CAT 2023 SLOT 3 VARC

DIRECTIONS for questions 1 - 4: The passage below is accompanied by a set of questions. Choose the best answer to each question.

Steven Pinker's new book, "Rationality: What It is, Why it Seems Scarce, Why It Matters," offers a pragmatic dose of measured optimism, presenting rationality as a fragile but achievable ideal in personal and civic life. . . . Pinker's ambition to illuminate such a crucial topic offers the welcome prospect of a return to sanity. . . . It's no small achievement to make formal logic, game theory, statistics and Bayesian reasoning delightful topics full of charm and relevance.

It's also plausible to believe that a wider application of the rational tools he analyzes would improve the world in important ways. His primer on statistics and scientific uncertainty is particularly timely and should be required reading before consuming any news about the [COVID] pandemic. More broadly, he argues that less media coverage of shocking but vanishingly rare events, from shark attacks to adverse vaccine reactions, would help prevent dangerous overreactions, fatalism and the diversion of finite resources away from solvable but less-dramatic issues, like malnutrition in the developing world.

It's a reasonable critique, and Pinker is not the first to make it. But analyzing the political economy of journalism — its funding structures, ownership concentration and increasing reliance on social media shares — would have given a fuller picture of why so much coverage is so misguided and what we might do about it.

Pinker's main focus is the sort of conscious, sequential reasoning that can track the steps in a geometric proof or an argument in formal logic. Skill in this domain maps directly onto the navigation of many real-world problems, and Pinker shows how greater mastery of the tools of rationality can improve decision-making in medical, legal, financial and many other contexts in which we must act on uncertain and shifting information. . . .

Despite the undeniable power of the sort of rationality he describes, many of the deepest insights in the history of science, math, music and art strike their originators in moments of epiphany. From the 19th century chemist Friedrich August Kekulé's discovery of the structure of benzene to any of Mozart's symphonies, much extraordinary human achievement is not a product of conscious, sequential reasoning. Even Plato's Socrates — who anticipated many of Pinker's points by nearly 2,500 years, showing the virtue of knowing what you do not know and examining all premises in arguments, not simply trusting speakers' authority or charisma — attributed many of his most profound insights to dreams and visions. Conscious reasoning is helpful in sorting the wheat from the chaff, but it would be interesting to consider the hidden aquifers that make much of the grain grow in the first place.

The role of moral and ethical education in promoting rational behavior is also underexplored. Pinker recognizes that rationality "is not just a cognitive virtue but a moral one." But this profoundly important point, one subtly explored by ancient Greek philosophers like Plato and Aristotle, doesn't really get developed. This is a shame, since possessing the right sort of moral character is arguably a precondition for using rationality in beneficial ways.

1. The author endorses Pinker's views on the importance of logical reasoning as it:

A. focuses public attention on real issues like development rather than sensational events.

B. provides a moral compass for resolving important ethical dilemmas.

C. helps people to gain expertise in statistics and other scientific disciplines.

D. equips people with the ability to tackle challenging practical problems.

2. According to the author, for Pinker as well as the ancient Greek philosophers, rational thinking involves all of the following EXCEPT:
A. the belief that the ability to reason logically encompasses an ethical and moral dimension.
B. an awareness of underlying assumptions in an argument and gaps in one's own knowledge.
C. arriving at independent conclusions irrespective of who is presenting the argument.
D. the primacy of conscious sequential reasoning as the basis for seminal human achievements.

3. The author refers to the ancient Greek philosophers to:
A. indicate the various similarities between their thinking and Pinker's conclusions.
B. reveal gaps in Pinker's discussion of the importance of ethical considerations in rational behaviour.
C. highlight the influence of their thinking on the development of Pinker's arguments.
D. show how dreams and visions have for centuries influenced subconscious behaviour and path breaking inventions.

4. The author mentions Kekulé's discovery of the structure of benzene and Mozart's symphonies to illustrate the point that:
A. unlike the sciences, human achievements in other fields are a mix of logical reasoning and spontaneous epiphanies.
B. great innovations across various fields can stem from flashes of intuition and are not always propelled by logical thinking.
C. it is not just the creative arts, but also scientific fields that have benefitted from flashes of creativity.
D. Pinker's conclusions on sequential reasoning are belied by European achievements which, in the past, were more rooted in unconscious bursts of genius.

DIRECTIONS for questions 5 - 8: The passage below is accompanied by a set of questions. Choose the best answer to each question.

In 2006, the Met [art museum in the US] agreed to return the Euphronios krater, a masterpiece Greek um that had been a museum draw since 1972. In 2007, the Getty [art museum in the US] agreed to return 40 objects to Italy, including a marble Aphrodite, in the midst of looting scandals. And in December, Sotheby's and a private owner agreed to return an ancient Khmer statue of a warrior, pulled from auction two years before, to Cambodia.

Cultural property, or patrimony, laws limit the transfer of cultural property outside the source country's territory, including outright export prohibitions and national ownership laws. Most art historians, archaeologists, museum officials and policymakers portray cultural property laws in general as invaluable tools for counteracting the ugly legacy of Western cultural imperialism.

During the late 19th and early 20th century — an era former Met director Thomas Having called "the age of piracy" — American and European art museums acquired antiquities by hook or by crook, from grave robbers or souvenir collectors, bounty from digs and ancient sites in impoverished but art-rich source countries. Patrimony laws were intended to protect future archaeological discoveries against Western imperialist designs. . . .

I surveyed 90 countries with one or more archaeological sites on UNESCO's World Heritage Site list, and my study shows that in most cases the number of discovered sites diminishes sharply after a country passes a cultural property law. There are 222 archaeological sites listed for those 90 countries. When you look into the history of the sites, you see that all but 21 were discovered before the passage of cultural property laws. . . .

Strict cultural patrimony laws are popular in most countries. But the downside may be that they reduce incentives for foreign governments, non-governmental organizations and educational institutions to invest in overseas exploration because their efforts will not necessarily be rewarded by opportunities to hold, display and study what is uncovered. To the extent that source countries can fund their own archaeological projects, artifacts and sites may still be discovered. . . .

The survey has far-reaching implications. It suggests that source countries, particularly in the developing world, should narrow their cultural property laws so that they can reap the benefits of new archaeological discoveries, which typically increase tourism and enhance cultural pride. This does not mean these nations should abolish restrictions on foreign excavation and foreign claims to artifacts.

China provides an interesting alternative approach for source nations eager for foreign archaeological investment. From 1935 to 2003, China had a restrictive cultural property law that prohibited foreign ownership of Chinese cultural artifacts. In those years, China's most significant archaeological discovery occurred by chance, in 1974, when peasant farmers accidentally uncovered ranks of buried terra cotta warriors, which are part of Emperor Qin's spectacular tomb system.

In 2003, the Chinese government switched course, dropping its cultural property law and embracing collaborative international archaeological research. Since then, China has nominated 11 archaeological sites for inclusion in the World Heritage Site list, including eight in 2013, the most ever for China.

5. Which one of the following statements, if true, would undermine the central idea of the passage?

A. Museums established in economically deprived archaeologically-rich source countries can display the antiques discovered there.

B. Affluent archaeologically-rich source countries can afford to carry out their own excavations.

C. UNESCO finances archaeological research in poor, but archaeologically-rich source countries.

D. Western countries will have to apologise to countries for looting their cultural property in the past century.

6. Which one of the following statements best expresses the paradox of patrimony laws?

A. They were aimed at protecting cultural property, but instead reduced new archaeological discoveries.

B. They were aimed at protecting cultural property, but instead reduced business for auctioneers like Sotheby's.

C. They were intended to protect cultural property, but instead resulted in the withholding of national treasure from museums.

D. They were intended to protect cultural property, but instead resulted in the neglect of historical sites.

7. It can be inferred from the passage that archaeological sites are considered important by some source countries because they:

A. give a boost to the tourism sector.

B. are subject to strict patrimony laws.

C. generate funds for future discoveries.
D. are a symbol of Western imperialism.

8. From the passage we can infer that the author is likely to advise poor, but archaeologically-rich source countries to do all of the following, EXCEPT:
A. allow foreign countries to analyse and exhibit the archaeological finds made in the source country.
B. adopt China's strategy of dropping its cultural property laws and carrying out archaeological research through international collaboration.
C. fund institutes in other countries to undertake archaeological exploration in the source country reaping the benefits of cutting-edge techniques.
D. to find ways to motivate other countries to finance archaeological explorations in their country.

DIRECTIONS for questions 9 - 12: The passage below is accompanied by a set of questions. Choose the best answer to each question.

Understanding romantic aesthetics is not a simple undertaking for reasons that are internal to the nature of the subject. Distinguished scholars, such as Arthur Lovejoy, Northrop Frye and Isaiah Berlin, have remarked on the notorious challenges facing any attempt to define romanticism. Lovejoy, for example, claimed that romanticism is "the scandal of literary history and criticism" . . . The main difficulty in studying the romantics, according to him, is the lack of any "single real entity, or type of entity" that the concept "romanticism" designates. Lovejoy concluded, "the word 'romantic' has come to mean so many things that, by itself, it means nothing" ...

The more specific task of characterizing romantic aesthetics adds to these difficulties an air of paradox. Conventionally, "aesthetics" refers to a theory concerning beauty and art or the branch of philosophy that studies these topics. However, many of the romantics rejected the identification of aesthetics with a circumscribed domain of human life that is separated from the practical and theoretical domains of life. The most characteristic romantic commitment is to the idea that the character of art and beauty and of our engagement with them should shape all aspects of human life. Being fundamental to human existence, beauty and art should be a central ingredient not only in a philosophical or artistic life, but also in the lives of ordinary men and women. Another challenge for any attempt to characterize romantic aesthetics lies in the fact that most of the romantics were poets and artists whose views of art and beauty are, for the most part, to be found not in developed theoretical accounts, but in fragments, aphorisms and poems, which are often more elusive and suggestive than conclusive.

Nevertheless, in spite of these challenges the task of characterizing romantic aesthetics is neither impossible nor undesirable, as numerous thinkers responding to Lovejoy's radical skepticism have noted. While warning against a reductive definition of romanticism, Berlin, for example, still heralded the need for a general characterization: "[Although] one does have a certain sympathy with Lovejoy's despair...[he is] in this instance mistaken. There was a romantic movement...and it is important to discover what it is" ...

Recent attempts to characterize romanticism and to stress its contemporary relevance follow this path. Instead of overlooking the undeniable differences between the variety of romanticisms of different nations that Lovejoy had stressed, such studies attempt to characterize romanticism, not in terms of a single definition, a specific time, or a specific place, but in terms of "particular philosophical questions and concems" ...

While the German, British and French romantics are all considered, the central protagonists in the following are the German romantics. Two reasons explain this focus: first, because it has paved the way for the other romanticisms, German romanticism has a pride of place among the different national romanticisms . . . Second, the aesthetic outlook that was developed in Germany roughly between 1796 and 1801-02 — the period that corresponds to the heyday of what is known as "Early Romanticism" . . .— offers the most philosophical expression of romanticism since it is grounded primarily in the epistemological, metaphysical, ethical, and political concerns that the German romantics discerned in the aftermath of Kant's philosophy.

9. Which one of the following statements is NOT supported by the passage?
A. Characterising romantic aesthetics is both possible and desirable, despite the challenges involved.
B. Romantic aesthetics are primarily expressed through fragments, aphorisms, and poems.
C. Recent studies on romanticism seek to refute the differences between national romanticisms.
D. Many romantics rejected the idea of aesthetics as a domain separate from other aspects of life.

10. According to the passage, recent studies on romanticism avoid "a single definition, a specific time, or a specific place" because they:
A. prefer to focus on the fundamental concerns of the romantics.
B. seek to discredit Lovejoy's scepticism regarding romanticism.
C. understand that the variety of romanticisms renders a general analysis impossible.
D. prefer to highlight the paradox of romantic aesthetics as a concept.

11. The main difficulty in studying romanticism is the:
A. controversial and scandalous history of romantic literature.
B. elusive and suggestive nature of romantic aesthetics.
C. absence of written accounts by romantic poets and artists.
D. lack of clear conceptual contours of the domain.

12. According to the romantics, aesthetics:

A. should be confined to a specific domain separate from the practical and theoretical aspects of life.
B. permeates all aspects of human life, philosophical and mundane.
C. is primarily the concern of philosophers and artists, rather than of ordinary people.
D. is widely considered to be irrelevant to human existence.

DIRECTIONS for questions 13 - 16: The passage below is accompanied by a set of questions. Choose the best answer to each question.

The biggest challenge [The Nutmeg's Curse by Ghosh] throws down is to the prevailing understanding of when the climate crisis started. Most of us have accepted . . . that it started with the widespread use of coal at the beginning of the Industrial Age in the 18th century and worsened with the mass adoption of oil and natural gas in the 20th, Ghosh takes this history at least three centuries back, to the start of European colonialism in the 15th century. He [starts] the book with a 1621 massacre by Dutch invaders determined to impose a monopoly on nutmeg cultivation and trade in the Banda islands in today's Indonesia. Not only do the

Dutch systematically depopulate the islands through genocide, they also try their best to bring nutmeg cultivation into plantation mode. These are the two points to which Ghosh returns through examples from around the world. One, how European colonialists decimated not only indigenous populations but also indigenous understanding of the relationship between humans and Earth. Two, how this was an invasion not only of humans but of the Earth itself, and how this continues to the present day by looking at nature as a 'resource' to exploit…

We know we are facing more frequent and more severe heatwaves, storms, floods, droughts and wildfires due to climate change. We know our expansion through deforestation, dam building, canal cutting — in short, terraforming, the word Ghosh uses — has brought us repeated disasters . . . Are these the responses of an angry Gaia who has finally had enough? By using the word 'curse' in the title, the author makes it clear that he thinks so. use the pronoun 'who' knowingly, because Ghosh has quoted many non-European sources to enquire into the relationship between humans and the world around them so that he can question the prevalent way of looking at Earth as an inert object to be exploited to the maximum.

As Ghosh''s text, notes and bibliography show once more, none of this is new. There have always been challenges to the way European colonialists looked at other civilisations and at Earth. It is just that the invaders and their myriad backers in the fields of economics, politics, anthropology, philosophy, literature, technology, physics, chemistry, biology have dominated global intellectual discourse. . . .

There are other points of view that we can hear today if we listen hard enough. Those observing global climate negotiations know about the Latin American way of looking at Earth as Pachamama (Earth Mother). They also know how such a framing is just provided lip service and is ignored in the substantive portions of the negotiations. In The Nutmeg's Curse, Ghosh explains why. He shows the extent of the vested interest in the oil economy — not only for oil-exporting countries, but also for a superpower like the US that controls oil drilling, oil prices and oil movement around the world. Many of us know power utilities are sabotaging decentralised solar power generation today because it hits their revenues and control. And how the other points of view are so often drowned out.

13. On the basis of information in the passage, which one of the following is NOT a reason for the failure of policies seeking to address climate change?
A. The marginalised status of non-European ways of looking at nature and the environment.
B. The greed of organisations benefiting from non-renewable energy resources.
C. The global dominance of oil economies and international politics built around it.
D. The decentralised characteristic of renewable energy resources like solar power.

14. Which one of the following, if true, would make the reviewer's choice of the pronoun "who" for Gala Inappropriate?
A. There is a direct cause—effect relationship between human activities and global climate change.
B. Ghosh's book has a different title: "The Nutmeg's Revenge".
C. Modem western science discovers new evidence for the Earth being an inanimate object.
D. Non-European societies have perceived the Earth as a non-living source of all resources.

15. Which one of the following best explains the primary purpose of the discussion of the colonisation of the Banda Islands In "The Nutmeg's Curse"?

A. To illustrate how systemic violence against the colonized constituted the cornerstone of colonialism.
B. To illustrate the first instance in history when the processes responsible for climate change were initiated.
C. To illustrate how colonialism represented and perpetuated the mindset that has led to climate change.
D. To illustrate the role played by the cultivation of certain crops in the plantation mode in contributing to climate change.

16. All of the following can be inferred from the reviewer's discussion of "The Nutmeg''s Curse", EXCEPT:
A. the history of climate change is deeply intertwined with the history of colonialism.
B. the contemporary dominant perception of nature and the environment was put in place by processes of colonialism.
C. environmental preservation policy makers can learn a lot from non-European and/or pre-colonial societies.
D. academic discourses have always served the function of raising awareness about environmental preservation.

17. DIRECTIONS for the question: There is a sentence missing in the paragraph below. Look at the paragraph and decide in which blank (option 1, 2, 3, or 4) the following sentence would best fit.
Sentence: For theoretical purposes, arguments may be considered as freestanding entities, abstracted from their contexts of use in actual human activities.
Paragraph: ___ (A)___. An argument can be defined as a complex symbolic structure where some parts, known as the premises, offer support to another part, the conclusion. Alternatively, an argument can be viewed as a complex speech act consisting of one or more acts of premising (which assert propositions in favor of the conclusion), an act of concluding, and a stated or implicit marker ("hence", "therefore) that indicates that the conclusion follows from the premises.__ (B)___. The relation of support between premises and conclusion can be cashed out in different ways: the premises may guarantee the truth of the conclusion, or make Its truth more probable; the premises may imply the conclusion; the premises may make the conclusion more acceptable (or assertible).__ (C)___. But depending on one's explanatory goals, there is also much to be gained from considering arguments as they in fact occur in human communicative practices. (D).
A. Blank A B. Blank B C. Blank C D. Blank D

18. DIRECTIONS for the question: There is a sentence missing in the paragraph below. Look at the paragraph and decide in which blank (option 1, 2, 3, or 4) the following sentence would best fit.
Sentence: Beyond undermining the monopoly of the State on the use of force, armed conflict also creates an environment that can enable organized crime to prosper.
Paragraph: __(1)___. Linkages between illicit arms, organized crime, and armed conflict can reinforce one another while also escalating and prolonging violence and eroding governance.___(2)__. Financial gains from crime can lengthen or intensify armed conflicts by creating revenue streams for non-State armed groups (NSAGs).___(3)___. In this context, when hostilities cease and parties to a conflict move towards a peaceful resolution, the widespread availability of surplus arms and ammunition can contribute to a situation of 'criminalized peace' that obstructs sustainable peace building efforts. (4)___.
A. Blank A B. Blank B C. Blank C D. Blank D

19. DIRECTIONS for the question: 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. Although hard skills have traditionally ruled the roost, some companies are moving away from choosing prospective hires based on technical abilities alone.
2. Companies are shaking off the old definition of an ideal candidate and ditching the idea of looking for the singularly perfect candidate altogether.
3. Now, some job descriptions are frequently asking for candidates to demonstrate soft skills, such as leadership or teamwork.
4. That's not to say that practical know-how is no longer required - some jobs still call for highly specific expertise
5. The move towards prioritising soft skills "is a natural response to three years of the pandemic" says a senlor recrulter at Cenlar FSB.

20. DIRECTIONS for the question: 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. Boa Senior, who lived through the 2004 tsunami, the Japanese occupation and diseases brought by British settlers, was the last native of the island chain who was fluent in Bo.
2. The indigenous population has been steadily collapsing since the island chain was colonized by British settlers in 1858 and used for most of the following 100 years as a colonial penal colony.
3. Taking its name from a now-extinct tribe, Bo is one of the 10 Great Andamanese languages, which are thought to date back to pre-Neolithic human settlement of south-east Asia.
4. The last speaker of an ancient tribal language has died in the Andaman Islands, breaking a 65,000-year link to one of the world's oldest cultures.
5. Though the language has been closely studied by researchers of linguistic history, Boa Senior spent the last few years of her life unable to converse with anyone in her mother tongue.

21. DIRECTIONS for the question: The question consists of four statements labelled 1, 2, 3 and 4, which when logically ordered, form a coherent paragraph. Rearrange the statements to construct a coherent paragraph and then type your answer in the box provided.

1. Veena Sahajwalla, a materials scientist at the University of New South Wales, believes there is a new way of solving this problem.
2. Her vision is for automated drones and robots to pick out components, put them into a small furnace and smelt them at specific temperatures to extract the metals one by one before they are sent off to manufacturers for reuse.
3. E-waste contains huge quantities of valuable metals, ceramics and plastics that could be salvaged and recycled, although currently not enough of it is.
4. She plans to build microfactories that can tease apart the tangle of materials in mobile phones, computers and other e-waste.

22. DIRECTIONS for the question: The question consists of four statements labelled 1, 2, 3 and 4, which when logically ordered, form a coherent

paragraph. Rearrange the statements to construct a coherent paragraph and then type your answer in the box provided.

1. Centuries later formal learning is still mostly based on reading, even with the widespread use of other possible education-affecting technologies such as film, radio, and television.
2. One of the immediate and recognisable impacts of the printing press was on how people learned; in the scribal culture it primarily involved listening, so memorization was paramount.
3. The transformation of learners from listeners to readers was a complex social and cultural phenomenon, and it was not until the industrial era that the concept of universal literacy took root.
4. The printing press shifted the learning process, as listening and memorization gradually gave way to reading and learning no longer required the presence of a mentor; it could be done privately.

23. DIRECTIONS for the question: The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

The weight of society's expectations is hardly a new phenomenon but it has become particularly draining over recent decades, perhaps because expectations themselves are so multifarious and contradictory. The perfectionism of the 1950s was rooted in the norms of mass culture and captured in famous advertising images of the ideal white American family that now seem self-satirising. In that era, perfectionism meant seamlessly conforming to values, behaviour and appearance: chiselled confidence for men, demure graciousness for women. The perfectionist was under pressure to look like everyone else, only more so. The perfectionists of today, by contrast, feel an obligation to stand out through their idiosyncratic style and wit if they are to gain a foothold in the attention economy.
A. The desire to attract attention is so deep-rooted in individual consciousness that people are willing to go to any lengths to achieve it.
B. Though long-standing, the pressure to appear perfect and thereby attract attention, has evolved over time from one of conformism to one of non-conformism.
C. The image of perfectionism is reflected in and perpetuated by the media; and people do their best to adhere to these ideals.
D. The pressure to appear perfect has been the cause of tension and conflict because the idea itself has been in a state of flux and hard to define.

24. DIRECTIONS for the question: The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

Gradually, life for the island's birds is improving. Antarctic prions and white-headed petrels, which also nest in burrows, had managed to cling on in some sites while pests were on the island. Their numbers are now increasing. "It's fantastic and so exciting," Shaw says. As birds return to breed, they also poo. This adds nutrients to the soil, which in turn helps the plants to grow back stronger. Tall plants then help burrowing birds hide from predatory skuas. "It's this wonderful feedback loop," Shaw says. Today, the "pretty paddock" that Houghton first experienced has been transformed. "The tussock is over your head, and you're dodging all these penguin tunnels," she says. The orchids and tiny herb that had been protected by fencing have started turning up all over the place.

A. In the absence of pests, life on the island is now protected, and there has been a revival of a variety of birds and plants.
B. There is a huge positive transformation of the ecosystem of the island when brought under environmental protection.
C. There is an increasing number of predatory birds and plants on the island despite the presence of pests which is a positive development.
D. Flowering plants, herbs and birds are now being protected on this wonderful Antarctic island.

QUANTIFIERS CAT ACADEMY

CAT 2023 Slot – 3 DILR

DIRECTIONS for questions 1 - 5: Read the information given below and answer the question that follows.

An air conditioner (AC) company has four dealers — D1, D2, D3 and D4 in a city. It is evaluating sales performances of these dealers. The company sells two variants of ACs — Window and Split. Both these variants can be either Inverter type or non-inverter type. It is known that of the total number of ACs sold in the city, 25% were of Window variant, while the rest were of Split variant. Among the Inverter ACs sold, 20% were of Window variant.
The following information is also known:
1. Every dealer sold at least two window ACs.
2. D1 sold 13 inverter ACs, while D3 sold 5 non-inverter ACs.
3. A total of six Window Non-inverter ACs and 36 Split Inverter ACs were sold in the city.
4. The number of Split ACs sold by D1 was twice the number of Window ACs sold by it.
5. D3 and D4 sold an equal number of Window ACs and this number was one-third of the number of similar ACs sold by D2.
6. D2 and D3 were the only ones who sold Window Non-inverter ACs. The number of these ACs sold by D2 was twice the number of these ACs sold by D3.
7. D3 and D4 sold an equal number of Split Inverter ACs. This number was half the number of similar ACs sold by D2.

1. How many Split Inverter ACs did D2 sell?

2. What percentage of ACs sold were of non-inverter type?

3. What was the total number of ACs sold by D2 and D4?

4. Which of the following statements is necessarily false?
A. D1 and D3 together sold more ACs as compared to D2 and D4 together.
B. D4 sold more Split ACs as compared to D3.
C. D2 sold the highest number of ACs.
D. D1 and D3 sold an equal number of Split ACs.

5. If D3 and D4 sold an equal number of ACs, then what was the number of non-inverter ACs sold by D2?
A. 5 B. 7 C. 6 D. 4

DIRECTIONS for questions 6 - 10: Read the information given below and answer the question that follows.

There are only three female students — Amala, Koli and Rini — and only three male students — Biman, Mathew and Shyamal — in a course. The course has two evaluation components, a project and a test. The aggregate score in the course is a weighted average of the two components, with the weights being positive and adding to 1.
The projects are done in groups of two, with each group consisting of a female and a male student. Both the group members obtain the same score in the project.
The following additional facts are known about the scores in the project and the test.

1. The minimum, maximum and the average of both project and test scores were identical – 40, 80 and 60, respectively.
2. The test scores of the students were all multiples of 10; four of them were distinct and the remaining two were equal to the average test scores.
3. Amala's score in the project was double that of Koli in the same, but Koli scored 20 more than Amala in the test. Yet Amala had the highest aggregate score.
4. Shyamal scored the second highest in the test. He scored two more than Koli, but two less than Amala in the aggregate.
5. Biman scored the second lowest in the test and the lowest in the aggregate.
6. Mathew scored more than Rini in the project, but less than her in the test.

6. What was Rini's score in the project?

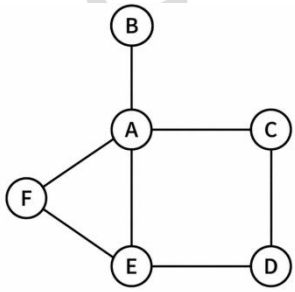
7. What was the weight of the test component?
A. 0.50 B. 0.60 C. 0.40 D. 0.75

8. What was the maximum aggregate score obtained by the students?
A. 68 B. 80 C. 66 D. 62

9. What was Mathew's score in the test?

10. Which of the following pairs of students were part of the same project team?
I. Amala and Biman
II. Koli and Mathew
A. Both (I) and (II) B. Only (II) C. Neither (I) nor (II) D. Only (I)

DIRECTIONS for questions 11 - 15: Read the information given below and answer the question that follows.
A, B, C, D, E and F are the six police stations in an area, which are connected by streets as shown below. Four teams - Team 1, Team 2, Team 3 and Team 4 - patrol these streets continuously between 09:00 hrs and 12:00 hrs each day.



The teams need 30 minutes to cross a street connecting one police station to another. All four teams start from Station A at 09:00 hrs and must return to Station A by 12:00 hrs. They can also pass via Station A at any point on their journeys.
The following facts are known.
1. None of the streets has more than one team traveling along it in any direction at any point in time.
2. Teams 2 and 3 are the only ones in stations E and D respectively at 10:00 hrs.
3. Teams 1 and 3 are the only ones in station E at 10:30 hrs.
4. Teams 1 and 4 are the only ones in stations B and E respectively at 11:30 hrs.
5. Team 1 and Team 4 are the only teams that patrol the street connecting stations A and E.
6. Team 4 never passes through Stations B, D or F.

11. Which one among the following stations is visited the largest number of times?
A. Station F B. Station C C. Station D D. Station E

12. How many times do the teams pass through Station B in a day?

13. Which team patrols the street connecting Stations D and E at 10:15 hrs?
A. Team 3 B. Team 4 C. Team 2 D. Team 1

14. How many times does Team 4 pass through Station E in a day?

15. How many teams pass through Station C in a day?
A. 4 B. 1 C. 2 D. 3

DIRECTIONS for questions 16 - 20: Read the information given below and answer the question that follows.
In a coaching class, some students register online, and some others register offline. No student registers both online and offline; hence the total registration number is the sum of online and offline registrations. The following facts and table pertain to these registration numbers for the five months — January to May of 2023. The table shows the minimum, maximum, median registration numbers of these five months, separately for online, offline and total number of registrations. The following additional facts are known.
1. In every month, both online and offline registration numbers were multiples of 10.
2. In January, the number of offline registrations was twice that of online registrations.
3. In April, the number of online registrations was twice that of offline registrations.
4. The number of online registrations in March was the same as the number of offline registrations in February.
5. The number of online registrations was the largest in May.

	Minimum	Maximum	Median
Online	40	100	80
Offline	30	80	50
Total	110	130	120

16. What was the total number of registrations in April?

17. What was the number of online registrations in January?

18. Which of the following statements can be true?
I. The number of offline registrations was the smallest In May.
II. The total number of registrations was the smallest in February.
A. Only I B. Neither I nor II C. Only II D. Both I and II

19. What best can be concluded about the number of offline registrations in February?
A. 50 or 80 B. 30 or 50 or 80 C. 50 D. 80

20. Which pair of months definitely had the same total number of registrations?
I. January and April
II. February and May

A. Neither I nor II B. Only II C. Both I and II D. Only I

QUANTIFIERS CAT ACADEMY

CAT 2023 Slot 3 Quant

DIRECTIONS for the questions: Solve the following questions and mark the best possible option.

1. For a real number x, if $\frac{1}{2}, \frac{\log_3(2^x-9)}{\log_3 4}$ and $\frac{\log_5\left(2^x+\frac{17}{2}\right)}{\log_5 4}$ are in an arithmetic progression, then the common difference is

A. $\log_4\left(\frac{7}{2}\right)$ B. $\log_4\left(\frac{3}{2}\right)$ C. $\log_4\left(\frac{23}{2}\right)$ D. $\log_4 7$

2. If x is a positive real number such that $x^8 + \left(\frac{1}{x}\right)^8 = 47$, then the value of $x^9 + \left(\frac{1}{x}\right)^9$ is

A. $30\sqrt{5}$ B. $34\sqrt{5}$ C. $40\sqrt{5}$ D. $36\sqrt{5}$

3. For some real numbers a and b, the system of equations $x + y = 4$ and $(a + 5)x + (b^2 - 15)y = 8b$ has infinitely many solutions for x and y. Then, the maximum possible value of ab is

A. 25 B. 33 C. 55 D. 15

4. Let n and m be two positive integers such that there are exactly 41 integers greater than 8^m and less than 8^n, which can be expressed as powers of 2. Then, the smallest possible value of n + m is

A. 16 B. 44 C. 14 D. 42

5. Let n be any natural number such that $5^{n-1} < 3^{n+1}$. Then, the least integer value of m that satisfies $3^{n+1} < 2^{n+m}$ for each such n, is

6. A quadratic equation $x^2 + bx + c = 0$ has two real roots. If the difference between the reciprocals of the roots is 1/3 and the sum of the reciprocals of the squares of the roots is 5/9, then the largest possible value of (b +c) is

7. The sum of the first two natural numbers, each having 15 factors (including 1 and the number itself), is

8. Anil mixes cocoa with sugar in the ratio 3: 2 to prepare mixture A, and coffee with sugar in the ratio 7: 3 to prepare mixture B. He combines mixtures A and B in the ratio 2: 3 to make a new mixture C. If he mixes C with an equal amount of milk to make a drink, then the percentage of sugar in this drink will be

A. 17 B. 24 C. 16 D. 21

9. Rahul, Rakshita and Gurmeet, working together, would have taken more than 7 days to finish a job. On the other hand, Rahul and Gurmeet, working together would have taken less than 15 days to finish the job. However, they all worked together for 6 days, followed by Rakshita, who worked alone for 3 more days to finish the job. If Rakshita had worked alone on the job, then the number of days she would have taken to finish the job, cannot be

A. 17 B. 16 C. 21 D. 20

10. The population of a town in 2020 was 100000. The population decreased by y% from the year 2020 to 2021, and increased by x% from the year 2021 to 2022, where x and y are two natural numbers. If population in 2022 was greater than the population in 2020 and the difference between x and y is 10, then the lowest possible population of the town in 2021 was

A. 72000 B. 75000 C. 74000 D. 73000

11. A merchant purchases a cloth at a rate of Rs.100 per meter and receives 5 cm length of cloth free for every 100 cm length of cloth purchased by him. He sells the same cloth at a rate of Rs.110 per meter but cheats his customers by giving 95 cm length of cloth for every 100 cm length of cloth purchased by the customers. If the merchant provides a 5% discount, the resulting profit earned by him is

A. 15.5% B. 4.2% C. 9.7% D. 16%

12. There are three persons A, B and C in a room. If a person D joins the room, the average weight of the persons in the room reduces by x kg. Instead of D, if person E joins the room, the average weight of the persons in the room increases by 2x kg. If the weight of E is 12 kg more than that of D, then the value of x is

A. 2 B. 1 C. 0.5 D. 1.5

13. A boat takes 2 hours to travel downstream a river from port A to port B, and 3 hours to return to port A. Another boat takes a total of 6 hours to travel from port B to port A and return to port B. If the speeds of the boats and the river are constant, then the time, in hours, taken by the slower boat to travel from port A to port B is

A. $3(\sqrt{5}-1)$ B. $12(\sqrt{5}-2)$ C. $3(3+\sqrt{5})$ D. $3(3-\sqrt{5})$

14. Gautam and Suhani, working together, can finish a job in 20 days. If Gautam does only 60% of his usual work on a day, Suhani must do 150% of her usual work on that day to exactly make up for it. Then, the number of days required by the faster worker to complete the job working alone is

15. The number of coins collected per week by two coin-collectors A and B are in the ratio 3: 4. If the total number of coins collected by A in 5 weeks is a multiple of 7, and the total number of coins collected by B in 3 weeks is a multiple of 24, then the minimum possible number of coins collected by A in one week is

16. A fruit seller has a stock of mangoes, bananas and apples with at least one fruit of each type. At the beginning of a day, the number of mangoes make up 40% of his stock. That day, he sells half of the mangoes, 96 bananas and 40% of the apples. At the end of the day, he ends up selling 50% of the fruits. The smallest possible total number of fruits in the stock at the beginning of the day is

17. Let ΔABC be an isosceles triangle such that AB and AC are of equal length. AD is the altitude from A on BC and BE is the altitude from B on AC. If AD and BE intersect at O such that $\angle AOB = 105°$, then AD/BE equals

A. cos 15° B. 2 sin 15° C. 2 cos 15° D. sin 15°

18. A rectangle with the largest possible area is drawn inside a semicircle of radius 2 cm. Then, the ratio of the lengths of the largest to the smallest side of this rectangle is

A. $\sqrt{5}$: 1 B. 2: 1 C. $\sqrt{2}$: 1 D. 1: 1

19. In a regular polygon, any interior angle exceeds the exterior angle by 120 degrees. Then, the number of diagonals of this polygon is

20. The value of $1+\left(1+\frac{1}{3}\right)\frac{1}{4}+\left(1+\frac{1}{3}+\frac{1}{9}\right)\frac{1}{16}+\left(1+\frac{1}{3}+\frac{1}{9}+\frac{1}{27}\right)\frac{1}{64}+\cdots$ is

A. 27/12 B. 15/8 C. 16/11 D. 15/13

21. Let $a_n = 46 + 8n$ and $b_n = 98 + 4n$ be two sequences for natural numbers $n \leq 100$. Then, the sum of all terms common to both the sequences is

A. 15000 B. 14900 C. 14602 D. 14798

22. Suppose f(x, y) is a real valued function such that f(3x + 2y, 2x – 5y) = 19x, for all real numbers x and y. The value of x for which f(x, 2x) = 27, is

QUANTIFIERS CAT ACADEMY

Solutions:
VARC

1. Correct Answer: D

This question tests your ability to identify the author's overall endorsement of Pinker's ideas rather than focusing on isolated examples from the passage. While the author offers some criticisms of Pinker's work, he clearly appreciates Pinker's argument that rational thinking is a valuable tool for navigating real-world challenges.
Option **D** is correct because the passage explicitly states that Pinker's focus is on "conscious, sequential reasoning" and that mastery of the tools of rationality can improve decision-making in "medical, legal, financial and many other contexts in which we must act on uncertain and shifting information." This shows that the author agrees with Pinker's view that logical reasoning equips people to deal effectively with practical problems and make better decisions in complex situations.
Why the other options are incorrect:
A) focuses public attention on real issues like development rather than sensational events.
This option is based on a specific example mentioned in the passage. Pinker argues that excessive media attention to rare events can divert resources away from important issues such as malnutrition. However, this is only one application of rational thinking and not the primary reason the author endorses Pinker's views. The broader endorsement concerns rationality as a tool for solving practical problems, not merely redirecting public attention.
B) provides a moral compass for resolving important ethical dilemmas.
The author actually criticizes Pinker for not sufficiently developing the moral and ethical dimensions of rationality. The passage notes that although Pinker recognizes rationality as a moral virtue, this aspect is "underexplored." Therefore, the author does not endorse Pinker on the basis of providing moral guidance.
C) helps people to gain expertise in statistics and other scientific disciplines.
The passage does praise Pinker's discussion of statistics and scientific uncertainty, calling it timely and valuable. However, the author's approval of Pinker's ideas is not limited to acquiring expertise in statistics or science. Instead, the emphasis is on the broader usefulness of rational thinking across many domains of life. Hence, this option is too narrow.
In summary, the author's central appreciation of Pinker's work lies in its demonstration that rational and logical reasoning can significantly improve decision-making and help people address a wide range of real-world challenges. Therefore, **Option D** is the best answer.

2. Correct Answer: D

Why D is the right answer (the EXCEPT):
The passage explicitly *contrasts* conscious sequential reasoning with great human achievements:
"Many of the deepest insights in the history of science, math, music and art strike their originators in moments of epiphany" — Kekulé, Mozart, even Socrates attributed profound insights to **dreams and visions**.
So, the passage argues that seminal achievements **cannot** be reduced to conscious sequential reasoning alone. This means neither Pinker's framework nor the Greek philosophers treat it as *primary* for extraordinary breakthroughs — making D something **neither** fully endorses as stated.

Why A, B, and C are all things BOTH Pinker and the Greeks endorsed (so they're eliminated):

Option	Evidence in Passage
A	Pinker calls rationality *"not just a cognitive virtue but a moral one"*; Aristotle and Plato explored this deeply
B	Socrates showed *"the virtue of knowing what you do not know and examining all premises"* — directly matches this
C	Socrates warned against *"simply trusting speakers' authority or charisma"* — independent conclusions regardless of who is speaking

---

The key skill tested: In EXCEPT questions, three options must be *positively supported* by the passage. Your job is to find the one that is either **contradicted** or **absent** — here, D is actively undermined by the epiphany argument, making it the clear outlier.

3. Correct Answer: B

Why B is the right answer:
The author's reference to Greek philosophers appears in the final paragraph, where the critique is explicit:
"The role of moral and ethical education in promoting rational behavior is also underexplored... this profoundly important point, one subtly explored by ancient Greek philosophers like Plato and Aristotle, doesn't really get developed."
The Greeks are invoked specifically as a **benchmark** — they explored the moral dimension of rationality with far greater depth, which makes Pinker's treatment look comparatively shallow. The philosophers aren't mentioned admiringly in isolation; they serve as a **critical foil** to expose what Pinker missed.

Why the other options fail:

Option	Why It's Wrong
A	The author's tone is **comparative and critical**, not celebratory of similarities. The point is what Pinker *lacks*, not where he *agrees* with the Greeks
C	The passage makes **no causal claim** that Greek thought influenced Pinker. Assuming intellectual lineage without textual evidence is a classic trap
D	Dreams and visions are mentioned in a **separate paragraph** about epiphanies and Kekulé/Mozart — the Greek reference there is incidental. The *primary* purpose of invoking the Greeks is ethical, not psychological

---

The key skill tested here: Identifying the **authorial purpose** behind a reference requires asking — *why does the author bring this up at this moment in the argument?* The Greeks appear precisely when the author shifts to criticizing Pinker's underdeveloped ethics, which makes B the only answer aligned with the passage's argumentative structure.

4. Correct Answer: B

Why B is the right answer:
The author uses these two examples in direct service of this argument:
"Many of the deepest insights in the history of science, math, music and art strike their originators in moments of epiphany... much extraordinary human achievement is not a product of conscious, sequential reasoning."
Kekulé (chemistry) and Mozart (music) are deliberately chosen from **different fields** to show that intuitive breakthroughs are a **universal phenomenon** — not confined to any single domain. The point is broad: great innovations anywhere can emerge from flashes of intuition rather than logical step-by-step reasoning.

Why the other options fail:

Option	Why It's Wrong
A	Creates a false **sciences vs. other fields** distinction — the passage explicitly groups science, math, music and art *together* as sharing this phenomenon
C	The reverse of A's error — narrows the claim to science benefitting from creativity, when the passage's whole point is that **all fields** share this characteristic
D	Introduces two unsupported ideas — that this is specifically **European**, and that it **contradicts** Pinker. The passage doesn't frame these as counterexamples to Pinker but as a *complementary consideration* he overlooked

---

The key skill tested here: Recognizing the **scope** of an argument is critical. Options A and C both commit the error of artificially narrowing the author's claim to one domain over another, when the examples are chosen precisely to demonstrate the claim **crosses all domains**. Always match the answer's scope to the passage's actual scope.

5. Correct Answer: C

Why C is the right answer:
The passage's central argument is:
"Strict cultural patrimony laws reduce incentives for foreign governments, NGOs and educational institutions to invest in overseas exploration because their efforts will not necessarily be rewarded by opportunities to hold, display and study what is uncovered."
The entire logic rests on a **funding gap** — strict laws discourage foreign investment, leaving poor source countries unable to finance their own excavations, resulting in fewer discoveries.
If UNESCO finances archaeological research in poor but archaeologically-rich countries, this **directly plugs the funding gap** that the author identifies as the core problem. Source countries could maintain strict patrimony laws AND still have discoveries funded — completely dismantling the author's recommendation to **narrow** those laws.

Why the other options fail:

Option	Why It Fails to Undermine
A	Actually **supports** the passage — local museums displaying local artifacts

Option	Why It Fails to Undermine
	aligns perfectly with cultural pride and tourism benefits the author mentions
B	Also **supports** the passage — the author already acknowledges *"to the extent that source countries can fund their own projects, artifacts may still be discovered."* Affluent countries doing so is consistent with, not against, the argument
D	Completely **irrelevant** to the central argument — apologies address historical injustice but have no bearing on whether strict laws reduce future archaeological discoveries

---

The key skill tested here: To undermine a central argument, an answer must **remove a necessary condition** the argument depends upon. Here the argument depends on a funding gap — C eliminates that gap entirely, making it the only option that truly weakens the core claim.

6. Correct Answer: A

Why A is the right answer:
A paradox requires two things: a **good intention** that produces an **opposite or contradictory outcome**. The passage sets this up perfectly:

- **Intention:** *"Patrimony laws were intended to protect future archaeological discoveries against Western imperialist designs"*
- **Outcome:** *"The number of discovered sites diminishes sharply after a country passes a cultural property law"*

The laws designed to **protect and preserve** cultural heritage ended up **preventing its very discovery** — that is the core paradox. You cannot protect what you never find.

Why the other options fail:

Option	Why It's Wrong
B	Sotheby's is mentioned only **once**, as an incidental example of a repatriation case. The passage is not concerned with the commercial auction market at all
C	The passage never argues that artifacts are being **withheld from museums** — in fact, the opening examples show museums *returning* artifacts, which is the opposite dynamic
D	**Neglect of historical sites** is never mentioned as a consequence of patrimony laws. The passage's measured concern is specifically about **undiscovered** sites, not neglected known ones

---

The key skill tested here: Identifying a paradox requires precisely matching **both halves** — the original intent and the unintended consequence. Options B, C and D each get the intention right but pair it with a consequence that is either **absent from the passage**, **contradicted by the passage**, or **too peripheral** to represent the central paradox. Only A captures both halves accurately.

7. Correct Answer: A

Why A is the right answer:
The passage directly states the benefits source countries derive from archaeological discoveries:
"It suggests that source countries, particularly in the developing world, should narrow their cultural property laws so that they can reap the benefits of new archaeological discoveries, which typically ***increase tourism*** *and* ***enhance cultural pride****."*
This is the only place in the passage where the author explicitly explains *why* source countries value archaeological sites — making A the only inference directly and unambiguously supported by the text.

Why the other options fail:

Option	Why It's Wrong
B	Patrimony laws are a **response to** the importance of sites, not the **reason for** their importance — this reverses the causal relationship
C	The passage never establishes a revenue cycle where discoveries **fund further discoveries** — this is an attractive but unsupported logical leap
D	Western imperialism is presented as a **historical threat** to cultural property, not as a reason source countries value their sites — in fact it is the **opposite** of why they matter

---

The key skill tested here: Inference questions must be grounded in **explicit textual evidence**, not plausible reasoning. Options C and D are particularly tempting because they feel logically connected to the passage's themes — but inference means *what must be true based on what is stated*, not *what could reasonably follow*. Only A has a direct, unambiguous textual anchor, making it the safest and strongest inference.

8. Correct Answer: C

Why C is the right answer (the EXCEPT):
The author's central recommendation is:
"Source countries should narrow their cultural property laws so that foreign governments, NGOs and educational institutions have incentives to invest in overseas exploration."
The logic flows **inward** — attract foreign investment and collaboration *into* the source country. Option C reverses this by suggesting source countries **actively fund foreign institutes** to do the work — making poor source countries the *financiers* of external institutions. This directly contradicts the passage's premise that these countries **lack the financial resources** to begin with. You cannot advise a poor country to fund overseas institutes when the entire argument is built on their inability to self-finance.

Why A, B, and D are all advisable (and therefore eliminated):

Option	Textual Support
A	International collaboration inherently involves foreign analysis and exhibition — aligns with the collaborative model endorsed
B	China's post-2003 approach is explicitly **praised** — *"Since then, China has nominated 11 archaeological sites for UNESCO listing"* — making it a model

Option	Textual Support
	worth recommending
D	Directly supported — *"reduce incentives"* is the identified problem, so finding ways to **motivate** foreign countries to invest is precisely the author's solution

---

The key skill tested here: In EXCEPT questions involving inferences, watch for options that **invert the passage's logic** rather than merely going beyond it. C doesn't just lack support — it actively contradicts the foundational premise that poor source countries need *incoming* investment, not outgoing expenditure.

9. Correct Answer: C

Why C is the right answer (NOT supported):
The passage explicitly states the opposite of what C claims:
*"Instead of **overlooking** the undeniable differences between the variety of romanticisms of different nations that Lovejoy had stressed, such studies attempt to characterize romanticism... in terms of 'particular philosophical questions and concerns.'"*
Option C claims recent studies **refute** the differences between national romanticisms — but the passage says they **acknowledge and retain** those differences while finding a broader characterization that transcends them. This is a subtle but critical distortion — accepting differences is the exact opposite of refuting them.

Why A, B, and D are all supported (and therefore eliminated):

Option	Direct Textual Support
A	*"The task of characterizing romantic aesthetics is neither impossible nor undesirable"* — verbatim support
B	*"Views of art and beauty are to be found in fragments, aphorisms and poems, which are often more elusive and suggestive than conclusive"* — directly stated
D	*"Many of the romantics rejected the identification of aesthetics with a circumscribed domain of human life that is separated from the practical and theoretical domains"* — explicitly stated

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The key skill tested here: This question tests your ability to detect **subtle misrepresentation** of the passage. Option C feels plausible because recent studies *do* move beyond Lovejoy's obsession with differences — but the crucial distinction is between **transcending** differences and **refuting** them. The passage is careful to say differences are acknowledged, not denied. Always check whether the answer **preserves or distorts** the passage's precise logical relationship.

10. Correct Answer: A

Why A is the right answer:
The passage directly states the reasoning behind recent studies' approach:
"Such studies attempt to characterize romanticism, not in terms of a single definition, a specific time, or a specific place, but in terms of 'particular philosophical questions and concerns.'"
The phrase "**particular philosophical questions and concerns**" is precisely what Option A means by "**fundamental concerns of the romantics**" — recent studies anchor their analysis in the core intellectual preoccupations shared across different romanticisms rather than geographic or temporal boundaries.

Why the other options fail:

Option	Why It's Wrong
B	The goal of recent studies is to **characterize** romanticism meaningfully, not to **discredit** Lovejoy. In fact the passage says they *respond to* his skepticism while acknowledging its partial validity — a nuanced engagement, not a refutation
C	This directly **contradicts** the passage — Berlin explicitly states a general characterization is both possible and necessary: *"There was a romantic movement and it is important to discover what it is"*
D	The paradox of romantic aesthetics is mentioned as a **challenge** in an earlier part of the passage — it is never presented as something recent studies seek to highlight or foreground

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The key skill tested here: This question rewards careful attention to **textual substitution** — recognizing that "fundamental concerns" in Option A maps directly onto "particular philosophical questions and concerns" in the passage. When answer options paraphrase rather than quote the passage, always trace them back to their textual origin to verify the match is accurate and complete.

11. Correct Answer: D

Why D is the right answer:
The passage explicitly identifies the core difficulty through Lovejoy's analysis:
"The main difficulty in studying the romantics, according to him, is the lack of any 'single real entity, or type of entity' that the concept 'romanticism' designates... 'the word romantic has come to mean so many things that, by itself, it means nothing.'"
This is precisely what "**lack of clear conceptual contours**" means — the term romanticism has no stable, bounded definition. It cannot be pinned down to a single identifiable concept, making systematic study fundamentally difficult.

Why the other options fail:

Option	Why It's Wrong
A	The word "**scandal**" does appear in the passage (*"the scandal of literary history"*) but this is Lovejoy's **metaphor** for conceptual confusion — not a literal claim about controversial or scandalous historical events
B	The elusive and suggestive nature of romantic expression is identified as **an additional challenge** — specifically relating to aesthetic characterization —

Option	Why It's Wrong
	but it is secondary to the primary conceptual difficulty Lovejoy identifies
C	The passage states the **opposite** — romantics *did* leave written accounts, but these take the form of *"fragments, aphorisms and poems"* rather than developed theoretical texts

---

The key skill tested here: Option A is a particularly clever trap — it **reuses a word from the passage** (*scandal*) but shifts its meaning from metaphorical to literal. Always verify that an answer preserves not just the **vocabulary** but the **meaning and context** in which that vocabulary appears. Lovejoy called romanticism a scandal of *classification*, not of *history*.

12. Correct Answer: B

Why B is the right answer:
The passage explicitly states the romantic position on aesthetics:
*"The most characteristic romantic commitment is to the idea that the character of art and beauty and of our engagement with them should shape **all aspects of human life**... beauty and art should be a central ingredient not only in a philosophical or artistic life, but also in the lives of **ordinary men and women**."*
Option B captures both dimensions perfectly — aesthetics permeates **all aspects** of life (philosophical and mundane alike), and it belongs to **everyone**, not just a privileged few.

Why the other options fail:

Option	Why It's Wrong
A	Directly **contradicted** by the passage — *"many of the romantics rejected the identification of aesthetics with a circumscribed domain... separated from the practical and theoretical domains of life"*
C	Also directly **contradicted** — the passage explicitly extends aesthetics beyond philosophers and artists to *"ordinary men and women"* — making this the precise opposite of the romantic view
D	The passage states aesthetics is *"fundamental to human existence"* — making irrelevance a complete contradiction of the romantic position

---

The key skill tested here: This question is relatively straightforward but rewards **complete reading** of the relevant passage section. Options A and C are not merely unsupported — they are **explicitly refuted** by the text. When a passage directly contradicts an answer choice, that contradiction is itself strong evidence you have identified the wrong answer. Only B honours **both** elements of the romantic definition — universality across domains AND universality across people.

13. Correct Answer: D

Why D is the right answer (NOT a reason):
The passage states:
"Many of us know power utilities are sabotaging decentralised solar power generation today because it hits their revenues and control."
The **decentralised characteristic** of solar power is not a reason for policy failure — it is actually what makes solar power **threatening to vested interests**. The failure

comes from **external sabotage by power utilities**, not from anything inherent to solar power's decentralised nature. Option D misattributes the cause — it is the **resistance to** decentralised solar, not the decentralisation itself, that contributes to policy failure.

Why A, B, and C are all genuine reasons (and therefore eliminated):

Option	Direct Textual Support
A	*"Such framing is just provided lip service and is ignored in the substantive portions of the negotiations"* — non-European perspectives like Pachamama are systematically marginalised
B	*"Vested interest in the oil economy... power utilities sabotaging decentralised solar power because it hits their revenues"* — greed of beneficiaries is explicitly cited
C	*"A superpower like the US that controls oil drilling, oil prices and oil movement around the world"* — global dominance of oil economies directly named

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The key skill tested here: This question tests your ability to distinguish between a **phenomenon** and its **cause**. Decentralised solar power is not a problem — it is a **solution being undermined**. The failure lies with those who sabotage it, not with the characteristic of decentralisation itself. Misreading cause and effect is a common trap in NOT/EXCEPT questions involving complex policy arguments.

14. Correct Answer: D

Why D is the right answer:
The reviewer explicitly justifies the pronoun "who" on a specific basis:
*"I use the pronoun 'who' knowingly, because Ghosh has quoted many **non-European sources** to enquire into the relationship between humans and the world around them so that he can question the prevalent way of looking at Earth as an **inert object**."*
The entire justification for "who" rests on **two pillars:**

1. Non-European perspectives that treat Earth as a **living entity**
2. Questioning the Western view of Earth as an **inanimate resource**

If non-European societies themselves perceived Earth as a **non-living source of resources**, both pillars collapse simultaneously. The very foundation the reviewer uses to justify personifying Gaia would be destroyed — making "who" entirely inappropriate.

Why the other options fail:

Option	Why It's Wrong
A	A cause-effect relationship between human activity and climate change actually **supports** the idea of Earth responding to human actions — consistent with personification
B	The book's title is **irrelevant** to the grammatical and philosophical justification for the pronoun — changing a title changes nothing about the argument
C	Western science declaring Earth inanimate is already the **prevailing view being challenged** — it represents exactly what Ghosh argues against, so it

Option	Why It's Wrong
	cannot undermine the reviewer's position

The key skill tested here: To undermine a justification, you must **attack its specific foundation**. The reviewer's justification is explicitly grounded in non-European perspectives — so only an option that **directly contradicts those perspectives** can make the pronoun choice inappropriate. D does this precisely and completely.

15. Correct Answer: C

Option **C** is correct. Here is the precise breakdown:

Why C is the right answer:

The passage explicitly states the **two-part purpose** of the Banda Islands example: *"These are the two points to which Ghosh returns through examples from around the world. One, how European colonialists decimated not only indigenous populations but also **indigenous understanding of the relationship between humans and Earth**. Two, how this was an invasion not only of humans but of **the Earth itself**, and how this continues to the present day by looking at nature as a 'resource' to exploit."*

The Banda Islands massacre is therefore an **illustrative entry point** into Ghosh's broader argument — that colonialism embedded a **exploitative mindset toward Earth** that directly connects to the climate crisis. It represents a **pattern of thinking**, not merely an isolated historical event.

Why the other options fail:

Option	Why It's Wrong
A	Systemic violence is **acknowledged** but is not the primary purpose — the discussion consistently pivots from human violence to **environmental exploitation** as its central concern
B	The passage explicitly says Ghosh takes climate history *"at least three centuries back"* to colonialism — but never claims the Banda Islands massacre was the **first instance** of climate-changing processes
D	Nutmeg cultivation in plantation mode is a **detail within the example**, not its primary purpose — the focus is on the **mindset** plantation agriculture represents, not the agricultural practice itself

---

The key skill tested here: Distinguishing between a **detail** and a **purpose** is critical here. Options A and D both identify real elements present in the discussion but mistake **components of the example** for its **primary illustrative function**. Always ask — what larger argument does this example serve? Here it serves to establish colonialism as the origin of the climate-destroying mindset, making C the only answer that captures the full argumentative purpose.

16. Correct Answer: D

Why D is the right answer (NOT inferable):

The passage states the precise opposite:

*"The invaders and their myriad backers in the fields of economics, politics, anthropology, philosophy, literature, technology, physics, chemistry, biology have **dominated global intellectual discourse**."*
Far from raising awareness about environmental preservation, academic discourses have historically **served and reinforced colonial and exploitative interests**. The passage presents intellectual discourse as part of the **problem**, not the solution — making D not just unsupported but actively contradicted.

Why A, B, and C are all inferable (and therefore eliminated):

Option	Textual Basis for Inference
A	Ghosh takes climate history *"three centuries back to the start of European colonialism"* — direct link between colonialism and climate crisis
B	Colonialism decimated *"indigenous understanding of the relationship between humans and Earth"* replacing it with viewing nature as *"a resource to exploit"* — contemporary dominant perception traced to colonialism
C	The passage highlights how non-European perspectives like **Pachamama** offer alternative frameworks, and Ghosh draws on *"many non-European sources"* to question exploitative relationships with Earth

---

The key skill tested here: This question rewards recognising when an answer choice **inverts the passage's argument**. Option D sounds reasonable in isolation — one might assume academia raises environmental awareness — but the passage specifically frames academic discourse as having **entrenched** the exploitative worldview rather than challenged it. Always test inferences against the passage's **actual characterisation**, not your prior assumptions about institutions like academia.

17. Correct Answer: C

Why C is the right answer:
The missing sentence serves a precise **pivoting function** — it introduces the idea of abstracting arguments from real-world contexts *for theoretical purposes*. Placed at C, it works in perfect conjunction with the sentence that immediately follows:
*"**But** depending on one's explanatory goals, there is also much to be gained from considering arguments as they **in fact occur** in human communicative practices."*
The word **"But"** is the critical signal here — it signals a **contrast** that only makes sense if the preceding sentence established the theoretical/abstract position. The missing sentence sets up the abstraction; the "But" sentence pivots away from it. This contrast is the logical hinge the paragraph turns on.

Why the other positions fail:

Position	Why It's Wrong
A	The paragraph opens with defining an argument — the missing sentence's theoretical framing would be **premature** before any definition has been established
B	Position B falls mid-discussion of **alternative definitions** — inserting a meta-theoretical statement here would **interrupt** the flow of complementary perspectives

Position	Why It's Wrong
D	The final position is the paragraph's **conclusion**, already occupied by the practical applications statement — placing the theoretical abstraction sentence here would reverse the logical progression from theory to practice

---

The key skill tested here: Sentence insertion questions often hinge on **transition signals** — words like "but," "however," "nevertheless" that signal contrast. Always identify these signals first and work **backwards** to find what the contrasting sentence must have said. Here "But...in fact occur" demands a preceding sentence about theoretical abstraction — making C the only viable position.

18. Correct Answer: C

Why C is the right answer:
The paragraph follows a precise **logical progression:**

- **Blank 1:** Introduces the overall interconnection of illicit arms, organized crime and conflict
- **Blank 2:** Explains how crime financially sustains armed groups
- **Blank 3 (missing sentence):** Expands consequences — conflict undermines state monopoly on force AND enables organized crime to prosper
- **Blank 4:** Discusses post-conflict "criminalized peace" obstructing peacebuilding

The missing sentence acts as a **bridging mechanism** — it takes the discussion from how crime funds conflict (Blank 2) and broadens it to show how conflict in turn **creates conditions for organized crime** (a reciprocal relationship). This then logically leads to Blank 4's discussion of how this cycle persists even after hostilities cease.

Why the other positions fail:

Position	Why It's Wrong
A	The opening already establishes the broad interconnection theme — the missing sentence is too **specific** to serve as an introduction
B	Position B leads into financial gains from crime fuelling conflict — the missing sentence discusses the **reverse relationship** and would interrupt this specific point
D	The paragraph has already reached its **conclusion** about criminalized peace — adding the missing sentence after this would disrupt the logical endpoint

---

The key skill tested here: This question tests your ability to recognise **reciprocal causation** in an argument's structure. The paragraph builds a **circular relationship** — crime funds conflict, conflict enables crime. The missing sentence captures the second half of this cycle, and only position C allows it to complete the logical loop before the paragraph moves to post-conflict consequences.

19. Correct Answer: Option 2

Why 2 is the odd sentence out:

Sentence 2 introduces a **different and broader idea** — companies abandoning the concept of a "singularly perfect candidate" altogether. This goes beyond the soft skills vs. hard skills discussion that the other four sentences consistently develop. The remaining sentences form a tight, coherent argument:

- **1** → Introduces the shift away from purely technical hiring criteria
- **3** → Specifies what is replacing it — soft skills like leadership and teamwork
- **5** → Explains *why* this shift is happening — pandemic response
- **4** → Adds a qualification — hard skills are still needed in some roles

This forms a complete logical arc: **shift identified → new focus specified → reason given → qualification added.**

Why sentences 1, 3, 4 and 5 belong together:

Sentence	Role in Paragraph
1	Opening claim — traditional hard skills dominance being challenged
3	Development — soft skills now explicitly requested
5	Explanation — pandemic as driving force behind shift
4	Qualification — hard skills still relevant in specific contexts

---

Why 2 is disruptive:
Sentence 2 shifts focus from **soft skills vs. hard skills** to the **entirely different concept** of abandoning the idea of a perfect candidate. This introduces a new theme that none of the other sentences develop or connect to, making it the odd one out.
The key skill tested here: In odd sentence questions, the four belonging sentences should form a **self-sufficient paragraph** without the odd one. Always verify that removing your chosen sentence leaves a complete, coherent argument — here removing sentence 2 does exactly that.

20. Correct Answer: Option 2

Why 2 is the odd sentence out:
Sentence 2 focuses on the **broad demographic collapse** of the indigenous population due to British colonisation and the penal colony — a **general historical fact** about the Andaman Islands' population as a whole. The other four sentences maintain a tight, consistent focus on the **Bo language specifically** and its last speaker:

- **4** → Introduces the death of the last Bo speaker and the 65,000-year cultural link severed
- **1** → Profiles Boa Senior as the last fluent Bo speaker
- **3** → Describes Bo language's origins and linguistic significance
- **5** → Details Boa Senior's isolation in her final years, unable to converse in Bo

This forms a complete narrative arc: **event announced → last speaker profiled → language's history explained → final years described.**

Why sentences 4, 1, 3 and 5 belong together:

Sentence	Role in Paragraph
4	Opening — announces the death and its cultural significance
1	Elaborates on the last speaker's identity and life experiences

Sentence	Role in Paragraph
3	Provides linguistic and historical context for Bo specifically
5	Concludes with the poignant human dimension of language death

---

Why 2 is disruptive:
Sentence 2 shifts focus from **one language and its last speaker** to the **entire indigenous population's decline** — a categorically broader subject. It addresses colonisation's demographic impact rather than the linguistic and cultural loss that unifies the other four sentences.
The key skill tested here: Identify the paragraph's **central subject** precisely. Here it is specifically the Bo language and Boa Senior — not Andaman Islands colonisation generally. Sentence 2 is related to the topic but operates at the wrong **level of specificity**, making it the odd one out.

21. Correct Sequence: 3 → 1 → 4 → 2

The correct sequence is **3 → 1 → 4 → 2**. Here is the precise breakdown:

Why this sequence is correct:
The paragraph follows a classic **problem → solution → plan → method** structure:

Position	Sentence	Logical Role
First	**3**	Establishes the problem — e-waste contains valuable materials but insufficient recycling occurs
Second	**1**	Introduces the solution-provider — Veena Sahajwalla believes there is a new way to solve *this problem*
Third	**4**	Outlines her specific plan — microfactories to separate materials in e-waste devices
Fourth	**2**	Details the execution — drones, robots, furnaces extracting metals for manufacturer reuse

---

Key linking signals that confirm the order:

- Sentence 1 uses "**this problem**" — a demonstrative reference that only makes sense after sentence 3 has identified the problem
- Sentence 4 uses "**she plans**" — naturally follows sentence 1's introduction of Sahajwalla and her belief in a solution
- Sentence 2 uses "**her vision is**" — elaborates on the plan introduced in sentence 4, providing granular mechanical detail

The key skill tested here: In paragraph ordering questions, always look for **referential links** — pronouns and demonstratives like "this," "she," and "her vision" that point backwards to previously established information. These linguistic anchors create an **unambiguous chain** that locks sentences into their correct positions. Here the chain runs: problem identified → solver introduced → plan stated → method detailed.

22. Correct Sequence: 2 → 4 → 3 → 1

Why this sequence is correct:
The paragraph follows a clear **historical chronological progression:**

Position	Sentence	Logical Role
First	**2**	Establishes pre-printing press context — scribal culture relied on listening and memorisation
Second	**4**	Describes the immediate impact — printing press shifts learning from listening to reading
Third	**3**	Elaborates the broader cultural transformation — complex shift culminating in universal literacy
Fourth	**1**	Brings argument to present day — reading still dominates despite newer technologies

---

Key linking signals that confirm the order:

- Sentence 4 begins with "**The printing press shifted**" — directly continues sentence 2's introduction of the printing press's impact
- Sentence 3 refers to "**the transformation of learners from listeners to readers**" — only meaningful after sentence 4 has established this specific shift
- Sentence 1 opens with "**centuries later**" — a temporal marker that only works as a conclusion after the historical development in sentences 2, 4 and 3 has been established

The key skill tested here: Chronological paragraphs are anchored by **temporal markers** — "centuries later," "immediately," "not until the industrial era." Map these markers onto a timeline first, then verify with referential links. Here the timeline runs: pre-press scribal culture → press introduced → gradual cultural transformation → present day persistence, creating an unambiguous historical arc.

23. Correct Answer: B

Why B is the right answer:
An ideal summary must capture **both the continuity and the change** the passage describes. B does this precisely:

- "**Though long-standing**" — captures the opening point that societal expectations are not new
- "**Pressure to appear perfect**" — identifies the consistent underlying phenomenon across eras
- "**Evolved from conformism to non-conformism**" — captures the passage's central contrast between 1950s uniformity and contemporary individuality

The passage's entire argumentative structure rests on this **single evolutionary contrast** — making B the only option that faithfully represents the passage's core movement.

Why the other options fail:

Option	Why It's Wrong
A	Reduces the passage to a claim about **attention-seeking** being deep-rooted in individuals — but the passage is about **societal perfectionism norms**, not individual psychology or motivation
C	Focuses narrowly on **media's role** in perpetuating perfectionism — but the passage mentions advertising only as a single illustrative detail, not as its central argument

Option	Why It's Wrong
D	Emphasises **tension and conflict** arising from perfectionism's changing definition — but the passage is descriptive and analytical, not focused on conflict or tension as consequences

---

The key skill tested here: A good summary must capture the passage's **central argumentative move** — not its details, not its examples, and not implications beyond what is stated. Here the central move is a **historical contrast**: 1950s conformist perfectionism versus today's individualist perfectionism. Only B encapsulates this contrast completely while correctly framing it as an evolution of a longstanding phenomenon.

24. Correct Answer: A

Why A is the right answer:
A good summary must capture the passage's **central cause and its effects**. Option A does this precisely:

- "**In the absence of pests**" — correctly identifies the **root cause** of the ecosystem's recovery
- "**Revival of a variety of birds and plants**" — captures the **dual effect** the passage describes through the feedback loop of birds returning, nutrients enriching soil, plants growing stronger, and burrowing birds finding better protection

The passage's entire argument rests on this **causal chain** — pest removal → bird return → nutrient addition → plant growth → better bird protection — and A captures both the cause and the cumulative effect faithfully.

Why the other options fail:

Option	Why It's Wrong
B	Attributes recovery to "**environmental protection**" as a broad concept — but the passage specifically identifies **pest removal** as the key driver, making B imprecise about causation
C	Contains a **factual contradiction** — it suggests predatory birds are increasing *despite* pests, when the passage describes recovery *following* pest reduction. Skuas are mentioned as threats, not as positive indicators
D	Narrows focus to **protection of plants and birds** — missing the passage's emphasis on the **interconnected ecological feedback loop** that makes the recovery self-sustaining and remarkable

---

The key skill tested here: Summary questions require identifying the passage's **causal structure**, not just its topic. Options B and D both correctly identify the *outcome* (ecosystem revival) but misidentify or omit the *cause* (pest absence). A complete summary must capture **why** something happened, not just **what** happened — making A the only option that faithfully represents both dimensions.

DILR

1. Correct Answer: 14

Explanation:

Let us assume, A is the total number of AC's sold

⇒ From the information that the total number of ACs sold in the city, 25% were of Window variant

⇒ Window AC's = A/4 and Split AC's = 3A/4

Now, let us assume B is the total number of inverter ACs

⇒ From the information that among the Inverter ACs sold, 20% were of Window variant.

⇒ Window Inverter AC's = B/5 and Window Non-Inverter AC's = 4B/5

TABLE (A)			
Split(3A/4)		Window (A/4)	
Inv (4B/5)	Non - Inv	Inv (B/5)	Non – Inv

From – Condition - 3

⇒ A/4 – B/5 = 6 and 4B/5 = 36 ⟹ B = 46 and A = 60.

Total=60			
Split(3A/4)		Window (A/4)	
Inv (4B/5)	Non - Inv	Inv (B/5)	Non – Inv

Now, from condition-6

a) D1 & D4 sold "0" window non-inverter ACs ⇒ D2 & D3 sold 6 window non-inverter ACs, it is given that D2 sold twice as many as D3 ⇒ D2 sold 4 and D3 sold 2 ACs of this type.

From condition-2

b) Let us assume, D1 sold "x" window inverter ACs ⟹ Number of split inverter ACs sold is 13-x From, condition - 4

c) Number of split ACs sold by D1 will be "2x"

From condition-5

d) Let us assume 'y' is the number of window ACs sold by D3 & D4 ⟹ D2 sold 3y ACs of this type. From condition-7

e) Let us assume 'z' is the number of split inverter ACs sold by D3 and D4 ⟹ D2 sold 2z ACs of this type. Let us use a, b, c, d, and e make a table:

D1 Total =			
Split=		Window =	
Inv = 13 – x	Non - Inv	Inv = x	Non – Inv = 0
D2 Total =			
Split=		Window =3y	
Inv = 2z	Non - Inv	Inv = x	Non – Inv = 4
D3 Total =			
Split=		Window =y	
Inv = z	Non – Inv = 3	Inv =	Non – Inv = 2
D4 Total =			

Split =		Window =y	
Inv = z	Non – Inv =	Inv =	Non – Inv = 0

We know that the total number of window ACs is 15
⇒ x + 3y + y + y = 15 ⇒ x + 5y = 15, also x and y should be greater than or equal to 2 from condition – 1
⇒ x = 5 and y = 2 is the only solution.
Filling this in the table:

D1 Total =			
Split =		Window = 5	
Inv = 8	Non - Inv	Inv = 5	Non – Inv = 0
D2 Total =			
Split=		Window = 3y	
Inv = 2z	Non - Inv	Inv = 2	Non – Inv = 4
D3 Total =			
Split =		Window =2	
Inv = z	Non – Inv = 3	Inv = 0	Non – Inv = 2
D4 Total =			
Split =		Window = 2	
Inv = z	Non – Inv =	Inv = 2	Non – Inv = 0

Now, Number of split inverter ACs is 36
⇒ 8 + 2z + z + z = 36 ⇒ 4z = 28 ⇒ z = 7.
Filling this and using (5), the number of split AC's sold by D1 is 2× 5 = 10.

D1 Total = 15			
Split = 10		Window = 5	
Inv = 8	Non – Inv = 2	Inv = 5	Non – Inv = 0
D2 Total =			
Split =		Window =3y	
Inv = 14	Non – Inv =	Inv = 2	Non – Inv = 4
D3 Total =			
Split = 10		Window = 2	
Inv = 7	Non – Inv = 3	Inv =	Non – Inv = 2
D4 Total			
Split		Window =2	
Inv=7	Non – Inv=	Inv=2	Non – Inv=0

From the table, we see that 14 split inverter ACs are sold.

2. Correct Answer: 25
Explanation:

Let us assume, A is the total number of AC's sold

⇒ From the information that the total number of ACs sold in the city, 25% were of Window variant
⇒ Window AC's = A/4 and Split AC's = 3A/4
Now, let us assume B is the total number of inverter ACs
⇒ From the information that among the Inverter ACs sold, 20% were of Window variant.
⇒ Window Inverter AC's = B/5 and Window Non-Inverter AC's = 4B/5

TABLE (A)			
Split(3A/4)		Window (A/4)	
Inv (4B/5)	Non - Inv	Inv (B/5)	Non – Inv

From – Condition - 3
⇒ A/4 – B/5 = 6 and 4B/5 = 36 ⟹ B = 46 and A = 60.

Total=60			
Split(3A/4)		Window (A/4)	
Inv (4B/5)	Non - Inv	Inv (B/5)	Non – Inv

Now, from condition-6
a) D1 & D4 sold "0" window non-inverter ACs ⇒ D2 & D3 sold 6 window non-inverter ACs, it is given that D2 sold twice as many as D3 ⇒ D2 sold 4 and D3 sold 2 ACs of this type.
From condition-2
b) Let us assume, D1 sold "x" window inverter ACs ⟹ Number of split inverter ACs sold is 13-x From, condition - 4
c) Number of split ACs sold by D1 will be "2x"
From condition-5
d) Let us assume 'y' is the number of window ACs sold by D3 & D4 ⟹ D2 sold 3y ACs of this type. From condition-7
e) Let us assume 'z' is the number of split inverter ACs sold by D3 and D4 ⟹ D2 sold 2z ACs of this type. Let us use a, b, c, d, and e make a table:

D1 Total =			
Split=		Window =	
Inv = 13 – x	Non - Inv	Inv = x	Non – Inv = 0
D2 Total =			
Split=		Window =3y	
Inv = 2z	Non - Inv	Inv = x	Non – Inv = 4
D3 Total =			
Split=		Window =y	
Inv = z	Non – Inv = 3	Inv =	Non – Inv = 2
D4 Total =			
Split =		Window =y	
Inv = z	Non – Inv =	Inv =	Non – Inv = 0

We know that the total number of window ACs is 15

⇒ x + 3y + y + y = 15 ⟹ x + 5y = 15, also x and y should be greater than or equal to 2 from condition – 1
⇒ x = 5 and y = 2 is the only solution.
Filling this in the table:

D1 Total =			
Split =		Window = 5	
Inv = 8	Non - Inv	Inv = 5	Non – Inv = 0
D2 Total =			
Split=		Window = 3y	
Inv = 2z	Non - Inv	Inv = 2	Non – Inv = 4
D3 Total =			
Split =		Window =2	
Inv = z	Non – Inv = 3	Inv = 0	Non – Inv = 2
D4 Total =			
Split =		Window = 2	
Inv = z	Non – Inv =	Inv = 2	Non – Inv = 0

Now, Number of split inverter ACs is 36
⇒ 8 + 2z + z + z = 36 ⟹ 4z = 28 ⟹ z = 7.
Filling this and using (5), the number of split AC's sold by D1 is 2× 5 = 10.

D1 Total = 15			
Split = 10		Window = 5	
Inv = 8	Non – Inv = 2	Inv = 5	Non – Inv = 0
D2 Total =			
Split =		Window =3y	
Inv = 14	Non – Inv =	Inv = 2	Non – Inv = 4
D3 Total =			
Split = 10		Window = 2	
Inv = 7	Non – Inv = 3	Inv =	Non – Inv = 2
D4 Total			
Split		Window =2	
Inv=7	Non – Inv=	Inv=2	Non – Inv=0

From this table, we see that total number of non-inverter ACs is 9 + 6 = 15.
Required percentage is 15 out of 60 ⟹ 25%.

3. Correct Answer: 33
Explanation:

Let us assume, A is the total number of AC's sold
⇒ From the information that the total number of ACs sold in the city, 25% were of Window variant
⇒ Window AC's = A/4 and Split AC's = 3A/4
Now, let us assume B is the total number of inverter ACs

⇒ From the information that among the Inverter ACs sold, 20% were of Window variant.
⇒ Window Inverter AC's = B/5 and Window Non-Inverter AC's = 4B/5

TABLE (A)			
Split(3A/4)		Window (A/4)	
Inv (4B/5)	Non - Inv	Inv (B/5)	Non – Inv

From – Condition - 3
⇒ A/4 – B/5 = 6 and 4B/5 = 36 ⟹ B = 46 and A = 60.

Total=60			
Split(3A/4)		Window (A/4)	
Inv (4B/5)	Non - Inv	Inv (B/5)	Non – Inv

Now, from condition-6
a) D1 & D4 sold "0" window non-inverter ACs ⇒ D2 & D3 sold 6 window non-inverter ACs, it is given that D2 sold twice as many as D3 ⇒ D2 sold 4 and D3 sold 2 ACs of this type.
From condition-2
b) Let us assume, D1 sold "x" window inverter ACs ⟹ Number of split inverter ACs sold is 13-x From, condition - 4
c) Number of split ACs sold by D1 will be "2x"
From condition-5
d) Let us assume 'y' is the number of window ACs sold by D3 & D4 ⟹ D2 sold 3y ACs of this type. From condition-7
e) Let us assume 'z' is the number of split inverter ACs sold by D3 and D4 ⟹ D2 sold 2z ACs of this type. Let us use a, b, c, d, and e make a table:

D1 Total =			
Split=		Window =	
Inv = 13 – x	Non - Inv	Inv = x	Non – Inv = 0
D2 Total =			
Split=		Window =3y	
Inv = 2z	Non - Inv	Inv = x	Non – Inv = 4
D3 Total =			
Split=		Window =y	
Inv = z	Non – Inv = 3	Inv =	Non – Inv = 2
D4 Total =			
Split =		Window =y	
Inv = z	Non – Inv =	Inv =	Non – Inv = 0

We know that the total number of window ACs is 15
⇒ x + 3y + y + y = 15 ⟹ x + 5y = 15, also x and y should be greater than or equal to 2 from condition – 1
⇒ x = 5 and y = 2 is the only solution.
Filling this in the table:

D1 Total =			
Split =		Window = 5	
Inv = 8	Non - Inv	Inv = 5	Non – Inv = 0
D2 Total =			
Split=		Window = 3y	
Inv = 2z	Non - Inv	Inv = 2	Non – Inv = 4
D3 Total =			
Split =		Window =2	
Inv = z	Non – Inv = 3	Inv = 0	Non – Inv = 2
D4 Total =			
Split =		Window = 2	
Inv = z	Non – Inv =	Inv = 2	Non – Inv = 0

Now, Number of split inverter ACs is 36
$\Rightarrow 8 + 2z + z + z = 36 \Longrightarrow 4z = 28 \Rightarrow z = 7.$
Filling this and using (5), the number of split AC's sold by D1 is $2\times 5 = 10$.

D1 Total = 15			
Split = 10		Window = 5	
Inv = 8	Non – Inv = 2	Inv = 5	Non – Inv = 0
D2 Total =			
Split =		Window =3y	
Inv = 14	Non – Inv =	Inv = 2	Non – Inv = 4
D3 Total =			
Split = 10		Window = 2	
Inv = 7	Non – Inv = 3	Inv =	Non – Inv = 2
D4 Total			
Split		Window =2	
Inv=7	Non – Inv=	Inv=2	Non – Inv=0

Total number of ACs sold by D2 and D4 = 60 - D1 - D3 = 60 - 15 - 12 = 33.

4. Correct Answer: A
Explanation:

Let us assume, A is the total number of AC's sold
⇒ From the information that the total number of ACs sold in the city, 25% were of Window variant
⇒ Window AC's = A/4 and Split AC's = 3A/4
Now, let us assume B is the total number of inverter ACs
⇒ From the information that among the Inverter ACs sold, 20% were of Window variant.
⇒ Window Inverter AC's = B/5 and Window Non-Inverter AC's = 4B/5

TABLE (A)			
Split(3A/4)		Window (A/4)	
Inv (4B/5)	Non -	Inv (B/5)	Non –

	Inv		Inv

From – Condition - 3
⇒ A/4 – B/5 = 6 and 4B/5 = 36 ⟹ B = 46 and A = 60.

Total=60			
Split(3A/4)		Window (A/4)	
Inv (4B/5)	Non - Inv	Inv (B/5)	Non – Inv

Now, from condition-6
a) D1 & D4 sold "0" window non-inverter ACs ⇒ D2 & D3 sold 6 window non-inverter ACs, it is given that D2 sold twice as many as D3 ⇒ D2 sold 4 and D3 sold 2 ACs of this type.
From condition-2
b) Let us assume, D1 sold "x" window inverter ACs ⟹ Number of split inverter ACs sold is 13-x From, condition - 4
c) Number of split ACs sold by D1 will be "2x"
From condition-5
d) Let us assume 'y' is the number of window ACs sold by D3 & D4 ⟹ D2 sold 3y ACs of this type. From condition-7
e) Let us assume 'z' is the number of split inverter ACs sold by D3 and D4 ⟹ D2 sold 2z ACs of this type. Let us use a, b, c, d, and e make a table:

D1 Total =			
Split=		Window =	
Inv = 13 – x	Non - Inv	Inv = x	Non – Inv = 0
D2 Total =			
Split=		Window =3y	
Inv = 2z	Non - Inv	Inv = x	Non – Inv = 4
D3 Total =			
Split=		Window =y	
Inv = z	Non – Inv = 3	Inv =	Non – Inv = 2
D4 Total =			
Split =		Window =y	
Inv = z	Non – Inv =	Inv =	Non – Inv = 0

We know that the total number of window ACs is 15
⇒ x + 3y + y + y = 15 ⟹ x + 5y = 15, also x and y should be greater than or equal to 2 from condition – 1
⇒ x = 5 and y = 2 is the only solution.
Filling this in the table:

D1 Total =			
Split =		Window = 5	
Inv = 8	Non - Inv	Inv = 5	Non – Inv = 0
D2 Total =			
Split=		Window = 3y	
Inv = 2z	Non - Inv	Inv = 2	Non – Inv = 4
D3 Total =			
Split =		Window =2	
Inv = z	Non – Inv = 3	Inv = 0	Non – Inv = 2
D4 Total =			
Split =		Window = 2	
Inv = z	Non – Inv =	Inv = 2	Non – Inv = 0

Now, Number of split inverter ACs is 36
⇒ 8 + 2z + z + z = 36 ⟹ 4z = 28 ⟹ z = 7.
Filling this and using (5), the number of split AC's sold by D1 is 2× 5 = 10.

D1 Total = 15			
Split = 10		Window = 5	
Inv = 8	Non – Inv = 2	Inv = 5	Non – Inv = 0
D2 Total =			
Split =		Window =3y	
Inv = 14	Non – Inv =	Inv = 2	Non – Inv = 4
D3 Total =			
Split = 10		Window = 2	
Inv = 7	Non – Inv = 3	Inv =	Non – Inv = 2
D4 Total			
Split		Window =2	
Inv=7	Non – Inv=	Inv=2	Non – Inv=0

We see that D1 & D3 sold 27 ACs together which is less than 60 – 27 = 33 sold by D2 & D4.
Therefore, Option – A is definitely false.

5. Correct Answer: A
Explanation:

Let us assume, A is the total number of AC's sold
⇒ From the information that the total number of ACs sold in the city, 25% were of Window variant
⇒ Window AC's = A/4 and Split AC's = 3A/4
Now, let us assume B is the total number of inverter ACs
⇒ From the information that among the Inverter ACs sold, 20% were of Window variant.
⇒ Window Inverter AC's = B/5 and Window Non-Inverter AC's = 4B/5

TABLE (A)

Split(3A/4)		Window (A/4)	
Inv (4B/5)	Non - Inv	Inv (B/5)	Non – Inv

From – Condition - 3
⇒ A/4 – B/5 = 6 and 4B/5 = 36 ⟹ B = 46 and A = 60.

Total=60			
Split(3A/4)		Window (A/4)	
Inv (4B/5)	Non - Inv	Inv (B/5)	Non – Inv

Now, from condition-6
a) D1 & D4 sold "0" window non-inverter ACs ⇒ D2 & D3 sold 6 window non-inverter ACs, it is given that D2 sold twice as many as D3 ⇒ D2 sold 4 and D3 sold 2 ACs of this type.
From condition-2
b) Let us assume, D1 sold "x" window inverter ACs ⟹ Number of split inverter ACs sold is 13-x From, condition - 4
c) Number of split ACs sold by D1 will be "2x"
From condition-5
d) Let us assume 'y' is the number of window ACs sold by D3 & D4 ⟹ D2 sold 3y ACs of this type. From condition-7
e) Let us assume 'z' is the number of split inverter ACs sold by D3 and D4 ⟹ D2 sold 2z ACs of this type. Let us use a, b, c, d, and e make a table:

D1 Total =			
Split=		Window =	
Inv = 13 – x	Non - Inv	Inv = x	Non – Inv = 0
D2 Total =			
Split=		Window =3y	
Inv = 2z	Non - Inv	Inv = x	Non – Inv = 4
D3 Total =			
Split=		Window =y	
Inv = z	Non – Inv = 3	Inv =	Non – Inv = 2
D4 Total =			
Split =		Window =y	
Inv = z	Non – Inv =	Inv =	Non – Inv = 0

We know that the total number of window ACs is 15
⇒ x + 3y + y + y = 15 ⟹ x + 5y = 15, also x and y should be greater than or equal to 2 from condition – 1
⇒ x = 5 and y = 2 is the only solution.
Filling this in the table:

D1 Total =			
Split =		Window = 5	
Inv = 8	Non - Inv	Inv = 5	Non – Inv = 0

D2 Total =			
Split=		Window = 3y	
Inv = 2z	Non - Inv	Inv = 2	Non – Inv = 4
D3 Total =			
Split =		Window =2	
Inv = z	Non – Inv = 3	Inv = 0	Non – Inv = 2
D4 Total =			
Split =		Window = 2	
Inv = z	Non – Inv =	Inv = 2	Non – Inv = 0

Now, Number of split inverter ACs is 36
$\Rightarrow 8 + 2z + z + z = 36 \Longrightarrow 4z = 28 \Longrightarrow z = 7.$
Filling this and using (5), the number of split AC's sold by D1 is $2\times 5 = 10$.

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D1 Total = 15			
Split = 10		Window = 5	
Inv = 8	Non – Inv = 2	Inv = 5	Non – Inv = 0
D2 Total =			
Split =		Window =3y	
Inv = 14	Non – Inv =	Inv = 2	Non – Inv = 4
D3 Total =			
Split = 10		Window = 2	
Inv = 7	Non – Inv = 3	Inv =	Non – Inv = 2
D4 Total			
Split		Window =2	
Inv=7	Non – Inv=	Inv=2	Non – Inv=0

Number of non-inverter ACs sold is 1 + 4 = 5

6. Correct Answer: 60
Explanation:

It is given that there are only three female students - Amala, Koli, and Rini - and only three male students - Biman, Mathew, and Shyamal - in a course.
It is also known that the aggregate score in the course is a weighted average of the two components, with the weights being positive and adding to 1.
Let the project score component be x, which implies the test score component will be (1-x). The projects are done in groups of two, with each group consisting of a female and a male student, which implies there are three groups for the project. It is also known that both the group members obtain the same score in the project. The score obtained in the project is 40, 60, and 80, respectively.
Therefore, we can say that each female student will consist of a different group, and no two male students or female students will be in the same group.
For the test scores, there are six scores given for six students among which four are distinct and the remaining two are average scores, which is 60. It is also known that the maximum score possible is 80, and the minimum score is 40.
Hence, the distinct scores are 80, 70, 50, and 40 (since all the test scores are multiple of 10), and the remaining two scores are 60, and 60, respectively.
From point 3, we know that Amala's score in the project was double that of Koli in the same, but Koli scored 20 more than Amala in the test. Hence, we can say the score obtained by Amala in the project is 80, and the score obtained by Koli is 40, which implies the score obtained by Rini in the project is 60. Now, Koli scored 20 more than Amala in the test, which implies the score obtained by Koli can be either 80, 70, or 60.
The score obtained by them is given below:

Students	Test Scores	Project Scores
Amala	40/50/60	80
Koli	60/70/80	40
Rini		60
Biman		
Mathew		

Shyamal		

It is known that Amala had the highest aggregate score, and Shyamal scored the second highest on the test. He scored two more than Koli, but two less than Amala in the aggregate.
Hence, the score obtained by Shyamal in the test is 70, which implies Koli can't score 70 in the test
⇒ Amala can't score 50 in the test.

Students	Test Scores	Project Scores
Amala	40/60	80
Koli	60/80	40
Rini		60
Biman		
Mathew		
Shyamal	70	

It is given that Shyamal scored two more than Koli, but two less than Amala in the aggregate. Hence, the aggregate score of Amala is 4 more than Koli. It is also known that Amala had the highest aggregate score.

Case 1: The test score of Amala is 40

Students	Test Scores	Project Scores	Aggregate Scores
Amala	40	80	40(1-x) + 80x
Koli	60	40	60(1-x) + 40x
Rini		60	
Biman			
Mathew			
Shyamal	70		

Therefore, 40(1 - x) + 80x = 60(1 - x) + 40x + 4
⇒ x = 0.4
Hence, the aggregate score obtained by Amala is 40(1 – 0.4) + 80 × 4 = 56
The minimum aggregate score of Shyamal is 70(1 – 0.4) + 40 × 0.4 = 58, which is greater than Amala.
Hence, Case 1 is not possible.

Hence, the table is given below:

Students	Test Scores	Project Scores	Aggregate Scores
Amala	60	80	60(1-x)+80x
Koli	80	40	80(1-x)+40x
Rini		60	
Biman			
Mathew			
Shyamal	70		

Therefore, 60(1 - x) + 80x = 80(1 - x) + 40x + 4
⟹ 60 + 20x = 84 – 40x
⟹ 60x = 24 ⇒ x = 0.4

Hence, the aggregate score of Amala is 60 (1 – 0.4) + 80 × 0.4 = 68, which implies the aggregate score of Shyamal is (68 – 2) = 66
Hence, the score obtained by Shyamal in Project is {66 – 70×(0.6)}/0.4 = 60.
It is also known that Biman scored second lowest in the test, which implies the score of Biman in the test is 50, and he scored the lowest in the aggregate. It is also known that Mathew scored more than Rini in the project, but less than her in the test. Hence, Mathew scored 80 in the project (since Rini scored 60 in the project), and Biman scored 40 in the project.
Similarly, Rini Scored more than Mathew on the test, which implies the score obtained by Rini is 60, and the score obtained by Mathew is 40 in the test.
Hence, the final table will look like this:

Students	Test Scores (T)	Project Scores (P)	Aggregate Score (T × 0.6 + P×0.4)	Project Pair
Amala	60	80	68	Amala, Mathew
Koli	80	40	64	Koli, Biman
Rini	60	60	60	Rini, Shyamal
Biman	50	40	46	Biman, Koli
Mathew	40	80	56	Mathew, Amala
Shyamal	70	60	66	Shyamal, Rini

Hence, the score obtained by Rini in the project is 60

7. Correct Answer: B
Explanation:

It is given that there are only three female students - Amala, Koli, and Rini - and only three male students - Biman, Mathew, and Shyamal - in a course.
It is also known that the aggregate score in the course is a weighted average of the two components, with the weights being positive and adding to 1.
Let the project score component be x, which implies the test score component will be (1-x). The projects are done in groups of two, with each group consisting of a female and a male student, which implies there are three groups for the project. It is also known that both the group members obtain the same score in the project. The score obtained in the project is 40, 60, and 80, respectively.
Therefore, we can say that each female student will consist of a different group, and no two male students or female students will be in the same group.
For the test scores, there are six scores given for six students among which four are distinct and the remaining two are average scores, which is 60. It is also known that the maximum score possible is 80, and the minimum score is 40.
Hence, the distinct scores are 80, 70, 50, and 40 (since all the test scores are multiple of 10), and the remaining two scores are 60, and 60, respectively.
From point 3, we know that Amala's score in the project was double that of Koli in the same, but Koli scored 20 more than Amala in the test. Hence, we can say the score obtained by Amala in the project is 80, and the score obtained by Koli is 40, which implies the score obtained by Rini in the project is 60. Now, Koli scored 20 more than Amala in the test, which implies the score obtained by Koli can be either 80, 70, or 60.
The score obtained by them is given below:

Students	Test Scores	Project Scores
Amala	40/50/60	80
Koli	60/70/80	40
Rini		60
Biman		
Mathew		
Shyamal		

It is known that Amala had the highest aggregate score, and Shyamal scored the second highest on the test. He scored two more than Koli, but two less than Amala in the aggregate.
Hence, the score obtained by Shyamal in the test is 70, which implies Koli can't score 70 in the test
⇒ Amala can't score 50 in the test.

Students	Test Scores	Project Scores
Amala	40/60	80
Koli	60/80	40
Rini		60
Biman		
Mathew		
Shyamal	70	

It is given that Shyamal scored two more than Koli, but two less than Amala in the aggregate. Hence, the aggregate score of Amala is 4 more than Koli. It is also known that Amala had the highest aggregate score.

Case 1: The test score of Amala is 40

Students	Test Scores	Project Scores	Aggregate Scores
Amala	40	80	40(1-x) + 80x
Koli	60	40	60(1-x) + 40x
Rini		60	
Biman			
Mathew			
Shyamal	70		

Therefore, 40(1 - x) + 80x = 60(1 - x) + 40x + 4
⇒ x = 0.4
Hence, the aggregate score obtained by Amala is 40(1 – 0.4) + 80 × 4 = 56
The minimum aggregate score of Shyamal is 70(1 – 0.4) + 40 × 0.4 = 58, which is greater than Amala.
Hence, Case 1 is not possible.

Hence, the table is given below:

Students	Test Scores	Project Scores	Aggregate Scores
Amala	60	80	60(1-x) + 80x
Koli	80	40	80(1-x) + 40x
Rini		60	
Biman			
Mathew			
Shyamal	70		

Therefore, 60(1 - x) + 80x = 80(1 - x) + 40x + 4
⟹ 60 + 20x = 84 – 40x
⟹ 60x = 24 ⇒ x = 0.4
Hence, the aggregate score of Amala is 60 (1 – 0.4) + 80 × 0.4 = 68, which implies the aggregate score of Shyamal is (68 – 2) = 66

Hence, the score obtained by Shyamal in Project is {66 – 70×(0.6)}/0.4 = 60.
It is also known that Biman scored second lowest in the test, which implies the score of Biman in the test is 50, and he scored the lowest in the aggregate. It is also known that Mathew scored more than Rini in the project, but less than her in the test. Hence, Mathew scored 80 in the project (since Rini scored 60 in the project), and Biman scored 40 in the project.
Similarly, Rini Scored more than Mathew on the test, which implies the score obtained by Rini is 60, and the score obtained by Mathew is 40 in the test.
Hence, the final table will look like this:

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Students	Test Scores (T)	Project Scores (P)	Aggregate Score (T × 0.6 + P×0.4)	Project Pair
Amala	60	80	68	Amala, Mathew
Koli	80	40	64	Koli, Biman
Rini	60	60	60	Rini, Shyamal
Biman	50	40	46	Biman, Koli
Mathew	40	80	56	Mathew, Amala
Shyamal	70	60	66	Shyamal, Rini

Hence, the weight of the test component is 0.60
The correct option is B

8. Correct Answer: A
Explanation:

It is given that there are only three female students - Amala, Koli, and Rini - and only three male students - Biman, Mathew, and Shyamal - in a course.
It is also known that the aggregate score in the course is a weighted average of the two components, with the weights being positive and adding to 1.
Let the project score component be x, which implies the test score component will be (1-x). The projects are done in groups of two, with each group consisting of a female and a male student, which implies there are three groups for the project. It is also known that both the group members obtain the same score in the project. The score obtained in the project is 40, 60, and 80, respectively.
Therefore, we can say that each female student will consist of a different group, and no two male students or female students will be in the same group.
For the test scores, there are six scores given for six students among which four are distinct and the remaining two are average scores, which is 60. It is also known that the maximum score possible is 80, and the minimum score is 40.
Hence, the distinct scores are 80, 70, 50, and 40 (since all the test scores are multiple of 10), and the remaining two scores are 60, and 60, respectively.
From point 3, we know that Amala's score in the project was double that of Koli in the same, but Koli scored 20 more than Amala in the test. Hence, we can say the score obtained by Amala in the project is 80, and the score obtained by Koli is 40, which implies the score obtained by Rini in the project is 60. Now, Koli scored 20 more than Amala in the test, which implies the score obtained by Koli can be either 80, 70, or 60.
The score obtained by them is given below:

Students	Test Scores	Project Scores
Amala	40/50/60	80
Koli	60/70/80	40
Rini		60
Biman		
Mathew		
Shyamal		

It is known that Amala had the highest aggregate score, and Shyamal scored the second highest on the test. He scored two more than Koli, but two less than Amala in the aggregate.
Hence, the score obtained by Shyamal in the test is 70, which implies Koli can't score 70 in the test
⇒ Amala can't score 50 in the test.

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Students	Test Scores	Project Scores
Amala	40/60	80
Koli	60/80	40
Rini		60
Biman		
Mathew		
Shyamal	70	

It is given that Shyamal scored two more than Koli, but two less than Amala in the aggregate. Hence, the aggregate score of Amala is 4 more than Koli. It is also known that Amala had the highest aggregate score.
Case 1: The test score of Amala is 40

Students	Test Scores	Project Scores	Aggregate Scores
Amala	40	80	40(1-x) + 80x
Koli	60	40	60(1-x) + 40x
Rini		60	
Biman			
Mathew			
Shyamal	70		

Therefore, 40(1 - x) + 80x = 60(1 - x) + 40x + 4
⇒ x = 0.4
Hence, the aggregate score obtained by Amala is 40(1 – 0.4) + 80 × 4 = 56
The minimum aggregate score of Shyamal is 70(1 – 0.4) + 40 × 0.4 = 58, which is greater than Amala.
Hence, Case 1 is not possible.

Hence, the table is given below:

Students	Test Scores	Project Scores	Aggregate Scores
Amala	60	80	60(1-x) + 80x
Koli	80	40	80(1-x) + 40x
Rini		60	
Biman			
Mathew			
Shyamal	70		

Therefore, 60(1 - x) + 80x = 80(1 - x) + 40x + 4
⟹ 60 + 20x = 84 – 40x
⟹ 60x = 24 ⇒ x = 0.4
Hence, the aggregate score of Amala is 60 (1 – 0.4) + 80 × 0.4 = 68, which implies the aggregate score of Shyamal is (68 – 2) = 66
Hence, the score obtained by Shyamal in Project is {66 – 70×(0.6)}/0.4 = 60.
It is also known that Biman scored second lowest in the test, which implies the score of Biman in the test is 50, and he scored the lowest in the aggregate. It is also known that Mathew scored more than Rini in the project, but less than her in the test. Hence, Mathew scored 80 in the project (since Rini scored 60 in the project), and Biman scored 40 in the project.

Similarly, Rini Scored more than Mathew on the test, which implies the score obtained by Rini is 60, and the score obtained by Mathew is 40 in the test.
Hence, the final table will look like this:

Students	Test Scores (T)	Project Scores (P)	Aggregate Score (T × 0.6 + P×0.4)	Project Pair
Amala	60	80	68	Amala, Mathew
Koli	80	40	64	Koli, Biman
Rini	60	60	60	Rini, Shyamal
Biman	50	40	46	Biman, Koli
Mathew	40	80	56	Mathew, Amala
Shyamal	70	60	66	Shyamal, Rini

Hence, the maximum aggregate score obtained is 68. The correct option is A

9. Correct Answer: 40
Explanation:

It is given that there are only three female students - Amala, Koli, and Rini - and only three male students - Biman, Mathew, and Shyamal - in a course.
It is also known that the aggregate score in the course is a weighted average of the two components, with the weights being positive and adding to 1.
Let the project score component be x, which implies the test score component will be (1-x). The projects are done in groups of two, with each group consisting of a female and a male student, which implies there are three groups for the project. It is also known that both the group members obtain the same score in the project. The score obtained in the project is 40, 60, and 80, respectively.
Therefore, we can say that each female student will consist of a different group, and no two male students or female students will be in the same group.
For the test scores, there are six scores given for six students among which four are distinct and the remaining two are average scores, which is 60. It is also known that the maximum score possible is 80, and the minimum score is 40.
Hence, the distinct scores are 80, 70, 50, and 40 (since all the test scores are multiple of 10), and the remaining two scores are 60, and 60, respectively.
From point 3, we know that Amala's score in the project was double that of Koli in the same, but Koli scored 20 more than Amala in the test. Hence, we can say the score obtained by Amala in the project is 80, and the score obtained by Koli is 40, which implies the score obtained by Rini in the project is 60. Now, Koli scored 20 more than Amala in the test, which implies the score obtained by Koli can be either 80, 70, or 60.
The score obtained by them is given below:

Students	Test Scores	Project Scores
Amala	40/50/60	80
Koli	60/70/80	40
Rini		60
Biman		
Mathew		
Shyamal		

It is known that Amala had the highest aggregate score, and Shyamal scored the second highest on the test. He scored two more than Koli, but two less than Amala in the aggregate.
Hence, the score obtained by Shyamal in the test is 70, which implies Koli can't score 70 in the test
⇒ Amala can't score 50 in the test.

Students	Test Scores	Project Scores
Amala	40/60	80
Koli	60/80	40
Rini		60
Biman		
Mathew		
Shyamal	70	

It is given that Shyamal scored two more than Koli, but two less than Amala in the aggregate. Hence, the aggregate score of Amala is 4 more than Koli. It is also known that Amala had the highest aggregate score.
Case 1: The test score of Amala is 40

Students	Test Scores	Project Scores	Aggregate Scores
Amala	40	80	40(1-x) + 80x
Koli	60	40	60(1-x) + 40x
Rini		60	
Biman			
Mathew			
Shyamal	70		

Therefore, 40(1 - x) + 80x = 60(1 - x) + 40x + 4
⇒ x = 0.4
Hence, the aggregate score obtained by Amala is 40(1 – 0.4) + 80 × 4 = 56
The minimum aggregate score of Shyamal is 70(1 – 0.4) + 40 × 0.4 = 58, which is greater than Amala.
Hence, Case 1 is not possible.

Hence, the table is given below:

Students	Test Scores	Project Scores	Aggregate Scores
Amala	60	80	60(1-x) + 80x
Koli	80	40	80(1-x) + 40x
Rini		60	
Biman			
Mathew			
Shyamal	70		

Therefore, 60(1 - x) + 80x = 80(1 - x) + 40x + 4
⟹ 60 + 20x = 84 – 40x
⟹ 60x = 24 ⇒ x = 0.4
Hence, the aggregate score of Amala is 60 (1 – 0.4) + 80 × 0.4 = 68, which implies the aggregate score of Shyamal is (68 – 2) = 66
Hence, the score obtained by Shyamal in Project is {66 – 70×(0.6)}/0.4 = 60.

It is also known that Biman scored second lowest in the test, which implies the score of Biman in the test is 50, and he scored the lowest in the aggregate. It is also known that Mathew scored more than Rini in the project, but less than her in the test. Hence, Mathew scored 80 in the project (since Rini scored 60 in the project), and Biman scored 40 in the project.
Similarly, Rini Scored more than Mathew on the test, which implies the score obtained by Rini is 60, and the score obtained by Mathew is 40 in the test.
Hence, the final table will look like this:

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Students	Test Scores (T)	Project Scores (P)	Aggregate Score (T × 0.6 + P×0.4)	Project Pair
Amala	60	80	68	Amala, Mathew
Koli	80	40	64	Koli, Biman
Rini	60	60	60	Rini, Shyamal
Biman	50	40	46	Biman, Koli
Mathew	40	80	56	Mathew, Amala
Shyamal	70	60	66	Shyamal, Rini

Hence, the score obtained by Mathew in the test is 40

10. Correct Answer: C
Explanation:

It is given that there are only three female students - Amala, Koli, and Rini - and only three male students - Biman, Mathew, and Shyamal - in a course.
It is also known that the aggregate score in the course is a weighted average of the two components, with the weights being positive and adding to 1.
Let the project score component be x, which implies the test score component will be (1-x). The projects are done in groups of two, with each group consisting of a female and a male student, which implies there are three groups for the project. It is also known that both the group members obtain the same score in the project. The score obtained in the project is 40, 60, and 80, respectively.
Therefore, we can say that each female student will consist of a different group, and no two male students or female students will be in the same group.
For the test scores, there are six scores given for six students among which four are distinct and the remaining two are average scores, which is 60. It is also known that the maximum score possible is 80, and the minimum score is 40.
Hence, the distinct scores are 80, 70, 50, and 40 (since all the test scores are multiple of 10), and the remaining two scores are 60, and 60, respectively.
From point 3, we know that Amala's score in the project was double that of Koli in the same, but Koli scored 20 more than Amala in the test. Hence, we can say the score obtained by Amala in the project is 80, and the score obtained by Koli is 40, which implies the score obtained by Rini in the project is 60. Now, Koli scored 20 more than Amala in the test, which implies the score obtained by Koli can be either 80, 70, or 60.
The score obtained by them is given below:

Students	Test Scores	Project Scores
Amala	40/50/60	80
Koli	60/70/80	40
Rini		60
Biman		
Mathew		
Shyamal		

It is known that Amala had the highest aggregate score, and Shyamal scored the second highest on the test. He scored two more than Koli, but two less than Amala in the aggregate.
Hence, the score obtained by Shyamal in the test is 70, which implies Koli can't score 70 in the test
⇒ Amala can't score 50 in the test.

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Students	Test Scores	Project Scores
Amala	40/60	80
Koli	60/80	40
Rini		60
Biman		
Mathew		
Shyamal	70	

It is given that Shyamal scored two more than Koli, but two less than Amala in the aggregate. Hence, the aggregate score of Amala is 4 more than Koli. It is also known that Amala had the highest aggregate score.
Case 1: The test score of Amala is 40

Students	Test Scores	Project Scores	Aggregate Scores
Amala	40	80	40(1-x) + 80x
Koli	60	40	60(1-x) + 40x
Rini		60	
Biman			
Mathew			
Shyamal	70		

Therefore, 40(1 - x) + 80x = 60(1 - x) + 40x + 4
⇒ x = 0.4
Hence, the aggregate score obtained by Amala is 40(1 – 0.4) + 80 × 4 = 56
The minimum aggregate score of Shyamal is 70(1 – 0.4) + 40 × 0.4 = 58, which is greater than Amala.
Hence, Case 1 is not possible.

Hence, the table is given below:

Students	Test Scores	Project Scores	Aggregate Scores
Amala	60	80	60(1-x) + 80x
Koli	80	40	80(1-x) + 40x
Rini		60	
Biman			
Mathew			
Shyamal	70		

Therefore, 60(1 - x) + 80x = 80(1 - x) + 40x + 4
⟹ 60 + 20x = 84 – 40x
⟹ 60x = 24 ⇒ x = 0.4
Hence, the aggregate score of Amala is 60 (1 – 0.4) + 80 × 0.4 = 68, which implies the aggregate score of Shyamal is (68 – 2) = 66
Hence, the score obtained by Shyamal in Project is {66 – 70×(0.6)}/0.4 = 60.
It is also known that Biman scored second lowest in the test, which implies the score of Biman in the test is 50, and he scored the lowest in the aggregate. It is also known that Mathew scored more than Rini in the project, but less than her in the test. Hence, Mathew scored 80 in the project (since Rini scored 60 in the project), and Biman scored 40 in the project.

Similarly, Rini Scored more than Mathew on the test, which implies the score obtained by Rini is 60, and the score obtained by Mathew is 40 in the test.
Hence, the final table will look like this:

Students	Test Scores (T)	Project Scores (P)	Aggregate Score (T × 0.6 + P×0.4)	Project Pair
Amala	60	80	68	Amala, Mathew
Koli	80	40	64	Koli, Biman
Rini	60	60	60	Rini, Shyamal
Biman	50	40	46	Biman, Koli
Mathew	40	80	56	Mathew, Amala
Shyamal	70	60	66	Shyamal, Rini

From the table, we can see that (Amala, Mathew), (Koli, Biman), and (Shyama, Rini) are the three groups for the project.
Hence, the correct option is C

11. Correct Answer: D
Explanation:

It is given that none of the streets has more than one team traveling along it in any direction at any point in time (point 1), which implies at 9.00 hrs, all 4 teams have chosen different roots from the starting point.
It is also known that Teams 2 and 3 are the only ones in stations E and D respectively at 10:00 hrs, and Team 1 and Team 4 are the only teams that patrol the street connecting stations A and E.
It is only possible when Team 2 traveled (A – E) via F, and Team 3 reached station D via station C.
It is also known that Teams 1 and 3 are the only ones in Station E at 10:30 hrs, and Team 4 never passes through Stations B, D, or F. Hence, Team 1 must have chosen the (A – B) root at the starting point, and Team 4 has chosen the (A – E) root at 9.00 hrs.
Hence, Team 1 will reach B at 9.30, and come to A at 10.00 hrs. After that, they will go to E at 10.30 hrs.
Since Team 4 never passes through stations B, D, or F. Team 4 only can pass through stations A, E, and C. Hence, the roots of team 4 to reach station E at 11.30 will be (A – E – A – C – A – E) or (A – E – A – E – A– E).
Since team 1 is already traveling to E from A at 10.00 hrs, at that time team 4 can't choose the same route. Hence, the final route for team 4 to reach E at 11.30 is (A – E – A – C – A – E), and at 12.00 hrs, team 4 will come back to station A.
Hence, the complete route diagram for team 4 is (A – E – A – C – A – E – A)

Team	9.00	9.30	10.00	10.30	11.00	11.30	12.00
1	A	B	A	E			
2	A	F	E				
3	A	C	D				
4	A	E	A	C	A	E	A

We can see that team 1 is at station E at 10.30 hrs, and they will reach station B at 11.30 hrs, which is only possible when they travel to B via A.
Hence, the complete route diagram for team 1 is (A – B – A – E – A – B – A). It is also known that Teams 1 and 3 are the only ones in station E at 10:30 hrs.

Team	9.00	9.30	10.00	10.30	11.00	11.30	12.00
1	A	B	A	E	A	B	A
2	A	F	E				
3	A	C	D	E			
4	A	E	A	C	A	E	A

The only possible root for Team 2 at 10.00 hrs is from E to F since they can't choose E to D because Team 3 is already on this route. Since team 3 has to reach A at 12.00. The only possible combination for team 3 is E – D – C – A

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Team	9.00	9.30	10.00	10.30	11.00	11.30	12.00
1	A	B	A	E	A	B	A
2	A	F	E	F			
3	A	C	D	E	D	C	A
4	A	E	A	C	A	E	A

Now the roots for team 2 going back to A is from F at 10.30 hrs (F – A – F – A) or (F – E – F – A).
Hence, the final table is given below:

Team	9.00	9.30	10.00	10.30	11.00	11.30	12.00
1	A	B	A	E	A	B	A
2	A	F	E	F	A/E	F	A
3	A	C	D	E	D	C	A
4	A	E	A	C	A	E	A

From the table, we can see that among the options station E is visited the largest number of times.

12. Correct Answer: 2
Explanation:

It is given that none of the streets has more than one team traveling along it in any direction at any point in time (point 1), which implies at 9.00 hrs, all 4 teams have chosen different roots from the starting point.
It is also known that Teams 2 and 3 are the only ones in stations E and D respectively at 10:00 hrs, and Team 1 and Team 4 are the only teams that patrol the street connecting stations A and E.
It is only possible when Team 2 traveled (A – E) via F, and Team 3 reached station D via station C.
It is also known that Teams 1 and 3 are the only ones in Station E at 10:30 hrs, and Team 4 never passes through Stations B, D, or F. Hence, Team 1 must have chosen the (A – B) root at the starting point, and Team 4 has chosen the (A – E) root at 9.00 hrs.
Hence, Team 1 will reach B at 9.30, and come to A at 10.00 hrs. After that, they will go to E at 10.30 hrs.
Since Team 4 never passes through stations B, D, or F. Team 4 only can pass through stations A, E, and C. Hence, the roots of team 4 to reach station E at 11.30 will be (A – E – A – C – A – E) or (A – E – A – E – A– E).
Since team 1 is already traveling to E from A at 10.00 hrs, at that time team 4 can't choose the same route. Hence, the final route for team 4 to reach E at 11.30 is (A – E – A – C – A – E), and at 12.00 hrs, team 4 will come back to station A.
Hence, the complete route diagram for team 4 is (A – E – A – C – A – E – A)

Team	9.00	9.30	10.00	10.30	11.00	11.30	12.00
1	A	B	A	E			
2	A	F	E				
3	A	C	D				
4	A	E	A	C	A	E	A

We can see that team 1 is at station E at 10.30 hrs, and they will reach station B at 11.30 hrs, which is only possible when they travel to B via A.
Hence, the complete route diagram for team 1 is (A – B – A – E – A – B – A). It is also known that Teams 1 and 3 are the only ones in station E at 10:30 hrs.

Team	9.00	9.30	10.00	10.30	11.00	11.30	12.00
1	A	B	A	E	A	B	A

2	A	F	E				
3	A	C	D	E			
4	A	E	A	C	A	E	A

The only possible root for Team 2 at 10.00 hrs is from E to F since they can't choose E to D because Team 3 is already on this route. Since team 3 has to reach A at 12.00. The only possible combination for team 3 is E – D – C – A

Team	9.00	9.30	10.00	10.30	11.00	11.30	12.00
1	A	B	A	E	A	B	A
2	A	F	E	F			
3	A	C	D	E	D	C	A
4	A	E	A	C	A	E	A

Now the roots for team 2 going back to A is from F at 10.30 hrs (F – A – F – A) or (F – E – F – A).

Hence, the final table is given below:

Team	9.00	9.30	10.00	10.30	11.00	11.30	12.00
1	A	B	A	E	A	B	A
2	A	F	E	F	A/E	F	A
3	A	C	D	E	D	C	A
4	A	E	A	C	A	E	A

From the table, we can see that the teams have passed through B 2 times in this given period.

13. Correct Answer: A

Explanation:

It is given that none of the streets has more than one team traveling along it in any direction at any point in time (point 1), which implies at 9.00 hrs, all 4 teams have chosen different roots from the starting point.

It is also known that Teams 2 and 3 are the only ones in stations E and D respectively at 10:00 hrs, and Team 1 and Team 4 are the only teams that patrol the street connecting stations A and E.

It is only possible when Team 2 traveled (A – E) via F, and Team 3 reached station D via station C.

It is also known that Teams 1 and 3 are the only ones in Station E at 10:30 hrs, and Team 4 never passes through Stations B, D, or F. Hence, Team 1 must have chosen the (A – B) root at the starting point, and Team 4 has chosen the (A – E) root at 9.00 hrs.

Hence, Team 1 will reach B at 9.30, and come to A at 10.00 hrs. After that, they will go to E at 10.30 hrs.

Since Team 4 never passes through stations B, D, or F. Team 4 only can pass through stations A, E, and C. Hence, the roots of team 4 to reach station E at 11.30 will be (A – E – A – C – A – E) or (A – E – A – E – A– E).

Since team 1 is already traveling to E from A at 10.00 hrs, at that time team 4 can't choose the same route. Hence, the final route for team 4 to reach E at 11.30 is (A – E – A – C – A – E), and at 12.00 hrs, team 4 will come back to station A.

Hence, the complete route diagram for team 4 is (A – E – A – C – A – E – A)

Team	9.00	9.30	10.00	10.30	11.00	11.30	12.00
1	A	B	A	E			
2	A	F	E				
3	A	C	D				
4	A	E	A	C	A	E	A

We can see that team 1 is at station E at 10.30 hrs, and they will reach station B at 11.30 hrs, which is only possible when they travel to B via A.

Hence, the complete route diagram for team 1 is (A – B – A – E – A – B – A). It is also known that Teams 1 and 3 are the only ones in station E at 10:30 hrs.

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Team	9.00	9.30	10.00	10.30	11.00	11.30	12.00
1	A	B	A	E	A	B	A
2	A	F	E				
3	A	C	D	E			
4	A	E	A	C	A	E	A

The only possible root for Team 2 at 10.00 hrs is from E to F since they can't choose E to D because Team 3 is already on this route. Since team 3 has to reach A at 12.00. The only possible combination for team 3 is E – D – C – A

Team	9.00	9.30	10.00	10.30	11.00	11.30	12.00
1	A	B	A	E	A	B	A
2	A	F	E	F			
3	A	C	D	E	D	C	A
4	A	E	A	C	A	E	A

Now the roots for team 2 going back to A is from F at 10.30 hrs (F – A – F – A) or (F – E – F – A).

Hence, the final table is given below:

Team	9.00	9.30	10.00	10.30	11.00	11.30	12.00
1	A	B	A	E	A	B	A
2	A	F	E	F	A/E	F	A
3	A	C	D	E	D	C	A
4	A	E	A	C	A	E	A

From the table, we can see that at 10.15 hrs, team 3 is travelling from station D to station E.

The correct option is A.

14. Correct Answer: 2

Explanation:

It is given that none of the streets has more than one team traveling along it in any direction at any point in time (point 1), which implies at 9.00 hrs, all 4 teams have chosen different roots from the starting point.

It is also known that Teams 2 and 3 are the only ones in stations E and D respectively at 10:00 hrs, and Team 1 and Team 4 are the only teams that patrol the street connecting stations A and E.

It is only possible when Team 2 traveled (A – E) via F, and Team 3 reached station D via station C.

It is also known that Teams 1 and 3 are the only ones in Station E at 10:30 hrs, and Team 4 never passes through Stations B, D, or F. Hence, Team 1 must have chosen the (A – B) root at the starting point, and Team 4 has chosen the (A – E) root at 9.00 hrs.

Hence, Team 1 will reach B at 9.30, and come to A at 10.00 hrs. After that, they will go to E at 10.30 hrs.

Since Team 4 never passes through stations B, D, or F. Team 4 only can pass through stations A, E, and C. Hence, the roots of team 4 to reach station E at 11.30 will be (A – E – A – C – A – E) or (A – E – A – E – A– E).

Since team 1 is already traveling to E from A at 10.00 hrs, at that time team 4 can't choose the same route. Hence, the final route for team 4 to reach E at 11.30 is (A – E – A – C – A – E), and at 12.00 hrs, team 4 will come back to station A.

Hence, the complete route diagram for team 4 is (A – E – A – C – A – E – A)

Team	9.00	9.30	10.00	10.30	11.00	11.30	12.00
1	A	B	A	E			

2	A	F	E				
3	A	C	D				
4	A	E	A	C	A	E	A

We can see that team 1 is at station E at 10.30 hrs, and they will reach station B at 11.30 hrs, which is only possible when they travel to B via A.

Hence, the complete route diagram for team 1 is (A – B – A – E – A – B – A). It is also known that Teams 1 and 3 are the only ones in station E at 10:30 hrs.

Team	9.00	9.30	10.00	10.30	11.00	11.30	12.00
1	A	B	A	E	A	B	A
2	A	F	E				
3	A	C	D	E			
4	A	E	A	C	A	E	A

The only possible root for Team 2 at 10.00 hrs is from E to F since they can't choose E to D because Team 3 is already on this route. Since team 3 has to reach A at 12.00. The only possible combination for team 3 is E – D – C – A

Team	9.00	9.30	10.00	10.30	11.00	11.30	12.00
1	A	B	A	E	A	B	A
2	A	F	E	F			
3	A	C	D	E	D	C	A
4	A	E	A	C	A	E	A

Now the roots for team 2 going back to A is from F at 10.30 hrs (F – A – F – A) or (F – E – F – A).

Hence, the final table is given below:

Team	9.00	9.30	10.00	10.30	11.00	11.30	12.00
1	A	B	A	E	A	B	A
2	A	F	E	F	A/E	F	A
3	A	C	D	E	D	C	A
4	A	E	A	C	A	E	A

From the table, we can see that team 4 passed station E 2 times in a day

15. Correct Answer: C

Explanation:

It is given that none of the streets has more than one team traveling along it in any direction at any point in time (point 1), which implies at 9.00 hrs, all 4 teams have chosen different roots from the starting point.

It is also known that Teams 2 and 3 are the only ones in stations E and D respectively at 10:00 hrs, and Team 1 and Team 4 are the only teams that patrol the street connecting stations A and E.

It is only possible when Team 2 traveled (A – E) via F, and Team 3 reached station D via station C.

It is also known that Teams 1 and 3 are the only ones in Station E at 10:30 hrs, and Team 4 never passes through Stations B, D, or F. Hence, Team 1 must have chosen the (A – B) root at the starting point, and Team 4 has chosen the (A – E) root at 9.00 hrs.

Hence, Team 1 will reach B at 9.30, and come to A at 10.00 hrs. After that, they will go to E at 10.30 hrs.

Since Team 4 never passes through stations B, D, or F. Team 4 only can pass through stations A, E, and C. Hence, the roots of team 4 to reach station E at 11.30 will be (A – E – A – C – A – E) or (A – E – A – E – A– E).

Since team 1 is already traveling to E from A at 10.00 hrs, at that time team 4 can't choose the same route. Hence, the final route for team 4 to reach E at 11.30 is (A – E – A – C – A – E), and at 12.00 hrs, team 4 will come back to station A.

Hence, the complete route diagram for team 4 is (A – E – A – C – A – E – A)

Team	9.00	9.30	10.00	10.30	11.00	11.30	12.00
1	A	B	A	E			
2	A	F	E				
3	A	C	D				
4	A	E	A	C	A	E	A

We can see that team 1 is at station E at 10.30 hrs, and they will reach station B at 11.30 hrs, which is only possible when they travel to B via A.

Hence, the complete route diagram for team 1 is (A – B – A – E – A – B – A). It is also known that Teams 1 and 3 are the only ones in station E at 10:30 hrs.

Team	9.00	9.30	10.00	10.30	11.00	11.30	12.00
1	A	B	A	E	A	B	A
2	A	F	E				
3	A	C	D	E			
4	A	E	A	C	A	E	A

The only possible root for Team 2 at 10.00 hrs is from E to F since they can't choose E to D because Team 3 is already on this route. Since team 3 has to reach A at 12.00. The only possible combination for team 3 is E – D – C – A

Team	9.00	9.30	10.00	10.30	11.00	11.30	12.00
1	A	B	A	E	A	B	A
2	A	F	E	F			
3	A	C	D	E	D	C	A
4	A	E	A	C	A	E	A

Now the roots for team 2 going back to A is from F at 10.30 hrs (F – A – F – A) or (F – E – F – A).

Hence, the final table is given below:

Team	9.00	9.30	10.00	10.30	11.00	11.30	12.00
1	A	B	A	E	A	B	A
2	A	F	E	F	A/E	F	A
3	A	C	D	E	D	C	A
4	A	E	A	C	A	E	A

From the table, we can see that 2 teams (teams 3 and 4) have passed through station C on the given day. The correct option is C

16. Correct Answer: 120

Explanation:

Given that in every month, both online and offline registration numbers were multiples of 10. From (2), in Jan, the number of offline registrations was twice that of online registrations.

⇒ If x is number of online registrations ⇒ 2x is the number of offline registrations ⇒ 3x is the total number of registrations.

According to the data given in the table ⇒ 3x should lie between the minimum and maximum total number of registrations. ⇒ x = 40 (as x should also be a multiple of 10)

⇒ In Jan (40, 80) are the online and offline registrations respectively.

Similarly, from (3), in Apr (80, 40) are the online and offline registrations respectively.

From 5, the number of online registrations is highest in May ⇒ in May there are 100 online registrations. The lowest possible number of offline registrations is 30 and maximum possible total registrations is 130 ⇒ in May (100, 30) are the online and offline registrations respectively.

Let us assume, 'x' to be the number of offline registrations in May = number of online registrations in March.

Let us capture all this data in a table:

Month	Online	Offline	Total
Jan	40	80	120
Feb	y	x	
Mar	x	z	
Apr	80	40	120
May	100	30	130

From the table given in the question, 50 is the median for Offline data
⇒ x should lie between 50 and 80 (included)
For 80 to be the median for the online data ⇒ y lies between 80 and 100 (included).
Now, consider Feb, Minimum value of y + x = 80 + 50 = 130 (which is the maximum value possible of the total possible registrations)
⇒ x = 50 and y = 80
Since, 110 is the minimum number of total registrations, the only possibility is in March ⇒ 50 + z = 110 ⇒ z = 60.
Now, filling the complete table we get,

Month	Online	Offline	Total
Jan	40	80	120
Feb	80	50	130
Mar	50	60	110
Apr	80	40	120
May	100	30	130

The total number of registrations in April is 120.

17. Correct Answer: 40
Explanation:

Given that in every month, both online and offline registration numbers were multiples of 10. From (2), in Jan, the number of offline registrations was twice that of online registrations.
⇒ If x is number of online registrations ⇒ 2x is the number of offline registrations ⇒ 3x is the total number of registrations.
According to the data given in the table ⇒ 3x should lie between the minimum and maximum total number of registrations. ⇒ x = 40 (as x should also be a multiple of 10)
⇒ In Jan (40, 80) are the online and offline registrations respectively.
Similarly, from (3), in Apr (80, 40) are the online and offline registrations respectively.

From 5, the number of online registrations is highest in May ⇒ in May there are 100 online registrations. The lowest possible number of offline registrations is 30 and maximum possible total registrations is 130 ⇒ in May (100, 30) are the online and offline registrations respectively.

Let us assume, 'x' to be the number of offline registrations in May = number of online registrations in March.
Let us capture all this data in a table:

Month	Online	Offline	Total
Jan	40	80	120
Feb	y	x	
Mar	x	z	
Apr	80	40	120
May	100	30	130

From the table given in the question, 50 is the median for Offline data
⇒ x should lie between 50 and 80 (included)
For 80 to be the median for the online data ⇒ y lies between 80 and 100 (included).
Now, consider Feb, Minimum value of y + x = 80 + 50 = 130 (which is the maximum value possible of the total possible registrations)
⇒ x = 50 and y = 80
Since, 110 is the minimum number of total registrations, the only possibility is in March ⇒ 50 + z = 110 ⇒ z = 60.
Now, filling the complete table we get,

Month	Online	Offline	Total
Jan	40	80	120
Feb	80	50	130
Mar	50	60	110
Apr	80	40	120
May	100	30	130

The number of online registrations in Jan is 40.

18. Correct Answer: A
Explanation:

Given that in every month, both online and offline registration numbers were multiples of 10. From (2), in Jan, the number of offline registrations was twice that of online registrations.
⇒ If x is number of online registrations ⇒ 2x is the number of offline registrations ⇒ 3x is the total number of registrations.
According to the data given in the table ⇒ 3x should lie between the minimum and maximum total number of registrations. ⇒ x = 40 (as x should also be a multiple of 10)
⇒ In Jan (40, 80) are the online and offline registrations respectively.
Similarly, from (3), in Apr (80, 40) are the online and offline registrations respectively.
From 5, the number of online registrations is highest in May ⇒ in May there are 100 online registrations. The lowest possible number of offline registrations is 30 and maximum possible total registrations is 130 ⇒ in May (100, 30) are the online and offline registrations respectively.
Let us assume, 'x' to be the number of offline registrations in May = number of online registrations in March.
Let us capture all this data in a table:

Month	Online	Offline	Total
Jan	40	80	120
Feb	y	x	
Mar	x	z	
Apr	80	40	120
May	100	30	130

From the table given in the question, 50 is the median for Offline data
⇒ x should lie between 50 and 80 (included)
For 80 to be the median for the online data ⇒ y lies between 80 and 100 (included).
Now, consider Feb, Minimum value of y + x = 80 + 50 = 130 (which is the maximum value possible of the total possible registrations)
⇒ x = 50 and y = 80
Since, 110 is the minimum number of total registrations, the only possibility is in March ⇒ 50 + z = 110 ⇒ z = 60.
Now, filling the complete table we get,

Month	Online	Offline	Total
Jan	40	80	120
Feb	80	50	130
Mar	50	60	110
Apr	80	40	120
May	100	30	130

1. In May, there are 30 offline registrations (smallest) which is True
2. In Mar, we have smallest number of total registrations which is False.

19. Correct Answer: C
Explanation:

Given that in every month, both online and offline registration numbers were multiples of 10. From (2), in Jan, the number of offline registrations was twice that of online registrations.
⇒ If x is number of online registrations ⇒ 2x is the number of offline registrations ⇒ 3x is the total number of registrations.
According to the data given in the table ⇒ 3x should lie between the minimum and maximum total number of registrations. ⇒ x = 40 (as x should also be a multiple of 10)
⇒ In Jan (40, 80) are the online and offline registrations respectively.
Similarly, from (3), in Apr (80, 40) are the online and offline registrations respectively.
From 5, the number of online registrations is highest in May ⇒ in May there are 100 online registrations. The lowest possible number of offline registrations is 30 and maximum possible total registrations is 130 ⇒ in May (100, 30) are the online and offline registrations respectively.
Let us assume, 'x' to be the number of offline registrations in May = number of online registrations in March.
Let us capture all this data in a table:

Month	Online	Offline	Total
Jan	40	80	120
Feb	y	x	
Mar	x	z	
Apr	80	40	120

May	100	30	130

From the table given in the question, 50 is the median for Offline data
⇒ x should lie between 50 and 80 (included)
For 80 to be the median for the online data ⇒ y lies between 80 and 100 (included).
Now, consider Feb, Minimum value of y + x = 80 + 50 = 130 (which is the maximum value possible of the total possible registrations)
⇒ x = 50 and y = 80
Since, 110 is the minimum number of total registrations, the only possibility is in March ⇒ 50 + z = 110 ⇒ z = 60.
Now, filling the complete table we get,

Month	Online	Offline	Total
Jan	40	80	120
Feb	80	50	130
Mar	50	60	110
Apr	80	40	120
May	100	30	130

The number of offline registrations in Feb is 50.

20. Correct Answer: C
Explanation:

Given that in every month, both online and offline registration numbers were multiples of 10. From (2), in Jan, the number of offline registrations was twice that of online registrations.
⇒ If x is number of online registrations ⇒ 2x is the number of offline registrations ⇒ 3x is the total number of registrations.
According to the data given in the table ⇒ 3x should lie between the minimum and maximum total number of registrations. ⇒ x = 40 (as x should also be a multiple of 10)
⇒ In Jan (40, 80) are the online and offline registrations respectively.
Similarly, from (3), in Apr (80, 40) are the online and offline registrations respectively.
From 5, the number of online registrations is highest in May ⇒ in May there are 100 online registrations. The lowest possible number of offline registrations is 30 and maximum possible total registrations is 130 ⇒ in May (100, 30) are the online and offline registrations respectively.
Let us assume, 'x' to be the number of offline registrations in May = number of online registrations in March.
Let us capture all this data in a table:

Month	Online	Offline	Total
Jan	40	80	120
Feb	y	x	
Mar	x	z	
Apr	80	40	120
May	100	30	130

From the table given in the question, 50 is the median for Offline data
⇒ x should lie between 50 and 80 (included)
For 80 to be the median for the online data ⇒ y lies between 80 and 100 (included).

Now, consider Feb, Minimum value of y + x = 80 + 50 = 130 (which is the maximum value possible of the total possible registrations)
⇒ x = 50 and y = 80
Since, 110 is the minimum number of total registrations, the only possibility is in March ⇒ 50 + z = 110 ⇒ z = 60.
Now, filling the complete table we get,

Month	Online	Offline	Total
Jan	40	80	120
Feb	80	50	130
Mar	50	60	110
Apr	80	40	120
May	100	30	130

Total registrations in Jan = Apr = 120 and Feb = May = 130.

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Quant

1. Correct Answer: A

Using Base Change rule in this question, we can say that $\frac{\log_3(2^x-9)}{\log_3 4}$ can be written as $\log_4(2^x-9)$, and $\frac{\log_5\left(2^x+\frac{17}{2}\right)}{\log_5 4}$ can be written as $\log_4\left(2^x+\frac{17}{2}\right)$.
Also, $\frac{1}{2}$ can be written as $\log_4 2$. So, we get the new terms as $\log_4 2$, $\log_4(2^x-9)$ and $\log_4\left(2^x+\frac{17}{2}\right)$.
Using the concept of AP, we get

$$2\times\log_4(2^x-9)=\log_4 2+\log_4\left(2^x+\frac{17}{2}\right)$$

$$\Rightarrow \log_4(2^x-9)^2=\log_4\left[2\left(2^x+\frac{17}{2}\right)\right]$$

$$\Rightarrow (2^x-9)^2=2\cdot 2^x+17$$

If we put $2^x=y$, we get

$$y^2-18y+81=2y+17$$

$$\Rightarrow y^2-20y+64=0\Rightarrow (y-4)(y-16)=0\Rightarrow \Rightarrow y=4 \text{ or } 16$$

$$\Rightarrow x=2 \text{ or } 4.$$

But $x=2$ is not valid because (2^x-9) will become negative. Hence $x=4$ is the right solution.
So, terms will be $\log_4 2$, $\log_4 7$, $\log_4\left(\frac{49}{2}\right)$.
Therefore, common difference $=\log_4 7-\log_4 2=\log_4\left(\frac{7}{2}\right)$.

2. Correct Answer: B

$x^8+\frac{1}{x^8}=47$. Let us put $x^4=a\Rightarrow a^2+\frac{1}{a^2}=47$.
Now, $\left(a+\frac{1}{a}\right)^2=a^2+\frac{1}{a^2}+2$

$$\Rightarrow \left(a+\frac{1}{a}\right)^2=49\Rightarrow a+\frac{1}{a}=7\Rightarrow x^4+\frac{1}{x^4}=7.$$

Put $x^2=b\Rightarrow b^2+\frac{1}{b^2}=47$.
Now, $\left(b+\frac{1}{b}\right)^2=b^2+\frac{1}{b^2}+2$

$$\Rightarrow \left(b+\frac{1}{b}\right)^2=9\Rightarrow b+\frac{1}{b}=3\Rightarrow x^2+\frac{1}{x^2}=3.$$

Also, $\left(x+\frac{1}{x}\right)^2=x^2+\frac{1}{x^2}+2$

$$\Rightarrow \left(x+\frac{1}{x}\right)^2=5\Rightarrow x+\frac{1}{x}=\sqrt{5}.$$

Now, $\left(x+\frac{1}{x}\right)^3=x^3+\frac{1}{x^3}+3\left(x+\frac{1}{x}\right)$

$$\Rightarrow 5\sqrt{5}=x^3+\frac{1}{x^3}+3\sqrt{5}$$

$$\Rightarrow x^3+\frac{1}{x^3}=2\sqrt{5}.$$

Let us put $x^3=d\Rightarrow d+\frac{1}{d}=2\sqrt{5}$.
Now, $x^9+\frac{1}{x^9}=d^3+\frac{1}{d^3}$ is to be calculated.

$$\left(d+\frac{1}{d}\right)^3=d^3+\frac{1}{d^3}+3\left(d+\frac{1}{d}\right)$$

$$\Rightarrow 40\sqrt{5}=d^3+\frac{1}{d^3}+6\sqrt{5}$$

$\Rightarrow d^3 + \frac{1}{d^3} = 34\sqrt{5}$
$\Rightarrow x^9 + \frac{1}{x^9} = 34\sqrt{5}$.

3. Correct Answer: B

$x + y = 4$ and $(a + 5)x + (b^2 - 15)y = 8b$ have infinitely many solutions for x and y.
Hence, $\frac{a+5}{1} = \frac{b^2-15}{1} = \frac{8b}{4}$.
So, $b^2 - 15 = 2b \Rightarrow b^2 - 2b - 15 = 0$
$\Rightarrow (b - 5)(b + 3) = 0 \Rightarrow b = 5$ or -3.
Also, $a + 5 = 2b \Rightarrow a + 5 = 10$ or $a + 5 = -6 \Rightarrow a = -11$ or 5.
Maximum value of ab will be when we take $a = -11$ and $b = -3$.
So maximum product = 33.

4. Correct Answer: A

$8^m = 2^{3m}$ and $8^n = 2^{3n}$. Smallest value of $n + m$ is asked. So, we will take m as 1 $\Rightarrow 2^{3m} = 2^3$.
Since there are 41 integers between 8^m and 8^n, so they would be $2^4, 2^5, \ldots$ till 2^{44}.
So 2^{3n} should be $2^{45} \Rightarrow n = 15$.
Hence minimum value of $n + m$ is $1 + 15 = 16$.

5. Correct Answer: 5

$5^{n-1} < 3^{n+1}$. n can take values from 1 to 5 because if $n = 6$, then we get $5^5 < 3^7$, which is wrong as 3125 is greater than 2187. Hence maximum value of n is 5.
If we take $n = 5$, we get, $3^{5+1} < 2^{5+m}$
$\Rightarrow 729 < 2^{5+m}$
$\Rightarrow m$ has to minimum 5 so that we get $729 < 2^{10}$ or $729 < 1024$.
Hence answer is 5.

6. Correct Answer: 9

$x^2 + bx + c = 0$. Let its roots be m and n. Hence, $m + n = -b$ and $mn = c$.
Also, $\frac{1}{n} - \frac{1}{m} = \frac{1}{3}$ and $\frac{1}{n^2} + \frac{1}{m^2} = \frac{5}{9}$.
Now, $\left(\frac{1}{n} - \frac{1}{m}\right)^2 = \frac{1}{n^2} + \frac{1}{m^2} - \frac{2}{mn}$
$\Rightarrow \frac{1}{9} = \frac{5}{9} - \frac{2}{mn} \Rightarrow mn = \frac{9}{2}$.
$\Rightarrow \left(\frac{1}{n} + \frac{1}{m}\right)^2 = \frac{1}{n^2} + \frac{1}{m^2} + \frac{2}{mn}$
$\Rightarrow \frac{1}{n} + \frac{1}{m} = 1 \Rightarrow \frac{m+n}{mn} = 1 \Rightarrow m + n = \frac{9}{2} \Rightarrow b = -\frac{9}{2}$.
Or, $\frac{1}{n} + \frac{1}{m} = -1 \Rightarrow \frac{m+n}{mn} = -1 \Rightarrow m + n = -\frac{9}{2} \Rightarrow b = \frac{9}{2}$.
$\Rightarrow b + c = \frac{9}{2} + \frac{9}{2} = 9$.

7. Correct Answer: 468

Number of factors in number N = $a^p \times b^q \times c^r \ldots\ldots$ where a, b and c... are prime numbers = (p + 1) × (q + 1) × (r + 1) × .....
As numbers have 15 factors ⇒ $a^2 \times b^4$ form is possible only. ⇒ $3^2 \times 2^4 = 144$ and $2^2 \times 3^4 = 324$ are the two numbers. Hence their sum = 144 + 324 = 468.

8. Correct Answer: A

Ratio of cocoa: sugar is 3:2 and ratio of coffee: sugar is 7:3.
Total 5 litres of A has 3 litres of cocoa and 2 litres of sugar.
Total 10 litres of B has 7 litres of coffee and 3 litres of sugar.
Since A and B are mixed in the ratio 2:3, so total 15 litres will be divided in this ratio. Hence, we take 6 litres of A and 9 litres of B.
Quantity of cocoa will be $\frac{3}{5} \times 6 = 3.6$ litres (from A)
Quantity of sugar will be $\frac{2}{5} \times 6 = 2.4$ litres (from A)
Quantity of coffee will be $\frac{7}{10} \times 9 = 6.3$ litres (from B)
Quantity of sugar will be $\frac{3}{10} \times 9 = 2.7$ litres (from B)
Total mixture $= 15 + 15 = 30$ litres. Mixture C will have 3.6 litres cocoa, 6.3 litres coffee and $2.4 + 2.7 = 5.1$ litres of sugar.
Hence required percentage $= \frac{5.1}{30} \times 100 = 17\%$.

9. Correct Answer: C

Suppose Rahul takes a days, Rakshita takes b days and Gurmeet takes c days.
As per the question, $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} < \frac{1}{7}$ ..... (1)
and $\frac{1}{a} + \frac{1}{c} > \frac{1}{15}$ ..... (2)

Also, it is given that, $6\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right) + \frac{3}{b} = 1$ ..... (3)

Putting the values from equations (1) and (2), we get
$6\left(< \frac{1}{7}\right) + \frac{3}{b} = 1 \Rightarrow \frac{3}{b} = 1 - \left(< \frac{1}{7}\right) \Rightarrow \frac{3}{b} > \frac{1}{7} \Rightarrow b < 21.$
Also, $\frac{9}{b} + \left(> \frac{6}{15}\right) = 1 \Rightarrow \frac{9}{b} = 1 - \left(> \frac{6}{15}\right)$
$\Rightarrow \frac{9}{b} < \frac{9}{15} \Rightarrow b > 15.$
Hence, b can be 16, 17 and 20. So 21 is not possible.

10. Correct Answer: D

Population in 2020 = 100000
It is given that there is y% decrease in population from 2020 to 2021 and x% increase in population from 2021 to 2022. Also, it is given that population of 2022 is greater than population of 2020.
This means x is greater than y because had it been x = y, even then population of 2022 would have been less the population of 2020.
Difference between x and y is 10. Minimum population in 2021 is to be calculated by options:
Option (1) which is 72000 ⇒ y = 28 and x = 38 ⇒ Population in 2022 = 72000 × 1.38 = 99360.
Hence it is possible.
Option (2) which is 75000 ⇒ y = 25 and x = 35 ⇒ Population in 2022 = 75000 × 1.35 = 101250.
Hence it is possible.
Option (3) which is 74000 ⇒ y = 26 and x = 36 ⇒ Population in 2022 = 74000 × 1.36 = 100640.

Hence it is possible.
Option (4) which is 73000 ⇒ y = 27 and x = 37 ⇒ Population in 2022 = 73000 × 1.37 = 100010.
Since 100010 is minimum of all ⇒ 73000 is the answer.

11. Correct Answer: A

CP of cloth = 100 per meter. SP of cloth = 110 per meter. But he gets 5 cm free for 100 cm and also gives 95 cm instead of 100 cm.
So, he gets $\frac{5}{100}$ and $\frac{5}{95}$ extra ⇒ $\frac{1}{20}$ and $\frac{1}{19}$.
So, SP = $110\left(1+\frac{1}{20}\right)\left(1+\frac{1}{19}\right)$.
But he gives 5% discount, therefore, Net SP = $110\times\frac{21}{20}\times\frac{20}{19}\times\frac{95}{100}=115.5$.
Hence, profit = 15.5%.

12. Correct Answer: B

Let the average of A, B and $C = a \Rightarrow A+B+C = 3a$ ……(1)
Also, $\frac{A+B+C+D}{4} = a-x$ ……(2)
and $\frac{A+B+C+E}{4} = a+2x$ ……(3)
It is given that $E-D=12$.
From (1) and (2), $3a+D = 4a-4x \Rightarrow D = a-4x$.
Also, from (1) and (3), $3a+E = 4a+8x \Rightarrow E = a+8x$.
As $E-D=12$, $a+8x-a+4x=12 \Rightarrow 12x=12 \Rightarrow x=1$.

13. Correct Answer: D

Let x be the speed of the first boat in still water and y be the speed of the river.
Speed of downstream $= x+y$ and Speed of upstream $= x-y$
As per the question, $(x+y)\times 2 = (x-y)\times 3$
$\Rightarrow x+y : x-y = 3:2$.
Hence, the ratio of the speeds downstream and upstream is 3:2.
$\Rightarrow x+y=3$ and $x-y=2 \Rightarrow x=2.5$ and $y=0.5$.
Therefore, Distance $= (5+1)\times 2 = 12$ km.
Let the speed of the other boat be a.
$\frac{12}{a-1}+\frac{12}{a+1}=6 \Rightarrow a^2-1=4a \Rightarrow a^2-4a-1=0$.
$\Rightarrow a=\frac{4\pm 2\sqrt{5}}{2}=2+\sqrt{5}$.
Hence, the speed of the slower boat $= 2+\sqrt{5}$.
Time taken by the slower boat to reach from A to B is $\frac{12}{2+\sqrt{5}+1}=\frac{12}{3+\sqrt{5}}\times\frac{3-\sqrt{5}}{3-\sqrt{5}}$
$=\frac{12(3-\sqrt{5})}{4}=9-3\sqrt{5}=3(3-\sqrt{5})$.

14. Correct Answer: 36

Let us assume the efficiency of Gautam as G and the efficiency of Suhani as S.
Hence, we get the equation, $(G+S)\times 20 = (0.6G+1.5S)\times 20$
$\Rightarrow 4G = 5S \Rightarrow G:S = 5:4$.
So, the ratio of time taken by Gautam and Suhani will be in the ratio 4:5.

Let us assume Gautam takes $4x$ days and Suhani takes $5x$ days to complete the work.
$\frac{1}{4x}+\frac{1}{5x}=\frac{1}{20} \Rightarrow \frac{9}{20x}=\frac{1}{20} \Rightarrow x=9.$
Hence, the faster worker takes $4x = 4 \times 9 = 36$ days to complete the work.

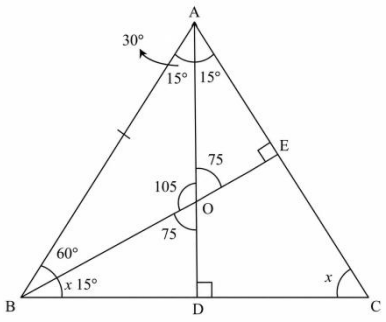
15. Correct Answer: 42

A: B = 3: 4. Let us take collection/week of A as 3x and B as 4x
⇒ In 5 weeks, A collected 3x × 5 = 15x which is a multiple of 7.
In 3 weeks, B collected 4x × 3 = 12x which is a multiple of 24 ⇒ x is an even multiple of 7
⇒ Lowest possible value of x is 14.
So, number of coins collections by A in one week is 3x = 3 × 14 = 42.

16. Correct Answer: 340

Let M be the number of mangoes, B be the number of bananas and A be the number of apples. So, as per the question, $M = 0.4(M + B + A)$
$\Rightarrow 5M = 2M + 2B + 2A$
$\Rightarrow 3M = 2B + 2A \ldots\ldots (1)$
Also, $\frac{M}{2}+B-96+\frac{3}{5}A=\frac{1}{2}(M+B+A)$
$\Rightarrow 5B + 10B - 960 + 6A = 5M + 5B + 5A$
$\Rightarrow A + 5B = 960 \ldots\ldots\ldots (2)$
Now, we need to minimise $M + B + A$, so we should maximise B, which should be 189.
Hence, we get $A = 15$.
Putting these values in equation (1), we get the value of M as 136.
Hence, the minimum total of M, B and A is $136 + 189 + 15 = 340$.

17. Correct Answer: C



As $\angle AOB = 105°$, so $\angle EOD = 105°$ (vertically opposite angles).
Also, as triangle ABC is isosceles with $AB = AC$, so $\angle ABC = \angle ACB = x$ (say).
Now, in quadrilateral $OECD$, $105° + 90° + x + 90° = 360° \Rightarrow x = 75°$.
Hence, $\angle BAC = 180° - (75° + 75°) = 30°$.
Also, $\angle AOE = \angle BOD = \frac{360°-(105°+105°)}{2} = 75°$.
Now, in triangle OBD, $75° + 90° + \angle OBD = 180° \Rightarrow \angle OBD = 15°$.
Hence, $\angle ABO = 75° - 15° = 60°$.
Also, in triangle BAO, $60° + \angle BAO + 105° = 180° \Rightarrow \angle BAO = 15°$.
Now, we can see that triangle BAE is $30° - 60° - 90°$ triangle.
If we take $AB = h$ (hypotenuse), then $BE = \frac{h}{2}$ (side opposite to 30°).

Now, in triangle ABD, $\frac{AD}{AB} = \sin 75° \Rightarrow \frac{AD}{h} = \sin 75°$
$\Rightarrow AD = h\sin 75° = h\cos 15°$.
Hence, the ratio of AD to BE is $\frac{AD}{BE} = \frac{h\cos 15°}{h/2} = 2\cos 15°$.

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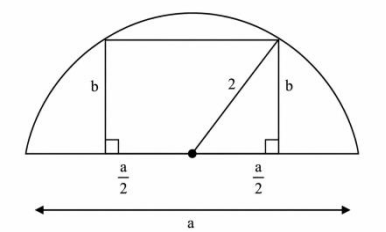
18. Correct Answer: B



Let the length of the rectangle be a and the breadth be b.

So, we get the equation as $2^2 = b^2 + \left(\frac{a}{2}\right)^2$

$\Rightarrow \frac{a^2}{4} + b^2 = 4 \cdots (1)$

Area of rectangle $= ab$, which can be written as twice the geometric mean of $\frac{a^2}{4}$ and b^2, and is equal to $2\sqrt{\frac{a^2}{4} \times b^2}$

For maximum area, the equality condition of AM and GM should be satisfied.

$\Rightarrow \frac{\frac{a^2}{4}+b^2}{2} = \sqrt{\frac{a^2}{4} \times b^2} \Rightarrow \frac{a^2}{4} + b^2 = 2\sqrt{\frac{a^2}{4} \times b^2}$

Squaring both sides, $\left(\frac{a^2}{4} + b^2\right)^2 = 4\left(\frac{a^2b^2}{4}\right)$

$\Rightarrow \frac{a^4}{16} + b^4 + \frac{2a^2b^2}{4} = a^2b^2 \Rightarrow \frac{a^4}{16} + b^4 = \frac{a^2b^2}{2}$

$\Rightarrow a^4 + 16b^4 = 8a^2b^2 \Rightarrow a^4 - 8a^2b^2 + 16b^4 = 0$

$\Rightarrow (a^2 - 4b^2)^2 = 0 \Rightarrow a^2 = 4b^2$

Hence, $\frac{a^2}{b^2} = 4 \Rightarrow \frac{a}{b} = 2$

$\therefore a : b = 2 : 1$

19. Correct Answer: 54

Let the number of sides be n.

Hence, $180° - \frac{360°}{n} - \frac{360°}{n} = 120° \Rightarrow \frac{720°}{n} = 60° \Rightarrow n = 12$

Number of diagonals $= {}^nC_2 - n$.

Putting $n = 12$, we get, ${}^{12}C_2 - 12 = 66 - 12 = 54$

20. Correct Answer: C

Given sequence is $1 + \left(1 + \frac{1}{3}\right)\frac{1}{4} + \left(1 + \frac{1}{3} + \frac{1}{9}\right)\frac{1}{16} + \left(1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27}\right)\frac{1}{64} + \cdots$

which can be written as

$$1\left(1 + \frac{1}{4} + \frac{1}{16} + \frac{1}{64} + \cdots\right) + \frac{1}{3}\left(\frac{1}{4} + \frac{1}{16} + \frac{1}{64} + \cdots\right) + \frac{1}{9}\left(\frac{1}{16} + \frac{1}{64} + \frac{1}{256} + \cdots\right) + \cdots$$

These are three different infinite GPs whose sums will be the first three terms of the final GP whose sum is required.

Hence, the first three terms of the final GP are $S_1 = \frac{1}{1-\frac{1}{4}} = \frac{4}{3}$,

$S_2 = \frac{1}{3}\left(\frac{\frac{1}{4}}{1-\frac{1}{4}}\right) = \frac{1}{9}$, and $S_3 = \frac{1}{9}\left(\frac{\frac{1}{16}}{1-\frac{1}{4}}\right) = \frac{1}{108}$.

Hence, the final sequence becomes, $\frac{4}{3} + \frac{1}{9} + \frac{1}{108} + \cdots$

It is an infinite GP with first term $\frac{4}{3}$ and common ratio $r = \frac{1}{12}$.

Therefore, Final answer $= \frac{\frac{4}{3}}{1-\frac{1}{12}} = \frac{4}{3} \times \frac{12}{11} = \frac{16}{11}$.

21. Correct Answer: B

$a_n = 46 + 8n$, $b_n = 98 + 4n$.
Putting the values of n as 1, 2, 3..... in the 1st sequence we get values as 54, 62, 70.....
Putting the values of n as 1, 2, 3..... in the 2nd sequence we get values as 102, 106, 110, 114.....
So, the common terms to both the sequences is 102, 110, 118.....
But last term in the 1st sequence is 846 when we put n = 100 and last term in the 2nd sequence is 498 when we put n = 100.
Also, the common sequence is 102, 110..... is of the form 8k + 6. Hence last number of this form in this sequence is 494.
So, we get the final sequence as 102, 110, 118, ...494.
Number of terms in this sequence: 102 + (n -1) 8 = 494 ⇒ n = 50.
Sum of these terms = 50/2 (102 + 494) = 14900.

22. Correct Answer: 3

Given that f(3x+2y, 2x – 5y) = 19x.
Multiplying 1st function by 5 and 2nd function by 2, we get 15x + 10y and 4x – 10y.
Now on adding these 2 functions, we get 15x + 10y + 4x – 10y = 19x.
Using the same operation for f(x, 2x), we get 5x + 2(2x) = 27 ⇒ 9x = 27 ⇒ x = 3

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