VERBAL ABILITY AND READING COMPREHENSION

Answer the following questions based on the information given below.

Contemporary internet shopping conjures a perfect storm of choice anxiety. Research has consistently held that people who are presented with a few options make better, easier decisions than those presented with many Helping consumers figure out what to buy amid an endless sea of choice online has become a cottage industry unto itself. Many brands and retailers now wield marketing buzzwords such as curation, differentiation, and discovery as they attempt to sell an assortment of stuff targeted to their ideal customer. Companies find such shoppers through the data gold mine of digital advertising, which can catalog people by gender, income level, personal interests, and more. Since Americans have lost the ability to sort through the sheer volume of the consumer choices available to them, a ghost now has to be in the retail machine, whether it's an algorithm, an influencer, or some snazzy ad tech to help a product follow you around the internet. Indeed, choice fatigue is one reason so many people gravitate toward lifestyle influencers on Instagram—the relentlessly chic young moms and perpetually vacationing 20-somethings—who present an aspirational worldview, and then recommend the products and services that help achieve it. . . .

For a relatively new class of consumer-products start-ups, there's another method entirely. Instead of making sense of a sea of existing stuff, these companies claim to disrupt stuff as Americans know it. Casper (mattresses), Glossier (makeup), Away (suitcases), and many others have sprouted up to offer consumers freedom from choice: The companies have a few aesthetically pleasing and supposedly highly functional options, usually at mid-range prices.

They're selling nice things, but maybe more importantly, they're selling a confidence in those things, and an ability to opt out of the stuff rat race. . . .

One-thousand-dollar mattresses and $300 suitcases might solve choice anxiety for a certain tier of consumer, but the companies that sell them, along with those that attempt to massage the larger stuff economy into something navigable, are still just working within a consumer market that's broken in systemic ways. The presence of so much stuff in America might be more valuable if it were more evenly distributed, but stuff's creators tend to focus their energy on those who already have plenty. As options have expanded for people with disposable income, the opportunity to buy even basic things such as fresh food or quality diapers has contracted for much of America's lower classes.

For start-ups that promise accessible simplicity, their very structure still might eventually push them toward overwhelming variety. Most of these companies are based on hundreds of millions of dollars of venture capital, the investors of which tend to expect a steep growth rate that can't be achieved by selling one great mattress or one great sneaker. Casper has expanded into bedroom furniture and bed linens. Glossier, after years of marketing itself as no-makeup makeup that requires little skill to apply, recently launched a full line of glittering color cosmetics. There may be no way to opt out of stuff by buying into the right thing.

1. Which one of the following best sums up the overall purpose of the examples of Casper and Glossier in the passage?
   (a) They are increasing the purchasing power of poor Americans.
   (b) They might transform into what they were exceptions to.
   (c) They are exceptions to a dominant trend in consumer markets.
   (d) They are facilitating a uniform distribution of commodities in the market.

2. Based on the passage, all of the following can be inferred about consumer behaviour EXCEPT that:
   (a) consumers are susceptible to marketing images that they see on social media.
   (b) having too many product options can be overwhelming for consumers.
   (c) consumers tend to prefer products by start-ups over those by established companies.
   (d) too many options have made it difficult for consumers to trust products.

3. Which of the following hypothetical statements would add the least depth to the author's prediction of the fate of start-ups offering few produc options?
   (a) With the motive of promoting certain rival companies, the government decides to double the tax-rates for these stat-ups.
   (b) Start-ups with few product options are no exception to the American consumer market that is deeply divided along class lines.

(c) With Casper and Glossier venturing into new product ranges, their regular customers start losing trust in the companies and their products.
(d) An exponential surge in their sales enables start-ups to meet their desired profit goals without expanding their product catalogue.

4. A new food brand plans to launch a series of products in the American market. Which of the following product plans is most likely to be supported by the author of the passage?
(a) A range of 10 products priced between $5 and $10.
(b) A range of 25 products priced between $5 and $10.
(c) A range of 10 products priced between $10 and $25.
(d) A range of 25 products priced between $10 and $25.

5. All of the following, IF TRUE, would weaken the author's claims EXCEPT:
(a) the annual sale of companies that hired lifestyle influencers on Instagram for marketing their products were 40% less than those that did not.
(b) product options increased market competition, bringing down the prices of commodities, which, in turn, increased purchasing power of the poor.
(c) the annual sales growth of companies with fewer product options were higher than that of companies which curated their products for target consumers.
(d) the empowerment felt by purchasers in buying a commodity were directly proportional to the number of options they could choose from.

Answer the following questions based on the information given below.

In the past, credit for telling the tale of Aladdin has often gone to Antoine Galland . . . the first European translator of . . . Arabian Nights [which] started as a series of translations of an incomplete manuscript of a medieval Arabic story collection. . . But, though those tales were of medieval origin, Aladdin may be a more recent invention. Scholars have not found a manuscript of the story that predates the version published in 1712 by Galland, who wrote in his diary that he first heard the tale from a Syrian storyteller from Aleppo named Hanna Diyab . . .

Despite the fantastical elements of the story, scholars now think the main character may actually be based on a real person's real experiences. Though Galland never credited Diyab in his published translations of the Arabian Nights stories, Diyab wrote something of his own: a travelogue penned in the mid-18th century. In it, he recalls telling Galland the story of Aladdin [and] describes his own hard-knocks upbringing and the way he marveled at the extravagance of Versailles. The descriptions he uses were very similar to the descriptions of the lavish palace that ended up in Galland's version of the Aladdin story. [Therefore, author Paulo Lemos] Horta believes that "Aladdin might be the young Arab Maronite from Aleppo, marveling at the jewels and riches of Versailles." . . .

For 300 years, scholars thought that the rags-to-riches story of Aladdin might have been inspired by the plots of French fairy tales that came out around the same time, or that the story was invented in that 18th century period as a byproduct of French Orientalism, a fascination with stereotypical exotic Middle Eastern luxuries that was prevalent then. The idea that Diyab might have based it on his own life — the experiences of a Middle Eastern man encountering the French, not vice-versa — flips the script. [According to Horta,] "Diyab was ideally placed to embody the overlapping world of East and West, blending the storytelling traditions of his homeland with his youthful observations of the wonder of 18th-century France." . . .

To the scholars who study the tale, its narrative drama isn't the only reason storytellers keep finding reason to return to Aladdin. It reflects not only "a history of the French and the Middle East, but also [a story about] Middle Easterners coming to Paris and that speaks to our world today," as Horta puts it. "The day Diyab told the story of Aladdin to Galland, there were riots due to food shortages during the winter and spring of 1708 to 1709, and Diyab was sensitive to those people in a way that Galland is not. When you read this diary, you see this solidarity among the Arabs who were in Paris at the time There is little in the writings of Galland that would suggest that he was capable of developing a character like Aladdin with sympathy, but Diyab's memoir reveals a narrator adept at capturing the distinctive psychology of a young protagonist, as well as recognizing the kinds of injustices and opportunities that can transform the path of any youthful adventurer."

6. All of the following serve as evidence for the character of Aladdin being based on Hanna Diyab EXCEPT:
   (a) Diyab's humble origins and class struggles, as recounted in his travelogue.
   (b) Diyab's description of the wealth of Versailles in his travelogue.
   (c) Diyab's narration of the original story to Galland.
   (d) Diyab's cosmopolitanism and cross-cultural experience.

7. The author of the passage is most likely to agree with which of the following explanations for the origins of the story of Aladdin?
   (a) Galland received the story of Aladdin from Diyab who, in turn, found it in an incomplete medieval manuscript.
   (b) The story of Aladdin has its origins in an undiscovered, incomplete manuscript of a medieval Arabic collection of stories.
   (c) Galland derived the story of Aladdin from Diyab's travelogue in which he recounts his fascination with the wealth of Versailles.
   (d) Basing it on his own life experiences, Diyab transmitted the story of Aladdin to Galland who included it in Arabian Nights.

8. Which of the following is the primary reason for why storytellers are still fascinated by the story of Aladdin?
   (a) The archetype of the rags-to-riches story of Aladdin makes it popular even today.
   (b) The story of Aladdin is evidence of the eighteenth century French Orientalist attitude.
   (c) The traveller's experience that inspired the tale of Aladdin resonates even today.
   (d) The tale of Aladdin documents the history of Europe and Middle East.

9. Which of the following, if true, would invalidate the inversion that the phrase "flips the script" refers to?
   (a) The description of opulence in Hanna Diyab's and Antoine Galland's narratives bore no resemblance to each other.
   (b) Galland acknowledged in the published translations of Arabian Nights that he heard the story of Aladdin from Diyab.
   (c) The French fairy tales of the eighteenth century did not have rags-to-riches plot lines like that of the tale of Aladdin.
   (d) Diyab's travelogue described the affluence of the French city of Bordeaux, instead of Versailles.

10. Which of the following does not contribute to the passage's claim about the authorship of Aladdin?
   (a) Galland's acknowledgment of Diyab in his diary.
   (b) The story-line of many French fairy tales of the 18th century.
   (c) The depiction of the affluence of Versailles in Diyab's travelogue
   (d) The narrative sensibility of Diyab's travelogue.

Answer the following questions based on the information given below.

Scientists recently discovered that Emperor Penguins—one of Antarctica's most celebrated species—employ a particularly unusual technique for surviving the daily chill. As detailed in an article published today in the journal Biology Letters, the birds minimize heat loss by keeping the outer surface of their plumage below the temperature of the surrounding air. At the same time, the penguins' thick plumage insulates their body and keeps it toasty. . . .

The researchers analyzed thermographic images . . . taken over roughly a month during June 2008. During that period, the average air temperature was 0.32 degrees Fahrenheit. At the same time, the majority of the plumage covering the penguins' bodies was even colder: the surface of their warmest body part, their feet, was an average 1.76 degrees Fahrenheit, but the plumage on their heads, chests and backs were -1.84, -7.24 and -9.76 degrees Fahrenheit respectively. Overall, nearly the entire outer surface of the penguins' bodies was below freezing at all times, except for their eyes and beaks. The scientists also used a computer simulation to determine how much heat was lost or gained from each part of the body—and discovered that by keeping their outer surface below air temperature, the birds might paradoxically be able to draw very slight amounts of heat from the air around them. The key to their trick is the difference between two different types of heat transfer: radiation and convection.

The penguins do lose internal body heat to the surrounding air through thermal radiation, just as our bodies do on a cold day. Because their bodies (but not surface plumage) are warmer than the surrounding air, heat gradually radiates outward over time, moving from a warmer material to a colder one. To maintain body temperature while losing heat, penguins, like all warm-blooded animals, rely on the metabolism of food. The penguins, though, have an additional strategy. Since their outer plumage is even colder than the air, the simulation showed that they might gain back a little of this heat through thermal convection—the transfer of heat via the movement of a fluid (in this case, the air). As the cold Antarctic air cycles around their bodies, slightly warmer air comes into contact with the plumage and donates minute amounts of heat back to the penguins, then cycles away at a slightly colder temperature.

Most of this heat, the researchers note, probably doesn't make it all the way through the plumage and back to the penguins' bodies, but it could make a slight difference. At the very least, the method by which a penguin's plumage wicks heat from the bitterly cold air that surrounds it helps to cancel out some of the heat that's radiating from its interior. And given the Emperors' unusually demanding breeding cycle, every bit of warmth counts. Since [penguins trek as far as 75 miles to the coast to breed and male penguins] don't eat anything during [the incubation period of 64 days], conserving calories by giving up as little heat as possible is absolutely crucial.

11. Which of the following best explains the purpose of the word "paradoxically" as used by the author?
(a) Heat loss through radiation happens despite the heat gain through convection.
(b) Heat gain through radiation happens despite the heat loss through convection.
(c) Keeping a part of their body colder helps penguins keep their bodies warmer.
(d) Keeping their body colder helps penguins keep their plumage warmer.

12. All of the following, if true, would negate the findings of the study reported in the passage EXCEPT:
(a) the average temperature of the feet of penguins in the month of June 2008 were found to be 2.76 degrees Fahrenheit.
(b) the average air temperature recorded during the month of June 2008 in the area of study were –10 degrees Fahrenheit.
(c) the penguins' plumage were made of a material that did not allow any heat transfer through convection or radiation.
(d) the temperature of the plumage on the penguins' heads, chests and backs were found to be 1.84, 7.24 and 9.76 degrees Fahrenheit respectively.

13. Which of the following can be responsible for Emperor Penguins losing body heat?
(a) Food metabolism
(b) Thermal convection
(c) Plumage
(d) Reproduction process

14. In the last sentence of paragraph 3, "slightly warmer air" and "at a slightly colder temperature" refer to _____AND _____respectively:

(a) the cold Antarctic air whose temperature is higher than that of the plumage AND the fall in temperature of the Antarctic air after it has transmitted some heat to the plumage.
(b) the air inside penguins' bodies kept warm because of metabolism of food AND the fall in temperature of the body air after it transfers some heat to the plumage.
(c) the cold Antarctic air which becomes warmer because of the heat radiated out from penguins' bodies AND the fall in temperature of the surrounding air after thermal convection.
(d) the air trapped in the plumage which is warmer than the Antarctic air AND the fall in temperature of the trapped plumage air after it radiates out some heat.

Answer the following questions based on the information given below.

"Free of the taint of manufacture" – that phrase, in particular, is heavily loaded with the ideology of what the Victorian socialist William Morris called the "anti-scrape", or an anticapitalist conservationism (not conservatism) that solaced itself with the vision of a preindustrial golden age. In Britain, folk may often appear a cosy, fossilised form, but when you look more closely, the idea of folk – who has the right to sing it, dance it, invoke it, collect it, belong to it or appropriate it for political or cultural ends – has always been contested territory. . . .

In our own time, though, the word "folk" . . . has achieved the rare distinction of occupying fashionable and unfashionable status simultaneously. Just as the effusive floral prints of the radical William Morris now cover genteel sofas, so the revolutionary intentions of many folk historians and revivalists have led to music that is commonly regarded as parochial and conservative. And yet – as newspaper columns periodically rejoice – folk is hip again, influencing artists, clothing and furniture designers, celebrated at music festivals, awards ceremonies and on TV, reissued on countless record labels. Folk is a sonic "shabby chic", containing elements of the uncanny and eerie, as well as an antique veneer, a whiff of Britain's heathen dark ages. The very obscurity and anonymity of folk music's origins open up space for rampant imaginative fancies. . . .

[Cecil Sharp, who wrote about this subject, believed that] folk songs existed in constant transformation, a living example of an art form in a perpetual state of renewal. "One man sings a song, and then others sing it after him, changing what they do not like" is the most concise summary of his conclusions on its origins. He compared each rendition of a ballad to an acorn falling from an oak tree; every subsequent iteration sows the song anew. But there is tension in newness. In the late 1960s, purists were suspicious of folk songs recast in rock idioms. Electrification, however, comes in many forms. For the early-20th-century composers such as Vaughan Williams and Holst, there were thunderbolts of inspiration from oriental mysticism, angular modernism and the body blow of the first world war, as well as input from the rediscovered folk tradition itself.

For the second wave of folk revivalists, such as Ewan MacColl and AL Lloyd, starting in the 40s, the vital spark was communism's dream of a post-revolutionary New Jerusalem. For their younger successors in the 60s, who thronged the folk clubs set up by the old guard, the lyrical freedom of Dylan and the unchained melodies of psychedelia created the conditions for folkrock's own golden age, a brief Indian summer that lasted from about 1969 to 1971 Four decades on, even that progressive period has become just one more era ripe for fashionable emulation and pastiche. The idea of a folk tradition being exclusively confined to oral transmission has become a much looser, less severely guarded concept. Recorded music and television, for today's metropolitan generation, are where the equivalent of folk memories are seeded. . . .

15. The primary purpose of the reference to William Morris and his floral prints is to show:
- (a) the pervasive influence of folk on contemporary art, culture, and fashion.
- (b) that what was once derided as genteel is now considered revolutionary.
- (c) that despite its archaic origins, folk continues to remain a popular tradition.
- (d) that what is once regarded as radical in folk, can later be seen as conformist.

16. Which of the following statements about folk revivalism of the 1940s and 1960s cannot be inferred from the passage?
- (a) Freedom and rebellion were popular themes during the second wave of folk revivalism
- (b) It reinforced Cecil Sharp's observation about folk's constant transformation.
- (c) Electrification of music would not have happened without the influence of rock music.
- (d) Even though it led to folk-rock's golden age, it wasn't entirely free from critique.

17. The author says that folk "may often appear a cosy, fossilised form" because:
- (a) it has been arrogated for various political and cultural purposes.
- (b) the notion of folk has led to several debates and disagreements.
- (c) of its nostalgic association with a pre-industrial past.
- (d) folk is a sonic "shabby chic" with an antique veneer.

18. All of the following are causes for plurality and diversity within the British folk tradition EXCEPT:
- (a) the fluidity of folk forms owing to their history of oral mode of transmission.
- (b) paradoxically, folk forms are both popular and unpopular.

(c) that British folk continues to have traces of pagan influence from the dark ages.
(d) that British folk forms can be traced to the remote past of the country.

19. At a conference on folk forms, the author of the passage is least likely to agree with which one of the following views?
(a) Folk forms, in their ability to constantly adapt to the changing world, exhibit an unusual poise and homogeneity with each change.
(b) The plurality and democratising impulse of folk forms emanate from the improvisation that its practitioners bring to it.
(c) Folk forms, despite their archaic origins, remain intellectually relevant in contemporary times.
(d) The power of folk resides in its contradictory ability to influence and be influenced by the present while remaining rooted in the past.

Answer the following questions based on the information given below.

As defined by the geographer Yi-Fu Tuan, topophilia is the affective bond between people and place. His 1974 book set forth a wideranging exploration of how the emotive ties with the material environment vary greatly from person to person and in intensity, subtlety, and mode of expression. Factors influencing one's depth of response to the environment include cultural background, gender, race, and historical circumstance, and Tuan also argued that there is a biological and sensory element. Topophilia might not be the strongest of human emotions— indeed, many people feel utterly indifferent toward the environments that shape their lives— but when activated it has the power to elevate a place to become the carrier of emotionally charged events or to be perceived as a symbol.

Aesthetic appreciation is one way in which people respond to the environment. A brilliantly colored rainbow after gloomy afternoon showers, a busy city street alive with human interaction—one might experience the beauty of such landscapes that had seemed quite ordinary only moments before or that are being newly discovered. This is quite the opposite of a second topophilic bond, namely that of the acquired taste for certain landscapes and places that one knows well. When a place is home, or when a space has become the locus of memories or the means of gaining a livelihood, it frequently evokes a deeper set of attachments than those predicated purely on the visual. A third response to the environment also depends on the human senses but may be tactile and olfactory, namely a delight in the feel and smell of air, water, and the earth.

Topophilia—and its very close conceptual twin, sense of place—is an experience that, however elusive, has inspired recent architects and planners. Most notably, new urbanism seeks to counter the perceived placelessness of modern suburbs and the decline of central cities through neo-traditional design motifs. Although motivated by good intentions, such attempts to create places rich in meaning are perhaps bound to disappoint. As Tuan noted, purely aesthetic responses often are suddenly revealed, but their intensity rarely is longlasting. Topophilia is difficult to design for and impossible to quantify, and its most articulate interpreters have been self-reflective philosophers such as Henry David Thoreau, evoking a marvelously intricate sense of place at Walden Pond, and Tuan, describing his deep affinity for the desert.

Topophilia connotes a positive relationship, but it often is useful to explore the darker affiliations between people and place. Patriotism, literally meaning the love of one's terra patria or homeland, has long been cultivated by governing elites for a range of nationalist projects, including war preparation and ethnic cleansing. Residents of upscale residential developments have disclosed how important it is to maintain their community's distinct identity, often by casting themselves in a superior social position and by reinforcing class and racial differences. And just as a beloved landscape is suddenly revealed, so too may landscapes of fear cast a dark shadow over a place that makes one feel a sense of dread or anxiety—or topophobia.

20. Which one of the following comes closest in meaning to the author's understanding of topophilia?
(a) Nomadic societies are known to have the least affinity for the lands through which they traverse because they tend to be topophobic.
(b) The tendency of many cultures to represent their land as "motherland" or "fatherland" may be seen as an expression of their topophilia
(c) The French are not overly patriotic, but they will refuse to use English as far as possible, even when they know it well.

(d) Scientists have found that most creatures, including humans, are either born with or cultivate a strong sense of topography.

21. In the last paragraph, the author uses the example of "Residents of upscale residential developments" to illustrate the:
(a) manner in which environments are designed to minimise the social exclusion of their clientele.
(b) social exclusivism practised by such residents in order to enforce a sense of racial or class superiority.
(c) sensitive response to race and class problems in upscale residential developments
(d) introduction of nationalist projects by such elites to produce a sense of dread or topophobia.

22. Which of the following statements, if true, could be seen as not contradicting the arguments in the passage?
(a) New Urbanism succeeded in those designs where architects collaborated with their clients.
(b) Generally speaking, in a given culture, the ties of the people to their environment vary little in significance or intensity.
(c) The most important, even fundamental, response to our environment is our tactile and olfactory response.
(d) Patriotism, usually seen as a positive feeling, is presented by the author as a darker form of topophilia.

23. The word "topophobia" in the passage is used:
(a) to represent a feeling of dread towards particular spaces and places.
(b) to signify feelings of fear or anxiety towards topophilic people.
(c) to signify the fear of studying the complex discipline of topography.
(d) as a metaphor expressing the failure of the homeland to accommodate non-citizens.

24. Which one of the following best captures the meaning of the statement, "Topophilia is difficult to design for and impossible to quantify . . ."?
(a) Architects have to objectively quantify spaces and hence cannot be topophilic.
(b) The deep anomie of modern urbanisation led to new urbanism's intricate sense of place.
(c) Philosopher-architects are uniquely suited to develop topophilic design.
(d) People's responses to their environment are usually subjective and so cannot be rendered in design.

25. The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage. Vance Packard's The Hidden Persuaders alerted the public to the psychoanalytical techniques used by the advertising industry. Its premise was that advertising agencies were using depth interviews to identify hidden consumer motivations, which were then used to entice consumers to buy goods Critics and reporters often wrongly assumed that Packard was writing mainly about subliminal advertising. Packard never mentioned the word subliminal, however, and devoted very little space to discussions of "subthreshold" effects. Instead, his views largely aligned with the notion that individuals do not always have access to their conscious thoughts and can be persuaded by supraliminal messages without their knowledge.

(a) Packard held that advertising as a 'hidden persuasion' understands the hidden motivations of consumers and works at the supraliminal level, though the people targeted have no awareness of being persuaded.
(b) Packard argued that advertising as a 'hidden persuasion' understands the hidden motivations of consumers and works at the subliminal level, on the subconscious level of the awareness of the people targeted.
(c) Packard argued that advertising as a 'hidden persuasion' works at the supraliminal level, wherein the people targeted are aware of being persuaded, after understanding the hidden motivations of consumers and works.
(d) Packard held that advertising as a 'hidden persuasion' builds on peoples' conscious thoughts and awareness, by understanding the hidden motivations of consumers and works at the subliminal level.

26. The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage. A distinguishing feature of language is our ability to refer to absent things, known as displaced reference. A speaker can bring distant referents to mind in the absence of any obvious stimuli. Thoughts, not limited to the here and now, can pop into our heads for unfathomable reasons. This ability to think about distant things necessarily precedes the ability to talk about them. Thought precedes meaningful referential communication. A prerequisite for the emergence of human-like meaningful symbols is that the mental categories they relate to can be invoked even in the absence o immediate stimuli.

(a) Thoughts precede all speech acts and these thoughts pop up in our heads even in the absence of any stimulus.
(b) Thoughts are essential to communication and only humans have the ability to think about objects not present in their surroundings.
(c) The ability to think about objects not present in our environment precedes the development of human communication.
(d) Displaced reference is particular to humans and thoughts pop into our heads for no real reason.

27. Five sentences related to a topic are given below. Four of them can be put together to form a meaningful and coherent short paragraph
Identify the odd one out. Choose its number as your answer and key it in.
1. One argument is that actors that do not fit within a single, well-defined category may suffer an "illegitimacy discount".
2. Others believe that complex identities confuse audiences about an organization's role or purpose.
3. Some organizations have complex and multidimensional identities that span or combine categories, while other organizations posses narrow identities.
4. Identity is one of the most important features of organizations, but there exist opposing views among sociologists about how identity affects organizational performance.
5. Those who think that complex identities are beneficial point to the strategic advantages of ambiguity, and organizations' potential to differentiate themselves from competitors.

28. The four sentences (labelled 1, 2, 3, and 4) given in this question, when properly sequenced, form a coherent paragraph. Decide on the proper order for the sentences and key in this sequence of four numbers as your answer.
1. We'll all live under mob rule until then, which doesn't help anyone.
2. Perhaps we need to learn to condense the feedback we receive online so that 100 replies carry the same weight as just one.
3. As we grow more comfortable with social media conversations being part of the way we interact every day, we are going to have to learn how to deal with legitimate criticism.
4. A new norm will arise where it is considered unacceptable to reply with the same point that dozens of others have already.

29. The four sentences (labelled 1, 2, 3, and 4) given in this question, when properly sequenced, form a coherent paragraph. Decide on the proper order for the sentences and key in this sequence of four numbers as your answer.
1. Metaphors may map to similar meanings across languages, but their subtle differences can have a profound effect on our understanding of the world.
2. Latin scholars point out carpe diem is a horticultural metaphor that, particularly seen in the context of its source, is more accurately translated as "plucking the day," evoking the plucking and gathering of ripening fruits or flowers, enjoying a moment that is rooted in the sensory experience of nature, unrelated to the force implied in seizing.
3. The phrase carpe diem, which is often translated as "seize the day and its accompanying philosophy, has gone on to inspire countless people in how they live their lives and motivates us to see the world a little differently from the norm
4. It's an example of one of the more telling ways that we mistranslate metaphors from one language to another, revealing in the process our hidden assumptions about what we really value.

30. Five sentences related to a topic are given below. Four of them can be put together to form a meaningful and coherent short paragraph Identify the odd one out. Choose its number as your answer and key it in.
1. His idea to use sign language was not a completely new idea as Native Americans used hand gestures to communicate with other tribes.
2. Ancient Greek philosopher Aristotle, for example, observed that men who are deaf are incapable of speech.
3. People who were born deaf were denied the right to sign a will as they were "presumed to understand nothing; because it is no possible that they have been able to learn to read or write."
4. Pushback against this prejudice began in the 16th century when Pedro Ponce de León created a formal sign language for the hearing impaired.
5. For millennia, people with hearing impairments encountered marginalization because it was believed that language could only be learned by hearing the spoken word.

31. The four sentences (labelled 1, 2, 3, and 4) given in this question, when properly sequenced, form a coherent paragraph. Decide on the proper order for

the sentences and key in this sequence of four numbers as your answer.

1. If you've seen a little line of text on websites that says something like "customers who bought this also enjoyed that" you have experienced this collaborative filtering firsthand.
2. The problem with these algorithms is that they don't take into account a host of nuances and circumstances that might interfere with their accuracy.
3. If you just bought a gardening book for your cousin, you might get a flurry of links to books about gardening, recommended just for you! – the algorithm has no way of knowing you hate gardening and only bought the book as a gift.
4. Collaborative filtering is a mathematical algorithm by which correlations and cooccurrences of behaviors are tracked and then used to make recommendations.

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

Physics is a pure science that seeks to understand the behavior of matter without regard to whether it will afford any practical benefit. Engineering i the correlative applied science in which physical theories are put to some specific use, such as building a bridge or a nuclear reactor. Engineer obviously rely heavily on the discoveries of physicists, but an engineer's knowledge of the world is not the same as the physicist's knowledge. In fact an engineer's know-how will often depend on physical theories that, from the point of view of pure physics, are false. There are some reasons for this First, theories that are false in the purest and strictest sense are still sometimes very good approximations to the true ones, and often have the added virtue of being much easier to work with. Second, sometimes the true theories apply only under highly idealized conditions which can only be created under controlled experimental situations. The engineer finds that in the real world, theories rejected by physicists yield more accurate predictions than the ones that they accept

(a) The relationship between pure and applied science is strictly linear, with the pure science directing applied science, and never the other way round.
(b) Though engineering draws heavily from pure science, it contributes to knowledge, by incorporating the constraints and conditions in the real world.
(c) The unique task of the engineer is to identify, understand, and interpret the design constraints to produce a successful result.
(d) Engineering and physics fundamentally differ on matters like building a bridge or a nuclear reactor.

33. The four sentences (labelled 1, 2, 3, and 4) given in this question, when properly sequenced, form a coherent paragraph. Decide on the proper order for the sentences and key in this sequence of four numbers as your answer.

1. People with dyslexia have difficulty with print-reading, and people with autism spectrum disorder have difficulty with mind-reading.
2. An example of a lost cognitive instinct is mind-reading: our capacity to think of ourselves and others as having beliefs, desires, thought and feelings.
3. Mind-reading looks increasingly like literacy, a skill we know for sure is not in our genes, since scripts have been around for only 5,000 6,000 years.
4. Print-reading, like mind-reading varies across cultures, depends heavily on certain parts of the brain, and is subject to developmenta disorders.

34. The four sentences (labelled 1, 2, 3, and 4) given in this question, when properly sequenced, form a coherent paragraph. Decide on the proper order for the sentences and key in this sequence of four numbers as your answer.

1. Stat' signaled something measurable, while 'matic' advertised free labour; but 'tron', above all, indicated control.
2. It was a totem of high modernism, the intellectual and cultural mode that decreed no process or phenomenon was too complex to be grasped, managed andoptimized.
3. Like the heraldic shields of ancient knights, these morphemes were painted onto the names of scientific technologies to proclaim one' history and achievements tofriends and enemies alike.
4. The historian Robert Proctor at Stanford University calls the suffix '-tron', along with '-matic' and '-stat', embodied symbols.
5. To gain the suffix was to acquire a proud and optimistic emblem of the electronic and atomic age.

DATA INTERPRETATION AND LOGICAL REASONING

Answer the following question based on the information given below.
A supermarket has to place 12 items (coded A to L) in shelves numbered 1 to 16. Five of these items are types of biscuits, three are types of candies and the rest are types of savouries. Only one item can be kept in a shelf. Items are to be placed such that all items of same type are clustered together with no empty shelf between items of the same type and at least one empty shelf between two different types of items. At most two empty shelves can have consecutive numbers.

The following additional facts are known.
1. A and B are to be placed in consecutively numbered shelves in increasing order.
2. I and J are to be placed in consecutively numbered shelves both higher numbered than the shelves in which A and B are kept.
3. D, E and F are savouries and are to be placed in consecutively numbered shelves in increasing order after all the biscuits and candies.
4. K is to be placed in shelf number 16.
5. L and J are items of the same type, while H is an item of a different type.
6. C is a candy and is to be placed in a shelf preceded by two empty shelves.
7. L is to be placed in a shelf preceded by exactly one empty shelf.

35. In how many different ways can the items be arranged on the shelves?
(a) 1 (b) 8
(c) 2 (d) 4

36. Which of the following items is not a type of biscuit?
(a) A (b) B
(c) L (d) G

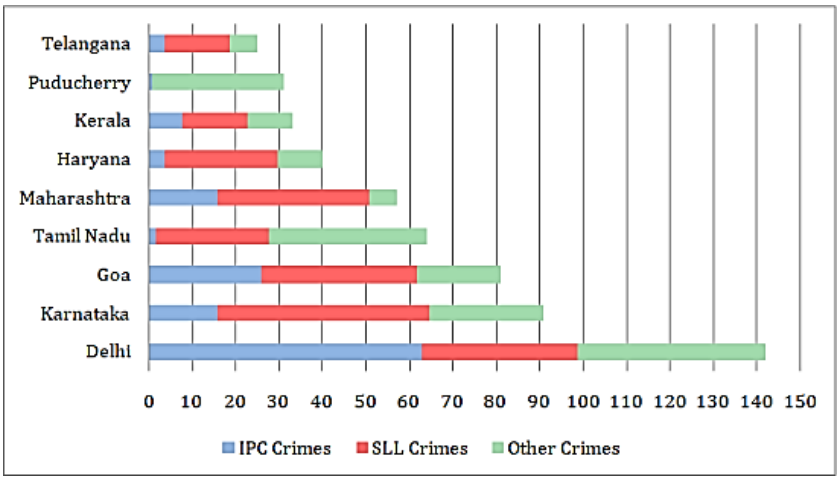
37. Which of the following can represent the numbers of the empty shelves in a possible arrangement?
(a) 1,2,8,12 (b) 1,7,11,12
(c) 1,5,6,12 (d) 1,2,6,12

38. Which of the following statements is necessarily true?
(a) There are at least four shelves between items B and C.
(b) There are two empty shelves between the biscuits and the candies.
(c) All biscuits are kept before candies.
(d) All candies are kept before biscuits.

Answer the following question based on the information given below.

The Ministry of Home Affairs is analysing crimes committed by foreigners in different states and union territories (UT) of India. All cases refer to the ones registered against foreigners in 2016.

The number of cases – classified into three categories: IPC crimes, SLL crimes and other crimes – for nine states/UTs are shown in the figure below. These nine belong to the top ten states/UTs in terms of the total number of cases registered. The remaining state (among top ten) is West Bengal, where all the 520 cases registered were SLL crimes.



The table below shows the ranks of the ten states/UTs mentioned above among ALL states/UTs of India in terms of the number of cases registered in each of the three category of crimes. A state/UT is given rank r for a category of crimes if there are (r−1) states/UTs having a larger number of cases registered in that category of crimes. For example, if two states have the same number of cases in a category, and exactly three other states/UTs have larger numbers of cases registered in the same category, then both the states are given rank 4 in that category. Missing ranks in the table are denoted by *.

	IPC Crimes	SLL Crimes	Other Crimes
Delhi	*	*	*
Goa	*	4	*
Haryana	8	6	*
Karnataka	3	2	*
Kerala	*	9	*
Maharashtra	3	4	8
Puducherry	13	29	*
Tamil Nadu	11	7	*
Telangana	6	9	8
West Bengal	17	*	16

39. What is the rank of Kerala in the 'IPC crimes' category?
(a) 5 (b) 4
(c) 3 (d) 2

40. In the two states where the highest total number of cases are registered, the ratio of the total number of cases in IPC crimes to the total number in SL crimes is closest to ?
(a) 19 : 20 (b) 11 : 10
(c) 1 : 9 (d) 3 : 2

41. Which of the following is DEFINITELY true about the ranks of states/UT in the 'other crimes' category?
i. Tamil Nadu: 2
ii. Puducherry: 3
(a) neither i , nor ii (b) only ii
(c) only I (d) both i and ii

42. What is the sum of the ranks of Delhi in the three categories of crimes?
(a) 5 (b) 4
(c) 3 (d) 2

Answer the following question based on the information given below.

	Round - 1	Round – 2	Round – 3	Round – 4	Round – 5	Round – 6
Tanzi	-	4	-	5	NP	NP
Umeza	-	-	-	1	2	NP
Wangdu	-	4	-	NP	NP	NP
Xyla	-	-	-	1	5	-
Yonita	-	-	3	5	NP	NP
Zeneca	-	-	-	5	5	NP

Six players – Tanzi, Umeza, Wangdu, Xyla, Yonita and Zeneca competed in an archery tournament. The tournament had three compulsory rounds, Rounds 1 to 3. In each round every player shot an arrow at a target. Hitting the centre of the target (called bull's eye) fetched the highest score of 5. The only other possible scores that a player could achieve were 4, 3, 2 and 1. Every bull's eye score in the first three rounds gave a player one additional chance to shoot in the bonus rounds, Rounds 4 to 6. The possible scores in Rounds 4 to 6 were identical to the first three. A player's total score in the tournament was the sum of his/her scores in all rounds played by him/her. The table below presents partial information on points scored by the players after completion of the tournament. In the table, NP means that the player did not participate in that round, while a hyphen means that the player participated in that round and the score information is missing.

The following facts are also known.
1. Tanzi, Umeza and Yonita had the same total score.

2. Total scores for all players, except one, were in multiples of three.
3. The highest total score was one more than double of the lowest total score.
4. The number of players hitting bull's eye in Round 2 was double of that in Round 3.
5. Tanzi and Zeneca had the same score in Round 1 but different scores in Round 3.

43. What was the highest total score?
(a) 23 (b) 21
(c) 24 (d) 25

44. What was Zeneca's total score?
(a) 23 (b) 22
(c) 21 (d) 24

45. Which of the following statements is true?
(a) Xyla was the highest scorer.
(b) Zeneca's score was 23.
(c) Zeneca was the highest scorer.
(d) Xyla's score was 23.

46. What was Tanzi's score in Round 3?
(a) 1 (b) 5
(c) 3 (d) 4

Answer the following question based on the information given below.

A new game show on TV has 100 boxes numbered 1, 2, . . . , 100 in a row, each containing a mystery prize. The prizes are items of different types, a, b, c, . . . , in decreasing order of value. The most expensive item is of type a, a diamond ring, and there is exactly one of these. You are told that the number of items at least doubles as you move to the next type. For example, there would be at least twice as many items of type b as of type a, at least twice as many items of type c as of type b and so on. There is no particular order in which the prizes are placed in the boxes.

47. What is the minimum possible number of different types of prizes?
(a) 5 (b) 2
(c) 3 (d) 1

48. What is the maximum possible number of different types of prizes?
(a) 6 (b) 2
(c) 3 (d) 1

49. Which of the following is not possible?
(a) There are exactly 30 items of type b.
(b) There are exactly 75 items of type e.
(c) There are exactly 60 items of type d.
(d) There are exactly 45 items of type c.

50. You ask for the type of item in box 45. Instead of being given a direct answer, you are told that there are 31 items of the same type as box 45 in boxe 1 to 44 and 43 items of the same type as box 45 in boxes 46 to 100.

What is the maximum possible number of different types of items?

(a) 5 (b) 3
(c) 6 (d) 4

Answer the following question based on the information given below.
The following table represents addition of two six-digit numbers given in the first and the second rows, while the sum is given in the third row. In the representation, each of the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 has been coded with one letter among A, B, C, D, E, F, G, H, J, K, with distinct letters representing distinct digits.

		B	H	A	A	G	F
+		A	H	J	F	K	F
	A	A	F	G	C	A	F

51. Which digit does the letter A represent?

52. Which digit does the letter B represent?

53. Which among the digits 3, 4, 6 and 7 cannot be represented by the letter D?
(a) 6 (b) 2
(c) 3 (d) 7

54. Which among the digits 4, 6, 7 and 8 cannot be represented by the letter G?

(a) 6 (b) 2
(c) 3 (d) 1

Answer the following question based on the information given below.
Princess, Queen, Rani and Samragni were the four finalists in a dance competition. Ashman, Badal, Gagan and Dyu were the four music composers who individually assigned items to the dancers. Each dancer had to individually perform in two dance items assigned by the different composers. The first items performed by the four dancers were all assigned by different music composers. No dancer performed her second item before the performance of the first item by any other dancers. The dancers performed their second items in the same sequence of their performance of their first items.

The following additional facts are known.i) No composer who assigned item to Princess, assigned any item to Queen.
ii) No composer who assigned item to Rani, assigned any item to Samragni.
iii) The first performance was by Princess; this item was assigned by Badal.
iv) The last performance was by Rani; this item was assigned by Gagan.
v) The items assigned by Ashman were performed consecutively. The number of performances between items assigned by each of the remaining composers was the same.

55. Which of the following is true?
(a) The second performance was composed by Gagan.
(b) The third performance was composed by Ashman.
(c) The second performance was composed by Dyu.
(d) The third performance was composed by Dyu.

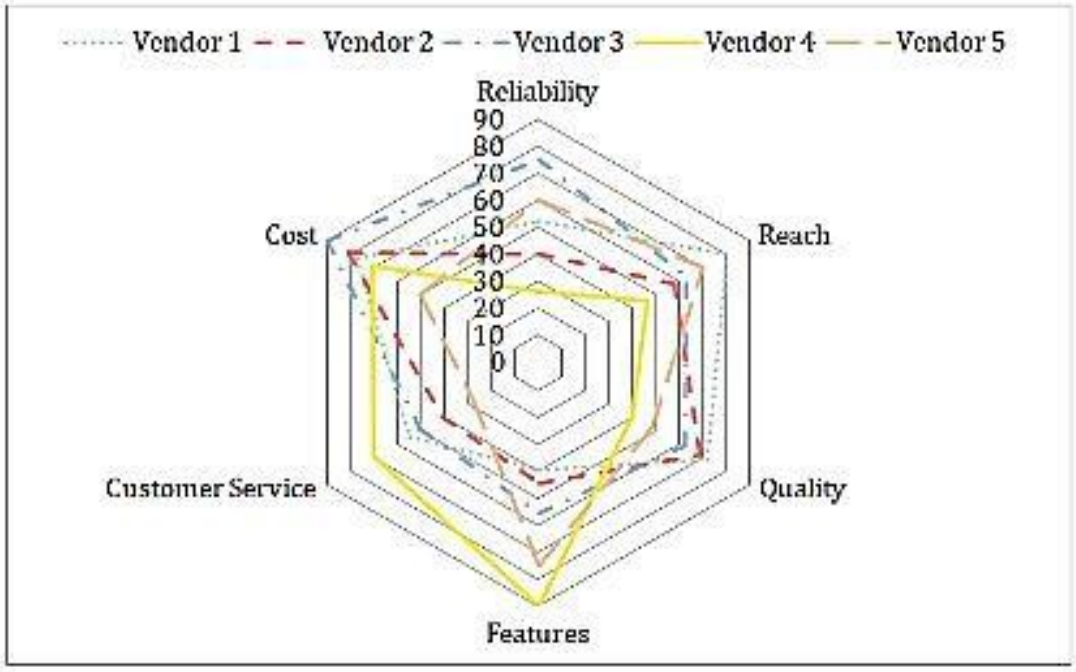
56. Which of the following is FALSE?
(a) Rani did not perform in any item composed by Badal.
(b) Princess did not perform in any item composed by Dyu.
(c) Samragni did not perform in any item composed by Ashman.
(d) Queen did not perform in any item composed by Gagan

57. The sixth performance was composed by
(a) Dyu (b) Gagan
(c) Ashman (d) Badal

58. Which pair of performances were composed by the same composer?
(a) The second and the sixth
(b) The third and the seventh
(c) The first and the seventh
(d) The first and the sixth

Answer the following question based on the information given below.

Five vendors are being considered for a service. The evaluation committee evaluated each vendor on six aspects – Cost, Customer Service, Features, Quality, Reach, and Reliability. Each of these evaluations are on a scale of 0 (worst) to 100 (perfect). The evaluation scores on these aspects are shown in the radar chart. For example, Vendor 1 obtains a score of 52 on Reliability, Vendor 2 obtains a score of 45 on Features and Vendor 3 obtains a score of 90 on Cost.



59. On which aspect is the median score of the five vendors the least?
(a) Cost
(b) Customer Service
(c) Reliability
(d) Quality

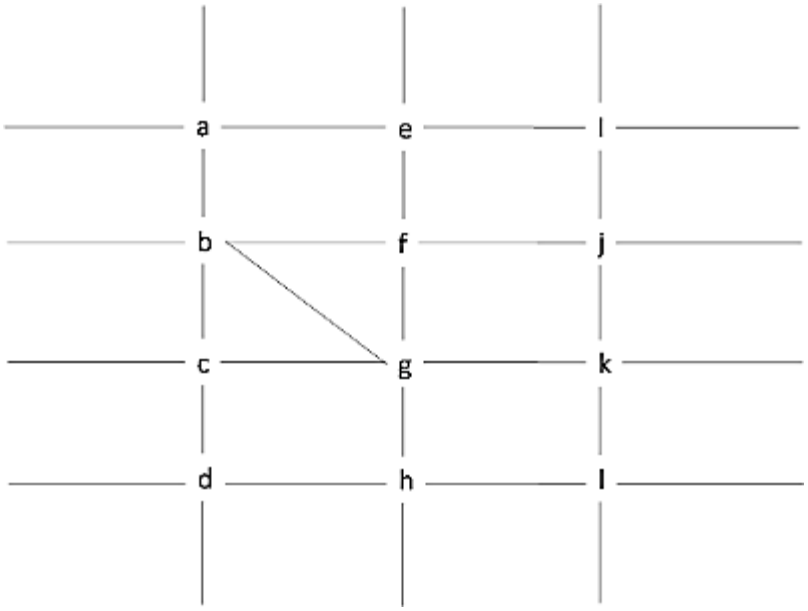
60. A vendor's final score is the average of their scores on all six aspects. Which vendor has the highest final score?
(a) Vendor 1
(b) Vendor 4
(c) Vendor 2
(d) Vendor 3

61. List of all the vendors who are among the top two scorers on the maximum number of aspects is:
(a) Vendor 1 and Vendor 2
(b) Vendor 1 and Vendor 5
(c) Vendor 2, Vendor 3 and Vendor 4
(d) Vendor 2 and Vendor 5

62. List of all the vendors who are among the top three vendors on all six aspects is:
(a) Vendor 1 and Vendor 3
(b) None of the Vendors
(c) Vendor 1
(d) Vendor 3

Answer the following question based on the information given below.

The figure below shows the street map for a certain region with the street intersections marked from a through l. A person standing at an intersection can see along straight lines to other intersections that are in her line of sight and all other people standing at these intersections. For example, a person standing at intersection g can see all people standing at intersections b, c, e, f, h, and k. In particular, the person standing at intersection g can see the person standing at intersection e irrespective of whether there is a person standing at intersection f.



Six people U, V, W, X, Y, and Z, are standing at different intersections. No two people are standing at the same intersection. The following additional facts are known.

1. X, U, and Z are standing at the three corners of a triangle formed by three street segments.
2. X can see only U and Z.
3. Y can see only U and W.
4. U sees V standing in the next intersection behind Z.
5. W cannot see V or Z.
6. No one among the six is standing at intersection d.

63. Who is standing at intersection a?
(a) No one (b) W
(c) Y (d) V

64. Who can V see?
(a) Z only (b) U only
(c) U and Z only (d) U, W and Z only

65. What is the minimum number of street segments that X must cross to reach Y?
(a) 2 (b) 3
(c) 1 (d) 4

66. Should a new person stand at intersection d, who among the six would she see?
(a) V and X only (b) W and X only
(c) U and Z only (d) U and W only.

67. Corners are cut off from an equilateral triangle T to produce a regular hexagon H. Then, the ratio of the area of H to the area of T is
(a) 5:6 (b) 4:5
(c) 3:4 (d) 2:3

68. With rectangular axes of coordinates, the number of paths from (1, 1) to (8, 10) via (4, 6), where each step from any point (x, y) is either to (x, y + 1) or to (x + 1,y),is

69. If the rectangular faces of a brick have their diagonals in the ratio $3 : 2\sqrt{3} : \sqrt{15}$, then the ratio of the length of the shortest edge of the brick to that of its longest edge is?
(a) $\sqrt{3}:2$ (b) $2:\sqrt{5}$
(c) 1:3 (d) $\sqrt{2}:\sqrt{3}$

70. If m and n are integers such that $(\sqrt{2})^{19}3^4 4^2 9^m 8^n = 3^n 16^m (64)^{1/4}$,then m is
(a) -16 (b) -12
(c) -24 (d) -20

71. A chemist mixes two liquids 1 and 2. One litre of liquid 1 weighs 1 kg and one litre of liquid 2 weighs 800 gm. If half litre of the mixture weighs 480 gm, then the percentage of liquid 1 in the mixture, in terms of volume, is
(a) 70 (b) 85
(c) 80 (d) 75

72. Let S be the set of all points (x, y) in the x-y plane such that |x|] + |y| ≤ 2 and |x| ≥ 1. Then, the area, in square units, of the region represented by S equals

73. In a circle of radius 11 cm, CD is a diameter and AB is a chord of length 20.5 cm. If AB and CD intersect at a point E inside the circle and CE has length 7 cm, then the difference of the lengths of BE and AE, in cm, is
(a) 05 (b) 25
(c) 35 (d) 15

74. Let T be the triangle formed by the straight line 3x + 5y — 45 = 0 and the coordinate axes. Let the circumcircle of T have radius of length L, measured in the same unit as the coordinate axes. Then, the integer closest to L is

Two cars travel the same distance starting at 10:00 am and 11:00 am, respectively, on the same day. They reach their common destination at the same point of time. If the first car travelled for at least 6 hours, then the highest possible value of the percentage by which the speed of the second car could exceed that of the first car is
(a) 25 (b) 10
(c) 30 (d) 20

75. One can use three different transports which move at 10, 20, and 30 kmph, respectively. To reach from A to B, Amal took each mode of transport for 1/3 of his total journey time, while Bimal took each mode of transport for 1/3 of the total distance. The percentage by which Bimal's travel time exceeds Amal's travel time is nearest to
(a) 22 (b) 21
(c) 20 (d) 19

76. At their usual efficiency levels, A and B together finish a task in 12 days. If A had worked half as efficiently as she usually does, and B had worked thrice as efficiently as he usually does, the task would have been completed in 9 days. How many days would A take to finish the task if she works alone at her usual efficiency?
(a) 36 (b) 24
(c) 12 (d) 18

77. If $a_1 + a_2 +, a_3 +, \ldots\ldots a_n = 3(2^{n+1} - 2)$,, for every n ≥1, then a_{11} equals

78. The product of two positive numbers is 616. If the ratio of the difference of their cubes to the cube of their difference is 157 : 3, then the sum of the two numbers is
(a) 58 (b) 85
(c) 50 (d) 95

79. Meena scores 40% in an examination and after review, even though her score is increased by 50%, she fails by 35 marks. If her post-review score is increased by 20%, she will have 7 marks more than the passing score. The percentage score needed for passing the examination is
(a) 60 (b) 80
(c) 70 (d) 75

80. The number of solutions to the equation $|x|(6x^2 + 1) = 5x^2 is$

81. Three men and eight machines can finish a job in half the time taken by three machines and eight men to finish the same job. If two machines can finish the job in 13 days, then how many men can finish the job in 13 days?

82. Ramesh and Gautam are among 22 students who write an examination. Ramesh scores 82.5. The average score of the 21 students other than Gautam is 62. The average score of all the 22 students is one more than the average score of the 21 students other than Ramesh. The score of Gautam is

(a) 53 (b) 51
(c) 49 (d) 48

83. The income of Amala is 20% more than that of Bimala and 20% less than that of Kamala. If Kamala's income goes down by 4% and Bimala's goes up by 10%, then the percentage by which Kamala's income would exceed Bimala's is nearest to
(a) 31 (b) 29
(c) 28 (d) 32

84. For any positive integer n, let f(n) = n(n + 1) if nis even, and f(n) = n + 3 if nis odd. If m is a positive integer such that 8 f(m + 1) — f(m) = 2, then m equals

85. In a race of three horses, the first beat the second by 11 metres and the third by 90 metres. If the second beat the third by 80 metres, what was the length, in metres, of the racecourse?

86. If the population of a town is p in the beginning of any year then it becomes 3 + 2p in the beginning of the next year. If the population in the beginning of 2019 is 1000, then the population in the beginning of 2034 will be
(a) $(1003)^{15} + 6$ (b) $(997)^{15} - 3$
(c) $(1003)2^{15} - 3$ (d) $(997)2^{14} + 3$

87. On selling a pen at 5% loss and a book at 15% gain, Karim gains Rs. 7. If he sells the pen at 5% gain and the book at 10% gain, he gains Rs. 13. What is the cost price of the book in Rupees?
(a) 95 (b) 85
(c) 100 (d) 80

88. In a class, 60% of the students are girls and the rest are boys. There are 30 more girls than boys. If 68% of the students, including 30 boys, pass an examination, the percentage of the girls who do not pass is

89. If a_1, a_2 ...are in A.P., then $\frac{1}{\sqrt{a_1}+\sqrt{a_2}} + \frac{1}{\sqrt{a_2}+\sqrt{a_3}} + \cdots + \frac{1}{\sqrt{a_n}+\sqrt{a_{n+1}}}$ is equal to
(a) $\frac{N}{\sqrt{a_1}+\sqrt{a_{N+1}}}$ (b) $\frac{n}{\sqrt{a_1}+\sqrt{a_{n+1}}}$
(c) $\frac{n-1}{\sqrt{a_1}+\sqrt{a_{n-1}}}$ (d) $\frac{n-1}{\sqrt{a_1}+\sqrt{a_n}}$

90. The wheels of bicycles A and B have radii 30 cm and 40 cm, respectively. While traveling a certain distance, each wheel of A required 5000 more revolutions than each wheel of B. If bicycle B traveled this distance in 45 minutes, then its speed, in km per hour, was
(a) 14m (b) 181
(c) 16m (d) 12m

91. The product of the distinct roots of $|x^2=x — 6| = x + 2$ is
(a) -16 (b) 4
(c) -8 (d) -24

92. AB is a diameter of a circle of radius 5 cm. Let P and Q be two points on the circle so that the length of PB is 6 cm, and the length of AP is twice that of AQ. Then the length, in cm, of QB is nearest to
(a) 7.8 (b) 8.5
(c) 9.3 (d) 9.1

93. Amala, Bina, and Gouri invest money in the ratio 3:4 : 5 in fixed deposits having respective annual interest rates in the ratio 6 : 5 : 4. What is their total interest income (in Rs) after a year, if Bina's interest income exceeds Amala's by Rs 250?
(a) 7000 (b) 7250
(c) 6350 (d0 6000

94. A person invested a total amount of Rs 15 lakh. A part of it was invested in a fixed deposit earning 6% annual interest, and the remaining amount was invested in two other deposits in the ratio 2 : 1, earning annual interest at the rates of 4% and 3%, respectively. If the total annual interest income is Rs 76,000 then the amount (in Rs lakh) invested in the fixed deposit was

95. A club has 256 members of whom 144 can play football, 123 can play tennis, and 132 can play cricket. Moreover, 58 members can play both football and tennis, 25 can play both cricket and tennis, while 63 can play both football and cricket. If every member can play at least one game, then the number of members who can play only tennis is
(a) 45 (b) 43
(c) 32 (d) 38

96. Let x and y be positive real numbers such that $\log_5(x + y) + \log_5(x - y) = 3$, and $\log_2 y - \log_2 x = 1 - \log_2 3$. Then xy equals
(a) 250 (b) 150
(c) 100 (d) 25

97. If $5.55^x = 0.555^y = 1000$, then the value of (1/x) — (1/y) is
(a) 1/3 (b) 2/3
(c) 3 (d) 1

98. Consider a function f satisfying f(x + y) = f(x) f(y) where x, y are positive integers and f(1) = 2. If f(a + 1) f(a + 2) +...+ f(a + n) = $16(2^n - 1)$ then a is equal to

99. The number of the real roots of the equation $2\cos(x(x + 1)) = 2^x + 2^{-x}$ is:
(a) 0 (b) 2
(c) infinite (d) 1

ANSWER KEY AND EXPLANATIONS

VERBAL ABILITY AND READING COMPREHENSION

1. **(b)** In the passage we can see that the author mentions that currently there is a rat race where consumers are spoilt for choice. In a situation like this, start-ups which offer fewer products will eventually be the ones to capture the majority of the market by indulging in product extension. Options 1 and 4 are out of context in regards to the passage. Option 3 while being in the correct zone does not talk about the end result of the start-ups and hence is incomplete.
   Hence, the correct answer is option 2.
2. **(c)** Our understanding from the passage is that the more the number of products, more confusion is created in the minds of the consumers. Hence 2 and 4 cannot be the answers because it's clearly inferred from the passage. Nowhere in the passage does the author talks about the preference of consumers towards start-ups or well established brands.
   Hence, the correct answer is option 3.
3. **(d)** Option 1 is completely irrelevant to the passage and the question asked. The entire premise of the start-ups according to the author is that they will have to increase their product offering due to some issues. Option 3 is aligning with the author's point of view and hence cannot be the answer. Option 2 is too specific and hence cannot be the answer.
   Hence, the correct answer is option 4.
4. **(a)** The author gives examples of certain companies which offer lesser product options, but these cater to only the elite group. He mentions the need of having products that cater to the lower income groups. So we are looking at an option that has few product offerings and is low on cost.
   Hence, the correct answer is option 1.
5. **(c)** We need to look for an option that is aligning with the author's viewpoint. Option 2 is incorrect since it's exactly the opposite to what the author is trying to portray in the passage. Option 4 is incorrect since its showing higher product options as a good thing, again going against the claim of the author. The author has mentioned that Instagram influencers have a big role to play in product selection, and Option 1 contradicts this.
   Hence, the correct answer is option 3.
6. **(c)** The passage highlights the humble beginnings of Diyab and the ups and downs that he faced in his life. It also mentions towards the end, his understanding of the Paris culture. All the above traits can relate to the characteristics of Aladdin. Hence Option 1,2 and 4 are incorrect. Option 3 is correct since only because the story was narrated to Galland we cannot derive any conclusion on the character of Aladdin.
   Hence, the correct answer is option 3.
7. **(d)** The author mentions that Galland must have heard Diyab's story, and then written about it in the Arabian nights. He also mentions that this story must have actually been Diyab's own story. This point is included only in option 4. Option 1 makes the 'incomplete medieval manuscript' and 'the story of Aladdin' as two different elements which is incorrect. Option 2 and 3 are incorrect as per the passage.
   Hence, the correct answer is option 4.
8. **(c)** This answer is directly given in the passage, the first two lines of the last paragraph, the author says that Aladdin is relevant even today because of its travel experiences. This is given only in option 3 hence that is the correct answer.
   Hence, the correct answer is option 3.
9. **(a)** As per the passage Galland heard the story from Diyab and then translated it. 'Flip the Script' is mentioned in reference to the French Fairy Tales. Now the question asks you to disprove the flipping script, so we need to look for an option that is opposite in nature to what the author is trying to actually say. In the options, Option 1 does the same, hence that is the answer.
   Hence, the correct answer is option 1.
10. **(b)** According to the passage, it is given that many authors were of the opinion that French Fairy Tales were the inspiration for Aladdin. But according to the author, there can be better comparisons made in regards to Diyab's life instances and story of Aladdin. As per this, only Option 2 goes against what the author is trying to convey in the passage and hence that is the right answer.
    Hence, the correct answer is option 2.
11. **(c)** In the passage, it is clearly mentioned that Penguins keep a part of their body cooler to maintain their body warmth. Now here we need to compare the placement of the word 'paradoxically' in the passage, it is placed in the 2nd paragraph and if we try to look at what the author is trying to convey in the part before that, then Option 3 is the correct answer. Hence, the correct answer is option 3.
12. **(a)** Throughout the passage the author talks about the plumage of the Penguins that helps them against the outer atmosphere, if we compare all the options, Options 2,3 and 4 talk something in regards to the plumage or outer atmosphere. Option 1 on the other hand talks about Penguin feet.
13. **(d)** The last paragraph mentions that there is loss of heat due to breeding cycle, this clearly points to Option 4 being the correct answer. In the passage it is given that food metabolism is used to maintain body temperature, plumage is used to maintain the body heat and thermal convection helps in regaining the heat.
    Hence, the correct answer is option 4.
14. **(a)** As per the passage we know that Penguins maintain their plumage temperature lower than the outer atmosphere to get body heat. Now the warmer air refers to the atmospheric air being slightly higher than the plumage, and the colder temperature refers to the colder air in the atmosphere once the heat is transferred to the penguin's body. This can be inferred only through Option 1, rest of the options are incorrect.
    Hence, the correct answer is option 1.
15. **(d)** Through the passage, the author says that the floral prints of William Morris are still relevant because they are accepted by the masses, despite him being radical. Option 4 is in sync with the same ideology. Hence, the correct answer is option 4
16. **(c)** We need to choose an answer that cannot be inferred, if we consider Option 1 then its mentioned by the author in the last paragraph where he says music in 40s and 60s went

through many changes. Option 2 is mentioned in the fourth paragraph. Option 4 can also be inferred from the fifth paragraph. Only Option 3 cannot be inferred.
Hence, the correct answer is option 3.

17. **(c)** The fossilised form here, has a clear connect with the past. Hence its important to look for an answer that has some connect with the past. Only Option 3 makes use of the word 'nostalgic' that creates a link with the past. Hence, the correct answer is option 3.
18. **(b)** We need to look for an answer that takes into account both plurality and diversity. In Option 2, being popular and unpopular has no relation to plurality and diversity. While other options have a connect in some form or the other.
Hence, the correct answer is option 2.
19. **(a)** The author mentions in the passage that though folk forms keep changing, they will still be relevant in recent times. Option A talks about homogeneity which goes against the author's viewpoint hence this should be the correct answer. The author will agree with the other options as per the passage.
Hence, the correct answer is option 1.
20. **(b)** Option 1 talks about Topophilia in relation to the nomadic societies, nowhere in the passage has the author made that correlation, hence this option is incorrect. Option 3 is clearly out of context; Option 4 will be incorrect because nothing has been said about the scientist's research.
Hence, the correct answer is option 2.
21. **(b)** In the passage the author mentions that the upscale residents try to maintain some amount of difference between them and other people, this is clearly illustrated in Option 2. Hence, the correct answer is option 2.
22. **(d)** Option 2 is completely opposite to the author's viewpoint and hence is not the right choice. Option 3 is incorrect as well, since the author never mentions that in the passage. As per the passage, new Urbanism failed to satisfy people hence Option 1 will be incorrect as well. The last paragraph highlights the negative traits of patriotism.
Hence, the correct answer is option 4.
23. **(a)** When the author says that people fear too many landscapes, in the last paragraph. We can clearly choose Option 1 as the correct answer. Other options are misleading and incorrectly phrased.
Hence, the correct answer is option 1.
24. **(d)** Through the passage we know that everyone does not feel the same kind of Topophilia, it changes from person to person. Because of these differences, it will be difficult to quantify it. So we need to choose an answer that highlights the varied responses, this is clearly stated only in Option 4.
Hence, the correct answer is option
25. **(a)** In Options 2 and 4, the word 'subliminal' is used, which is not used anywhere in the passage, hence these two options can be considered as out of context. The premise of the passage lies on the fact that people aren't aware that they are being targeted, hence Option 3 is also incorrect. This makes Option 1 the correct answer because it summarizes the passage well without any discrepancies.
Hence, the correct answer is option 1.
26. **(c)** This is a medium difficulty level question, Option 1 mentions 'all speech acts...' this portrays certainty hence cannot be the answer. In a similar way, Option 2 mentions 'only humans…' hence even this needs to be eliminated. Option 4, is incomplete and hence cannot be the answer.
Hence, the correct answer is option 3.
27. **(1)** If we take the approach of arranging the sentences in a sequence and then look out for an odd one out. In that case clearly 4 has to start the sequence, 5 and 2 need to follow in the same order because they are talking about different ideologies, now between 3 and 1, 3 fits the order since its still talking about the identities. 1 is talking about something completely different hence it is the odd one out.
Hence, the correct answer is option 1.
28. **(3241)** After reading all the four sentences, it is clear that 3 has to start the sequence. Now the 'learn' bit makes a mandatory pair of 3 and 2 in that order. Now clearly 4 will follow 2 since it talks about replies. And the last sentence will be 1. Answer: 3241
29. **(3241)** Sol. 3 introduces the metaphoric phrase 'Carpe Diem' hence it has to start the sequence. 2 is clearly a continuation of the phrase and its meaning, hence has to follow. The 'example' that 4 refers to, is provided in 2, so the order is 3241. Answer: 3241
30. **(2)** The sequence has to start with 5 and 3 has to follow. Now in sentence 4 'this prejudice…' is in reference to what is spoken in 3. So 534 is together, now connect with sign language is only provided in 1. Hence 2 becomes the odd one out.
Answer: 2
(4123) 4 introduces the concept of 'Collaborative filtering' and hence has to start the sequence. If you read carefully, 1 mentions 'experienced this collaborative filtering' so that is the next one in line. Next has to be 2 because it states the problems with this algorithm and 3 gives an example of the problem. So the correct order is 4123.
Answer: 4123
31. **(b)** The paragraph uses logic to point out the difference between Physics and Engineering. Option 3 only talks about Engineers and ignores the other side of science, hence is not correct. Similarly, Option 1 only talks about Science and ignores Engineering. Option 4 is very specific since it only caters to one aspect of difference.
Answer: 2
32. **(2341)** This is a tricky question since we don't normally feel the sequence would start with 'An example…' but in this case, a careful reading of the sentences makes it clear that 2 is introducing the concept of 'mind-reading'. 3 elaborates further on the same concept. Sentence 4 brings in the concept of 'Print-reading' it's important to note here, that this sentence mentions mind-reading, so unless that concept is introduced in 2 and 3, 4 cannot come into the picture. So the correct order is 2341.
Answer: 2341
33. **(2)** With a careful reading of all the four sentences, we know 4 will start the sequence since it acts like an introduction. 3, 1 and 5 has to follow to form a meaningful sequence. Even if we just read sentence 2 it talks about symbol of high modernism, which has no link with the others.
Hence 2 is the odd one out.
Answer: 2

DATA INTERPRETATION AND LOGICAL REASONING

34. (b) There are 5 types of biscuits, 3 types of candies and 4 types of savouries. Among 16 shelves, there are 4 empty shelves.
It is given that all items of same type are clustered together with no empty shelf between items of the same type.
From (3) and (4), it can be concluded that D, E, F and K are savouries.
From (2) and (5), L, I and J are of one type and H is the other type. Therefore from (6), as C is a candy, L, I J must be types of biscuits and
H is a type of candy. Now using (1), we can conclude that A and B are of one type but not candies as there are only 3 types of candies.
Therefore,
Biscuits: A, B, I, J, L Candies: C, H, G Savouries: D, E, F, K
From (3), (4), (6) and (7), there shelf number 12 must be an empty shelf. Also, D, E, F and K are placed in shelves numbered 13, 14, 15
and 16 respectively.
Now from (1), (2) and (7), the sequence (from left to right) in which biscuits are kept is:
(Empty shelf), L, A, B, (I/J), (J/I).
From (6), the candies must be in the following order: (Empty shelf), (Empty shelf), C, (H/G), (G/H)
Thus, we have

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Case (i)	Empty	L	A	B	(I/J)	(J/I)	Empty	Empty	C	(H/G)	(G/H)	Empty	D	E	F	K
Case (ii)	Empty	Empty	C	(H/G)	(G/H)	Empty	L	A	B	(I/J)	(J/I)	Empty	D	E	F	K

Solution Discuss Report
In each case, J and I can be arranged in 2 ways and G and H can be arranged among them in 2 ways. Thus, 2 × 2 = 4 ways.
Total number of ways the items can be arranged on the shelves = 4 + 4 = 8
Hence, option (b).

35. (d) Consider the solution to first question of this set.
G is not a type of biscuit. It is a candy.
Hence, option (d).

36. (d) Consider the solution to first question of this set.
In the second case we have shelf 1, 2, 6 and 12 empty.
Hence, option (d).

37. (a) Consider the solution to first question of this set.
Considering case (i): There are 4 shelves between B and C.
Considering case (ii): There are 5 shelves between B and C.
Hence, there are at least 4 shelves between B and C.
Hence, option (a).

38. (a) The approximate values in the bar chart can be tablated as follows.

	Crime Type			
	IPC Crimes	SLL Crimes	Other Crimes	Total
Telangana	4	15	6	25
Puducherry	1	0	30	31
Kerala	8	15	10	33
Haryana	4	26	10	40
Maharashtra	16	35	6	57
Tamil Nadu	2	26	36	64
Goa	26	36	19	81
Karnataka	16	49	26	91
Delhi	63	36	43	142
West Bengal	0	520	0	520
Total	140	758	186	1084

All the above states/UTs are arranged in descending order according to the number of cases. The 'Rank' column in the table lists the rank given to each state/UT among all states/UTs of India.

	IPC	Rank
Delhi	63	
Goa	26	
Maharashtra	16	3
Karnataka	16	3
Kerala	8	
Telangana	4	6
Haryana	4	8
Tamil Nadu	2	11
Puducherry	1	13

Note that Maharashtra and Karnataka are ranked 3. This means the two states with higher number of cases than Maharashtra and
Karnataka have to be ranked as 1 and 2. So Delhi and Goa are ranked 1 and 2 respectively.
Since two states have been given the same rank (3), so the next state will be ranked 5.
So Kerela is ranked 5.
Hence, 5

39. (c) The two states where the highest total number of cases are registered are West Bengal and Delhi.
Total number of cases across both these cities in the category;
IPC = 0 + 62 = 62.
SLL = 520 + 35 = 555.
Required ratio = 62/555 = 0.1117 ≈ 1/9.
Hence, option (c).

40. (d) The approximate values in the bar chart can be tablated as follows

	Crime Type			
	IPC Crimes	SLL Crimes	Other Crimes	Total
Telangana	4	15	6	25
Puducherry	1	0	30	31
Kerala	8	15	10	33
Haryana	4	26	10	40
Maharashtra	16	35	6	57
Tamil Nadu	2	26	36	64
Goa	26	36	19	81
Karnataka	16	49	26	91
Delhi	63	36	43	142
West Bengal	0	520	0	520
Total	140	758	186	1084

All the above states/UTs are arranged in descending order according to the number of cases. The 'Rank' column in the table lists the rank given to each state/UT among all states/UTs of India.

	Other	Rank
Delhi	43	
Tamil Nadu	36	
Puducherry	30	
Karnataka	26	
Goa	19	
Kerala	10	
Haryana	10	
Telangana	6	8
Maharashtra	6	8
West Bengal	0	16

Since Telangana and Maharashtra are both ranked 8, so all the states having more than 6 cases (Other crimes) are ranked 1 to 7.
So, the final ranking is as follows.

	Other	Rank
Delhi	43	1
Tamil Nadu	36	2
Puducherry	30	3
Karnataka	26	4
Goa	19	5
Kerala	10	6
Haryana	10	7
Telangana	6	8
Maharashtra	6	8
West Bengal	0	16

So, Tamil Nadu is ranked 2 and Puducherry is ranked 3. Hence both statements (i) and (ii) are true.

Hence, option (d).

41. (a) The approximate values in the bar chart can be tablated as follows

	Crime Type			
	IPC Crimes	SLL Crimes	Other Crimes	Total
Telangana	4	15	6	25
Puducherry	1	0	30	31
Kerala	8	15	10	33
Haryana	4	26	10	40
Maharashtra	16	35	6	57
Tamil Nadu	2	26	36	64
Goa	26	36	19	81
Karnataka	16	49	26	91
Delhi	63	36	43	142
West Bengal	0	520	0	520
Total	140	758	186	1084

Following table is sorted list for all three crime categories where in each category, states are arrranged in descending order (from top to bottom) according to the number of cases. The 'Rank' column determines the rank of each state among all states/UTs of India.

IPC Crimes			SLL Crimes			Other Crimes		
State/UT	Cases	Rank	State/UT	Cases	Rank	State/UT	Cases	Rank
Delhi	63		West Bengal	520		Delhi	43	1
Goa	26		Karnataka	49	2	Tamil Nadu	36	2
Maharashtra	16	3	Delhi	36		Puducherry	30	3
Karnataka	16	3	Goa	36	4	Karnataka	26	4
Kerala	8		Maharashtra	35	4	Goa	19	5
Telangana	4	6	Haryana	26	6	Kerala	10	6
Haryana	4	8	Tamil Nadu	26	7	Haryana	10	7
Tamil Nadu	2	11	Telangana	15	9	Telangana	6	8
Puducherry	1	13	Kerala	15	9	Maharashtra	6	8
West Bengal	0		Puducherry	0	29	West Bengal	0	16

Observe that in IPC crimes category, Maharashtra and Karnataka are ranked 3. So Delhi and Goa would be ranked 1 and 2 respectively.
In Other crimes category, Delhi is clearly ranked 1 as it has the highest number of cases.
In SLL crimes category, West Bengal and Karnataka are ranked 1 and 2 respectively. Since Goa and Maharashtra have been ranked 4.
Also Delhi's number of cases (36) is lesser than that of Karnataka (49), so Delhi cannot be ranked 2. So it has to be ranked 3. Please note
that Delhi having 36 cases was an approximate value.
Required sum = 1 + 3 + 1 = 5.
Hence, 5.

42. (d) Tanzi, Umeza, Xyla, Yonita and Zeneca got 1,2,3,1,2 chances to shoot in the bonus rounds respectively. Therefore, in the compulsory
round, 9 bull's eye were hit. From (4), it can be concluded that number of bull's eye hit in Rounds 1, 2 and 3 were 3, 4 and 2 respectively.
Note that Xyla got three chances in the bonus round. So she must have hit three bull's eye in the compulsory rounds. Therefore, Xyla's
minimum score is $5 \times 4 + 1 + 1 = 22$.
Zeneca's maximum score could be $5 \times 4 + 4 = 24$. Her minimum score could be $5 \times 4 + 1 = 21$. If her score was the maximum score, it
must be an odd number. So, 23 is the maximum score. Now using (3), the lowest score = 11. But both 11 and 23 are not divisible by 3.

Using (2), we can conclude that 23 is not the maximum score. So, Xyla's must have scored maximum. And Zeneca's score was either
21(5 × 4 + 1) or 24(5 × 4 + 4).
Thus, Xyla scored 5 in each of the compulsory rounds and 4 in round 6.
Tanzi hit one bull's eye either in round 1 or in round 3. So her minimum score = 5 + 4 + 1 + 5 = 15 and her maximum score = 5 + 4 + 4
+ 5 = 18.
Yonita's maximum score = 5 + 4 + 3 + 5 = 17.
So from (1) and (2), Tanzi, Umeza and Yonita each had total score 15. And hence, Wangdu scored least points i.e., 12 points. The only
possible combination is 4 points in each of the compulsory rounds.
So, Tanzi scored 1 and 5 in rounds 1 and 3 in some order. Assume that she scored 1 in round 1 and 5 in round 3. From (5), Zeneca scored 1 in round 1. But then she must also have scored 5 in round 3 as she hit bull's eye twice in the compulsory rounds. But this is
contradiction to (5). So, Tanzi and Zeneca scored 5 in round 1. Tanzi scored 1 in round 3.
Thus, Tanzi, Zeneca and Xyla hit bull's eye in round 1. Therefore Yonita (total score =15) must have hit bull's eye in the second round
and scored 2 points in the first round.
Umeza must have hit two bull's eye in rounds 2 and 3. Also, she must have scored 2 points in the first round.
Thus, Umeza and Xyla hit the bull's eye in the third round. Therefore, Zeneca hit bull's eye in the second round and scored 4 points in
the third round.
Thus, we have

	Round - 1	Round – 2	Round – 3	Round – 4	Round – 5	Round – 6
Tanzi	5	4	1	5	NP	NP
Umeza	2	5	5	1	2	NP
Wangdu	4	4	4	NP	NP	NP
Xyla	5	5	5	1	5	4
Yonita	2	5	3	5	NP	NP
Zeneca	5	5	4	5	5	NP

So, the highest total score was 25.
Hence, option (d)

43. **(d)** Consider the solution to first question of this set.
Zeneca's total score was 24.
Hence, option (d).

44. **(a)** Consider the solution to first question of this set.
Xyla was the highest scorer.
Hence, option (a).

45. **(a)** Consider the solution to first question of this set.
Tanzi's score in Round 3 was 1.
Hence, option (a).

46. **(b)** There is exactly one prize of type a.
There can be 99 items of type b. Thus, there can be only two types of items.
Answer: 2.

47. **(a)** There is exactly one prize of type a.
As we need to find maximum possible different types of prizes, number of prizes of type b has to be minimum possible and hence must
be 2, number of items of type c = 4 …and so on.
1(type a) + 2(type b) + 4(type c) + 8(type d) + 16(type e) + 32(type e) = 63
Suppose there is prize of type f then number of items has to be at least 64. But then there are more than 100 items, which is not true.
So there cannot be prize of type f.
Answer: 6.

48. **(d)** There is exactly one prize of type a.
[1]. If there are 30 items of type b, then items of type c = 100 – 30 −1 = 69. So this case is possible.
[2]. There are 75 items of type e, then items of type b, c and d = 100 – 75 −1 = 24.
Some of the values of (b, c, d) are (2, 4, 18) or (2, 5, 17) or (3, 6, 15). So this case is possible.
[3]. If there are 60 items of type d, then items of type b and c = 100 – 60 −1 = 39. So this case is possible as we can find many
combinations for (b, c).
[4]. If there are 45 items of type c, then items of type a, b and c in all cannot be more than 1 + 22 + 45 = 68. Now items of type d has to be more than 90. But then total number of items exceed 100. So this case is not possible.
Hence, option (d).

49. **(a)** Considering the given options, the maximum number of different types can be 6.
Assume that there are 6 items.
Now number of items of same type as the one in box 45 = 1 + 31 + 43 = 75
So number of remaining items = 25
1 + 2 + 4 + 8 + 16 = 31. If there are 5 types of items, the minimum number of items of 5 types = 31.
31 + 75 >100
So, there cannot be 6 types of items.
Now consider that there are 5 types of items.

Now number of items of same type as the one in box 45 = 1 + 31 + 43 = 75
So number of remaining items = 25
Now, 25 = (1 + 2 + 4 + 17) or (1 + 3 + 6 + 16) ,... etc
So there can be 5 types of different items.
Hence, option (a)

50. **(1)** Units place of $(F + F)$ is $F \Rightarrow F = 0$
Units place of $(H + H)$ or $(H + H + 1)$ is also F. This is possible only when H is 5 and there is no carry over.
So, F = 0 and H = 5
$\therefore (1 + B + A) = (10A + A)$
$\Rightarrow 1 + B = 10A$
$\Rightarrow A = 1$ and $B = 9$
As units place of $(G + K) = 1$, actual value of $G + K = 11$
So, $1 + F + A = 1 + 1 + 0 = 2 = C$
Now, 1 + J = G and G + K = 11
Also, G, J and $K \in \{3,4,6,7,8\}$
Therefore, $(G, J, K) =$ (8,7,3) or (7,6,4) or (4,3,7), accordingly D and E can be represented by (4,6) or (3,8) or (6,8) in some order.
The letter A represents digit 1.

51. **(d)** Consider the solutoin to first question of this set.
B represents the digit 9.
Answer: 9

52. **(d)** Consider the solutoin to first question of this set.
The digit 7 cannot be represented by the letter D.
Answer: 7.

53. **(a)** Consider the solution to first question of this set.
The digit 6 cannot be represented by the letter G.
Answer: 6.

54. **(c)** Four music composers assigned one item; among items 1 to 4; to each of the four finalist. These four composers assigned one item;
among items 5 to 8; to different finalists.
From (v), as items assigned by Ashman were performed consecutively, these must be the fourth and the fifth performances.
From (iii), (iv) and (v), the first, the fourth, the fifth and the eighth performances were composed by Badal, Ashman, Ashman, Gagan
respectively. Also as the number of performances between items assigned by each of the remaining composers was the same, Badal
and Gagan must have composed 6th and 3rd items. Therefore, the second and the seventh items were composed by Dyu. As Ashman
and Gagan composed items for Rani, using (ii), we can concluded that Gagan's other composition was performed by Queen. Also, using
(i), Badal's other composition was performed by Samragni.
Thus, we have

Performance No.	Dancers	Composer
1	Princess	Badal
2	Samragani	Dyu
3	Queen	Gagan
4	Rani	Ashman
5	Princess	Ashman
6	Samragani	Badal
7	Queen	Dyu
8	Rani	Gagan

It can be seen that the second performance was composed by Dyu.
Hence, option (c).

55. **(d)** Consider the solution to first question of this set.
Queen performed third item composed by Gagan. So statement given in option 4 is FALSE.
Hence, option (d).

56. **(d)** Consider the solution to first question of this set.
The sixth performance was composed by Badal.
Hence, option (d).

57. **(d)** Consider the solution to first question of this set.
The first and the sixth performances were composed by the same composer.
Hence, option (d).

58. (b) The approximate data is tabulated as follows.

Aspect/Vendor	Vendor 1	Vendor 2	Vendor 3	Vendor 4	Vendor 5
Reliability	52	40	75	26	60
Reach	80	58	63	46	70
Quality	72	69	62	40	48
Features	40	45	56	90	75
Customer Service	55	41	50	70	28
Cost	77	81	90	71	50

For each aspect, the five values are arranged in ascending order (from left to right) as shown below. Also shown is the median value as shaded below.

			Median		
Reliability	26	40	52	60	75
Reach	46	58	63	70	80
Quality	40	48	62	69	72
Features	40	45	56	75	90
Customer Service	28	41	50	55	70
Cost	50	70	77	81	90

The least median score is 50 and that corresponds to 'Customer Service'
Hence, option (b).

59. (d) The average score of that vendor is highest who has the highest total score across all the six aspects.
The totals of all vendors are shown in the table below.

Aspect/Vendor	Vendor 1	Vendor 2	Vendor 3	Vendor 4	Vendor 5
Reliability	52	40	75	26	60
Reach	80	58	63	46	70
Quality	72	69	62	40	48
Features	40	45	56	90	75
Customer Service	55	41	50	70	28
Cost	77	81	90	71	50
Total	376	334	396	343	331

So,Vendor 3 (396) has the highest final score.
Hence, option (d).

60. (b) The average score of that vendor is highest who has the highest total score across all the six aspects.
The totals of all vendors are shown in the table below.

Aspect/Vendor	Vendor 1	Vendor 2	Vendor 3	Vendor 4	Vendor 5
Reliability	52	40	75	26	60
Reach	80	58	63	46	70
Quality	72	69	62	40	48
Features	40	45	56	90	75
Customer Service	55	41	50	70	28
Cost	77	81	90	71	50
Total	376	334	396	343	331

As observed, Vendor 1 is among the top two in 3 aspects (Reach, Quality and Customer Service). Vendor 5 is also among top two in 3 aspects (Reliability, Reach and Features).
All other vendors are among top two in 2 aspects only.
Hence, option (b).

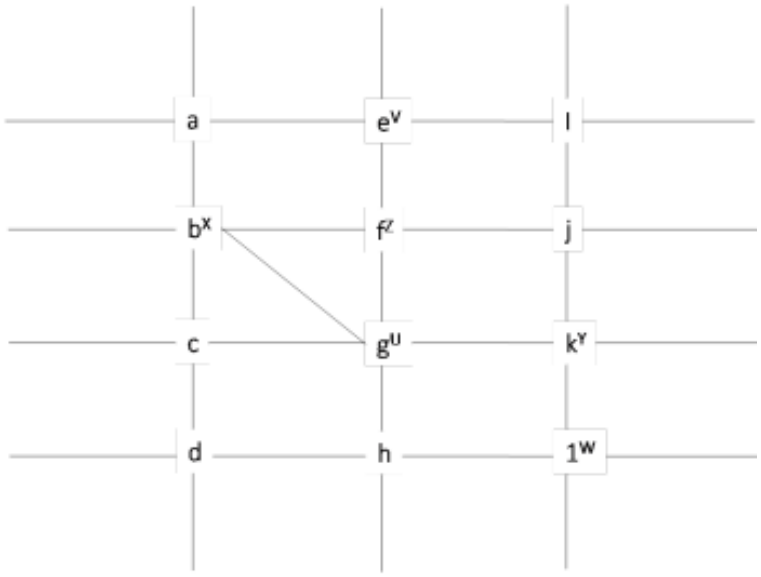
61. (d) The average score of that vendor is highest who has the highest total score across all the six aspects.

The totals of all vendors are shown in the table below.

Aspect/Vendor	Vendor 1	Vendor 2	Vendor 3	Vendor 4	Vendor 5
Reliability	52	40	75	26	60
Reach	80	58	63	46	70
Quality	72	69	62	40	48
Features	40	45	56	90	75
Customer Service	55	41	50	70	28
Cost	77	81	90	71	50
Total	376	334	396	343	331

As observed, only Vendor 3 is among the top three in all the six aspects.
Hence, option (d).

62. **(a)** From (1), X, U, Z are at b,c, g or at b, f, g in some order. Thus, X, U or Z is definitely at g.
Let X is at g.
Case (i): U and Z at b and f.
From (4), U has to be at b, Z at f and V at j. From (2), no one is at c, e, k and h. As Y sees both U and W, Y must be at a and W at i. But
then W sees V, which contradicts (5).
Thus, this case is not valid.
Case (ii): U and Z at b and c.
From (4), U has to be at c, Z at b and V at a. From (2), no one is at c, e,f, k and h. But then Y must be at I, j or l. But in that case Y cannot
see U. Thus, this case is not valid.
Therefore, X cannot be at g.
Let Z is at g.
Solution Discuss Report
From (4), U is at c or f.
Case (i) U is at c and hence V is at k and X is at a. Again there is no place for V. This case is invalid.
Case (ii) U is at f, X is at b and V at h. V will be at e as he sees U. But then he will be able to see Z also. So this case is also invalid.
Thus, U is at g. Therefore, Z is at f, V at e and X at b. So, from (2) no one will be at a, c and j. From (3) and (5), it can be concluded that Y
is at k and W at l. Thus, we have



No one is standing at intersection a.
Hence, option (a).

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

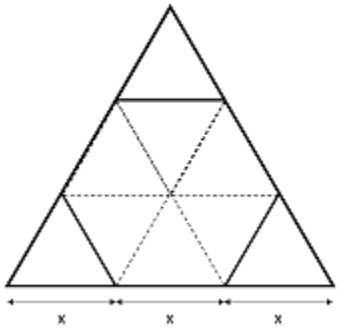
V can see only U and Z.
Hence, option (c).

64. **(a)** Consider the solution to first question of this set.
X must reach Y via g so that he would cross minimum street segments. i.e., he would cross 2 street segments.
Hence, option (a).

65. **(b)** Consider the solution to first question of this set.
A new person standing at d would see W and X only.
Hence, option (b).

QUANTITATIVE APTITUDE

66. **(d)** The hexagon will be regular only if the hexagon is symmetrical with resepect to the original triangle.
This is only possible when the comers cut are all equilateral (of let's say side x) and the side length of the hexagon is equal to side length of the equilateral corner (again x).



H=6x $\frac{\sqrt{3}}{4}x^2$(∵ A regular hexagon consists of six equilateral triangles of side length equal to the side length of the hexagon)

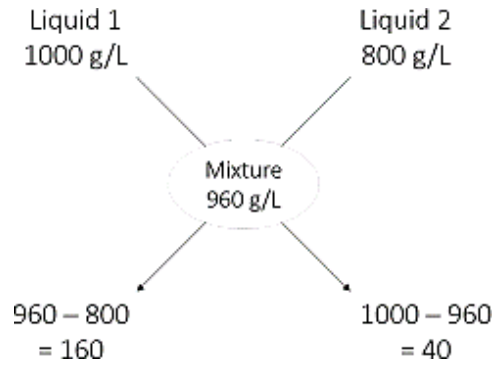
T= $\frac{\sqrt{3}}{4}(3x)^2 = \frac{9\sqrt{3}}{4}x^2$ (- Side length of the triangle = x + x + x = 3x)
$\therefore \frac{H}{T} = \frac{6}{9} = \frac{2}{3}$
Hence, option (d).

67. **(3920)** We have to go from (1, 1) to (8, 10) via (4, 6)
Number of paths from (1,1) to (8,10) = [Number of paths from (1,1) to (4,6)] x [Number of paths from (4,6) to (8,10)]
Path from (1,1) to (4,6):
Number of horizontal displacements (Δx) = 4 — 1 = 3 units and
Number of vertical displacements (Δy) = 6 — 1 = 5 units.
Hence, a total of 8 units.
∴Number of paths from (1,1) to (4,6) = $8_{C_3} \times 5_{C_5} = 56$.
Path from (4,6) to (8,10):
Number of horizontal displacements (Δx) = 8 — 4 = 4 units and
Number of vertical displacements (Δy) = 10 — 6 = 4 units.
Hence, a total of 8 units.
=. Number of paths from (4,6) to (8,10) = $8_{C_4} \times 4_{C_4} = 70$.
Total required number of paths = 56 x 70 = 3920.
Hence, 3920.

68. **(c)** Ratio of the three diagonals is 3: $2\sqrt{3}$: $\sqrt{15}$
Let the legths of the three diagonals be 3k, $(2\sqrt{3})$k and $(\sqrt{15})$k.
And, the brick have length, breadth, height as x, y and z respectively.
$\therefore X^2 + Y^2 = (3K)^2 = 9K^2$
$Y^2 + Z^2 = [(2\sqrt{})K]^2 = 12K^2$ … (2)
$Z^2 + X^2 = [(\sqrt{15})K]^2 = 15K^2$
Adding (1),(2)and (3), we get;
$X^2 + y^2 + z^2 = 18k^2$ ….. (4)
Using (4) along with any of (1), (2) and (3), we get;
$x = K\sqrt{6}, Y = k\sqrt{3}$ and $Z = 3k$
Required ratio = $(k\sqrt{3}) \frac{1}{k} = \frac{1}{\sqrt{3}}$
Hence, option (c).

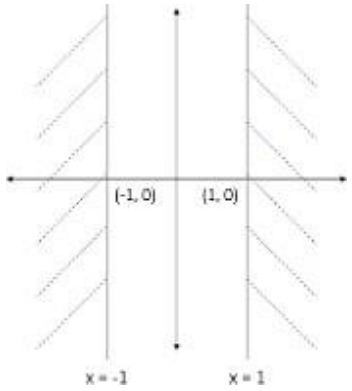
69. **(b)** $(\sqrt{2})^{19} 3^4 4^2 9^m 8^n = 3^n 16^m (64)^{\frac{1}{4}}$
$\therefore 2^{19/2} 3^4 2^4 3^{2m} 2^{3n} = 3^n 2^{4m} 2^{6/4}$
$\therefore 2^{19/2} 3^4 2^4 3^{2m} 2^{3n} = 3^n 2^{4m} 2^{3/2}$
$\therefore 2^{(\frac{19}{2})+4+3n]} 3^{(4+2m)} = 2^{[4m+(\frac{3}{2})} 3^n$
Equating the exponents of 2 and 3 on both sides, we get;
Powers of 2: (19/2) + 4 + 3n = 4m + (3/2)
=6n +24 =8m..(1)
Powersof3:4 + 2m =n ..(2)
Solving (1) and (2), we get;
m= -12.
Hence, option (b).

70. **(c)** Density of liquid 1 = 1000 g/L.
Density of liquid 2 = 800 g/L.
Half litre of the mixture weighs 480 gm, so 1 L of the mixture weighs 960 gm.
So, density of the mixture = 960 g/L.
Using the alligation cross;

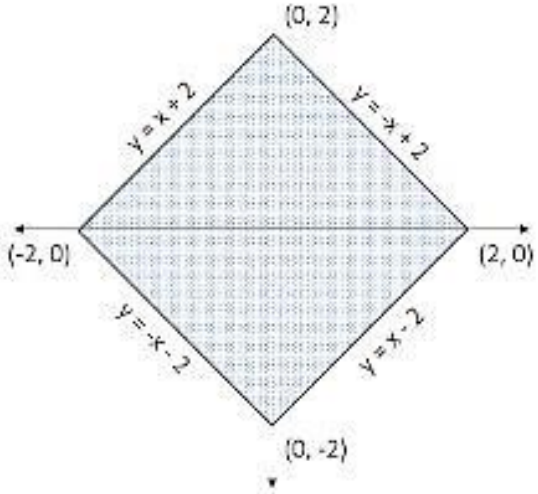


$\frac{Liquid\ 1}{Liquid\ 2} = \frac{(960-800)}{(1000-960)} = \frac{4}{1}$.
Percentage of liquid 1 in the mixture = (4/5) x 100 = 80%.
Hence, option (c).

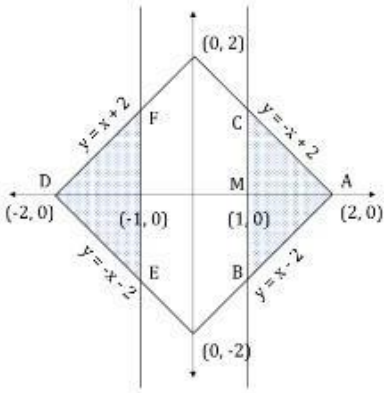
71. **(2)** $|x| \geq 1 \Rightarrow x \geq 1$ and $x \leq -1$. This is represented as the shaded region in the figure below.



$|x| + |y| \leq 2$: This will have four subcases depending on which quadrant the point is.
1st quadrant $(x > 0; y > 0)$: $y \leq 2 - x$
2nd quadrant ($x < 0; y > 0$): $y \leq 2 + x$
3rd quadrant $(x < 0; y < 0)$: $y \geq -2 - x$
4th quadrant $(x > 0; y < 0)$: $y \geq x - 2$

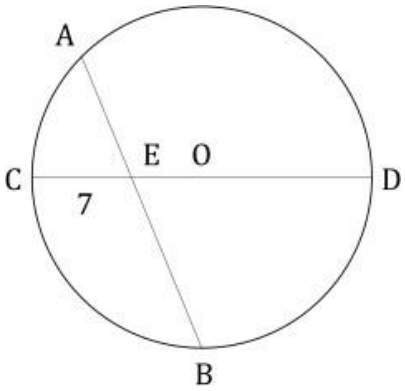


Combining these four, the graph for $|x| + |y| \leq 2$ is as shown below.



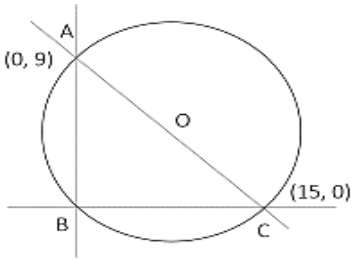
The intersection of $|x| + |y| \leq 2$ and $|x| \geq 1$ is as shown as the shaded area in the following image.
We need to find Area △ ABC + Area △ DEF
Area △ ABC = Area △ DEF = $(1/2) \times BC \times AM = (1/2) \times 2 \times 1 = 1$ square unit.
Required area = 1 + 1 = 2 square units.
Hence, 2.

72. **(a)** The circle can be drawn as shown below. Diameter of the circle = 2 x 11 = 22 cm.



CE=7,s0ED=CD-CE=22-7=15.
Let AE be x units, so EB = AB — AE = 20.5 — x.
Using the intersecting chords theorem; AE x EB = CE x ED.
∴ 2x05 -x)=7 x15
Solving this equation, we get x = 10.5, 10.
So, if (AE, BE) = (10.5, 10) or (10,10.5)
Required difference = |BE — AE| = |10.5- 10] = 0.5.
Hence, option (a).

73. **(9)** 3x + 5y — 45 = 0 cuts the coordinate axes at C(15,0) and A(0,9) as shown in the image below.



ABC = 90°, so we can deduce that AC is the diameter of the circumcircle.
[In a right triangle, hypotenuese is the diameter of circumcircle.]
Diameter = $\sqrt{}(15^2 + 9^2) = \sqrt{}306$.
Radius = $(\sqrt{}306)/2 = 8.74 = 9$ units.
Hence, 9.

74. **(d)** First car starts at 10 am : Let the speed and time taken be a and t respectively.
Second car starts at 11 am : Let the speed be b. Time taken =t — 1.
Required percentage = [(b — a)/a] x 100 = [(b/a) — 1] x 100
Required percentage will be highest when b/a is highest.
Now, since distances covered by both cars are same, so D = at = b(t — 1)
∴ b/a=t/(t-1)=1/[1- 1/t]

(b/a) is maximum when t is minimum.
t_{min} = 6 (given)
∴b/a = 6/5.
Maximum required percentage = [(6/5) — 1] x 100 = 20%.
Hence, option (d).

75. (a) Let time taken by Amal be 3t, so time taken with each speed = 3t/3 = t.
Let total distance travelled be 3d. Hence, Bimal travels d at each of the 3 different speeds.
For Amal : 3d = 10t + 20t + 30t = 60t.
∴d =20t
Time taken by Bimal = (d/10) + (d/20) + (d/30) = (11d/60) = 11t/3.
Required percentage = [{(11t/3)/3t} — 1] x 100 = (2/9) x 100 = 22.22 ≈ 22%.
Hence, option (a).

76. (d) Let total work be the LCM of 12 and 9 = 36 units.
Let the efficiency of A and B be a and b respectively.
Work done per day when A and B are working together = 36/12 = 3 units.
∴ a+b=3.0
Work done per day when A is working at half efficieny and B is working at thrice efficiency = 36/9 = 4 units.
∴ (@/2)+3b=4.02)
Solving (1) and (2), we get; a = 2.
Time taken by A alone to complete the work = 36/2 = 18 days.
Hence, option (d).

77. (6144) Eleventh term of the series (a_{11}) = s_{11} —s_{10} (where S,, represents the sum of n terms of the series)
s_{11} = 3($2^{12} - 2$) and $s_{10} = 3(2^{11} - 2)$
$\therefore a_{11}$ $(2^{12} - 2) - (2^{11} - 2) = (2^{12} - 2^{11}) = 3 \times 2^{11} = 3 \times 2^{11}(2 - 1) = 6144$
Hence, 6144.

78. (c) Let the two numbers be x and y.
So, xy = 616 and $(x^3 — y^3)/(x - y)^3$ = 157/3.
$3(x^3 — y^3) = 157(x - y)^3$
$\therefore 3(x^3 — y^3) = 157[x^3 - y^3 - 3xy(x - y)]$
$\therefore 154\ (x^3 — y^3) = 3 \times 157 \times xy(x-y)$
$\therefore 154(x^3 — y^3) = 3 \times 157 \times 616 \times (x-y)$[using xy=616]
$\therefore (x-y)\ (x^2 + y^2 + xy) = 1884(x - y)$
$\therefore (x^2 + y^2 + xy) = 1884\ (if\ x \neq y)$
Adding xy both sides, we get;
$(x^2 + y^2 + xy) = 1884 + xy = 1884 + 616 = 2500$
∴x+y=50
Hence, option (c).

79. (c) Let the total marks be 100x.
Meena's score = 40x.
Meena's score after review = 40x + [(40x)/2] = 60x.
Passing marks = 60x + 35.
Post review score x (6/5) = 7 + Passing marks
60x x (6/5) = 60x + 42.
Solving this equation we get; x = 3.5.
So, passing marks = 60x + 35 = (60 x 3.5) + 35 = 245 and total marks = 100x = 100 × 3.5 = 350.
Percentage score needed to pass the examination = (Passing marks/Total marks) x 100 = (245/350) × 100 = 70%.
Hence, option (c).

80. (5) Since we have |x|, we will have to consider cases where, x < 0 or x =0orx > 0.
For x > 0: $6x^2 + 1 = 5x = 6x^2 — 5x + 1 = 0$. The two roots of this equation are 1/2 and 1/3.
For x = 0, LHS = RHS, .. x = 0 is a root of the equation.
For x < 0: $6x^2 + 1 = 5x \Rightarrow 6x^2 + 5x + 1 = 0$. The two roots of this equation are -1/2 and -1/3.
∴ Number of roots =2 + 1 +2 =5.
Answer: 5.

81. (13) Let the work done by one man and one machine per day be x and y respectively.
Three men and eight machines can finish a job in half the time taken by three machines and eight men to finish the same job.
Since efficiency is inversely proportional to the time taken, so the efficiency of 3 men and 8 machines is twice that of 8 men and 3 machines.
∴(3x + 8y) = 2(8x + 3y)
∴13x = 2y.
So, work done by 13 men in a day = work done by 2 machines in a day.
If two machines can finish the job in 13 days, same work will be done by 13 men in 13 days.
Hence, 13.

82. (b) Let marks of Gautam be G.
G+ (62 x21) =T..(l) (where T is the total marks of all 22 students)
82.5 + (21 x x) = T ..(Il) (where x is the average marks of 21 students other than Ramesh)
The average score of all the 22 students is one more than the average score of the 21 students other than Ramesh.
A (T/722) = 1 + x.)
Solving (I), (Il) and (lll), we get; x = 60.5, T = 1353 and G = 51.
Hence, option (b).

83. (a) Let incomes of Amala, Bimala and Kamala be a, b and k respectively.
$\therefore \frac{a}{k} = \frac{6}{5} \times b = \frac{4}{5} \times k.$
$\therefore \frac{a}{b} = \frac{3}{2}$
Let Kamala's income be 300 and Bimala's income be 200.
∴ Kamala's new income = 300 × 0.96 = 288 and Bimla's new income = 200 × 1.1 = 220
∴ Required percentage = $(\frac{288-220}{220}) \times 100 = (\frac{68}{220}) \times 100 = 30.9 \approx 31\%$
Hence, option (a).

84. (10) Case I: m is odd.
So, (m + 1) is even.
∴8[(m+1)(m+2)]-(m+3)=2
$\therefore 8m^2 + 23m + 11 = 0$
Both roots of this equation are negative as sum of the roots (-23/8) is negative and the product (11/8) is positive. But it is given that m is a positive integer. Hence this case is discarded.
Case Il: m is even.
So, (m + 1) is odd.
∴8(m+3+1)-m(m+1)=2
$\therefore m^2 - 7m - 30 = 0$
Solving this equation, we get; m = 10 or -3.
Since m is positive, m = 10.
Hence, 10.

85. (880) Let x be the length of the racecourse.

The first horse beat the second by 11 metres and the third by 90 metres.
∴ Distances travelled by the first, second and third horse are x, x — 11 and x — 90 respectively.
The second horse beat the third by 80 metres.
Distances travelled by the second and third horse are x and x — 80 respectively.
Ratio of speeds of second and third horse is constant which is equal to the ratio of the distances travelled by the second and third horse.
∴(x= 11)/(x - 90) = x/(x — 80)
$=x^2$ - 91x + 880 = x^2 - 90x
=x = 880
Hence, 880.

86. **(c)** From the given data, population in 2019: p
after 1 year ie. in 2020: 2p +3
after 2 years i.e. in 2021:2(2p +3) +3 =2^2p + 2x3 + 3
after 3 years i.e. in 2022: 2(2^2p + 2x3 + 3) = 2^2p + 22x3 + 2x3 + 3
……
After n years ie :=2"p + 2^{n-1}x3 + 2^{n-2}x3 +….. + 3
Hence, population in 2034 i.e. after 15 years = 2^{15}p + 2^{14}x3 + 2^{13}x3 +…… +3
$= 2^{15}p + 3(2^{n-1} + 2^{n-2} + \cdots + 1)$
$= 2^{15}p + 3(2^{15} - 1)/(2 - 1)$
$= 2^{15} \times 1000 + 3(2^{15} - 1)$
$= 2^{15} \times 1003 - 3$
Hence, option (c).

87. **(d)** Let the cost price of one pen and one book be 100p and 100b respectively.
On selling a pen at 5% loss and a book at 15% gain, Karim gains Rs. 7.
∴95p + 115b =7 + (100p + 100b) = 15b - 5p =7 ..(1)
On selling the pen at 5% gain and the book at 10% gain, he gains Rs. 13.
∴2105p + 110b = 13 + (100p + 100b) = 10b + 5p = 13 ..(2)
Solving (1) and (2), we get; b = 4/5.
So, cost price of one book = 100b = 100 x (4/5) = Rs. 80.
Hence, option (d).

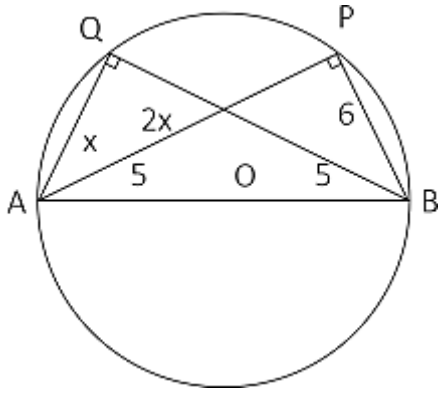
88. **(20)** Let the total number of students be 100x.
So, number of girls and boys are 60x and 40x respectively.
There are 30 more girls than boys... 60x = 40x + 30.
∴x =3/2.
Number of students who passed = 68x = 68 x (3/2) = 102 out of which 30 boys passed.
So, number of girls who passed = 102 — 30 = 72
Number of girls who did not pass = 60x — 72 = 90 - 72 = 18.
Required percentage = [18/90] x 100 = 20%.
Hence, 20.

89. **(b)** The best approach to solving such questions in exams is to put values and then cross checking the options.
Let n = 2, so we will have three terms in AP (a_1, a_2 and a_3).
Leta_1; =a_2 =a_3 = 1.
$1/(\sqrt{a_1} + \sqrt{a_2}) = 1/2$.
$1/(\sqrt{a_2} + \sqrt{a_3}) = 1/2$.
$\therefore [1/(\sqrt{a_1} + \sqrt{a_2})] + [1/(\sqrt{a_1} + \sqrt{a_2}) = (1/2) + (1/2) = 1$.
Put n=2in;
Option 1: 2/0 = not defined. So this option is incorrect.
Option 2: 2/(1 + 1) = 2/2 = 1. So this option is correct.
Option 3: 2 — 1)/(1 + 1) = 1/2. So this option is incorrect.
Option 4: 2 — 1)/(1 + 1) = 1/2. So this option is incorrect.
Hence, option (b).

90. **(c)** Let the radius of A and B be a and b respectively. (a = 30 and b = 40)
Distance travelled by any wheel D = (Circumference C) x (Number of revolutions N)
∴ D ∝ Rx N(∵C ∝ Radius R)
∴N ∞ 1/R
$\therefore N_a/N_b$ = b/a=40/30=4/3….(1)
It is given that N; = N_a, + 5000 ...(2)
Solving (1) and (2), we get; N; = 20000 and n_b = 15000.
$D=C_a \times N_a = 2\pi a \times N_a = V_b \times (\frac{1}{4})$[where V_b *is the velocity of* B]
$\therefore 2\pi \times (30 \times 10^{-5}) \times 20000 = V_b \times (3/4)$
$\therefore V_b = 16\pi$
Hence, option (c).

91. **(a)** $|x^2$=x — 6| =x +2
∴|(x-3)(x+2)|= x +2
Case 1: x < -2.ie.(x-3)x+2)>0
(X-3)x+2)=x+2
∴ x = 4. (which is rejected since 4 is not less than -2)
Case 2: x = —2.
This is a real root of this equation.
Case 3: -2 <x <3. ie. (x-3)x+2)<0
(x-3)x+2)=x+2
∴ X= 2.
Case 4: x = 3.
This does not satisfy the equation so x = 3 is not a root of this equation.
Case 5: x>3. x-3)x+2)>0
(X-3)x+2)=x+2
∴X =4
Required product = (-2) x 2 x 4 = -16.
Hence, option (a).

92. **(d)** Since diameter subtends an angle of 90° at any point on the circumference, ΔAPB is a right angled triangle.



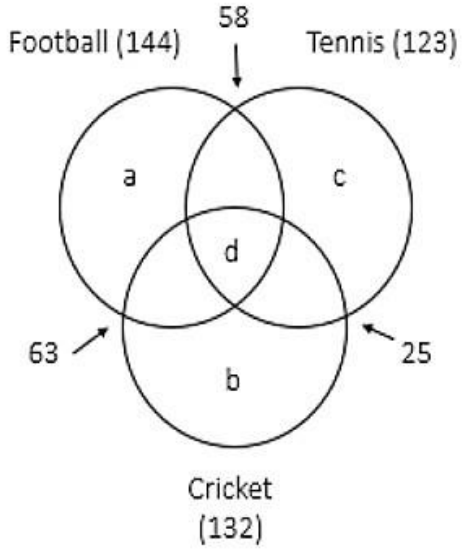
So $AB^2 = AP^2 + PB^2$
$= 10^2 = (2X)^2 + 6^2$
∴ X = 4
ΔAQB is also a right angled traingled , so $AB^2 = AQ^2 + QB^2$
$\therefore 10^2 = X^2 + QB^2$
Put x =4 to get QB =v84 =9.165 ≈ 9.1 cm.

Hence, option (d).

93. **(b)** Let the amount invested by Amala, Bina and Gouri be 3x, 4x and 5x respectively.
Also, let the respective rates be 6r, 5r and 4r.
So, the respective ratio of simple interest is (3x x 6r) : (4x x 5r) : (5x x 4r) = 18xr : 20xr : 20xr.
Bina's interest income exceeds Amala's by Rs 250.
∴ 20xr — 18xr = 250.
∴ xr = 125.
Total interest income = 18xr + 20xr + 20xr = 58xr = 58 x 125 = Rs. 7250.
Hence, option (b).

94. **(9)** Since the amount invested is in the ratio 2 : 1, we can assum the amout to be 2x and x respectively.
∴ Amount invested in fixed deposit = 15L — 3x (where L is lakhs)
Simple interest earned on the fixed deposit = [(15L — 3x) x (6/100) x 1] ...(1)
Simple interest earned on 2x principle = 2x x (4/100) x 1...(2)
Simple interest earned on x principle = x x (3/100) x 1..(3)
(1) + (2) + (3) = 76000.
Solving we get; x = 2L.
So, amount invested in fixed deposit = 15L — 3x = 15L — 6L = 9L.
Hence, 9.

95. **(b)** From observing the data given, we find that it is a closed 3 set Venn diagram.
Let the three sports be F, T and C for Football, Tennis and Cricket respectively
n(FUTUC) = 256,
n(F) = 144, n(T) = 123, n(C) = 132,
n(FNT) = 58, n(CnT) = 25, n(FnC) = 63



We know that (AUBUC) = n(A) + n(B) +n(C) - n(AnB) - n(BnC) - n(CnA) + n(AnBnC)
So, 256 = 144 + 123 + 132 - 58 - 25 - 63 + n(FnTnC)
n(FNTnC) = 256 - 144 + 123 +132 - 146
n(FnTnC) = 256-253 =3
Now, n(Students who play only Tennis) = 123 - (55 + 3 + 22) = 123 - 80
n(Students who play only Tennis) = 43 students.
Hence, option (b).

96. **(b)** $\log_5(x+y)+\log_5(x-y)=3$
$\therefore \log_5(x+y)(x-y)=3$
$\therefore (x+y)(x-y)=5^3=125$
So, $x^2-y^2=125$
$\log_2 y-\log_2 x=1-\log_2 3$
$\therefore \log_2(\frac{3y}{x})=1$
$\therefore (3y/x)=2^1=2$
So, $3y=2x$ ...
Solving (1) and (2), we get; x = 15 and y = 10.
$\therefore xy=15\times 10=150.$
Hence, option (b).

97. **(a)** Given, $5.55^x = 0.555^y 1000 = k$ say.
$= 5.55^X = k = 555 = K^{1/X}$ (1)
$= 0.555^Y = K = 0.555 = K^{1/X}$.....(2)
$= 1000^z = 10^3 = k = 10 = K^{\frac{1}{3}}$ ... ... (3)
$= 5.55 \times 10 = 0.555$
$\therefore k^{1/x} \times k^{1/3} = k^{1/y}$
$= k^{1/x+} + 1/3 = k^{1/y}$
= 1/x+1/3=1/y
= 1/x-1/y=1/3
Alternately,
$5.55^x = 0.555^y = 1000$
Taking log to the base 10, we get;
$\log(5.55^x) = 109(0.555^y) = \log(1000) = \log 10^3 = 3$
∴ x log 5.55 =y log 0.555 = 3
So, (1/%) = (log 5.55)/3
(1/y) = (log 0.555)/3
Log 0.555 = log 5.55 x 10^{-1} = log 5.55 + log 110^{-1} = (log 5.55) - 1.
So, (1/y) = [(log 5.55) — 1]/3
(1/x) - (1/y) = [log 5.55)/3] — [{(log 5.55) — 1}/3] = 1/3.
Hence, option (a).

98. **(3)** Given, $f(1)=2$
Now,
$f(2)=f(1+1)=f(1)\times f(1)=2\times 2=4=2^2.$
$f(3)=f(1+2)=f(1)\times f(2)=2\times 2^2=2^3.$
$f(3)=f(1+3)=f(1)\times f(3)=2\times 2^3=2^4.$
So, $f(n)=2^n.$
$f(a+1)+f(a+2)+\cdots+f(a+n)=16(2^n-1)$
$\therefore 2^{(a+1)}+2^{(a+2)}+\cdots+2^{(a+n)}=2^4(2^n-1)$
$\therefore 2^{(a+1)}[1+2+\cdots 2^{(n-1)}]=2^4(2^n-1)$
$\therefore 2^{(a+1)}(2^n-1)=2^4(2^n-1)$
$\therefore 2^{(a+1)}=2^4$
So, $a+1=4$
∴ a = 3.
Hence, 3.

99. **(d)** —2 <2cos(x(x + 1)) <2
$\therefore -2\le 2^x+2^{-x}\le 2$
Let 2^xbe a, so $2^{-x}is\ 1/a$
So, -2≤ a+ (1/a) ≤ 2
$\therefore -2\le (a^2+1)\le 2$
$\therefore -2a\le (a^2+1)\ \le 2a$
$\therefore (a^2+1+2a)\ge 0=(a+1)^2\ge 0, so\ a\epsilon\ R$
Also, $a^2+1+2a\le 0=(a+1)^2\ge 0$, So a=1
Hence a= 1
So, $2^x=1$
∴ x = 0
So, there is only one real root.
Hence, option (d).