

CAT 2019

SHIFT-2

QUESTION
PAPER

Time: 180 Mins

Total Marks: 300

Important Instructions

- (i) Total Number of Questions: 100
- (ii) Number of Questions in Verbal Ability and Reading Comprehension (VARC): 34
- (iii) Number of Questions in Data Interpretation and Logical Reasoning (DILR): 32
- (iv) Number of Questions in Quantitative Ability (QA): 34
- (v) 60 minutes are allotted to attempt each section.
- (vi) 4 answer options for each MCQ type question.
- (vii) Answers are typed in the given space on the computer screen for Non-MCQ.
- (viii) For each correct answer: + 3 marks
- (ix) Negative marking (Applicable for wrong answers in MCQs): - 1 mark

Verbal Ability and Reading Comprehension (VARC)

Directions (Q. 1 to 4): For two years, I tracked down dozens of . . . Chinese in Upper Egypt [who were] selling lingerie. In a deeply conservative region, where Egyptian families rarely allow women to work or own businesses, the Chinese flourished because of their status as outsiders. They didn't gossip, and they kept their opinions to themselves. In a *New Yorker* article entitled "Learning to Speak Lingerie," I described the Chinese use of Arabic as another non-threatening characteristic. I wrote, "Unlike Mandarin, Arabic is inflected for gender, and Chinese dealers, who learn the language strictly by ear, often pick up speech patterns from female customers. I've come to think of it as the lingerie dialect, and there's something disarming about these Chinese men speaking in the feminine voice." . . .

When I wrote about the Chinese in the *New Yorker*, most readers seemed to appreciate the unusual perspective. But as I often find with topics that involve the Middle East, some people had trouble getting past the black-and-white quality of a byline. "This piece is so orientalist I don't know what to do," Aisha Gani, a reporter who worked at *The Guardian*, tweeted. Another colleague at the British paper, Iman Amrani, agreed: "I wouldn't have minded an article on the subject written by an Egyptian woman—probably would have had better insight." . . .

As an MOL (man of language), I also take issue with this kind of essentialism. Empathy and understanding are not inherited traits, and they are not strictly tied to gender and race. An individual who wrestles with a difficult language can learn to be more sympathetic to outsiders and open to different experiences of the world. This learning process—the embarrassments, the frustrations, the gradual sense of understanding and connection—is invariably transformative. In Upper Egypt, the Chinese experience of struggling to learn Arabic and local culture had made them much more thoughtful. In the same way, I was interested in their lives not because of some kind of voyeurism, but because I had also experienced Egypt and Arabic as an outsider. And both the Chinese and the Egyptians welcomed me because I spoke their languages. My identity as a white male was far less important than my ability to communicate.

And that easily lobbed word—"Orientalist"—hardly captures the complexity of our interactions. What exactly is the dynamic when a man from Missouri observes a Zhejiang native selling lingerie to an Upper Egyptian woman? . . . If all of us now stand beside the same river, speaking in ways we all understand, who's looking east and who's looking west? Which way is Oriental?

For all of our current interest in identity politics, there's no corresponding sense of identity linguistics. You are what you speak—the words that run throughout your mind are at least as fundamental to your

selfhood as is your ethnicity or your gender. And sometimes it's healthy to consider human characteristics that are not inborn, rigid, and outwardly defined. After all, you can always learn another language and change who you are.

Q. 1. According to the passage, which of the following is not responsible for language's ability to change us?

- (1) The ups and downs involved in the course of learning a language.
- (2) Language's ability to mediate the impact of identity markers one is born with.
- (3) The twists and turns in the evolution of language over time.
- (4) Language's intrinsic connection to our notions of self and identity.

Q. 2. A French ethnographer decides to study the culture of a Nigerian tribe. Which of the following is most likely to be the view of the author of the passage?

- (1) The author would discourage the ethnographer from conducting the study as Nigerian ethnographers can better understand the tribe.
- (2) The author would encourage the ethnographer, but ask him/her to first learn the language of the Nigerian tribe s/ he wishes to study.
- (3) The author would encourage the ethnographer, but ask him/her to be

mindful of his/her racial and gender identity in the process.

- (4) The author would encourage the ethnographer and recommend him/her to hire a good translator for the purpose of holding interviews.

Q. 3. Which of the following can be inferred from the author's claim, "Which way is Oriental?"

- (1) Globalisation has mitigated cultural hierarchies and barriers.
- (2) Orientalism is a discourse of the past, from colonial times, rarely visible today.
- (3) Goodwill alone mitigates cultural hierarchies and barriers.
- (4) Learning another language can mitigate cultural hierarchies and barriers.

Q. 4. The author's critics would argue that:

- (1) Language is insufficient to bridge cultural barriers.
- (2) Empathy can overcome identity politics.
- (3) Linguistic politics can be erased.
- (4) Orientalism cannot be practiced by Egyptians.

Directions (Q. 5 to 9): British colonial policy . . . went through two policy phases, or at least there were two strategies between which its policies actually oscillated, sometimes to its great advantage. At first, the new colonial apparatus exercised caution, and occupied India by a mix of military power and subtle diplomacy, the high ground in the middle of the circle of circles. This, however, pushed them into contradictions. For, whatever their sense of the strangeness of the country and the thinness of colonial presence, the British colonial state represented the great conquering discourse of Enlightenment rationalism, entering India precisely at the moment of its greatest unchecked arrogance. As inheritors and representatives of this discourse, which carried everything before it, this colonial state could hardly adopt for long such a self-denying attitude. It had restructured everything in Europe—the productive system, the political regimes, the moral and cognitive orders—and would do the same in India, particularly as some empirically inclined theorists of that generation considered the colonies a massive laboratory of utilitarian or other theoretical experiments. Consequently, the colonial state could not settle simply for eminence at the cost of its marginality; it began to take initiatives to introduce the logic of modernity into Indian society. But this modernity did not enter a passive society. Sometimes, its initiatives were resisted by pre-existing structural forms. At times, there was a more direct form of collective resistance. Therefore the map of continuity and discontinuity that this state left behind at the time of independence was rather complex and has to be traced with care.

Most significantly, of course, initiatives for . . . modernity came to assume an external character. The acceptance of modernity came to be connected, ineradicably, with subjection. This again points to two different problems, one theoretical, the other political. Theoretically, because modernity was externally introduced, it is explanatorily unhelpful to apply the logical format of the 'transition process' to this pattern of change. Such a logical format would be wrong on two counts. First, however subtly, it would imply

that what was proposed to be built was something like European capitalism. (And, in any case, historians have forcefully argued that what it was to replace was not like feudalism, with or without modificatory adjectives.) But, more fundamentally, the logical structure of endogenous change does not apply here.

Here transformation agendas attack as an external force. This externality is not something that can be casually mentioned and forgotten. It is inscribed on every move, every object, every proposal, every legislative act, each line of causality. It comes to be marked on the epoch itself. This repetitive emphasis on externality should not be seen as a nationalist initiative that is so well rehearsed in Indian social science. . . .

Quite apart from the externality of the entire historical proposal of modernity, some of its contents were remarkable. . . . Economic reforms, or rather alterations . . . did not foreshadow the construction of a classical capitalist economy, with its necessary emphasis on extractive and transport sectors. What happened was the creation of a degenerate version of capitalism—what early dependency theorists called the ‘development of underdevelopment’.

- Q. 5. “Consequently, the colonial state could not settle simply for eminence at the cost of its marginality; it began to take initiatives to introduce the logic of modernity into Indian society.” Which of the following best captures the sense of this statement?**
- (1) The cost of the colonial state’s eminence was not settled; therefore, it took the initiative of introducing modernity into Indian society.
 - (2) The colonial enterprise was a costly one; so to justify the cost it began to take initiatives to introduce the logic of modernity into Indian society.
 - (3) The colonial state’s eminence was unsettled by its marginal position; therefore, it developed Indian society by modernising it.
 - (4) The colonial state felt marginalised from Indian society because of its own modernity; therefore, it sought to address that marginalisation by bringing its modernity to change Indian society.
- Q. 6. All of the following statements, if true, could be seen as supporting the arguments in the passage, EXCEPT:**
- (1) throughout the history of colonial conquest, natives have often been experimented on by the colonisers.
 - (2) modernity was imposed upon India by the British and, therefore, led to underdevelopment.
 - (3) the change in British colonial policy was induced by resistance to modernity in Indian society.
 - (4) the introduction of capitalism in India was not through the transformation of feudalism, as happened in Europe.
- Q. 7. All of the following statements about British colonialism can be inferred from the first paragraph, EXCEPT that it:**
- (1) allowed the treatment of colonies as experimental sites.
 - (2) faced resistance from existing structural forms of Indian modernity.
 - (3) was at least partly an outcome of Enlightenment rationalism.
 - (4) was at least partly shaped by the project of European modernity.
- Q. 8. Which one of the following 5-word sequences best captures the flow of the arguments in the passage?**
- (1) Colonial policy — Enlightenment — external modernity — subjection — underdevelopment.
 - (2) Military power — colonialism — restructuring — feudalism — capitalism.
 - (3) Military power — arrogance — laboratory — modernity — capitalism.
 - (4) Colonial policy — arrogant rationality — resistance — independence — development.
- Q. 9. Which of the following observations is a valid conclusion to draw from the author’s statement that “the logical structure of endogenous change does not apply here. Here transformation agendas attack as an external force”?**
- (1) Colonised societies cannot be changed through logic; they need to be transformed with external force.
 - (2) The transformation of Indian society did not happen organically, but was forced by colonial agendas.

(3) The endogenous logic of colonialism can only bring change if it attacks and transforms external forces.

(4) Indian society is not endogamous; it is more accurately characterised as aggressively exogamous.

Directions (Q. 10 to 14): Around the world, capital cities are disgoring bureaucrats. In the post-colonial fervour of the 20th century, coastal capitals picked by trade-focused empires were spurned for “regionally neutral” new ones But decamping wholesale is costly and unpopular; governments these days prefer piecemeal dispersal. The trend reflects how the world has changed. In past eras, when information travelled at a snail’s pace, civil servants had to cluster together. But now desk-workers can ping emails and video-chat around the world. Travel for face-to-face meetings may be unavoidable, but transport links, too, have improved. . . .

Proponents of moving civil servants around promise countless benefits. It disperses the risk that a terrorist attack or natural disaster will cripple an entire government. Wonks in the sticks will be inspired by new ideas that walled-off capitals cannot conjure up. Autonomous regulators perform best far from the pressure and lobbying of the big city. Some even hail a cure for ascendant cynicism and populism. The unloved bureaucrats of faraway capitals will become as popular as firefighters once they mix with regular folk.

Beyond these sunny visions, dispersing central-government functions usually has three specific aims: to improve the lives of both civil servants and those living in clogged capitals; to save money; and to redress regional imbalances. The trouble is that these goals are not always realised.

The first aim—improving living conditions—has a long pedigree. After the second world war Britain moved thousands of civil servants to “agreeable English country towns” as London was rebuilt. But swapping the capital for somewhere smaller is not always agreeable. Attrition rates can exceed 80%. . . . The second reason to pack bureaucrats off is to save money. Office space costs far more in capitals. . . . Agencies that are moved elsewhere can often recruit better workers on lower salaries than in capitals, where well-paying multinationals mop up talent.

The third reason to shift is to rebalance regional inequality. . . . Norway treats federal jobs as a resource every region deserves to enjoy, like profits from oil. Where government jobs go, private ones follow. . . . Sometimes the aim is to fulfil the potential of a country’s second-tier cities. Unlike poor, remote places, bigger cities can make the most of relocated government agencies, linking them to local universities and businesses and supplying a better-educated workforce. The decision in 1946 to set up America’s Centres for Disease Control in Atlanta rather than Washington, D.C., has transformed the city into a hub for health-sector research and business.

The dilemma is obvious. Pick small, poor towns, and areas of high unemployment get new jobs, but it is hard to attract the most qualified workers; opt for larger cities with infrastructure and better-qualified residents, and the country’s most deprived areas see little benefit. . .

Others contend that decentralisation begets corruption by making government agencies less accountable. . . . A study in America found that state-government corruption is worse when the state capital is isolated—journalists, who tend to live in the bigger cities, become less watchful of those in power.

Q. 10. According to the passage, colonial powers located their capitals:

- (1) based on political expediency.
- (2) to promote their trading interests.
- (3) where they had the densest populations.
- (4) to showcase their power and prestige.

Q. 11. According to the author, relocating government agencies has not always been a success for all of the following reasons EXCEPT:

- (1) a rise in pollution levels and congestion in the new locations.
- (2) the difficulty of attracting talented, well-skilled people in more remote areas.
- (3) increased avenues of corruption away from the capital city.
- (4) high staff losses, as people may not be prepared to move to smaller towns.

Q. 12. The “long pedigree” of the aim to shift civil servants to improve their living standards implies that this move:

- (1) has become common practice in several countries worldwide.
- (2) is supported by politicians and the ruling elites.
- (3) takes a long time to achieve its intended outcomes.
- (4) is not a new idea and has been tried in the past.

Q. 13. People who support decentralising central government functions are LEAST likely to cite which of the following reasons for their view?

- (1) It could weaken the nexus between bureaucrats and media in the capital.
- (2) More independence could be enjoyed by regulatory bodies located away from political centres.
- (3) Policy makers may benefit from fresh thinking in a new environment.

- (4) It reduces expenses as infrastructure costs and salaries are lower in smaller cities.

Q. 14. The “dilemma” mentioned in the passage refers to:

- (1) keeping government agencies in the largest city with good infrastructure or moving them to a remote area with few amenities.
- (2) relocating government agencies to boost growth in remote areas with poor amenities or to relatively larger cities with good amenities.
- (3) encouraging private enterprises to relocate to smaller towns or not incentivising them in order to keep government costs in those towns low.
- (4) concentrating on decongesting large cities or focusing on boosting employment in relatively larger cities.

Directions (Q. 15 to 19): The magic of squatter cities is that they are improved steadily and gradually by their residents. To a planner’s eye, these cities look chaotic. I trained as a biologist and to my eye, they look organic. Squatter cities are also unexpectedly green. They have maximum density—1 million people per square mile in some areas of Mumbai—and have minimum energy and material use. People get around by foot, bicycle, rickshaw, or the universal shared taxi.

Not everything is efficient in the slums, though. In the Brazilian favelas where electricity is stolen and therefore free, people leave their lights on all day. But in most slums recycling is literally a way of life. The Dharavi slum in Mumbai has 400 recycling units and 30,000 ragpickers. Six thousand tons of rubbish are sorted every day. In 2007, the Economist reported that in Vietnam and Mozambique, “Waves of gleaners sift the sweepings of Hanoi’s streets, just as Mozambiquan children pick over the rubbish of Maputo’s main tip. Every city in Asia and Latin America has an industry based on gathering up old cardboard boxes.” . . .

In his 1985 article, Calthorpe made a statement that still jars with most people: “The city is the most environmentally benign form of human settlement. Each city dweller consumes less land, less energy, less water, and produces less pollution than his counterpart in settlements of lower densities.” “Green Manhattan” was the inflammatory title of a 2004 New Yorker article by David Owen. “By the most significant measures,” he wrote, “New York is the greenest community in the United States, and one of the greenest cities in the world . . . The key to New York’s relative environmental benignity is its extreme compactness. . . . Placing one and a half million people on a twenty - three - square-mile island sharply reduces their opportunities to be wasteful.” He went on to note that this very compactness forces people to live in the world’s most energy-efficient apartment buildings. . . .

Urban density allows half of humanity to live on 2.8 per cent of the land. . . . Consider just the infrastructure efficiencies. According to a 2004 UN report: “The concentration of population and enterprises in urban areas greatly reduces the unit cost of piped water, sewers, drains, roads, electricity, garbage collection, transport, health care, and schools.” . . .

[T]he nationally subsidised city of Manaus in northern Brazil “answers the question” of how to stop deforestation: give people decent jobs. Then they can afford houses, and gain security. One hundred thousand people who would otherwise be deforesting the jungle around Manaus are now prospering in town making such things as mobile phones and televisions. . . .

Of course, fast-growing cities are far from an unmitigated good. They concentrate crime, pollution, disease and injustice as much as business, innovation, education and entertainment. . . . But if they are overall a

net good for those who move there, it is because cities offer more than just jobs. They are transformative: in the slums, as well as the office towers and leafy suburbs, the progress is from hick to metropolitan to cosmopolitan . . .

Q. 15. We can infer that Calthorpe’s statement “still jars” with most people because most people:

- (1) do not consider cities to be eco-friendly places.
- (2) consider cities to be very crowded and polluted.
- (3) do not regard cities as good places to live in.
- (4) regard cities as places of disease and crime.

Q. 16. In the context of the passage, the author refers to Manaus in order to:

- (1) explain how urban areas help the environment.
- (2) describe the infrastructure efficiencies of living in a city.
- (3) promote cities as employment hubs for people.
- (4) explain where cities source their labour for factories.

Q. 17. According to the passage, squatter cities are environment-friendly for all of the following reasons EXCEPT:

- (1) they recycle material.
- (2) their transportation is energy efficient.

(3) their streets are kept clean.

(4) they sort out garbage.

Q. 18. Which one of the following statements would undermine the author’s stand regarding the greenness of cities?

- (1) Sorting through rubbish contributes to the rapid spread of diseases in the slums.
- (2) The high density of cities leads to an increase in carbon dioxide and global warming.
- (3) The compactness of big cities in the West increases the incidence of violent crime.
- (4) Over the last decade the cost of utilities has been increasing for city dwellers.

Q. 19. From the passage it can be inferred that cities are good places to live in for all of the following reasons EXCEPT that they:

- (1) help prevent destruction of the environment.
- (2) contribute to the cultural transformation of residents.
- (3) offer employment opportunities.
- (4) have suburban areas as well as office areas.

Directions (Q. 20 to 24): War, natural disasters and climate change are destroying some of the world’s most precious cultural sites. Google is trying to help preserve these archaeological wonders by allowing users access to 3D images of these treasures through its site. But the project is raising questions about Google’s motivations and about who should own the digital copyrights. Some critics call it a form of “digital colonialism.” When it comes to archaeological treasures, the losses have been mounting. ISIS blew up parts of the ancient city of Palmyra in Syria and an earthquake hit Bagan, an ancient city in Myanmar, damaging dozens of temples, in 2016. In the past, all archaeologists and historians had for restoration and research were photos, drawings, remnants and intuition. But that’s changing. Before the earthquake at Bagan, many of the temples on the site were scanned. . . . [These] scans . . . are on Google’s Arts & Culture site. The digital renditions allow viewers to virtually wander the halls of the temple, look up-close at paintings and turn the building over, to look up at its chambers. . . .

[Google Arts & Culture] works with museums and other nonprofits . . . to put high-quality images online. The images of the temples in Bagan are part of a collaboration with CyArk, a nonprofit that creates the 3D scanning of historic sites. . . . Google . . . says [it] doesn’t make money off this website, but it fits in with Google’s mission to make the world’s information available and useful.

Critics say the collaboration could be an attempt by a large corporation to wrap itself in the sheen of culture. Ethan Watrall, an archaeologist, professor at Michigan State University and a member of the Society for American Archaeology, says he’s not comfortable with the arrangement between CyArk and Google. . . . Watrall says this project is just a way for Google to promote Google. “They want to make this material accessible so people will browse it and be filled with wonder by it,” he says. “But at its core, it’s all about

advertisements and driving traffic." Watrall says these images belong on the site of a museum or educational institution, where there is serious scholarship and a very different mission. . . . [There's] another issue for some archaeologists and art historians. CyArk owns the copyrights of the scans — not the countries where these sites are located. That means the countries need CyArk's permission to use these images for commercial purposes.

Erin Thompson, a professor of art crime at John Jay College of Criminal Justice in New York City, says it's the latest example of a Western nation appropriating a foreign culture, a centuries-long battle. . . . CyArk says it copyrights the scans so no one can use them in an inappropriate way. The company says it works closely with authorities during the process, even training local people to help. But critics like Thompson are not persuaded. . . . She would prefer the scans to be owned by the countries and people where these sites are located.

Q. 20. Which of the following, if true, would most strongly invalidate Dr. Watrall's objections?

- (1) Google takes down advertisements on its website hosting CyArk's scanned images.
- (2) There is a ban on CyArk scanning archeological sites located in other countries.
- (3) CyArk uploads its scanned images of archaeological sites onto museum websites only.
- (4) CyArk does not own the copyright on scanned images of archaeological sites.

Q. 21. By "digital colonialism", critics of the CyArk-Google project are referring to the fact that:

- (1) the scanning process can damage delicate frescos and statues at the sites.
- (2) CyArk and Google have not shared the details of digitisation with the host countries.
- (3) countries where the scanned sites are located do not own the scan copyrights.
- (4) CyArk and Google have been scanning images without copyright permission from host countries.

Q. 22. Of the following arguments, which one is LEAST likely to be used by the companies that digitally scan cultural sites?

- (1) It helps preserve precious images in case the sites are damaged or destroyed.

- (2) It enables people who cannot physically visit these sites to experience them.
- (3) It provides images free of cost to all users.
- (4) It allows a large corporation to project itself as a protector of culture.

Q. 23. Based on his views mentioned in the passage, one could best characterise Dr. Watrall as being:

- (1) uneasy about the marketing of archaeological images for commercial use by firms such as Google and CyArk.
- (2) dismissive of laypeople's access to specialist images of archaeological and cultural sites.
- (3) critical about the links between a non-profit and a commercial tech platform for distributing archaeological images.
- (4) opposed to the use of digital technology in archaeological and cultural sites in developing countries.

Q. 24. In Dr. Thompson's view, CyArk owning the copyright of its digital scans of archaeological sites is akin to:

- (1) tourists uploading photos of monuments onto social media.
- (2) the seizing of ancient Egyptian artefacts by a Western museum.
- (3) the illegal downloading of content from the internet.
- (4) digital platforms capturing users' data for market research.

Directions (Q. 25 to 30): The four sentences (labelled 1, 2, 3, 4) given below, when properly sequenced would yield a coherent paragraph. Decide on the proper sequence of the order of the sentences and key in the sequence of the four numbers as your answer.

- Q. 25. 1.** To the uninitiated listener, atonal music can sound like chaotic, random noise.
- 2.** Atonality is a condition of music in which the constructs of the music do not 'live'

within the confines of a particular key signature, scale, or mode.

- 3.** After you realize the amount of knowledge, skill, and technical expertise

required to compose or perform it, your tune may change, so to speak.

4. However, atonality is one of the most important movements in 20th century music.

Q. 26. 1. Living things—animals and plants—typically exhibit correlational structure.

2. Adaptive behaviour depends on cognitive economy, treating objects as equivalent.
3. The information we receive from our senses, from the world, typically has structure and order, and is not arbitrary.
4. To categorize an object means to consider it equivalent to other things in that category, and different—along some salient dimension—from things that are not.

Q. 27. 1. Conceptualisations of ‘women’s time’ as contrary to clock-time and clock-time as synonymous with economic rationalism are two of the deleterious results of this representation.

2. While dichotomies of ‘men’s time’, ‘women’s time’, clock-time, and caring time can be analytically useful, this article argues that everyday caring practices incorporate a multiplicity of times; and both men and women can engage in these multiple-times
3. When the everyday practices of working sole fathers and working sole mothers are carefully examined to explore conceptualisations of gendered time, it is found that caring time is often more focused on the clock than generally theorised.
4. Clock-time has been consistently represented in feminist literature as a masculine artefact representative of a ‘time is money’ perspective.

Q. 28. Language is an autapomorphy found only in our lineage, and not shared with other branches of our group such as primates. We also have no definitive evidence that any species other than *Homo sapiens* ever had language. However, it must be noted straightaway that ‘language’ is not a monolithic entity, but rather a complex bundle of traits that must have evolved over a significant time frame.... Moreover,

language crucially draws on aspects of cognition that are long established in the primate lineage, such as memory: the language faculty as a whole comprises more than just the uniquely linguistic features.

- (1) Language evolved with linguistic features building on features of cognition such as memory.
- (2) Language, a derived trait found only in humans, has evolved over time and involves memory.
- (3) Language is not a single, uniform entity but the end result of a long and complex process of linguistic evolution.
- (4) Language is a distinctively human feature as there is no evidence of the existence of language in any other species.

Q. 29. Privacy-challenged office workers may find it hard to believe, but open-plan offices and cubicles were invented by architects and designers who thought that to break down the social walls that divide people, you had to break down the real walls, too. Modernist architects saw walls and rooms as downright fascist. The spaciousness and flexibility of an open plan would liberate homeowners and office dwellers from the confines of boxes. But companies took up their idea less out of a democratic ideology than a desire to pack in as many workers as they could. The typical open-plan office of the first half of the 20th century was a white-collar assembly line. Cubicles were interior designers’ attempt to put some soul back in.

- (1) Wall-free office spaces could have worked out the way their utopian inventors intended had companies cared for workers’ satisfaction.
- (2) Wall-free office spaces did not quite work out as desired and therefore cubicles came into being.
- (3) Wall-free office spaces did not quite work out the way their utopian inventors intended, as they became tools for exploitation of labor.
- (4) Wall-free office spaces did not quite work out as companies don’t believe in democratic ideology.

Q. 30. Social movement organizations often struggle to mobilize supporters from allied

movements in their efforts to achieve critical mass. Organizations with hybrid identities—those whose organizational identities span the boundaries of two or more social movements, issues, or identities—are vital to mobilizing these constituencies. Studies of the post-9/11 U.S. antiwar movement show that individuals with past involvement in non-anti-war movements are more likely to join hybrid organizations than are individuals without involvement in non-anti-war movements. In addition, they show that organizations with hybrid identities occupy relatively more central positions in inter-organizational contact networks within the antiwar movement and

thus recruit significantly more participants in demonstrations than do non hybrid organizations.

- (1) Movements that work towards social change often find it difficult to mobilize a critical mass of supporters.
- (2) Organizations with hybrid identities are able to mobilize individuals with different points of view.
- (3) Post 9/11 studies show that people who are involved in non anti-war movements are likely to join hybrid organizations.
- (4) Hybrid organizations attract individuals that are deeply involved in anti-war movements.

Directions (Q. 31 to 34): For the following questions answer them individually.

Q. 31. Five sentences related to a topic are given below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out. Choose its number as your answer and key it in.

- (1) Ocean plastic is problematic for a number of reasons, but primarily because marine animals eat it.
- (2) The largest numerical proportion of ocean plastic falls in small size fractions.
- (3) Aside from clogging up the digestive tracts of marine life, plastic also tends to adsorb pollutants from the water column.
- (4) Plastic in the oceans is arguably one of the most important and pervasive environmental problems today.
- (5) Eating plastic has a number of negative consequences such as the retention of plastic particles in the gut for longer periods than normal food particles.

Q. 32. The four sentences (labelled 1, 2, 3, 4) given below, when properly sequenced would yield a coherent paragraph. Decide on the proper sequence of the order of the sentences and key in the sequence of the four numbers as your answer.

- (1) Such a belief in the harmony of nature requires a purpose presumably imposed by the goodness and wisdom of a deity.
- (2) These parts, all fit together into an integrated, well-ordered system that was created by design.

- (3) Historically, the notion of a balance of nature is part observational, part metaphysical, and not scientific in any way.
- (4) It is an example of an ancient belief system called teleology, the notion that what we call nature has a predetermined destiny associated with its component parts.

Q. 33. Five sentences related to a topic are given below in a jumbled order. Four of them form a coherent and unified paragraph. Identify the odd sentence that does not go with the four. Key in the number of the option that you choose.

- (1) Socrates told us that 'the unexamined life is not worth living' and that to 'know thyself' is the path to true wisdom.
- (2) It suggests that you should adopt an ancient rhetorical method favored by the likes of Julius Caesar and known as 'illeism'—or speaking about yourself in the third person.
- (3) Research has shown that people who are prone to rumination also often suffer from impaired decision making under pressure and are at a substantially increased risk of depression.
- (4) Simple rumination - the process of churning your concerns around in your head—is not the way to achieve self-realization.
- (5) The idea is that this small change in perspective can clear your emotional fog, allowing you to see past your biases.

Q. 34. Five sentences related to a topic are given below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out. Choose its number as your answer and key it in.

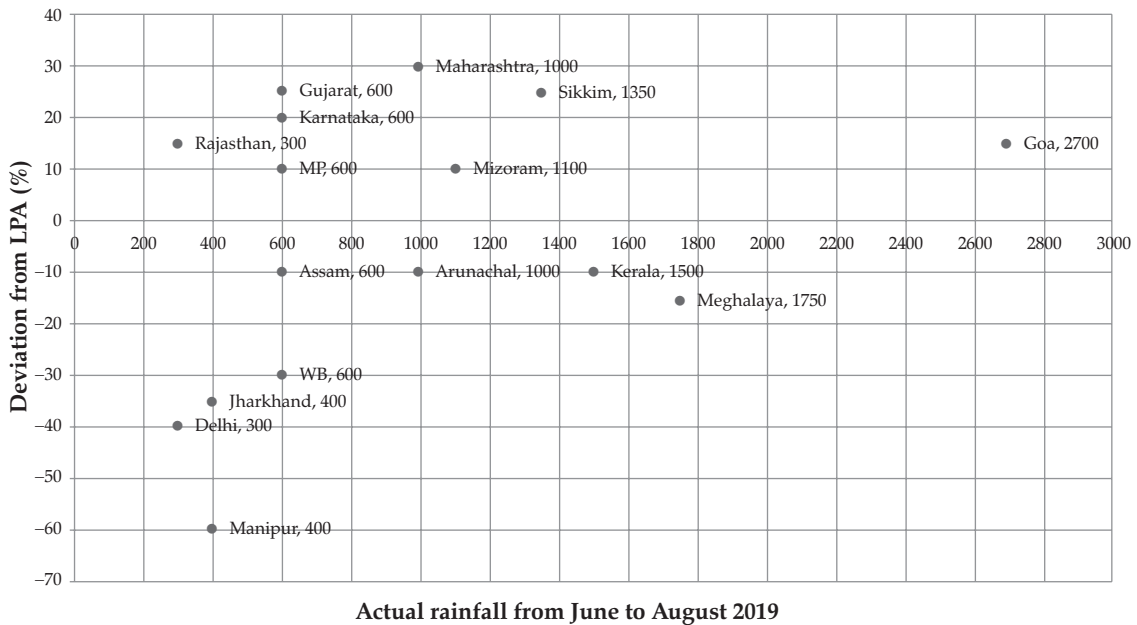
- (1) A particularly interesting example of inference occurs in many single panel comics.
- (2) It's the creator's participation and imagination that makes the single-panel comic so engaging and so rewarding.

- (3) Often, the humor requires you to imagine what happened in the instant immediately before or immediately after the panel you're being shown.
- (4) To get the joke, you actually have to figure out what some of these missing panels must be.
- (5) It is as though the cartoonist devised a series of panels to tell the story and has chosen to show you only one - and typically not even the funniest.

Data Interpretation and Logical Reasoning (DILR)

Directions (Q. 1 to 4): Read the following passage carefully and answer the questions that follow.

Comprehension: To compare the rainfall data, India Meteorological Department (IMD) calculated the Long Period Average (LPA) of rainfall during period June-August for each of the 16 states. The figure given below shows the actual rainfall (measured in mm) during June-August, 2019 and the percentage deviations from LPA of respective states in 2018. Each state along with its actual rainfall is presented in the figure.



Q. 1. If a 'Heavy Monsoon State' is defined as a state with actual rainfall from June-August, 2019 of 900 mm or more, then approximately what percentage of 'Heavy Monsoon States' have a negative deviation from respective LPAs in 2019?

- (1) 42.86
- (2) 75.00
- (3) 57.14
- (4) 14.29

Q. 2. If a 'Low Monsoon State' is defined as a state with actual rainfall from June-August, 2019 of 750 mm or less, then what is the median 'deviation from LPA' (as defined in the y-axis of the figure) of 'Low Monsoon States'?

- (1) -10%
- (2) 10%
- (3) -20%
- (4) -30%

Q. 3. What is the average rainfall of all states that have actual rainfall of 600 mm or less in 2019 and have a negative deviation from LPA?

- (1) 367 mm
- (2) 500 mm
- (3) 450 mm
- (4) 460 mm

Q. 4. The LPA of a state for a year is defined as the average rainfall in the preceding 10 years considering the period of June-August. For example, LPA in 2018 is the average rainfall during 2009-2018 and LPA in 2019 is the

average rainfall during 2010-2019. It is also observed that the actual rainfall in Gujarat in 2019 is 20% more than the rainfall in 2009.

The LPA of Gujarat in 2019 is closest to

- (1) 475 mm (2) 505 mm
(3) 490 mm (4) 525 mm

Directions (Q. 5 to 8): Read the following passage carefully and answer the questions that follow.

Ten players, as listed in the table below, participated in a rifle shooting competition comprising of 10 rounds. Each round had 6 participants. Players numbered 1 through 6 participated in Round 1, players 2 through 7 in Round 2,..., players 5 through 10 in Round 5, players 6 through 10 and 1 in Round 6, players 7 through 10, 1 and 2 in Round 7 and so on. The top three performances in each round were awarded 7, 3 and 1 points respectively. There were no ties in any of the 10 rounds. The table below gives the total number of points obtained by the 10 players after Round 6 and Round 10.

Player No.	Player's Name	Points after Round 6	Points after Round 10
1	Amita	8	18
2	Bala	2	5
3	Chen	3	6
4	David	6	6
5	Eric	3	10
6	Fatima	10	10
7	Gordon	17	17
8	Hansa	1	4
9	Ikea	2	17
10	Joshin	14	17

The following information is known about Rounds 1 through 6:

- Gordon did not score consecutively in any two rounds.
- Eric and Fatima both scored in a round. The following information is known about Rounds 7 through 10:
 - Only two players scored in three consecutive rounds. One of them was Chen. No other player scored in any two consecutive rounds.
 - Joshin scored in Round 7, while Amita scored in Round 10.
 - No player scored in all the four rounds.

Q. 5. What were the scores of Chen, David, and Eric respectively after Round 3?

- (1) 3, 6, 3 (2) 3, 3, 3
(3) 3, 3, 0 (4) 3, 0, 3

Q. 7. Which player scored points in maximum number of rounds?

- (1) Joshin (2) Chen
(3) Amita (4) Ikea

Q. 6. Which three players were in the last three positions after Round 4?

- (1) Bala, Ikea, Joshin
(2) Bala, Hansa, Ikea
(3) Bala, Chen, Gordon
(4) Hansa, Ikea, Joshin

Q. 8. Which players scored points in the last round?

- (1) Amita, Eric, Joshin
(2) Amita, Chen, David
(3) Amita, Bala, Chen
(4) Amita, Chen, Eric

Directions (Q. 9 to 12): Read the following passage carefully and answer the questions that follow.

The first year students in a business school are split into six sections. In 2019 the Business Statistics course was taught in these six sections by Annie, Beti, Chetan, Dave, Esha, and Fakir. All six sections had a common midterm (MT) and a common endterm (ET) worth 100 marks each. ET contained more questions than MT. Questions for MT and ET were prepared collectively by the six faculty members. Considering MT and ET together, each faculty member prepared the same number of questions.

Each of MT and ET had at least four questions that were worth 5 marks, at least three questions that were worth 10 marks, and at least two questions that were worth 15 marks. In both MT and ET, all the 5-marks questions preceded the 10-marks questions, and all the 15-marks questions followed the 10-marks questions.

The following additional facts are known:

- Annie prepared the fifth question for both MT and ET. For MT, this question carried 5 marks.
- Annie prepared one question for MT. Every other faculty member prepared more than one questions for MT.
- All questions prepared by a faculty member appeared consecutively in MT as well as ET.
- Chetan prepared the third question in both MT and ET; and Esha prepared the eighth question in both.
- Fakir prepared the first question of MT and the last one in ET. Dave prepared the last question of MT and the first one in ET.

Q. 9. The second question in ET was prepared by:

- (1) Chetan (2) Beti
- (3) Esha (4) Dave

Q. 10. How many 5-mark questions were there in MT and ET combined?

- (1) 13
- (2) 12
- (3) 10
- (4) Cannot be determined

Q. 11. Who prepared 15-mark questions for MT and ET?

- (1) Only Beti, Dave, Esha and Fakir
- (2) Only Dave and Fakir
- (3) Only Esha and Fakir
- (4) Only Dave, Esha and Fakir

Q. 12. Which of the following questions did Beti prepare in ET?

- (1) Seventh question (2) Fourth question
- (3) Ninth question (4) Tenth question

Directions (Q. 13 to 16): Read the following passage carefully and answer the questions that follow.

Comprehension: Students in a college are discussing two proposals:

- a proposal by the authorities to introduce dress code on campus, and
 - a proposal by the students to allow multinational food franchises to set up outlets on college campus.
- A student does not necessarily support either of the two proposals.

In an upcoming election for student union president, there are two candidates in fray:

Sunita and Ragini. Every student prefers one of the two candidates.

A survey was conducted among the students by picking a sample of 500 students. The following information was noted from this survey.

- 250 students supported proposal A and 250 students supported proposal B.
- Among the 200 students who preferred Sunita as student union president, 80% supported proposal A.
- Among those who preferred Ragini, 30% supported proposal A.
- 20% of those who supported proposal B preferred Sunita.
- 40% of those who did not support proposal B preferred Ragini.
- Every student who preferred Sunita and supported proposal B also supported proposal A.
- Among those who preferred Ragini, 20% did not support any of the proposals.

Q. 13. Among the students surveyed who supported proposal A, what percentage preferred Sunita for student union president?

- (1) 40 (2) 25
- (3) 20 (4) 50

Q. 14. What percentage of the students surveyed who did not support proposal A preferred Ragini as student union president?

Q. 16. How many of the students surveyed supported proposal B, did not support proposal A and preferred Ragini as student union president?

Q. 15. What percentage of the students surveyed who supported both proposals A and B preferred Sunita as student union president?

- (1) 150 (2) 210
- (3) 200 (4) 40

Directions (Q. 17 to 20): Read the following passage carefully and answer the questions that follow.

Comprehension: In the table below the check marks indicate all languages spoken by five people: Paula, Quentin, Robert, Sally and Terence. For example, Paula speaks only Chinese and English.

	Arabic	Basque	Chinese	Dutch	English	French
Paula			✓		✓	
Quentin				✓	✓	
Robert	✓					✓
Sally		✓			✓	
Terence			✓			✓

These five people form three teams, Team 1, Team 2 and Team 3. Each team has either 2 or 3 members. A team is said to speak a particular language if at least one of its members speak that language.

The following facts are known:

- (1) Each team speaks exactly four languages and has the same number of members.
- (2) English and Chinese are spoken by all three teams, Basque and French by exactly two teams and the other languages by exactly one team.
- (3) None of the teams include both Quentin and Robert.
- (4) Paula and Sally are together in exactly two teams.
- (5) Robert is in Team 1 and Quentin is in Team 3.

Q. 17. Who among the following four is not a member of Team 2?

- (1) Paula (2) Terence
(3) Quentin (4) Sally

Q. 19. Who among the five people is a member of all teams?

- (1) Terence (2) Sally
(3) Paula (4) No one

Q. 18. Who among the following four people is a part of exactly two teams?

- (1) Paula
(2) Quentin
(3) Sally
(4) Robert

Q. 20. Apart from Chinese and English, which languages are spoken by Team 1?

- (1) Arabic and French
(2) Basque and French
(3) Arabic and Basque
(4) Basque and Dutch

Directions (Q. 21 to 24): Read the following passage carefully and answer the questions that follow.

Three doctors, Dr. Ben, Dr. Kane and Dr. Wayne visit a particular clinic Monday to Saturday to see patients. Dr. Ben sees each patient for 10 minutes and charges ₹100. Dr. Kane sees each patient for 15 minutes and charges ₹200, while Dr. Wayne sees each patient for 25 minutes and charges ₹300. The clinic has three rooms numbered 1, 2 and 3 which are assigned to the three doctors as per the following table.

Room No.	Monday & Tuesday	Wednesday & Thursday	Friday & Saturday
1	Ben	Wayne	Kane
2	Kane	Ben	Wayne
3	Wayne	Kane	Ben

The clinic is open from 9 a.m. to 11:30 a.m. every Monday to Saturday.

On arrival each patient is handed a numbered token indicating their position in the queue, starting with token number 1 every day. As soon as any doctor becomes free, the next patient in the queue enters that emptied room for consultation.

If at any time, more than one room is free then the waiting patient enters the room with the smallest number. For example, if the next two patients in the queue have token numbers 7 and 8 and if rooms numbered 1 and 3 are free, then patient with token number 7 enters room number 1 and patient with token number 8 enters room number 3.

Q. 21. What is the maximum number of patients that the clinic can cater to on any single day?

- (1) 12 (2) 30
(3) 31 (4) 15

Q. 22. The queue is never empty on one particular Saturday. Which of the three doctors would earn the maximum amount in consultation charges on that day?

- (1) Dr. Wayne
(2) Dr. Kane
(3) Dr. Ben
(4) Both Dr. Wayne and Dr. Kane

Q. 23. Mr. Singh visited the clinic on Monday, Wednesday, and Friday of a particular week, arriving at 8:50 a.m. on each of the three

days. His token number was 13 on all three days. On which day was he at the clinic for the maximum duration?

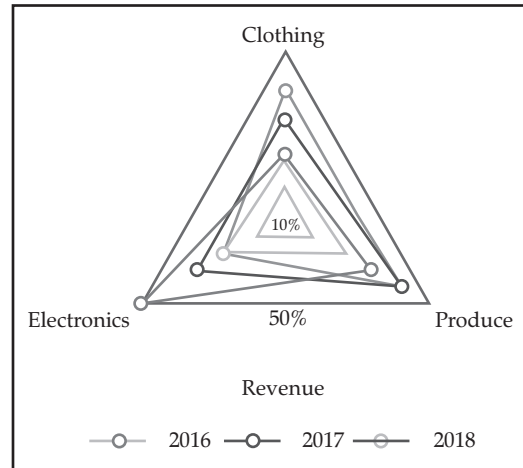
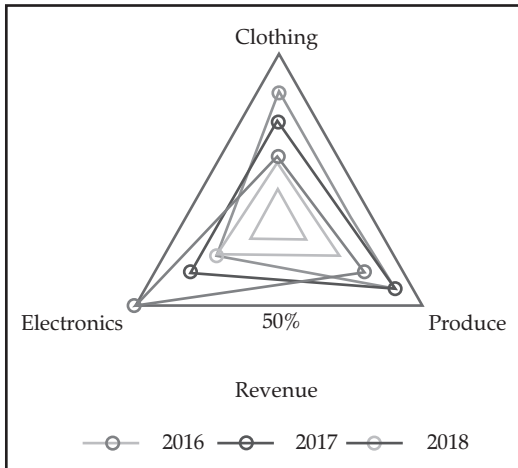
- (1) Same duration on all three days
(2) Friday
(3) Monday
(4) Wednesday

Q. 24. On a slow Thursday, only two patients are waiting at 9 a.m. After that two patients keep arriving at exact 15-minute intervals starting at 9:15 a.m., i.e., at 9:15 a.m., 9:30 a.m., 9:45 a.m. etc. Then the total duration in minutes when all three doctors are simultaneously free is

- (1) 30 (2) 10
(3) 15 (4) 0

Directions (Q. 25 to 28): Read the following passage carefully and answer the questions that follow.

Comprehension: A large store has only three departments: Clothing, Produce, and Electronics. The following figure shows the percentages of revenue and cost from the three departments for the years 2016, 2017 and 2018. The dotted lines depict percentage levels. So for example, in 2016, 50% of store's revenue came from its Electronics department while 40% of its costs were incurred in the Produce department.



In this setup, Profit is computed as (Revenue - Cost) and Percentage Profit as $\frac{\text{Profit}}{\text{Cost}} \times 100\%$.

It is known that

- The percentage profit for the store in 2016 was 100%.
- The store's revenue doubled from 2016 to 2017, and its cost doubled from 2016 to 2018.
- There was no profit from the Electronics department in 2017.
- In 2018, the revenue from the Clothing department was the same as the cost incurred in the Produce department.

Q. 25. What was the percentage profit of the store in 2018?

- (1) 16 : 9 (2) 4 : 3
(3) 9 : 16 (4) 8 : 5

Q. 26. What was the ratio of revenue generated from the Produce department in 2017 to that in 2018?

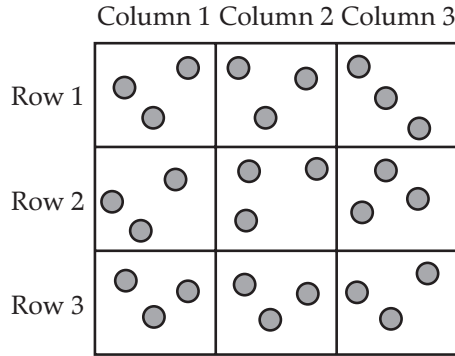
Q. 27. What percentage of the total profits for the store in 2016 was from the Electronics department?

- (1) 15.5 (2) 25.0
(3) 8.3 (4) 33.3

Q. 28. What was the approximate difference in profit percentages of the store in 2017 and 2018?

Directions (Q. 29 to 32): Read the following passage carefully and answer the questions that follow.

Comprehension:



	Column 1	Column 2	Column 3
Row 1	(2, 4)	(6, 8)	(1, 3)
Row 2	(3, 5)	(1, 1),	(6, 20)
Row 3	(1, 2)	(1, 2)	(2, 5)

Three pouches (each represented by a filled circle) are kept in each of the nine slots in a 3×3 grid, as shown in the figure. Every pouch has a certain number of one-rupee coins. The minimum and maximum amounts of money (in rupees) among the three pouches in each of the nine slots are given in the table. For example, we know that among the three pouches kept in the second column of the first row, the minimum amount in a pouch is ₹6 and the maximum amount is ₹8.

There are nine pouches in any of the three columns, as well as in any of the three rows. It is known that the average amount of money (in rupees) kept in the nine pouches in any column or in any row is an integer. It is also known that the total amount of money kept in the three pouches in the first column of the third row is ₹4.

- Q. 29. What is the total amount of money (in rupees) in the three pouches kept in the first column of the second row?
- Q. 30. How many pouches contain exactly one coin?
- Q. 31. What is the number of slots for which the average amount (in rupees) of its three pouches is an integer?
- Q. 32. The number of slots for which the total amount in its three pouches strictly exceeds ₹10 is.

Quantitative Aptitude (QA)

- Q. 1. A shopkeeper sells two tables, each procured at cost price p , to Amal and Asim at a profit of 20% and at a loss of 20%, respectively. Amal sells his table to Bimal at a profit of 30%, while Asim sells his table to Barun at a loss of 30%. If the amounts paid by Bimal and Barun are x and y , respectively, then $\frac{(x - y)}{p}$ equals
 - (1) 1
 - (2) 1.2
 - (3) 0.50
 - (4) 0.7
- Q. 2. The real root of the equation $2^{6x} + 2^{3x+2} - 21 = 0$ is:
 - (1) $\log_2 9$
 - (2) $\frac{1}{3} \log_2 3$
 - (3) $\log_2 27$
 - (4) $\log_2 7/3$
- Q. 3. Let a, b, x, y be real numbers such that $a^2 + b^2 = 25, x^2 + y^2 = 169$, and $ax + by = 65$. If $k = ay - bx$, then
 - (1) $0 < k \leq \frac{5}{13}$
 - (2) $k > \frac{5}{13}$
 - (3) $k = \frac{5}{13}$
 - (4) $k = 0$

- Q. 4. If x is a real number, then $\log_e \frac{4x-x^2}{3}$ is a real number if and only if
 (1) $1 \leq x \leq 3$ (2) $1 \leq x \leq 2$
 (3) $-1 \leq x \leq 3$ (4) $-3 \leq x \leq 3$
- Q. 5. If $(2n + 1) + (2n + 3) + (2n + 5) + \dots + (2n + 47) = 5280$, then what is the value of $1 + 2 + 3 + \dots + n$?
- Q. 6. Two circles, each of radius 4 cm, touch externally. Each of these two circles is touched externally by a third circle. If these three circles have a common tangent, then the radius of the third circle, in cm, is
 (1) $\frac{1}{\sqrt{2}}$ (2) $\frac{\pi}{3}$
 (3) $\sqrt{2}$ (4) 1
- Q. 7. If $5^x - 3^y = 13438$ and $5^{x-1} + 3^{y+1} = 9686$, then $x + y$ equals:
- Q. 8. In 2010, a library contained a total of 11500 books in two categories – fiction and nonfiction. In 2015, the library contained a total of 12760 books in these two categories. During this period, there was 10% increase in the fiction category while there was 12% increase in the nonfiction category. How many fiction books were in the library in 2015?
 (1) 6160 (2) 6600
 (3) 6000 (4) 5500
- Q. 9. The strength of a salt solution is $p\%$ if 100 ml of the solution contains p grams of salt. Each of three vessels A, B, C contains 500 ml of salt solution of strengths 10%, 22%, and 32%, respectively. Now, 100 ml of the solution in vessel A is transferred to vessel B. Then, 100 ml of the solution in vessel B is transferred to vessel C. Finally, 100 ml of the solution in vessel C is transferred to vessel A. The strength, in percentage, of the resulting solution in vessel A is
 (1) 15 (2) 13
 (3) 12 (4) 14
- Q. 10. In an examination, the score of A was 10% less than that of B, the score of B was 25% more than that of C, and the score of C was 20% less than that of D. If A scored 72, then the score of D was
- Q. 11. In a triangle ABC, medians AD and BE are perpendicular to each other, and have lengths 12 cm and 9 cm, respectively. Then, the area of triangle ABC, in sq cm, is:
 (1) 78 (2) 80
 (3) 72 (4) 68
- Q. 12. The number of common terms in the two sequences: 15, 19, 23, 27, ..., 415 and 14, 19, 24, 29, ..., 464 is:
 (1) 21 (2) 20
 (3) 18 (4) 19
- Q. 13. John gets ₹57 per hour of regular work and ₹114 per hour of overtime work. He works altogether 172 hours and his income from overtime hours is 15% of his income from regular hours. Then, for how many hours did he work overtime?
- Q. 14. Let ABC be a right-angled triangle with hypotenuse BC of length 20 cm. If AP is perpendicular on BC, then the maximum possible length of AP, in cm, is:
 (1) 10 (2) 5
 (3) $8\sqrt{2}$ (4) $6\sqrt{2}$
- Q. 15. Let A be a real number. Then the roots of the equation $x^2 - 4x - \log_2 A = 0$ are real and distinct if and only if
 (1) $A > \frac{1}{16}$ (2) $A < \frac{1}{16}$
 (3) $A < \frac{1}{8}$ (4) $A > \frac{1}{8}$
- Q. 16. The average of 30 integers is 5. Among these 30 integers, there are exactly 20 which do not exceed 5. What is the highest possible value of the average of these 20 integers?
 (1) 3.5 (2) 5
 (3) 4.5 (4) 4
- Q. 17. The salaries of Ramesh, Ganesh and Rajesh were in the ratio 6:5:7 in 2010, and in the ratio 3 : 4 : 3 in 2015. If Ramesh's salary increased by 25% during 2010-2015, then the percentage increase in Rajesh's salary during this period is closest to
 (1) 10 (2) 7
 (3) 9 (4) 8
- Q. 18. Mukesh purchased 10 bicycles in 2017, all at the same price. He sold six of these at a profit

of 25% and the remaining four at a loss of 25%. If he made a total profit of ₹2000, then his purchase price of a bicycle, in Rupees, was

- (1) 6000 (2) 8000
(3) 4000 (4) 2000

Q. 19. Let a_1, a_2, \dots be integers such that

$$a_1 - a_2 + a_3 - a_4 + \dots + (-1)^{n-1}a_n = n, \text{ for all } n \geq 1.$$

Then $a_{51} + a_{52} + \dots + a_{1023}$ equals:

- (1) 0 (2) 1
(3) 10 (4) -1

Q. 20. In a six-digit number, the sixth, that is, the rightmost, digit is the sum of the first three digits, the fifth digit is the sum of first two digits, the third digit is equal to the first digit, the second digit is twice the first digit and the fourth digit is the sum of fifth and sixth digits. Then, the largest possible value of the fourth digit is

Q. 21. How many factors of $2^4 \times 3^5 \times 10^4$ are perfect squares which are greater than 1 ?

Q. 22. A cyclist leaves A at 10 a.m. and reaches B at 11 a.m. Starting from 10:01 a.m., every minute a motorcycle leaves A and moves towards B. Forty-five such motorcycles reach B by 11 a.m. All motorcycles have the same speed. If the cyclist had doubled his speed, how many motorcycles would have reached B by the time the cyclist reached B?

- (1) 22 (2) 23
(3) 15 (4) 20

Q. 23. Let A and B be two regular polygons having a and b sides, respectively. If $b = 2a$ and each interior angle of B is 2 times each interior angle of A, then each interior angle, in degrees, of a regular polygon with $a + b$ sides is

Q. 24. Anil alone can do a job in 20 days while Sunil alone can do it in 40 days. Anil starts the job, and after 3 days, Sunil joins him. Again, after a few more days, Bimal joins them and they together finish the job. If Bimal has done 10% of the job, then in how many days was the job done?

- (1) 12 (2) 13
(3) 15 (4) 14

Q. 25. The quadratic equation $x^2 + bx + c = 0$ has two roots $4a$ and $3a$, where a is an integer. Which of the following is a possible value of $b^2 + c$?

- (1) 3721 (2) 361
(3) 427 (4) 549

Q. 26. Amal invests ₹12000 at 8% interest, compounded annually, and ₹10000 at 6% interest, compounded semi-annually, both investments being for one year. Bimal invests his money at 7.5% simple interest for one year. If Amal and Bimal get the same amount of interest, then the amount, in Rupees, invested by Bimal is

Q. 27. What is the largest positive integer n such that $\frac{n^2 + 7n + 12}{n^2 - n - 12}$ is also a positive integer?

- (1) 16 (2) 6
(3) 8 (4) 12

Q. 28. Two ants A and B start from a point P on a circle at the same time, with A moving clockwise and B moving anti-clockwise. They meet for the first time at 10:00 am when A has covered 60% of the track. If A returns to P at 10:12 am, then B returns to P at

- (1) 10:25 am (2) 10:45 am
(3) 10:18 am (4) 10:27 am

Q. 29. A man makes complete use of 405 cc of iron, 783 cc of aluminium, and 351 cc of copper to make a number of solid right circular cylinders of each type of metal. These cylinders have the same volume and each of these has radius 3 cm. If the total number of cylinders is to be kept at a minimum, then the total surface area of all these cylinders, in sq cm, is:

- (1) $1026(1 + \pi)$ (2) 8464π
(3) 928π (4) $1044(4 + \pi)$

Q. 30. In an examination, Rama's score was one-twelfth of the sum of the scores of Mohan and Anjali. After a review, the score of each of them increased by 6. The revised scores of Anjali, Mohan, and Rama were in the ratio 11 : 10 : 3. Then Anjali's score exceeded Rama's score by

- (1) 26 (2) 32
(3) 35 (4) 24

Q. 31. The base of a regular pyramid is a square and each of the other four sides is an equilateral triangle, length of each side being 20 cm. The vertical height of the pyramid, in cm, is:

- (1) 12 (2) $10\sqrt{2}$
 (3) $8\sqrt{3}$ (4) $5\sqrt{5}$

Q. 32. Let f be a function such that $f(mn) = f(m)f(n)$ for every positive integers m and n .

If $f(1)$, $f(2)$ and $f(3)$ are positive integers, $f(1) < f(2)$, and $f(24) = 54$, then $f(18)$ equals

Q. 33. In a race of three horses, the first beat the second by 11 metres and the third by 90 metres. If the second beat the third by 80 metres, what was the length, in metres, of the racecourse?

Q. 34. How many pairs (m, n) of positive integers satisfy the equation $m^2 + 105 = n^2$?

Answer Key

Verbal Ability and Reading Comprehension (VARC)

1. (3)	2. (2)	3. (4)	4. (1)	5. (2)	6. (3)	7. (2)	8. (1)
9. (2)	10. (2)	11. (1)	12. (4)	13. (1)	14. (2)	15. (1)	16. (1)
17. (3)	18. (2)	19. (4)	20. (3)	21. (3)	22. (4)	23. (3)	24. (2)
25. 2143	26. 2431	27. 4132	28. (1)	29. (3)	30. (2)	31. (2)	32. 3421
33. (1)	34. (2)						

Data Interpretation and Logical Reasoning (DILR)

1. (1)	2. (1)	3. (4)	4. (3)	5. (2)	6. (4)	7. (4)	8. (4)
9. (4)	10. (1)	11. (4)	12. (4)	13. 64	14. 84	15. (4)	16. (1)
17. (3)	18. (3)	19. (3)	20. (1)	21. (3)	22. (2)	23. (3)	24. (4)
25. 25	26. (4)	27. 70	28. (3)	29. 13	30. 8	31. 2	32. 3

Quantitative Aptitude (QA)

1. (1)	2. (2)	3. (4)	4. (1)	5. 4851	6. (4)	7. 13	8. (2)
9. (4)	10. 80	11. (3)	12. (4)	13. 12	14. (1)	15. (1)	16. (3)
17. (2)	18. (3)	19. (2)	20. 7	21. 44	22. (3)	23. 150	24. (2)
25. (4)	26. 20920	27. (4)	28. (4)	29. (1)	30. (2)	31. (2)	32. 12
33. 880	34. 4						

Answers and Explanations

Verbal Ability and Reading Comprehension (VARC)

1. Option (3) is correct.

In the third paragraph the author talks about how language learning process change one's identity. Option (1) can be inferred from the lines: 'This learning process—the embarrassments, the frustrations, the gradual sense of understanding and connection—is invariably transformative.'

Option (2) can be derived from the last line of the paragraph.

Option (4) can be derived from: You are what you speak—the words that run throughout your mind are at least as fundamental to your selfhood as is your ethnicity or your gender.

Option (4) talks about evolution, which is not mentioned in the passage. So, one cannot say language has ability to change us because of evolution of language. Hence, option (4) is the answer.

2. Option (2) is correct.

The author believes that learning language of other culture can help in bridging the cultural barriers. So, the author would suggest before studying about any culture one must learn that culture's language. This is mentioned in option (2). Hence, option (2) is the answer.

The author will not discourage anyone to learn any language because he believes learning language of any new culture makes people sympathetic. Hence, option (1) is eliminated.

Option (3) is ruled out, because he says learning language bridges the gap between two culture.

Option (4) is opposite to the author's point of view. Hence, it is eliminated.

3. Option (4) is correct.

'You are what you speak—the words that run throughout your mind are at least as fundamental to your selfhood as is your

ethnicity or your gender.' This lines summarize the central idea of the passage. That is, the author believes cultural hierarchies and barriers are not fixed and that they can be mitigated by learning another language. And to make readers to realise that the author asks, 'Which way is Oriental?' Hence, option (4) is correct answer.

Nowhere in the passage it is mentioned that globalization has enabled people learn more languages and thereby mitigated cultural hierarchies and barriers. Hence, option (1) is eliminated.

Option (2) is factually incorrect. Hence, it is incorrect.

Option (3) is ruled out, because there is no mention of 'goodwill'.

4. Option (1) is correct.

The author states 'both the Chinese and the Egyptians welcomed me because I spoke their languages. My identity as a white male was far less important than my ability to communicate.' That is, he is of the opinion that language can help overcome identity politics and can bridge the gap between two cultures. His, critics would be of the opinion that language can't bridge the gap between two cultures. Hence, option (1) is the correct answer.

The author himself says, 'an individual who wrestles with a difficult language can learn to be more sympathetic to outsiders'. So option (2) can be inferred from this line. Hence, it is ruled out.

Linguistic politics is not discussed in the passage. Hence, option (3) is ruled out.

The word orientalism is a derogatory term for middle eastern countries by the US and European countries. Hence, option D is irrelevant in context of this question.

5. Option (2) is correct.

“For, whatever their sense of the strangeness of the country and the thinness of colonial presence, the British colonial state represented the great conquering discourse of Enlightenment rationalism. So, it began to take initiatives to introduce the logic of modernity into Indian society.” and “this colonial state could hardly adopt for long such a self-denying attitude.” Make it clear that the British colonial state believed its superior modernity set it apart from the Indian society. But it did not want to be marginalised because of its modernity. Option (2) best captures this. Hence, option (2) is the answer.

6. Option (3) is correct.

The question asks to select the option that does not support the argument in the passage.

From paragraph 1 it can be understood that colonizers regarded colonies as laboratories of practical or theoretical experiments. So, option one supports the argument of the passage.

Option (2) also supports the arguments in the passage. This can be inferred from multiple references in the passage, to quote a few: ‘... transformation agendas attack as an external force’, ‘What happened was the creation of a degenerate version of capitalism—what early dependency theorists called the ‘development of underdevelopment’. Hence, option (2) is eliminated.

The passage in paragraph 2 suggests that what European modernity tried to introduce was not like European capitalism and that what it tried to replace was not like feudalism in Europe. Option (4) supports this statement. Hence, it is eliminated.

7. Option (2) is correct.

The question asks which of the options cannot be inferred.

From the line ‘...some empirically inclined theorists of that generation considered the colonies a massive laboratory of utilitarian or other theoretical experiments’, it is understood that British colonialism allowed the treatment of colonies as experimental sites. Hence, option (1) is ruled out.

From the lines, ‘the British colonial state represented the great conquering discourse

of Enlightenment rationalism... As inheritors and representatives of this discourse, which carried everything before it, this colonial state could hardly adopt for long such a self-denying attitude...’, one can understand that the colonial state emerged at least partly as a result of Enlightenment rationalism. Also it implies British colonialism was at least partly shaped by the project of European modernity. This is clearly true. Hence, option (3) and option (4) can be inferred from the passage.

The passage mentions about European modernity, not Indian modernity. Paragraph 1 mentions that initiatives to introduce its logic of modernity on the Indian society by the British ‘were resisted by pre-existing structural forms’. But it is not stated that were these structural forms of Indian modernity? Hence, option (2) can’t be inferred from the passage.

8. Option (1) is correct.

The passage flows as: The first paragraph talks about British colonial policy. The second key idea was the idea of Enlightenment and rationalism/ European modernity. Because the British believed colonies could be used as laboratories, they imposed modernity in India. However, this imposed modernity came to assume an external character. External modernity was associated with subjugation and met with stiff resistance. What the economic reforms resulted in was only a degenerate version of capitalism and underdevelopment. Hence, option (1) is the answer.

9. Option (2) is correct.

The first line of the passage suggests that the transformation of the Indian society did not proceed due to changes within the system, the agenda to transform the society was imposed upon by external forces (colonial agenda). Option (2) is the correct answer.

10. Option (2) is correct.

From the very first line (‘coastal capitals picked by trade-focused empires...’. So, empires picked their capitals in order to promote their trading interests.) it is clear that colonial powers located their capitals as per their trade interest. Hence, option (2) is the answer. Rest of the options are not mentioned in the passage. So, (1), (3), and (4) are eliminated.

11. Option (1) is correct.

All the options are stated in the passage except for option (1). The passage does not talk of rise in pollution level. Hence, option (1) is the answer.

Option (2) is mentioned in the penultimate paragraph. Option (3) is stated in the last paragraph and option (4) is mentioned in the fourth paragraph: Attrition rates can exceed 80%. . . . So, options (2), (3) and (4) are ruled out.

12. Option (4) is correct.

'Pedigree' is used in the sense of history of an idea or an activity. Means, shifting civil servants in order to improve their living standards is something that is not new and has been tried in the past. This is stated in option (4). Hence, it is the answer.

13. Option (1) is correct.

The question asks you to select the option that does not support the argument for decentralization.

As the passage states: Autonomous regulators perform best far from the pressure and lobbying of the big city. It is clear that the supporters of the decentralization are likely to use option (2) and option (3) to support their view. So, option (2) and option (3) are ruled out.

Option (4) is stated in the passage as the second reason for dispersing central government. Hence, people who support decentralization would use it as argument to support decentralization.

14. Option (2) is correct.

The 'dilemma' is mentioned in paragraph 6 elaborates there is a predicament: Small, poor towns = new jobs in areas of high employment, but it is hard to attract the most qualified workers; Larger cities = infrastructure and better-qualified residents, but deprived areas do not benefit. Option (2) simply paraphrases this.

Option (1) is ruled out. It distorts the fact, because the passage states government agencies being in 'larger cities' and not in the 'largest cities'.

Option (3) is rightly eliminated. The passage primarily focuses upon relocation of government agencies, not upon shifting of private companies.

Option (4) is eliminated. Since, it does not talk about qualified workers.

15. Option (1) is correct.

In the passage Calthorpe made a statement that still jars with most people: "The city is the most environmentally benign form of human settlement. Each city dweller consumes less land, less energy, less water, and produces less pollution than his counterpart in settlements of lower densities." Because people believe the opposite: that cities are not eco-friendly.

Rest of the options are not related to eco-friendliness. Hence, they do not contradict Calthorpe's argument. So, they can be eliminated easily.

16. Option (1) is correct.

'One hundred thousand people who would otherwise be deforesting the jungle around Manaus are now prospering in town making such things as mobile phones and televisions'. The line from the passage makes it clear the idea that the author wants to convey is that employment in the city helps stop deforestation. Hence, option (1) is the answer.

(2) and (3) are given in the passage, but they are not the right reasons of why the author quoted example of Manaus.

(4) is factually incorrect.

17. Option (3) is correct.

Option (2) is stated in the last two line of the first paragraph. Hence, option (2) is ruled out.

Option (1) can be inferred from: "But in most slums recycling is literally a way of life." And from the lines, "The Dharavi slum in Mumbai has 400 recycling units and 30,000 ragpickers. Six thousand tons of rubbish are sorted every day.", option (4) can be inferred.

Nowhere in the passage it is mentioned that street of slums is clean. Hence, option (3) is the answer.

18. Option (2) is correct.

The rapid spread of diseases is not related to the idea of greenness. Hence, option (1) is eliminated.

In the same way increase in crime is also not related to the idea of greenness. So, option (3) is eliminated.

Option (4) focuses upon increasing cost of utilities for city dwellers, but does not talk about recycling and reduced opportunities to be wasteful in big cities as stated in the passage. So, it does not weaken the author's stand.

The author says, high urban density makes cities green. The argument that high density of cities results in an increase in carbon dioxide and global warming goes against this. Hence, option (2) is the answer.

19. Option (4) is correct.

In the passage, the author mentions employment opportunities ('give people decent jobs they can afford houses, and gain security'). From this option (3) can be derived and considered as a reason for cities being good place to live in.

Prevention of destruction of the environment can be understood by the example of Manaus. From this option (1) can be considered as a reason for cities being good place to live in.

Cultural transformation can be derived from, 'the progress is from hick to metropolitan to cosmopolitan'. From this option (2) can be considered as a reason for cities being good places to live in.

Option (4) talks about cities having suburban as well as office areas. This does not meaningfully relate to the idea that cities are good places to live in. Hence, option (4) is the answer.

20. Option (3) is correct.

Dr. Watrall believes, the CyArk-Google project is about Google promoting itself and benefitting through advertisements and traffic. His concern about how the images are put to use. He asserts that these images, instead, belong on the site of a museum or educational institution, 'where there is serious scholarship and a very different mission'. From this it is clear that he is not against digital image. If CyArk uploads its scanned images of archaeological sites onto museum websites, Dr. Watrall's objections become invalid. Hence, option (3) is the correct answer.

Option (1) is eliminated. Because as per the passage Dr. Watrall believes, the CyArk-Google project is about Google promoting itself. Just taking down the advertisement would not invalidate the professor's claim.

Option (2) is wrong. By banning in certain locations google's intention to advertise itself won't get changed and professor's objection would still be valid.

Option (4) is a close option, but it is incorrect. Dr. Watrall does not raise the issue of copyrights—this is discussed later in the passage.

21. Option (3) is correct.

In the passage 'digital colonialism' is stated: '... the project is raising questions about Google's motivations and about who should own the digital copyrights. Some critics call it a form of "digital colonialism." That is the countries need CyArk's permission to use the images for commercial purposes.' Hence, option (3) 'countries where the scanned sites are located do not own the scan copyrights' is the correct answer. Rest of the options are outrightly eliminated. Since, they are not mentioned in the passage.

22. Option (4) is correct.

Answer has to the option, which does not support the companies in promoting themselves.

Option (1), option (2), and option (3) will be used by the companies to promote themselves. But option (4) would not like it to be generally known that this project is a good way for them acquire a sheen of culture. Hence, option (4) is the correct answer.

23. Option (3) is correct.

The passage mentions that Dr. Watrall is 'not comfortable' about the arrangement between CyArk and Google as he believes the project as 'a way for Google to promote Google', and, at its core, 'about advertisements and driving traffic.' This is represented in option (3). Hence, option (3) is correct answer.

Option (1) is ruled out. From the passage we can understand that CyArk is a non-profit organisation that creates the 3D scanning of historic sites and that Google does not make money off the website. Option (1) labels both Google and CyArk as firms interested in the marketing of archaeological images for commercial use. This is incorrect. Moreover Dr. Watrall was uneasy about the arrangement between a non-profit organisation and a

commercial organisation, because he believes their values are, in reality, different from what they portray.

Option (2) is factually incorrect. Nothing like option (2) is mentioned in the passage.

Option (4) is also ruled out because Dr. Watrall is not against the use of digital technology in archaeological and cultural sites in developing countries. He is against the arrangement between a non-profit organisation and a commercial organisation, because he believes their values are, in reality, different from what they portray.

24. Option (2) is correct.

Dr. Thompson mentions CyArk owning the copyright of its digital scans of archaeological sites as 'the latest example of a Western nation appropriating a foreign culture'. The only option talking about foreign culture is option (2). Hence, it is the answer.

25. Correct answer is [2143].

Sentence (2) introduces the idea of 'atonality' in music. Sentence (1) follows sentence (2) by telling about misconceptions about atonal music. Sentence (4) clears the misconception by stating that it is one of the most important movements in the music of 20th century. (4)(3) makes a pair. Statement (3) tells why atonality in music is difficult to attain and asserts after understanding the skill needed to attain atonality in music one must change one's way of thinking about it. So, the order is 2143.

26. Correct answer is [2431].

The passage is related to 'adaptive behaviour'. Sentence 2 is the obvious opener since; it states defining 'adaptive behavior depends upon cognitive economy'. Sentence 4 elaborates what 'treating objects as equivalent' involves. So, 4 follows 2. Sentence 3 follows 2, since it introduces the idea of 'structure' in the living world by explaining that the information we receive from the world has both structure and order. Sentence 1 adds to 3. So, 2431 is the correct order.

27. Correct answer is [4132].

This is a tricky question. Sentence 1 talks of "this representation", which refers to the representation of clock-time in feminist

literature as a masculine 'time is money' artefact—mentioned in sentence 4. The idea that time is money relates to economic rationalism. Hence, 41 is a pair. Statement (3) introduces 'caring time' and statement (2) talks of all the conceptualizations referred in sentence 1, 4 and 3. Hence is better placed at the end of the paragraph. So, the correct order is 4132.

28. Option (1) is correct.

The main idea of the passage is stated in the last line of the paragraph. It that language is more than just the uniquely linguistic features and is based upon cognitive traits such as memory. This is summed up in option (1). Hence option (1) is the answer.

Rest of the options miss the key point that language is more than a linguistic faculty. So, options (2), (3), and (4) are ruled out.

29. Option (3) is correct.

The paragraph explains that while open-plan offices and cubicles were created with the idea of breaking down the social walls, but it did not work to plan, as companies taking out democracy out of the plan used these spaces to cram in as many workers as they could. This is aptly summed up in option (3). Hence option (3) is the correct answer.

Option (1) is ruled out. It talks about 'workers' satisfaction' but passage does not talk anything like this

Option (2) is eliminated. It says cubicles came into existence because wall-free office space did not work. It is factually incorrect.

Option (4) is eliminated because the passage does not say anything about companies believe in democracy.

30. Option (2) is correct.

The paragraph states that the individuals with past involvement in other movements are more likely to join hybrid organizations as compare to no hybrid organizations. So, hybrid organizations are more powerful and have higher ability to achieve critical mass. Option (2) captures the essence of the paragraph. Hence, option (2) is the answer.

Option (1) is ruled out, because it does not talk about the important key idea hybrid organization.

Option (3) is eliminated since, post 9/11 studies are used as an example to prove the author's point related to hybrid organization, not as the topic itself.

Option (4) is wrong because it distorts the fact by focusing upon individuals involved in anti-war movements, the paragraph uses it as an example.

31. Option (2) is correct.

All the sentences are related to plastic pollution in ocean and its impact upon marine life except for statement (2). It talks about the size of oceanic plastic. Hence, it is the odd one out.

32. Correct answer is [3421].

It is an easy question. Sentence 3 is an obvious opener, since it is introducing the topic of the paragraph. Statement 4, which defines teleology and the idea of nature as having a predetermined destiny with component part,

follows 3. Sentence 2 talks about the parts stated in statement 4. So, 342. And sentence 1 sums up the paragraph. So the correct order is 3421.

33. Option (1) is correct.

All the sentences are about rumination in negative way except for sentence (1), which talks about importance of self-examination. Hence, sentence (1) is odd one out. The correct order of the paragraph would be 4325.

34. Option (2) is correct.

The paragraph is about how to understand the humor behind the single panel comics. Sentence (1) introduces the topic. 3, 4 and 5 relate to the reader of the single panel comic and the importance of the reader's ability to infer what happened before and after, and three of the sentences use "you" to refer the readers. But sentence 2 is about the creator of the comics. Hence, sentence (2) is odd one out.

Data Interpretation and Logical Reasoning (DILR)

Solution for Questions 1 to 4:

1. Correct answer is (1).

Heavy monsoon states :

- Maharashtra = 1000
- Arunachal = 1000
- Mizoram = 1100
- Sikkim = 1350
- Kerala = 1500
- Meghalaya = 1750
- Goa = 2700

Heavy monsoon states having -ve deviation: Arunachal, Kerala, Meghalaya.

So, $\text{Percentage} = \frac{3}{7} \times 100 = 42.86\%$

2. Correct answer is (1).

Low monsoon states:

Gujarat = +25%, Karnataka = +20%, Rajasthan + 15%, MP = +10%, WB = -30%, Jharkhand = -35%, Delhi = -40% and Manipur = -60%

So, Median of all deviations = -10%

3. Correct answer is (4).

States which have 600 mm or less in 2019 and having negative deviation are:

Assam, West Bengal, Jharkhand, Delhi and Manipur.

Rainfall of these states are

$$= 600, 600, 400, 300, 400$$

So, Average rainfall = $\frac{600 + 600 + 400 + 300 + 400}{5}$
= 460

4. Option (3) is correct.

Actual rainfall in 2019 is 20%. More than the rainfall in 2009.

Let in 2009 = x mm

then in 2019 = $1.2x$ mm

Given actual rainfall in 2019 = 600 mm

then in 2009 = 500 mm

Also, given deviation is 25%

Means average till 2018 = $\frac{600}{1.25} = 480$

So, LPA in 2019 = $\frac{[480 \times 10 - 500 + 600]}{10} = 490$

Solution for Questions 5 to 8:

Top 3 performance awarded 7, 3, 1 points respectively

Name	1	2	3	4	5	6	Total
A		×	×	×	×		8
B			×	×	×	×	2
C				×	×	×	3
D					×	×	6
E						×	3
F							10
G	×						17
H	×	×					1
I	×	×	×				2
J	×	×	×	×			14

As given player numbered 1 through 6 (A to F) participating in Round 1. Player 2 through 7 (B to G) participating in Round 2 and so on.

In upper table blank means participation and × marks means not participating

Point 1: G is not score consecutively in any two round. As shown in table, G participated in 5 rounds out of 6 rounds and scored 17 points.

So, possible scores are [7, 7, 3]

From table, J participated in 2 rounds out of 6.

So, score of J = [7, 7]

B scored 2 points in 2 rounds.

So, score of B = [1, 1]

Now, observe A, as he scored total 8 in 2 rounds.

So, A must scored 7 in first round and 1 in other.

So, score of A = [7, 1].

Now, for G as total 17 score. Means 7, 7 & 3 in different rounds. As did not score in two consecutive rounds. Means he scored in 2nd, 4th and 6th round. As in 6th round J already scored 7. So, G will score only 8.

So, score of G = [7, 7, 3]

2nd, 4th, 6th

Now, for I as total 2. Means in 2 rounds scored [1, 1] and 6th round already marked all three scorer. So, I scored in 4th & 5th round.

So, score of I = [1, 1]

4th, 5th

Now, consider for H as total 1 is scored. The only possible round is 3 when he scored.

Now, consider for F as total is 10. So two score will be there 7 & 3. 7 in round 3.

Now, observe C, D, E and F where there scores 3, 6 (3, 3), 3, 10 (7, 3), respectively. As there are five 3 scores to filled.

From here F → 3 (5th round)

E → 3 (3rd round)

C & D → Either 1st or 2nd round.

Given table is shown as follows:

	1	2	3	4	5	6	Total	7	8	9	10	Total
A	7	×	×	×	×	1	8					18
B	1	1	×	×	×	×	2					5
C	3/0	0/3	0	×	×	×	3	×				6
D	3/0	0/3	0	3	×	×	6	×	×			6
E	0	0	3	0	0	×	3	×	×	×		10
F	0	0	7	0	3	0	10	×	×	×	×	10
G	×	7	0	7	0	3	17		×	×	×	17
H	×	×	1	0	0	0	1			×	×	4
I	×	×	×	1	1	0	2				×	17
J	×	×	×	×	7	7	14					17

Given information for 7 to 10 round as follows:

Point 1: 2 scored in three consecutive rounds. One of them is C.

Means C scored [1, 1, 1] by 8th, 9th, 10th round

Point 2: J scored in round 7 while A scored in 10.

Means J = 3 in 7th round 0 in rest rounds.

Point 3: No player scored in all four rounds.

I scored 15 point in round 7th, 8th & 9th.

So, I = [1, 7, 7]

E scored 7 in round 10th.

Now, the table becomes:

	1	2	3	4	5	6	Total	7	8	9	10	Total
A	7	×	×	×	×	1	8	7	0	0	3	18
B	1	1	×	×	×	×	2	0	0	3	0	5
C	3/0	0/3	0	×	×	×	3	×	1	1	1	6
D	3/0	0/3	0	3	×	×	6	×	×	0	0	6
E	0	0	3	0	0	×	3	×	×	×	7	10
F	0	0	7	0	3	0	10	×	×	×	×	10
G	×	7	0	7	0	3	17	0	×	×	×	17
H	×	×	1	0	0	0	1	0		×	×	4
I	×	×	×	1	1	0	2	1	7	7	×	17
J	×	×	×	×	7	7	14	3	0	0	0	17

5. **Option (2) is correct.**

After round 3,

$$\text{Score of C} = 3$$

$$\text{D} = 3$$

$$\text{E} = 3$$

6. **Option (4) is correct.**

After round 4,

$$\text{Scores of A} = 7 \quad \text{F} = 7$$

$$\text{B} = 2 \quad \text{G} = 14$$

$$\text{C} = 3 \quad \text{H} = 1$$

$$\text{D} = 6 \quad \text{I} = 1$$

$$\text{E} = 3 \quad \text{J} = 10$$

So, least scores have H, I, J.

7. **Option (4) is correct.**

From table it can be observed that Ikea scored in maximum number of rounds.

8. **Option (4) is correct.**

As shown in table A, C & E scored in last round.

Solution for Questions 9 to 12:

Number of exams = 2 [MT and ET]

Total marks in each exam = 100

At least 4 questions of 5 marks, 3 questions of 10 marks and 2 questions of 15 marks are in each paper.

So, least marks for fixed questions

$$= 4 \times 5 + 3 \times 10 + 2 \times 15 = 80 \text{ marks}$$

So, now 20 marks question will have four options.

$$\text{Like 4 questions of 5 marks} = 4 \times 5 = 20$$

$$\text{2 questions of 5 marks or 1 question of 10 marks} = 2 \times 5 + 1 \times 10 = 20$$

$$\text{2 questions of 10 marks} = 2 \times 10 = 20$$

$$\text{1 question of 5 marks 1 question of 15 marks} = 1 \times 5 + 1 \times 15 = 20$$

All six faculty made equal no. of questions and ET contained more number of questions than MT.

So, possible questions in MT & ET = 11 & 13

Point 1: A → Prepared 5th question for both MT & ET and question carried 5 marks

Point 2: A → One question for MT

Others → More than one question

Point 3: Question are consecutive in both paper

Point 4: C → 3rd question in both

E → 8th question in both

Point 5: F → 1st in MT & last in ET

D → Last in MT & 1st in ET.

So,

MT

1	2	3	4	5	6	7	8	9	10	11
5	5	5	5	5	10	10	10	15	15	15
F	F	C	C	A	B	B	E	E	D	D

ET

1	2	3	4	5	6	7	8	9	10	11	12	13
5	5	5	5	5	5	5	5	10	10	10	15	15
D		C		A			E					F

As there are 24 questions and all faculty will make equal no. of questions.

Then ET:

1	2	3	4	5	6	7	8	9	10	11	12	13
5	5	5	5	5	5	5	5	10	10	10	15	15
D	D	C	C	A	A	A	E	E	B	B	F	F

9. **Option (4) is correct.**

From the table we can see that second question of ET is made by D.

10. Option (1) is correct.

From the table we can see that total 5 marks questions = 5 + 8 = 13

11. Option (4) is correct.

From the table we can see that only E, D and F made 15 marks questions.

12. Option (4) is correct.

From the table we can see that 10th question prepared by B.

Solution for Questions 13 to 16:

Point 1: 250 students supported proposal A and 250 students supported proposal B.

Point 2: Among the 200 students who preferred Sunita as student union president, 80% supported proposal A.

Point 3: Among those who preferred Ragini, 30% supported proposal A.

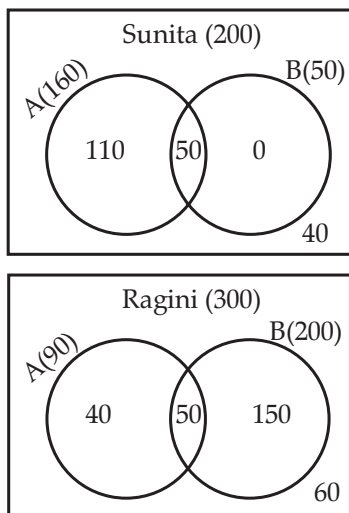
Point 4: 20% of those who supported proposal B preferred Sunita.

Point 5: 40% of those who did not support proposal B preferred Ragini.

Point 6: Every student who preferred Sunita and supported proposal B also supported proposal A.

Point 7: Those who preferred Ragini, 20% didn't support any of proposals.

Now, we can draw Venn diagram



13. Correct answer is [64].

Percentage of students who Preferred Sunita for student union president = $\frac{160}{250} \times 100 = 64$

14. Correct answer is [84].

No. of the students surveyed who did not

support proposal A preferred Ragini as student union president = 300 – 90 = 210

Required percentage = $\frac{210}{250} \times 100 = 84$

15. Option (4) is correct.

No. of students who supported both proposals = 100

No. of the students surveyed who supported both proposals A and B and preferred Sunita as student union president = 50

Thus required percentage = $\frac{50}{100} \times 100 = 50$

16. Option (1) is correct.

No. of the students surveyed supported proposal B, did not support proposal A and preferred Ragini as student union president = No. of students who supported proposal B and preferred Ragini

– No. of students who supported proposal A and B and preferred Ragini

= 200 – 50 = 150

Solution for Questions 17 to 20:

Person/Language →	A	B	C	D	E	F
↓						
P			√		√	
Q				√	√	
R	√					√
S		√			√	
T			√			√

Three teams = T₁, T₂, T₃

Point 1: As each team speaks four languages and have same members.

Point 4: P and S are together in exactly 2 teams.

P $\xrightarrow{\text{speaks}}$ C & E

S $\xrightarrow{\text{speaks}}$ B & E

Means

T₁ $\xrightarrow{\text{speaks}}$ E & C & A & F

T₃ $\xrightarrow{\text{speaks}}$ E & C & D

Point 4: Says that two teams have P & S together and they speak B, C & E.

In T₁ no one speaks B. So P & S are in T₂ and T₃.

So, T₃ $\xrightarrow{\text{speaks}}$ E & C & D & B

Point 2: B & F speaks by exactly two teams and A & D by exactly one team.

So, $T_2 \xrightarrow{\text{speaks}} E \& C \& B \& C$

The final data table is:

T ₁		T ₂		T ₃	
Language	People	Language	People	Language	People
E	P	E	P	E	P
C		C		C	Q
A	T	B	T	B	S
F	R	F	S	D	S

17. **Option (3) is correct.**
Q is not member of T₂.
18. **Option (3) is correct.**
Sally is part of T₂ & T₃.
19. **Option (3) is correct.**
P is member of all three teams.
20. **Option (1) is correct.**
 $T_1 \xrightarrow{\text{speaks}} E, C, A \& F$

Solution for Questions 21 to 24:

	Duration	Charges
Dr. Ben	10 min	₹100
Dr. Kane	15 min	₹200
Dr. Wayne	25 min	₹300

and

Room No.	Mon & Tue	Wed & Thu	Fri & Sat
1	Ben	Wayne	Kane
2	Kane	Ben	Wayne
3	Wayne	Kane	Ben

Clinic timing = 9 a.m. to 11:30 a.m.

21. **Option (3) is correct.**
Maximum number of patients by
- $$\text{Ben} = \frac{150}{10} = 15$$
- $$\text{Kane} = \frac{150}{15} = 10$$
- $$\text{Wayne} = \frac{150}{25} = 6$$
- Total $15 + 10 + 6 = 31$

22. **Option (2) is correct.**

Amount earned by

$$\text{Dr. Ben} = 15 \times 100 = ₹1500$$

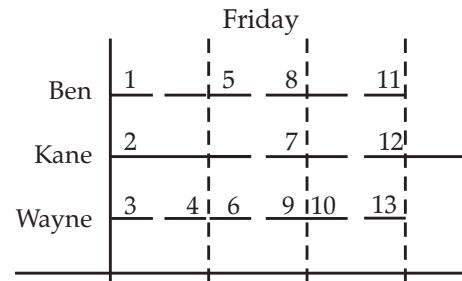
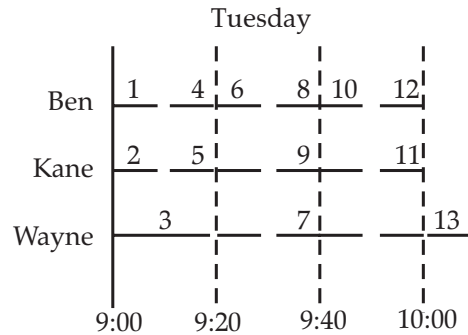
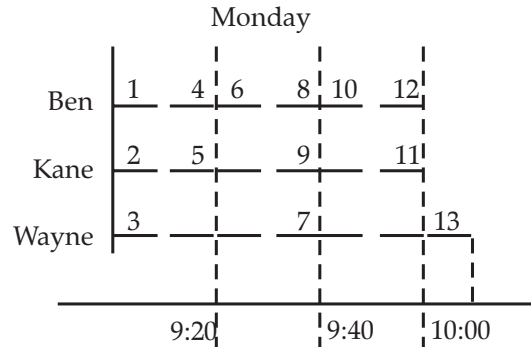
$$\text{Dr. Kane} = 10 \times 200 = ₹2000$$

$$\text{Dr. Wayne} = 6 \times 300 = ₹1800$$

So, maximum amount earned by Kane.

23. **Option (3) is correct.**

Mr. Singh is 13th in the sequence on all 3 days.

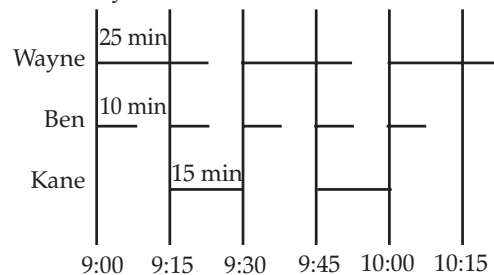


He will stay the longest when the 13th guy is saved by Dr. Wayne.

From table of Monday Mr. Singh had to wait for maximum duration till 10:15 a.m.

24. **Option (4) is correct.**

Thursday



As cycle repeat after 30 min. So, all three doctors will never free.

Solution for Questions 25 to 28:

	Revenue			Cost		
	Clothing	Produce	Electronics	Clothing	Produce	Electronics
2016	20	30	50	30	40	30
2017	30	40	30	30	30	40
2018	40	40	20	20	50	30

Assume total cost of 2016 = 100

Then, Revenue = 200 [from point 1]

Point 2: 2[Revenue 2016] = [Revenue 2017]

means Revenue 2017 = 2 × 200 = 400

So, in 2017,

$$\text{Clothing Revenue} = 400 \times \frac{30}{100} = 120$$

$$\text{Produce Revenue} = 400 \times \frac{40}{100} = 160$$

$$\text{Electronics Revenue} = 400 \times \frac{30}{100} = 120$$

So, no profit from electronics department in 2017.

$$\text{Means cost} \times \frac{40}{100} = 120$$

$$\text{Total cost} = 300$$

$$\text{So, Cost of clothing} = \frac{300 \times 30}{100} = 90$$

$$\text{Cost of produce} = 90$$

$$\text{Cost of electronics} = 120$$

Point 4: Revenue of clothing in 2018 was same as the cost incurred in produce department also given that in point 2 that cost doubled from 2016 to 2018.

From here cost in 2018 = 200

$$\text{Cost in produce department} = \frac{200 \times 50}{100} = 100$$

and Revenue of clothing department = 100

$$\text{Total revenue} \times \frac{40}{100} = 100$$

$$\begin{aligned} \text{Total revenue} &= \frac{100 \times 100}{40} \\ &= 250 \end{aligned}$$

25. Correct answer is [25].

26. Option (4) is correct.

27. Correct answer is [70].

28. Option (3) is correct.

Solution for Questions 29 to 32:

Amount kept any of row or column is an integer.

Total amount in 1st column of 3rd row = ₹4

Row 2 & column 2 have min & max value same

So, total amount in 3 pouches = 1 + 1 + 1 = 3

Let amount in a cell in any row and column

$$= A_{RC}$$

Then

$$A_{13} = 4$$

[as calculated above]

$$A_{22} = 3$$

As maximum and minimum possible values are given in table.

	C ₁	C ₂	C ₃
Row 1	(2, 4)	(6, 8)	(1, 3)
Row 2	(3, 5)	(1, 1)	(6, 20)
Row 3	(1, 2)	(1, 2)	(2, 5)

Till now tabulation form:

	C ₁	C ₂	C ₃
R ₁			
R ₂		3 (1, 1, 1)	
R ₃	4 (1, 1, 2)		

As average of any column is integer. Means that must be multiple of 9.

$$\begin{aligned} \text{Possible values of } A_{11} &= \text{Max } (2, 4, 4) \quad \text{Min } (2, 2, 4) \\ &10 \quad 8 \end{aligned}$$

$$\begin{aligned} \&\text{ for } A_{11} &= \text{Max } (3, 5, 5) \quad \text{Min } (3, 3, 5) \\ &13 \quad 11 \end{aligned}$$

Make the column sum in a multiple value of

$$A_{11} = 10 (2, 4, 4)$$

$$\& A_{21} = 13 [3, 5, 5]$$

Similarly we can calculate for column 2,

$$\begin{aligned} \text{Here } A_{12} &= \text{Max } (6, 8, 8) \quad \text{Min } (6, 6, 8) \end{aligned}$$

$$\begin{aligned} A_{32} &= \text{Max } (1, 2, 3) \quad \text{Min } (1, 1, 2) \end{aligned}$$

$$\text{Again finally } A_{12} = 20 [6, 8, 8]$$

$$A_{32} = 4 [1, 1, 2]$$

$$A_{23} = 38 [6, 12, 20]$$

Similarly, we can calculate for column 3,

$$A_{13} = 6 [1, 2, 3]$$

$$A_{33} = 10 [2, 3, 5]$$

$$A_{23} = 38 [6, 12, 20]$$

Finally:

	Column 1	Column 2	Column 3
Row 1	10 (2, 4, 4)	20 (6, 6, 8)	6 (1, 2, 3)
Row 2	13 (3, 5, 15)	3 (1, 1, 1)	38 (6, 12, 20)
Row 3	4 (1, 1, 2)	4 (1, 1, 2)	10 (2, 3, 5)

29. Correct answer is [13].

$$A_{21} = 13$$

30. Correct answer is [8].

Total 8 pouches are there which contains 1 coin.

31. Correct answer is [2].

Only two slots of pouches are there which average is an integer.

32. Correct answer is [3].

Total 3 slots are there which amount exceeds ₹10.

Quantitative Aptitude (QA)

1. Option (1) is correct.

C.P. of the table at which the shopkeeper procured each table = 100

It is given that shopkeeper sold the tables to Amal and Asim at a profit of 20% and at a loss of 20%, respectively

The selling price of the tables = 120 and 80 to Amal and Asim, respectively.

Amal sells his table to Bimal at a profit of 30%

So, CP of the table by Bimal $(x) = 120 \times 1.3$
 $= 156$

Asim sells his table to Barun at a loss of 30%

So, C.P. of the table by Barun $(y) = 0.7 \times 80 = 56$

$$\frac{(x - y)}{p} = \frac{(156 - 56)}{100} = 1$$

2. Option (2) is correct.

Let $2^{3x} = v$

$$2^{6x} + 2^{3x+2} - 21 = 0$$

$$= v^2 + 4v - 21 = 0$$

$$= (v + 7)(v - 3) = 0$$

$$v = 3, -7$$

$$2^{3x} = 3$$

or $2^{3x} = -7$ (This can be neglected)

$$3x = \log_2 3$$

$$x = \frac{1}{3} \log_2 3$$

3. Option (4) is correct.

Given $a^2 + b^2 = 8$... (i)

and $x^2 + y^2 = 9$... (ii)

(i) \times (ii)

$$\Rightarrow (a^2 + b^2)(x^2 + y^2) = 8 \times 9 = 72$$

$$\Rightarrow a^2x^2 + a^2y^2 + b^2x^2 + b^2y^2 = 72$$

$$\Rightarrow a^2x^2 + a^2y^2 + b^2x^2 + b^2y^2 = 65^2 \quad \dots \text{(iii)}$$

and also given $ax + by = 65$

$$\Rightarrow (ax + by)^2 = 65^2$$

$$\Rightarrow a^2x^2 + b^2y^2 + 2abxy = 65^2 \quad \dots \text{(iv)}$$

(iii) - (iv)

$$\Rightarrow a^2y^2 + b^2x^2 - 2abxy = 0$$

$$\Rightarrow (ay)^2 + (bx)^2 - 2(ay)(bx) = 0$$

$$\Rightarrow (ay - bx)^2 = 0$$

$$\Rightarrow ay - bx = 0$$

4. Option (1) is correct.

The expression will be real only if

$$\log_e \frac{4x - x^2}{3} \geq 0$$

$$\text{or } \frac{4x - x^2}{3} \geq e^0$$

$$\Rightarrow \frac{4x - x^2}{3} \geq 1$$

$$\Rightarrow 4x - x^2 \geq 3$$

$$\Rightarrow x^2 - 4x + 3 \leq 0$$

$$\Rightarrow (x - 1)(x - 3) \leq 0$$

$$1 \leq x \leq 3$$

5. Correct answer is [4851].

The sequence $(2n + 1) + (2n + 3) + (2n + 5) + \dots + (2n + 47) = 5280$, is in arithmetic progression with first term $a = 2n + 1$, common difference, $= 2$ and last term $t_n = 2n + 47$,

Let 'm' be the number of terms in this sequence.

The last term of A.P. is given by $a + (n - 1)d$

$$\Rightarrow (2n + 1) + (m - 1)(2) = 2n + 47$$

$$\Rightarrow m = 24$$

$$(2n + 1) + (2n + 3) + (2n + 5) + \dots + (2n + 47) = 5280,$$

$$= \frac{24}{2} [2(2n + 1)$$

$$+ (24 - 1) \times 2]$$

$$= 24(2n + 1 + 23)$$

$$= 48(n + 12)$$

Therefore, $48(n + 12) = 5280$

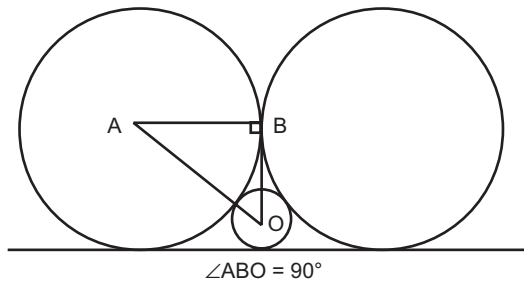
$$\Rightarrow n = 98$$

Hence, $1 + 2 + 3 + \dots + n = \frac{n(n + 1)}{2}$

$$= \frac{98 \times 99}{2}$$

$$= 4851$$

6. **Option (4) is correct.**



Assume the radius of smaller circle = r

$$OB = 4 - r$$

$$OA = 4 + r$$

$$AB = 4$$

As tangent is perpendicular to radius, ABO is a right angle triangle.

$$4^2 + (4 - r)^2 = (4 + r)^2$$

Solving we get

$$16r = 16$$

$$r = 1 \text{ cm}$$

7. **Correct answer is [13].**

Taking 2nd equation

$$5^{x-1} + 3^{y+1} = 9686,$$

the last digit of 5^{x-1} will always be 5 for all positive integral values of x

The power cycle of 3 is:

$$3^{4k+1} \equiv 3$$

$$3^{4k+2} \equiv 9$$

$$3^{4k+3} \equiv 7$$

$$3^{4k} \equiv 1$$

Clearly 3^{y+1} must be in the form of 3^{4k} as the unit digit of RHS = 6

We have $3^4 = 81$, and $3^8 = 6561$

Also, $9686 - 81 = 9605$ and $9686 - 6561 = 3125$

Observe that $3125 = 5^5$

Hence, $5^{x-1} = 5^5$

or $x = 6$ and $3^{y+1} = 3^8$

$$\Rightarrow y = 7$$

($x = 6$ and $y = 7$ also satisfies the first equation)

Therefore, $x + y = 6 + 7 = 13$

8. **Option (2) is correct.**

Let the number of fiction and nonfiction books in 2010 = $100a, 100b$ respectively

It is given that the total number of books in 2010 = 11500

$$\therefore 100a + 100b = 11500 \quad \dots(i)$$

The number of fiction and nonfiction books in 2015 = $110a, 112b$, respectively

$$\therefore 110a + 112b = 12760 \quad \dots(ii)$$

On solving both the equations, we get,

$$b = 55, a = 60$$

$$\therefore \text{The number of fiction books in 2015} = 110 \times 60 = 6600$$

9. **Option (4) is correct.**

Volume of solution in each vessels = 500 ml

Salt in each vessel,

In A = 10% of 500 = 50 ml

In B = 22 % of 500 = 110 ml

In C = 32% of 500 = 160 ml

When 100 ml of the solution in vessel A is transferred to vessel B, salt in B = 110 + 10% of 100 = 110 + 10 = 120 ml

$$\Rightarrow \text{Percentage of salt in B} = \frac{120}{600} = 20\%$$

So, When 100 ml of the solution in vessel B is transferred to vessel C = 160 + 20% of 100

$$= 160 + 20 = 180$$

$$\Rightarrow \text{Percentage of salt in C} = \frac{180}{600} \times 100 = 30\%$$

Now, when 100 ml of the solution in vessel C is transferred to vessel A, volume of solution in A

$$= 400 + 100 = 500$$

$$\text{Salt in A} = 10\% \text{ of } 400 + 30\% \text{ of } 100$$

$$= 40 + 30 = 70$$

$$\Rightarrow \text{Percentage of salt in A} = \frac{70}{500} \times 100 = 14\%$$

10. **Correct answer is [80].**

Let, the score of D = 100

The score of C = 20% less than that of D = 80

The score of B = 25% more than C = 100

The score of A = 10% less than B = 90

If $90 = 72$

Then $100 = 72 \times \frac{100}{90}$

$$= 80$$

11. Option (3) is correct.

We know, a centroid divides the median in the ratio 2 : 1

$$\begin{aligned} AD &= 12 \text{ cm,} \\ AG &= 8 \text{ cm, } GD = 4 \text{ cm} \end{aligned}$$

And similarly, $BG = 6 \text{ cm, } GE = 3 \text{ cm}$

$$\begin{aligned} \text{Area } (\triangle ABE) &= \frac{1}{2} \times BE \times AG \\ &= \frac{1}{2} \times 9 \times 8 = 36 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Area } (\triangle ABE) &= \text{area } (\triangle BEC) \\ \text{Area } (\triangle ABC) &= 2 \times 36 = 72 \text{ cm}^2 \end{aligned}$$

12. Option (4) is correct.

Both the sequences are in arithmetic progression.

The common difference (d_1) for the first sequence = 4

The common difference (d_2) for the first sequence = 5

The first term common is 19.

The common terms will also be in arithmetic progression with common difference

$$\text{LCM } (d_1, d_2) = \text{LCM } (4, 5) = 20$$

Let there be ' n ' terms in this sequence, then the last term would be ≤ 415

$$\text{i.e., } a + (n - 1)d \leq 415$$

$$\Rightarrow 19 + (n - 1) \times 20 \leq 415$$

$$\Rightarrow (n - 1) \times 20 \leq 415 - 19$$

$$\Rightarrow (n - 1) \times 20 \leq 396$$

$$\Rightarrow (n - 1) = \left[\frac{396}{20} \right] \text{ where } [] \text{ is the greatest integer}$$

$$\Rightarrow (n - 1) = 19$$

13. Correct answer is [12].

It is given that John works altogether 172 hours, i.e., including regular and overtime hours.

Let a be the regular hours, $172 - a$ will be the overtime hours

$$\text{John's income from regular hours} = 57 \times a$$

$$\begin{aligned} \text{John's income for working overtime hours} \\ = (172 - a) \times 144 \end{aligned}$$

It is given that his income from overtime hours is 15% of his income from regular hours

$$a \times 57 \times 0.15 = (172 - a) \times 114$$

$$a = 160$$

The number of hours for which he worked overtime = $172 - 160 = 12 \text{ hrs}$

14. Option (1) is correct.

For BC to be a hypotenuse, triangle ABC is right angled at A. For AP to be maximum triangle ABC has to be an isosceles triangle.

Thus,

$$\text{Hypotenuse } BC = \sqrt{2} \times a \text{ where } a = AB = AC$$

$$20 = \sqrt{2} \times a$$

$$a = 10\sqrt{2}$$

$$\text{Area of triangle} = \frac{1}{2} \times AB \times AC$$

$$= \frac{1}{2} \times AP \times BC$$

$$\Rightarrow 10\sqrt{2} \times 10\sqrt{2} = AP \times 20$$

$$\Rightarrow AP = 10$$

15. Option (1) is correct.

For quadratic equation $ax^2 + bx + c = 0$, the roots are real and distinct if $b^2 - 4ac > 0$

$$\text{Given, } x^2 - 4x - \log_2 A = 0$$

$$\therefore (-4)^2 - 4 \times 1 \times (-\log_2 A) > 0$$

$$\Rightarrow 16 + 4\log_2 A > 0$$

$$\Rightarrow \log_2 A > -4$$

$$\Rightarrow A > 2^{-4}$$

$$\Rightarrow A > \frac{1}{16}$$

16. Option (3) is correct.

It is given that the average of the 30 integers = 5

$$\text{Sum of the 30 integers} = 30 \times 5 = 150$$

There are exactly 20 integers whose value is less than 5.

To maximise the average of the 20 integers, we have to assign minimum value to each of the remaining 10 integers. This minimum value has to be 6.

$$\text{So, the sum of 10 integers} = 10 \times 6 = 60$$

$$\text{The sum of the 20 integers} = 150 - 60 = 90$$

$$\text{Average of 20 integers} = \frac{90}{20} = 4.5$$

17. Option (2) is correct.

Let the salaries of Ramesh, Ganesh and Rajesh in 2010 be $6x, 5x, 7x$, respectively

Let, the salaries of Ramesh, Ganesh and Rajesh in 2015 be $3y, 4y, 3y$, respectively

It is given that Ramesh's salary increased by 25% during 2010 - 2015,

$$3y = 1.25 \times 6x$$

$$y = 2.5x$$

Percentage increase in Rajesh's salary

$$= \frac{7.5x - 7x}{7x} \times 100 = 7\%$$

18. Option (3) is correct.

Let the cost of each bicycle = $100x$
 C.P of 10 bicycles = $1000x$
 It is given that he sold six of these at a profit of 25% and the remaining four at a loss of 25%
 SP of 10 bicycles = $125x \times 6 + 75x \times 4 = 1050x$
 Profit = $1050x - 1000x = 50x$
 $50x = 2000$
 $x = 40$
 \therefore C.P. = $100x = 4000$

19. Option (2) is correct.

For $n = 1, a_1 = n \Rightarrow a_1 = 1$
 For $n = 2, a_1 - a_2 = 2 \Rightarrow a_2 = -1$
 For $n = 3, a_1 - a_2 + a_3 = 3 \Rightarrow a_3 = 1$
 For $n = 4, a_1 - a_2 + a_3 - a_4 = 4 \Rightarrow a_4 = -1$
 From the pattern, each odd term = 1 and each even term = -1
 $\Rightarrow a_{51} + a_{52} + \dots + a_{1022} = 0$
 Therefore, the value of $a_{1023} = 1$

20. Correct answer is [7].

Let the six digit number be $abcdef$

$\therefore f = a + b + c$
 $\therefore e = a + b$
 $\therefore a = c$
 $\therefore b = 2a$
 $\therefore d = e + f$

Now

$\therefore f = 3a + c = 4a$
 $\therefore e = a + 2a = 3a$

Now

$\therefore d = 4a + 3a = 7a$

As d is a single digit number so only value of a possible is 1 and value of d is 7.

21. Correct answer is [44].

$$2^4 \times 3^5 \times (2^4 \times 5^4) = 2^8 \times 3^5 \times 5^4$$

Perfect square factors of the number will be of the form $2^a \times 3^b \times 5^c$.

Here, a, b and c will be even numbers or zero.

Hence, a can be 0, 2, 4, 6 or 8. b can be 0, 2 or 4 and c can be 0, 2 or 4

So, total number of square factors

$$= 5 \times 3 \times 3 = 45$$

But, when $a = b = c = 0$ factor will be 1.

Thus, perfect squares which are greater than 1 = $45 - 1 = 44$

22. Option (3) is correct.

45th Motor cyclist reaches B by 11
 First motor cyclist started at 10:01, i.e., 45th motor cyclist started at 10:45 and reached at 11 a.m. i.e. Each Motor cyclist takes 15 minutes to reach from A to B
 If the Cyclist doubles his speed then the cyclist will reach B at 10:30 instead of 11 a.m., i.e., Last motor cyclist who reaches at 10:30 must have started 15 minutes ago i.e. @10:15 a.m.
 So, total number of Motor cyclists who would have reached B by the time the cyclist reached B = 15 (starting from 10:01 to 10:15)

23. Correct answer is [150].

$$\text{Interior angle of a polygon} = (n - 2) \times \frac{180}{n}$$

Given Interior angle of B = $\frac{3}{2} \times A$ and sides are $b = 2a$

We have

$$(b - 2) \times \frac{180}{b} = \frac{3}{2} \times (a - 2) \times \frac{180}{a}$$

put $b = 2a$

we get $a = 4$ and $b = 8$

Total sides $a + b = 12$

Angle measure of 12 sided polygon;

$$(12 - 2) \times \frac{180}{12} = 150$$

24. Option (2) is correct.

Let, the total work be LCM of 20, 40 = 40 units
 Efficiency of Anil and Sunil is 2 units and 1 unit per day, respectively.

Anil works alone for 3 days, so Anil must have completed 6 units.

Bimal completes 10% of the work while working along with Anil and Sunil.

Bimal must have completed 4 units.

The remaining 30 units of work is done by Anil and Sunil

$$\text{Number of days taken by them} = \frac{30}{3} = 10$$

The total work is completed in $3 + 10 = 13$ days

25. Option (4) is correct.

$$\text{Sum of the roots} = 7a = -b$$

$$\text{Product of the roots} = 12a^2 = c$$

$$b^2 = 49a^2$$

$$b^2 + c = 49a^2 + 12a^2 = 61a^2$$

Now, the option will have multiple of 61 and the other part of 61 will have a square number. Hence, $549 = 61 \times 3^2$.

26. Correct answer is [20920].

The amount with Amal at the end of 1 year
 $= 12000 \times 1.08 + 10000 \times (1.03)^2$
 $= 23569$

Interest received by Amal = $23569 - 22000$
 $= 1569$

Let, the amount invested by Bimal = $100b$

Interest received by Bimal = $100b \times 7.5 \times 1/100$
 $= 7.5b$

It is given that the amount of interest received by both of them is the same

$$7.5b = 1569$$

$$\Rightarrow b = 209.2$$

Hence, Amount invested by Bimal = $100b$
 $= 20920$

27. Option (4) is correct.

We have

$$\begin{aligned} \frac{n^2 + 7n + 12}{n^2 - n - 12} &= \frac{n^2 + 3n + 4n + 12}{n^2 - 4n + 3n - 12} \\ &= \frac{n(n+3) + 4(n+3)}{n(n-4) + 3(n-4)} \\ &= \frac{(n+3)(n+4)}{(n+3)(n-4)} = \frac{(n+4)}{(n-4)} \\ &= \frac{(n-4) + 8}{(n-4)} = 1 + \frac{8}{(n-4)} \end{aligned}$$

This will be positive integer and n should be maximum, when $n - 4 = 8 \Rightarrow n = 12$

28. Option (4) is correct.

When A and B met for the first time at 10:00 a.m., A covered 60% of the track.

So, B must have covered 40% of the track.

It is given that A returns to P at 10:12 a.m., i.e., A covers 40% of the track in 12 minutes

Hence, A covers 60% of the track in $12 \times \frac{60}{40} =$

18 minutes

B covers 40% of track when A covers 60% of the track.

B covers 40% of the track in 18 minutes.

B will cover the rest 60% in $18 \times \frac{60}{40} =$

27 minutes, Hence, it will return to B at 10:27 a.m.

29. Option (1) is correct.

Volume of Cylinder = L.C.M. of {405, 783, 351}
 $= 27$

$$\pi r^2 \times h = 27$$

i.e., Height = 3π

i.e., Number of iron cylinders = $\frac{405}{27} = 15$

i.e., Number of Al cylinders = $\frac{783}{27} = 29$

i.e., Number of Cu cylinders = $\frac{351}{27} = 13$

Total cylinders = 57

Surface area of cylinder = $2\pi r^2 + 2\pi rh$
 $= 2\pi r(r + h)$

Surface area of 57 cylinders

$$= 57 \times 2 \times 3 \left(3\pi + \frac{3\pi}{\pi} \right)$$

$$= 1026(\pi + 1)$$

30. Option (2) is correct.

It is given that the scores of Anjali, Mohan and Rama after review were in the ratio 11 : 10 : 3

So, let their values be $11x, 10x$ and $3x$, respectively.

It is known that their score increased by 6 after review.

So, scores before review = $11x - 6, 10x - 6$ and $3x - 6$, respectively

Now, from the given data

$$(11x - 6 + 10x - 6) \times \frac{1}{12} = 3x - 6$$

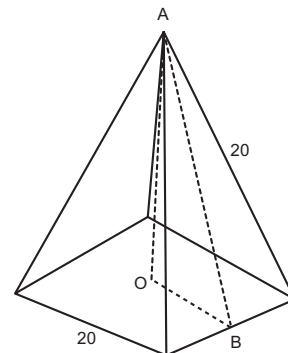
$$21x - 12 = 36x - 72$$

$$x = 4$$

So, marks after revision are 44, 40 and 12, respectively.

Therefore, Anjali's score exceeded Rama's by $44 - 12 = 32$ marks

31. Option (2) is correct.



Let h be the vertical height of the pyramid *i.e.*,
 $OA \perp OB = 10$

Since, it is half the side of the square.

AB is the height of the equilateral triangle *i.e.*,
 $10\sqrt{3}$.

$\angle AOB$ is a right angle, so applying Pythagoras theorem

$$OA^2 + OB^2 = AB^2$$

$$h^2 + 100 = 300$$

$$h = 10\sqrt{2}$$

32. Correct answer is [12].

Given, $f(mn) = f(m)f(n)$ and

$f(1)$, $f(2)$ and $f(3)$ are positive integers.

As we know $f(2 \times 1) = f(2)$

$$= f(2) \times f(1), \text{ so } f(1) = 1$$

$$f(4) = f(2) \times f(2)$$

$$f(6) = f(3) \times f(2)$$

$$f(24) = f(4) \times f(6)$$

$$= f(2) \times f(2) \times f(2) \times f(3)$$

$$= 54 = 3^3 \times 2$$

i.e., $f(2) = 3$ and $f(3) = 2$

$$f(18) = f(9) \times f(2)$$

$$= f(3) \times f(3) \times f(2)$$

$$= 2 \times 2 \times 3 = 12$$

33. Correct answer is [880].

A beats B by 11 meters. When B completes the 11 metres, there is a lead of 80 meters to C

So, C must have travelled only

$$90 - 80 = 10 \text{ metres}$$

When B travels 11 metres, C travels only 10 metres

Ratio of distance travelled by second and third horse are $11x$ and $10x$, respectively

We know that the second horse beats the third horse by 80 meters.

$$\text{Hence, } 11x - 10x = 80$$

$$\Rightarrow x = 80$$

So, Length of the track = Distance travelled by the second horse = $11 \times 80 = 880$ metres

34. Correct answer is [4].

$$\text{Given } m^2 + 105 = n^2$$

$$\text{or } n^2 - m^2 = 105$$

$$(n - m) \times (n + m) = 105$$

105 can be written as

$$105 \times 1 = 21 \times 5 = 15 \times 7 = 35 \times 3$$

So, only 4 cases possible to get values of n , m as positive. Thus number of solutions = 4