



CAT  
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2019

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SLOT 2

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## Verbal Ability and Reading Comprehension

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. . . .

**CAT 2019 Question Paper Slot 2**

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. 1:** 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. have suburban areas as well as office areas.
3. offer employment opportunities.
4. contribute to the cultural transformation of residents.

**Q. 2:** Which one of the following statements would undermine the author’s stand regarding the greenness of cities?

1. The compactness of big cities in the West increases the incidence of violent crime.

**CAT 2019 Question Paper Slot 2**

2. The high density of cities leads to an increase in carbon dioxide and global warming.
3. Over the last decade the cost of utilities has been increasing for city dwellers.
4. Sorting through rubbish contributes to the rapid spread of diseases in the slums.

**Q. 3:** We can infer that Calthorpe’s statement “still jars” with most people because most people:

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

**Q. 4:** In the context of the passage, the author refers to Manaus in order to:

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

**Q. 5:** 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. they sort out garbage.
4. their streets are kept clean.

British colonial policy . . . went through two policy phases, or at least there were two strategies between which its policies actually oscillated, sometimes to its

## CAT 2019 Question Paper Slot 2

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

**CAT 2019 Question Paper Slot 2**

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. 6:** All of the following statements, if true, could be seen as supporting the arguments in the passage, EXCEPT:

1. the change in British colonial policy was induced by resistance to modernity in Indian society.
2. modernity was imposed upon India by the British and, therefore, led to underdevelopment.
3. throughout the history of colonial conquest, natives have often been experimented on by the colonisers.
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 shaped by the project of European modernity.
4. was at least partly an outcome of Enlightenment rationalism.

**CAT 2019 Question Paper Slot 2**

**Q. 8:** “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. 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. Indian society is not endogamous; it is more accurately characterised as aggressively exogamous.
4. The endogenous logic of colonialism can only bring change if it attacks and transforms external forces.

**Q. 10:** Which one of the following 5-word sequences best captures the flow of the arguments in the passage?

1. Colonial policy—arrogant rationality—resistance—independence—development.

## CAT 2019 Question Paper Slot 2

2. Military power—colonialism—restructuring—feudalism—capitalism.
3. Military power—arrogance—laboratory—modernity—capitalism.
4. Colonial policy—Enlightenment—external modernity—subjection—underdevelopment.

Around the world, capital cities are disgorging 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. . . .

**CAT 2019 Question Paper Slot 2**

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

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

**Q. 12:** According to the passage, colonial powers located their capitals:

**CAT 2019 Question Paper Slot 2**

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

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

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

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

**Q. 15:** People who support decentralising central government functions are LEAST likely to cite which of the following reasons for their view?

1. It reduces expenses as infrastructure costs and salaries are lower in smaller cities.
2. Policy makers may benefit from fresh thinking in a new environment.
3. More independence could be enjoyed by regulatory bodies located away from political centres.
4. It could weaken the nexus between bureaucrats and media in the capital.

## CAT 2019 Question Paper Slot 2

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.

**CAT 2019 Question Paper Slot 2**

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. 16:** Which of the following can be inferred from the author’s claim, “Which way is Oriental?”

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

**Q. 17:** According to the passage, which of the following is not responsible for language’s ability to change us?

1. Language’s intrinsic connection to our notions of self and identity.
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. The ups and downs involved in the course of learning a language.

**CAT 2019 Question Paper Slot 2**

**Q. 18:** 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 and recommend him/her to hire a good translator for the purpose of holding interviews.
3. The author would encourage the ethnographer, but ask him/her to first learn the language of the Nigerian tribe s/he wishes to study.
4. The author would encourage the ethnographer, but ask him/her to be mindful of his/her racial and gender identity in the process.

**Q. 19:** The author's critics would argue that:

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

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.

**CAT 2019 Question Paper Slot 2**

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

**CAT 2019 Question Paper Slot 2**

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

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

**Q. 21:** Based on his views mentioned in the passage, one could best characterise Dr. Watrall as being:

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

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

1. It provides images free of cost to all users.
2. It helps preserve precious images in case the sites are damaged or destroyed.
3. It allows a large corporation to project itself as a protector of culture.

**CAT 2019 Question Paper Slot 2**

4. It enables people who cannot physically visit these sites to experience them.

**Q. 23:** Which of the following, if true, would most strongly invalidate Dr. Watrall's objections?

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

**Q. 24:** By "digital colonialism", critics of the CyArk–Google project are referring to the fact that:

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

**Q. 25:** 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. To the uninitiated listener, atonal music can sound like chaotic, random noise.

**CAT 2019 Question Paper Slot 2**

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

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, a derived trait found only in humans, has evolved over time and involves memory.
2. Language evolved with linguistic features building on features of cognition such as 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. 28:** 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. 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.

## CAT 2019 Question Paper Slot 2

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. 29:** 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. 30:** Five sentences related to a topic are given below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out. Choose its number as your answer and key it in.

1. A particularly interesting example of inference occurs in many single panel comics.

**CAT 2019 Question Paper Slot 2**

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.



**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.



**CAT 2019 Question Paper Slot 2**

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

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

**Q. 33:** The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

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-

## CAT 2019 Question Paper Slot 2

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 nonhybrid organizations.

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

**Q. 34:** 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. 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.

**CAT 2019 Question Paper Slot 2**

4. Clock-time has been consistently represented in feminist literature as a masculine artefact representative of a 'time is money' perspective.

### Logical Reasoning and Data Interpretation

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 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:

1. Gordon did not score consecutively in any two rounds.
2. Eric and Fatima both scored in a round.

The following information is known about Rounds 7 through 10:

1. Only two players scored in three consecutive rounds. One of them was Chen. No other player scored in any two consecutive rounds.
2. Joshin scored in Round 7, while Amita scored in Round 10.

**CAT 2019 Question Paper Slot 2**

3. No player scored in all the four rounds.

**Q. 35:** What were the scores of Chen, David, and Eric respectively after Round 3?

1. 3,3,3
2. 3,0,3
3. 3,6,3
4. 3,3,0

**Q. 36:** Which three players were in the last three positions after Round 4?

1. Bala, Chen, Gordon
2. Bala, Hansa, Ikea
3. Bala, Ikea, Joshin
4. Hansa, Ikea, Joshin

**Q. 37:** Which player scored points in maximum number of rounds?

1. Ikea
2. Amita
3. Chen
4. Joshin

**Q. 38:** Which players scored points in the last round?

1. Amita, Chen, Eric
2. Amita, Chen, David
3. Amita, Bala, Chen
4. Amita, Eric, Joshin

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.

**CAT 2019 Question Paper Slot 2**

	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. 39:** Who among the following four is not a member of Team 2?

1. Quentin
2. Paula
3. Sally
4. Terence

**Q. 40:** Who among the following four people is a part of exactly two teams?

1. Sally
2. Robert
3. Paula

**CAT 2019 Question Paper Slot 2**

4. Quentin

**Q. 41:** Who among the five people is a member of all teams?

1. Sally
2. No one
3. Terence
4. Paula

**Q. 42:** Apart from Chinese and English, which languages are spoken by Team 1?

1. Arabic and Basque
2. Arabic and French
3. Basque and Dutch
4. Basque and French

Students in a college are discussing two proposals --

A: a proposal by the authorities to introduce dress code on campus, and

B: 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.

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

**CAT 2019 Question Paper Slot 2**

2. Among the 200 students who preferred Sunita as student union president, 80% supported proposal A.
3. Among those who preferred Ragini, 30% supported proposal A.
4. 20% of those who supported proposal B preferred Sunita.
5. 40% of those who did not support proposal B preferred Ragini.
6. Every student who preferred Sunita and supported proposal B also supported proposal A.
7. Among those who preferred Ragini, 20% did not support any of the proposals.

**Q. 43:** Among the students surveyed who supported proposal A, what percentage preferred Sunita for student union president?

**Q. 44:** What percentage of the students surveyed who did not support proposal A preferred Ragini as student union president?

**Q. 45:** What percentage of the students surveyed who supported both proposals A and B preferred Sunita as student union president?

1. 50
2. 40
3. 20
4. 25

**Q. 46:** How many of the students surveyed supported proposal B, did not support proposal A and preferred Ragini as student union president?

**CAT 2019 Question Paper Slot 2**

1. 200
2. 150
3. 210
4. 40

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-mark questions preceded the 10-mark questions, and all the 15-mark questions followed the 10-mark questions.

The following additional facts are known.

- i. Annie prepared the fifth question for both MT and ET. For MT, this question carried 5 marks.
- ii. Annie prepared one question for MT. Every other faculty member prepared more than one questions for MT.
- iii. All questions prepared by a faculty member appeared consecutively in MT as well as ET.
- iv. Chetan prepared the third question in both MT and ET; and Esha prepared the eighth question in both.
- v. 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. 47:** The second question in ET was prepared by:

**CAT 2019 Question Paper Slot 2**

1. Dave
2. Beti
3. Chetan
4. Esha

**Q. 48:** How many 5- mark questions were there in MT and ET combined?

1. 12
2. 10
3. 13
4. Cannot be determined

**Q. 49:** Who prepared 15-mark questions for MT and ET?

1. Only Dave and Fakir
2. Only Beti, Dave, Esha and Fakir
3. Only Esha and Fakir
4. Only Dave, Esha and Fakir

**Q. 50:** Which of the following questions did Beti prepare in ET?

1. Seventh question
2. Fourth question
3. Ninth question
4. Tenth question

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 Rs. 100/-. Dr. Kane sees each patient for 15 minutes and charges Rs. 200/-, while Dr. Wayne sees each patient for 25 minutes and charges Rs. 300/-.

### CAT 2019 Question Paper Slot 2

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. 51:** What is the maximum number of patients that the clinic can cater to on any single day?

1. 30
2. 12
3. 31
4. 15

**Q. 52:** 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

**CAT 2019 Question Paper Slot 2**

2. Dr. Kane
3. Both Dr. Wayne and Dr. Kane
4. Dr. Ben

**Q. 53:** 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?

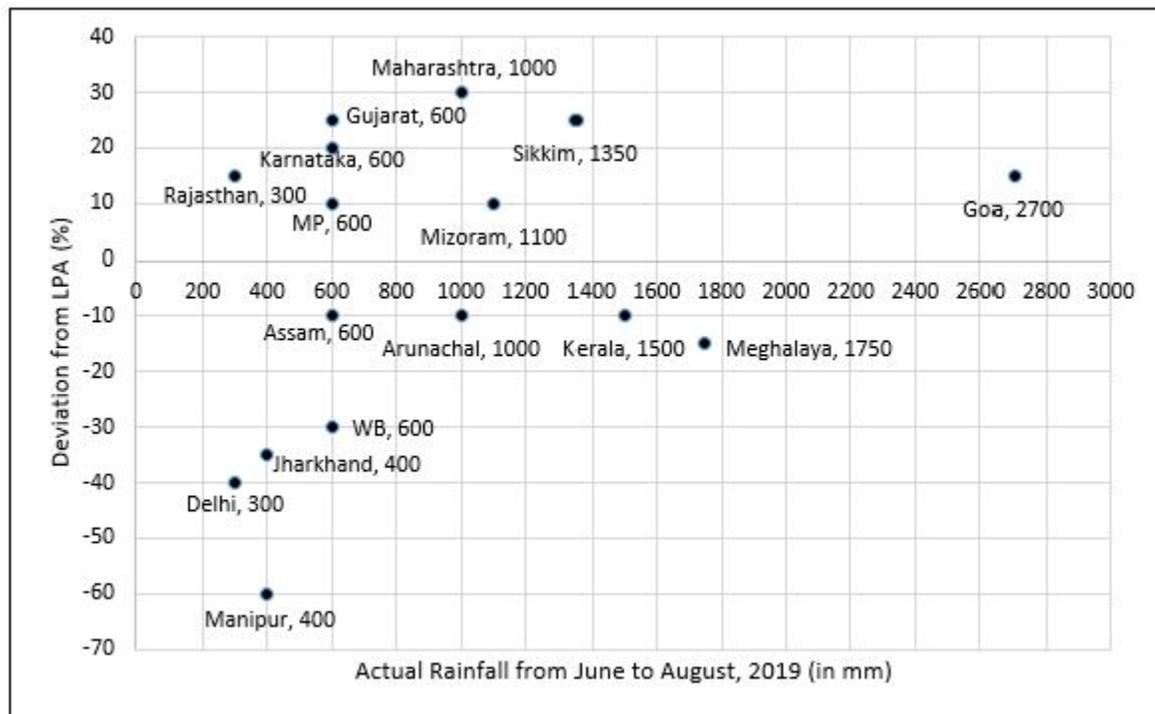
1. Monday
2. Friday
3. Wednesday
4. Same duration on all three days

**Q. 54:** 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. 15
2. 30
3. 10
4. 0

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.

CAT 2019 Question Paper Slot 2



**Q. 55:** 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. 14.29
2. 57.14
3. 42.86
4. 75.00

**Q. 56:** 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. -30%
3. -20%
4. 10%

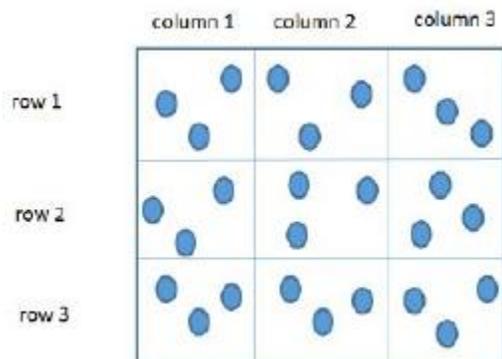
CAT 2019 Question Paper Slot 2

**Q. 57:** 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. 500 mm
2. 460 mm
3. 367 mm
4. 450 mm

**Q. 58:** 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. 525mm
2. 490mm
3. 475mm
4. 505mm



	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  $3 \times 3$  grid, as shown in the figure. Every pouch has a certain number of

## CAT 2019 Question Paper Slot 2

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 Rs. 6 and the maximum amount is Rs. 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 Rs. 4.

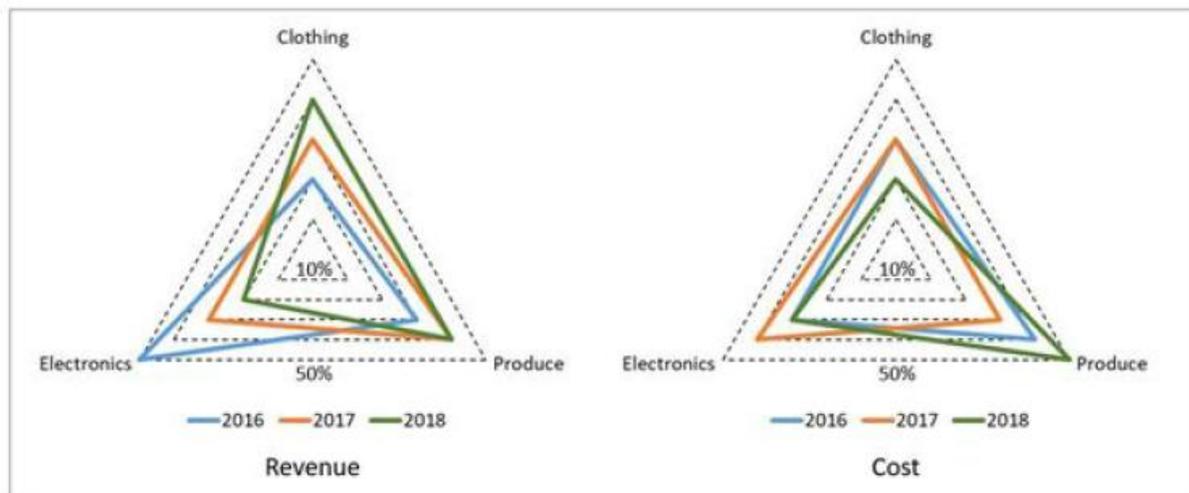
**Q. 59:** What is the total amount of money (in rupees) in the three pouches kept in the first column of the second row?

**Q. 60:** How many pouches contain exactly one coin?

**Q. 61:** What is the number of slots for which the average amount (in rupees) of its three pouches is an integer?

**Q. 62:** The number of slots for which the total amount in its three pouches strictly exceeds Rs. 10 is

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  $\text{Profit}/\text{Cost} \times 100\%$ .

It is known that

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

**CAT 2019 Question Paper Slot 2**

**Q. 63:** What was the percentage profit of the store in 2018?

**Q. 64:** What was the ratio of revenue generated from the Produce department in 2017 to that in 2018?

1. 16: 9
2. 9: 16
3. 8: 5
4. 4: 3

**Q. 65:** What percentage of the total profits for the store in 2016 was from the Electronics department?

**Q. 66:** What was the approximate difference in profit percentages of the store in 2017 and 2018?

1. 33.3
2. 15.5
3. 8.3
4. 25.0

## Quantitative Ability

**Q. 67:** 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. 8
2. 7
3. 9
4. 10

**Q. 68:** If  $x$  is a real number, then  $\sqrt{\log_e \frac{4x - x^2}{3}}$  is a real number if and only if

1.  $1 \leq x \leq 2$
2.  $-3 \leq x \leq 3$
3.  $1 \leq x \leq 3$
4.  $-1 \leq x \leq 3$

**Q. 69:** 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. 24
2. 26
3. 32
4. 35

**Q. 70:** How many pairs  $(m, n)$  of positive integers satisfy the equation  $m^2 + 105 = n^2$  ?

## CAT 2019 Question Paper Slot 2

**Q. 71:** 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. 14
2. 13
3. 15
4. 12

**Q. 72:** 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.  $\sqrt{2}$
2.  $\pi/3$
3.  $1/\sqrt{2}$
4. 1

**Q. 73:** 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. 74:** A cyclist leaves A at 10 am and reaches B at 11 am. Starting from 10:01 am, every minute a motor cycle leaves A and moves towards B. Forty-five such motor cycles reach B by 11 am. All motor cycles have the same speed. If the cyclist had doubled his speed, how many motor cycles would have reached B by the time the cyclist reached B?

CAT 2019 Question Paper Slot 2

1. 23
2. 20
3. 15
4. 22

**Q. 75:** 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. 4
2. 3.5
3. 4.5
4. 5

**Q. 76:** John jogs on track A at 6 kmph and Mary jogs on track B at 7.5 kmph. The total length of tracks A and B is 325 metres. While John makes 9 rounds of track A, Mary makes 5 rounds of track B. In how many seconds will Mary make one round of track A?

**Q. 77:** 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. 78:** 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. 549
3. 427

**CAT 2019 Question Paper Slot 2**

4. 361

**Q. 79:** The real root of the equation  $2^{6x} + 2^{3x+2} - 21 = 0$  is

1.  $\frac{\log_2 7}{3}$
2.  $\log_2 9$
3.  $\frac{\log_2 3}{3}$
4.  $\log_2 27$

**Q. 80:** 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. -1
2. 10
3. 0
4. 1

**Q. 81:** Two ants A and B start from a point P on a circle at the same time, with A moving clock-wise 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. 10:25am
2. 10:18am
3. 10:27am
4. 10:45am

**Q. 82:** 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

## CAT 2019 Question Paper Slot 2

1. 68
2. 72
3. 78
4. 80

**Q. 83:** 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 non-fiction category. How many fiction books were in the library in 2015?

1. 6000
2. 6160
3. 5500
4. 6600

**Q. 84:** 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. 12
2. 14
3. 13
4. 15

**Q. 85:** How many factors of  $2^4 \times 3^5 \times 10^4$  are perfect squares which are greater than 1?

CAT 2019 Question Paper Slot 2

**Q. 86:** What is the largest positive integer  $n$  such that  $\frac{n^2 + 7n + 12}{n^2 - n - 12}$  is also a positive integer?

1. 8
2. 12
3. 16
4. 6

**Q. 87:** 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.  $k = 0$
2.  $0 < k \leq \frac{5}{13}$
3.  $k = \frac{5}{13}$
4.  $k > \frac{5}{13}$

**Q. 88:** 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.  $A > 1/16$
2.  $A > 1/8$
3.  $A < 1/16$
4.  $A < 1/8$

**Q. 89:** 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  $(x - y) / p$  equals

1. 0.7
2. 1

## CAT 2019 Question Paper Slot 2

3. 1.2
4. 0.50

**Q. 90:** 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 Rs. 2000, then his purchase price of a bicycle, in Rupees, was

1. 8000
2. 6000
3. 4000
4. 2000

**Q. 91:** John gets Rs 57 per hour of regular work and Rs 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. 92:** 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.  $8464\pi$
2.  $928\pi$
3.  $1044(4 + \pi)$
4.  $1026(1 + \pi)$

**Q. 93:** 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

CAT 2019 Question Paper Slot 2

2.  $6\sqrt{2}$
3.  $8\sqrt{2}$
4. 5

**Q. 94:** 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.  $8\sqrt{3}$
2. 12
3.  $5\sqrt{5}$
4.  $10\sqrt{2}$

**Q. 95:** 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. 96:** If  $(2n+1) + (2n+3) + (2n+5) + \dots + (2n+47) = 5280$ , then what is the value of  $1+2+3+\dots+n$  ?

**Q. 97:** If  $5^x - 3^y = 13438$  and  $5^{x-1} + 3^{y+1} = 9686$ , then  $x+y$  equals

**Q. 98:** Let  $A$  and  $B$  be two regular polygons having  $a$  and  $b$  sides, respectively. If  $b = 2a$  and each interior angle of  $B$  is  $3/2$  times each interior angle of  $A$ , then each interior angle, in degrees, of a regular polygon with  $a + b$  sides is

**CAT 2019 Question Paper Slot 2**

**Q. 99:** The number of common terms in the two sequences: 15, 19, 23, 27, . . . . , 415 and 14, 19, 24, 29, . . . . , 464 is

1. 18
2. 19
3. 21
4. 20

**Q. 100:** Amal invests Rs 12000 at 8% interest, compounded annually, and Rs 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

## Answer Keys

Question No.	Answer Key						
1	Option: 2	26	1	51	Option: 3	76	48
2	Option: 2	27	Option: 2	52	Option: 2	77	7
3	Option: 4	28	2431	53	Option: 1	78	Option: 2
4	Option: 3	29	3421	54	Option: 4	79	Option: 3
5	Option: 5	30	2	55	Option: 3	80	Option: 4
6	Option: 1	31	2	56	Option: 1	81	Option: 3
7	Option: 2	32	Option: 1	57	Option: 2	82	Option: 2
8	Option: 4	33	Option: 4	58	Option: 2	83	Option: 4
9	Option: 2	34	4132	59	13	84	Option: 2
10	Option: 4	35	Option: 1	60	8	85	44
11	Option: 4	36	Option: 4	61	2	86	Option: 2
12	Option: 2	37	Option: 1	62	3	87	Option: 1
13	Option: 4	38	Option: 1	63	25	88	Option: 1
14	Option: 1	39	Option: 1	64	Option: 3	89	Option: 2
15	Option: 4	40	Option: 1	65	70	90	Option: 3
16	Option: 2	41	Option: 4	66	Option: 3	91	12
17	Option: 3	42	Option: 2	67	Option: 2	92	Option: 4
18	Option: 2	43	64	68	Option: 3	93	Option: 1
19	Option: 3	44	84	69	Option: 3	94	Option: 4
20	Option: 2	45	Option: 1	70	4	95	12
21	Option: 4	46	Option: 2	71	Option: 2	96	4851
22	Option: 3	47	Option: 1	72	Option: 4	97	13
23	Option: 1	48	Option: 3	73	80	98	150
24	Option: 1	49	Option: 4	74	Option: 3	99	Option: 4
25	2143	50	Option: 4	75	Option: 3	100	20920

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**Solution 1:**

This might prove to be a little challenging to most students as it asks to choose the one that cannot be inferred. In other words, we have to eliminate the ones that can be inferred and choose the as right answer the one that cannot be inferred.

The last paragraph helps us eliminate two choices. The first that cities indeed help create jobs, and the second that they help prevent destruction of environment. Both the choices can be inferred when the author gives example of Manaus. Option 1 and 3 can be ruled out.

So we are left with two choices, option 4 tells us that cities contribute to cultural transformation. This can be inferred from the last sentence of the para. The author has used the word transformative in the last sentence of the passage “the progress is from hick to metropolitan to cosmopolitan”, we can infer that this is cultural transformation, after all you are moving from metropolitan to cosmopolitan.

Many of you might say that option 2 can also be inferred from the last sentence of the passage. But this is not the reason why the author feels that cities are good places to live in.

The last para has clues to all the choices except 2.

**Solution 2:**

This is an easy question, provided that you have understood the question well. The question wants us to undermine the author’s argument regarding the ‘greenness of cities’. We must restrict our answer to greenness only.

Option 1 talks about ‘violent crimes’, which has nothing to do with greenness of cities. It can be ruled out

Option 2 is the right choice. If population density is likely to increase CO2 and global warming, then the idea of greenness is futile as the carbon dioxide will neutralize it.

Option 3, like option 1, is out of scope. The high cost of utilities has nothing to do with greenness

Option 4 too is out of scope. It is not countering the idea of greenness.

We must understand that in spite of the ideas presented in choices 1, 3 and 4, author’s idea of greenness of cities can still be a valid point.

**Solution 3:**

This is a difficult question. The options are so close that it is difficult to pick any with confidence. However, we can try the elimination method here.

The passage says:

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.”

The right answer has to be opposite of what Calthorpe has to say, because what people believe in and what Calthorpe has to say are contradictory in nature (the verb jars means to disturb). Calthorpe says that cities are the most environmentally benign form of human settlement. So people’s belief would be the opposite of this. Thus option 4 is the right choice.

Option 1 is not specific. It is too broad and does not capture the people’s belief as precisely as option 4 does. Option 2 is indeed very close, the pollution idea is stated by Calthorpe, but the idea of crowdedness is not present in his statement.

Similarly option 3 talks about crimes and diseases, something which has not been mentioned in Calthorpe’s quote.

Both choice 2 and 4 are very close, but 2 goes out only because of idea of ‘crowdedness’.

A very close call indeed.

**Solution 4:**

This is an easy question and can be answered by understanding the context in which the author discusses Manaus. We have to go to the first sentence of the last para.

[T]he nationally subsidised city of Manaus in northern Brazil “answers the question” of how to stop deforestation: give people decent jobs.

Reading the above lines, we can shortlist two choices, one is 2 and the other is 3. But the purpose of giving jobs is to stop deforestation, which is the bigger issue. Option 3 is thus the right choice.

**Solution 5:**

This question can be marked correctly by using a bit of common sense and by picking the one that has least impact on environment. Here the common sense comes into play.

Recycling material and energy efficient transportation can indeed have a huge impact on environment. Since this is an except question, both 1 and 2 can be ruled out.

We are left with two choices sorting out garbage and keeping streets clean. Sorting out garbage will have a greater impact on environment. Moreover, this idea has been discussed in the passage. Thus we can rule out option 3 as well.

Option 4 is the best choice.

**Solution 6:**

The points that are mentioned directly by the author in the passage will definitely support his argument. The point that is not mentioned or is opposite to what the author has to say

will not support his argument. You must understand that not supporting doesn't mean weakening. Any

Option 4 supports the author's argument because he himself mentions historians who have argued that capitalism in India was not introduced with any modifications (2nd para paragraph)

Option 3, too, has been mentioned in the passage in the very first para where the author says that colonies were experimental labs.

Option 2 has come towards the end of the passage, in the last para wherein the author says that since modernity was externally imposed, it led to development of underdevelopment.

Option 1 is difficult because people have difficulty understanding the meaning of the term 'induced by'. Induced by means triggered by or caused by. The change in British colonial policy was not induced by resistance to modernity. In fact, first came the change in policy, then came the resistance to modernity in Indian society. So the correct way of framing this idea would be: the resistance to modernity in Indian society was induced by the change in the British colonial policy.

Option 1 is the right choice.

#### **Solution 7:**

From the first paragraph, we can infer all of the following except 2. The experimental sites idea is visible in the first para. Similarly, we can see Enlightenment rationalism as the motivation behind the change in colonial policy.

The statement "It had restructured everything in Europe—the productive system, the political regimes, the

moral and cognitive orders—and would do the same in India" in the first para supports option 3 as well.

Thus we have evidence for 1,3 and 4. Many of you might wonder as to why 2 cannot be inferred because we have evidence for 2 as well.

But option 2 is distorted, it did face resistance from existing structural forms, but these structural forms were not of modernity. In fact there was no modernity in India, it was introduced externally by the British, as the passage argues. The existing structural forms were of society and not of modernity. Thus we can't infer 2.

#### **Solution 8:**

To marginalise means to treat something or someone as insignificant. The colonial state was marginalized because it was at the periphery of Indian society. Here colonial state is the small ruling elite. Since it was a small group, it was marginalized, and to come out of that marginalization, it tried to introduce modernity in Indian society, because if everyone is modernized, then the colonized state would be a part of mainstream Indian society. To get

the right answer we have to understand the meaning of the word marginalized. No other option correctly captures the contextual meaning of the word 'marginalized', except 4. Thus 4 is the right choice.

**Solution 9:**

Here we must correctly understand the meaning of the word endogenous. Endogenous is not the same as endogamous, though there are some parallels. Endogenous means having internal cause or origin, while endogamous means marriage within a specific tribe. Option 3 has to go out.

The meaning of the word endogenous makes it clear that the right answer has to be 2.

**Solution 10:**

This is the easiest question of the passage. Towards the end the author talks about the development of underdevelopment, and he opens the passage by introducing British colonial policy. Option 4 is the right choice.

**Solution 11:**

This is a question that has double negative, you must carefully read the question, simplify it and then try to eliminate the options. According to the author, relocating government agencies has not always been a success. You have to mark the option that is not one of the reasons. The option that is the reason will go out, and the one that is not will be the right choice.

Once you understand the question, it becomes quite a simple one. The corruption point has been mentioned towards the end of the passage. So option 3 is the reason. Staff losses and difficulty of attracting talent are both mentioned in the passage.

Option 4 is nowhere mentioned and has to be the right choice.

**Solution 12:**

You will not get a question easier than this.

In the first paragraph, we have the following lines: In the post-colonial fervour of the 20th century, coastal capitals picked by trade-focused empires were spurned for "regionally neutral" new ones...

Thus we get to know that colonial powers were focussed on trade. Option 2 is the right choice.

**Solution 13:**

This is primarily a vocabulary question. Pedigree means history. So a long pedigree means something that has a history. Thus option 4 becomes the right choice.

**Solution 14:**

This question has come from the second last paragraph of the passage.

“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. . . .”

In short, the dilemma is pick small towns or opt for larger cities.

Option 2 says keep government agencies in large cities, but the issue is opt x or opt y, not opt x or keep y

Option 3 does not even mention the two choices, while option 4 talks about private enterprise, which is definitely out of scope.

Option 1 is the best answer, relocate to remote areas or to relatively larger cities, opt x or opt y.

**Solution 15:**

We have to choose an option that would not be used by people who support decentralizing of central government functions.

If the option supports decentralization, then it is out or else it is in.

Option 1 supports decentralization and has been discussed in the passage, the cost factor has been extensively discussed by the author.

New ideas and autonomy in regulation is given in the second paragraph. Thus options 2 and 3 are out,

Option 4 is not a reason given in support of decentralization.

**Solution 16:**

To answer this question we must understand the context in which Orientalism has been used. The word Orientalism has been used here in the sense of identity. The author says when we speak the same language and understand each other, there is nothing like Orientalism in that case. In effect, he wants to say that language breaks all the barriers of culture and identity.

Option 2 is correct because it mentions learning another language and thus captures the essence. Option 1 goes out because goodwill is not the intention, nor is globalization.

Option 4 takes the word Orientalism literally, the author has used the word in a context, that context is identity defined by language.

**Solution 17:**

This is an easy question. By reading third last para of the passage, you should be able to answer all the questions.

Passage says “My identity as a white male was far less important than my ability to communicate”... this justifies option 2. Option 2 can be ruled out.

If you are welcomed because you speak a particular language, then it has intrinsic connection with your identity. You speak a language, as a result people identify you as someone similar to them, so they welcome you.

The third last para of the passage clearly mentions option 4.

Option 3 is the right choice because it has nothing to do with language's ability to change us.

**Solution 18:**

This is an application based question. The answer to such questions cannot be found directly in the passage, but has to be gathered from the key ideas supported by the author. The author of this passage is in favour of learning a new language because he thinks it breaks cultural barriers. So, if a French ethnographer decides to study the culture of a Nigerian tribe, the author would unarguably want him to learn their language, as this will help the ethnographer better study the tribe.

This is a very easy question and option 3 is the right choice.

**Solution 19:**

This question too can be answered by keeping in mind the author's key argument. The author says that language can help us overcome cultural barriers and barriers of identity you are born with. To weaken this point, the author's critics would say something contrary to that point. Option 3 is the best choice.

Option 1 would support the author. Option 2 has nothing to do with language. Option 4 is simply out of scope.

**Solution 20:**

Owning the copyright technically means possessing something. The site belongs to some other country, but the copyrights are owned by some other entity. This would be akin to Egyptian artefacts owned by Western museum. This is the right analogy. You must understand that 'seizing' means snatching something forcefully from someone.

Option 1 goes out because the illegal downloading will not make you the owner of it.

Option 3 too goes out because giving free access to others is not akin to giving the right to own

Option 4 too does not have the right analogy.

**Solution 21:**

By reading Watrall's views, we get to know that he is against google's intention, not against the technology. We can eliminate option 2. Also, he is not dismissive of laypeople's access to those images. In fact being dismissive would put him in the wrong.

We have option 3 and 4 to choose from. Is he uneasy or is he outrightly critical? Maybe both, but google has nowhere claimed that it will use the images for commercial purposes.

Google has said that it is going to give people free access to those images. It might get traffic and good advertisement as a result, but that is not commercial use of the images. Moreover, the advertisement part is just a conjecture or a guess. This is something that the critics think google might do, but has not yet done, and may never do.

Option 4 is the best choice.

**Solution 22:**

This question can be answered by using a bit of common sense and by reading the lines of the passage in which Google and CyArk have put forth their defence. We should mark the choice that these companies would not use to support their actions.

Option 1, 2 and 4 provide valid reasons. Option 3 is not the valid reason because it implies authoritarian attitude on behalf of the companies. Someone who tries to be a protector of culture would be considered snobbish. You can be a promoter of culture but not a protector of culture. Option 3 is the right choice.

**Solution 23:**

To answer this question correctly, we have to look for Dr. Watrall's argument. In the passage we can see "Watrall says these images belong on the site of a museum or educational institution, where there is serious scholarship and a very different mission".

If option 1 is true, it will unequivocally invalidate Dr Watrall's objection.

**Solution 24:**

We should always try to answer questions by looking for contextual references from the passage. The term 'digital colonization' has come in the very first paragraph. It says critics have raised question about "who should own the copyrights". Some have referred to it as 'digital colonization'. Thus digital colonization refers to the fact that countries where the scanned sites are located do not own the scan copyrights.

Option 4 is the other close choice, but this option can be true only if the host countries own the copyrights. Only if they own the copyrights can they give copyright permission.

**Solution 25:**

The presence of 'however' in statement 4 suggests that 4 must be preceded by a contrary idea. Statement 1 has that. Thus 1 and 4 form a mandatory pair. 3 says 'your tune may change'. In other words, 'your attitude may change'. That attitude is there in statement 1. Thus 143 form pair because 3 cannot come before 1. You must state the negative attitude, and then say that your attitude may change after you realize the amount of skill required to come or perform such music. Statement 2 can come only at the start and not at the end. Thus 2143 is the right sequence. An easy question.

**Solution 26:**

Sentence 5 says ‘this small change in perspective’. You must find out the sentence in which there is a change in perspective. 2 is that statement: speaking about yourself in the third person. The third person is a change in perspective. 2 and 5 form a pair. 4 introduces the idea of rumination, and 3 says that people prone to rumination are at a risk of depression. So there must be some alternative to rumination. 2 presents that alternative; it is ‘illesim’, which has some benefit as stated in 5. Thus 4325 form a paragraph. There is no place for 1

**Solution 27:**

Option 1 goes out because nowhere does the para says that language is a derived trait. It says that it is a human trait, but not a derived trait (a derived trait would be something that was missing in the common ancestor). Option 2 is correct, nothing is distorted or missing in this choice.

Option 3 is very close to 2 except that it misses the crucial point of ‘language drawing on aspects of cognition such as memory’

Option 4 misses two crucial points, one about language evolving over a period of time, and the other about point of ‘language drawing on aspects of cognition such as memory’

This is a very difficult question as there was little difference between 2 and 3.

We could eliminate 4 because it does not cover two critical points, focussing on the information that is less significant and is not the part of the author’s main focus, which is ‘evolution of language’.

**Solution 28:**

This is a very difficult question, and our team is yet to come up with the right logic behind this sequence. This is the source of the

paragraph: [https://books.google.co.in/books?id=F78cBAAQBAJ&pg=PT99&lpg=PT99&dq=%22To+categorize+an+object+means+to+consider+it+equivalent+to+other+things+in+that+category,+and+different%E2%80%94along+some+salient+dimension%E2%80%94from+things+that+are+not.%22&source=bl&ots=lgshG8EiJ&sig=ACfU3U1ruR0N3cr27rDXNSGCXuPQFRXtKw&hl=en&sa=X&ved=2ahUKEwiYoa\\_gqpbmAhWw6nMBHY4PDboQ6AEwAHoECAIQAAQ#v=onepage&q=%22To%20categorize%20an%20object%20means%20to%20consider%20it%20equivalent%20to%20other%20things%20in%20that%20category%2C%20and%20different%E2%80%94along%20some%20salient%20dimension%E2%80%94from%20things%20that%20are%20not.%22&f=false](https://books.google.co.in/books?id=F78cBAAQBAJ&pg=PT99&lpg=PT99&dq=%22To+categorize+an+object+means+to+consider+it+equivalent+to+other+things+in+that+category,+and+different%E2%80%94along+some+salient+dimension%E2%80%94from+things+that+are+not.%22&source=bl&ots=lgshG8EiJ&sig=ACfU3U1ruR0N3cr27rDXNSGCXuPQFRXtKw&hl=en&sa=X&ved=2ahUKEwiYoa_gqpbmAhWw6nMBHY4PDboQ6AEwAHoECAIQAAQ#v=onepage&q=%22To%20categorize%20an%20object%20means%20to%20consider%20it%20equivalent%20to%20other%20things%20in%20that%20category%2C%20and%20different%E2%80%94along%20some%20salient%20dimension%E2%80%94from%20things%20that%20are%20not.%22&f=false)

Looking at the way the sentences have been twisted, we can say that this qualifies as a dubious question.

**Solution 29:**

This is an average-difficulty question. Statement 4 says ‘it is an example of an ancient belief system...’. You must ask what noun the pronoun ‘it’ is referring to. It can only refer to the

noun phrase 'the notion of balance'. Thus 3 and 4 form a pair. Now we can have 3412 or 3421

2 has the phrase 'these parts', what noun is 'these parts' referring to. It is referring to the noun 'component parts' in statement 4. Thus, 342 form a pair. In fact, 4 and 2 form one unit. 'Such a belief' in 4 refers to the belief in 4. Thus we must have 3421 in sequence.

**Solution 30:**

This question is of a higher difficulty. In the first look, all the statements seem to be connected to one another. Option 2 says 'it is the creator's participation and imagination that makes the single-panel comic so engaging and so rewarding'. The opening sentence of the para can have two possible opening sentences, 1 or 2.

Sentence 1 wants to give us an interesting example of inference, which can be found in single panel comics.

To infer means to arrive at something on the basis of evidence. Single panel comic precisely has that. You are shown a panel and you have to imagine, through humor, what must have happened in the instant immediately before or immediately after... to get the joke you have to figure out (again inference). Thus 1 is a better opening sentence. 1345 forms a coherent paragraph.

You might wonder why can't 2 be the opening sentence. 2 says it is the creator's participation...but here the creator is not participating, he is hiding something and the viewer has to use his imagination and arrive at hidden things through inference.

**Solution 31:**

We believe that this was an easy question. statement 5 "the retention of plastic particles in the gut" and "Aside from clogging up the digestive tracts" in statement 3 can be connected together. Thus 53 form a pair. 1 must come before 53 because it talks about marine animals eating the plastic. So we have 153 in sequence. 4 introduces the idea by talking about plastic and the environmental problem it brings with itself. So we have 4153 in sequence, with option 2 becoming the odd one out.

**Solution 32:**

This is moderate difficulty question. The passage has two parts, the first speaks of the dismantling of the walls to overcome all divisions, the second speaks of how something else resulted from it because of selfish business interest.

Option 1 is the best choice; it says that the intention was to make things democratic, but by putting in as many people as possible in cubicles, it became a tool of exploitation of labour.

Option 2 goes out because workers' satisfaction is a little far-fetched. People might work in confined spaces but they could still be satisfied with their work

Option 3 is quite close, but the passage talks of intention of the companies. The inventor's idea was to dismantle barriers but the organizations took it as a tool to exploit labour. It did not work out because they did not want it to work out that way.

Option 4 too misses on highlighting the exploitation of labour point, something that is critical in the passage.

**Solution 33:**

The question is easy if you read the passage twice. The passage mentions hybrid organizations and says that it is easy for hybrid organizations to attract people, than it is for non-hybrid organizations.

Option 1 goes out because it broadly focuses on 9/11, which is just a minor detail as an example of hybrid organizations attracting more people. Option 2 does not even talk of hybrid organizations, it has to go out.

Option 3 is a misrepresentation. While hybrid organizations do attract people from anti-war movements, these movements are just an example. These hybrid organizations might attract people from any social movement, not necessarily anti-war movements. Option 4 is the best choice.

**Solution 34:**

This question is of a higher difficulty.

Statement 1 has the demonstrative pronoun 'this representation'. It must refer to something. Statement 4 says clock-time has been consistently represented...Statement 1 talks about this representation. 41 is a pair. The point is whether 4132 is correct or 4123. To sort out this confusion, we must read the 2nd sentence given in the question. Statement 1 speaks of a negative outcome by mentioning the deleterious results. This negative outcome is further extended in statement 3 in which the author says 'it is found that caring time is often more focused on the clock than generally theorised'. In parajumbles we must keep similar ideas together, thus the deleterious results in 1 and the biased focus in 3 must be kept together. 413 forms pair, with 2 coming in the end because it is a sort of conclusion in which the author mentions all the different 'times'.

**Solution for Question 35 to 38**

From the given information, we can see that each player participated in only a certain number of rounds. The following table provides the rounds that each person participated in (split by Rounds 1 - 6 and Rounds 7 - 10):

Person	Rounds participated From 1 to 6	Rounds participated From 7 to 10
Amita	1, 6	7, 8, 9, 10
Bala	1, 2	7, 8, 9, 10

Chen	1, 2, 3	8, 9, 10
David	1,2, 3,4	9, 10
Eric	1,2, 3, 4,5	10
Fatima	1,2, 3, 4, 5,6	-
Gordon	2, 3, 4, 5, 6	7
Hansa	3, 4, 5, 6	7,8
Ikea	4, 5,6	7, 8, 9
Joshin	5, 6	7, 8, 9, 10

**Rounds 1 to 6:**

The points that Amita scored till Round 6 is 8. Among the rounds 1 to 6. he participated only in Round 1 and Round 6. Hence, he must have scored 7 and 1 points in Round 1 and Round 6 in any order.

Since Bala scored 2 points till Round 6, he must have scored 1 point in Round 1 and 1 point in Round 2.

Since Bala scored 1 point in Round 1. Amita could not have scored 1 point in Round 1. Hence. Amita must have scored 7 points in Round 1 and 1 point in Round 6.

Gordon scored 17 points in Rounds 2 to 6. It is given that from Round 1 to Round 6. Gordon did not score consecutively in any two rounds. Since it is not possible to score 17 points in two rounds. Gordon must have scored 17 points in three rounds - Round 2, Round 4 and Round 6.

In these three rounds, he must have scored 7, 7 and 3 points, in any order.

Joshin scored 14 points in Rounds 5 and 6. Hence, he must have scored 7 points in each of these two rounds. Since Joshin scored 7 points in Round 6, Gordon cannot score 7 points in Round 6. Hence, Gordon must have scored 3 points in Round 6 and 7 points in each of Round 2 and Round 4.

Ikea scored 2 points till Round 6. In the first 6 rounds, he played in only Rounds 4, 5 and 6, of which he scored 0 points in Round 6. Hence, he must have scored 1 point each in Round 4 and Round 5.

Hansa scored 1 point in the first 6 rounds. He played in only Rounds 3 to 6. Of these rounds, he did not score any point in Round 6. In Rounds 4 and 5. Ikea scored 1 point. Hence. Hansa could not have scored 1 point in Rounds 4 and 5.

Therefore, Hansa must have scored 1 point in Round 3.

Eric scored 3 points in the first 6 rounds. He could have scored 1 point in each of three rounds OR 3 points in one round. He participated only in Rounds 1 to 5. Of these rounds, Bala scored 1 point each in Round 1 and 2. Hansa scored 1 point in Round 3, while Ikea scored 1 point in Round 4 and Round 5. Hence, Eric could not have scored 1 point each in three rounds. Hence, Eric must have scored 3 points in one round.

Similarly, Fatima cannot score 7. 1, 1, 1 point in four rounds (among the first 6 rounds) and must have scored 7 points and 3 points in two rounds.

Given that Eric and Fatima both scored in one round. In the round that both of them scored, Eric must have scored 3 points, while Fatima must have score 7 points (since both of them cannot score the same number of points in a round).

Among the rounds that both Eric and Fatima played (i.e., Rounds 1 to 5), the only round in which Fatima could have scored 7 points is Round 3. Hence, in round 3, Fatima must have scored 7 points and Eric must have scored 3 points. Eric should have scored 0 in all the other rounds from rounds 1 to 6.

Chen must have scored 3 points in one of the rounds, while David must have scored 3 points in two rounds each. Irrespective of which round Chen scored 3 points, David must have scored 3 points in Round 4. In the first two rounds, Chen and David must have scored 3 points in any order. Hence, Fatima could have scored 3 points only in Round 5.

#### **Rounds 7 to 10:**

In rounds 7-10, Chen must have scored 3 points (since he scored 6 points in total, after Round 10). Since Chen played 3 rounds from 7-10 and he scored in three consecutive rounds among these rounds, he must have scored 1 point each in Round 8, Round 9 and Round 10.

Ikea scored 15 points in Rounds 7 to 10. Since he played only in Rounds 7, 8 and 9, he must have scored 7, 7 and 1 points in these three rounds, in any order. Since Chen scored 1 point each in Rounds 8 and 9, Ikea could have

scored 1 point only in Round 7. In Rounds 8 and 9, he must have scored 7 points each.

Joshin scored 3 points in Rounds 7 to 10. He could not have scored 1 point in each of three rounds (since Ikea and Chen are the only persons who scored in three consecutive rounds and no one else scored in any two consecutive rounds).

Hence, Joshin must have scored 3 points in one round. Since it is given that Joshin scored in Round 7, he must

have scored 3 points in Round 7 and no points in the other rounds.

In Round 7, Ikea scored 1 point and Joshin scored 3 points. The only person who could have scored 7 points in Round 7 is Amita.

Hansa would have scored 3 points in Round 8 (since he scored 0 in Round 7).

Eric scored 7 points in Rounds 7 to 10. Among the rounds that he played (Rounds 9, 10), he must have scored 7 points in Round 10 (since Ikea scored 7 points in Round 9).

David did not score any points in Rounds 7 through 10.

Amita must have scored 3 points in Round 10 (since Amita scored in Round 10) and Bala must have scored 3 points in Round 9.

The table below provides the points scored by all the players in all the rounds. An 'X' indicates that the player did not participate in that round.

	A	B	C	D	E	F	G	H	I	J
1	7	1	3/0	0/3	0	0	X	X	X	X
2	X	1	0/3	3/0	0	0	7	X	X	X
3	X	X	0	0	3	7	0	1	X	X
4	X	X	X	3	0	0	7	0	1	X
5	X	X	X	X	0	3	0	0	1	7
6	1	X	X	X	X	0	3	0	0	7
7	7	0	X	X	X	X	0	0	1	3
8	0	0	1	X	X	X	X	3	7	0
9	0	3	1	0	X	X	X	X	7	0
10	3	0	1	0	7	X	X	X	X	0

**Solution 35:**

After Round 3, the scored of Chen, David and Eric were 3, 3 and 3 points respectively.

Answer: (3, 3, 3)

**Solution 36:**

The three players who were in the last position after Round 4 were Joshin (0 points), Ikea (1 point) and Hansa (1 point).

Answer: (Hansa, Ikea, Joshin)

**Solution 37:**

Ikea scored in the maximum number of rounds (5 rounds).

Answer: (Ikea)

**Solution 38:**

The players who scored in the last round are Amita. Chen and Eric.

Answer: (Amita, Chen, Eric)

**Solution for Question 39 to 42**

From (1) and (5), the persons in Team 1 speak English. Chinese. Arabic and French. (Robert speaks both Arabic and French).

From (1) and (5), the persons in Team 3 speak. English, Chinese and Dutch. (Quentin speaks Dutch and English). Since each person speaks two languages and each team speaks exactly four languages, we need to find one person for Team 3. who speaks one language among English, Chinese and Dutch and a different language apart from these three.

Since, Paula and Sally together speak Basque, Chinese and English and they are together in exactly two teams, they cannot be in Team 1. They must be in Teams 2 and 3.

Hence, from (5) and the above, Paula, Quentin and Sally, (Basque. Chinese. Dutch and English) are in Team 3. Since there are three persons in Team 3. Teams 1 and 2 should also have three persons each. Team 1 speaks, English, Chinese, Arabic and French. Robert (Arabic and French) is one of the team members. Now, two more persons, who speak languages among the above four are to be selected. It is possible only with Paula and Terence.

From (2) Basque and French are spoken by two teams. Hence, Team 2 speaks these two languages. Paula and Sally are there in Team 2 (Basque, Chinese and English). We need to find one more person, who speaks one of these three languages and French. It is possible with only Terence.

Team	1	2	3
Persons	Robert, Paula, Terence	Paula, Sally, Terence	Quentin, Paula, Sally
Languages	Arabic, Chinese, English, French	Basque, Chinese, English, French	Basque, Chinese, Dutch, English

**Solution 39:**

Quentin is not a member of Team 2.

Answer: (Quentin)

**Solution 40:**

Sally is part of exactly two teams.

Answer: (Sally)

**Solution 41:**

Paula is a member of all the teams.

Answer: (Paula)

**Solution 42:**

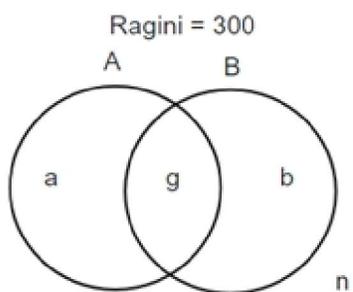
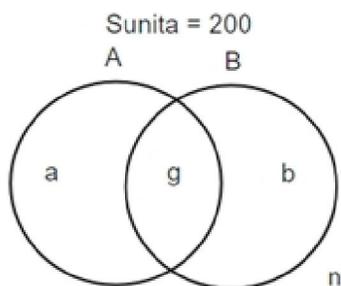
Apart from Chinese and English, Team 1 speaks Arabic and French.

Answer: (Arabic and French)

**Solution for Question 43 to 46**

The set of students who like Sunita and Ragini are disjoint sets.

Hence, the Venn diagram can be drawn as follows



There are 500 students in all.

From statement (2)

Sunita = 200. Hence, Ragini = 300.

From statement (1)  $A(\text{Sunita}) + A(\text{Ragini}) = 250$  and  $B(\text{Sunita}) + B(\text{Ragini}) = 250$ .

From (2),  $A(\text{Sunita}) = 160$ . Hence,  $A(\text{Ragini}) = 90$ .

From (4),  $B$  (Sunita) = 20 % of 250 = 50. Hence,  $B$  (Ragini) = 200.

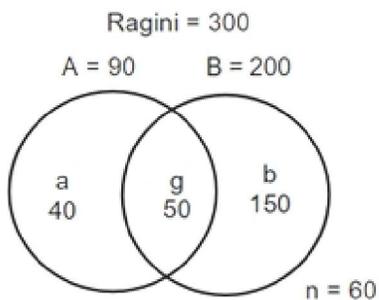
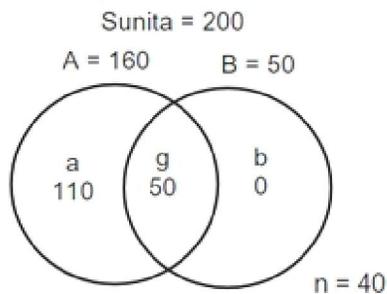
From (6),  $g$  (Sunita) = 50 and hence,  $b$  (Sunita) = 0 and  $a$  (Sunita) = 110. Hence,  $n$  (Sunita) = 40.

From (7),  $n$  (Ragini) = 60

It is given that 250 support  $B$ , hence the other 250 do not support  $B$ .

From (5),  $(a + n)$  of Ragini = 40 % of 250 = 100. Hence,  $a$  (Ragini) = 40.

Thus, the final solution is as follows.



**Solution 43:**

The required value is  $\frac{160}{250} \times 100 = 64$

**Solution 44:**

The required answer is  $\frac{210}{250} \times 100 = 84$ .

**Solution 45:**

The required answer is  $\frac{50}{250} \times 100 = 50$ .

**Solution 46:**

The students who supported proposal  $B$  but not  $A$  are  $b$  (Sunita) and  $b$  (Ragini). Among them those supported Ragini are  $b$  (Ragini) = 150.    Ans: (150)

**Solution for Question 47 to 50**

In the following the names of the faculties are referred by first letter of their names.

Given that each of MT and ET carries 100 marks. Each of MT and ET has at least four questions of 5 marks ( $4 \times 5 = 20$ ), at least three questions of 10 marks ( $3 \times 10 = 30$ ) and at least two questions of 15 marks ( $2 \times 15 = 30$ ). These together add up to 80 marks. The remaining 20 marks can be of the following possible combinations. (Four questions of 5 marks) or (two questions of 10 marks) or (one question of 5 marks and 1 question of 15 marks) or (two questions of five marks and one question of ten marks). Hence, the total number of questions in MT or ET can be 11 or 12 or 13. It is given that ET has more number of questions than in MT. Hence, MT has 11 or 12 questions.

It is given that the number of questions given by any faculty in both MT and ET together is the same. If MT has 12 questions and ET has 13 questions, or if MT has 11 questions and ET has 12 questions, this condition cannot be satisfied. Hence, MT has 11 (Five 5 marks, three 10 marks and three 15 marks) questions and ET has 13 questions (eight 5 marks, three ten marks and two 15 marks). This implies, each faculty has given four questions in MT and ET together. Since it is given that faculty A has given only one question in MT and each of the other faculties has given more than one question, each of the faculties B, C, D, E and F has given two questions in MT. This implies faculty A has given three questions in ET and all other faculties have given two questions each in ET. From the given data we get the following.

Q No.	MT (Faculty name/Marks)	ET (Faculty name/Marks)
1	F	D
2		
3	C	C
4		
5	A / 5	A
6		
7		
8	E	E
9		
10		
11	D	
12	No 12 <sup>th</sup> question in MT	
13	No 13 <sup>th</sup> question in MT	F

Except A, every other faculty gave at least two questions for MT and all the questions of a faculty appeared consecutively. Hence, 2<sup>nd</sup> question in MT is given by F, 4<sup>th</sup> by C, 10<sup>th</sup> by D. B also has given two questions and both appeared consecutively. Hence, 6<sup>th</sup> and 7<sup>th</sup> questions

are given by B and the 9<sup>th</sup> question is given by E. In each test first all 5 marks questions appeared followed by 10 marks questions and then 15 marks questions. It can be understood that MT has five 5 marks, three 10 marks and three 15 marks. Hence, in MT questions 1 to 5 carry 5 marks each, 6 to 8 carry 10 marks each and 9 to 11 carry 15 marks each.

It can be understood that A has given three questions for ET and each of the others has given two questions. Hence, the 2<sup>nd</sup> question of ET is given by D, the 4<sup>th</sup> question by C, 6<sup>th</sup> and 7<sup>th</sup> questions by A, 9<sup>th</sup> by E, 10<sup>th</sup> and 11<sup>th</sup> by B and 12<sup>th</sup> by F. Since ET has eight 5 marks questions, three ten marks questions and two 15 marks questions, questions 1 to 8 of ET carry 8 marks each, 9 to 11 carry ten marks each, 12 and 13 carry 15 marks each. Thus, we get the following:

Q No.	MT (Faculty name/Marks)	ET (Faculty name/Marks)
1	F/5	D/5
2	F/5	D/5
3	C/5	C/5
4	C/5	C/5
5	A / 5	A/5
6	B/10	A/5
7	B/10	A/5
8	E/10	E/5
9	E/15	E/10
10	D/15	B/10
11	D/15	B/10
12	No 12 <sup>th</sup> question in MT	F/15
13	No 13 <sup>th</sup> question in MT	F/15

**Solution 47:**

The second question in ET was prepared by Dave.

Ans: (Dave)

**Solution 48:**

In MT and ET together, there are 13 questions

Ans: (13)

**Solution 49:**

The 15 marks question in MT and ET are prepared by Esha, Dave and Fakir only.

Ans: (Only Dave, Esha and Fakir)

**Solution 50:**

Beti prepared 10th question in ET.

Ans: (Tenth question)

**Solution 51:**

From 9-11: 30, we have 150 minutes. Doctors Ben, Kane and Wayne take 10,15 and 20 minutes respectively for each patient. Therefore Ben, Kane and Wayne can see  $150/10=15$ ,  $150/15=10$  and  $150/25=6$  respectively. Therefore Ben, Kane and Wayne can see a maximum of 15,10 and 6 patients respectively every day. Sum =31

**Solution 52:**

Given, on Saturday, the queue is not empty.

=> Each doctor sees the maximum number of patients on a day.

Given Ben, Kane and Wayne charge Rs.100, 200 and 300 respectively.

=> Ben earns  $15(100)=Rs.1500$ , Kane earns  $10(200)$

= Rs .2000, Wayne earns  $6(300)=Rs .1800$

Therefore, Kane earns the maximum amount.

Ans: (Dr. Kane)

**Solution 53:**

Mr. Singh takes maximum duration when he enters Dr. Wayne’s room, who sees each patient for 25 minutes.

Monday – timings / token numbers					
Ben	9:10 (4)	9:20 (6)	9:30 (8)	9:40 (10)	9:50 (12)
Kane	9:15 (5)		9:30 (9)	9:45 (11)	
Wayne	9:25 (7)				9:50 (13)

He was at the clinic for 85 minutes.

Similarly On Wednesday, he would meet Ben and he would be at the clinic for 70 minutes.

On Friday, he would meet Ben and he would be at the clinic for 70 minutes.

Therefore, Singh stays at the clinic for the maximum duration on Monday

Ans: (Monday)

**Solution 54:**

Thursday					
Wayne – Room no 1	9-9:25 – Token 1	(Free 9:25-9:30)	9:30-9:55-Token 5	(Free 9:55-10:00)	10-10:25 – Token 9
Ben – Room no 2	9-9:10 – Token 2 (Free 9:10-9:15)	9:15-9:25-Token 3 (Free 9:25-9:30)	9:30-9:40-Token 6 (Free 9:40-9:45)	9:45-9:55-Token 7 (Free 9:55 to 10:00)	10-10:10 – Token 10
Kane – Room no 3	(Free 9-9:15)	9:15-9:30-Token 4	(Free 9:30-9:45)	9:45-10:00-Token 8	(Free 10:00-10:15)

The above pattern continues.

Hence, there is no time where all the doctors are simultaneously free.

Ans: (0)

### Solution for Question 55 to 58

The actual rainfall in 2019 and the Long Period

Average (LPA) for the different states are as follows.

Sl No.	State	Actual	LPA
1.	Maharashtra	1000	770
2.	Gujarat	600	480
3.	Sikkim	1350	1080
4.	Karnataka	600	500
5.	Rajasthan	300	260
6.	MP	600	545
7.	Mizoram	1100	1000
8.	Goa	2700	2350
9.	Assam	600	665
10.	Arunachal	1000	1110
11.	Kerala	1500	1665
12.	Meghalaya	1750	2060
13.	WB	600	855
14.	Jharkhand	400	615
15.	Delhi	300	500
16.	Manipur	400	1000

### Solution 55:

The heavy monsoon states are Maharashtra, Sikkim, Mizoram, Goa, Arunachal, Kerala and Meghalaya. Among these, Arunachal, Kerala and Meghalaya have a negative deviation from

respective LPAs in 2019 . The required percentage =  $\frac{3}{7} \times 100 = 42.86\%$

### Solution 56:

The Low monsoon states are Gujarat, Karnataka, Rajasthan, MP, Assam, WB, Jharkhand, Delhi and Manipur. The deviation from LPA for these states are 25,20,15, 10,-10,-30,-35,-40 and -60. The median value is -10

**Solution 57:**

The states which have a negative deviation from LPA and have an actual rainfall of 600 mm or less are Assam, WB, Jharkhand, Delhi and Manipur. The average rainfall in these states is  $\frac{2300}{5} = 460mm$

**Solution 58:**

The actual rainfall in Gujarat in 2019 is 600 mm. The rainfall in Gujarat in 2009 was 500 mm. As the value of 500 is replaced by 600 in calculating the LPA, the LPA would increase by 10 as it is the average of 10 years.

Ans: (490 mm)

**Solution for Question 59 to 62**

The minimum and maximum and possible number of coins (overall) in each slot would be as follows.

(2, 4) 8/9/10	(6, 8) 20/21/22	(1, 3) 5/6/7
(3, 5) 11/12/13	(1, 1) 3	(6, 20) 32 – 46
(1, 2) 4 (given)	(1, 2) 4/5	2, 5 9/10/11/12

It is given that the average amount of money kept in the nine pouches in any column or any row is an integer (a multiple of nine).

The total amount of money in the first column must be either 18 or 27 . The minimum value of the sum of money in the three slots is  $8+11+4=23$  and the maximum value is  $10+13+4=27$  .

$\therefore$  The number of coins in the first column of the three rows are  $10(2+4+4), 13(3+5+5)$  and  $4(1+2+1)$  Similarly in the third row, the sum must be 18 and in the second column, the sum must be 27 .

$\therefore$  The number of coins in the second column is  $20(6+6+8)+3(1+1+1)$  and  $4(1+1+2)$

The third column in the first row would be  $6(1+2+3)$  and the third column in the third row would be  $10(2+3+5)$

In the last column, the value in the second row would be  $54 - 16 = 38(6 + 12 + 20)$

We have the following figure for the number of coins in the pouches in each slot.

(2, 4, 4)	(6, 6, 8)	(1, 2, 3)
(3, 5, 5)	(1, 1, 1)	(6, 12, 20)
(1, 1, 2)	(1, 1, 2)	(2, 3, 5)

**Solution 59:**

The total amount of money in the three pouches in the first column of the second row is 13.

Ans: (13)

**Solution 60:**

Eight pouches contain exactly one coin.

Ans: (8)

**Solution 61:**

Only in two slots (row 2 , column 2 ) and (row 1 , column 3) is the average amount in the three pouches an integer.

Ans: (2)

In three slots (row 2 , column 1), (row 1 , column 2) and (row 2, column 3), the amount in the three pouches strictly exceeds 10.

**Solution 62:**

The percentage share in Revenue and cost in the different years are as follows.

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

**Solution for Question 63 to 66**

Assume the cost of the store in 2016 to be 100.

As the profit percentage that year was 100, the revenue of the store in that year would be 200 .

∴ Revenue in 2017 would be 400 and cost of the store in 2018 would be 200 . Given that in 2017, 30% of 400 = 40% of cost.

$\therefore 120 = 40\%$  of cost or cost in 2017=300

In 2018, 50% of 200 = 40% of Revenue

$$\therefore \text{Revenue in 2018} = \frac{100}{0.4} = 250$$

$\therefore$  We have the following values for Revenue and cost for the different years.

	Revenue	Cost	Profit
2016	200	100	100
2017	400	300	100
2018	250	200	50

**Solution 63:**

$$\text{Percentage profit of the store in 2018} = \frac{50}{200} = 25\%$$

**Solution 64:**

The ratio of the revenues = 160 : 100 = 8 : 5

**Solution 65:**

Profit of the store from the Electronics department in 2016 = 100 – 30 = 70

Total profit = 100 The required percentage = 70% .

**Solution 66:**

Profit percentage of the store in 2017 =  $\frac{100}{300} = 33.3\%$  Profit percentage of the store in

2018 =  $\frac{50}{200} = 25.0\%$  The required difference 33.3 – 25.0 = 8.3

**Solution 67:**

Let their salaries in 2010 be 6x, 5x and 7x respectively.

Also, let their salaries in 2015 be 3y, 4,y and 3y respectively

Given, 3y = 1.25 × 6x

Or y = 2.5x.

Therefore, salary of Rajesh in 2015 = 3y = 3 × 2.5x = 7.5x

$$\text{Percentage increase} = \left( \frac{7.5x - 7x}{7x} \right) \times 100 \approx 7\%$$

**Solution 68:**

The expression will be real only if  $\log_e \frac{4x-x^2}{3} \geq 0$

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

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

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

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

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

$$1 \leq x \leq 3$$

**Solution 69:**

Let their scores after review be  $11x$ ,  $10x$ , and  $3x$  respectively.

Therefore, their scores before review was:  $(11x-6)$ ,  $(10x-6)$  and  $(3x-6)$  respectively.

Given, Rama's score was one-twelfth of the sum of the scores of Mohan and Anjali.

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

$$\Rightarrow 12(3x-6) = 21x-12$$

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

$$\Rightarrow 36x-21x = 72-12 = 60$$

$$\Rightarrow x = 4$$

Now, Anjali's score – Rama's score =  $(11x-6)-(3x-6)=8x=32$ .

**Solution 70:**

Shortcut:

$$\text{Number of pairs} = \frac{\text{number of factors } 105}{2}$$

$$105 = 3 \times 5 \times 7$$

$$\text{Number of factors} = 2 \times 2 \times 2 = 8$$

$$\text{Hence, required number of pairs} = 8/2 = 4$$

Detailed Explanation:

$$m^2 + 105 = n^2$$

$$\Rightarrow n^2 - m^2 = 105$$

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

Since  $m$  and  $n$  are positive integers,  $(n-m) < (n+m)$

Splitting 105 in two factors, we get

$$\Rightarrow (n-m)(n+m) = 1 \times 105$$

For  $(n-m) = 1$  and  $(n+m) = 105$ ,  $(m, n) = (52, 53)$

$$\Rightarrow (n-m)(n+m) = 3 \times 35$$

For  $(n-m) = 3$  and  $(n+m) = 35$ ,  $(m, n) = (16, 19)$

$$\Rightarrow (n-m)(n+m) = 5 \times 21$$

For  $(n-m) = 5$  and  $(n+m) = 21$ ,  $(m, n) = (8, 13)$

$$\Rightarrow (n-m)(n+m) = 7 \times 15$$

For  $(n-m) = 7$  and  $(n+m) = 15$ ,  $(m, n) = (4, 11)$

Hence there are four pairs.

**Solution 71:**

Let the work be of 40 units

Amount of work done by Anil in one day =  $40/20 = 2$  units

Amount of work done by Sunil in one day =  $20/20 = 1$  units

Bimal does 10% work i.e. 4 units.

Rest  $40 - 4 = 36$  units is done by Anil and Sunil.

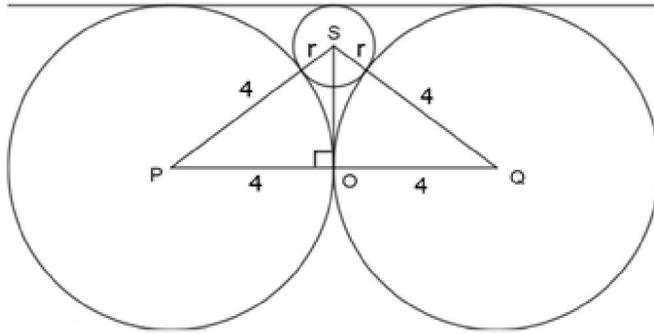
Let Anil took  $x$  days. Therefore, Sunil took  $(x-3)$  days. Therefore,

$$2 \times x + 1 \times (x-3) = 36$$

Or  $x = 13$  days.

**Solution 72:**

Refer to the figure



$$SO = 4 - r.$$

Applying Pythagoras theorem in triangle POS, we get

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

$$\Rightarrow (4 + r)^2 - (4 - r)^2 = 16$$

$$\Rightarrow 4 \times 4 \times r = 16$$

$$\Rightarrow r = 1$$

**Solution 73:**

Given  $A = 72$

Also,  $A = 0.9 \times B \Rightarrow B = A / 0.9 = 72 / 0.9 = 80.$

And  $B = 1.25 \times C \Rightarrow C = B / 1.25 = 80 / 1.25 = 64$

And  $C = 0.8 \times D \Rightarrow D = C / 0.8 = 64 / 0.8 = 80.$

**Solution 74:**

Time taken by cyclist to cover the distance AB = 60 min

Given, starting from 10:01 am, every minute a motor cycle leaves A and moves towards B. Forty-five such motor cycles reach B by 11 am.

Also, the speed of all the motor cycles is same.

That means that the 45th motor cycle which started at 10:45 am, reached B exactly at 11 am. Rest all reached B some time before B.

Therefore, each motor cycle takes 15 min to cover the distance AB.

Now, if the cyclist doubles his speed, then he will reach B in 30 min i.e. at 10:30 am.

So, the 15th motor cycle (started at 10:15 am from A) would be the last motor cycle to reach point B at 10:30 am.

Hence, there will be 15 motor cycles would have reached B by the time the cyclist reached B.

**Solution 75:**

Let a be the average of 20 numbers whose average does not exceed 5.

Let b be the average of rest of the 10 numbers. Clearly,  $b > 5$  i.e. the average of these numbers exceeds 5.

Therefore,

$$30 \times 5 = 20a + 10b$$

$$\Rightarrow 2a + b = 15$$

$$\Rightarrow b = 15 - 2a$$

Going by the options, we can say that when  $a = 4.5$ ,  $b = 6$  which satisfies all the conditions.

**Solution 76:**

$$\text{Speed of John} = 6 \text{ kmph} = 6 \times \frac{5}{18} = \frac{5}{3} \text{ m/s}$$

$$\text{Speed of Mary} = 7.5 \text{ kmph} = 7.5 \times \frac{5}{18} = \frac{25}{12} \text{ m/s}$$

Let the track length of A and B be x and y respectively.

$$\text{Given, } x + y = 325 \dots (1)$$

$$\text{Time taken by John to cover one round of A} = \frac{x}{5/3} \text{ sec}$$

$$\text{Therefore, time taken to cover 9 rounds} = 9 \times \frac{x}{5/3} = \frac{27}{5} x \text{ sec}$$

$$\text{Time taken by Mary to cover one round of B} = \frac{y}{25/12} \text{ sec}$$

$$\text{Therefore, time taken to cover 5 rounds} = 5 \times \frac{y}{25/12} = \frac{12}{5} y \text{ sec}$$

As per the condition:

$$\frac{27}{5} x = \frac{12}{5} y$$

$$\Rightarrow \frac{x}{y} = \frac{12}{27} = \frac{4}{9}$$

Putting in equation (1) we get  $x = 100$  and  $y = 225$ .

$$\text{Time taken by Mary to cover one round of A} = \frac{100}{25/12} = 48 \text{ sec}$$

**Solution 77:**

Let the number be ABCDEF, where A, B, C, D, E, and F be the digits.

Given,

$$C=A$$

$$B=2A$$

$$F=A+B+C=A+2A+A=4A$$

$$E=A+B=A+2A=3A$$

$$D=E+F=3A + 4A=7A.$$

Since A and D both are digit, the maximum possible value of A=1. Therefore, the maximum value of D=7.

**Solution 78:**

$$\text{Sum of roots} = 4a+3a=7a=-b$$

$$\text{Or } b=-7a$$

$$\text{Product of roots} = 4a \times 3a = c$$

$$\text{Or } c = 12a^2$$

$$\text{Now, } b^2 + c = (-7a)^2 + 12a^2 = 61a^2$$

Comparing the options.

$$\text{Option 1: } 61a^2 = 3721 \Rightarrow a^2 = 61, \text{ clearly } a \text{ is not an integer.}$$

$$\text{Option 2: } 61a^2 = 549 \Rightarrow a^2 = 9, \text{ we can have } a = -3 \text{ or } 3 \text{ (an integer)}$$

$$\text{Option 3: } 61a^2 = 427 \Rightarrow a^2 = 7, \text{ clearly } a \text{ is not an integer.}$$

$$\text{Option 4: } 61a^2 = 361 \Rightarrow a^2 = \frac{361}{61}, \text{ clearly } a \text{ is not an integer.}$$

**Solution 79:**

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

$$\text{Take } 2^{3x} = y$$

$$\Rightarrow y^2 + 4y - 21 = 0$$

$$\Rightarrow (y-3)(y+7) = 0$$

$$\Rightarrow y = 3 \text{ or } y = -7$$

$$\Rightarrow 2^{3x} = 3 \text{ or } 2^{3x} = -7 \{ \text{No solution} \}$$

$$\Rightarrow 3x = \log_2 3$$

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

**Solution 80:**

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 is equal to  $a_{1023} = 1$

**Solution 81:**

Let the track length be  $10x$ .

When they meet at 10 am, ant A travelled  $6x$  of the distance and ant B travelled  $4x$  of the distance.

Therefore,  $\frac{\text{Speed of ant A}}{\text{Speed of ant B}} = \frac{6x}{4x} = \frac{3}{2}$

And, the ratio of time taken by A and B to cover the same distance =  $\frac{2}{3}$

The distance by ant A from meeting point to point P was  $4x$ . Similarly, the distance covered by ant B from meeting point to point P was  $6x$ .

Given, ant A took 12 min to reach P.

Therefore, to cover a distance of  $4x$ , time taken by ant B =  $\frac{3}{2} \times 12 = 18$  min.

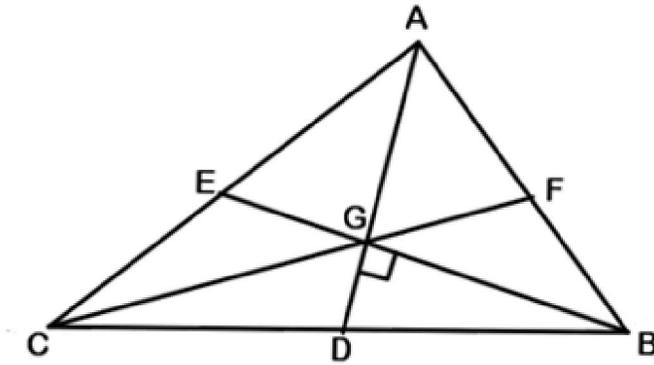
But, ant B has to cover a total of  $6x$  distance.

Hence, the time required =  $\frac{6x}{4x} \times 18 = 27$  min.

Therefore, ant B reaches P at 10:27 am.

**Solution 82:**

Refer to the figure below:



Draw the third median CF. We know the following facts:

1. The intersection point of medians i.e. centroid (G) divides each median into 2:1.
2. All three medians divide the triangle into 6 parts of equal area.

$$GD = \frac{1}{3} \times AD = \frac{1}{3} \times 12 = 4$$

$$GB = \frac{2}{3} \times BE = \frac{2}{3} \times 9 = 6$$

$$\text{Area of triangle BGD} = \frac{1}{2} \times GB \times GD = \frac{1}{2} \times 6 \times 4 = 12$$

Hence, area of triangle ABC =  $6 \times 12 = 72$

**Solution 83:**

Let there number of fiction and non fiction books in 2010 be x and y respectively.

From the first condition:

$$x + y = 11500 \dots (1)$$

From the second condition:

$$1.1 \times x + 1.2 \times y = 11500 \dots (2)$$

Solving both the equations, we get  $x = 6000$ .

In 2015, the number of fiction books =  $1.1x = 6600$

**Solution 84:**

Initial amount of salt in vessel A=10 gms per 100 ml, therefore in 500 ml the amount of salt =50 gms

Initial amount of salt in vessel B=22 gms per 100 ml, therefore in 500 ml the amount of salt =110 gms

Initial amount of salt in vessel C=32 gms per 100 ml, therefore in 500 ml the amount of salt =160 gms

When 100 ml is trasfered from A to B, the amount of salt now in B = 10+110=120 gms in 600ml.

The new concentration of salt in B = 120/600=20 gms per 100 ml.

Also, the amount of salt lef in A =50-10 =40 gms in 400ml.

Now, when 100 ml is trasfered from B to C, the amount of salt now in C = 20+160=180 gms in 600ml.

The new concentration of salt in C= 180/600=30 gms per 100 ml.

Finally, when 100 ml is trasfered from C to A, the amount of salt now in A = 30+40=70 gms in 500ml.

Therefore, the strength of salt in A =  $\frac{70}{500} \times 100 = 14\%$

**Solution 85:**

$$2^4 \times 3^5 \times 10^4 = 2^8 \times 3^5 \times 5^4$$

For perfect squares, we have to take only even powers of the prime factors of the number.

The number of ways 2's can be used is 5 i.e.  $2^0, 2^2, 2^4, 2^6, 2^8$

The number of ways 3's can be used is 3 i.e.  $3^0, 3^2, 3^4$

The number of ways 5's can be used is 3 i.e.  $5^0, 5^2, 5^4$

Therefore, the total number of factors which are perfect squares =  $5 \times 3 \times 3 = 45$

But this also includes the number 1. Hence excluding 1, the required number is 45-1=44.

**Solution 86:**

$$\frac{n^2 + 7n + 12}{n^2 - n - 12} = \frac{(n+3)(n+4)}{(n-4)(n+3)} = \frac{(n+4)}{(n-4)}$$

$$\Rightarrow \frac{(n+4)}{(n-4)} = \frac{(n-4+8)}{(n-4)} = 1 + \frac{8}{(n-4)}$$

The expression is positive integer if  $\frac{8}{(n-4)}$  is integer.

Or (n-4) must be factor of 8.

For n to be largest, n-4=8

Or n =12

**Solution 87:**

Shortcut:

We can take  $a=5$ ,  $b=0$ ,  $x=13$  and  $y=0$  as values which satisfies all three equations.

$$\text{Hence, } k = ay - bx = 5 \times 0 - 0 \times 13 = 0$$

**Solution 88:**

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

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

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

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

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

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

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

**Solution 89:**

Cost of table for Aman =  $1.2p$

Cost of table for Asim =  $0.8p$

Aman sells to Bimal at  $1.3 \times 1.2p = 1.56p$  = cost of table for Bimal =  $x$

Asim sells table to Barun at  $0.7 \times 0.8p = 0.56p$  = cost of table for Barun =  $y$

$$\text{Therefore, } \frac{x - y}{p} = \frac{1.56p - 0.56p}{p} = 1$$

**Solution 90:**

Let the cost of each bicycle be  $x$ .

From the given condition:

$$10x + 2000 = 6 \times 1.25x + 4 \times 0.75x$$

$$\Rightarrow x = 4000$$

**Solution 91:**

Let the number of hours for regular and overtime work be  $x$  and  $y$  respectively.

We have two equations:

$$x + y = 172 \dots (1)$$

$$114y = \frac{15}{100} \times 57x \dots (2)$$

On solving both the equations, we get  $x = 160$  and  $y = 12$ .

Hence, his overtime work = 12 hours

**Solution 92:**

To get the minimum number of cylinders, the volume of each of the cylinder must be HCF of 405, 783, and 351

$$\Rightarrow \text{HCF}(405, 783, 351) = 27$$

$$\text{Therefore, number of cylinders of iron} = \frac{405}{27} = 15$$

$$\text{and, number of cylinders of aluminum} = \frac{783}{27} = 29$$

$$\text{and, number of cylinders of copper} = \frac{351}{27} = 13$$

$$\text{Hence, the total number of a cylinders} = 15 + 29 + 13 = 57$$

Also, volume of each cylinder = 27 cc

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

$$\Rightarrow \pi \times 3^2 \times h = 27$$

$$\Rightarrow h = \frac{3}{\pi}$$

$$\text{And total surface area of each cylinder} = 2\pi r(r + h)$$

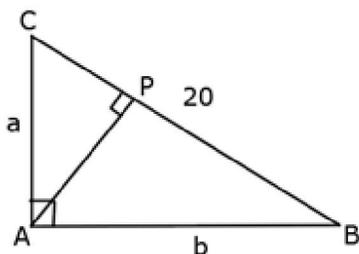
$$= 2\pi \times 3 \left( 3 + \frac{3}{\pi} \right) = 18(\pi + 1)$$

$$\text{Hence, total surface area of 57 cylinders} = 57 \times 18(\pi + 1)$$

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

**Solution 93:**

Refer to the figure:



For this right angle triangle, we have the following relations

$$a^2 + b^2 = 20^2 = 400 \dots (1) \text{ and}$$

$$AP = \frac{ab}{20} \dots (2)$$

For maximum value of AP, we have to maximize the product ab.

Applying  $AM \geq GM$  inequality we get

$$\frac{a^2 + b^2}{2} \geq \sqrt{a^2 \times b^2}$$

$$\Rightarrow \frac{400}{2} \geq ab$$

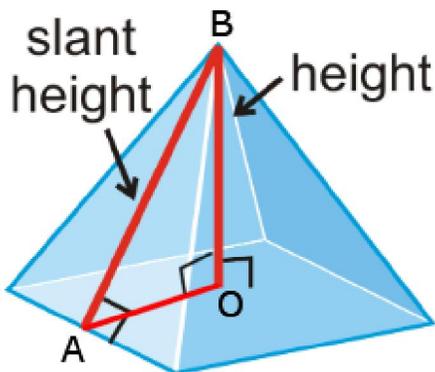
$$\Rightarrow ab \leq 200$$

Hence the maximum value of ab = 200.

Therefore, the maximum value of AP =  $\frac{200}{20} = 10$

**Solution 94:**

From the diagram, it is obvious that AB is the height of the equilateral triangle and is also the slant height of the pyramid.



$$\text{Therefore, } AB = \frac{\sqrt{3}}{2} \times \text{side} = \frac{\sqrt{3}}{2} \times 20 = 10\sqrt{3}$$

$$\text{And } AO = \frac{1}{2} \times \text{side} = \frac{1}{2} \times 20 = 10$$

Applying Pythagoras theorem in triangle AOB

$$OB^2 = AB^2 - OA^2$$

$$= (10\sqrt{3})^2 - 10^2$$

$$= 200$$

Hence, the height of the pyramid (OB) =  $10\sqrt{2}$

**Solution 95:**

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

Also,  $f(24)=54$

$$\Rightarrow f(24) = 2 \times 3 \times 3 \times 3$$

$$\Rightarrow f(2 \times 12) = f(2)f(12) = f(2)f(2 \times 6) = f(2)f(2)f(6) = f(2)f(2)f(2 \times 3) = f(2)f(2)f(2)f(3) = 2 \times 3 \times 3 \times 3$$

Given that  $f(1)$ ,  $f(2)$  and  $f(3)$  are all positive integers, by comparison, we get

$f(2) = 3$  and  $f(3)=2$ . And we can safely take  $f(1)=1$

$$\text{Now, } f(18)=f(2)(9)=f(2)f(3 \times 3)=f(2)f(3)f(3)=3 \times 2 \times 2=12$$

**Solution 96:**

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

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

$$\Rightarrow m = 24$$

Also,

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

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

$$= 24(2n+1+23) = 48(n+12)$$

$$\text{Therefore, } 48(n+12) = 5280 \Rightarrow n = 98$$

$$\text{Hence, } 1+2+3+\dots+n = \frac{n(n+1)}{2} = \frac{98 \times 99}{2} = 4851$$

**Solution 97:**

Taking 2<sup>nd</sup> 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 R.H.S. =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,  $x + y = 6 + 7 = 13$

**Solution 98:**

The formula for each interior angle  $= 180 - \frac{360}{n}$ , where 'n' is the side of the regular polygon

$$\Rightarrow 180 - \frac{360}{2a} = \frac{3}{2} \left( 180 - \frac{360}{a} \right)$$

$$\Rightarrow 360 - \frac{360}{a} = 540 - \frac{3 \times 360}{a}$$

$$\Rightarrow \frac{2 \times 360}{a} = 180$$

$$\Rightarrow a = \frac{2 \times 360}{180}$$

$$\Rightarrow a = 4 \text{ and } b = 2a = 8$$

Polygon with each side  $= a + b = 4 + 8 = 12$ , will have each interior angle  $= 180 - \frac{360}{12}$

=150

**Solution 99:**

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

$$LCM(d_1, d_2) = LCM(4, 5) = 20$$

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

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

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

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

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

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

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

$$\Rightarrow n = 20$$

**Solution 100:**

Let the amount invested by Bimal be Rs. P

Given, the interest incomes for both are equal. Therefore,

$$\left[ 12000 \left( 1 + \frac{8}{100} \right) - 12000 \right] + \left[ 10000 \left( 1 + \frac{3}{100} \right)^2 - 10000 \right] = \frac{P \times 7.5 \times 1}{100}$$

Solving for P we get P = Rs. 20920

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