VERBAL ABILITY AND READING COMPREHENSION

The passage below is accompanied by four questions. Based on the passage, choose the best answer for 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 concerns" . . .

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.

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

2. 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 widely considered to be irrelevant to human existence.
(d) is primarily the concern of philosophers and artists, rather than of ordinary people.

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

4. The main difficulty in studying romanticism is the:
(a) absence of written accounts by romantic poets and artists.
(b) elusive and suggestive nature of romantic aesthetics.
(c) lack of clear conceptual contours of the domain.
(d) controversial and scandalous history of romantic literature.

The passage below is accompanied by four questions. Based on the passage, choose the best answer for 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.

5. The author endorses Pinker's views on the importance of logical reasoning as it:
(a) equips people with the ability to tackle challenging practical problems.
(b) focuses public attention on real issues like development rather than sensational events.
(c) provides a moral compass for resolving important ethical dilemmas.
(d) helps people to gain expertise in statistics and other scientific disciplines.

6. 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) the primacy of conscious sequential reasoning as the basis for seminal human achievements.
(c) arriving at independent conclusions irrespective of who is presenting the argument.
(d) an awareness of underlying assumptions in an argument and gaps in one's own knowledge.

7. The author refers to the ancient Greek philosophers to:
(a) highlight the influence of their thinking on the development of Pinker's arguments.
(b) indicate the various similarities between their thinking and Pinker's conclusions.

(c) reveal gaps in Pinker's discussion of the importance of ethical considerations in rational behaviour.
(d) show how dreams and visions have for centuries influenced subconscious behaviour and pathbreaking inventions.

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

The passage below is accompanied by four questions. Based on the passage, choose the best answer for 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 heat waves, 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. 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 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.

9. Which one of the following, if true, would make the reviewer's choice of the pronoun "who" for Gaia inappropriate?

(a) Non-European societies have perceived the Earth as a non-living source of all resources.
(b) Modern western science discovers new evidence for the Earth being an inanimate object.
(c) There is a direct cause–effect relationship between human activities and global climate change.
(d) Ghosh's book has a different title: "The Nutmeg's Revenge".

10. All of the following can be inferred from the reviewer's discussion of "The Nutmeg's Curse", EXCEPT:

(a) environmental preservation policy makers can learn a lot from non-European and/or pre-colonial societies.
(b) the history of climate change is deeply intertwined with the history of colonialism.
(c) the contemporary dominant perception of nature and the environment was put in place by processes of colonialism.
(d) academic discourses have always served the function of raising awareness about environmental preservation.

11. 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 the first instance in history when the processes responsible for climate change were initiated.
(b) To illustrate the role played by the cultivation of certain crops in the plantation mode in contributing to climate change.
(c) To illustrate how colonialism represented and perpetuated the mindset that has led to climate change.
(d) To illustrate how systemic violence against the colonised constituted the cornerstone of colonialism.

12. 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 greed of organisations benefiting from non-renewable energy resources.
(b) The marginalised status of non-European ways of looking at nature and the environment.
(c) The global dominance of oil economies and international politics built around it.
(d) The decentralised characteristic of renewable energy resources like solar power

The passage below is accompanied by four questions. Based on the passage, choose the best answer for each question.

In 2006, the Met [art museum in the US] agreed to return the Euphronios krater, a masterpiece Greek urn 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 Hoving 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, nongovernmental 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.

13. It can be inferred from the passage that archaeological sites are considered important by some source countries because they:
(a) are a symbol of Western imperialism.
(b) are subject to strict patrimony laws.
(c) generate funds for future discoveries.
(d) give a boost to the tourism sector.

14. 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) Western countries will have to apologise to countries for looting their cultural property in the past century.
(d) UNESCO finances archaeological research in poor, but archaeologically-rich source countries.

15. Which one of the following statements best expresses the paradox of patrimony laws?
(a) They were intended to protect cultural property, but instead resulted in the withholding of national treasure from museums.
(b) They were aimed at protecting cultural property, but instead reduced new archaeological discoveries.
(c) They were intended to protect cultural property, but instead resulted in the neglect of historical sites.
(d) They were aimed at protecting cultural property, but instead reduced business for auctioneers like Sotheby's.

16. 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) to find ways to motivate other countries to finance archaeological explorations in their country.
(c) adopt China's strategy of dropping its cultural property laws and carrying out archaeological research through international collaboration.
(d) fund institutes in other countries to undertake archaeological exploration in the source country reaping the benefits of cuttingedge techniques.

17. There is a sentence that is missing in the paragraph below. Look at the paragraph and decide where (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 : __(1)__. 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.__(2)__. 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).__(3)__. 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.__(4)__.

(a) Option 2 (b) Option 3
(c) Option 4 (d) Option 1

18. There is a sentence that is missing in the paragraph below. Look at the paragraph and decide where (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 peacebuilding efforts.__(4)__.

(a) Option 2 (b) Option 4
(c) Option 3 (d) Option 1

19. 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 colonised 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.

20. 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 senior recruiter at Cenlar FSB.

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

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

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 memorisation gradually gave way to reading and learning no longer required the presence of a mentor; it could be done privately.

23. 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. 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 an increasing number of predatory birds and plants on the island despite the presence of pests which is a positive development.

(c) There is a huge positive transformation of the ecosystem of the island when brought under environmental protection.

(d) Flowering plants, herbs and birds are now being protected on this wonderful Antarctic island.

DATA INTERPRETATION AND LOGICAL REASONING

Answer the following questions based on the information given below:

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

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

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

27. 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 II (b) Only I
(c) Both I and II (d) Neither I nor II

28. What best can be concluded about the number of offline registrations in February?
(a) 50 (b) 30 or 50 or 80
(c) 50 or 80 (d) 80

29. 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) Only I (d) Both I and II

Answer the following questions based on the information given below:

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.

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

31. What was the weight of the test component?
(a) 0.75 (b) 0.60
(c) 0.40 (d) 0.50

32. What was the maximum aggregate score obtained by the students?
(a) 66 (b) 80
(c) 62 (d) 68

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

34. Which of the following pairs of students were part of the same project team?

i) Amala and Biman

ii) Koli and Mathew

(a) Neither i) nor ii) (b) Only ii)

(c) Only i) (d) Both i) and ii)

Answer the following questions based on the information given below:

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.

35. How many Split Inverter ACs did D2 sell?

36. What percentage of ACs sold were of Non-inverter type?

(a) 33.33% (b) 75.00%

(c) 20.00% (d) 25.00%

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

38. Which of the following statements is necessarily false?

(a) D1 and D3 sold an equal number of Split ACs.

(b) D1 and D3 together sold more ACs as compared to D2 and D4 together.

(c) D2 sold the highest number of ACs.

(d) D4 sold more Split ACs as compared to D3.

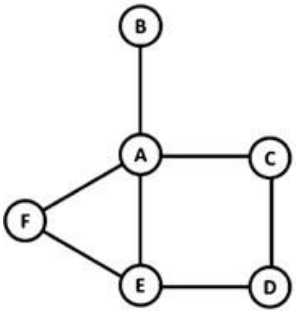
39. If D3 and D4 sold an equal number of ACs, then what was the number of Non-inverter ACs sold by D2?

(a) 7 (b) 5

(c) 6 (d) 4

Answer the following questions based on the information given below:

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.

40. Which one among the following stations is visited the largest number of times?

(a) Station C (b) Station D
(c) Station E (d) Station F

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

42. Which team patrols the street connecting Stations D and E at 10:15 hrs?

(a) Team 3 (b) Team 1
(c) Team 2 (d) Team 4

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

44. How many teams pass through Station C in a day?

(a) 3 (b) 4
(c) 1 (d) 2

45. 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) 15 (b) 25
(c) 33 (d) 55

46. Let n and m be two positive integers such that there are exactly 41 integers greater than 8 and less than 8^n, which can be expressed as powers of 2.
Then, the smallest possible value of n + m is?
(a) 44 (b) 14
(c) 16 (d) 42

47. 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) $34\sqrt{5}$ (b) $36\sqrt{5}$
(c) $40\sqrt{5}$ (d) $30\sqrt{5}$

48. For a real number x, if $\frac{1}{2}$, $\frac{\log_3(2^x-9)}{\log_3 4}$, and $\frac{\log_5(2^x+\frac{17}{2})}{\log_5 4}$ are in arithmetic progression, then the common difference is
(a) $\log_4(3/2)$ (b) $\log_4(7/2)$
(c) $\log_4 7$ (d) $\log_4(23/2)$

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

50. 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

51. 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?

52. 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) 9.7% (b) 4.2%
(c) 15.5% (d) 16%

53. 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) $3(3 + \sqrt{5})$ (b) $3(\sqrt{5} - 1)$
(c) $3(3 - \sqrt{5})$ (d) $12(\sqrt{5} - 2)$

54. 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) 21 (b) 17
(c) 16 (d) 20

55. 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) 73000 (b) 72000
(c) 75000 (d) 74000

56. 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) 1.5 (b) 0.5
(c) 1 (d) 2

57. 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) 21 (b) 17
(c) 16 (d) 24

58. 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

59. 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

60. 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

61. Let triangle ABC be isosceles triangle such that AB and AC are of equal lenght. 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) $2\cos 15°$ (b) $\cos 15°$
(c) $2\sin 15°$ (d) $\sin 15°$

62. 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) 2 : 1 (b) $\sqrt{5}$: 1
(c) 1 : 1 (d) $\sqrt{2}$: 1

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

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

(a) 14798 (b) 14602
(c) 14900 (d) 15000

65. The value of $1 + (1 + \frac{1}{3})\frac{1}{4} + (1 + \frac{1}{3} + \frac{1}{9})\frac{1}{16} + (1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27})\frac{1}{64} + \ldots$, is

(a) 15/13 (b) 27/12
(c) 16/11 (d) 15/8

66. 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:

ANSWER KEY AND EXPLANATIONS

VERBAL ABILITY AND READING COMPREHENSION

1. **(d)**
2. **(b)**
3. **(a)**
4. **(c)**
5. **(a)**
6. **(b)**
7. **(c)**
8. **(b)**
9. **(a)** Paragraph 3 says: "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".
   Ghosh uses the word who because many non-European societies see Earth as a living entity.
   If option (a) were true this would contradict the use of word who for a non-living thing.
   Hence, option (a).
10. **(d)** Option (a): This is what Ghosh has been arguing in the passage by referring to non-European societies and their view of Earth as a living creature.
    Option (b): Paragraph 2 entablishes the link between colonialism and Earth's exploitation.
    Option (c): Paragraph 2 states: "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. . ..". This tells us that colonialism perceived Earth as something to be exploited.
    Option (d) is wrong. Paragraph 4 says: "invaders and their myriad backers in the fields of economics, politics, anthropology, philosophy, literature, technology, physics, chemistry, biology have dominated global intellectual discourse". This clearly states that academic dicussions were dominated by section of soceity which did not care about environment protection.
    Hence, option (d).
11. **(c)** Option (a): The passage does not mention colonisation of Banda to be the first such instance.
    Option (b): Colonialism led to change in crop plantation but this is not the primary purpose of dicussing colonisation of Banda islands.
    Option (d): Again violence against indigenous population is mentioned in the passage but this is not the main reason why the author dicusses Banda islands.
    Option (c): The main reason author discusses Banda islands is the systematic way colonialism has led to climate change by perpetuating the idea that Earth is a resource which should be exploited.
    Hence, option (c).
12. **(d)** Last paragraph: "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."
    Except option (d) all other reasons are mentioned in the paragraph.
    Hence, option (d).
13. **(d)**
14. **(d)**
15. **(b)**
16. **(d)**
17. **(b)**
18. **(c)**
19. **(2)** The main theme of the paragraph is the ancient Andamanese language B o and its last known speaker Boa Senior.
    All sentences focus on this theme except sentence 2 which focuses on decreasing indigenous population since British occupation.
    Hence, 2.
20. **(2)** The theme of the pragraph is companies shifting from hard/technical skills to soft skills for hiring.
    All sentences focus on this theme except setence 2 which focuses on definition of ideal candidate.
    Hence, 2.
21. **(3142)** Sentence 3 is the best opening sentence as it introduces the idea of recycling of e-waste.
    Sentence 1, 2 and 4 talk about Veena, but sentences 2 and 4 start with pronouns 'her' and 'she' so they should come after 1.
    We have 31 as the starting of the paragraph so far.
    Sentence 1 talks about Veen having a way to solve e-waste problem, while sentence 4 lists down here plans, hence should follow 1. So, we have 14 as a strong pair.
    Sentence 3 further elaborates the-her plan mentioned in sentence 4 and concludes the paragraph.
    Hence, 3142.
22. **(2431)** Sentence 2 is the best opening sentence as it introduces the idea of how people learned through listening in scribal culture and that printing press has impacted this way of learning.
    Sentence 4 elaborates the impact of printing press and how it has shifted from listening to reading. Hence, 24 make a strong pair.
    Sentence 3 underlines this transformation from listeners to readers and it became more widesperad during industrial era.
    Sentence 1 concludes the paragraph by learning process is still predominantly reading based even after many technological advancement in this field.
    Hence, 2431.
23. **(b)** The passage talks about how perfectionism of 1950 s meant conforming to values, behaviour and appearance. But perfectionists of today in contrast feel an obligation to stand out.
    Option (b) captures this essence perfectly.
    Option (a) empahsizes that people will go to any length for perctionism which is not mentioned in the passage.
    Option (c): The passage doen't discuss role of media in perpetuating perfectionism. The passage only mentions about advertising and not the role of media.
    Option (d): The passage does not mention conflict due to idea of perfectionism not defined. The idea of perfectionism has changed in modern times, but it did not lead to tension and conflicts.
    Hence, option (b).

24. **(a)** The passage illustrates the gradual enhancement of life on the island, particularly benefiting birds such as Antarctic prions and white-headed petrels. It underscores the rising bird populations, attributed to absence of pests on the island. The elimination of pests facilitates the birds' return, fostering breeding activities and contributing positively to the ecosystem.
Furthermore, the passage notes the valuable role of bird droppings in enriching the soil with nutrients, supporting the growth of plants. In summary, Option (a) accurately captures the core theme of the passage, emphasizing the rejuvenation and improvement of the island's environment through the eradication of pests, positively impacting both birds and plants.
Option (b) incorrectly implies an increase in predatory bird numbers, contradicting the positive developments outlined in the passage.
Option (c) is inaccurate, as the passage doesn't explicitly identify the mentioned protection as the primary cause of the positive changes.
Option (d) is too general and fails to specifically highlight the absence of pests as a pivotal factor in the positive transformation detailed in the passage.
Hence, option (a).

DATA INTERPRETATION AND LOGICAL REASONING

25. **(120)** We get the following table based on the conditions given.

	40, 80, 100	30, 50, 80	110, 120, 130
	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 April is 120.
Hence, 120.

26. **(40)** We get the following table based on the conditions given.

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

Number of online registration in January is 40.
Hence, 40.

27. **(b)** We get the following table based on the conditions given.

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

Offline registrations is smallest in May. Hence, I is correct.
Total registrations was highest in Feb. Hence, II is incorrect.
Hence, option (b).

28. **(a)** We get the following table based on the conditions given.

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

Number of offline registrations in February is 50.
Hence, option (a).

29. **(d)** We get the following table based on the conditions given.

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

Jan and April both have 120 total registrations.
Feb and May both have 130 total registrations.
Hence, option (d).

30. **(60)** We get the following table from conditions given in the question.

Project (0.4)				
40		60		80
B		S		A
K		R		M

Test (0.6)				
40	50	60	70	80
M	B	A R	S	K

Rani's score in project is 60.
Hence, 60.

31. **(b)** We get the following table from conditions given in the question.

Project (0.4)				
40		60		80
B		S		A
K		R		M

Test (0.6)				
40	50	60	70	80
M	B	A R	S	K

Weight of test componenet is 0.6.
Hence, option (b).

32. **(d)** We get the following table from conditions given in the question.

Project (0.4)				
40		60		80
B		S		A
K		R		M

Test (0.6)				
40	50	60	70	80
M	B	A	S	K

		R		

Aggregate score was maximum for Amal.
Amala's maximum score = 80 × 0.4 + 60 × 0.6 = 32 + 36 = 68.
Hence, option (d).

33. **(40)** We get the following table from conditions given in the question.

Project (0.4)				
40		60		80
B		S		A
K		R		M

Test (0.6)				
40	50	60	70	80
M	B	A R	S	K

Mathew's score in test is 40.
Hence, 40.

34. **(a)** We get the following table from conditions given in the question.

Project (0.4)				
40		60		80
B		S		A
K		R		M

Test (0.6)				
40	50	60	70	80
M	B	A R	S	K

A and B are not in same team.
K and M are not in same team.
Neither i) nor ii) is correct.
Hence, option (a).

35. **(14)** We can make the following table based on the conditions given in the question.

	Window (15)		Split (45)		Total
	Inv	Non-Inv	Inv	Non-Inv	
D1	5	0	8	2	15
D2	2	4	14	c	
D3	0	2	7	3	12
D4	2	0	7	4 – c	
Total	9	6	36	9	60

Number of Split Inverter ACs sold by D2 = 14.
Hence, 14.

36. **(d)** We can make the following table based on the conditions given in the question.

	Window (15)		Split (45)		Total
	Inv	Non-Inv	Inv	Non-Inv	
D1	5	0	8	2	15
D2	2	4	14	c	
D3	0	2	7	3	12
D4	2	0	7	4 – c	
Total	9	6	36	9	60

Total non-Inverter ACs = 6 + 9 = 15.
∴ Required % = 15/60 × 100 = 25%
Hence, option (d).

37. **(33)** We can make the following table based on the conditions given in the question.

	Window (15)		Split (45)		Total
	Inv	Non-Inv	Inv	Non-Inv	
D1	5	0	8	2	15
D2	2	4	14	c	
D3	0	2	7	3	12
D4	2	0	7	4 – c	
Total	9	6	36	9	60

D1 and D3 sold a total of 27 ACs.
Hence, D2 and D4 sold a total of 60 - 27 = 33 ACs
Hence, 33.

38. **(b)** We can make the following table based on the conditions given in the question.

	Window (15)		Split (45)		Total
	Inv	Non-Inv	Inv	Non-Inv	
D1	5	0	8	2	15
D2	2	4	14	c	
D3	0	2	7	3	12
D4	2	0	7	4 – c	
Total	9	6	36	9	60

D1 and D3 together sold 27 ACs whereas D2 and D4 together sold 33 ACs.
Therefore, option (b) is false.
Hence, option (b).

39. **(b)** We can make the following table based on the conditions given in the question.

	Window (15)		Split (45)		Total
	Inv	Non-Inv	Inv	Non-Inv	
D1	5	0	8	2	15
D2	2	4	14	c	
D3	0	2	7	3	12
D4	2	0	7	4 – c	
Total	9	6	36	9	60

D3 and D4 sold equal number of ACs i.e., each of them sold 12 ACs.
For D3: 12 = 2 + 0 + 7 + (4 - c)
⇒ c = 1
∴ Number of non-Inverter ACs sold by D2 = 4 + 1 = 5
Hence, option (b).

40. **(c)** We get the following schedule based on the conditions given in the question.

	9 am		9:30 am		10 am		10:30 am		11 am		11:30 am		12 noon
T1	A	→	B	→	A	→	E	→	A	→	B	→	A
T2	A	→	F	→	E	→	F	→	E A	→	F	→	A
T3	A	→	C	→	D	→	E	→	D	→	C	→	A
T4	A	→	E	→	A	→	C	→	A	→	E	→	A

Number of times each station is visited (excluding the starting station)
C - 3

D - 2
E - 4/5
F - 3
Of the stations mentioned in options, E is visited the maximum number of times.
Hence, option (c).

41. **(2)** We get the following schedule based on the conditions given in the question.

	9 am		9:30 am		10 am		10:30 am		11 am		11:30 am		12 noon
T1	A	→	B	→	A	→	E	→	A	→	B	→	A
T2	A	→	F	→	E	→	F	→	E A	→	F	→	A
T3	A	→	C	→	D	→	E	→	D	→	C	→	A
T4	A	→	E	→	A	→	C	→	A	→	E	→	A

Station B is passed through twice by T1 at 9:30 am and at 11:30 am.
Hence, 2.

42. **(a)** We get the following schedule based on the conditions given in the question.

	9 am		9:30 am		10 am		10:30 am		11 am		11:30 am		12 noon
T1	A	→	B	→	A	→	E	→	A	→	B	→	A
T2	A	→	F	→	E	→	F	→	E A	→	F	→	A
T3	A	→	C	→	D	→	E	→	D	→	C	→	A
T4	A	→	E	→	A	→	C	→	A	→	E	→	A

Team 3 is patrolling D-E route from 10 to 10:30.
Hence, option (a).

43. **(2)** We get the following schedule based on the conditions given in the question.

	9 am		9:30 am		10 am		10:30 am		11 am		11:30 am		12 noon
T1	A	→	B	→	A	→	E	→	A	→	B	→	A
T2	A	→	F	→	E	→	F	→	E A	→	F	→	A
T3	A	→	C	→	D	→	E	→	D	→	C	→	A
T4	A	→	E	→	A	→	C	→	A	→	E	→	A

Team 4 passes through station E at 9:30 am and at 11:30 am, i.e., 2 times.
Hence, 2.

44. **(d)** We get the following schedule based on the conditions given in the question.

	9 am		9:30 am		10 am		10:30 am		11 am		11:30 am		12 noon
T1	A	→	B	→	A	→	E	→	A	→	B	→	A
T2	A	→	F	→	E	→	F	→	E A	→	F	→	A
T3	A	→	C	→	D	→	E	→	D	→	C	→	A
T4	A	→	E	→	A	→	C	→	A	→	E	→	A

Team 3 and 4, i.e., 2 teams pass through C at least once.
Hence, option (d).

QUANTITATIVE APTITUDE

45. **(c)** A system of linear equations $a_1x + b_1y = c_1$ and $a_2x + b_2y = c_2$ has infinite solutions if

$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

For, $x + y = 4$ and $(a + 5)x + (b^2 - 15)y = 8b$ to have infinite solution

$\Rightarrow \frac{1}{a+5} = \frac{1}{b^2-15} = \frac{4}{8b}$ ...(1)

$\Rightarrow 8b = 4(b^2 - 15)$
$\Rightarrow 4b^2 - 8b - 60 = 0$
$\Rightarrow b^2 - 2b - 15 = 0$
$\Rightarrow (b - 5)(b + 3) = 0$
$\Rightarrow b = 5$ or -3
From (1): $\Rightarrow a + 5 = b - 15$
$\Rightarrow a = b^2 - 20$
$\therefore a = 5$ when $b = 5 \Rightarrow ab = 25$
or, $a = -11$ when $b = -3 \Rightarrow ab = 33$
$\therefore$ Maximum value of $ab = -11 \times -3 = 33$
Hence, option (c).

46. **(c)** $8^m = 2^{3m}$ and $8^n = 2$

Now, $2^{3m} < 2^x < 2^{3n}$
We have to find least possible value of $(m + n)$ such that there are 41 possible values of x.

Least possible of m = 1, hence we get, $2^3 < 2^x < 2^{3n}$
Now, x can be any interger from 4 till 44 (41 values).
∴ Least possible value of 3n = 45, hence n = 15.
∴ Least possible value of m + n = 1 + 15 = 16.
Hence, option (c).

47. **(a)** Given, $x^8 + (\frac{1}{x})^8 = 47$

$\Rightarrow x^8 + (\frac{1}{x})^8 + 2 = 49$

$\Rightarrow (x^4)^2 + (\frac{1}{x^4})^2 + 2 \times x^4 \times \frac{1}{x^4} = 49$

$\Rightarrow (x^4 + \frac{1}{x^4})^2 = 49$

$\Rightarrow x^4 + \frac{1}{x^4} = 7$[$-7$ will be rejected as LHS should be positive]
Now, $x^4 + \frac{1}{x^4} + 2 = 9$

$\Rightarrow (x^2)^2 + (\frac{1}{x^2})^2 + 2 \times x^2 \times \frac{1}{x^2} = 9$

$\Rightarrow (x^2 + \frac{1}{x^2})^2 = 9$

$\Rightarrow x^2 + \frac{1}{x^2} = 3$
Similarly, $x + \frac{1}{x} = \sqrt{5}$
Cubing both sides, we get
$\Rightarrow x^3 + \frac{1}{x^3} + 3 \times x \times \frac{1}{x}(x + \frac{1}{x}) = 5\sqrt{5}$

$\Rightarrow x^3 + \frac{1}{x^3} = 2\sqrt{5}$
Again cubing both sides, we get
$\Rightarrow x^9 + \frac{1}{x^9} + 3 \times x^3 \times \frac{1}{x^3}(x^3 + \frac{1}{x^3}) 40\sqrt{5}$

$\Rightarrow x^9 + \frac{1}{x^9} = 34\sqrt{5}$
Hence, option (a).

48. **(b)** Given, $\frac{1}{2}, \frac{\log_3(2^x - 9)}{\log_3 4}$ and $\frac{\log_5(2^x + 17)}{\log_5 4}$ are in arithmetic progression,
$\Rightarrow 1/2, \log_4(2^x - 9)$ and $\log_4(2^x + 17/2)$ are in AP
$\Rightarrow 2 \times \log_4(2^x - 9) = 1/2 + \log_4(2^x + 17/2)$
$\Rightarrow \log_4(2^x - 9)^2 = \log_4 2 + \log_4(2^x + 17/2)$
$\Rightarrow \log_4(2^x - 9)^2 = \log_4 2 + \log_4(2^x + 17/2)$
$\Rightarrow \log_4(2^x - 9)^2 = \log_4 2 \times (2^x + 17/2)$
$\Rightarrow (2^x - 9)^2 = 2 \times (2^x + 17/2)$
$\Rightarrow (a - 9)^2 = 2a + 17$ [Assuming $2^x = a$]
$\Rightarrow a^2 - 18a + 81 = 2a + 17$
$\Rightarrow a^2 - 20a + 64 = 0$
$\Rightarrow (a - 16)(a - 4) = 0$
$\Rightarrow a = 2^x = 16$ [4 is rejected as $(a - 9)$ cannot be negative]
Now the first term of the AP = 1/2 and
second term of the AP = log (2^x - 9) = $\log_4$ (16 - 9) = $\log_4$ 7
Common difference = $\log_4$ 7 - 1/2 = $\log_4$ 7 – $\log_4$ 2 = log 7/2
Hence, option (a).

49. **(468)** A number having 15 factors can be of the form:
a^{14} or $a^4 \times b^2$
Case 1: a^{14}
The smallest possible such number = 2^{14} = 1024 × 16 > 16000
Case 2: $a^4 \times b^2$
The smallest possible such number = $2^4 \times 3$ = 16 × 9 = 144
The second smalled possible such number = $3^4 \times 2^2$ = 81 × 4 = 324
∴ The required sum = 144 + 324 = 468.
Hence, 468.

50. **(9)** Let the roots of the given quandratic equation be p and q.
$\Rightarrow \frac{1}{p} - \frac{1}{q} = \frac{1}{3}$ ...(1)
$\Rightarrow \frac{1}{p^2} + \frac{1}{q^2} = \frac{5}{9}$ ...(2)
Squaring (1) we get
$\Rightarrow \frac{1}{p^2} + \frac{1}{q^2} - \frac{2}{pq} = \frac{1}{9}$
$\Rightarrow \frac{5}{9} - \frac{2}{pq} = \frac{1}{9}$
$\Rightarrow pq = 9/2 = c$
From (2) we get
$\Rightarrow 9(p^2 + q^2) = 5p^2q^2$
$\Rightarrow 9(p^2 + q^2) = 5(pq)^2$
$\Rightarrow 9((p + q)^2 - 2pq) = 5(9/2)^2$
$\Rightarrow (p + q)^2_2 - 9 = 45/4$
$\Rightarrow (p + q)^2 = 81/4$
$\Rightarrow (p + q) = +9/2 = -b$
largest possible value of b = 9/2
∴ Largest possible value of a + b = 9/2 + 9/2 = 9.
Hence, 9.

51. **(5)** Given, $5^{n-1} < 3^{n+1}$
Putting values of n = 1, 2 and so on we see that the above inequality is true for n = 1, 2, 3, 4 and 5 only.
Now, $3^{n+1} < 2^{n+m}$ is true of all values of n.
Taking n = 5, we get
$3^6 < 2^{5+m}$
$\Rightarrow 729 < 2^{5+m}$
The least power of 2 greater than 729 is 1024 (2^{10})
$\therefore 2^{10} = 2^{5+m}$
$\Rightarrow 5 + m = 10$
$\Rightarrow m = 5$
∴ Least value of m = 5.
If we check for other values of n, we may get smaller value of m, but those values will not suffice when n = 5.
Hence, 5.

52. **(c)** The merchange earns profit due to increase in price and due to cheating (quantity) while buying and selling.
multiplication factor for price: 110/100 × 0.95
multiplication factor for quantity: while buying = 105/100
while selling = 100/95
overall multiplication factor for quantity: 105/100 × 100/95 = 105/95
⇒ overall multiplication factor (including price and quantity) = 110/100 × 0.95 × 105/95 = 11/10 × 105/100 = 1.155
∴ overall % profit = (1.155 - 1) × 100% = 15.5%
Hence, option (c).

53. **(c)** Let the speeds of river, faster and slower boats be r, f and s km/hr respectively and distance between A and B be 12 kms.
For Faster boat:
⇒ f + r = 12/2 = 6 ...(1)
⇒ f - r = 12/3 = 4 ...(2)
(1) - (2)
⇒ 2r = 6 - 4 = 2
⇒ r = 1
For Slower boat:
$\Rightarrow \frac{12}{s-1} + \frac{12}{s+1} = 6$

$\Rightarrow \frac{12\times 2s}{s^2-(1)^2} = 6$

$\Rightarrow s^2 - 1 = 4s$

$\Rightarrow s^2 - 4s - 1 = 0$

$\therefore s = \frac{4\pm\sqrt{16+4}}{2} = 2 \pm \sqrt{5} = 2 + \sqrt{5}$ [negative value of s is rejected]

Now, time taken by the slower boat to go from A to B

$= \frac{12}{(2+\sqrt{5})+1} = \frac{12}{(3+\sqrt{5})} = \frac{12(3-\sqrt{5})}{9-5} = 3(3 - \sqrt{5})$.

Hence, option (c).

54. **(a)** Let the total work to be done = LCM (7, 15, 6) = 630 units.

⇒ Combined efficiency of Rahul, Rakshita and Gurmeet < 630/7 = 90 units/day

All 3 worked for 6 days and then Rakshita worked for 3 days. Calculating total work done

∴ 630 = (combined efficiency of all 3) × 6 + (efficiency of Rakshita) × 3

⇒ (efficiency of Rakshita) × 3 = 630 - (combined efficiency of all 3) × 6

⇒ (efficiency of Rakshita) = 210 - (combined efficiency of all 3) × 2

⇒ (efficiency of Rakshita) > 210 - 90 × 2

⇒ (efficiency of Rakshita) > 30

∴ Rakshita's efficiency is greater than 30 units/day.

⇒ Time taken by Rakshita < 630/30 = 21 days.

∴ Rakshita will take less than 21 days to finish the job. Hence, she cannot take 21 days to finish the job.

Hence, option (a).

55. **(a)** Population at the end of 2021 = 1,00,000 × (1 - x/100)

Population at the end of 2022 = 1,00,000 × (1 - x/100) × (1 + y/100) ...(1)

Since population in 2022 is greater than that in 2020

⇒ y > x.

∴ y = x + 10

Hence, the population decreases by x% and then increases by (x + 10)%

∴ Overall % change = -x + (x + 10) + (-x × (x + 10))/100 = 10 - x(x + 10)/100 [using formula = a + b + ab/100]

Overall change should be positive

∴ Overall % change = 10 - x(x + 10)/100 > 0

⇒ x(x + 10) < 1000

Higheset value of x satisfying the above inequality is 27.

∴ The population will decrease by a maximum of 27%.

⇒ Least population in 2021 = 1,00,000 × (1 - 27%) = 73,000.

Hence, option (a).

56. **(c)** Let the old average be 'a'.

∴ Total weight of the three students = 3a

Let the weight of D and E be D kgs and E kgs respectively.

Because of D the average reduces by x kg.

⇒ a - x = (3a + D)/4

⇒ 4a - 4x = 3a + D

⇒ D = a - 4x ...(1)

Because of E the average increases by 2x kg.

⇒ a + 2x = (3a + E)/4

⇒ 4a + 8x = 3a + E

⇒ E = a + 8x ...(2)

We know, E - D = 12

⇒ (a + 8x) - (a - 4x) = 12

⇒ 12x = 12

⇒ x = 1

Hence, option (c).

57. **(b)** Let 20 kgs and 30 kgs of A and B are mixed.

∴ Amount of sugar in C = 2/5 × 20 + 3/10 × 30 = 17 kgs

Now we have 50 kgs of C mixed with 50 kgs of milk i.e., 100 kgs of final solution.

⇒ Concentration of sugar in final solution = 17/(50 + 50) × 100% = 17%

Hence, option (b).

58. **(340)** Let total number of fruits at the beginning of the day = 5x

∴ Number of mangoes = 40% of 5x = 2x

Let the number of apples be '5a', hence the number of bananas = 5x - 5a.

⇒ He sells 50% of 2x mangoes, 96 bananas and 40% of 5a apples i.e., x + 96 + 2a fruits.

Also, he sold 50% of his fruits

⇒ x + 96 + 2a = 50% of 5x = 2.5x

⇒ 1.5x = 96 + 2a

⇒ x = 64 + 4a/3

⇒ 5x = 320 + 20a/3

To minimise 5x, we need to minimise 2aa/3.

Minimum integral value of 20a/3 will be 20 when a = 3.

∴ 5x = 320 + 20 = 340

Hence, 340.

59. **(42)** Let the number of coins collected each week by A and B be 3x and 4x respectively.

For A: Coins collected by A in 5 weeks is a multiple of 7

∴ 3x × 5 is a multiple of 7

⇒ x is a multiple of 7.

For B: Coins collected by B in 3 weeks is a multiple of 24

∴ 4x × 3 is a multiple of 24

⇒ x is a multiple of 2.

∴ x is a multiple of 7 and 2, hence least possible value of x = 14.

⇒ Minimum possible number of coins collected by A in one week is = 3x = 42.

Hence, 42.

60. **(36)** Let work done per day (efficiency) of Gautam and Suhani are 'g' and 's' units.

A shortfall of 40% for Gautam is compensated by 50% extra work done by Suhani.

⇒ 0.4 × g = 0.5 × s

⇒ g/s = 5/4

⇒ Let g = 5x and s = 4x

Together they can complete the work in 20 days.

⇒ Total work to be done = 20 × (5x + 4x) = 180x units

The faster among the two is Gautam whose efficiency is 5x.

∴ Time required by Gautam alone = 180x / 5x = 36 days.

Hence, 36.

61. **(a)** In △OBD, ∠OBD = 90 - 75 = 15°

In △EBC, ∠ECB = 90 - 15 = 75°

Similarly, ∠B = 75° and ∠A = 180 - 75 - 75 = 30°

Area of $\triangle ABC = \frac{1}{2} = AD \times BC = \frac{1}{2} \times BE \times AC$

$\Rightarrow \frac{AD}{BE} = \frac{AC}{BC}$ ...(2)

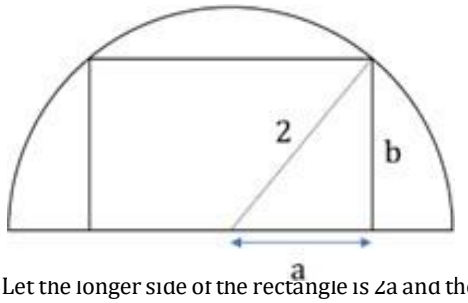
Area of $\triangle ABC = \frac{1}{2} = AB \times AC \times \sin 30° = \frac{1}{2} \times AB \times BC \times \sin 75°$

$\Rightarrow \frac{AC}{BC} = \frac{\sin 75°}{\sin 30°} = 2 \times \sin 75° = 2 \times \cos (90 - 15)° = 2 \times \cos 15°$

$\Rightarrow \frac{AD}{BE} = \frac{AC}{BC} = 2 \times \cos 15°$

Hence, option (a).

62. **(a)**



Let the longer side of the rectangle is 2a and the shorter side is b as shown in the figure.
Using pythagoras theorem, we get
$a^2 + b^2 = 2^2 = 4$ ...(1)
Also, AM ≥ GM
$\Rightarrow \frac{a^2+b^2}{2} \geq \sqrt{a^2 b^2}$
$\Rightarrow a^2 + b^2 \geq 2ab$
$\Rightarrow 4 \geq 2ab$
$\Rightarrow 2 \geq ab$
∴ Highest value of ab = 2, when a = b.
⇒ Ratio of longer side to shorter side = 2a : b = 2 : 1.
Hence, option (a).

63. **(54)** Let the exterior angle be x°, hence interior angle is (x + 120)°.
Sum of interior and exterior angles is 180°.
⇒ x + (x + 120) = 180
⇒ x = 30°
∴ Interior angle of this regular polygon = 30 + 120 = 150°
Each interior angle of a regular polygon of n sides = (n - 2)/n × 180° = 150°
⇒ (n - 2)/n = 5/6
⇒ n = 12
Now, number of diagonals in a n-sided polygon = n × (n - 3)/2 = 12 × 9/2 = 54
Hence, 54.

64. **(c)** n can take any value from 1 till 99.
∴ a_n = 54, 62, 70, 78, 86, 94, 102, ..., 838 and
b_n = 102, 106, 110, ..., 494
These two are arithmetic progressions. Common terms of 2 APs are also in AP whose common difference is LCM of the common difference of original APs.
Common difference of a and b is 8 and 4 respectively.
∴ The common difference of the common terms = LCM(8, 4) = 8
⇒ The common terms are 102, 110, 118, ...
Now, n^{th} term of this series = 102 + 8(n - 1)
This should be less than or equal to 494
⇒ 102 + 8(n - 1) ≤ 494
⇒ n ≤ 50
Sum of all these 50 terms = 50/2 × (102 + 494) = 14900
Hence, 14900.

65. **(c)** Given, $1 + (1 + \frac{1}{3})\frac{1}{4} + (1 + \frac{1}{3} + \frac{1}{9})\frac{1}{16} + (1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27})\frac{1}{64} + \cdots$
$= 1 + (\frac{1}{4} + \frac{1}{3} \times \frac{1}{4}) + (\frac{1}{16} + \frac{1}{3} \times \frac{1}{16} + \frac{1}{9} \times \frac{1}{16}) + (\frac{1}{64} + \frac{1}{3} \times \frac{1}{64} + \frac{1}{9} \times \frac{1}{64} + \frac{1}{27} \times \frac{1}{64}) + \cdots$
$= 1 + (\frac{1}{4} + \frac{1}{16} + \frac{1}{64} + \cdots) + \frac{1}{3}(\frac{1}{4} + \frac{1}{16} + \frac{1}{64} + \cdots) + \frac{1}{9}(\frac{1}{16} + \frac{1}{64} + \frac{1}{256} + \cdots) + \frac{1}{27}(\frac{1}{64} + \frac{1}{256} + \frac{1}{1024} \ldots) + \cdots$
$= 1 + (\frac{1/4}{1-1/4}) + \frac{1}{3}(\frac{1/4}{1-1/4}) + \frac{1}{9}(\frac{1/16}{1-1/4}) + \frac{1}{27}(\frac{1/64}{1-1/4}) + \cdots$
$= 1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{9} \times \frac{1}{12} + \frac{1}{9} \times \frac{1}{144} + \cdots$
$= 1 + \frac{1}{3} + \frac{1}{9}(1 + \frac{1}{12} + \frac{1}{144} + \cdots)$
$= 1 + \frac{1}{3} + \frac{1}{9} \times \frac{1}{1-1/12}$
$= 1 + \frac{1}{3} + \frac{4}{33}$
$= \frac{33+11+4}{33}$
$= \frac{48}{33}$
$= \frac{16}{11}$
Hence, option (c).

66. **(3)** 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
Let
3x + 2y = a ...(1) and
2x - 5y = b ...(2)
Solving (1) and (2), we get
x = (5a + 2b)/19 and y = (2a - 3b)/19
∴ f(3x + 2y, 2x - 5y) = 19x can be rewritten as
f(a, b) = 5a + 2b
Now, substituting a = x and b = 2x, we get
⇒ f(x, 2x) = 5x + 4x = 9x
⇒ 27 = 5x + 4x = 9x
⇒ x = 3
Hence, 3.