

## VERBAL ABILITY AND READING COMPREHENSION

**Directions (Q.1-Q.4): for Reading Comprehension: The passages given here are followed by some questions that have four answer choices; read the passage carefully and pick the option whose answer best aligns with the passage.**

We cannot travel outside our neighbourhood without passports. We must wear the same plainclothes. We must exchange our houses every ten years. We cannot avoid labour. We all go to bed at the same time . . . We have religious freedom, but we cannot deny that the soul dies with the body, since 'but for the fear of punishment, they would have nothing but contempt for the laws and customs of society'. In More's time, for much of the population, given the plenty and security on offer, such restraints would not have seemed overly unreasonable. For modern readers, however, Utopia appears to rely upon relentless transparency, the repression of variety, and the curtailment of privacy. Utopia provides security: but at what price? In both its external and internal relations, indeed, it seems perilously dystopian.

Such a conclusion might be fortified by examining selectively the tradition which follows more on these points. This often portrays societies where. . "it would be almost impossible for man to be depraved, or wicked" This is achieved both through institutions and mores, which underpin the common life The passions are regulated and inequalities of wealth and distinction are minimized. Needs, vanity, and emulation are restrained, often by prizing equality and holding riches in contempt. The desire for public power is curbed. Marriage and sexual intercourse are often controlled: in Tommaso Campanella's *The City of the Sun* (1623), the first great literary utopia after More's, relations are forbidden to men before the age of twenty-one and women before nineteen. Communal child-rearing is normal; for Campanella this commences at age two. Greater simplicity of life, living according to nature', is often a result: the desire for simplicity and purity are closely related. People become more alike in appearance, opinion, and outlook than they often have been. Unity, order, and homogeneity thus prevail at the cost of individuality and diversity. This model, as J. C. Davis demonstrates, dominated early modern utopianism. And utopian homogeneity remains a familiar theme well into the twentieth century.

Given these considerations, it is not unreasonable to take as our starting point here the hypothesis that utopia and dystopia evidently share more in common than is often supposed. Indeed, they might be twins, the progeny of the same parents. Insofar as this proves to be the case, my linkage of both here will be uncomfortably close for some readers. Yet we should not mistake this argument for the assertion that all utopias are, or tend to produce, dystopias. Those who defend this proposition will find that their association here is not nearly close enough. For we have only to acknowledge the existence of thousands of successful intentional communities in which a cooperative ethos predominates and where harmony without coercion is the rule to set aside such an assertion. Here the individual's submersion in the group is consensual (though this concept is not unproblematic). It results not in enslavement but voluntary submission to group norms. Harmony is achieved without harming others.

1. All of the following statements can be inferred from the passage EXCEPT that:
  - (a) Utopian and dystopian societies are twins, the progeny of the same parents.
  - (b) Utopian societies exist in a long tradition of literature dealing with imaginary people practicing imaginary customs, in imaginary worlds.
  - (c) Many conceptions of utopian societies emphasise the importance of social uniformity and cultural homogeneity.
  - (d) It is possible to see utopias as dystopias, with a change in perspective, because one person's utopia could be seen as another's dystopia.
2. Following from the passage, which one of the following may be seen as a characteristic of a utopian society?
  - (a) The regulation of homogeneity through promoting competitive heterogeneity.
  - (b) A society where public power is earned through merit rather than through privilege.
  - (c) Institutional surveillance of every individual to ensure his/her security and welfare.
  - (d) A society without any laws to restrain one's individuality.
3. Which sequence of words below best captures the narrative of the passage?
  - (a) Relentless transparency - Homogeneity - Utopia - Dystopia.
  - (b) Utopia - Security - Dystopia - Coercion.
  - (c) Curtailment of privacy - Dystopia - Utopia - Intentional community.
  - (d) Utopia - Security - Homogeneity - Intentional community.

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4. All of the following arguments are made in the passage EXCEPT that.
- (a) In More's time, there was plenty and security, so people did not need restraints that could appear unreasonable.
  - (b) There have been thousands of communities where homogeneity and stability have been achieved through choice, rather than by force.
  - (c) In early modern utopianism, the stability of utopian societies was seen to be achieved only with individuals surrendering their sense of self.
  - (d) The tradition of utopian literature has often shown societies in which it would be nearly impossible for anyone to be sinful or criminal.

**Directions (Q.5-Q.8): for Reading Comprehension: The passages given here are followed by some questions that have four answer choices; read the passage carefully and pick the option whose answer best aligns with the passage.**

Cuttlefish are full of personality, as behavioral ecologist Alexandra Schnell found out while researching the cephalopod's potential to display self-control. "Self-control is thought to be the cornerstone of intelligence, as it is an important prerequisite for complex decision-making and planning for the future," says Schnell . . .

[Schnell's] study used a modified version of the "marshmallow test" . . . During the original marshmallow test, psychologist Walter Mischel presented children between age four and six with one marshmallow. He told them that if they waited 15 minutes and didn't eat it, he would give them a second marshmallow. A long-term follow-up study showed that the children who waited for the second marshmallow had more success later in life. The cuttlefish version of the experiment looked a lot different. The researchers worked with six cuttlefish under nine months old and presented them with seafood instead of sweets. (Preliminary experiments showed that cuttlefishes' favorite food is live grass shrimp, while raw prawns are so-so and Asian shore crab is nearly unacceptable.) Since the researchers couldn't explain to the cuttlefish that they would need to wait for their shrimp, they trained them to recognize certain shapes that indicated when a food item would become available. The symbols were pasted on transparent drawers so that the cuttlefish could see the food that was stored inside. One drawer, labeled with a circle to mean "immediate," held raw king prawn. Another drawer, labeled with a triangle to mean "delayed," held live grass shrimp. During a control experiment, square labels meant "never."

"If their self-control is flexible and I hadn't just trained them to wait in any context, you would expect the cuttlefish to take the immediate reward [in the control], even if it's their second preference," says Schnell. . . and that's what they did. That showed the researchers that cuttlefish wouldn't reject the prawns if it was the only food available. In the experimental trials, the cuttlefish didn't jump on the prawns if the live grass shrimp were labeled with a triangle - many waited for the shrimp drawer to open up. Each time the cuttlefish showed it could wait, the researchers tacked another ten seconds on to the next round of waiting before releasing the shrimp. The longest that a cuttlefish waited was 130 seconds.

Schnell [says] that the cuttlefish usually sat at the bottom of the tank and looked at the two food items while they waited, but sometimes, they would turn away from the king prawn "as if to distract themselves from the temptation of the immediate reward." In past studies, humans, chimpanzees, parrots and dogs also tried to distract themselves while waiting for a reward.

Not every species can use self-control, but most of the animals that can share another trait in common: long, social lives. Cuttlefish, on the other hand, are solitary creatures that don't form relationships even with mates or young. "We don't know if living in a social group is important for complex cognition unless we also show those abilities are lacking in less social species," says comparative psychologist Jennifer Vonk.

5. Which one of the following, if true, would best complement the passage's findings?
- (a) Cuttlefish are equally fond of live grass shrimp and raw prawn.
  - (b) Cuttlefish wait longer than 100 seconds for the shrimp drawer to open up.
  - (c) Cuttlefish live in big groups that exhibit sociability.
  - (d) Cuttlefish cannot distinguish between geometrical shapes.
6. All of the following constitute a point of difference between the "original" and "modified" versions of the marshmallow test EXCEPT that:
- (a) The former was performed over a longer time span than the latter.
  - (b) The former correlated self-control and future success, while the latter correlated self-control and survival advantages.
  - (c) The former had human subjects, while the latter had cuttlefish.

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- (d) The former used verbal communication with its subjects, while the latter had to develop a symbolic means of communication.
7. Which one of the following cannot be inferred from Alexandra Schnell's experiment?
- (a) Cuttlefish exercise choice when it comes to food.
  - (b) Cuttlefish exert self-control with the help of diversions.
  - (c) Like human children, cuttlefish are capable of self-control.
  - (d) Intelligence in a species is impossible without sociability.
8. In which one of the following scenarios would the cuttlefish's behaviour demonstrate self-control?
- (a) Asian shore crabs and raw prawns are simultaneously released while a live grass shrimp drawer labelled with a triangle is placed in front of the cuttlefish, to be opened after one minute.
  - (b) Raw prawns are released while a live grass shrimp drawer labelled with a square is placed in front of the cuttlefish.
  - (c) Live grass shrimp are released while two raw prawn drawers labelled with a circle and a triangle respectively are placed in front of the cuttlefish; the triangle-labelled drawer is opened after 50 seconds.
  - (d) Raw prawns are released while an Asian shore crab drawer labelled with a triangle is placed in front of the cuttlefish, to be opened after one minute.

**Directions (Q.9-Q.12): for Reading Comprehension: The passages given here are followed by some questions that have four answer choices; read the passage carefully and pick the option whose answer best aligns with the passage.**

For the Maya of the Classic period, who lived in Southern Mexico and Central America between 250 and 900 CE, the category of "persons" was not coincident with human beings, as it is for us. That is, human beings were persons - but other, nonhuman entities could be persons, too. In order to explore the slippage of categories between "humans" and "persons", I examined a very specific category of ancient Maya images, found painted in scenes on ceramic vessels. I sought out instances in which faces (some combination of eyes, nose, and mouth) are shown on inanimate objects. . . . Consider my iPhone, which needs to be fed with electricity every night, swaddled in a protective bumper, and enjoys communicating with other fellow-phone-beings. Does it have personhood (if at all) because it is connected to me, drawing this resource from me as an owner or source? For the Maya (who did have plenty of other communicating objects, if not smartphones), the answer was no. Nonhuman persons were not tethered to specific humans, and they did not derive their personhood from a connection with a human. It's a profoundly democratising way of understanding the world. Humans are not more important persons - we are just one of many kinds of persons who inhabit this world. . . . The Maya saw personhood as 'activated' by experiencing certain bodily needs and through participation in certain social activities. For example, among the faced objects that I examined, persons are marked by personal requirements (such as hunger, tiredness, physical closeness), and by community obligations (communication, interaction, ritual observance). In the images I examined, we see, for instance, faced objects being cradled in humans' arms; we also see them speaking to humans. These core elements of personhood are both turned inward, what the body or self of a person requires, and outward, what a community expects of the persons who are a part of it, underlining the reciprocal nature of community membership.

Personhood was a nonbinary proposition for the Maya. Entities were able to be persons while also being something else. The faced objects I looked at indicate that they continue to be functional, doing what objects do (a stone implement continues to chop, an incense burner continues to do its smoky work). Furthermore, the Maya visually depicted many objects in ways that indicated the material category to which they belonged - drawings of the stone implement show that a person-tool is still made of stone. One additional complexity: the incense burner (which would have been made of clay, and decorated with spiky appliques representing the sacred ceiba tree found in this region) is categorised as a person - but also as a tree. With these Maya examples, we are challenged to discard the person/nonperson binary that constitutes our basic ontological outlook. The porousness of boundaries that we have seen in the Maya world points towards the possibility of living with a certain uncategorisability of the world.

9. Which one of the following best explains the "additional complexity" that the example of the incense burner illustrates regarding personhood for the Classic Maya?
- (a) The example adds a new layer to the nonbinary understanding of personhood by bringing in a third category that shares a similar relation with the previous two.
  - (b) The example provides an exception to the nonbinary understanding of personhood that the passage had hitherto established.

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- (c) The example adds a new layer to the nonbinary understanding of personhood by bringing in a third category that shares a dissimilar relation with the previous two.
- (d) The example complicates the nonbinary understanding of personhood by bringing in the sacred, establishing the porosity of the divine and the profane.
10. Which one of the following, if true about the Classic Maya, would invalidate the purpose of the iPhone example in the passage?
- (a) The day incense burner with spiky appliques was categorised only as a person and not as a tree by the Classic Maya.
- (b) Classic Maya songs represent both humans and non-living objects as characters, talking and interacting with each other.
- (c) The personhood of the incense burner and the stone chopper was a function of their usefulness to humans.
- (d) Unlike modern societies equipped with mobile phones, the Classic Maya did not have any communicating objects.
11. On the basis of the passage, which one of the following worldviews can be inferred to be closest to that of the Classic Maya?
- (a) A futuristic society that perceives robots to be persons as well as robots because of their similarity to humans.
- (b) A tribe that perceives plants as person-plants because they form an ecosystem and are marked by needs of nutrition.
- (c) A tribe that perceives its hunting weapons as sacred person-artefacts because of their significance to its survival.
- (d) A tribe that perceives its utensils as person-utensils in light of their functionality and bodily needs.
12. Which one of the following, if true, would not undermine the democratising potential of the Classic Maya worldview?
- (a) They understood the stone implement and the incense burner in a purely human form.
- (b) They believed that animals like cats and dogs that live in proximity to humans have a more clearly articulated personhood.
- (c) They depicted their human healers with physical attributes of local medicinal plants.
- (d) While they believed in the personhood of objects and plants, they did not believe in the personhood of rivers and animals.

**Directions (Q.13-Q.16): for Reading Comprehension: The passages given here are followed by some questions that have four answer choices; read the passage carefully and pick the option whose answer best aligns with the passage.**

The sleights of hand that conflate consumption with virtue are a central theme in *A Thirst for Empire*, a sweeping and richly detailed history of tea by the historian Erika Rappaport. How did tea evolve from an obscure "China drink" to a universal beverage imbued with civilising properties? The answer, in brief, revolves around this conflation, not only by profit-motivated marketers but by a wide variety of interest groups. While abundant historical records have allowed the study of how tea itself moved from east to west, Rappaport is focused on the movement of the idea of tea to suit particular purposes.

Beginning in the 1700s, the temperance movement advocated for tea as a pleasure that cheered but did not inebriate, and industrialists soon borrowed this moral argument in advancing their case for free trade in tea (and hence more open markets for their textiles). Factory owners joined in, compelled by the cause of a sober workforce, while Christian missionaries discovered that tea "would soothe any colonial encounter". During the Second World War, tea service was presented as a social and patriotic activity that uplifted soldiers and calmed refugees.

But it was tea's consumer-directed marketing by importers and retailers - and later by brands - that most closely portends current trade debates. An early version of the "farm to table" movement was sparked by anti-Chinese sentiment and concerns over trade deficits, as well as by the reality and threat of adulterated tea containing dirt and hedge clippings. Lipton was soon advertising "from the Garden to Tea Cup" supply chains originating in British India and supervised by "educated Englishmen". While tea marketing always presented direct consumer benefits (health, energy, relaxation), tea drinkers were also assured that they were participating in a larger noble project that advanced the causes of family, nation and civilization. . . .

Rappaport's treatment of her subject is refreshingly apolitical. Indeed, it is a virtue that readers will be unable to guess her political orientation: both the miracle of markets and capitalism's dark underbelly are evident in tea's complex story, as are the complicated effects of British colonialism. Commodity histories are now themselves commodities: recent works investigate cotton, salt, cod, sugar, chocolate, paper and milk. And morality marketing is now a commodity as well,

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applied to food, "fair trade" apparel and eco- tourism. Yet tea is, Rappaport makes clear, a world apart - an astonishing success story in which tea marketers not only succeeded in conveying a sense of moral elevation to the consumer but also arguably did advance the cause of civilisation and community.

I have been offered tea at a British garden party, a Bedouin campfire, a Turkish carpet shop and a Japanese chashitsu, to name a few settings. In each case the offering was more an idea - friendship, community, respect - than a drink, and in each case the idea then created a reality. It is not a stretch to say that tea marketers have advanced the particularly noble cause of human dialogue and friendship.

13. Today, "conflat[ing] consumption with virtue" can be seen in the marketing of:
- (a) Travel to pristine destinations.
  - (b) Ergonomically designed products.
  - (c) Sustainably farmed foods.
  - (d) Natural health supplements.
14. This book review argues that, according to Rappaport, tea is unlike other "morality" products because it:
- (a) Was actively encouraged by interest groups in the government.
  - (b) Was marketed by a wide range of interest groups.
  - (c) Appealed to a universal group and not just to a niche section of people.
  - (d) Had an actual beneficial effect on social interaction and society in general.
15. According to this book review, A Thirst for Empire says that, in addition to "profit-motivated marketers", tea drinking was promoted in Britain by all of the following EXCEPT:
- (a) The anti-alcohol lobby as a substitute for the consumption of liquor.
  - (b) Factories to instill sobriety in their labour.
  - (c) Manufacturers who were pressing for duty-free imports.
  - (d) Tea drinkers lobbying for product diversity.
16. The author of this book review is LEAST likely to support the view that:
- (a) Tea became the leading drink in Britain in the nineteenth century.
  - (b) The ritual of drinking tea promotes congeniality and camaraderie.
  - (c) Tea drinking has become a social ritual worldwide.
  - (d) Tea drinking was sometimes promoted as a patriotic duty.
17. **Directions for Summary: A paragraph is followed by four options which have summarized the passage in their own way. Pick the option that best summarizes the passage:**

speech. They recorded a voice articulating a consonant 'ba-ba-ba' and dubbed it with a face articulating another consonant 'ga-ga-ga'. Even though the acoustic speech signal was well recognized alone, it was heard as another consonant after dubbing with incongruent visual speech i.e., 'da-da-da'. The illusion, termed as the McGurk effect, has been replicated many times, and it has sparked an abundance of research. The reason for the great impact is that this is a striking demonstration of multisensory integration, where that auditory and visual information is merged into a unified, integrated percept.

- (a) When the quality of auditory information is poor, the visual information wins over the auditory information.
- (b) When the auditory speech signal does not match the visual speech movements, the acoustic speech signal is confusing and integration of the two is imperfect.
- (c) The McGurk effect which is a demonstration of multisensory integration has been replicated many times.
- (d) Visual speech mismatched with auditory speech can result in the perception of an entirely different message: this illusion is known as the McGurk effect.

McGurk and MacDonald (1976) reported a powerful multisensory illusion occurring with audio-visual

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**18. Directions for sentence exclusion: Five sentences are given below; out of these, four come together to form a coherent paragraph, but one sentence does not fit into the sequence. Choose the sentence that does not fit into the sequence.**

- (a) The legal status of resources mined in space remains ambiguous; and while the market for asteroid minerals is currently nonexistent, this is likely to change as technical hurdles diminish.
- (b) Outer space is a commons, and all of it is open for exploration, however, space law developed in the 1950s and 60s is state-centric and arguably ill-suited to a commercial future.
- (c) Laws adopted by the US and Luxembourg are first steps, but they only protect firms from competing claims by their compatriots; a Chinese company will not be bound by US law.
- (d) Critics say the US is conferring rights that it has no authority to confer; Russia in particular has condemned this, citing the US' disrespect for international law.
- (e) At issue now is commercial activity, as private firms - rather than nation states - look to space for profit.

**19. Directions for Summary: A paragraph is followed by four options which have summarized the passage in their own way. Pick the option that best summarizes the passage:**

Foreign peacekeepers often exist in a bubble in the poor countries in which they are deployed; they live in posh compounds, drive fancy vehicles, and distance themselves from locals. This may be partially justified as they are outsiders, living in constant fear, performing a job that is emotionally draining. But they are often despised by the locals, and many would like them to leave. A better solution would be bottom-up peacebuilding, which would involve their spending more time working with communities, understanding their grievances and earning their trust, rather than only meeting government officials.

- (a) The environment in poor countries has tended to make foreign peacekeeping forces live in enclaves, but it is time to change this scenario.
- (b) Extravagant lifestyles and an aloof attitude among the foreigners working as peacekeepers in poor countries have justifiably made them the target of local anger.
- (c) Peacekeeping forces in foreign countries have tended to be aloof for valid reasons but would be more effective if they worked more closely with local communities.
- (d) Peacekeeping duties would be more effectively performed by local residents given their better

understanding, knowledge and rapport with their own communities.

**20. Four sentences that are a part of paragraph are given below; the sentences may or may not be in the right order; create the sequence that forms a coherent paragraph.**

- 1. In the central nervous systems of other animal species, such a comprehensive regeneration of neurons has not yet been proven beyond doubt.
- 2. Biologists from the University of Bayreuth have discovered a uniquely rapid form of regeneration in injured neurons and their function in the central nervous system of zebrafish.
- 3. They studied the Mauthner cells, which are solely responsible for the escape behaviour of the fish, and previously regarded as incapable of regeneration.
- 4. However, their ability to regenerate crucially depends on the location of the injury.

**21. Four sentences that are a part of paragraph are given below; the sentences may or may not be in the right order; create the sequence that forms a coherent paragraph.**

- 1. The work is more than the text, for the text only takes on life, when it is realized and furthermore the realization is by no means independent of the individual disposition of the reader.
- 2. The convergence of text and reader brings the literary work into existence and this convergence is not to be identified either with the reality of the text or with the individual disposition of the reader.
- 3. From this polarity it follows that the literary work cannot be completely identical with the text, or with the realization of the text, but in fact must lie halfway between the two.
- 4. The literary work has two poles, which we might call the artistic and the aesthetic; the artistic refers to the text created by the author, and the aesthetic to the realization accomplished by the reader.

**22. Four sentences that are a part of paragraph are given below; the sentences may or may not be in the right order; create the sequence that forms a coherent paragraph.**

- 1. A popular response is the exhortation to plant more trees.
- 2. It seems all but certain that global warming will go well above two degrees - quite how high no one knows yet.

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3. Burning them releases it, which is why the scale of forest fires in the Amazon basin last year garnered headlines.
  4. This is because trees sequester carbon by absorbing carbon dioxide.

**23. Directions for sentence exclusion: Five sentences are given below; out of these, four come together to form a coherent paragraph, but one sentence does not fit into the sequence. Choose the sentence that does not fit into the sequence.**

- (a) There is a dark side to academic research, especially in India, and at its centre is the phenomenon of predatory journals.
- (b) But in truth, as long as you pay, you can get anything published.
- (c) In look and feel thus, they are exactly like any reputed journal.
- (d) They claim to be indexed in the most influential databases, say they possess editorial boards that comprise top scientists and researchers, and claim to have a rigorous peer-review structure.
- (e) But a large section of researchers and scientists across the world are at the receiving end of nothing short of an academic publishing scam.

**24. Directions for Summary: A paragraph is followed by four options which have summarized the passage in their own way. Pick the option that best summarizes the passage:**

Developing countries are becoming hotbeds of business innovation in much the same way as Japan did from the 1950s onwards. They are reinventing systems of production and distribution, and experimenting with entirely new business models. Why are countries that were until recently associated with cheap hands now becoming leaders in innovation? Driven by a mixture of ambition and fear they are relentlessly climbing up the value chain. Emerging-market champions have not only proved highly competitive in their own backyards, they are also going global themselves.

- (a) Developing countries are being forced to invent new business models which challenge the old business models, so they can remain competitive domestically.
- (b) Production and distribution models are going through rapid innovations worldwide as developed countries are being challenged by their earlier suppliers from the developing world.
- (c) Competition has driven emerging economies, once suppliers of cheap labour, to become innovators of business models that have enabled them to move up the value chain and go global.
- (d) Innovations in production and distribution are helping emerging economies compete with countries to which they once supplied cheap labour.

## DATA INTERPRETATION AND LOGICAL REASONING

**Directions (Q.25-Q.28):** Ganga, Kaveri, and Narmada are three women who buy four raw materials (Mango, Apple, Banana and Milk) and sell five finished products (Mango smoothie, Apple smoothie, Banana smoothie, Mixed fruit smoothie and Fruit salad). Table-1 gives information about the raw materials required to produce the five finished products. One unit of a finished product requires one unit of each of the raw materials mentioned in the second column of the table.

Table - 1

Finished Product	Raw materials required
Mango smoothie	Mango, Milk
Apple smoothie	Apple, Milk
Banana smoothie	Banana, Milk
Mixed fruit smoothie	Mango, Apple, Banana, Milk
Fruit Salad	Mango, Apple, Banana

One unit of milk, mango, apple, and banana cost ₹5, ₹3, ₹2, and ₹1 respectively. Each unit of a finished product is sold for a profit equal to two times the number of raw materials used to make that product. For example, apple smoothie is made with two raw materials (apple and milk) and will be sold for a profit of ₹4 per unit. Leftover raw materials are sold during the last business hour of the day for a loss of ₹1 per unit. The amount, in rupees, received from sales (revenue) for each woman in each of the four business hours of the day is given in Table-2.

Table - 2

Business Hour	Ganga	Kaveri	Narmada
Hour 1	23	19	31
Hour 2	21	22	21
Hour 3	29	30	23
Hour 4 (last hour)	30	27	22

The following additional facts are known.

1. No one except possibly Ganga sold any Mango smoothie.
2. Each woman sold either zero or one unit of any single finished product in any hour.
3. Each woman had exactly one unit each of two different raw materials as leftovers.
4. No one had any banana leftover.

**25.** What BEST can be concluded about the number of units of fruit salad sold in the first hour?

- (a) Either 0 or 2                      (b) Exactly 2  
(c) Exactly 1                        (d) Either 1 or 2

**26.** Which of the following is NECESSARILY true?

- (a) Kaveri sold one unit of leftover mangoes.  
(b) Ganga did not sell any leftover apples.  
(c) Narmada sold one unit of leftover milk.  
(d) Ganga did not sell any leftover mangoes.

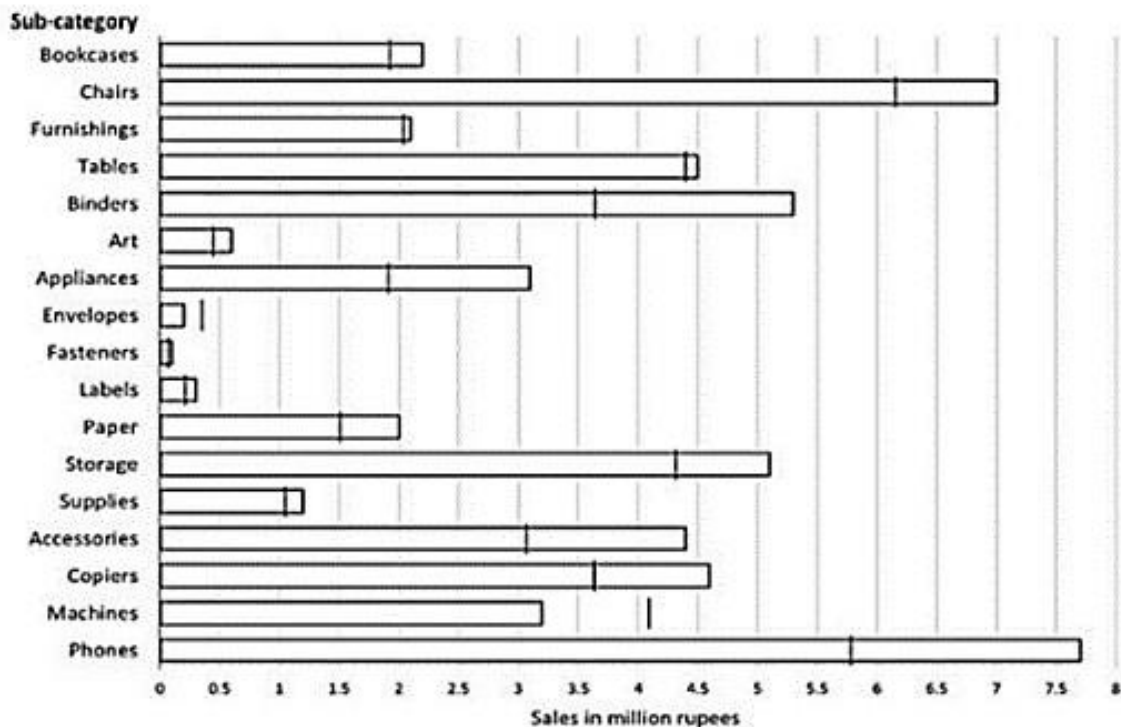
**27.** What BEST can be concluded about the total number of units of milk the three women had in the beginning?

- (a) Either 18 or 19 or 20 units.  
(b) Either 19 or 20 units.  
(c) Either 17 or 18 or 19 units.  
(d) Either 18 or 19 units.

**28.** If it is known that three leftover units of mangoes were sold during the last business hour of the day, how many apple smoothies were sold during the day?

**Directions (Q.29-Q.32):** The horizontal bars in the above diagram represent 2020 aggregate sales (in ₹ million) of a company for the different subcategories of its products. The top four product subcategories (Bookcases, Chairs, Furnishings, Tables) belong to furniture product category; the bottom four product subcategories (Accessories, Copiers, Machines, Phones) belong to the technology product category while all other product subcategories belong to the office supply product category. For each of the product subcategories, there is a vertical line indicating the sales of the corresponding subcategory in 2019.





29. The total sales (in million) in 2019 from products in office supplies category is closest to  
 (a) 16.5 (b) 12.5  
 (c) 13.5 (d) 18
30. The percentage increase in sales in Furniture category from 2019 to 2020 is closest to  
 (a) 20% (b) 1%  
 (c) 8% (d) 25%
31. How many subcategories had sales of ₹ 4 million or more in 2019 and registered an increase in sales in excess of 25% in 2020?
32. The improvement index for a category is the maximum percentage increase in sales from 2019 to 2020 among any of its subcategories. The correct order of categories in increasing order of this improvement index is  
 (a) furniture, technology, office supply  
 (b) technology, furniture, office supply  
 (c) office supply, technology, furniture  
 (d) office supply, furniture, technology

**Directions (Q.33-Q.38):** A journal plans to publish 18 research papers, written by eight authors (A, B, C, D, E, F, G, and H) in four issues of the journal scheduled in January, April, July and October. Each of the research papers was written by exactly one of the eight authors. Five papers were scheduled in each of the first two issues, while four were scheduled in each of the last two issues. Every author wrote at least one paper and at most three papers. The total number of papers written by A, D, G and H was double the total number of papers written by the other four authors. Four of the authors were from India and two each were from Japan and China. Each author belonged to exactly one of the three areas Manufacturing, Automation and Logistics. Four of the authors were from the Logistics area and two were from the Automation area. As per the journal policy, none of the authors could have more than one paper in any issue of the journal.

The following facts are also known.

1. F, an Indian author from the Logistics area, wrote only one paper. It was scheduled in the October issue.
2. A was from the Automation area and did not have a paper scheduled in the October issue.
3. None of the Indian authors were from the Manufacturing area and none of the Japanese or Chinese authors were from the Automation area.
4. A and H were from different countries, but had their papers scheduled in exactly the same issues.
5. C and E, both Chinese authors from different areas, had the same number of papers scheduled. Further, E had papers scheduled in consecutive issues of the journal but C did not.

6. B, from the Logistics area, had a paper scheduled in the April issue of the journal.
7. B and G belonged to the same country. None of their papers were scheduled in the same issue of the journal.
8. D, a Japanese author from the Manufacturing area, did not have a paper scheduled in the July issue.
9. C and H belonged to different areas.

33. What is the correct sequence of number of papers written by B, C, E and G, respectively?

- (a) 1, 2, 2, 3
- (b) 1, 3, 3, 1
- (c) 3, 1, 1, 3
- (d) 1, 2, 2, 1

34. How many papers were written by Indian authors?

35. Which of the following statement(s) MUST be true?

**Statement A:** Every issue had at least one paper by author(s) from each country.

**Statement B:** Every issue had at most two papers by author(s) from each area.

- (a) Neither of the statements
- (b) Both the statements
- (c) Only Statement A
- (d) Only Statement B

36. Which of the following statements is FALSE?

- (a) Every issue had at least one paper by author(s) from Automation area.
- (b) Every issue had exactly two papers by Indian authors.

(c) Every issue had exactly two papers by authors from Logistics area.

(d) Every issue had exactly one paper by a Chinese author.

37. Which of the following statements is FALSE?

- (a) There was exactly one paper by an author from Manufacturing area in the April issue.
- (b) There was exactly one paper by an author from Logistics area in the October issue.
- (c) There were exactly two papers by authors from Manufacturing area in the January issue.
- (d) There were exactly two papers by authors from Manufacturing area in the July issue.

38. Which of the following is the correct sequence of number of papers by authors from Automation, Manufacturing and Logistics areas, respectively?

- (a) 6, 6, 6
- (b) 6, 5, 7
- (c) 6, 7, 5
- (d) 5, 6, 7

**Direction (Q.39-Q.44):** Amudha, Bharatan, Chandran, Dhinesh, Ezhil, Fani and Gowtham are seven people in a town. Any pair of them could either be strangers, acquaintances, or friends. All relationships are mutual. For example, if Amudha is a friend of Bharatan, then Bharatan is also a friend of Amudha. Similarly, if Amudha is a stranger to Bharatan, then Bharatan is also a stranger to Amudha.

Partial information about the number of friends, acquaintances, and strangers of each of these people among them is given in the table below.

	No. of Friends	No. of Acquaintances	No. of Strangers
Amudha		1	4
Bharatan			
Chandran		1	
Dhinesh			2
Ezhil			1
Fani	1		
Gowtham		3	2

The following additional facts are also known.

1. Amudha, Bharatan, and Chandran are mutual strangers.
2. Amudha, Dhinesh, and Fani are Ezil's friends.
3. Chandran and Gowtham are friends.
4. Every friend of Amudha is an acquaintance of Bharatan, and every acquaintance of Bharatan is a friend of Amudha.
5. Every friend of Bharatan is an acquaintance of Amudha, and every acquaintance of Amudha is a friend of Bharatan.

39. Who are Gowtham's acquaintances?

- (a) Bharatan, Dhinesh and Ezhil
- (b) Amudha, Dhinesh and Fani
- (c) Dhinesh, Ezhil and Fani
- (d) Amudha, Bharatan and Fani

40. Which of these pairs share the same type of relationship?

- (a) (Bharatan, Ezhil) and (Fani, Gowtham)
- (b) (Bharatan, Chandran) and (Dhinesh, Ezhil)
- (c) (Chandran, Ezhil) and (Dhinesh, Gowtham)
- (d) (Amudha, Gowtham) and (Ezhil, Fani)

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**41.** Who is an acquaintance of Amudha?

(a) Ezhil

(b) Dhinesh

(c) Fani

(d) Gowtham

**42.** Who is an acquaintance of Chandran?

(a) Dhinesh

(b) Bharatan

(c) Fani

(d) Ezhil

**43.** How many friends does Ezhil have?

**44.** How many people are either a friend or a friend-of-a-friend of Ezhil?

## QUANTITATIVE APTITUDE

45. Suppose hospital A admitted 21 less Covid infected patients than hospital B, and all eventually recovered. The sum of recovery days for patients in hospitals A and B were 200 and 152, respectively. If the average recovery days for patients admitted in hospital A was 3 more than the average in hospital B then the number admitted in hospital A was
46. Amal purchases some pens at ₹ 8 each. To sell these, he hires an employee at a fixed wage. He sells 100 of these pens at ₹ 12 each. If the remaining pens are sold at ₹ 11 each, then he makes a net profit of ₹ 300, while he makes a net loss of ₹ 300 if the remaining pens are sold at ₹ 9 each. The wage of the employee, in INR, is
47. The amount Neeta and Geeta together earn in a day equals what Sita alone earns in 6 days. The amount Sita and Neeta together earn in a day equals what Geeta alone earns in 2 days. The ratio of the daily earnings of the one who earns the most to that of the one who earns the least is  
(a) 7:3 (b) 3:2  
(c) 11:3 (d) 11:7
48. The number of integers  $n$  that satisfy the inequalities  $|n - 60| < |n - 100| < |n - 20|$  is  
(a) 18 (b) 21  
(c) 20 (d) 19
49. If  $r$  is a constant such that  $|x^2 - 4x - 13| = r$  has exactly three distinct real roots, then the value of  $r$  is?  
(a) 21 (b) 15  
(c) 17 (d) 18
50. Two trains cross each other in 14 seconds when running in opposite directions along parallel tracks. The faster train is 160 m long and crosses a lamp post in 12 seconds. If the speed of the other train is 6 km/hr less than the faster one, its length, in m, is  
(a) 180 (b) 184  
(c) 190 (d) 192
51. Anu, Vinu and Manu can complete a work alone in 15 days, 12 days and 20 days, respectively. Vinu works everyday. Anu works only on alternate days starting from the first day while Manu works only on alternate days starting from the second day. Then, the number of days needed to complete the work is  
(a) 8 (b) 6  
(c) 5 (d) 7
52. The number of groups of three or more distinct numbers that can be chosen from 1, 2, 3, 4, 5, 6, 7 and 8 so that the groups always include 3 and 5, while 7 and 8 are never included together is
53. If the area of a regular hexagon is equal to the area of an equilateral triangle of side 12 cm, then the length in cm of each side of the hexagon is  
(a)  $4\sqrt{6}$  (b)  $\sqrt{6}$   
(c)  $6\sqrt{6}$  (d)  $2\sqrt{6}$
54. If  $5 - \log_{10}(\sqrt{1+x}) + 4 \log_{10}(\sqrt{1-x}) = \log_{10}\left(\frac{1}{\sqrt{1-x^2}}\right)$ , then  $100x$  equals
55. A basket of 2 apples, 4 oranges and 6 mangoes costs the same as a basket of 1 apple, 4 oranges and 8 mangoes, or a basket of 8 oranges and 7 mangoes. Then the number of mangoes in a basket of mangoes that has the same cost as the other baskets is  
(a) 13 (b) 12  
(c) 11 (d) 10
56. The strength of an indigo solution in percentage is equal to the amount of indigo in grams per 100 cc of water. Two 800 cc bottles are filled with indigo solutions of strengths 33% and 17%, respectively. A part of the solution from the first bottle is thrown away and replaced by an equal volume of the solution from the second bottle. If the strength of the indigo solution in the first bottle has now changed to 21% then the volume, in cc, of the solution left in the second bottle is
57. Onion is sold for 5 consecutive months at the rate of Rs 10, 20, 25, 25, and 50 per kg, respectively. A family spends a fixed amount of money on onion for each of the first three months, and then spends half that amount on onion for each of the next two months. The average expense for onion, in rupees per kg, for the family over these 5 months is closest to  
(a) 20 (b) 16  
(c) 18 (d) 26
58. Suppose the length of each side of a regular hexagon ABCDEF is 2 cm. If T is the mid point of CD, then the length of AT, in cm, is  
(a)  $\sqrt{14}$  (b)  $\sqrt{12}$   
(c)  $\sqrt{13}$  (d)  $\sqrt{15}$
59. A circle of diameter 8 inches is inscribed in a triangle ABC where  $\angle ABC = 90^\circ$ . If BC = 10 inches then the area of triangle in square inches is.
60.  $f(x) = \frac{x^2 - 2x - 15}{x^2 - 7x - 18}$  is negative if and only if

- 
- (a)  $X < -5$  or  $3 < x < 9$   
 (b)  $-2 < x < 3$  or  $x > 9$   
 (c)  $-5 < x < -2$  or  $3 < x < 9$   
 (d)  $x < -5$  or  $-2 < x < 3$
61. Amar, Akbar and Anthony are working on a project. Working together Amar and Akbar can complete the project in 1 year, Akbar and Anthony can complete in 16 months, Anthony and Amar can complete in 2 years. If the person who is neither the fastest nor the slowest works alone, the time in months he will take to complete the project is
62. Identical chocolate pieces are sold in boxes of two sizes, small and large. The large box is sold for twice the price of the small box. If the selling price per gram of chocolate in the large box is 12% less than that in the small box, then the percentage by which the weight of chocolate in the large box exceeds that in the small box is nearest to
- (a) 127 (b) 135  
 (c) 144 (d) 124
63. How many three-digit numbers are greater than 100 and increase by 198 when the three digits are arranged in the reverse order?
64. Anil invests some money at a fixed rate of interest, compounded annually. If the interests accrued during the second and third year are \* 806.25 and 866.72, respectively, the interest accrued, in INR, during the fourth year is nearest to
- (a) 934.65 (b) 926.84  
 (c) 931.72 (d) 929.48
65. If  $x_0 = 1, x_1 = 2$  and  $X_{n+2} = \frac{1+x_n+1}{x_n}, n = 0, 1, 2, 3, \dots$ , then  $x_{2021}$  is equal to
- (a) 1 (b) 3  
 (c) 4 (d) 2
66. The natural numbers are divided into groups as (1), (2, 3, 4), (5, 6, 7, 8, 9), and so on. Then, the sum of the numbers in the 15th group is equal to
- (a) 4941 (b) 6119  
 (c) 7471 (d) 6090

## ANSWER KEY AND EXPLANATIONS

### VERBAL ABILITY AND READING COMPREHENSION

- (a)** In the last paragraph the author says that "utopia and dystopia evidently share more in common... indeed, they might be twins..." further adding "Yet we should not mistake this argument..."

Hence we can say that option (a) cannot be inferred from the passage.

The author mentions "More", who was the first author of a book on Utopia, and further mentions Tommaso who also wrote a book on Utopia. We have enough evidence in the passage that shows that in literature we have enough material that have dealt with the idea of Utopia. Hence, option (b) can be inferred from the passage.

Option (c) can be inferred from the last sentence of second paragraph and option (d) can be inferred from last sentence of first paragraph.

Hence, option (a).
- (c)** Option (d) can be eliminated as the passage refers to homogeneity and unity as a familiar theme.

Option (b) can be eliminated since the second paragraph refers to curbing the desire for public power.

Option (a) can be eliminated since there is no mention of "competitive heterogeneity" in the passage.

Option (c) is correct as the first paragraph refers to 'Utopia appears to rely upon relentless transparency, the repression of variety, and the curtailment of privacy. Utopia provides security: but at what price?' So, institutional surveillance in the name of security can be seen as a characteristic of a Utopian society.

Hence, option (c).
- (d)** Options (b) and (c) do not contain the important idea of 'intentional communities', hence they can be eliminated.

Option (a) does not contain the idea of homogeneity which is mentioned in detail in second paragraph.

Thus option (d) is the best choice.

Hence, option (d).
- (a)** Option (b) is mentioned in the last paragraph of the passage: 'For we have only to acknowledge the existence of thousands of successful intentional communities in which a cooperative ethos predominates and where harmony without coercion is the rule to set aside such an assertion'.

Option (c) can also be inferred from the last few lines of the second passage: 'Unity, order, and homogeneity thus prevail at the cost of individuality and diversity. This model, as J. C. Davis demonstrates, dominated early modern utopianism'.

Option (d) is true, based on the second paragraph which states that the tradition which follows More 'often portrays societies where... 'it would be almost impossible for man to be depraved, or wicked'.

In the first para the author says "in More's time...given the plenty and security on offer, such restraints would not have seemed unreasonable" (it means that in More's time such restraints would have seemed reasonable), suggesting that restraints were there. Option (a) states the exact opposite.

Hence, option (a).
- (c)** Option (a): If this were true there would have been no point of doing the experiment.

Option (b): Does not add anything significant to the findings of the experiment

Option (c): According to the passage, species that exhibit self-control are usually social. Cuttlefish are not. But if it were true that cuttlefish exhibit sociability, you could conclude that like most other social creatures, cuttlefish, too, exhibit self-control. So if option B were true, the findings of the passage would be in line with what is generally observed. So, that way, it would complement the findings.

Option (d): If cuttlefish could not distinguish between geometric shapes, there was no reason for them to wait for the shrimp. The whole premise of the experiment is negated.

Hence, option (c).

- (b)** Options (c) and (d) are the obvious differences between the two experiments and hence can be eliminated.

Option (a) is also true as the marshmallow experiment was conducted since childhood till they became adults while the cuttlefish experiment was a short duration experiment.

Option (b) is the best choice as nowhere in the passage is it implied that the latter correlated survival advantages.

Hence, option (b).
- (d)** Option (a) It is mentioned in the passage that cuttlefish prefer shrimp over prawn, hence it is true.

Option (b) This is also mentioned in the second last paragraph: "but sometimes, they would turn away from the king prawn "as if to distract themselves from the temptation of the immediate reward."

Option (c) Since some cuttlefish waited up to 130 seconds for shrimp instead of eating prawn immediately, it shows that they are capable of self-control.

Option (d) The passage states that 'most of the animals' that can exercise self-control are social. Cuttlefish exhibit self-control and are not social.

Hence, option (d).
- (a)** Cuttlefish prefer shrimp over prawns and Asian crab. So to demonstrate their self-control we need to offer them prawn or crab and make them wait for shrimp.

Option (a) does that while other options don't make cuttlefish wait for shrimp.

Hence, option (a).
- (a)** By giving the example of incense burner, the additional complexity is that in addition to being categorised as a person, it is also categorised as a tree. This third categorisation is similar to the first two. The same object can be a person-tool as well as a tree.

Hence, option (a).
- (c)** Consider these lines from first paragraph: "...Does it have personhood (if at all) because it is connected to me, drawing this resource from me as an owner or source? For the Maya (who did have plenty of other communicating objects, if not smartphones), the answer was no..."

This clearly states that Mayan's did not see personhood because of usefulness of objects to humans.

Hence, option (c).
- (b)** Mayans looked at things democratically and in a nonbinary way. Humans were not the only important things to them.

The second paragraph says "The Maya saw personhood as 'activated' by experiencing certain bodily needs and through participation in certain social activities. For example, among the faced objects that I examined, persons are marked by personal requirements (such as hunger, tiredness, physical closeness), and by community obligations (communication, interaction, ritual observance)."

This tells us that personhood was not based on the usefulness of nonpersons to humans or their similarity to humans. Hence, options (a), (c) and (d) can be eliminated. Option (b) talks about ecosystem of plants (i.e., social aspect) and need nutritions (bodily needs).

Hence, option (b).

12. **(c)** Proximity or usefulness to humans was not a criteria for personhood of an object. Hence, option (b) and (d) can be eliminated.

Option (a) can be eliminated because to understand something in a purely human form means to have a binary outlook which is undemocratic.

Option (c) does not violate the democratising potential in any way.

Hence, option (c).

13. **(c)** First paragraph mentions "conflate consumption with virtue". To conflate means to combine. In the choices we have to find an option that has both virtue and consumption.

Option (c): sustainably farmed foods: has implied consumption because "foods" are meant to be consumed, it also has virtue because those farm foods are sustainable.

Hence, option (c).

14. **(d)** The second last paragraph, where the author says "tea is a success story... because tea marketers succeeded in conveying moral elevation ....and advance cause of community".

Option (d) is the best choice. None of the other options are not connected with these lines of the passage.

Hence, option (d).

15. **(d)** Options (a), (b) and (c) are mentioned in the second and the third paragraphs.

The passage does not have any mention of "tea drinkers lobbying for product diversity".

Hence, option (d).

16. **(a)** Options (b) and (c) are mentioned in the last paragraph. The fact that tea is consumed in many places means tea drinking has become a social ritual worldwide. And the fact that it advances human dialogue and friendship means that it promotes congeniality and camaraderie,

Option (d) is mentioned in the last sentence of second paragraph.

Option (a) finds no mention anywhere in the passage.

Hence, option (a).

17. **(d)** The paragraphs talks about multisensory integration, where that auditory and visual information is merged into a unified, integrated percept.

Options (d) best captures the essence of the passage.

Options (a) is not true. McGurk effect takes place even with good audio quality.

Option (b): McGurk effect is not about confusion but unification.

Option (c) does not explain what McGurk experiment is.

Hence, option (d).

18. **(d)** Most of the statements given talk about commercial activity in outer space and the laws binding such activities. Statement 5 is likely to open the paragraph, as it introduces the idea of "commercial activity".

Statement 2 explains that the current laws are ill-suited for commercial future.

Statement 1 is futhers the idea of out-dated laws with respect to mining of asteroid minerals.

Statement 3 explains what has been done and what more needs to be done.

Statement 4 does not relate to commercial activity and hence is the odd one out.

Hence, option (d).

19. **(c)** The passage mentions

Anger of locals peacekeepers. the reason for aloofness of peacekeepers. how to resolve these issues going forward. Option (a) only catures the reason for aloofness of peacekeepers, but does not provide the solution.

Option (b) justifies the anger of local agains the peacekeepers but again does not provide any solution.

Option (c) captures the essence of the passage well.

Option (d) Nowhere in the passage is it mentioned that peacekeeping duties should be performed by locals themselves.

Hence, option (c).

20. **(2341)** The central idea of the statements given is about the regeneration.

Statement 2 introduces the idea of regeneration and hence is the best opening sentence.

'They' in statement 3 referes to the biologist in statement 2 and hence follows statement 2.

Statement 4 gives additional information about regeneration and hence should follow statement 3.

Statement 1 talks about regeneration capability in other species and is the best concluding statement.

Hence, 2341.

21. **(4312)** Statement 4 introduces the two poles i.e, 'artistic' and 'aesthetic' while statements 3 furthers this idea of polarity. Hence, 4 followed by 3 makes a pair.

Sentence 1 states that text takes on life only when it is realised and that the realisation itself depends on the reader's disposition.

Sentence 2 adds to 1, discussing the convergence of the text and the reader and is a good concluding statement.

Hence, 4312.

22. **(2143)** Statement 2 introduces the idea of rise in temperature due to global warming.

Statement 1 explains the measure to reduce global warming i.e., planting of trees.

Statement 4 explains how trees help in reducing global warming.

Statement 3 further explains the reason for planting trees.

Hence, 2143.

23. **(e)** Statement 1 is the best opening statement as it introduces the idea of predatory journals.

Statements 4 explains what these journals claim because of which they look and feel like reputed journals (Statement 3).

Statement 2 shows that reality is different and is the best concluding statement.

Statements 5 talks about a slightly different topic of publishing scam and hence is the odd one out.

Hence, option (ge).

24. (c) The passage discusses developing countries becoming hotbeds of business innovation. In addition to this, it mentions the reasons as to why this is happening, and finally ends saying that they are going global as well. Option (c) captures all the ideas in the right order.

Option (a) mentions "developing countries are being forced", which is not true.

Option (b) focuses on global competition rather than innovation happening in developing countries.

Option (d) is not as detailed as option (c).

Hence, option (c).

### DATA INTERPRETATION AND LOGICAL REASONING

25. (d) One unit of milk, mango, apple, and banana cost ₹5, ₹3, ₹2, and ₹1 respectively

We can make the following table for Cost price, Profit and Selling price of each of the products.

Finished Product	Raw materials required	Cost price	Profit	Selling price
Mango smoothie (MS)	Mango, Milk	8	4	12
Apple smoothie (AS)	Apple, Milk	7	4	11
Banana smoothie (BS)	Banana, Milk	6	4	10
Mixed fruit smoothie (MFS)	Mango, Apple, Banana, Milk	11	8	19
Fruit Salad (FS)	Mango, Apple, Banana	6	6	12

Now, we can make the following table for types of products sold by each of the three based on selling price

Business Hour	Ganga	Kaveri	Narmada
Hour 1	23 (MS/FS + AS)	19 (MFS)	31 (MFS+ FS)
Hour 2	21 (AS + BS)	22 (BS + FS)	21 (AS + BS)
Hour 3	29 (BS + MFS)	30 (AS + MFS)	23 (AS + FS)
Hour 4 (last hour)	30	27	22

Note: No one except Ganga sells Mango Smoothie.

After the last hour each woman had exactly one unit each of two different raw materials as leftovers but no one had any banana. Also, leftover raw materials are sold during the last business hour of the day for a loss of ₹ 1 per unit

∴ Items left could be

(Milk + Mango) ⇒ CP = 8 ⇒ sold at Rs. 6

(Milk + Apple) ⇒ CP = 7 ⇒ sold at Rs. 5

(Apple + Mango) ⇒ CP = 5 ⇒ sold at Rs. 3

Ganga sells items worth Rs. 30 in last hour, out of these

**Case 1:** Rs. 6 could be earned from left-overs hence Rs. 24 would be earned from finished products. This is possible by selling Mango Smoothie and Fruit Salad.

**Case 2:** Rs. 5 could be earned from left-overs hence Rs. 25 would be earned from finished products. This is not possible.

**Case 3:** Rs. 3 could be earned from left-overs hence Rs. 27 would be earned from finished products. This is not possible.

Hence, Ganga sells Mango Smoothie and Fruit Salad in the last hour and the left-over items are one unit of Milk and Mango each. Kaveri sells items worth Rs. 27 in last hour, out of these

**Case 1:** Rs. 6 could be earned from left-overs hence Rs. 21 would be earned from finished products. This is possible by selling Apple Smoothie and Banana Smoothie.

**Case 2:** Rs. 5 could be earned from left-overs hence Rs. 22 would be earned from finished products. This is possible by selling Banana Smoothie and Fruit Salad.

**Case 3:** Rs. 3 could be earned from left-overs hence Rs. 24 would be earned from finished products. This is not possible.

Hence, we have 2 cases for Kaveri.

Narmada sells items worth Rs. 22 in last hour, out of these

**Case 1:** Rs. 6 could be earned from left-overs hence Rs. 16 would be earned from finished products. This is not possible.

**Case 2:** Rs. 5 could be earned from left-overs hence Rs. 17 would be earned from finished products. This is not possible.

**Case 3:** Rs. 3 could be earned from left-overs hence Rs. 19 would be earned from finished products. This is possible by selling Mixed

Fruit Smoothie.

Hence, Narmada sells Mixed Fruit Smoothie in the last hour and if left with one unit of Apple and Mango each.

Hence, we have the following final table

Business Hour	Ganga	Kaveri	Narmada
Hour 1	23 (MS/FS + AS)	19 (MFS)	31 (MFS+ FS)
Hour 2	21 (AS + BS)	22 (BS + FS)	21 (AS + BS)
Hour 3	29 (BS + MFS)	30 (AS + MFS)	23 (AS + FS)
Hour 4 (last hour)	30 (AS + MFS)	27 (BS+ AS/FS)	22 (MFS)
Left over	Milk and Mango	Milk + Mango/Apple	Apple + Mango

Narmada sells one unit of Fruit Salad while Ganga may or may not sell one unit of Fruit Salad.

∴ Number of Fruit Salads sold in first hour can be either 1 unit or 2 units.

Hence, option (d).

26. (b) Consider the solution to first question of this set.



Business Hour	Ganga	Kaveri	Narmada
Hour 1	23 (MS/FS + AS)	19 (MFS)	31 (MFS+ FS)
Hour 2	21 (AS + BS)	22 (BS + FS)	21 (AS + BS)
Hour 3	29 (BS + MFS)	30 (AS + MFS)	23 (AS + FS)
Hour 4 (last hour)	30 (AS + MFS)	27 (BS+ AS/FS)	22 (MFS)
Left over	Milk and Mange	Milk + Mango/Apple	Apple + Mango

Hence, option (b).

27. (a) Consider the solution to first question of this set.

Business Hour	Ganga	Kaveri	Narmada
Hour 1	23 (MS/FS + AS)	19 (MFS)	31 (MFS+ FS)
Hour 2	21 (AS + BS)	22 (BS + FS)	21 (AS + BS)
Hour 3	29 (BS + MFS)	30 (AS + MFS)	23 (AS + FS)
Hour 4 (last hour)	30 (AS + MFS)	27 (BS+ AS/FS)	22 (MFS)
Left over	Milk and Mange	Milk + Mango/Apple	Apple + Mango

Number of units of milk with

**Ganga** =  $1/2$  (Hour 1) + 2 (Hour 2) + 2 (Hour 3) + 1 (Hour 3) + 1 (Left-over) =  $7/8$  units

**Kaveri** = 1 (Hour 1) + 1 (Hour 2) + 2 (Hour 3) +  $1/2$  (Hour 3) + 1 (Left-over) =  $6/7$  units

**Narmada** = 1 (Hour 1) + 2 (Hour 2) + 1 (Hour 3) + 1 (Hour 3) + 0 (Left-over) = 5 units

$\therefore$  Number of units of milk initially could be 18 or 19 or 20.

Hence, option (a).

- 28.

Business Hour	Ganga	Kaveri	Narmada
Hour 1	23 (MS/FS + AS)	19 (MFS)	31 (MFS+ FS)
Hour 2	21 (AS + BS)	22 (BS + FS)	21 (AS + BS)
Hour 3	29 (BS + MFS)	30 (AS + MFS)	23 (AS + FS)
Hour 4 (last hour)	30 (AS + MFS)	27 (BS+ AS/FS)	22 (MFS)
Left over	Milk and Mange	Milk + Mango/Apple	Apple + Mango

Since, 3 units of leftover mangoes were sold at the end of the day, hence Kaveri sold leftover mango that means she sold Apple Smoothie in the 4th hour.

We can make the following table with the additional information.

Business Hour	Ganga	Kaveri	Narmada
Hour 1	23 (MS/FS + <b>AS</b> )	19 (MFS)	31 (MFS+ FS)
Hour 2	21 ( <b>AS</b> + BS)	22 (BS + FS)	21 ( <b>AS</b> + BS)
Hour 3	29 (BS + MFS)	30 ( <b>AS</b> + MFS)	23 ( <b>AS</b> + FS)
Hour 4 (last hour)	30 (AS + MFS)	27 (BS+ <b>AS</b> )	22 (MFS)
Left over	Milk and Mange	Milk + Mango/Apple	Apple + Mango

Number of apple smoothies sold by Ganga = 2, Kaveri = 1 and Narmada = 2

$\Rightarrow$  Total Apple Smoothies sold =  $2 + 2 + 2 = 6$

Hence, 6.

29. (c) Office Supplies in 2019:  
 $3.6$  (Binders) +  $0.4$ (Art) +  $1.9$  (Appliances) +  $0.4$  (Envelopes) +  $0.1$  (Fasteners) +  $0.2$  (Labels) +  $1.5$  (Paper) +  $4.3$  (Storage) +  $1.1$  (Supplies) =  $13.5$   
Hence, option (c).
30. (c) Furniture sales in 2019:  
 $1.9 + 6.1 + 2 + 4.4 = 14$   
Furniture sales in 2020:  
 $2.2 + 6.5 + 2 + 4.5 = 15.2$   
 $\therefore$  % change  $(15.2 - 14)/14 \times 100\% = 8.6\%$   
Hence, option (c).
31. (1) Only Phones registered an increase of more than 25% from 2019 to 2020 and also had sales of more than \$ 4 million in 2019.  
Hence, 1.
32. (a) In furniture category, Chairs subcategory has the highest % increase i.e., approx. 15%.  
 $\therefore$  Improvement index for furniture is 15%.  
In office supply category, Appliances, subcategory has the highest % increase i.e., approx. 60%.  
 $\therefore$  Improvement index for office supply is 60%.

In technology category, Accessories subcategory has the highest % increase i.e., approx. 40%.

$\therefore$  Improvement index for technology is 40%.

$\therefore$  Improvement index of Furniture < Technology < Office Supplies.

Hence, option (a).

33. (a) The information given in the question can be written as follows

Point (2) & (3): A has to be from India

Month	Authors	Not possible
Jan (5)		
Apr (5)	B	
Jul (4)		D
Oct (4)	F,	A

Manufacturing (2)	D	India
Automation (2)	A	Japan, China
Logistics (4)	F	

India (4)	A, F	
China (2)	C, E	

Japan (2)	D	
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Name	Country	Area	# Papers
A	India	Auto.	
B	Same as G	Logs.	
C	China		x
D	Japan	Man.	
E	China		x
F	India	Logs,	1
G	Same as B		
H			

The total number of papers written by A, D, G and H was double the total number of papers written by the other four authors

$$\Rightarrow A + D + G + H = 2(B + C + E + F)$$

$$\text{Also, } A + D + G + H + B + C + E + F = 18$$

$$\Rightarrow 3(B + C + E + F) = 18$$

$$\Rightarrow B + C + E + F = 6 \dots (1)$$

$$\Rightarrow A + D + G + H = 12 \dots (2)$$

Point (5):  $C = E \geq 2$  (since E has papers scheduled in consecutive issues, E must have written more than 1 paper)  
From (1) we can conclude that E must have written exactly 2 papers. C would also have written exactly 2 papers.

$$\therefore B + 2 + 2 + 1 = 6$$

$$\Rightarrow B = 1$$

Also,  $A + D + G + H = 12$ . Since each person can write a maximum of 3 papers, hence the only possible value of A, D, G and H will be 3 each.

Month	Authors	Not possible
Jan (5)		
Apr (5)	B	
Jul (4)		D
Oct (4)	F,	A

Manufacturing (2)	D	India
Automation (2)	A	Japan, China
Logistics (4)	B, F	

India (4)	A, F	
China (2)	C, E	
Japan (2)	D	

Name	Country	Area	# Papers
A	India	Auto.	3
B	Same as G	Logs.	1
C	China		2
D	Japan	Man.	3
E	China		2
F	India	Logs.	1
G	Same as B		3
H			3

Point (7): B and G both can only be from India. Hence, H has to be from Japan.

Month	Authors	Not possible
Jan (5)		
Apr (5)	B	
Jul (4)		D
Oct (4)	F,	A

Manufacturing (2)	D	India
-------------------	---	-------

Automation (2)	A	Japan, China
Logistics (4)	B, F	

India (4)	A, F, B, G	
China (2)	C, E	
Japan (2)	D, H	

Name	Country	Area	# Papers
A	India	Auto.	3
B	India	Logs.	1
C	China		2
D	Japan	Man.	3
E	China		2
F	India	Logs.	1
G	India		3
H	japan		3

Point (5) & (3): C and E cannot be from Automation since they are Chinese. Hence, one of C or E is from Manufacturing and the other from Logistics.

Now, since H is from Japan he cannot be from Automation, hence H can only be from Logistics.

Since, C and H have to be from different areas (9), C has to be from Manufacturing and E from Logistics.

This leaves us with G who has to be from Automation.

Month	Authors	Not possible
Jan (5)		
Apr (5)	B	
Jul (4)		D
Oct (4)	F,	A

Manufacturing (2)	D, c	India
Automation (2)	A, H	Japan, China
Logistics (4)	B, F, E, B	

India (4)	A, F, B, G	
China (2)	C, E	
Japan (2)	D, H	

Name	Country	Area	# Papers
A	India	Auto.	3
B	India	Logs.	1
C	China	Man.	2
D	Japan	Man.	3
E	China	Logs.	2
F	India	Logs.	1
G	India	Auto.	3
H	japan	Logs.	3

A has to write 3 papers and an author can write only one paper in a single issue, hence A must have written one paper each in Jan, Apr and Jul issue.

A and H had papers scheduled in same issues (4). Hence, must have written one paper each in Jan, Apr and Jul issue. Similarly, D must have written one paper each in Jan, Apr and Oct issue.

Point (7): None of B and G's papers were scheduled in the same issue of the journal. Hence, G must have written papers in Jan, Jul and Oct.

Month	Authors	Not possible
Jan (5)	A, D, H, G	

Apr (5)	A, B, D, H	
Jul (4)	A, H, G	D
Oct (4)	F, D, G	A

Manufacturing (2)	D, C	India
Automation (2)	A, H	Japan, China
Logistics (4)	B, F, E, B	

India (4)	A, F, B, G	
China (2)	C, E	
Japan (2)	D, H	

Name	Country	Area	# Papers
A	India	Auto.	3
B	India	Logs.	1
C	China	Man.	2
D	Japan	Man.	3
E	China	Logs.	2
F	India	Logs.	1
G	India	Auto.	3
H	japan	Logs.	3

Point (5): E wrote papers in successive issues while C did not write in successive issues. Only possible way this can happen is when E writes in Apr and Jul while C writes in Jan and Oct.

Month	Authors	Not possible
Jan (5)	A, D, H, G	
Apr (5)	A, B, D, H	
Jul (4)	A, H, G	D
Oct (4)	F, D, G, C	A

Manufacturing (2)	D, C	India
Automation (2)	A, H	Japan, China
Logistics (4)	B, F, E, B	

India (4)	A, F, B, G	
China (2)	C, E	
Japan (2)	D, H	

Name	Country	Area	# Papers
A	India	Auto.	3
B	India	Logs.	1
C	China	Man.	2
D	Japan	Man.	3
E	China	Logs.	2
F	India	Logs.	1
G	India	Auto.	3
H	japan	Logs.	3

Number of papers written by B, C, E and G is 1, 2, 2 and 3 respectively.

Hence, option (a).

34. **(8)** Consider the solution to first question of this set. Indian authors have written 8 papers.  
Hence, 8.
35. **(c)** Consider the solution to first question of this set. Only statement A is correct.  
Hence, option (c).
36. **(c)** Consider the solution to first question of this set. Hence, option (b).

37. **(d)** Consider the solution to first question of this set. Hence, option (d).
38. **(b)** Consider the solution to first question of this set. Hence, option (b).
39. **(c)** Amudha, Bharatan, and Chandran are mutual strangers.

	A	B	C	D	E	F	G
A							
B	S						
C	S	S					
D							
E							
F							
G							

Amudha, Dhinesh, and Fani are Ezil's friends.  
Chandran and Gowtham are friends.

	A	B	C	D	E	F	G
A							
B	S						
C	S	S					
D							
E	F			F			
F					F		
G			F				

Every friend of Amudha is an acquaintance of Bharatan, and every acquaintance of Bharatan is a friend of Amudha. And every friend of Bharatan is an acquaintance of Amudha, and every acquaintance of Amudha is a friend of Bharatan. Since Ezil is Amudha's friend Ezil will be Bharatan's acquaintance

	A	B	C	D	E	F	G
A							
B	S						
C	S	S					
D							
E	F	A		F			
F					F		
G			F				

Gautam has 3 acquaintances and 2 strangers hence Gautam will have 1 friend.

Fani also has 1 friend.

We can see from the table that Fani and Gautam already have one friend and the remaining people will be either acquaintances or strangers.

Now, if Fani is an acquaintance of Amudha/Bharatan, he will be a friend of Bharatan/Amudha. Thus Fani will have 2 friends which is not possible. Hence, Fani will be a stranger to both Amudha and Bharatan.

We can use the same logic for Gautam and conclude that Gautam will be a stranger to both Amudha and Bharatan.

Now, Gautam has 3 acquaintances, these will be Dhinesh, Ezhil and Fani.

Amudha has 1 acquaintance, this can only be Dhinesh. Since Dhinesh is Amudha's acquaintance, he will be Bharatan's friend.

	A	B	C	D	E	F	G
A							
B	S						
C	S	S					
D	A	F					
E	F	A		F			
F	S	S			F		
G	S	S	F	A	A	A	

Dhinesh has two strangers, hence Chandran and Fani will be strangers to Dhinesh.

Ezhi has one stranger, this can only be Chandran.

	A	B	C	D	E	F	G
A							
B	S						
C	S	S					
D	A	F	S				
E	F	A	S	F			
F	S	S		S	F		
G	S	S	F	A	A	A	

Chandran has one acquaintance and this will be Fani. Hence, we get the final table for all relationships.

	A	B	C	D	E	F	G
A							
B	S						
C	S	S					
D	A	F	S				
E	F	A	S	F			
F	S	S	A	S	F		
G	S	S	F	A	A	A	

Gautam's acquaintances are Dhinesh, Ezil and Fani.

Hence, option (c).

40. (a) Consider the solution to first question of this set.

	A	B	C	D	E	F	G
A							
B	S						
C	S	S					
D	A	F	S				
E	F	A	S	F			
F	S	S	A	S	F		
G	S	S	F	A	A	A	

Bharatan and Chandran are acquaintances while Dhinesh and Ezhil are also acquaintances.

Hence, option (a).

41. (b) Consider the solution to first question of this set.

	A	B	C	D	E	F	G
A							
B	S						
C	S	S					
D	A	F	S				
E	F	A	S	F			
F	S	S	A	S	F		
G	S	S	F	A	A	A	

Dhinesh is an acquaintance of Amudha.

Hence, option (b).

42. (c) Consider the solution to first question of this set.

	A	B	C	D	E	F	G
A							
B	S						
C	S	S					
D	A	F	S				
E	F	A	S	F			
F	S	S	A	S	F		
G	S	S	F	A	A	A	

Fani is an acquaintance of Chandran.

Hence, option (c).

43. (3) Consider the solution to first question of this set.

	A	B	C	D	E	F	G
A							
B	S						
C	S	S					
D	A	F	S				
E	F	A	S	F			
F	S	S	A	S	F		
G	S	S	F	A	A	A	

Ezil has 3 friends, i.e., Amudha, Dhinesh and Fani.

Hence, 3.

44. (4) Consider the solution to first question of this set.

	A	B	C	D	E	F	G
A							
B	S						
C	S	S					
D	A	F	S				
E	F	A	S	F			
F	S	S	A	S	F		
G	S	S	F	A	A	A	

Ezil's direct friends are Amudha, Dhinesh and Fani while friends of friends is Bharatan (Dhinesh's friend).

Hence, 4.

#### QUANTITATIVE APTITUDE

45. (35) Let the number of patients in hospital A = x  
 $\therefore$  The number of patients in hospital B = x + 21

$$\Rightarrow \frac{200}{x} = \frac{152}{x+21} + 3$$

$$\Rightarrow 200x + 4200 = 152x + 3x^2 + 63x$$

$$\Rightarrow 3x^2 + 15x - 4200 = 0$$

$$\Rightarrow x^2 + 5x - 1400 = 0$$

$$\Rightarrow x = 35 \text{ or } -40 \text{ (not possible)}$$

$\therefore$  Number of patients in hospital A = 35

Hence, 35.

46. (1000) Let the total number of pens Amal bought = x

Also, let the wage of the employee = W

$\therefore$  Amal's total cost price = 8x + w

Total selling price of the first 100 pen = 100  $\times$  12 = 1200

**Case 1:** The remaining pen when each is Total selling price of the remaining pen

$$\Rightarrow 1200 + 11(x - 100) = 8x + w + 300$$

$$\Rightarrow 3x - 200 = w \dots (1)$$

**Case 2:** The remaining pen when each is sold at Rs. 9

Total selling price of the remaining pen = (x - 100)  $\times$  9

$$\Rightarrow 1200 + 9(x - 100) = 8x + w - 300$$

$$\Rightarrow 4x - 600 = w \dots (2)$$

Solving (1) and (2) we get

$$x = 400 \text{ and } w = 1000.$$

Hence, 1000.

47. (c) Let the earnings of Neeta, Geeta and Sita be 'n', 'g' and 's' respectively.

The amount Neeta and Geeta together earn in a day equals

what Sita alone earns in 6 days  $\Rightarrow 6s = n + g \dots (1)$

The amount Sita and Neeta together earn in a day equals

what Geeta alone earns in 2 days  $\Rightarrow 2g = s + n$

$$\Rightarrow 2(6s - n) = s + n \text{ [From (1)]}$$

$$\Rightarrow 11s = 3n$$

$$\Rightarrow n = 11s/3 \dots (2)$$

Substituting  $n = 11s/3$  in (1)

$$\Rightarrow 6s = 11s/3 + g$$

$$\Rightarrow 7s/3 = g \dots (3)$$

From (2) and (3)

$$11s/3 > 7s/3 > s$$

$$\therefore n > g > s$$

$\therefore$  The ratio of the daily earnings of the one who earns the most to that of the one who earns the least is = 11s/3: s = 11:3

Hence, option (c).

48. (d) Here the critical points are 20, 60 and 100.

**Case 1:**  $n \geq 100$

$$\Rightarrow n - 60 < n - 100$$

$$\Rightarrow -60 < -100$$

This can never be true.

This case is rejected.

**Case 2:**  $60 < n < 100$

$$\Rightarrow n - 60 < -n + 100$$

$$\Rightarrow 2n < 160$$

$$\Rightarrow n < 80$$

Also,

$$-n + 100 < n - 20$$

$$\Rightarrow 2n > 120$$

$$\Rightarrow n > 60$$

$\therefore$  Possible integral values of n are 61, 62, 63, ..., 79 i.e., 19 values

**Case 3:**  $n < 60$

$$\Rightarrow -n + 100 < -n + 20$$

$$\Rightarrow 100 < 20$$

This can never be true.

This case rejected.

∴ n can take 19 integral values.

Hence, option (d).

49. (c) Given,  $|x^2 - 4x - 13| = r$

$$\therefore x^2 - 4x - 13 = \pm r$$

We have two quadratic equations here but only three distinct roots it means one of the quadratic equations will have equal roots.

Case 1:  $x^2 - 4x - 13 = r$  has equal roots, i.e., Discriminant = 0

$$\Rightarrow x^2 - 4x - 13 - r = 0 \text{ had } D = 0$$

$$\Rightarrow D = 16 - 4(-13 - r) = 0$$

$$\Rightarrow 16 + 52 + 4r = 0$$

$$\Rightarrow r = -17$$

Case 2:  $x^2 - 4x - 13 = -r$  has equal roots, i.e., Discriminant = 0

$$\Rightarrow x^2 - 4x - 13 + r = 0 \text{ had } D = 0$$

$$\Rightarrow D = 16 - 4(-13 + r) = 0$$

$$\Rightarrow 16 + 52 - 4r = 0$$

$$\Rightarrow r = 17$$

Hence, option (c).

50. (c) Let the length of the smaller train be L meters.

Also, let the speeds of faster and slower trains be 'f' and 's' m/s.

$$\text{Given, } f - s = 6 \times 5/18 = 5/3 \text{ m/s}$$

$$\Rightarrow f = s + 5/3 \dots (1)$$

Faster train crosses a lamp post in 12 seconds.

$$\therefore 160/f = 12$$

$$\Rightarrow f = 40/3$$

$$\therefore s = f - 5/3 = 35/3$$

The two trains cross each other in 14 seconds.

$$\therefore (160 + L)/(f + s) = 14$$

$$\Rightarrow L = 14(f + s) - 160$$

$$\Rightarrow L = 14 \times 25 - 160$$

$$\Rightarrow L = 350 - 160 = 190$$

Hence, option (c).

51. (d) Let the total work to be done = LCM (15, 12, 20) = 60 units.

Efficiency of Anu = 60/15 = 4 units/day

Efficiency of Vinu = 60/12 = 5 units/day

Efficiency of Manu = 60/20 = 3 units/day

Let us calculate the work done every 2 days.

Vinu works on both the days, hence work done by Vinu  $2 \times 5 = 10$  units

Anu works on alternate days, hence work done by Anu = 4 units

Manu works on alternate days, hence work done by Manu

∴ Total work done in 2 days  $10 + 4 + 3 = 17$  units.

Hence total work done in 6 days =  $3 \times 17 = 51$  units.

On 7th day Vinu and Anu will work, hence work done =  $5 + 4 = 9$  units.

∴ Work done in total 7 days =  $51 + 9 =$

60 units [Work gets completed now]

∴ The number of days needed to complete the work is 7 days.

Hence, option (d).

52. (47) Out of the seven integers given, 3 and 5 should always be selected.

Case 1: Exactly 1 of 7 or 8 is selected.

Exactly one of 7 or 8 can be selected in 2 ways.

Now we have already selected three integers.

For each of the remaining 4 integers, it may be selected or it may not be selected.

∴ Number of ways of selection for remaining integers =  $2 \times 2 \times 2 \times 2 = 16$

∴ Total number of ways =  $2 \times 16 = 32$

Case 2: None of 7 and 8 is selected.

So far we have selected only two integer.

For each of the remaining 4 integers, it may be selected or it may not be selected.

∴ Number of ways of selection for remaining integers =  $2 \times 2 \times 2 \times 2 = 16$

But this includes one way when no integer is selected.

∴ Number of ways of selecting at least one integer =  $16 - 1 = 15$

∴ Total number of ways =  $32 + 15 = 47$ .

Hence, 47.

53. (d) Area of the equilateral triangle =  $\frac{\sqrt{3}}{4} \times (12)^2$

Let the length of each side of the regular hexagon be 'a'. Area of a regular hexagon with side 'a' =  $6 \times \sqrt{3}/4 \times (a)^2$

$$\text{Now, } 6 \times \sqrt{3}/4 \times (a)^2 = \sqrt{3}/4 \times (12)^2$$

$$\Rightarrow a^2 = 24$$

$$\Rightarrow a = 2\sqrt{6}$$

Hence, option (d).

54. (99) Given,

$$5 - \log_{10}(\sqrt{1+x}) + 4\log_{10}(\sqrt{1-x}) = \log_{10}\left(\frac{1}{\sqrt{1-x^2}}\right)$$

$$\Rightarrow 5 - \log_{10}(1+x)^{1/2} + \log_{10}(1-x)^{4/2} = \log_{10}(1-x^2)^{-1/2}$$

$$\Rightarrow 5 = \log_{10}(1+x)^{1/2} - \log_{10}(1-x)^2 - \log_{10}(1-x^2)^{1/2}$$

$$\Rightarrow 5 = \log_{10} \left[ \frac{(1+x)^{1/2}}{(1-x)^2 \times \{(1+x)(1-x)\}^{1/2}} \right]$$

$$\Rightarrow 5 = \log_{10}(1-x)^{-5/2}$$

$$\Rightarrow 5 = -5/2 \times \log_{10}(1-x)$$

$$\Rightarrow -2 = \log_{10}(1-x)$$

$$\Rightarrow 1-x = 10^{-2} = 1/100$$

$$\Rightarrow 100 - 100x = 1$$

$$\Rightarrow 100x = 99$$

Hence, 99.

55. (a) Let the cost of each apple be 'a', each orange be 'o' and each mango be 'm'.

$$\therefore 2a + 40 + 6m = a + 40 + 8m = 80 + 7m$$

$$\Rightarrow 2a + 40 + 6m = 80 + 7m$$

$$\Rightarrow 40 + m = 2a \dots (1)$$

$$\text{Also, } a + 40 + 8m = 80 + 7m$$

$$\Rightarrow 40 - m = a \dots (2)$$

Solving (1) and (2) we get

$$80 = 3a \text{ and } m = a/2$$

∴ Value of each basket in terms of mangoes

$$= 2a + 40 + 6m$$

$$= 4m + 3a/2 + 6m$$

$$= 10m + 3/2 \times 2m$$

$$= 10m + 3m$$

$$= 13m$$

∴ Value of each basket is same as value of 13 mangoes.

Hence, option (a).

56. (200) Let x cc is removed from first bottle and replaced with solution from second bottle.

Using alligation rule

Bottle 1	Bottle 2
----------	----------

$(800-x)$	$x$
33%	17%
21%	
4	12
$\Rightarrow (800 - x)/x = 4/12 = 1/3$	
$\Rightarrow 2400 - 3x = x$	
$\Rightarrow x = 600\text{cc.}$	

$\therefore$  Solution left in second bottle =  $800 - 600 = 200\text{cc.}$   
Hence, 200.

57. (c) Let the amounts spent by the family each month be LCM (10, 20, 25, 50) = Rs. 100 for the first 3 months and then Rs. 50 for the next two months.

Amount of onion bought during month 1 =  $100/10 = 10$  kgs

Amount of onion bought during month 2 =  $100/20 = 5$  kgs

Amount of onion bought during month 3 =  $100/25 = 4$  kgs

Amount of onion bought during month 4 =  $50/25 = 2$  kgs

Amount of onion bought during month 5 =  $50/50 = 1$  kgs

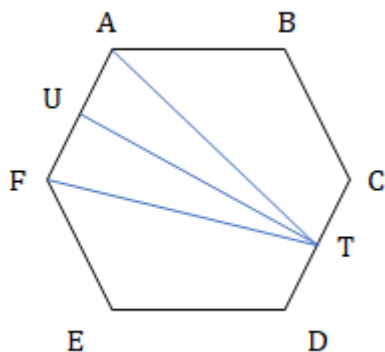
$\therefore$  Total amount of onion bought =  $10 + 5 + 4 + 2 + 1 = 22$  kgs

Total amount spend on onions =  $100 + 100 + 100 + 50 + 50 = \text{Rs. } 400.$

$\therefore$  Average expense for onion per kg for these 5 months =  $400/22 = 18.18 \approx \text{Rs. } 18/\text{kg}.$

Hence, option (c).

58. (c) Side of the regular hexagon = 2 cm.  
Consider the figure below.



Consider the isosceles  $\Delta ATF$

TU is the altitude from T to AF.

We know, in a regular hexagon the distance between any two parallel sides =  $\sqrt{3} \times \text{side}.$

$\therefore TU = \sqrt{3} \times 2 = 2\sqrt{3} \text{ cm.}$

Since ATF is an isosceles triangle, U will be the mid-point of AF

$\therefore AU = 1 \text{ cm.}$

In  $\Delta ATU$

$$AT^2 = TU^2 + AU^2$$

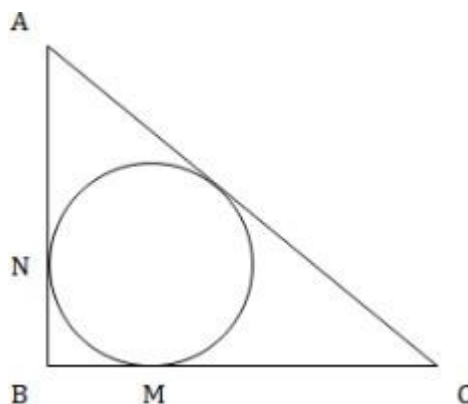
$$\Rightarrow AT^2 = (2\sqrt{3})^2 + 1^2$$

$$\Rightarrow AT^2 = 13$$

$$\Rightarrow AT = \sqrt{13}$$

Hence, option (c).

59. (120)



Here,  $BM = BN = 4$  (Radius of the circle)

$BC = 10 \text{ cm}$ , hence,  $MC = 10 - 4 = 6 \text{ cm}.$

Let  $AN = x$ , hence,  $AO = x$

In right  $\Delta ABC$ ,

$$AB^2 + BC^2 = AC^2$$

$$\Rightarrow (x + 4)^2 + 10^2 = (x + 6)^2$$

$$\Rightarrow x^2 + 16 + 8x + 100 = x^2 + 12x + 36$$

$$\Rightarrow$$

$$\Rightarrow 4x = 80$$

$$\Rightarrow x = 20$$

$\therefore$  Area of triangle  $ABC = \frac{1}{2} \times AB \times BC = \frac{1}{2} \times (20 + 4) \times 10 = 120 \text{ sq. inches.}$

Hence, 120.

60. (c) Given,  $f(x) = \frac{x^2 - 2x - 15}{x^2 - 7x - 18}, 0$   
 $\Rightarrow \frac{(x+5)(x-3)}{(x-9)(x+2)} < 0$

Here, the critical points are -5, -2, 3 and 9.

$\therefore f(x)$  will be positive when  $-5 < x < -2$  or  $3 < x < 9$ .

Hence, option (c).

61. (32) Let the total work to be done = LCM (12, 16, 24) = 48 units.

Let the efficiency of Amar, Akbar and Anthony be 'x', 'y' and 'z' units/month

$$\Rightarrow x + y = 48/12 = 4 \dots (2)$$

$$\Rightarrow y + z = 48/16 = 3 \dots (1)$$

$$\Rightarrow z + x = 48/24 = 2 \dots (3)$$

Adding all these equations

$$\Rightarrow x + y + z = 9/2 = 4.5 \dots (4)$$

Solving these four equations we get,

$$x = 1.5, y = 2.5 \text{ and } z = 0.5$$

$\therefore$  The person who is neither slowest nor fastest is Amar with efficiency of 1.5 units/month.

$\therefore$  Time required by Amar to complete the task alone =  $48/1.5 = 32$  months.

Hence, 32.

62. (a) Let the weight and price of small box is 'w' and 'p' respectively.

$\therefore$  Selling price per gram for small box =  $p/w$

Now, selling price per gram for large box =  $0.88p/w$

Also, selling price for the whole box =  $2p$ .

$$\Rightarrow \text{Weight of the large box} = \frac{2p}{0.88p/w} = \frac{2w}{0.88} = \frac{25w}{11}$$

$\therefore$  Required percentage  $\frac{\frac{25w}{11} - w}{w} \times 100 = \frac{14}{11} \times 100 \approx 127\%$

63. Hence, option (a).  
**(70)** Let the required three-digit number be 'abc'.  
 According to the question:  
 'abc' + 198 = 'cba'  
 $\Rightarrow 100a + 10b + c + 198 = 100c + 10b + a$   
 $\Rightarrow 99c - 99a = 198$   
 $\Rightarrow c - a = 2$   
 $\therefore$  Value of (c, a) can be (9, 7) or (8, 6) or (7, 5) or (6, 4) or (5, 3) or (4, 2) or (3, 1) i.e., total 7 values.  
 For each of these 7 values of c and a, b can take any of the 10 values from 0 to 9.  
 $\therefore$  Total such possible numbers =  $7 \times 10 = 70$ .  
 Hence, 70.
64. **(c)**  
 Let the interest accrued during first year = I and rate of interest be  $r\%$   
 We know in case of compound interest, interest for each year increases by  $r\%$  every year.  
 $\therefore$  Interest for 2<sup>nd</sup> year =  $1 \times (1 + \frac{r}{100}) = 806.25$   
 Interest for 3<sup>rd</sup> year =  $1 \times (1 + \frac{r}{100}) = 866.72$   
 $(2) \div (1)$   
 $\Rightarrow (1 + \frac{r}{100}) = \frac{866.72}{806.25} = 1 + \frac{60.47}{806.25}$   
 $\Rightarrow r = 7.5\%$   
 $\therefore$  Interest for 4<sup>th</sup> year = Interest for 3<sup>rd</sup> year  $\times (1 + r/100)$   
 $= 866.72 \times (1 + \frac{7.5}{100}) = 931.72$
- Hence, option (c).
65. **(d)** Given,  $X_{n+2} = \frac{1+x_{n+1}}{x_n}$   
 $X_0 = 1, x_1 = 2$   
 Substituting  $n = 0$  we get

- $$x_2 = \frac{1+2}{1} = 3$$
- Similarly,  
 $X_3 = 2$   
 $X_4 = 1$   
 $X_5 = 1$   
 $X_6 = 2$   
 $X_7 = 3$   
 $X_8 = 2$   
 $X_9 = 1$   
 ..... and so on.  
 Here, we can see that the value of  $x_n$  repeats after every 5 terms.  
 $\therefore X_{2021} = X_{2020+1} = X_1 = 2$   
 Hence, option (d).
66. **(b)** Here,  
 1st group has 1 integer  
 2nd group has 3 integers  
 3rd group has 5 integers  
 $\therefore$  nth groups will have  $(2n-1)$  integers.  
 Total integers used till  
 1st group =  $1 = 1^2$   
 2nd group =  $1 + 3 = 2^2$   
 3rd group =  $1 + 3 + 5 = 9 = 3^2$   
 $\therefore$  Total integers used till nth group =  $n^2$   
 $\therefore$  Sum of integers in 15<sup>th</sup> group = Sum of all integers used till 15<sup>th</sup> group - Sum of all integers used till 14<sup>th</sup>  
 $= (1 + 2 + 3 + \dots + 15^2) - (1 + 2 + 3 + \dots + 14^2)$   
 $= \frac{225 \times 226}{2} - \frac{196 \times 197}{2}$   
 $= 25425 - 19306 = 6119$   
 Hence, option (b).



