

CAT 2016 SOLVED PAPER

(Memory Based)

SECTION I : VRC

Directions for questions 1 to 6: The passage given below is followed by a set of six questions. Choose the most appropriate answer to each question.

My mother, deeply rooted in the peasant culture of her native Punjab, was always immersed in the supernatural. She was born into Sikhism, but – like many Indians of her generation – her knowledge of her religion was never strong. She could never name its 10 founding gurus; nor had she any interest in its monist theology which encourages an internal experience of God through meditation.

Her Sikhism was an emotionally driven, personal mish-mash of various customs from across the subcontinent – most of it Hindu. She visited temples daily, prayed each morning and chanted Sanskrit hymns – without understanding a word – while wafting incense through the house. And she fasted – a lot.

Her religion was disordered, ad-hoc and impossible to pin down, but it was a constant in my life and it inspired me. I have an abiding love of myth – the first book I took out of a library was about the Greek heroes – and I find India and its spiritual traditions enchanting. I've made dozens of pilgrimages there to sites of Sikh martyrdom, birthplaces of Hindu avatars and the shrines of Sufi babas. I have a lasting fascination with yoga and mystical experiences.

Mum's supernatural thinking – her certainty that creation was shaped by divine beings and magical forces, and influenced by spells and curses – was, I felt, a link between myself and my ancestors, stretching back millennia. I loved talking to her about the stories in the *Puranas*, about Krishna battling snake-devils and Shiva churning the oceans for the nectar of immortality, on her terms – as things that actually happened – and seeing her light up with excitement at the tales.

But last year she found Jesus – and all her fantastical pagan ways went out of the window. She had begun to seek Him in earnest the year before. My mother works for a catering company in Southall, west London, cleaning the dishes that come off the planes at nearby Heathrow Airport, and it was an evangelist colleague, a former Sikh, who invited her to a Christian prayer service in a local church. "I felt peace straight away," Mum said. "From the first time I went and listened to people's testimonies, about how Jesus had healed and changed their lives, I felt peace."

She continued visiting the church, which has a north-Indian congregation and conducts its services in Punjabi, and lost interest in her old ways. Then Jesus came to her in a dream: "He held my hand," she told me. "He said he was with me and wouldn't leave me. I woke up and I could still feel it."

Her conversion itself wasn't too surprising. The story of Jesus is, by Indian standards, a plausibly humdrum one. Most Indian villagers could point you towards someone who cures the sick, raises the dead and knows the secret of eternal life. And the morphing of religions has always been a common occurrence there. What unnerved me was my sense of betrayal, the painful sense of rejection as Mum turned her back on what had been our abiding bond. It felt like she'd turned her back on me.

1. According to the passage, which of the following cannot be inferred to be true about the author's mother?
 - (a) She did not experience a lasting connection with her original religion.
 - (b) She looked towards religion as an answer to her problems.
 - (c) She had always felt a disconnect with the Sikhism.
 - (d) She came from a humble background.
2. According to the passage, which of the following options would best explain the original religious philosophy of the author's mother?
 - (a) She felt a oneness in the diversity of religion.
 - (b) She was staunch in following every custom of her religion.
 - (c) She turned to religion for emotional fulfilment over the spiritual.
 - (d) She would follow the religious creed according to her whims and fancies.
3. According to the passage, it can be inferred that the author's mother stepped over to another religion because
 - (a) she felt assured that she was not alone in her suffering.
 - (b) people from her community were doing so.
 - (c) she did not feel a major difference in following the new religion.
 - (d) she finally felt the peace that she had been searching for long.

4. From the passage, it can be best inferred that the author
 (a) is nonchalant about his mother's religious affiliations.
 (b) has mixed feelings on his mother's conversion.
 (c) feels betrayed that she left his religion and moved to another.
 (d) viewed his own reaction in an objective manner.
5. According to the passage, the story of Jesus is, by Indian standards
 (a) unbelievable (b) polemic
 (c) unexciting (d) misunderstood
6. According to the author, what happened after the author's mother discovered Jesus?
 (a) She stopped practicing fasts and other rituals.
 (b) She started regularly dreaming about Jesus.
 (c) She abandoned her faith and her family.
 (d) She betrayed her son's trust.

Directions for questions 7 to 12: The passage given below is followed by a set of six questions. Choose the most appropriate answer to each question.

I enjoyed *Imaginary Friends*. Lurie's keen eye for detail, plot twists, and subtle, laugh-out-loud humour brings the Festinger study to another level. Lurie includes and goes beyond the participant-observer point of view of the sociologist. She deftly choreographs how cults can affect and change those who study them, just as sociologists can change the cults they study. In many ways, Lurie explores critiques of Festinger's theory and methodology while she sustains the reasoning behind them.

Imaginary Friends is the story of two male professors, one seasoned and the other just out of graduate school. Doctor Tom McMann as the lead sociologist is a large, fit, middle-aged, never-married fellow. He has established a powerful reputation among his colleagues after just one important publication. McMann convinces his new, young colleague Roger Zimmern, a non-practicing Jew, to help him find a charismatic group so that the two can test a sociological theory. It has been decades since McMann has published anything of significance. He is anxious that no other colleague knows about the project until he gathers his data. Zimmern finds a small, newly formed cult in the nearby town of Sophis—Lurie mimics Festinger's Seekers with her cult the Truth Seekers. The two men successfully infiltrate the group that exhibits little suspicion of their motives, save for one member, Ken. McMann wants to observe how unexpected change and unfulfilled prophecies affect group dynamics. He

predicts that, after cognitive dissonance from a "disconfirmation," the group will adjust through rationalizations and by increased recruiting. The sociologists expect to participate for months, if necessary.

Roger narrates the story from the perspective of reflection months after things have fallen apart. The comic events originally occurred when Roger got in over his head in more ways than one during the project. The story is his effort to make sense of all the apparent nonsense that happened then.

The core of the cult depends on Verena, a college dropout at age 19, who moves in with her Aunt Elsie, an avid Spiritualist. Elsie encourages Verena's mediumistic sensibilities. Through automatic writing, Verena makes contact with an alien race of Guardians from the planet Varna. The Varnian leader Ro channels information to the group through Verena's cryptic scrawls written after she enters a trance state. The group also hears from Mo and Ko of Varna in this way.

Roger describes Verena as both a nut and a sensitive, alluring waif with sculpted features, and hypnotic and liquid eyes. McMann poses as the professor that he is, but in personality more like an affable, accommodating car salesman. Throughout the text, Roger refers to himself as both Roger Zimmern, the objective scholar, and as "Stupid Roger," the klutzy, shy professor truly interested in contact with Varna. His split persona adds to the tension he feels and the confusion he exhibits, all of which cause uncomfortable, if comic, moments. He eventually wonders who is crazy: Is it he, McMann, or the group?

During weeks of meetings with six or seven others in Elsie's house, Roger endures progressive changes in diet and belief structures. He tries ineffectively to memorize layers of lessons derived from Ro, Spiritualist doctrine, and idiosyncratic truths that members add to group metaphysics. McMann and Zimmern try their best to be nondirective and participatory, but some circumstances push their acting abilities.

7. Which of the following, according to the passage, can best be inferred from the passage?
 (a) The study of cult and group behaviour is an exhausting process.
 (b) Sociologists are affected by the behaviour and lives of those they study.
 (c) In the study of cults, the observer and the observed can both be affected by each other.
 (d) Roger, in his enthusiasm to impress the group, becomes progressively stupid.

- 8.** According to the passage, which of the following can be said to be untrue about *Imaginary Friends*?
- Lurie bases her protagonists on the actual sociologists who undertook the Festinger study.
 - Lurie takes her book beyond a level that the Festinger study achieved.
 - The book is a fiction based on a study conducted on a cult.
 - The plot is a first person account of one of the sociologists and his effort to understand his experiences with the cult.
- 9.** Which of the following has been mentioned in the passage as a result of an unfulfilled prophecy within a cult?
- There is an effect on group dynamics.
 - There is a cognitive dissonance within the group.
 - The group has to go through the unexpected change that follows.
 - The group adjusts through a process of rationalisations.
- 10.** From the passage, which of the following cannot be inferred about the indoctrination process of the cult that Roger joins?
- A comic pairing of a new recruit and an older member of the cult.
 - A requirement to inculcate the new beliefs of the cult.
 - Change in food consumption.
 - The memorisation of truths which are specific to the cult.
- 11.** Which of the following is an apt title for the passage?
- The Festinger Study – A Critical Analysis
 - McMann and Roger – An Unlikely Pair
 - Imaginary Friends* – A Review
 - Sociological Integration in Cults
- 12.** According to the passage, which of the following can be true about Verena?
- She was an insane yet alluring waif with attractive features.
 - She had a certain charisma that appealed to Roger.
 - She was way too young to be a part of a cult.
 - She had been exploited and brainwashed by her aunt into joining the cult.

Directions for questions 13 to 15: The passage given below is followed by a set of three questions. Choose the most appropriate answer to each question.

Why do sensible and rational people seem to lose the ability to act sensibly and rationally when they are in

conflict? What makes some families tear themselves apart in a variety of squabbles which to outsiders may seem petty but which result in family members not speaking to each other for years? What drives neighbours to blight their daily lives with unpleasant, bitter, and confrontational disputes? And how can otherwise placid and restrained people become almost unrecognizable when involved in road rage incidents – or even trolley rage in supermarkets?

The answer may be distilled down to one psychological phenomenon: self-esteem. It is one of the strongest motivating factors in conflict and generates powerful emotions. We all have self-esteem, whether corporate or individual; we all have a need to think well of ourselves, and for others to think well of us. Self-esteem governs many of the decisions we make daily, as we expend huge amounts of time and effort constantly maintaining and protecting our self-image.

The flipside of our desire for approval is our aversion to disapproval – or worse still, our dread of humiliation. An example of this is the fear of public speaking – a dread that can be greater than that of flying or even of death. It is explained by the fact that the disapproval of each person in the audience constitutes a potentially significant attack on our self-image. The larger the audience, the more overwhelming is the prospect of humiliation.

There is now neurological evidence demonstrating the effect that attacks on our self-esteem have on the brain. One study showed that "social pain" activated the same circuits of the brain as physical pain. Consequently any attack on our self-image is interpreted by the brain as physical pain. When we speak of "hurt" feelings, we acknowledge that any form of censure, from slight criticism to outright condemnation or rejection, affects our self-esteem and is felt as physical pain – hence our aversion to admitting fault or to accepting liability. The word "sorry" is one of the most difficult to express, despite it being the quickest, cheapest, and most effective form of resolving a dispute. But our brain seems to indicate to us that saying sorry will be as painful as putting our hand into a fire.

- 13.** What is the theme of the first two paragraphs of this passage?
- Inability to act rationally in a conflict
 - Lack of conversation between family members
 - Behaviour of people in road rage incidents
 - Response of people to injured self-esteem
- 14.** According to the passage, what kind of evidence does the author cite in support of his claim that we react with various degrees of violence to attacks on our self-esteem?
- Empirical
 - Sociological
 - Neurological
 - None of the above

15. According to the passage, the author would agree with all of the following except:
- The desire for approval is ubiquitous.
 - Since the brain interprets any attack on our self esteem as physical pain such pain can be treated and cured like a physical pain.
 - Some people have a far greater fear of public speaking than that of death because the former incurs the displeasure of so many people.
 - Self esteem plays a major role in our lives.

Directions for questions 16 to 18: The passage given below is followed by a set of three questions. Choose the most appropriate answer to each question.

At a nondescript tin shed in Mumbai's Lower Parel, a young man lights a lamp in front of a photo of *Hanuman* before stepping into the red mud pit where he is being trained in *kushti* by Prakash Ranwade, national wrestler and secretary of the Bombay Wrestling Association. This is the 85-year-old Laxmi Narayan VayamShala, possibly among the oldest *kushti akharas* in India.

In the 18th century, the Maratha rulers of Kolhapur promoted *kushti* enthusiastically, including encouraging women to take up training. Later, the British encouraged *pehelwans* by employing them in security services and the police force, etc. Then, in the early 20th century, it was the turn of the mills to play patron by employing the *pehelwans*.

But *kushti* is finally vanishing from Mumbai. The *taleems* or training houses have been slowly shutting down. "Earlier we used to have at least 25 *taleems* around Parel and Lower Parel. But today there are only four or five, and they are struggling to survive," says Tanwade. At Laxmi Narayan VayamShala, there are only eight wrestlers, who practice on the ground floor and live on the first floor. They used to come from all over Maharashtra, but not so much anymore.

"I used to learn *kushti* but now I play cricket. There is no partner to wrestle with and no future either," says Class 10 student Akanksha, the daughter of Ramachandra Patil. Her father represented Maharashtra twice in the national wrestling championships, and she would have liked to make him proud.

But some signs of hope are sprouting. A State-level championship was held in Nagpur after 28 years, and the Maharashtra Chief Minister has also promised to lend support. The few remaining *taleems* might yet get back their glory days.

16. According to the passage, why is *kushti* vanishing from Mumbai?
- because cricket is more popular
 - because there are no state level competition
 - because there are no patrons
 - because of lack of space

17. According to the passage, what does the author mean when he says that the Maratha rulers promoted *kushti*?
- They honoured the winners of contests.
 - They attended *kushti* championships.
 - They invited the wrestlers to the court.
 - They gave financial encouragement to those who took up *kushti*.

18. Which of the following can be inferred from the passage?

- Political recognition is necessary for any sport to flourish.
- Wrestling is dying in Mumbai for lack of state government's encouragement.
- The former wrestlers do not encourage their children to take up *kushti* anymore.
- Material reward and the prospect of livelihood are needed to attract people to *kushti*.

Directions for questions 19 to 24: The passage given below is followed by a set of six questions. Choose the most appropriate answer to each question.

Why is it that during the Renaissance, China fell behind Europe in technology? Often people assume that it has something to do with the Confucian tradition in China supposedly making the Chinese ultra-conservative, whereas the Judeo-Christian tradition in Europe supposedly stimulated science and innovation. Well, first of all, just ask Galileo about the simulating effects of the Judeo-Christian tradition on science. Then, secondly, just consider the state of technology in medieval Confucian China. China led the world in innovation and technology in the early Renaissance. Chinese inventions include canal lock gates, cast iron, compasses, deep drilling, gun powder, kites, paper, porcelain, printing, stern-post rudders, and wheelbarrows — all of those innovations are Chinese innovations. So the real question is, why did China lose its enormous technological lead to late-starter Europe? Why did the Renaissance affected Europe and not China?

We can get insight by seeing why China lost its lead in ocean-going ships. As of the year 1400, China had by far the best, the biggest, and the largest number of, ocean-going ships in the world. Between 1405 and 1432 the Chinese sent 7 ocean-going fleets, the so-called treasure fleets, out from China. Those fleets comprised hundreds of ships; they had total crews of 20,000 men; each of those ships dwarfed the tiny ships of Columbus; and those gigantic fleets sailed from China to Indonesia, to India, to Arabia, to the east coast of Africa, and down the east coast of Africa. It looked as if the Chinese were on the verge of rounding the Cape of Good Hope, coming up the west side of Africa, and colonizing Europe.

Well, China's tremendous fleets came to an end through a typical episode of isolationism, such as one finds in the histories of many countries. There was a new emperor in China in 1432. In China there had been a Navy faction and an anti-Navy faction. In 1432, with the new emperor, the anti-Navy faction gained ascendancy. The new emperor decided that spending all this money on ships is a waste of money. Okay, there's nothing unusual about that in China; there was also isolationism in the United States in the 1930's, and Britain did not want anything to do with electric lighting until the 1920s. The difference, though, is that this abandoning of fleets in China was final, because China was unified under one emperor. When that one emperor gave the order to dismantle the shipyards and stop sending out the ships, that order applied to all of China and China's tradition of building ocean-going ships was lost because of the decision by one person. China was a virtual gigantic island, like Tasmania.

Now contrast that with what happened with ocean-going fleets in Europe. Columbus was an Italian, and he wanted an ocean-going fleet to sail across the Atlantic. Everybody in Italy considered this a stupid idea and wouldn't support it. So Columbus went to the next country, France, where everybody considered it a stupid idea and wouldn't support it. So Columbus went to Portugal, where the king of Portugal considered it a stupid idea and wouldn't support it. So Columbus went across the border to a duke of Spain who considered this stupid. And Columbus then went to another duke of Spain who also considered it a waste of money. Finally, on the seventh try, Columbus went back to the king and queen of Spain, who said, all right, you can have three ships, but they were small ships. Columbus sailed across the Atlantic and, as we all know, discovered the New World, came back, and brought the news to Europe. Cortez and Pizarro followed him and brought back huge quantities of wealth. Within a short time, as a result of Columbus having shown the way, 11 European countries jumped into the colonial game and got into fierce competition with each other. The essence of these events is that Europe was fragmented, so Columbus had many different chances.

19. What was the impact of the Renaissance on China?

- (a) It led to an intellectual rebirth.
- (b) It had the effect of resuscitating knowledge.
- (c) It gave birth to intellectual fermentation.
- (d) It did not affect China.

20. What was the relation between China's maritime strength and inventions?

- (a) China became military strong and so could devote time to inventions.
- (b) Chinese maritime trade made China wealthy and allowed her to pursue new ideas.

(c) Chinese sea farers visited many lands which led to a cross pollination of thought and this in turn gave birth to new concepts.

(d) The sea farers of China sailed far and wide, thus, putting a premium on the proper maintenance of the craft which forced the crew of these ships to come up with new ideas.

21. What does the author mean when he refers to Galileo and the influences of the Judeo Christian tradition?

- (a) It is generally believed that the Judas Christian tradition encouraged science.
- (b) England and Europe use their phenomenal achievements in sciences and innovation to the Judas Christian tradition.
- (c) The Judas Christian tradition stifled science.
- (d) The Judas Christian tradition played no role but get the credit for the flowering of sciences and innovation.

22. What is the message of this passage?

- (a) Maritime buyer is essential for sciences and innovation.
- (b) The Renaissance played a major role in shifting the balances of power.
- (c) Italian curiosity in conjunction with European wealth led to the development of Europe.
- (d) Concentration of power in one hand can as easily destroy a country as it can strengthen it.

23. What is the author's opinion about isolationism?

- (a) It is nothing unusual.
- (b) Several countries including the United States have practised isolationism at one time or another and they have not come to any harm.
- (c) The isolation resulting from the dismantling of navies did not harm China in any way or affect its science and innovation.
- (d) The absolute power of the Chinese emperor brought about the isolation of China, which has the potential to kill science & innovation.

24. Why does the author refer to the colonial game?

- (a) The colonies enriched the European countries.
- (b) The colonies facilitated transfer of large chunks of population thereby enriching the lives of remaining populations.
- (c) The colonies necessitated the build-up of military strength.
- (d) The colonies gave rise to fierce competition.

- 25.** The following question consists of a paragraph which is followed by four options. Among the given options, choose the one which captures the essence of the paragraph accurately and clearly. Type in that option as the answer in the space provided below the question.

There is a difference between knowingness and knowledge, but what is it? Knowingness comes after knowledge; it is only the echo of its source, and it is proud to be the echo. One of the liberties of our connected age is that we can be almost infinitely knowing, consoling our lack of true knowledge with an easy cynicism of acquisition. It is cheaply glorious to be able to discover almost any fact about the world. On the machine I am using to write this review: I experience that liberty as the reward it is, and also as a punishment; as both a gift of the digital world and a judgment on my scant acquaintance with the actual world. Speak for yourself, you may say. Who is this "we," so easily invoked? If knowingness is capitalism's gift to those metropolitan élites who haven't earned it, there are also multitudes of people, constrained by poverty and political oppression and the bad luck of obscurity, who don't deserve the brutal "knowledge" that is being meted out daily on their lives; they would be very grateful for the privileges of knowingness.

1. Those overlooked by capitalism would willingly choose knowledge and this diminishes the value of the argument of cynicism made by the sheltered elites about knowledge.
2. Capitalism shields the elites from a full acquaintance with the world while exposing the poor to the world and this explains their different attitudes towards privileges.
3. The ease of acquisition is a reward for the underprivileged that would be grateful for even the 'cheap glory' associated with it.
4. The cynical argument of the ease of knowingness wanes when one grasps that those less fortunate would gladly embrace this 'ease' rather than an immersed acquaintance with the world.

- 26.** The following question consists of a paragraph which is followed by four options. Among the given options, choose the one which captures the essence of the paragraph accurately and clearly. Type in that option as the answer in the space provided below the question.

As in the 18th century, so in the 21st. Cognitive psychologists with their innatist views tell us that women work with a finer mesh of emotional understanding than men. The novel - by that view

the most feminine of forms - answers to their biologically ordained skills. From other rooms in the teeming mansion of the social sciences, there are others who insist that it is all down to conditioning. But perhaps the causes are less interesting than the facts themselves. Reading groups, readings, breakdowns of book sales all tell the same story: when women stop reading, the novel will be dead.

1. In the 21st century too, the survival of the novel depends on female readership, which is to say it depends on their innate inclination towards fine emotional understanding.
2. As psychology has shown, both women and the novel share a deep reservoir of emotional understanding, which underscores the reason for the dependence of the novel on female readership.
3. Some social sciences argue that women are conditioned by society to have finer emotional understanding, which explains why the novel depends on women readers for its survival.
4. It may be down to nature or nurture, but even in the 21st century one thing is clear: if women read on, the novel lives on.

- 27.** The following question consists of a paragraph which is followed by four options. Among the given options, choose the one which captures the essence of the paragraph accurately and clearly. Type in that option as the answer in the space provided below the question.

The century since Franz Kafka was born has been marked by the idea of "modemism"—self-consciousness new among centuries, a consciousness of being new. Sixty years after his death, Kafka epitomizes one aspect of this modern mind-set: a sensation of anxiety and shame whose center cannot be located and therefore cannot be placated; a sense of an infinite difficulty within things, impeding every step; a sensitivity acute beyond usefulness, as if the nervous system, flayed of its old hide of social usage and religious belief, must record every touch as pain. In Kafka's peculiar and highly original case this dreadful quality is mixed with immense tenderness, oddly good humor, and a certain severe and reassuring formality. The combination makes him an artist; but rarely can an artist have struggled against greater inner resistance and more sincere diffidence as to the worth of his art.

1. Despite Kafka's shyness and struggles he is a quintessential modernist artist, as he, quite unlike any other, manages to juxtapose tenderness and humor with pain and an implacable sense of anxiety and shame.

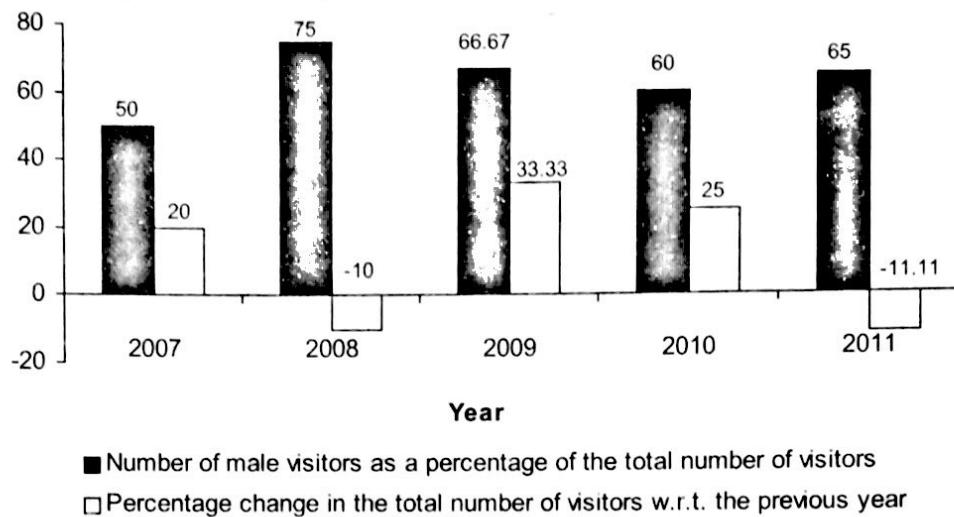
2. Kafka's ability to lace his literature with themes of modernism such as anxiety, shame and pain intermingled with humor and tenderness makes him an original modernist.
3. Kafka was ahead of his time as he exemplifies the modernist mindset of anxiety and pain, but he is raised to the level of an artist only when he manages to mix this with humor and tenderness.
4. Kafka's shyness and inner struggles are an outcome of the modernism he displays wherein the thoughts are permeated with anxiety and pain, but as he is an artist he uses humor and formality as a reassurance.
- 28.** The following question consists of a set of five sentences. Out of these, four sentences can be arranged to make a coherent paragraph. One sentence doesn't belong to the paragraph. Type in that option as the odd one out in the space provided below the question.
1. Management of tropical forests could stabilize current CO₂ concentrations while nations transition from fossil fuels to clean, renewable energy.
 2. Forests' carbon-storing abilities cannot compare to the potential emissions in the planet's current fossil fuel reserves
 3. But a fresh look at forests might reveal a solution.
 4. Negotiators in Paris face a tough job hammering out a global agreement to slash greenhouse gas emissions far enough and fast enough to prevent the worst effects of climate change.
 5. If governments could reverse tropical deforestation; the planet could buy some time.
- 29.** The following question consists of a set of five sentences. Out of these, four sentences can be arranged to make a coherent paragraph. One sentence doesn't belong to the paragraph. Type in that option as the odd one out in the space provided below the question.
1. More and more land is being cleared for people to plant crops like cotton and tobacco, creating runoff downriver that silts up rivers and shrinks waterholes for Africa's remaining hippo population.
 2. Low-slung with big bellies, hippos appear awkward on land, but they are fast runners for their size (more than 9,000 pounds for some adult males) and, can cover great distances when defending their territory or searching for food.
 3. Male hippos regularly take over a length of riverbank to establish mating territory.
4. With a name derived from the Greek words for "river horse," hippopotamuses are semiaquatic herbivores that live their lives in water, except for evening rituals when they follow well-worn paths up riverbanks to feeding grounds.
5. Sometimes, these squatting rights result in fierce battles, during which the males bellow loudly and bare their huge canine teeth.
- 30.** The following question consists of a set of five sentences. Out of these, four sentences can be arranged to make a coherent paragraph. One sentence doesn't belong to the paragraph. Type in that option as the odd one out in the space provided below the question.
1. Neanderthals, the closest extinct relatives of humans, lived in Eurasia from about 200,000 to 30,000 years ago.
 2. To investigate this question, the researchers examined the facial bones of Neanderthals.
 3. Some scientists think that Neanderthals and humans are on the same branch of the family tree.
 4. "However, our findings, based upon facial growth patterns, indicate they are indeed sufficiently distinct from one another," Lacruz said.
 5. Bone is created with bone-forming cells called osteoblasts, and it's broken down with bone-absorbing cells called osteoclasts.
- 31.** The following question consists of a set of five sentences. These sentences need to be arranged in a coherent manner to create a meaningful paragraph. Type in the correct order of the sentences in the space provided below the question.
1. The 1800's were transitional years in the struggle for individual democratic human rights.
 2. The controversy surrounding the Women question is but one example of the shifting sands underlying the so-called firm foundation of the period's attitudes toward faith, morality, and "every assertion [was] met with a counter-assertion."
 3. Most people today still believe the myth that the Victorian era was a period of a universally accepted value system; that most women lived leisurely, inactive lives, and that husbands and wives remained serenely together, both serving their separate functions in making life pleasant and meaningful.

4. As Walter Houghton has argued so forcefully in *The Victorian Frame of Mind*, the Victorian period could best be characterized by the word "doubts."?
5. Such, however, was not the case, as recent scholarship has shown.
32. The following question consists of a set of five sentences. These sentences need to be arranged in a coherent manner to create a meaningful paragraph. Type in the correct order of the sentences in the space provided below the question.
1. The emergence of life might not be the luck of atoms arranging themselves in the right way, it says, but an inevitable event if the conditions are correct.
 2. But a new theory, proposed by a researcher at MIT and first reported in *Quanta Magazine*, proposes that when a group of atoms is exposed for a long time to a source of energy, it will restructure itself to dissipate more energy.
 3. "You start with a random clump of atoms, and if you shine light on it for long enough, it should not be so surprising that you get a plant," England said.
 4. Paul Rosenberg, writing this week on Richard Dawkins' site, said that the theory could make things "a whole lot worse for creationists".
 5. The problem for scientists attempting to understand how life began is understanding how living beings – which tend to be far better at taking energy from the environment and dissipating it as heat – could come about from non-living ones.
33. The following question consists of a set of five sentences. These sentences need to be arranged in a coherent manner to create a meaningful paragraph. Type in the correct order of the sentences in the space provided below the question.
1. The fundamental idea behind any such theory— which we may call the *immediacy thesis*—is that judgments of beauty are not (or at least not primarily) mediated by inferences from principles or applications of concepts, but rather have all the immediacy of straightforwardly sensory judgments.
 2. It was against this, and against more moderate forms of rationalism about beauty, that mainly British philosophers working mainly within an empiricist framework began to develop theories of taste.
3. Rationalism about beauty is the view that judgments of beauty are judgments of reason, i.e., that we judge things to be beautiful by reasoning it out, where reasoning it out typically involves inferring from principles or applying concepts.
4. It is the idea, in other words, that we do not reason to the conclusion that things are beautiful, but rather "taste" that they are.
5. At the beginning of the 18th century, rationalism about beauty had achieved dominance on the continent, and was being pushed to new extremes by "les géomètres," a group of literary theorists who aimed to bring to literary criticism the mathematical rigor that Descartes had brought to physics.
34. The following question consists of a set of five sentences. These sentences need to be arranged in a coherent manner to create a meaningful paragraph. Type in the correct order of the sentences in the space provided below the question.
1. Game theory can also help us to understand how the ongoing Greek bank run could be quelled by European policymakers signalling that a "Grexit" is out of the cards, dispelling asymmetric information in what's known to game theorists as a "Bayesian game."
 2. Using this type of analysis can help us understand better why a "Grexit" is a non-credible threat and what is known to game theorists as a "strictly dominated strategy".
 3. One key question to ask is what makes this default stand-off difference from previous Greek defaults in the past few years?
 4. The Nash equilibrium, named after Nash who proved its ubiquitous existence in his 28-page Nobel-prize winning 1951 Ph.D. thesis, was a revolutionary concept that essentially a way to predict the outcome of events in matters of conflict and non-cooperation much like between Greece and Europe in their present stand-off.
 5. To understand how the "game" works and identify the Nash equilibrium (the predicted outcome), one must first understand the incentives of all players, namely those of Greece and the rest of Europe.

SECTION II : LRDI

Directions for questions 35 to 38: Answer the questions on the basis of the information given below.

The bar graph given below shows the data related to the number of people visiting a famous museum named 'Ancient Wax' in Putlabad from the year 2007 to the year 2011.



35. If the total number of visitors in the year 2006 was 46850, what was the number of female visitors in the year 2011?

36. How many of the following statement(s) is/are true?

- (i) The only year in the given period when the number of female visitors decreased as compared to the previous year was 2008.
- (ii) There was a growth of 40% in the number of male visitors from 2008 to 2009.
- (iii) There was a growth of 50% in the number of female visitors from 2009 to 2010.
- (iv) The year 2008 onwards, there was an increase each year in the number of male visitors as compared to the previous year.

37. The difference between the number of male visitors and the number of female visitors in a year is called "Gender Gap". For which of the following pairs of years is Gender Gap equal?

Fill 1 if "your answer is 2008 and 2011"

Fill 2 if "your answer is 2009 and 2010"

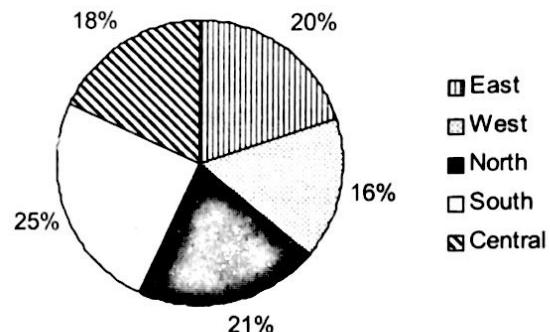
Fill 3 if "your answer is 2008 and 2010"

Fill 4 if "your answer is 2009 and 2011"

38. If the number of male visitors in 2010 was 14796, what was the total number of visitors in 2007?

Directions for questions 39 to 42: Answer the questions on the basis of the information given below.

The pie chart given below shows the percentage break-up of students who participated from five different regions in the Sports Week organized by Dharma Public Association in the year 2011.



The partially filled-in table given below shows the number of students who participated from the five regions in the six events conducted during the Sports Week.

Activity	East	West	North	South	Central
Swimming	23		42	64	19
Lawn Tennis	45	27		46	31
Cycling	39		41	18	45
Badminton	52	49	23	38	
Hockey	21	24	37		25
Football		16	32	34	30

Note:

- (i) Each student who came to the Sports Week participated in exactly one of the six events.
- (ii) At least one student from each region participated in each of the six events.
- (iii) Six cells in the table are left blank. The sum of the six missing values is 279.

39. Which of the following is not a possible ratio of the number of students who participated from the West region in Swimming and Cycling respectively?

- (a) 7 : 8
- (b) 3 : 5
- (c) 5 : 7
- (d) 1 : 9

40. Which of the six events witnessed the highest participation from the students of the five regions put together?
 (a) Swimming (b) Cycling
 (c) Badminton (d) Cannot be determined
41. The number of students who participated in Badminton from central region was what percentage of the number of students who participated in Football from East region?
 (a) 80 (b) 120
 (c) 125 (d) 75
42. If the number of students who participated in Swimming from West region was more than that of those who participated in Cycling from West and was also multiple of 5, what is the sum of all the possible values of the product of the number of students who participated in Swimming from West and that of those who participated in Hockey from South?
 (a) 21375 (b) 18875
 (c) 20325 (d) 16875

Directions for questions 43 to 46: Answer the questions on the basis of the information given below.

Ina, Mina and Dika had some money with which they decided to buy the shares of two companies – Bindaas and Jhakkas. The amount with Mina was $\frac{1}{3}$ rd of the total money available with the three of them. Ina and Mina spent equal amounts of money in buying Bindaas shares. The amount spent by Mina on buying Jhakkas shares was twice that of Dika. The amount spent by Ina on buying Jhakkas shares was 50% more than the amount spent on Jhakkas shares by Mina and Dika together. The amount spent by Dika on Bindaas shares was $\frac{1}{9}$ th of the total initial money with the three of them. The amount spent on Jhakkas shares by the three of them together was $\frac{1}{3}$ rd of the total initial money with them. Mina and Dika had equal amounts of money left with them after making the purchases. The amount spent by Dika in buying Jhakkas shares was equal to the amount left with Mina after making the purchases. The money left with Ina after making the purchases was $\frac{1}{15}$ th of the total initial money with the three of them. The amount spent on Jhakkas shares by Mina and Dika together was Rs. 2,00,000 more than the money that was left with the two of them after making the purchases.

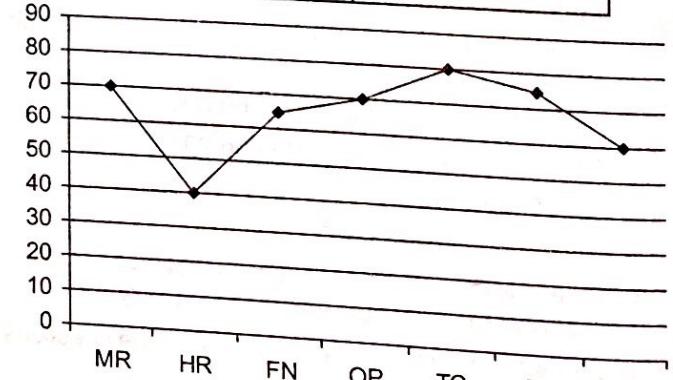
43. If the price of a Bindaas share was Rs. 5,000 then find the number of Bindaas shares bought by the three of them together.
 (a) 420 (b) 440
 (c) 460 (d) 480

44. What was the money available with Ina in the beginning?
 (a) Rs. 21,00,000 (b) Rs. 30,00,000
 (c) Rs. 24,00,000 (d) Rs. 18,00,000
45. Which of the following statement(s) is/are true?
 I. The money spent on purchases as a percentage of the money available with an individual in the beginning was the highest for Dika among the three.
 II. The three of them were left with a sum of Rs. 7,00,000 after making the purchases.
 (a) Only I (b) Only II
 (c) Both I and II (d) Neither I nor II
46. What was the total amount of money (in Rs.) with the three at the beginning?
 (a) 45,00,000 (b) 40,00,000
 (c) 42,50,000 (d) None of these

Directions for questions 47 to 50: Answer the questions on the basis of the information given below.

In an organization, there are seven departments – MR, HR, FN, OP, TC, TL and AD. The table given below shows the number of employees in a few combinations of four departments taken together. The line graph shows the percentage of male employees in the mentioned departments.

Combination of departments	Number of employees
MR, HR, FN, OP	870
TC, TL, AD, MR	600
HR, FN, OP, TC	780
TL, AD, MR, HR	670
FN, OP, TC, TL	630
AD, MR, HR, FN	850
OP, TC, TL, AD	640



47. What is the ratio of the number of female employees in HR department to the number of male employees in TC department?
 (a) 19 : 16 (b) 27 : 19
 (c) 19 : 27 (d) 11 : 5

48. In which department is the difference between the number of male employees and the number of female employees the highest?
- FN
 - TC
 - OP
 - MR
49. The number of male employees in MR, FN and AD departments taken together is approximately what percent more than the number of female employees in HR, OP and AD departments taken together?
- 43
 - 57
 - 52
 - 63
50. What is the absolute difference between the total number of males and that of females across the seven departments?
- 347
 - 350
 - 351
 - 343

Directions for questions 51 to 54: Answer the questions on the basis of the information given below.

H1, H2, H3 and H4 are four horses that participated in each of the four different races – Race-I, Race-II, Race-III and Race-IV – during an annual horse-racing event in Goa. Each horse is owned by a different owner among Rahul, Dharma, Dablu and Ritesh, in no particular order. None of the four horses finished at the same position in more than two of the four races. In each race the four horses were given ranks 1, 2, 3 and 4 according to the positions at which they finished in the race. It is also known that:

- In Race-I, H2 finished third and Ritesh's horse finished first. Interestingly, in Race-II, H2 finished first and Ritesh's horse finished third.
- In Race-IV, H2 finished third and H3 finished fourth.
- Dablu's horse finished at the same position in Race-I and Race-II, and also in Race-III and Race-IV.
- In Race-IV, H1 and H3 interchanged the positions at which they had finished in Race-II.
- In Race-III, H3 finished fourth and H4 finished second.
- Rahul's horse did not finish first in any of the four races.

51. Who are the owners of H3 and H4 respectively?

- Ritesh and Rahul
- Dablu and Ritesh
- Rahul and Dablu
- Cannot be determined

52. Whose horse finished third in Race-III?

- Rahul
- Ritesh
- Dharma
- Either Rahul or Dablu

53. If the horse with the lowest sum of ranks in the four races won a Jackpot of Rs. 1 crore, which horse won the Jackpot?

- H1
- H2
- H3
- H4

54. Which of the following statements is definitely false?
- H2 is owned by Dharama
 - H3 finished second in Race-II
 - H4 finished fourth in Race-II
 - None of these

Directions for questions 55 to 58: Answer the questions on the basis of the information given below.

Anu, Banu, Charu, Dhanu, Ellu, Fiza, Goru and Hina are eight friends, from eight different B-Schools. They perform in Nukkad Natak "LPG" held at Patna. During the performance they sit at a circular table such that four of them face inside i.e. towards the center and the rest four face outside i.e. away from the center of the table. Each of them uses one of the four props – Dholak, Danda, Dafli and Chunni. Anu and Hina sit diametrically opposite to each other and use the same prop. No other pair of friends sitting diametrically opposite uses the same prop. It is also known that:

- Hina from IMT uses Dafli. She sits immediately to the left of both Charu from IMI and Banu from FMS.
- The person sitting diametrically opposite the person from IMI faces inside.
- Goru from IIMS sits immediately to the left of Anu from CIMP.
- Charu and both her immediate neighbours face inside.
- Dhanu from IIMA sits diametrically opposite Ellu.
- The props used by Banu and Charu are Chunni and Dholak respectively.
- Dhanu, who uses Chunni, sits third to the left of the person from IIMR.
- The person from IIFT uses Danda and is the only person sitting between the two persons using Dholak.

55. Who is from IIMR and which prop does he/she use?

- Fill 1 if "your answer is Fiza, Chunni"
- Fill 2 if "your answer is Charu, Dholak"
- Fill 3 if "your answer is Fiza, Dholak"
- Fill 4 if "your answer is Cannot be determined"

56. How many of the following combinations of person-prop is/are correct?

- Goru - Dholak
- Dhanu - Chunni
- Ellu - Danda
- Anu - Dafli

57. The number of friends sitting between Fiza and the friend from FMS is

58. The number of letters in the name of the person who is sitting opposite to Charu is

Directions for questions 59 to 62: Answer the questions on the basis of the information given below.

During a cycle racing event in 2012 Olympic Games, eight riders – Alex, Fausto, Hilton, Jason, Matt, Nathan, Rahsaan and Ryan – cycled in eight different lanes on a track. The lanes were numbered 1 to 8 from left to right in that order. In a strange coincidence, the finishing positions of all the riders were same as their lane numbers. E.g. the rider cycling in the lane numbered 1 finished first, the rider cycling in the lane numbered 2 finished second and so on. It is also known that:

- (i) Exactly two riders finished between Hilton and Rahsaan.
- (ii) Jason finished just ahead of Rahsaan.
- (iii) Nathan finished just ahead of Alex.
- (iv) Jason finished ahead of Hilton.
- (v) Neither Matt nor Ryan finished last.
- (vi) Exactly two riders finished ahead of Jason.

59. Who could not have finished fifth in the race?

- (a) Alex
- (b) Matt
- (c) Nathan
- (d) Ryan

60. Who finished seventh and eighth respectively in the race?

- (a) Rahsaan and Fausto
- (b) Hilton and Fausto
- (c) Jason and Hilton
- (d) Cannot be determined

61. The sum of all the possible positions to which Matt could finish the race was

- (a) 14
- (b) 11
- (c) 12
- (d) 13

62. If Ryan did not finish first, who finished first?

- (a) Nathan
- (b) Matt
- (c) Rahsaan
- (d) Cannot be determined

Directions for questions 63 to 66: Answer the questions on the basis of the information given below.

Amar went for a vacation to a different place every year from 2004 to 2008. His vacation lasted for a different number of day(s) among 1, 2, 3, 4 and 5 on each occasion, in no particular order. It is also known that:

- (i) His vacation in 2007 lasted a day longer as compared to the year when he went to Singapore.
- (ii) He went to Europe in the year next to the one in which he went to the USA.
- (iii) He went to Bangkok in the year next to the one in which his vacation lasted for just 1 day.
- (iv) He didn't go to Europe in 2008. His vacation in Europe lasted for less than 5 days.

(v) His vacation in 2006 lasted a day longer as compared to the year when he went to Nepal.

(vi) He went to Bangkok in 2005 and his vacation lasted for less than 5 days.

63. Which of the following combinations of the destination and the year of vacation is not correct?

- (a) Nepal – 2008
- (b) Europe – 2007
- (c) Singapore – 2004
- (d) None of these

64. How many days did Amar spend on his vacation in Europe?

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

65. Which of the following statement(s) is/are true?

- I. He spent 1 day on his vacation in Nepal.
- II. He spent 4 days on his vacation in the USA.
- (a) Only I
- (b) Only II
- (c) Both I and II
- (d) Neither I nor II

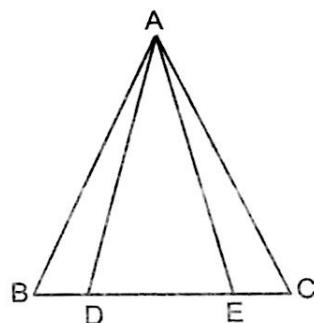
66. In which year did he visit Nepal?

- (a) 2004
- (b) 2006
- (c) 2007
- (d) 2008

SECTION III : QA

67. The absolute difference between the average of first N_1 natural numbers and that of the first N_2 natural numbers is 10. What is the absolute difference between N_1 and N_2 ?

68. In the figure given below, $AD = AE = 4 \text{ cm}$ and $BD = CE = 2 \text{ cm}$. If BC is a straight line and $\angle ADE = 60^\circ$, find the length of AB .

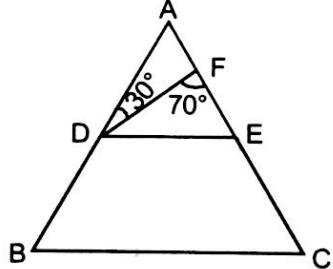


- (a) $2\sqrt{7} \text{ cm}$
- (b) 5 cm
- (c) $2\sqrt{5} \text{ cm}$
- (d) None of these

69. If 'a' and 'b' are the roots of the equation $x^2 + 7x + 4 = 0$, where $a > b$, then find the value of

$$\left(\frac{2}{7a}\right) + \left(\frac{1}{3.5b}\right) + ab.$$

- (a) $\frac{7}{2}$
- (b) $\frac{14}{3}$
- (c) $\frac{-7}{2}$
- (d) $\frac{2}{7}$

70. A contractor agreed to finish a piece of work in 150 days. He employed 75 men and made them work for 8 hours per day. However, after 90 days, he realized that only $\frac{2}{7}$ th of the work was completed. How many more men would he need to employ to complete the work on time if he intended to make everybody work for 10 hours per day henceforth?
71. A cube is painted with red colour and then cut into 64 small identical cubes. If two cubes are picked randomly from the heap of 64 cubes, what is the probability that both of them have exactly two faces painted red?
- (a) $\frac{23}{168}$ (b) $\frac{47}{84}$
 (c) $\frac{1}{4}$ (d) $\frac{3}{8}$
72. Two friends – Prakash and Arpit – started running simultaneously from a point P in the same direction along a straight running track. The ratio of the speeds of Prakash and Arpit was 2 : 5 respectively. Two hours later, Arpit turned back and started running backwards at one-fifth of his original speed. He met Prakash at a distance of 10 km from the point P. What was Prakash's speed?
- (a) 1.25 km/hr (b) 2.5 km/hr
 (c) 3.75 km/hr (d) 6.25 km/hr
73. A function $f(x)$ is defined as $(x+1) \times f(x+1) + x \times f(x) + (x-1) \times f(x-1) = 0$ for $x \geq 2$. If $f(1) = 40$ and $f(6) = 180$, find the value of $f(14)$.
- (a) -80 (b) -160
 (c) -1120 (d) Cannot be determined
74. A 100 ml flask contains 30% acid solution. What quantity of the solution should be replaced with 12% acid solution so that the resultant solution contains 21% acid?
- (a) 50 ml (b) 44.44 ml
 (c) 33.33 ml (d) 64 ml
75. If $a^2 + 6a - 1 = 0$, then what is the value of $\left(a + \frac{1}{a}\right)^2 - 5\left(a - \frac{1}{a}\right)$?
76. How many natural numbers less than or equal to 15 have 4 factors each?
77. If $\log_c a = \frac{1}{2}$, $\log_d b = \frac{1}{3}$, where a, b, c and d are distinct natural numbers and $a < b < c < d$, what is the minimum possible value of $a + b + c + d$?
- (a) 10 (b) 22
 (c) 34 (d) 36
78. Anu and Prem started running simultaneously from diametrically opposite points on a circular track. They ran in opposite directions and met after 12 minutes for the first time. After how long (in minutes) would they meet for the seventh time?
79. An unsharpened cylindrical pencil consists of a layer of wood surrounding a solid cylinder of graphite. The radius of a pencil is 7 mm, the radius of the graphite cylinder is 1 mm and the length of the pencil is 10 cm. Find the cost of the material used in a pencil, if the cost of wood is Rs.0.70/cm³ and that of graphite is Rs.2.10/cm³.
- (a) Rs.8.76 (b) Rs.10.02
 (c) Rs.11.22 (d) Rs.13.74
80. Two circles of radii 'r' units and '2r' units intersect each other in such a way that their common chord is of the maximum possible length. What is the area (in square units) of the region that is common to the two circles?
- (a) $\frac{\pi r^2}{2}$ (b) $\frac{7\pi r^2}{6} - \sqrt{3}r^2$
 (c) $\frac{11\pi r^2}{6} - \frac{\sqrt{3}r^2}{2}$ (d) $\frac{7\pi r^2}{6} - \frac{\sqrt{3}r^2}{2}$
81. In an isosceles triangle ABC shown below, AB = AC, DE || BC, $\angle ADF = 30^\circ$ and $\angle DFE = 70^\circ$. If DF = 4 cm, then find the length of DE.
- 
- (a) 2 cm (b) 4 cm
 (c) $2\sqrt{3}$ cm (d) $4\sqrt{3}$ cm
82. Find the minimum possible value of 'y' if $\frac{4}{7} < \frac{x}{y} < \frac{12}{13}$, where x and y are natural numbers.
- (a) 4 (b) 5
 (c) 3 (d) 2
83. If $4x + 3y : y - 6x :: 14 : 1$, then find the value of $\frac{2x}{y}$.
- (a) $\frac{1}{2}$ (b) $\frac{1}{4}$
 (c) 2 (d) 4

98. $x + \frac{1}{y + \frac{1}{z}} = \frac{68}{21}$, where x , y and z are natural numbers. Find the value of $x + y + z$.

- (a) 9 (b) 12
 (c) 11 (d) 14

99. A florist sells only two kinds of flowers – Rose and Tulip. On a particular day, he sold 70 Roses and 90 Tulips. If none of his customers bought more than one flower of each type, what is the minimum number of customers that must have visited his shop on that day?

100. During a fundraiser event for the elderly people, apart from all the members of the organising committee, a huge number of volunteers also donated some amount for the noble cause. The members of the organising committee made an average contribution of Rs. 1,100 and this sum comprised 88% of the total amount raised through the event. The number of members in the organising committee was 40% more than the number of volunteers. Find the average contribution (in Rs.) made by the volunteers.

ANSWERS

1. (c)	2. (c)	3. (d)	4. (b)	5. (c)	6. (a)	7. (c)	8. (a)	9. (d)	10. (a)
11. (c)	12. (b)	13. (d)	14. (d)	15. (b)	16. (c)	17. (d)	18. (d)	19. (d)	20. (c)
21. (c)	22. (d)	23. (d)	24. (d)	25. 4	26. 4	27. 1	28. 2	29. 1	30. 1
31. 35142	32. 52134	33. 35214	34. 42153	35. 26236	36. 1	37. 4	38. 16440	39. (b)	40. (c)
41. (b)	42. (d)	43. (c)	44. (a)	45. (b)	46. (a)	47. (a)	48. (c)	49. (c)	50. (b)
51. (b)	52. (a)	53. (d)	54. (c)	55. 3	56. 3	57. 3	58. 4	59. (a)	60. (b)
61. (a)	62. (d)	63. (d)	64. (b)	65. (d)	66. (d)	67. 20	68. (a)	69. (a)	70. 150
71. (a)	72. (b)	73. (a)	74. (a)	75. 70	76. 5	77. (d)	78. 156	79. (c)	80. (b)
81. (b)	82. (c)	83. (b)	84. (c)	85. (a)	86. (c)	87. 8	88. (a)	89. (d)	90. (a)
91. (a)	92. 2000	93. (b)	94. (c)	95. (a)	96. (b)	97. (a)	98. (b)	99. 90	100. 210

EXPLANATIONS

1. Option (a) can be inferred from the passage. The author's mother feels the need to convert later in her life. It shows that she did not experience a lasting connection with her original religion. Option (b) can also be inferred from the passage as the author's mother followed her religion seriously as a mean to cope with her life. Option (c) cannot be inferred even though the first paragraph indicates that her knowledge of Sikhism was not strong and that she had no interest in its monist theology. The second paragraph indicates that she had her own interpretation of the religion - a more emotional one. This paragraph helps argue against the claim that she felt a disconnect with her religion. The word "always" also makes it inappropriate. Option (c) is thus the answer. Option (d) can be inferred from the first sentence of the passage - *'deeply rooted in the peasant culture of her native Punjab'*.
2. The first four paragraphs in the passage help place the religious philosophy of the author's mother when she followed Sikhism. She followed Sikhism but brought in a variety of customs from the subcontinent; most of these customs were Hindu. It is clear that she did not follow the monist theology of the religion - the understanding that a variety of existing things can be explained in terms of a single reality or substance eluded her. Hence, option (a) can be ruled out. Option (b) is incorrect because there is no mention that she followed every custom. Option (c) can be inferred from the first sentence of the second paragraph. This sentence indicates that the author's mother was looking for emotional security in religion. The third paragraph points to the fact that she followed certain customs for her personal goals. The last sentence of the first paragraph also indicates that she was not looking for spiritual fulfilment in religion. Option (d) is a negative portrayal of the reason why the author's mother followed religious customs. However, the passage only indicates her lack of understanding and her personal motivation. It does not indicate a whimsical nature.
3. The last sentence of the fifth paragraph indicates that the reason she continued visiting church was that she felt peace. The penultimate paragraph also indicates that she felt assured that Jesus was with her and she was not alone. It is also clear from these two paragraphs that she had not felt this way previously and hence, it is safe to infer that she felt the peace she had been searching for. Option (d) is the answer. Option (a) is incorrect because the author's mother was looking for an answer to her suffering and not reassurance that there were others who were suffering too. Option (b) is incorrect because even though the congregation at the church was north-Indian, this would not have been a factor in her move away from Sikhism as latter also had followers from her community (native Punjab). Option (c) cannot be inferred because the sixth and seventh paragraphs indicate that she felt a difference from her previous religion and hence moved over to Christianity.
4. The last paragraph states that the author was not too surprised by his mother's conversion. However, what surprised him was his own feeling of hurt and betrayal that he felt by what he understood to be his mother's rejection of their bond over religion. Option (a) can be ruled out. The author has mixed feeling about this mother's conversion - an understanding of why she converted and yet a feeling of hurt on her betrayal of their religious bond. Option (b) is the answer. Option (c) is not the full portrayal of the author's feelings. Option (d) is incorrect because the author says he was surprised (*unnerved*) at his own reaction to his mother's conversion. In such an instance, he could not have viewed his reaction in an objective manner.
5. Refer to the line "The story of Jesus is, by Indian standards, a plausibly humdrum one" in the last paragraph. The word "humdrum" means unexciting. Hence, option (c) is the best answer. Option (a) can be ruled out because the exact opposite has been stated in the passage. Every Indian village has a story like that of Jesus. Hence, people will readily believe it. Option (b) is wrong because "polemic" means confrontational. The passage doesn't talk about Jesus's story being confrontational for the Indians. Option (d) is not factually supported by the passage. Hence, C is the best answer.
6. Option (b) is wrong because the passage mentions that she dreamt of the Jesus once. Option (c) is wrong because the passage has not given us any information regarding the author's mother abandoning her family. Option (d) is wrong because the author feels betrayed but it can't be inferred that his mother deliberately betrayed him. Option (a) is mentioned in the passage. Refer to the lines - "and lost interest in her old ways". Hence, Option (a) is the best answer.
7. The passage is a review of a book (*Imaginary Friends*) that has links with the Festinger study. The third sentence of the first paragraph also states that this book looks at "how cults can affect and change those who study them, just as sociologists can change the cults they study". The rest of the passage focuses on this subject matter and does not move into the

broader topic of group behaviour. Hence (a) can be ruled out (Mark the word "exhaustive"). Option (b) is a partial assessment of the statement in the first paragraph and hence it is not the answer. It is also too generic in nature. Option (c) correctly infers the third sentence of the first paragraph and is thus the answer. The word "can be" makes it the correct deduction. Option (d) is incorrect because the narrator calls himself stupid on occasions. However, whether he undergoes any cerebral deterioration in the process of the study can't be determined.

8. Option (a) cannot be determined based on the information in the passage. The Festinger study was undertaken by sociologists but there is no confirmation, in the passage, that the protagonists of *Imaginary Friends* are based on the sociologists who undertook the Festinger study. Option (b) can be inferred from the second sentence of the first paragraph. It is clear that the book is a fiction and takes the Festinger study to another level. There is also the mention of the detailed and multi-layered description of the characters. Option (c) can be inferred from the first paragraph. The fourth sentence of this paragraph also indicates that the Festinger study was conducted on (a) cult/cults. Option (d) can be inferred from the third paragraph. Hence, Option (a) is the answer.
9. The result of an unfulfilled prophecy or a disconfirmation, on a cult, is mentioned in the last half of the second paragraph. While an unfulfilled prophecy or an unexpected change may take place, the group usually adjusts through a process of rationalisation and increase in recruitment. This is mentioned in the penultimate sentence of the second paragraph. Option (d) is the answer. Refer to the last two lines of the second paragraph. Option (a) can be ruled out because it is an effect and not the end result. Option (b) can be ruled out because it is a preliminary effect of an unfulfilled prophecy but not the result. Option (c) can be ruled out because the unexpected change and unfulfilled prophecy have been used as synonyms in the passage (Refer to the third last sentence of the second paragraph). Option (c) is, thus, incorrect.
10. Option (a) cannot be inferred from the passage as there is no reference, at all, to 'a pairing' of a new recruit and an older member. Option (b) and Option (c) can be inferred from the first sentence of the last paragraph. Option (d) can be inferred from the second sentence of the last paragraph - "*He tries ineffectively to memorize... idiosyncratic truths that members add to group metaphysics.*" The reference to idiosyncratic truths indicates that these truths are specific to the cult. E can be inferred from the last two lines of the

passage. Roger desperately tries to remember all that he has been taught so as to become a part of the group. So, Option (a) is the answer.

11. The passage focuses entirely upon the book and its analysis. Option (a) can be ruled out because the main idea of the passage is not to critically analyse The Festinger Study. The focus is its application in the book. Option (b) is too narrow to be the central idea. Hence, it can't be the title. Option (d) is too broad as this passage only talks about one fictional cult. It can't be applied to cults everywhere. Option (c) is the best fit. Though the passage doesn't read like a conventional book review, this option best captures the essence of the passage. Hence, Option (c) is the answer.
12. The personality of Verena is mentioned in the fourth paragraph. The fifth paragraph mentions Roger's impression of Verena. Option (a) is the way Roger describes Verena. It may or may not be true regarding her personality. Hence, option (a) can't be inferred from the passage. Option (c) is untrue as the passage mentions her as a 19 year old. The passage doesn't talk about the normal age group of cult members. There may have been other members who were quite young. So, Option (c) can't be the answer. Option (d) is partially correct as the fourth paragraph says that Verena's aunt encouraged her. The words 'exploitation' and 'brainwashed' make the option too extreme to be inferred from the limited data given in the passage. Hence, Option (b) is the best option. The fifth paragraph makes it clear that Roger is obsessed with Verena's personality and appeal.
13. Option (d) best captures the central idea of the first two paragraphs. Option (a), (b), and (c) are too narrow to be the theme. They are the separate things mentioned in the first paragraph. The author asks why people act in certain manners. The first line of the second paragraph supplies part of the answer – self esteem.
14. No empirical or sociological evidence has been cited in the passage while discussing the main idea of the passage. In the last paragraph the author talks about some neurological evidence. He refers to a study. But he does not cite any neurological evidence himself.
15. Option (a) is stated in the second paragraph. Refer to the line "we all have a need to think well of ourselves, and for others to think well of us". Hence, the author will agree with option (a). Option (c) is mentioned in the third paragraph. Refer to the line "An example of this is the fear of public speaking – a dread that can be greater than that of flying or even of death". The author will agree with Option (c).

- Option (d) is the central theme of the passage. The author talks about road rage incidents to highlight this point. But nowhere does the author suggest that the pain of injured self esteem is identical to physical pain. The brain interprets any attack on our self esteem as a physical pain but it does not follow that the brain of the body reacts to it in the same ways they would to physical pain. The passage also doesn't talk about cure. Option (b) is the answer.
- 16.** The passage does not say that the popularity of cricket is the reason for the decline of *kushti*. The passage states that after 28 years a state level championship was held. But it does not say that the absence of state level championships led to the decline of *kushti*. The passage does not talk about lack of space anywhere. Similarly, the passage mentions that Akanksha, the daughter of an erstwhile wrestler would have loved to make her father proud. So, it can't be inferred that youngsters are not interested in *kushti*. But the passage does say that earlier *pehelwans* were employed by the British & the mills. Now there is no employer or growth opportunity. Option (c) is the answer.
- 17.** Promoting a sport means giving it sustained encouragement. The Maratha rulers encouraged even women to take up the sport. So they acted like patrons. Option (d) is the best option. Option (a) is incorrect because the passage doesn't give factual information regarding honours bestowed by the Maratha rulers on winners. Option (b) is also factually unsupported by the passage. Option (c) has not been mentioned in the passage. The British employed *pehelwans*, according to the passage. The correct answer is, thus, Option (d).
- 18.** Option (a) can't be inferred. The Marathas' encouragement of wrestling does not mean that political encouragement is essential. We can't also apply the information given in the passage to any sport as the passage focuses solely on *kushti*. Option (b) cannot be inferred from the passage. The last paragraph praises the effort of the state government. So, we can't say that the state government is to be solely blamed for the decline in *kushti*. Option (c) is wrong because the passage talks about the daughter of a former wrestler. The author doesn't talk about the opinion of the parents. Option (d) is not directly stated; rather it is implied. The passage highlights lack of prospects as one of the reasons why youngsters are not taking up *kushti*. It makes E the best answer.
- 19.** The Renaissance was an European development. The Church and Christian theology had killed science and the pursuit of knowledge. The Renaissance marked the rebirth and revival of science and the quest for knowledge. China was never a Christian country and hence the Renaissance did not affect it. Hence the solutions is (d).
- 20.** Chinese seafarers travelled far and wide interacted with many races and nations and encountered many new ideas & concepts. Their tales gave rise to curiosity among the native Chinese who came up with conflations as well as original ideas. The fermentation of ideas was the source of Chinese science. Hence the answer is option (c). Military strength wealth and long voyages are all irrelevant.
- 21.** The Judes Christian tradition refers to the beliefs & practices of Judaism, which is older than Christianity and Christianity itself. Both these religions hold that what is given in their scriptures is the word of god and hence, cannot be wrong. When science challenged these ideas it became necessary to put science and scientists down with a heavy hand. Hence the influence of Judeo Christian tradition instead of stimulating science actually killed it. Hence the word 'supposedly'. Correct answer is option (c).
- 22.** The message of the passage is that when a single person wields absolute power a single wrong decision can play havoc. China which led the world bill about the 14th century because backward when the emperor ordered the dismantling of the navy thus in a way making China insular. The correct answer is option (d). Option (a) is irrelevant because maritime trade & not maritime power is the source of cross-fertilization of ideas. Option (b) is irrelevant because the Renaissance played no role in China. Option (c) is irrelevant because Europe was not exactly wallowing in wealth and further the curiosity of Columbus does not mean that all Italians were equally curious.
- 23.** Option (a) is irrelevant because the question is not whether isolationism is usual or unusual but rather, whether it is good or bad. Option (c) is irrelevant because in the ultimate analysis the dismantling of the navies isolated China and this led in the long run to the intellectual decay of China. Hence the correct answer is option (d).
- 24.** Option (a) is irrelevant because any amount of wealth is spent overtime. It cannot last forever. Similarly, option (b) is incorrect as the one time transfer of population is not a permanent solution. Likewise option (c) is irrelevant because the increase in military might was a temporary phenomenon. The correct answer is option (d). When there is fierce competition it gives rise to a quest for new solutions, new ideas, and new science.

- 25.** The author explains cynically the ease of acquiring knowledge and makes a distinction between knowledge and knowingness. He proceeds to state how it has no value as compared to actual experience. He counters the view of the first paragraph in the second one by mentioning less fortunate people's point of view. Option (4) is the correct summation of the points of cynicism and those points which are later disputed by the less fortunate. The other options are either too narrow or too broad to be the summary of this passage.
- 26.** The passage is an analysis of the novel and its survivability and its relationship with female readers. Option (4) uses 'nature' to relate to innatism and mentions nurture to equate with 'conditioning'. Then later it proceeds to state the clear conclusion of the passage. This is an accurate summation of the passage.
- 27.** In this passage the author has explained Kafka's work and the way he impacted modernism. Option (1) is correct as it includes all the themes i.e. Kafka's inner problems, modernism, humour, pain etc. Option (2) is incorrect because it mentions 'literature' which is not mentioned in the passage.
- 28.** Misfit sentence is 2 with correct sequence being 4351. The theme of the passage is introduced by 4 where challenge to slash greenhouse gas emission is faced. 2 follows the idea giving a ray of hope. 51 go on further to suggest that what can be done to care of such a problem. 2 only tells about the existing limitation.
- 29.** 1 is the misfit sentence with correct sequence being 4235. 4 introduces the subject - hippo of the passage. 2 further gives details of the description. 35 is a mandatory pair that describes the behaviour of the creature. 1 is out of context that introduces a new element of habitat issues of the hippos.
- 30.** 1 is the misfit sentence with the correct sequence being 3425. The theme of the passage is that we are trying to draw similarity between humans and Neanderthals. 3 initiates the discussion and 4 states the opposite idea. This is followed by 2 which says to answer 'this question', researchers are studying facial bones followed by description of facts about bone formation.
- 31.** Sentence 3 introduces the topic. 35 make a mandatory pair as the word "however" in 5 contradicts the theme of sentence 3. 1 follows next as it explains the latest findings of the scholars which is mentioned in 5. 4 gives an example of 1. 2 is the final sentence as it gives the author's opinion.
- 32.** 5 introduces the paragraph and hence, can be the topic sentence. 2 will come next as the word "but" suggests a slight change in the theme. 2 changes the theme mentioned in 5. 51 make a mandatory pair as the pronoun "it says" in 1 refers to the theory or study mentioned in 5. 3 will come next as England is the researcher who has been mentioned in 2 and 1. 4 will come next as Paul Rosenberg reviews the theory mentioned in the previous sentences.
- 33.** Sentence 3 introduces the topic under discussion i.e. Rationalism and beauty. 5 takes the idea forward by providing the historical backdrop. 52 make a mandatory pair as the pronoun "this" in 2 has been defined in 5. 21 also make a mandatory pair as the phrase "any such theory" in 1 has been defined in 2. 4 explains the ideas mentioned in 1. Hence 14 also make a mandatory pair.
- 34.** 4 introduces the concept of Nash equilibrium and also its relation with the Greece and Europe stand-off. 42 make a mandatory pair as 2 has a pronoun "this" which has been explained in 4. 1 takes the idea forward as is evident by the phrase "can also help us". 5 will come after 1 as it talks about the "game" which has been mentioned in the previous sentences. 3 is the last sentence as it raises a question. This question will be answered in the subsequent paragraphs.
- For questions 35 to 38:**
- The data given in the bar graph can be tabulated as shown below.
- Let the total number of visitors in the year 2006 be $100x$.
- | Year | Total number of visitors | Number of male visitors | Number of female visitors |
|------|--------------------------|-------------------------|---------------------------|
| 2007 | $120x$ | $60x$ | $60x$ |
| 2008 | $108x$ | $81x$ | $27x$ |
| 2009 | $144x$ | $96x$ | $48x$ |
| 2010 | $180x$ | $108x$ | $72x$ |
| 2011 | $160x$ | $104x$ | $56x$ |
- 35.** The total number of female visitors in the year 2011
 $= 56x = 56 \times 468.50 = 26236$
- 36.** Percentage growth in the number of female visitors from 2009 to 2010

$$= \frac{72x - 48x}{48x} \times 100$$

$$= 50\%$$
- 37.** Gender Gap in
the year 2009 = $96x - 48x = 48x$
the year 2011 = $104x - 56x = 48x$
Hence, it is equal in 2009 and 2011.

38. According to the question,

$$108x = 14796$$

$$\Rightarrow x = 137$$

$$\text{Hence, required number} = 120 \times 137 \\ = 16440.$$

For questions 39 to 42:

Let the number of students who participated from East, West, North, South and Central regions be $20k$, $16k$, $21k$, $25k$ and $18k$ respectively, where ' k ' is a natural number.

The total number of students who participated from the five regions is equal to $100k$.

$$\Rightarrow (180 + 116 + 175 + 200 + 150) + 279 = 100k$$

$$\Rightarrow 100k = 821 + 279$$

$$\Rightarrow k = 11$$

Let the number of students who participated in Swimming and Cycling from the West region be x and y respectively, where $x + y = 60$.

The final table is given below.

	East	West	North	South	Central
Swimming	23	x	42	64	19
Lawn Tennis	45	27	56	46	31
Cycling	39	y	41	18	45
Badminton	52	49	23	38	48
Hockey	21	24	37	75	25
Football	40	16	32	34	30

39. The sum of the number of students who participated from the West region in Swimming and Cycling is 60. Since 60 when divided in the ratio $3 : 5$ does not give integer values, $3 : 5$ is the answer.

40. The number of students who participated in

Lawn Tennis = 205

Badminton = 210

Hockey = 182

Football = 152

In case of Swimming the number will be highest if $x = 59$, $y = 1$, and in case of Cycling the number will be highest if $x = 1$, $y = 59$. However, the number of students who participated in Badminton will still be the highest among the six events.

41. Required percentage = $\frac{48}{40} \times 100 = 120$.

42. We have $x + y = 60$.

According to the given condition, the possible values of x are 35, 40, 45, 50 and 55.

Hence, the required answer

$$= 75(35 + 40 + 45 + 50 + 55)$$

$$= 16875.$$

For questions 43 to 46: Let the total money with the three of them in the beginning be Rs. $45x$, the amount left with Mina and Dika after making the purchases be Rs. y each and the money spent on Bindaas shares by Ina and Mina be Rs. z each. The initial table can be made as shown below.

Name	Ina	Mina	Dika	Total
Money spent (in Rs.) on Jhakkas shares	4.5y	2y	y	15x
Money spent (in Rs.) on Bindaas shares	z	z	5x	
Amount (in Rs.) left	3x	y	y	
Total (in Rs.)		15x		45x

Now,

$$(2y + y) - (y + y) = 2,00,000$$

$$\Rightarrow y = 2,00,000 \quad \dots(i)$$

$$4.5y + 2y + y = 15x$$

$$\Rightarrow x = 1,00,000 \quad \dots(ii)$$

$$2y + z + y = 15x$$

$$\Rightarrow z = 9,00,000 \quad \dots(iii)$$

The final table is given below.

Name	Ina	Mina	Dika	Total
Money spent (in Rs.) on Jhakkas Shares	9,00,000	4,00,000	2,00,000	15,00,000
Money spent (in Rs.) on Bindaas Shares	9,00,000	9,00,000	5,00,000	23,00,000
Amount (in Rs.) left	3,00,000	2,00,000	2,00,000	7,00,000
Total (in Rs.)	21,00,000	15,00,000	9,00,000	45,00,000

43. Total amount spent by the three of them on purchasing Bindaas shares

$$= \text{Rs. } 23,00,000$$

The number of Bindaas shares purchased

$$= \frac{2300000}{5000} = 460.$$

44. Total money available with Ina in the beginning = Rs. 21,00,000.

45. Mina, and not Dika, was the person. Hence, statement I is not correct.

They were left with Rs. 7,00,000 after making the purchases. Hence, statement II is correct.

46. The required amount = Rs. 45,00,000.

For questions 47 to 50:

Since each department appears four times in the given combinations, the total number of employees in the organization

$$= \frac{870 + 600 + 780 + 670 + 630 + 850 + 640}{4} \\ = 1260.$$

The number of employees in MR department

$$= (\text{MR}, \text{HR}, \text{FN}, \text{OP} + \text{TC}, \text{TL}, \text{AD}, \text{MR}) - 1260 \\ = (870 + 600) - 1260 = 210.$$

Similarly, the number of employees in HR, FN, OP, TC, TL and AD are 190, 220, 250, 120, 40 and 230 respectively.

Using the information given in the graph, the data can be tabulated as shown below.

Department	Total number of employees	Male employees	Female employees
MR	210	147	63
HR	190	76	114
FN	220	143	77
OP	250	175	75
TC	120	96	24
TL	40	30	10
AD	230	138	92

47. The ratio = $\frac{114}{96} = \frac{19}{16}$, i.e. 19:16.

48. The difference between the number of male employees and the number of female employees is the highest in OP department, i.e. 100.

49. The percentage

$$= \frac{(147 + 143 + 138) - (114 + 75 + 92)}{(114 + 75 + 92)} \times 100 \\ = \frac{147}{281} \times 100 \approx 52.$$

50. The difference

$$= (147 + 76 + 143 + 175 + 96 + 30 + 138) \\ - (63 + 114 + 77 + 75 + 25 + 10 + 92) \\ = 350.$$

For questions 51 to 54:

After filling up the given data in a table, it can be concluded from statement (iv) that H3 could not have finished first, third or fourth in Race-II. Therefore, it must have finished second and so H4 and H1 must have finished third and fourth respectively in Race-II.

Now, H2 must have finished first in Race-III as it couldn't have finished at the same position in more than two races.

From statement (iii), Dablu's horse must be H3 and it must have finished second in Race-I.

Further analysis leads to the final tables as below.

Owner	Rahul	Dharma	Dablu	Ritesh
Horse	H1	H2	H3	H4
Race	Rank	1	2	3
Race-I		H4	H3	H2
Race-II		H2	H3	H4
Race-III		H2	H4	H1
Race-IV		H4	H1	H2

51. Dablu and Ritesh

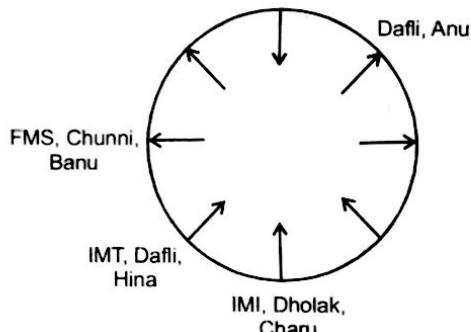
52. Rahul

53. The sum of the ranks of H4 was the lowest and was equal to 7. Hence, H4 must have won the jackpot.

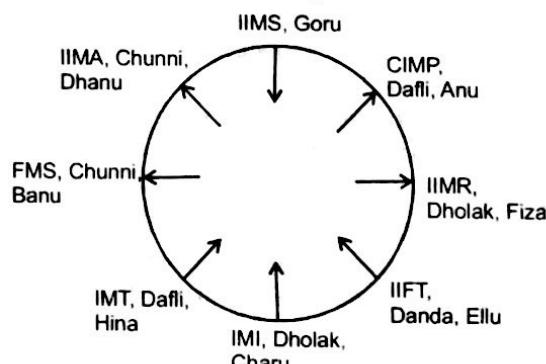
54. H4 finished third in Race-II. Hence, option (c) is the correct answer.

For questions 55 to 58:

From statement (iv), Charu and both her neighbours face inside. From statement (i), Hina sits to the immediate left of Charu as well as Banu; therefore, we can conclude that Banu must be facing outside. From statement (ii), the person sitting diametrically opposite Charu faces inside. Therefore, the rest of the persons must be facing outside. Also, it is given that Anu sits diametrically opposite Hina and the two use the same prop i.e. Dafli. The conclusions made thus far can be shown with the help of a diagram.



From statement (iii), Goru sits to the immediate left of Anu and must be facing inside. From statement (v), the only vacant positions, that are diametrically opposite, must have been occupied by Dhanu and Ellu. Now, Fiza from IIMR must be sitting immediately to the right of Anu. Further analysis leads to the final arrangement shown below.



55. Fiza, Dholak

56. 3

57. Fiza is sitting opposite to the person who is from FMS.

Hence, the number of friends sitting between them is 3.

58. Goru is sitting opposite to Charu and thus the number of letters in the name of the friend sitting opposite to Charu is 4.

For questions 59 to 62:

From statements (ii) and (vi), Jason and Rahsaan were cycling in the lanes numbered 3 and 4 respectively. From statements (i) and (iv), Hilton was in the lane numbered 7. From statements (iii) and (v), either Alex or Fausto was in the lane numbered 8. But since Hilton was in the lane numbered 7, Alex could not have been in the lane numbered 8. Therefore, Fausto was in the lane numbered 8. Now two cases are possible:

Case I: Nathan and Alex were in the lanes numbered 1 and 2 respectively. Matt and Ryan were in the lanes numbered 5 and 6, in no particular order.

Lane No.	1	2	3	4	5	6	7	8
Rider	Nathan	Alex	Jason	Rahsaan	Matt/Ryan	Ryan/Matt	Hilton	Fausto

Case II: Nathan and Alex were in the lanes numbered 5 and 6 respectively. Matt and Ryan were in the lanes numbered 1 and 2, in no particular order.

Lane No.	1	2	3	4	5	6	7	8
Rider	Matt/Ryan	Ryan/Matt	Jason	Rahsaan	Nathan	Alex	Hilton	Fausto

59. Alex

60. Hilton and Fausto

61. The possible positions to which could have finished were 1, 2, 5 and 6.

Hence, the required sum = $1 + 2 + 5 + 6 = 14$.

62. Either Nathan or Matt must have finished first in case Ryan did not finish first. Hence, the question cannot be answered.

For questions 63 to 66:

As he went to Bangkok in 2005, he must have gone to the USA and Europe respectively in either 2006 and 2007 or 2007 and 2008. But 2007 and 2008 is not possible as it violates statement (iv). From statement (iii), he spent 1 day on his vacation in 2004.

Let the number of days spent on vacation in Singapore and Nepal be x and y respectively. Therefore, he spent ' $x + 1$ ' and ' $y + 1$ ' days in Europe and the USA respectively. Let the number of days he spent in Bangkok be z .

Either x or y is equal to 1. Also, z as well as $(x + 1)$ cannot be equal to 5 (from statements (iv) and (vi)); the only possibility is $x = 1$ and $y = 4$. Further analysis leads to the final table shown below.

Year	Destination	No. of days
2004	Singapore	1
2005	Bangkok	3
2006	USA	5
2007	Europe	2
2008	Nepal	4

63. None of these

64. 2

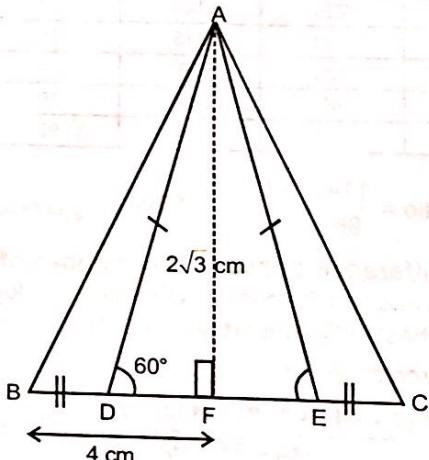
65. Neither I nor II

66. He visited Nepal in 2008

67. According to the question,

$$\frac{N_1+1}{2} - \frac{N_2+1}{2} = 10 \\ \Rightarrow N_1 - N_2 = 20$$

68.



Let's draw AF perpendicular to BC.

In $\triangle ADE$, as $AD = AE$

$\angle AED = \angle ADE = 60^\circ$

$\Rightarrow \angle DAE = 60^\circ$

Hence, we can conclude that $\triangle ADE$ is an equilateral triangle.

$$\Rightarrow AF = \frac{\sqrt{3}}{2} \times 4 \\ = 2\sqrt{3} \text{ cm}$$

and

$$DF = FE = 2 \text{ cm}$$

In $\triangle AFB$, using Pythagoras' Theorem,

$$AB = \sqrt{AF^2 + BF^2} \\ = \sqrt{(2\sqrt{3})^2 + 4^2} = 2\sqrt{7} \text{ cm.}$$

69. As 'a' and 'b' are the roots of the given equation,

$$a + b = -7$$

$$ab = 4$$

The given expression can be rewritten as

$$\frac{2}{7} \left(\frac{a+b}{ab} \right) + ab = \frac{2}{7} \left(\frac{-7}{4} \right) + 4 = \frac{7}{2}.$$

70. $\frac{m \times d \times h}{w} = \text{constant}$, where

m = number of men

d = number of days

h = number of hours

w = amount of work

Let the number of additional men required be x .

$$\therefore \frac{75 \times 90 \times 8}{2} = \frac{(75+x) \times 60 \times 10}{5}$$

$$\text{or } x = 150$$

Hence, 150 additional men would be required.

71. The number of ways of picking two small cubes

$$= {}^{64}C_2 = 32 \times 63$$

The number of small cubes with exactly two faces painted red

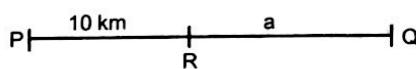
$= 2 \times 12 = 24$ (Since two such cubes will be obtained from each edge of the large cube.)

The number of ways of picking two such cubes

$$= {}^{24}C_2 = 23 \times 12$$

$$\text{So the required probability} = \frac{23 \times 12}{63 \times 32} = \frac{23}{168}.$$

72. Let the speeds of Prakash and Arpit be $2x$ and $5x$ respectively. Let's assume that Arpit turned back from point Q as shown in the figure given below, ran at a speed of x after turning back and met Prakash at point R, 't' hours after they started running.



From the given conditions,

$$2x \times t = 10 = 5x \times 2 - x \times (t - 2)$$

$$\Rightarrow t = 4$$

So the running speed of Prakash

$$= 2x = \frac{10}{4} = 2.5 \text{ km/hr.}$$

73. $(x+1) \times f(x+1) + x \times f(x) + (x-1) \times f(x-1) = 0 \dots (i)$

In the above equation, replacing x by $x-1$, we get

$$x \times f(x) + (x-1) \times f(x-1) + (x-2) \times f(x-2) = 0 \dots (ii)$$

From equations (i) and (ii), we get

$$(x+1) \times f(x+1) = (x-2) \times f(x-2) \dots (iii)$$

Replacing x by $x+2$ in equation (iii), we get

$x \times f(x) = (x+3) \times f(x+3) = (x+6) \times f(x+6)$ and so on...

Hence, $f(1) = 4f(4) = 7f(7) \dots, 2f(2) = 5f(5) = 8f(8) \dots$ and $3f(3) = 6f(6) = 9f(9) \dots$

Also, $3f(3) = 6f(6) \Rightarrow f(3) = 2f(6) \Rightarrow f(3) = 180 \times 2 = 360$

By putting the values of $f(1)$ and $f(3)$ in $f(1) + 2f(2) + 3f(3) = 0$, we get $f(2) = -560$

$$\text{Also, } 2f(2) = 14f(14) \Rightarrow f(14) = \frac{f(2)}{7} = -80$$

74. Let x ml of the solution be replaced with 12% acid solution. Therefore,

$$\frac{30}{100} \times (100-x) + \frac{12}{100} \times x = \frac{21}{100} \times 100$$

$$\Rightarrow x = 50$$

$$75. a^2 - 1 = -6a$$

$$\Rightarrow a - \frac{1}{a} = -6$$

$$\text{Now, } \left(a + \frac{1}{a}\right)^2 - 5\left(a - \frac{1}{a}\right) = \left(\left(a - \frac{1}{a}\right)^2 + 4\right) - 5\left(a - \frac{1}{a}\right) \\ = ((-6)^2 + 4) - 5 \times -6 \\ = 40 + 30 = 70.$$

76. If a number which is of the form $a^p \times b^q \times \dots$, where a, b, \dots are prime numbers and p, q, \dots are natural numbers, then the number of factors of the number is given by $(p+1) \times (q+1) \times \dots$.

According to the question,

$$(p+1) \times (q+1) \times \dots = 4 = 1 \times 4 = 2 \times 2$$

From the above equation, it can be concluded that the number in the given case can be of the form either a^3 or $a \times b$.

There is only one number of the form a^3 which is less than or equal to 15 i.e. 2^3 . There are 4 numbers of the form $a \times b$ which are less than or equal to 15 and these numbers are $2 \times 3, 2 \times 5, 2 \times 7$ and 3×5 .

Hence, the number of required numbers is 5.

$$77. \log_c a = \frac{1}{2} \text{ or } c = a^2 \quad \dots (i)$$

$$\log_d b = \frac{1}{3} \text{ or } d = b^3 \quad \dots (ii)$$

Clearly, 'a' and 'b' cannot be equal to 1.

$$\text{Therefore, } a_{\min} = 2 \text{ and } b_{\min} = 3$$

The minimum possible value of $a + b + c + d$

$$= 2 + 3 + 4 + 27 = 36$$

78. Let the length of the track be $4x$ meters.

As they together cover $2x$ meters in 12 minutes, they will together cover $4x$ meters in 24 minutes.

Hence, the required time = $12 + 6 \times 24 = 156$.

79. Volume of a cylinder = $\pi r^2 h$, where

r = radius of the cylinder

h = height of the cylinder

Volume of the graphite cylinder

$$= \pi \left(\frac{1}{10} \right)^2 \times 10 = \frac{\pi}{10} \text{ cm}^3$$

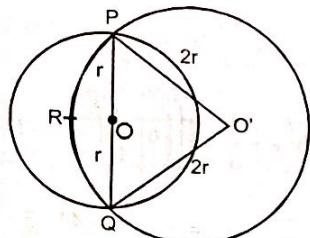
Volume of the layer of wood

$$= 10\pi \left[\left(\frac{7}{10} \right)^2 - \left(\frac{1}{10} \right)^2 \right] = \frac{48\pi}{10} \text{ cm}^3$$

Cost of the material in a pencil

$$= \frac{\pi}{10} \times 2.10 + \frac{48\pi}{10} \times 0.70 = \text{Rs.} 11.22$$

80.



The common chord will be of the maximum length if it is the diameter of the smaller circle.

In $\triangle PO'Q$, $PQ = 2r$ and $PO' = QO' = 2r$, therefore, $\triangle PO'Q$ is an equilateral triangle.

Required area (in sq. units) of the shaded region

$$\begin{aligned} &= \frac{1}{2} \times \text{Area of smaller circle} + \text{Area of segment PRQ} \\ &= \frac{1}{2} \times \text{Area of smaller circle} + (\text{Area of sector O'PQ} \\ &\quad - \text{Area of triangle PO'Q}) \\ &= \frac{\pi r^2}{2} + \left\{ \frac{\pi (2r)^2}{6} - \frac{\sqrt{3}(2r)^2}{4} \right\} = \frac{7\pi r^2}{6} - \sqrt{3}r^2. \end{aligned}$$

81. In $\triangle ABC$, $AB = AC$

Let

$$\angle ABC = \angle ACB = x^\circ$$

and

$$\angle BAC = y^\circ$$

\therefore

$$2x + y = 180^\circ$$

In $\triangle FDE$,

$$\angle FED = x^\circ$$

and

$$\angle FDE = x - 30^\circ$$

$$\Rightarrow x + x - 30 + 70 = 180^\circ$$

$$\therefore x = 70^\circ$$

We see that $\angle FED = \angle DFE$

Hence, DFE is an isosceles triangle i.e.

$$DF = DE = 4 \text{ cm.}$$

$$82. \frac{4}{7} < \frac{x}{y} < \frac{12}{13}, \Rightarrow \frac{13x}{12} < y < \frac{7x}{4}$$

As 'x' increases, the interval in which 'y' lies also increases.

For $x = 1$, the intervals in which y lies is $\left(\frac{1}{12}, \frac{3}{4} \right)$.

This interval does not contain any integer.

For $x = 2$, the interval in which y lies is $\left(2\frac{1}{6}, 3\frac{1}{2} \right)$ and 3 lies in the interval.

Hence, the minimum possible value of y is 3.

83. Let $4x + 3y = 14k$, then $xy = 2k$ and $y - 6x = k$.

On solving the first and the third equations, we get

$$x = \frac{k}{2} \text{ and } y = 4k.$$

$$\Rightarrow xy = 2k^2$$

$$\therefore \frac{2x}{y} = \frac{2 \times \frac{k}{2}}{4k} = \frac{1}{4}.$$

84. If $\frac{A}{B}$ is always a terminating decimal, then B can either be 1 or can have only two prime factors i.e. 2 and 5. The possible values of B are 1, 2, 4, 5, 8, 10, 16, 20, 25, 32, 40, 50, 64 and 80, i.e. 14 values in all.

85. Let the original volume of the raindrop be ' x ' ml.

Therefore, initial volume of water in the raindrop will be $0.75x$ ml.

Remaining volume of water after evaporation

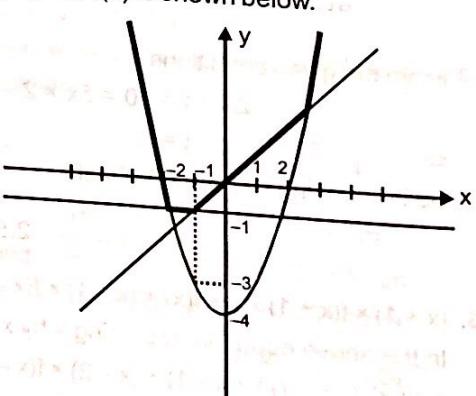
$$= (0.75x - 2) \text{ ml}$$

Remaining volume of water is 70% of $(x - 2)$ ml.

$$\therefore 0.75x - 2 = (x - 2) \times 0.7$$

$$\Rightarrow x = 12.$$

86. The graph of $f(x)$ is shown below.



We can see from the graph that the minimum value of $f(x)$ is -4 .

87. The number finally obtained will be the "digit sum" of the original number. It can be directly obtained by dividing the original number by 9 and finding the remainder.

$$\begin{aligned}\text{Rem}\left[\frac{5^{11+21+31+41}}{9}\right] &= \text{Rem}\left[\frac{5^{33}}{9}\right] \\ &= \text{Rem}\left[\frac{(5^3)^{11}}{9}\right] \\ &= \text{Rem}\left[\frac{(-1)^{11}}{9}\right] = -1 = 8.\end{aligned}$$

88. The form of a number which when divided by 3, 5 and 7 leaves remainders 2, 4 and 6 respectively
 $= k \times (\text{LCM of } 3, 5 \text{ and } 7) - 1$, where k is a natural number
 $= 105k - 1$

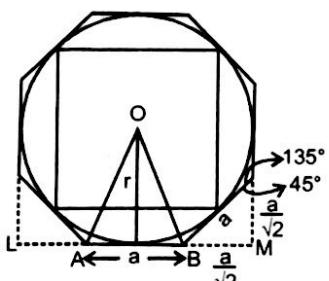
For the number to be the smallest, k has to be 1.

Hence, the smallest such number $= 105 \times 1 - 1 = 104$.

89. The calendars of two leap years with a gap of 28 years will be the same. E.g. the calendars of 1908 and 1936 are exactly the same.

The calendars of two leap years with a gap of 12 years will be the same if a century year, which is not a leap year, falls between the two years. E.g. since 1900 falls between 1896 and 1908, the calendars of 1896 and 1908 are exactly the same.
 Also, we can see that the calendars of 1896 and 1936 (a gap of 40 (12 + 28) years) are exactly the same.

90. Let the length of the side of the octagon and the radius of the circle be ' a ' units and ' r ' units respectively. Therefore, the length of the side of the square will be $\left(\frac{2r}{\sqrt{2}}\right)$ units.



$$LM = LA + AB + BM$$

$$\Rightarrow 2r = \frac{a}{\sqrt{2}} + a + \frac{a}{\sqrt{2}}$$

$$\Rightarrow r = \frac{a(1+\sqrt{2})}{2}$$

$$\begin{aligned}\text{Hence, the ratio} &= \frac{\left(\frac{2r}{\sqrt{2}}\right)^2}{8 \times \frac{1}{2} \times r \times a} \\ &= \frac{r}{2a} \\ &= \frac{a\left(\frac{1+\sqrt{2}}{2}\right)}{2a} = (1+\sqrt{2}):4.\end{aligned}$$

91. $A = \{1, 4, 7, 10, \dots, 20 \text{ terms}\}$

$$B = \{9, 16, 23, 30, \dots, 20 \text{ terms}\}$$

We first need to find $n(A \cap B)$.

$$\text{The } n^{\text{th}} \text{ term of } A = 1 + (n-1)3 = 3n - 2.$$

$$\text{The } m^{\text{th}} \text{ term of } B = 9 + (m-1)7 = 7m + 2.$$

$n(A \cap B)$ will be equal to the number of solutions of $3n - 2 = 7m + 2$, where n and m are natural numbers not more than 20.

$$\Rightarrow n = \frac{7m + 4}{3}$$

$$\text{If } m = 2, n = 6;$$

$$m = 5, n = 13;$$

$$m = 8, n = 20$$

$$\Rightarrow n(A \cap B) = 3$$

$$\begin{aligned}\text{Hence, } n(A \cup B) &= n(A) + n(B) - n(A \cap B) \\ &= 20 + 20 - 3 = 37.\end{aligned}$$

92. Let the C.P. of the article be Rs. x .

$$\begin{aligned}\therefore \frac{1920-x}{x} \times 100 &= \frac{x-1280}{x} \times 100 \\ \Rightarrow 1920-x &= x-1280 \\ \Rightarrow 2x &= 3200 \\ \Rightarrow x &= 1600\end{aligned}$$

Hence, to make a profit of 25%, the S.P.

$$= 125\% \text{ of } 1600 = \text{Rs.}2,000.$$

93. Let the number of games won and those lost by the man be N_w and N_l respectively.

Since he gains \$2, $N_w - N_l = 2$.

Also, he does not lose more than once.

The possible cases are ($W \rightarrow \text{Win}$ and $L \rightarrow \text{Loss}$):

Case (i): $N_w = 2$ and $N_l = 0$.

The only possible sequence is WW.

Case (ii): $N_w = 3$ and $N_l = 1$.

Possible sequences: LWWW and WLWW.

Hence, the total number of possible Win-Loss sequences $= 1 + 2 = 3$.

94. $\frac{21}{2n-1} = m$ (say), where m is an integer.

For m to be an integer, $(2n - 1)$ should be 1, 3, 7 or 21 i.e. one of the factors of 21.

Hence, the number of integers in the sequence is 4.

95. Interior angle of an n -sided regular polygon

$$= \frac{(n-2)\pi}{n} = \theta$$

$$\Rightarrow n = \frac{2\pi}{\pi - \theta}$$

The number of diagonals in an n -sided polygon

$$= {}^nC_2 - n = kn$$

$$\Rightarrow \frac{n(n-3)}{2} = kn$$

$$\Rightarrow k = \frac{n-3}{2}$$

$$\text{Hence, } k = \frac{\left(\frac{2\pi}{\pi - \theta}\right) - 3}{2} = \frac{30 - \pi}{2(\pi - \theta)}$$

Alternate solution:

If the polygon is an equilateral triangle, then, $k = 0$ and $\theta = 60^\circ$. Only options (a) and (b) satisfy these conditions.

If the polygon is a square, then, $k = \frac{1}{2}$ and $\theta = 90^\circ$.

Between (a) and (b), only option (a) satisfies these conditions. Hence, it has to be the answer.

96. Let the side of the squares be 'a' cm.

So the dimensions of the open box will be:

$$\text{Length} = (30 - 2a) \text{ cm}$$

$$\text{Breadth} = (20 - 2a) \text{ cm}$$

$$\text{Height} = a \text{ cm}$$

$$\therefore (30 - 2a) \times (20 - 2a) \times a = 1056$$

$$\Rightarrow (15 - a) \times (10 - a) \times a = 264 = 11 \times 6 \times 4$$

$$\text{Hence, } a = 4.$$

CAT 2016 Solved Paper (Memory Based)

97. Let the bowlers be represented by $B_1, B_2, B_3, \dots, B_n$.

If a particular bowler B_1 (say) did not bowl in pair with two other bowlers, B_2 and B_3 (say), then B_2 and B_3 also did not bowl in pair with every bowler in the team. Therefore, at least three bowlers must not have bowled in pair with every other bowler in the team.

Hence, the maximum number of bowlers who could have bowled in pair with every other bowler in the team is $n - 3$.

98. Given, $x + \frac{1}{y + \frac{1}{z}} = 3 + \frac{5}{21}.$

As x is a natural number, the only possible value of x is 3.

$$\therefore y + \frac{1}{z} = \frac{21}{5} = 4 + \frac{1}{5}$$

As y and z are natural numbers, the only possible values of y and z are 4 and 5 respectively.

$$\therefore x + y + z = 3 + 4 + 5 = 12$$

99. His shop must have been visited by at least 90 customers.

The number of customers who bought both Rose and Tulip = 70.

The rest 20 customers must have bought just 1 Tulip each.

100. Let the number of volunteers be x .

\therefore the number of members = $1.4x$

Total contribution made by the members

$$= 1100 \times 1.4x = \text{Rs.} 1540x$$

Now, $\text{Rs.} 1540x$ is 88% of the total amount raised, therefore, the remaining 12% = $\text{Rs.} 210x$.

Hence, the average contribution made by the volunteers = $\frac{210x}{x} = \text{Rs.} 210$.



$$M = 14 + 2.1 = 20$$

$$P = 5 + 2.1 = 7$$

$$Q = 10 + 2.1 = 12$$