage offers several reasons to dismiss contamination concerns: Mars is described as a barren, radiation-soaked, oxygen-free landscape with no confirmed life (supporting A); China's mission to the Moon shows international competitors will ignore planetary protection protocols (supporting B); and Apollo's feces-filled campsites on the Moon demonstrate that earlier missions already contaminated pristine environments (supporting D).

Option C, however, is not presented as a valid argument. The author does not specifically claim that lunar robotic probes have had 'little effect' on the Moon's environment. The contamination discussion focuses on human waste from Apollo missions, not on robotic probes.

Hence, Option C is the exception — the reason not actually given by the author.

Q23. The author's overall tone in the first paragraph can be described as

(A) sceptical about the excessive efforts to sanitise planets where life has not yet been proven to exist.

(B) equivocal about the reasons extended by the group of scientists seeking to limit space exploration.

(C) indifferent to the elitism of a few scientists aiming to corner space exploration.

(D) approving of the amount of money NASA spends to restrict the spread of contamination in space.

Answer: A

Solution:

In the first paragraph, the author introduces 'planetary protection advocates' with noticeable scepticism. He describes them as treating the solar system as a 'nature preserve' for an elite group; he uses the phrase 'entirely theoretical biospheres' to describe what NASA is spending money to protect — emphasising the speculative nature of the concern.

Option B (equivocal) would imply uncertainty or ambiguity about the scientists' reasons — but the author is clearly critical, not uncertain. Option C (indifferent) is wrong because the author is actively engaged, not apathetic. Option D (approving) is the opposite of his position.

The tone is unambiguously sceptical — questioning whether the financial and scientific cost of extreme planetary protection is justified by the hypothetical risks. Option A is correct.

Q24. The contrasting reactions to the Chinese and Israeli 'contaminations' of lunar space

(A) are valid as the contamination of the lunar environment from animal sources is far greater than from plants.

(B) are evidence of China's reasonable approach towards space contamination.

(C) indicate that national scientists may have different sensitivities to issues of biosphere protection.

(D) reveal global biases prevalent in attitudes towards different countries.

Answer: C

Solution:

China germinated a plant seed on the Moon with no protest from its own scientific community, while Israel's accidental release of microscopic tardigrades via the Beresheet probe sparked a firestorm within the space community.

The passage uses this contrast to illustrate that different national scientific communities have different levels of sensitivity to — and different norms around — planetary protection.

Option A is unsupported: the passage does not compare the relative environmental impact of plants versus animals. Option B incorrectly endorses China's approach as inherently reasonable — the author merely notes it as a fact. Option D introduces 'global biases against specific countries,' which the passage does not discuss. Option C accurately captures the passage's implication: the difference in reaction reflects different cultural and institutional norms around biosphere protection, not objective differences in harm.

Hence, Option C is correct.

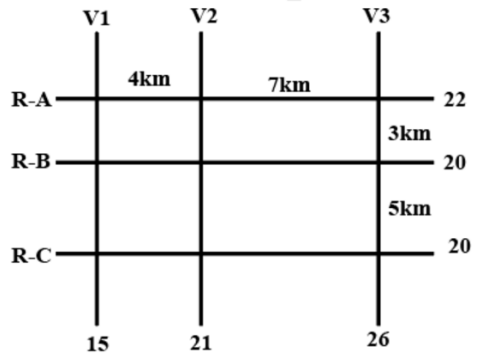
SECTION II - LOGICAL REASONING & DATA INTERPRETATION (LRDI)

Instructions for Questions 25 - 29:

The figure below shows a network with three parallel roads represented by horizontal lines R-A, R-B, and R-C and another three parallel roads represented by vertical lines V1, V2, and V3. The figure also shows the distance (in km) between two adjacent intersections. Six ATMs are placed at six of the nine road intersections. Each ATM has a distinct integer cash requirement (in Rs. Lakhs), and the numbers at the end of each line in the figure indicate the total cash requirements of all ATMs placed on the corresponding road. For example, the total cash requirement of the ATM(s) placed on road R-A is Rs. 22 Lakhs.

The following additional information is known.

1. The ATMs with the minimum and maximum cash requirements of Rs. 7 Lakhs and Rs. 15 Lakhs are placed on the same road.
2. The road distance between the ATM with the second highest cash requirement and the ATM located at the intersection of R-C and V3 is 12 km.



Q25. Which of the following statements is correct?

(A) There is no ATM placed at the (R-C, V2) intersection.

(B) The ATM placed at the (R-C, V2) intersection has a cash requirement of Rs. 9 Lakhs.

(C) The ATM placed at the (R-C, V2) intersection has a cash requirement of Rs. 8 Lakhs.

(D) The cash requirement of the ATM placed at the (R-C, V2) intersection cannot be uniquely determined.

Answer: B

Solution:

From condition (2): the second-highest ATM is 12 km from (R-C, V3). Since we can only travel on roads and the adjacent distances from (R-C, V3) are 5 km and 7 km (in R-C direction), the only way to reach 12 km is 5 + 7 = 12, placing the second-highest ATM at (R-B, V2).

From condition (1): the minimum (7L) and maximum (15L) ATMs are on the same road. The sum 15 + 7 = 22 = total on R-A, so both are on R-A. This means 15L is at (R-A, V1) or (R-A, V3), and 7L is at the other end of R-A.

Case 1: 15L at (R-A, V3). Then V3 total = 26L needs an additional 11L on V3. The 9L ATM lands at (R-C, V2) after eliminating other placements that violate the row/column totals. This gives a unique valid arrangement.

Case 2: 15L at (R-A, V1). V1 total = 15L means only one ATM on V1. Working through V3 and V2 constraints, (R-C, V2) still holds 9L.

In both valid cases, the ATM at (R-C, V2) has exactly 9L. Hence, Option B is correct.

Q26. How many ATMs have cash requirements of Rs. 10 Lakhs or more?

Answer: 3

Solution:

From the arrangement derived in Question 25, the six ATM values in the two valid cases are: 15L, 12L, 11L, 9L, 8L, and 7L.

The ATMs with Rs. 10 Lakhs or more are: 15L, 12L, and 11L.

That gives us exactly 3 ATMs with requirements of Rs. 10 Lakhs or more.

Answer: 3

Q27. Which of the following two statements is/are DEFINITELY true?

Statement A: Each of R-A, R-B, and R-C has two ATMs.

Statement B: Each of V1, V2, and V3 has two ATMs.

(A) Only Statement A

(B) Neither Statement A nor Statement B

(C) Only Statement B

(D) Both Statement A and Statement B

Answer: A

Solution:

In Case 1 (15L at R-A, V3): R-A has 2 ATMs (15L and 7L), R-B has 2 ATMs, R-C has 2 ATMs. V1 has 1 ATM, V2 has 2 ATMs, V3 has 3 ATMs.

In Case 2 (15L at R-A, V1): R-A has 2 ATMs (15L and 7L), R-B has 2 ATMs, R-C has 2 ATMs. V1 has 1 ATM, V2 has 2 ATMs, V3 has 3 ATMs.

In both cases, each horizontal road (R-A, R-B, R-C) has exactly 2 ATMs — Statement A is always true.

However, V3 has 3 ATMs in Case 2 and V1 has only 1, so Statement B does not hold in all cases.

Hence, only Statement A is definitely true — Option A.

Q28. What best can be said about the road distance (in km) between the ATMs having the second highest and the second lowest cash requirements?

(A) 4 km

(B) 7 km

(C) 5 km

(D) Either 4 km or 7 km

Answer: D

Solution:

The six ATM values are 15, 12, 11, 9, 8, 7. The second-highest is 12L and the second-lowest is 8L.

In Case 1: 12L is at (R-B, V2) and 8L is at (R-B, V1). The distance between these is 4 km (the horizontal distance V1–V2 on R-B).

In Case 2: 12L is at (R-B, V2) and 8L is at (R-B, V3). The distance between these is 7 km (the horizontal distance V2–V3 on R-B).

Since both cases are valid, the answer cannot be uniquely pinned to either 4 km or 7 km.

Hence, Option D — Either 4 km or 7 km — is correct.

Q29. What is the number of ATMs whose locations and cash requirements can both be uniquely determined?

Answer: 3

Solution:

Comparing the two valid cases:

ATMs common to both cases in the same position: (R-B, V2) = 12L, (R-C, V2) = 9L, (R-C, V3) = 11L. These three are uniquely determined in both cases.

The remaining ATMs (7L, 8L, 15L) change positions between the two cases — their locations are not uniquely determined.

Therefore, exactly 3 ATMs have both location and cash requirement uniquely determined.

Answer: 3

Instructions for Questions 30-33:

The table given below shows the amount, in grams, of carbohydrate, protein, fat and all other nutrients, per 100 grams of nutrients in seven food grains. The first column shows the food grain category and the second column its codename. The table has some missing values.

Food grain Category	Codename of the food grain	Composition per hundred grams of nutrients in the food grains			
		Carbohydrate	Protein	Fat	Other nutrients
Cereal	C1			0	12
	C2			3	10
Millet	M1	62	10		
	M2			7	16
	M3	56		12	
Pseudo-cereal	P1	66			10
	P2		14		8

The following additional facts are known.

1. Both the pseudo-cereals had higher amounts of carbohydrate as well as higher amounts of protein than any millet.

2. Both the cereals had higher amounts of carbohydrate than any pseudo-cereal.

3. All the missing values of carbohydrate amounts (in grams) for all the food grains are non-zero multiples of 5.

4. All the missing values of protein, fat and other nutrients amounts (in grams) for all the food grains are non-zero multiples of 4.

5. P1 contained double the amount of protein that M3 contains.

Q30. How many food grains had a higher amount of carbohydrate per 100 grams of nutrients than M1?

Answer: 5

Solution:

Using the constraints systematically: Each row sums to 100 grams total.

For C1: carbs must be > P1's carbs (66) and > P2's carbs. Possible carb values (multiples of 5, leaving room for non-zero multiples of 4 in protein and fat): 80g works — giving 100 - 80 - 0 - 12 = 8g protein.

For C2: carbs must also be > P2's carbs. Working through: 75g carbs gives 100 - 75 - 3 - 10 = 12g protein (a multiple of 4). Valid.

For P2: carbs must be between 62 (M1) and 75 (C2). Multiples of 5 in this range: 65 or 70. At 65: protein = 100 - 65 - 8 - 14 = 13 (not a multiple of 4). At 70: protein = 100 - 70 - 8 - 14 = 8. Valid. So P2 has 70g carbs.

For M2: protein + carbs = 100 - 7 - 16 = 77. Protein must be < 14 (both pseudo-cereal proteins). Valid options: 12 → carbs = 65. Valid.

For P1 protein: must equal 2 × M3's protein, be > M1's protein (10) and M2's protein (12), and protein + fat = 100 - 66 - 10 = 24. Only 16g protein works (fat = 8g, both multiples of 4). So M3's protein = 8g, M3's others = 24g.

Now counting food grains with carbs > M1's 62g: C1 (80), C2 (75), M2 (65), P1 (66), P2 (70). That is 5 food grains.

Answer: 5

Q31. How many grams of protein were there in 100 grams of nutrients in M2?

Answer: 12

Solution:

From the solution to Question 30: M2's carbs + protein = 100 - 7 (fat) - 16 (others) = 77.

Protein in M2 must be less than the protein of both pseudo-cereals: P1 has 16g and P2 has 8g, so protein in M2 must be less than 8... wait — condition (1) says pseudo-cereals have higher protein than any millet. So M2's protein < min(P1, P2) = min(16, 8) = 8. But 77 - carbs = protein, and carbs must be a multiple of 5.

If protein = 4: carbs = 73 — not a multiple of 5. If protein = 8: carbs = 69 — not a multiple of 5.

Re-reading: P2's protein is 8, P1's is 16. Condition: both pseudo-cereals must have protein > any millet. So M2 protein < 8, but 77 - multiple-of-5 carbs must give a multiple-of-4 protein less than 8.

Carbs = 65: protein = 12. But 12 > 8 (P2). This seems inconsistent — let's reconsider P2's fat. P2: carbs=70, protein=8, fat=?, others=8. Fat = 100-70-8-8 = 14, which is not a multiple of 4.

Going back: P2 carbs must be a multiple of 5 between 62 and 75 with protein 14 (given), so: 100 - carbs - 14 - fat - 8 = 0. Fat = 78 - carbs. For multiples of 5 in carbs and multiples of 4 in fat: carbs=70, fat=8 (multiple of 4). Valid. Protein of P2 is given as 14.

So millet proteins must be < 14. M2: carbs=65, protein=12. 12 < 14. Valid.

Answer: 12

Q32. How many grams of other nutrients were there in 100 grams of nutrients in M3?

Answer: 24

Solution:

From the full table reconstruction: P1's protein = 16g, so M3's protein = 8g (condition 5: P1 protein = 2 × M3 protein).

M3: carbs=56, protein=8, fat=12, others=?

100 = 56 + 8 + 12 + others → others = 24g.

Answer: 24

Q33. What is the median of the number of grams of protein in 100 grams of nutrients among these food grains?

Answer: 12

Solution:

The protein values for all seven food grains: C1=8, C2=12, M1=10, M2=12, M3=8, P1=16, P2=14.

Arranging in ascending order: 8, 8, 10, 12, 12, 14, 16.

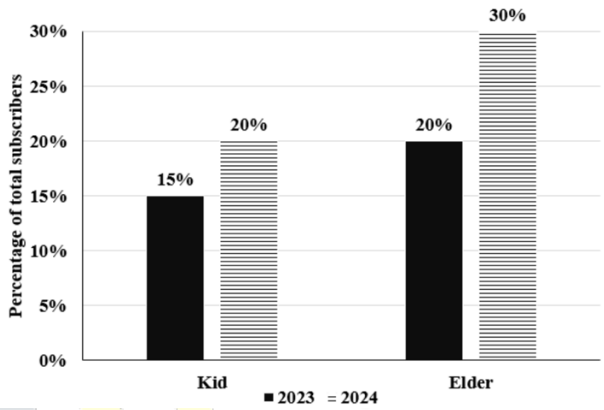
The median of 7 values is the 4th value = 12.

Answer: 12

Instructions for Questions 34–37:

Comprehension:

Over the top (OTT) subscribers of a platform are segregated into three categories: i) Kid, ii)Elder, and iii) Others. Some of the subscribers used one app and the others used multiple apps to access the platform. The figure below shows the percentage of the total number of subscribers in 2023 and 2024 who belong to the 'Kid' and 'Elder' categories.



The following additional facts are known about the numbers of subscribers.

1. The total number of subscribers increased by 10% from 2023 to 2024.

2. In 2024, 1/2 of the subscribers from the 'Kid' category and 2/3 of the subscribers from the 'Elder' category subscribers use one app.

3. In 2023, the number of subscribers from the 'Kid' category who used multiple apps was the same as the number of subscribers from the 'Elder' category who used one app.

4. 10,000 subscribers from the 'Kid' category used one app and 15,000 subscribers from the 'Elder' category used multiple apps in 2023.

Q34. How many subscribers belonged to the 'Others' category in 2024?

(A) Cannot be determined
(B) 65000
(C) 55000
(D) 45000

Answer: C

Solution:

Let total subscribers in 2023 = 100x, so in 2024 = 110x.

In 2023: Kids = 15x, Elders = 20x, Others = 65x.

Using condition (4): 10,000 Kids used one app, so Kids using multiple apps = 15x - 10,000. 15,000 Elders used multiple apps, so Elders using one app = 20x - 15,000.

Condition (3): 15x - 10,000 = 20x - 15,000 → 5x = 5,000 → x = 1,000.

In 2024: total = 110,000. Kids = 20% × 110,000 = 22,000. Elders = 30% × 110,000 = 33,000.

Others in 2024 = 110,000 - 22,000 - 33,000 = 55,000.

Answer: Option C — 55,000.

Q35. What percentage of subscribers in the 'Kid' category used multiple apps in 2023?

(A) 33.33%
(B) 5.00%
(C) 25.50%
(D) 50.00%

Answer: A

Solution:

From the solution above, x = 1,000. Total Kids in 2023 = 15,000.

Kids using one app = 10,000. Kids using multiple apps = 15,000 - 10,000 = 5,000.

Percentage = (5,000 / 15,000) × 100 = 100/3 = 33.33%.

Answer: Option A — 33.33%.

Q36. What was the percentage increase in the number of subscribers in the 'Elder' category from 2023 to 2024?

(A) 60%
(B) 50%
(C) 65%
(D) 40%

Answer: C

Solution:

Elders in 2023 = 20x = 20,000. Elders in 2024 = 33,000.

Percentage increase = ((33,000 - 20,000) / 20,000) × 100 = (13,000 / 20,000) × 100 = 65%.

Answer: Option C — 65%.

Q 37. What could be the minimum percentage of subscribers who used multiple apps in 2024?

(A) 16.5%

(B) 20.0%

(C) 10.0%

(D) 22.00%

Answer: B

Solution:

In 2024: total = 110,000. Kids = 22,000 (half use one app = 11,000, half use multiple = 11,000). Elders = 33,000 (2/3 use one app = 22,000, 1/3 use multiple = 11,000).

Kids + Elders using multiple = 11,000 + 11,000 = 22,000.

To minimise total multiple-app users, assume all 55,000 Others use only one app.

Minimum multiple-app users = 22,000. Percentage = (22,000 / 110,000) × 100 = 20%.

Answer: Option B — 20.0%.

Instructions for Questions 38–41:

Out of 10 countries -- Country 1 through Country 10 -- Country 9 has the highest gross domestic product (GDP), and Country 10 has the highest GDP per capita. GDP per capita is the GDP of a country divided by its population. The table below provides the following data about Country 1 through Country 8 for the year 2024.

- Column 1 gives the country's identity.
- Column 2 gives the country's GDP as a fraction of the GDP of Country 9.
- Column 3 gives the country's GDP per capita as a fraction of the GDP per capita of Country10.
- Column 4 gives he country's annual GDP growth rate.
- Column 5 gives the country's annual population growth rate.

Country	GDP	GDP per capita	GDP growth rate	Population growth rate
Country 1	0.15	0.41	0.2%	-0.12%
Country 2	0.14	0.25	0.9%	-0.41%
Country 3	0.13	0.02	6.5%	0.70%
Country 4	0.12	0.38	0.5%	0.49%
Country 5	0.1	0.36	0.7%	0.31%
Country 6	0.08	0.08	3.2%	0.61%
Country 7	0.08	0.3	0.7%	-0.11%
Country 8	0.07	0.41	1.2%	0.71%

Assume that the GDP growth rates and population growth rates of the countries will remain constant for the next three years.

Q38. Which one among the countries 1 through 8 has the smallest population in 2024?

(A) Country 8

(B) Country 3

(C) Country 7

(D) Country 5

Answer: A

Solution:

Population = GDP / GDP per capita (since both are relative to the same reference countries, they are directly comparable).

Country 8: Pop ∝ 0.07 / 0.41 = 7/41 ≈ 0.171

Country 3: Pop ∝ 0.13 / 0.02 = 13/2 = 6.5

Country 7: Pop ∝ 0.08 / 0.30 = 8/30 ≈ 0.267

Country 5: Pop ∝ 0.10 / 0.36 = 10/36 ≈ 0.278

Country 8 has the smallest relative population at 0.171.

Answer: Option A — Country 8.

Q39. The ratio of Country 4's GDP to Country 5's GDP in 2026 will be closest to

(A) 1.195

(B) 0.963

(C) 1.314

(D) 1.032

Answer: A

Solution:

Country 4 GDP in 2026: $0.12 \times (1.005)^2 = 0.12 \times 1.010025 \approx 0.121203$

Country 5 GDP in 2026: $0.10 \times (1.007)^2 = 0.10 \times 1.014049 \approx 0.101405$

Ratio = 0.121203 / 0.101405 ≈ 1.1952 ≈ 1.195

Answer: Option A — 1.195.

Q40. Which one among the countries 1, 4, 5, and 7 will have the largest population in 2027?

(A) Country 1

(B) Country 5

(C) Country 7

(D) Country 4

Answer: A

Solution:

Population 2024 (proportional): Country 1 = 15/41 ≈ 0.3659, Country 4 = 12/38 ≈ 0.3158, Country 5 = 10/36 ≈ 0.2778, Country 7 = 8/30 ≈ 0.2667.

Country 7's population is already the smallest and it is shrinking (-0.11%) — ruled out immediately.

For 2027, applying 3-year growth (multiply by $(1 + \text{rate})^3$):

Country 1: $0.3659 \times (0.9988)^3 \approx 0.3659 \times 0.99641 \approx 0.3646$

Country 4: $0.3158 \times (1.0049)^3 \approx 0.3158 \times 1.01476 \approx 0.3205$

Country 5: $0.2778 \times (1.0031)^3 \approx 0.2778 \times 1.00932 \approx 0.2804$

Country 1 retains the largest population in 2027 despite its slight decline.

Answer: Option A — Country 1.

Q41. For how many countries among Country 1 through Country 8 will the GDP per capita in 2027 be lower than that in 2024?

Answer: 0

Solution:

GDP per capita = GDP / Population. For GDP per capita to decline, population growth must exceed GDP growth.

Checking each country: Country 1: GDP 0.2% > Pop -0.12% (pop falling, so GDP/cap definitely rises). Country 2: GDP 0.9% > Pop -0.41% (same). Country 3: GDP 6.5% > Pop 0.70%. Country 4: GDP 0.5% > Pop 0.49% (just barely ahead). Country 5: GDP 0.7% > Pop 0.31%. Country 6: GDP 3.2% > Pop 0.61%. Country 7: GDP 0.7% > Pop -0.11% (pop falling). Country 8: GDP 1.2% > Pop 0.71%.

In every single case, GDP growth rate exceeds population growth rate (or population is shrinking while GDP grows).

Therefore, no country will have a lower GDP per capita in 2027 than in 2024.

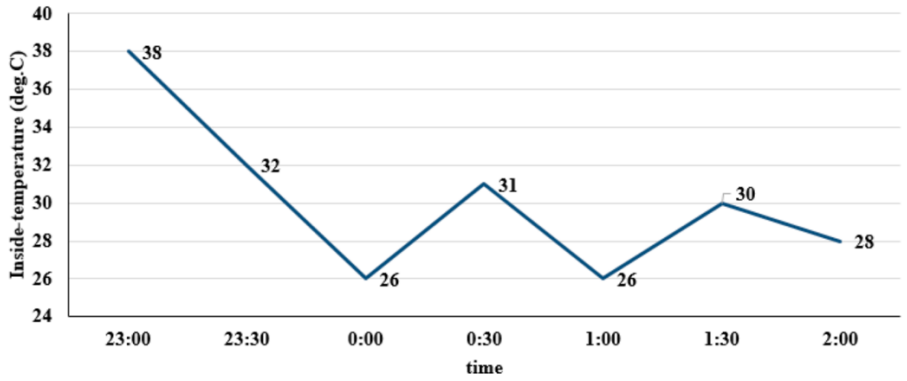
Answer: 0.

Instructions for Questions 42–46:

The air-conditioner (AC) in a large room can be operated either in REGULAR mode or in POWER mode to reduce the temperature.

If the AC operates in REGULAR mode, then it brings down the temperature inside the room(called inside temperature) at a constant rate to the set temperature in 1 hour. If it operates in POWER mode, then this is achieved in 30 minutes.

If the AC is switched off, then the inside temperature rises at a constant rate so as to reach the temperature outside at the time of switching off in 1 hour. The temperature outside has been falling at a constant rate from 7 pm onward until 3 am on a particular night. The following graph shows the inside temperature between 11 pm (23:00) and 2 am (2:00) that night.



The following facts are known about the AC operation that night.

- The AC was turned on for the first time that night at 11 pm (23:00).
- The AC setting was changed (including turning it on/off, and/or setting different temperatures) only at the beginning of the hour or at 30 minutes after the hour.
- The AC was used in POWER mode for longer duration than in REGULAR mode during this 3-hour period.

Q42. How many times must the AC have been turned off between 11:01 pm and 1:59 am?

(A) cannot be determined
(B) 2
(C) 0
(D) 1

Answer: B

Solution:

The inside temperature rises only when the AC is turned off. Looking at the graph, temperature increases occur in exactly two intervals: from 00:00 to 00:30 (26°C → 31°C) and from 01:00 to 01:30 (26°C → 30°C).

Each rise indicates the AC was turned off at the start of that half-hour. So the AC was turned off at 00:00 and again at 01:00.

That is exactly 2 instances of the AC being turned off between 11:01 pm and 1:59 am.

Answer: Option B — 2.

Q43. What was the temperature outside, in degree Celsius, at 1 am?

Answer: 34

Solution:

When the AC is off, the inside temperature rises linearly to reach the outside temperature in exactly 1 hour.

From 01:00 to 01:30: temperature rises from 26°C to 30°C — an increase of 4°C in 30 minutes. At this rate, in 1 hour (by 02:00), it would reach 26 + 8 = 34°C.

This means the outside temperature at 1:00 am was 34°C (the temperature the room was headed toward when the AC was off at 1:00 am).

Answer: 34°C.

Q44: What was the temperature outside, in degree Celsius, at 9 pm?

Answer: 42

Solution:

From the analysis of both AC-off periods:

At 00:00, outside temperature was 36°C (the temperature the room would reach from 26°C in 1 hour when AC was off, confirmed by the 26→31 in 30 min → 36 in 1 hour).

At 01:00, outside temperature was 34°C. The outside temperature drops by 2°C per hour (36°C at midnight, 34°C at 1 am).

Extending backward: 11 pm → 38°C, 10 pm → 40°C, 9 pm → 42°C.

Answer: 42°C.

Q45. What best can be concluded about the number of times the AC must have either been turned on or the AC temperature setting been altered between 11:01 pm and 1:59 am?

(A) More than 3
(B) Either 2 or 3
(C) Exactly 2
(D) Exactly 3

Answer: D

Solution:

The AC was turned on at 23:00 (before the window), so we don't count that. Events within the window 11:01 pm to 1:59 am:

The AC must have been turned on after each of the two off-periods: once at 00:30 (after being off from 00:00) and once at 01:30 (after being off from 01:00). That accounts for 2 turn-ons.

However, the POWER mode constraint requires that POWER was used for longer than REGULAR mode across the 3-hour period (4 half-hour slots). The possible combination satisfying this is POWER used for 3 slots and REGULAR for 1 slot. This means at one of the on-events, the mode or temperature setting was also changed.

Working through the cases, there must be exactly one additional setting change (either at 23:30 or within a running AC period). This gives exactly 3 total events (2 turn-ons + 1 setting change) between 11:01 pm and 1:59 am.

Answer: Option D — Exactly 3.

Q46. What was the maximum difference between temperature outside and inside temperature, in degree Celsius, between 11:01 pm and 1:59 am?

Answer: 10

Solution:

We need the maximum gap between outside and inside temperatures within the given window (excluding the endpoints).

Using the outside temperature schedule (dropping 2°C per hour) and the inside temperature graph:

At 23:30: outside = 37°C, inside = 32°C → difference = 5°C.

At 00:00: outside = 36°C, inside = 26°C → difference = 10°C.

At 00:30: outside = 35°C, inside = 31°C → difference = 4°C.

At 01:00: outside = 34°C, inside = 26°C → difference = 8°C.

At 01:30: outside = 33°C, inside = 30°C → difference = 3°C.

The maximum difference is 10°C, occurring at 00:00.

Answer: 10.

SECTION III - QUANTITATIVE ABILITY

Q47. In a group of 250 students, the percentage of girls was at least 44% and at most 60%. The rest were boys. Each student opted for either swimming or running or both. If 50% of the boys and 80% of the girls opted for swimming while 70% of the boys and 60% of the girls opted for running, then the minimum and maximum possible number of students who opted for both swimming and running, are

(A) 72 and 88, respectively
(B) 75 and 96, respectively
(C) 72 and 80, respectively
(D) 75 and 90, respectively

Answer: C

Solution:

Let Girls = G, Boys = B = 250 - G. Given: $110 \le G \le 150$.

Students opting for swimming: 0.8G + 0.5B. Students opting for running: 0.6G + 0.7B.

By inclusion-exclusion: Both = Swimming + Running - Total = (0.8G + 0.5B) + (0.6G + 0.7B) - 250 = 1.4G + 1.2B - 250.

Substituting B = 250 - G: Both = 1.4G + 1.2(250-G) - 250 = 1.4G + 300 - 1.2G - 250 = 0.2G + 50.

Minimum (G = 110): Both = 0.2(110) + 50 = 22 + 50 = 72.

Maximum (G = 150): Both = 0.2(150) + 50 = 30 + 50 = 80.

Answer: Option C - 72 and 80.

Q48. If $(a + b\sqrt{3})^2 = 52 + 30\sqrt{3}$, where a and b are natural numbers, then a + b equals

(A) 7

(B) 8

(C) 9

(D) 10

Answer: B

Solution:

Expanding the left side: $(a + b\sqrt{3})^2 = a^2 + 3b^2 + 2ab\sqrt{3}$.

Matching rational parts: $a^2 + 3b^2 = 52$.

Matching irrational parts: $2ab\sqrt{3} = 30\sqrt{3} \rightarrow 2ab = 30 \rightarrow ab = 15$.

Natural number factor pairs of 15: (1,15), (3,5), (5,3), (15,1).

Testing a=5, b=3: $a^2 + 3b^2 = 25 + 27 = 52$. Valid!

a + b = 5 + 3 = 8.

Answer: Option B - 8.

Q49. The average of three distinct real numbers is 28. If the smallest number is increased by 7 and the largest number is reduced by 10, the order remains unchanged, and the new arithmetic mean becomes 2 more than the middle number, while the difference between the largest and the smallest numbers becomes 64. Then, the largest number in the original set of three numbers is

Answer: 70

Solution:

Let the three numbers in ascending order be x < y < z.

Given: x + y + z = 84 (since average = 28).

After modification: (x+7) + y + (z-10) = 81. New mean = 81/3 = 27.

New mean is 2 more than middle number: 27 - 2 = y = 25.

So x + z = 84 - 25 = 59.

New largest - new smallest = (z-10) - (x+7) = z - x - 17 = 64 → z - x = 81.

From x + z = 59 and z - x = 81: adding these → 2z = 140 → z = 70.

Answer: 70.

Q50. If 10^{68} is divided by 13, the remainder is

(A) 5

(B) 8

(C) 9

(D) 4

Answer: C

Solution:

We look for a useful pattern. Note that $10^3 = 1000 = 76 \times 13 + 12$, so $10^3 \equiv -1 \pmod{13}$.

We can write $10^{68} = 10^{66} \times 10^2 = (10^3)^{22} \times 100$.

Remainder of $(10^3)^{22}$: since $10^3 \equiv -1 \pmod{13}$, $(10^3)^{22} \equiv (-1)^{22} = 1 \pmod{13}$.

Remainder of $100 \div 13$: $100 = 7 \times 13 + 9$, so $100 \equiv 9 \pmod{13}$.

Therefore, $10^{68} \equiv 1 \times 9 = 9 \pmod{13}$.

Answer: Option C - 9.

Q51. Sam can complete a job in 20 days when working alone. Mohit is twice as fast as Sam and thrice as fast as Ayna in the same job. They undertake a job with an arrangement where Sam and Mohit work together on the first day, Sam and Ayna on the second day, Mohit and Ayna on the third day, and this three-day pattern is repeated. Then, the fraction of total work done by Sam is

(A) 1/20

(B) 3/10

(C) 1/5

(D) 3/20

Answer: B

Solution:

Sam's rate: 1/20 per day. Mohit (twice Sam's rate): 1/10 per day. Ayna (one-third of Mohit): 1/30 per day.

Taking total work = 60 units: Sam does 3 units/day, Mohit does 6 units/day, Ayna does 2 units/day.

Per 3-day cycle: Day 1 (Sam+Mohit)=9 units, Day 2 (Sam+Ayna)=5 units, Day 3 (Mohit+Ayna)=8 units → Total = 22 units/cycle.

After 2 complete cycles (6 days): 44 units done, 16 remaining.

Day 7 (Sam+Mohit): 9 units → 7 remaining. Day 8 (Sam+Ayna): 5 units → 2 remaining. Day 9 (Mohit+Ayna): 2 units completes the job.

Sam worked on days 1,2,4,5,7,8 — that is 6 days × 3 units/day = 18 units.

Fraction = 18/60 = 3/10.

Answer: Option B - 3/10.

Q52. A circular plot of land is divided into two regions by a chord of length $10\sqrt{3}$ metres such that the chord subtends an angle of 120° at the centre. Then the area, in square metres, of the smaller region is

(A) $20(4\pi/3 + \sqrt{3})$

(B) $25(4\pi/3 + \sqrt{3})$

(C) $20(4\pi/3 - \sqrt{3})$

(D) $25(4\pi/3 - \sqrt{3})$

Answer: D

Solution:

Let the radius of the circle be r. Using the cosine rule in triangle AOB (where O is the centre, A and B are endpoints of the chord):

$AB^2 = r^2 + r^2 - 2r^2 \cdot \cos(120°) = 2r^2 - 2r^2(-1/2) = 3r^2$.

$AB = r\sqrt{3}$. Given $AB = 10\sqrt{3}$, so $r\sqrt{3} = 10\sqrt{3} \rightarrow r = 10$.

Area of sector AOB (120° out of 360°): $(120/360) \cdot \pi \cdot r^2 = (1/3) \cdot \pi \cdot 100 = 100\pi/3$.

Area of triangle AOB: $(1/2) \cdot r^2 \cdot \sin(120°) = (1/2) \cdot 100 \cdot (\sqrt{3}/2) = 25\sqrt{3}$.

Area of the smaller segment = Sector area - Triangle area = $100\pi/3 - 25\sqrt{3} = 25(4\pi/3 - \sqrt{3})$.

Answer: Option D.

Q53. Consider the sequence $t_1 = 1$, $t_2 = -1$ and $t_n = ((n-3)/(n-1)) \cdot t_{n-2}$ for $n \geq 3$. Then the value of the sum $1/t_2 + 1/t_4 + 1/t_6 + ... + 1/t_{2022} + 1/t_{2024}$ is

(A) -1024144

(B) -1022121

(C) -1023132

(D) -1026169

Answer: A

Solution:

Computing the sequence: $t_3 = (0/2) \cdot t_1 = 0$, $t_4 = (1/3) \cdot t_2 = -1/3$, $t_5 = (2/4) \cdot t_3 = 0$, $t_6 = (3/5) \cdot t_4 = -1/5$.

Pattern: all odd-indexed terms are 0; even-indexed terms follow: $t_{2k} = -1/(2k-1)$ for $k \geq 1$.

Verification: $t_2 = -1 = -1/1$, $t_4 = -1/3$, $t_6 = -1/5$. ✓

The reciprocals $1/t_{2k} = -(2k-1)$.

The sum $1/t_2 + 1/t_4 + ... + 1/t_{2024} = \Sigma(k=1 \text{ to } 1012) [-(2k-1)] = -[1 + 3 + 5 + ... + 2023]$.

This is the sum of the first 1012 odd numbers = $-1012^2 = -1024144$.

Answer: Option A (-1024144).

Q54. The number of distinct real values of x satisfying the equation $\max\{x, 2\} - \min\{x, 2\} = |x + 2| - |x - 2|$ is

Answer: 2

Solution:

Note that $\max\{x,2\} - \min\{x,2\} = |x - 2|$ (always non-negative).

And $|x+2| - |x-2|$ can be negative. So the equation is: $|x - 2| = |x + 2| - |x - 2|$, i.e., $2|x-2| = |x+2|$.

Case 1: $x \geq 2$. Both $|x-2| = x-2$ and $|x+2| = x+2$. Equation: $2(x-2) = x+2 \rightarrow x = 6$. Valid ($6 \geq 2$). ✓

Case 2: $-2 \le x < 2$. $|x-2| = 2-x$, $|x+2| = x+2$. Equation: $2(2-x) = x+2 \rightarrow 4-2x = x+2 \rightarrow x = 2/3$. Valid ($-2 \le 2/3 < 2$). ✓

Case 3: $x < -2$. $|x-2| = 2-x$, $|x+2| = -(x+2)$. Equation: $2(2-x) = -(x+2) \rightarrow 4-2x = -x-2 \rightarrow x = 6$. But 6 is not < -2. Invalid. ✗

Two valid solutions: $x = 6$ and $x = 2/3$.

Answer: 2.

Q55. Aman invests Rs 4000 in a bank at a certain rate of interest, compounded annually. If the ratio of the value of the investment after 3 years to the value of the investment after 5 years is 25:36, then the minimum number of years required for the value of the investment to exceed Rs 20000 is

Answer: 9

Solution:

Let the annual rate be r. Value after 3 years: $4000(1+r)^3$. Value after 5 years: $4000(1+r)^5$.

Ratio = $(1+r)^3 / (1+r)^5 = 1/(1+r)^2 = 25/36 \rightarrow (1+r)^2 = 36/25 \rightarrow 1+r = 6/5 \rightarrow r = 0.2$ (20%).

For the investment to exceed Rs 20000: $4000 \times (1.2)^n > 20000 \rightarrow (1.2)^n > 5$.

Checking: $(1.2)^8 \approx 4.30$. $(1.2)^9 \approx 5.16 > 5$.

The minimum number of years is 9.

Answer: 9.

Q56. The sum of all distinct real values of x that satisfy the equation $10^x + 4/10^x = 81/2$ is

(A) $2 \log_{10} 2$

(B) $4 \log_{10} 2$

(C) $\log_{10} 2$

(D) $3 \log_{10} 2$

Answer: A

Solution:

Let $A = 10^x$. The equation becomes: $A + 4/A = 81/2 \rightarrow 2A^2 - 81A + 8 = 0$.

By Vieta's formulas: product of roots $A_1 \cdot A_2 = 8/2 = 4$.

The sum of the corresponding x values: $x_1 + x_2 = \log_{10}(A_1) + \log_{10}(A_2) = \log_{10}(A_1 \cdot A_2) = \log_{10}(4) = \log_{10}(2^2) = 2 \log_{10} 2$.

(Both roots of the quadratic in A are positive - verified by discriminant $81^2 - 4 \cdot 2 \cdot 8 > 0$ and positive sum/product.)

Answer: Option A ($2 \log_{10} 2$).

Q57. A train travelled a certain distance at a uniform speed. Had the speed been 6 km per hour more, it would have needed 4 hours less. Had the speed been 6 km per hour less, it would have needed 6 hours more. The distance, in km, travelled by the train is

(A) 720
(B) 800
(C) 780
(D) 640

Answer: A

Solution:

Let distance = D km and speed = S km/h. Time = D/S.

Condition 1: $D/(S+6) = D/S - 4 \rightarrow D[1/S - 1/(S+6)] = 4 \rightarrow D \cdot 6/[S(S+6)] = 4$.

Condition 2: $D/(S-6) = D/S + 6 \rightarrow D[1/(S-6) - 1/S] = 6 \rightarrow D \cdot 6/[S(S-6)] = 6$.

Dividing condition 2 by condition 1: $[S(S+6)] / [S(S-6)] = 6/4 = 3/2$.

$2(S+6) = 3(S-6) \rightarrow 2S + 12 = 3S - 18 \rightarrow S = 30$ km/h.

Distance $D = S(S-6) = 30 \times 24 = 720$ km.

Answer: Option A - 720 km.

Q58. If $3^a = 4$, $4^b = 5$, $5^c = 6$, $6^d = 7$, $7^e = 8$ and $8^f = 9$, then the value of the product abcdef is

Answer: 2

Solution:

Taking logarithms: $a = \log_3 4$, $b = \log_4 5$, $c = \log_5 6$, $d = \log_6 7$, $e = \log_7 8$, $f = \log_8 9$.

Using the chain rule of logarithms ($\log_b c = \log c / \log b$):

$abcdef = (\log 4/\log 3) \cdot (\log 5/\log 4) \cdot (\log 6/\log 5) \cdot (\log 7/\log 6) \cdot (\log 8/\log 7) \cdot (\log 9/\log 8)$.

All intermediate terms cancel: $= \log 9/\log 3 = \log_3 9 = \log_3(3^2) = 2$.

Answer: 2.

Q59. Gopi marks a price on a product in order to make 20% profit. Ravi gets 10% discount on this marked price, and thus saves Rs 15. Then, the profit, in rupees, made by Gopi by selling the product to Ravi is

(A) 10
(B) 25
(C) 15
(D) 20

Answer: A

Solution:

Let cost price = C. Marked price (for 20% profit) = 1.2C.

Ravi gets 10% discount: selling price = 0.9 × 1.2C = 1.08C.

Amount saved by Ravi = Marked price - Selling price = 1.2C - 1.08C = 0.12C = Rs 15.

Therefore C = 15 / 0.12 = Rs 125.

Profit for Gopi = Selling price - Cost price = 1.08C - C = 0.08C = 0.08 × 125 = Rs 10.

Answer: Option A - Rs 10.

Q60. A certain amount of water was poured into a 300-litre container and the remaining portion was filled with milk. Then an amount of this solution equal to twice the volume of the water initially poured was taken out, and water was added to refill the container. If the resulting solution contains 72% milk, then the amount of water, in litres, that was initially poured into the container was

Answer: 30

Solution:

Let water initially = W litres. Milk initially = 300 - W litres.

Amount removed = 2W litres. This is a fraction 2W/300 of the total solution.

Milk removed = (300-W) × (2W/300).

Milk remaining = (300-W) - (300-W)(2W/300) = (300-W)(1 - 2W/300) = (300-W)(300-2W)/300.

After refilling with water: total = 300 litres. Milk fraction = 72% = 0.72.

Equation: (300-W)(300-2W)/300 = 0.72 × 300 = 216.

(300-W)(300-2W) = 64800.

Expanding: 90000 - 600W - 300W + $2W^2$ = 64800 → $2W^2$ - 900W + 25200 = 0 → W^2 - 450W + 12600 = 0.

W = [450 ± √(202500 - 50400)] / 2 = [450 ± √152100] / 2 = [450 ± 390] / 2.

W = 420 or W = 30. Since W < 300, W = 30.

Answer: 30 litres.

Q61. A regular octagon ABCDEFGH has sides of length 6 cm each. Then the area, in sq. cm, of the square ACEG is

(A) 72(2 + √2)

(B) 36(1 + √2)

(C) 72(1 + √2)

(D) 36(2 + √2)

Answer: D

Solution:

In a regular octagon with side length s, the diagonal connecting every other vertex (like AC) can be found using the cosine rule in triangle ABC.

Interior angle of a regular octagon = (8-2)×180°/8 = 135°.

Using cosine rule in △ABC with AB = BC = 6 and angle B = 135°:

$AC^2 = AB^2 + BC^2 - 2 \cdot AB \cdot BC \cdot \cos(135°) = 36 + 36 - 2 \cdot 36 \cdot (-1/\sqrt{2}) = 72 + 72/\sqrt{2} = 72 + 36\sqrt{2} = 36(2 + \sqrt{2})$.

ACEG is a square with side length AC. Area of square = $AC^2 = 36(2 + \sqrt{2})$.

Answer: Option D.

Q62: The number of distinct integer solutions (x, y) of the equation $|x + y| + |x - y| = 2$ is

Answer: 8

Solution:

The equation $|x+y| + |x-y| = 2$ is equivalent to $2 \cdot \max(|x|, |y|) = 2$, i.e., $\max(|x|, |y|) = 1$.

Integer solutions with $\max(|x|, |y|) = 1$ are all integer pairs where at least one of $|x|, |y|$ equals 1 and neither exceeds 1.

These are: (1,0), (-1,0), (0,1), (0,-1), (1,1), (1,-1), (-1,1), (-1,-1).

That is 8 distinct integer solutions.

Answer: 8.

Q63. For any non-zero real number x, let $f(x) + 2f(1/x) = 3x$. Then, the sum of all possible values of x for which $f(x) = 3$ is

(A) 3
(B) -2
(C) -3
(D) 2

Answer: C

Solution:

From $f(x) + 2f(1/x) = 3x$ ... (i)

Substituting $x \rightarrow 1/x$: $f(1/x) + 2f(x) = 3/x$ ... (ii)

From (ii): $f(1/x) = 3/x - 2f(x)$. Substituting into (i):

$f(x) + 2(3/x - 2f(x)) = 3x \rightarrow f(x) + 6/x - 4f(x) = 3x \rightarrow -3f(x) = 3x - 6/x \rightarrow f(x) = 2/x - x$.

Setting $f(x) = 3$: $2/x - x = 3 \rightarrow 2 - x^2 = 3x \rightarrow x^2 + 3x - 2 = 0$.

By Vieta's formulas, sum of roots = $-3/1 = -3$.

Answer: Option C.

Q64: For some constant real numbers p, k and a, consider the following system of linear equations in x and y:

$px - 4y = 2$

$3x + ky = a$

A necessary condition for the system to have no solution for (x, y) is

(A) ap + 6 = 0

(B) 2a + k ≠ 0

(C) ap - 6 = 0

(D) kp + 12 ≠ 0

Answer: B

Solution:

A system of two linear equations has no solution (is inconsistent) when the lines are parallel — i.e., same slopes but different intercepts.

Same slope condition: p/3 = -4/k → kp = -12 → kp + 12 = 0. This is the parallelism condition.

Different intercepts (to ensure they are parallel, not identical): 2/a ≠ p/3, OR equivalently 2a ≠ something... checking via the ratio: p/3 = -4/k but 2/a ≠ 4/k → a ≠ -2k/4 ... simplified: for no solution, we need kp = -12 AND a ≠ -2(k/something).

The necessary condition for no solution requires the slope condition (kp = -12) to hold, AND the intercept condition must not make the equations identical. The condition 2a + k ≠ 0 ensures the second ratio is distinct from the first, guaranteeing inconsistency rather than infinite solutions.

Among the options, Option B (2a + k ≠ 0) is a necessary condition for ensuring no solution (as opposed to infinite solutions) once the lines are parallel.

Answer: Option B.

Q65. Rajesh and Vimal own 20 hectares and 30 hectares of agricultural land, respectively, which are entirely covered by wheat and mustard crops. The cultivation area of wheat and mustard in the land owned by Vimal are in the ratio of 5:3. If the total cultivation area of wheat and mustard are in the ratio 11:9, then the ratio of cultivation area of wheat and mustard in the land owned by Rajesh is

(A) 4:3

(B) 7:9

(C) 3:7

(D) 1:1

Answer: B

Solution:

Vimal's land: 30 hectares split 5:3. Wheat = (5/8)×30 = 18.75 ha. Mustard = (3/8)×30 = 11.25 ha.

Let Rajesh's wheat:mustard ratio = k:1. Rajesh's wheat = 20k/(k+1), mustard = 20/(k+1).

Total wheat = 18.75 + 20k/(k+1). Total mustard = 11.25 + 20/(k+1).

Total ratio = 11:9: [18.75 + 20k/(k+1)] / [11.25 + 20/(k+1)] = 11/9.

Multiplying out: 9[18.75(k+1) + 20k] = 11[11.25(k+1) + 20] → 9[18.75k + 18.75 + 20k] = 11[11.25k + 11.25 + 20] → 9[38.75k + 18.75] = 11[11.25k + 31.25].

348.75k + 168.75 = 123.75k + 343.75 → 225k = 175 → k = 7/9.

Rajesh's ratio = k:1 = 7/9 : 1 = 7:9.

Answer: Option B.

Q66. The midpoints of sides AB, BC, and AC in △ABC are M, N, and P, respectively. The medians drawn from A, B, and C intersect the line segments MP, MN and NP at X, Y, and Z, respectively. If the area of △ABC is 1440 sq cm, then the area, in sq cm, of △XYZ is

Answer: 90

Solution:

M, N, P are the midpoints of the three sides, so △MNP is the medial triangle of △ABC, with area = (1/4) × area of △ABC = (1/4) × 1440 = 360 sq cm.

The medians of △ABC connect each vertex to the midpoint of the opposite side. They intersect MP, MN, and NP at X, Y, Z respectively.

By the proportionality of similar triangles within the medial triangle construction, each median of △ABC divides the corresponding side of △MNP at its midpoint.

Therefore, △XYZ is the medial triangle of △MNP, and its area = (1/4) × area of △MNP = (1/4) × 360 = 90 sq cm.

Answer: 90.

Q67. The number of all positive integers up to 500 with non-repeating digits is

Answer: 378

Solution:

Single-digit positive integers (1–9): 9 numbers, all with non-repeating digits.

Two-digit integers (10–99): tens digit can be 1–9 (9 choices), units digit can be 0–9 excluding the tens digit (9 choices). Total = 9 × 9 = 81.

Three-digit integers (100–499): hundreds digit can be 1, 2, 3, or 4 (4 choices). Tens digit: any digit 0–9 except hundreds digit (9 choices). Units digit: any digit 0–9 except hundreds and tens digits (8 choices). Total = 4 × 9 × 8 = 288.

For 500: digits are 5, 0, 0 — repeating, so excluded.

Grand total = 9 + 81 + 288 = 378.

Answer: 378.

Q68. After two successive increments, Gopal's salary became 187.5% of his initial salary. If the percentage of salary increase in the second increment was twice of that in the first increment, then the percentage of salary increase in the first increment was

(A) 30
(B) 27.5
(C) 25
(D) 20

Answer: C

Solution:

Let the first increment be z (as a decimal). Second increment = 2z.

After two increments: $(1 + z)(1 + 2z) = 1.875$.

Expanding: $1 + 3z + 2z^2 = 1.875 \rightarrow 2z^2 + 3z - 0.875 = 0$.

Multiplying by 8: $16z^2 + 24z - 7 = 0$.

Using the quadratic formula: $z = [-24 \pm \sqrt{(576 + 448)}] / 32 = [-24 \pm \sqrt{1024}] / 32 = [-24 \pm 32] / 32$.

Taking the positive root: $z = 8/32 = 0.25$.

First increment = 25%.

Answer: Option C - 25%.