CAT 2024

SLOT 2

CAT 2024 SLOT 2 VARC

Q.1) Five jumbled up sentences (labelled 1, 2, 3, 4 and 5), related to a topic, are given below. Four of them can be put together to form a coherent paragraph. Identify the odd sentence and key in the number of that sentence as your answer.

The UK is a world leader in developing cultivated meat and the approval of a cultivated pet food is an important milestone.

If we're to realise the full potential benefits of cultivated meat the government must invest in research and infrastructure.

The first UK applications for cultivated meat produced for humans remain under assessment with the Food Standards Agency.

The previous UK government had been looking at fast-tracking the approval of cultivated meat for human consumption.

It underscores the potential for new innovation to help reduce the negative impacts of intensive animal agriculture.

Instructions : The passage below is accompanied by four questions. Based on the passage, choose the best answer for each question.

(. . .) There are three other common drivers for carnivore-human attacks, some of which are more preventable than others. Natural aggression-based conflicts - such as those involving females protecting their young or animals protecting a food source - can often be avoided as long as people stay away from those animals and their food.

Carnivores that recognise humans as a means to get food, are a different story. As they become more reliant on human food they might find at campsites or in rubbish bins, they become less avoidant of humans. Losing that instinctive fear response puts them into more situations where they could get into an altercation with a human, which often results in that bear being put down by humans. "A fed bear is a dead bear," says Servheen, referring to a common saying among biologists and conservationists.

Predatory or predation-related attacks are quite rare, only accounting for 17% of attacks in North America since 1955. They occur when a carnivore views a human as prey and hunts it like it would any other animal it uses for food. (. . .)

Then there are animal attacks provoked by people taking pictures with them or feeding them in natural settings such as national parks which often end with animals being euthanised out of precaution. "Eventually, that animal becomes habituated to people, and [then] bad things happen to the animal. And the folks who initially wanted to make that connection don't

necessarily realise that," says Christine Wilkinson, a postdoctoral researcher at UC Berkeley, California, who's been studying coyote-human conflicts.

After conducting countless postmortems on all types of carnivore-human attacks spanning 75 years, Penteriani's team believes 50% could have been avoided if humans reacted differently. A 2017 study co-authored by Penteriani found that engaging in risky behaviour around large carnivores increases the likelihood of an attack

Two of the most common risky behaviours are parents leaving their children to play outside unattended and walking an unleashed dog, according to the study. Wilkinson says 66% of coyote attacks involve a dog. "[People] end up in a situation where their dog is being chased, or their dog chases a coyote, or maybe they're walking their dog near a den that's marked, and the coyote wants to escort them away," says Wilkinson.

Experts believe climate change also plays a part in the escalation of human-carnivore conflicts, but the correlation still needs to be ironed out. "As finite resources become scarcer, carnivores and people are coming into more frequent contact, which means that more conflict could occur," says Jen Miller, international programme specialist for the US Fish & Wildlife Service. For example, she says, there was an uptick in lion attacks in western India during a drought when lions and people were relying on the same water sources.

(. . .) The likelihood of human-carnivore conflicts appears to be higher in areas of low-income countries dominated by vast rural landscapes and farmland, according to Penteriani's research. "There are a lot of working landscapes in the Global South that are really heterogeneous, that are interspersed with carnivore habitats, forests and savannahs, which creates a lot more opportunity for these encounters, just statistically," says Wilkinson.

Q.2) According to the passage, which of the following scenarios would MOST likely exacerbate the frequency of carnivore-human conflicts?
[A] Addressing the impact of climate change on the availability of resources for wildlife.
[B] Unleashing dogs by pet owners in areas with known high concentrations of large carnivores.
[C] Implementing 'food waste' management strategies to prevent wild animals being attracted to human food sources.
[D] Attempting to photograph wild animals from within secured viewing areas in national parks and protected zones.

Q.3) Given the insights provided by Penteriani's research and Wilkinson's statement, which of the following conclusions can be drawn about the relationship between landscape heterogeneity and human-carnivore conflicts?

[A] Landscape heterogeneity, characterized by a mix of farmland and natural habitats, inherently reduces the chances of human-carnivore conflicts by providing more refuge for wildlife away from human activity

[B] Homogeneous landscapes with uniform agricultural practices are more likely to experience high rates of human-carnivore conflicts due to the predictability of resources
[C] The diversity and interspersion of working landscapes with carnivore habitats in rural areas increase the statistical probability of encounters between humans and carnivores
[D] Low-income countries with vast, contiguous wilderness areas are less prone to human-carnivore conflicts because these areas lack the human presence necessary for such encounters

Q.4) According to the passage, what is a significant factor that contributes to the habituation of carnivores to human presence?
[A] The natural aggression exhibited by carnivores, exacerbated by human interference, particularly when they are safeguarding their offspring or food sources
[B] The reduction in carnivores' instinctive fear response, resulting from their reliance upon human-provided food
[C] The increased scarcity of resources due to climate change, forcing carnivores to venture outside their natural habitats in search of sustenance
[D] The predatory perception of humans as potential prey within the carnivores' food chain

Q.5) Which of the following statements, if false, would be inconsistent with the concerns raised in the passage regarding the drivers of carnivore-human conflicts?
[A] Predatory attacks by carnivores are a common occurrence and have steadily increased over the past few decades.
[B] Climate change has had negligible effects on the frequency of carnivore-human interactions in affected regions.
[C] Human efforts to avoid risky behaviours around large carnivores have proven effective in reducing conflict incidents.
[D] Carnivores lose their instinctive fear of humans, when consistently exposed to human food sources.

Q.6) The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

Recent important scientific findings have emerged from crossing the boundaries of scientific fields. They stem from physicists collaborating with biologists, sociologists and others, to answer questions about our world. But physicists and their potential collaborators often find their cultures out of sync. For one, physicists often discard a lot of information while extracting broad patterns; for other scientists, information is not readily disposed. Further, many non-physicists are uncomfortable with mathematical models. Still, the desire to work on something new and different is real, and there are clear benefits from the collision of views.

[A] Large data sets and mathematical models in physics research combined with the research methods of non-physicist collaborators have yielded important scientific findings
[B] The desire to diversify their research and answer important questions has led to several collaborations between physicists and other social scientists
[C] Despite differences in their research styles, physicists' research collaborations with scholars from other disciplines have yielded important research findings

[D] Physicists have successfully buried their differences on research methods applied in other fields in their desire to find answers to baffling scientific questions

Q.7) Five jumbled up sentences (labelled 1, 2, 3, 4 and 5), related to a topic, are given below. Four of them can be put together to form a coherent paragraph. Identify the odd sentence and key in the number of that sentence as your answer.

No known real researcher of human behaviour would say that gender is all nature or all nurture.

The evidence for a biological basis for gender certainly doesn't mean we should be complacent in the face of sexism.

Many people are uncomfortable with the Idea that gender Is not purely a social construct.

Despite this empirical truth, researchers who study the biological basis of gender often face political pushback.

There's a political preference for gender to be only a reflection of social factors and so entirely malleable

Q.8) The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

John Cleese told Fox News Digital that comedians do not have the freedom to be funny in 2022. "There's always been limitations on what they're allowed to say," Cleese said. "I think it's particularly worrying at the moment because you can only create in an atmosphere of freedom, where you're not checking everything you say critically before you move on. What you have to be able to do is to build without knowing where you're going because you've never been there before. That's what creativity is - you have to be allowed to build. And a lot of comedians now are sitting there and when they think of something, they say something like, 'Can I get away with it? I don't think so. So and so got into trouble, and he said that, oh, she said that.' You see what I mean? And that's the death of creativity."

[A] Comedians must not check what they think and say. They must go where no one has gone before.
[B] Freedom and creativity are essential for comedy. Fear about offending people
[C] hinders originality
[D] Creativity and critical thinking cannot work together. Comedians must first be creative, and later be critical
[E] Comedians are being prevented from saying what they want and that is the death of this art form.

Q.9) There is a sentence that is missing in the paragraph below. Look at the paragraph and decide where (option 1, 2,3, or 4) the following sentence would best fit.

Sentence: Yet each day the flock produced eggs with calcareous shells though they apparently had not ingested any calcium from land which was entirely lacking in limestone.

Paragraph: Early in this century a young Breton schoolboy who preparing himself for a scientific career began to notice a strange fact about hens in his father's poultry yard. __(1) _ . As they scratched the soil they constantly seemed to be pecking at specks of mica, a siliceous material dotting the ground. __**(2)**__. No one could explain to Louis Kervran why the chickens selected the mica, or why each time a bird was killed for the family cooking pot no trace of the mica could be found in its gizzard. __(3) __. It took Kervran many years to establish that the chickens were transmuting one element into another. (4) .

[A] Option 3
[B] Option 2
[C] Option 1
[D] Option 4

Instructions: The passage below is accompanied by four questions. Based on the passage, choose the best answer for each question.

[S]pices were a global commodity centuries before European voyages. There was a complex chain of relations, yet consumers had little knowledge of producers and vice versa. Desire for spices helped fuel European colonial empires to create political, military and commercial networks under a single power.

Historians know a fair amount about the supply of spices in Europe during the medieval period - the origins, methods of transportation, the prices - but less about demand. Why go to such extraordinary efforts to procure expensive products from exotic lands? Still, demand was great enough to inspire the voyages of Christopher Columbus and Vasco Da Gama, launching the first fateful wave of European colonialism. . . .

So, why were spices so highly prized in Europe in the centuries from about 1000 to 1500? One widely disseminated explanation for medieval demand for spices was that they covered the taste of spoiled meat. . . . Medieval purchasers consumed meat much fresher than what the average city-dweller in the developed world of today has at hand. However, refrigeration was not available, and some hot spices have been shown to serve as an anti-bacterial agent. Salting, smoking or drying meat were other means of preservation. Most spices used in cooking began as medical ingredients, and throughout the Middle Ages spices were used as both medicines and condiments. Above all, medieval recipes involve the combination of medical and culinary lore in order to balance food's humeral properties and prevent disease. Most spices were hot and dry and so appropriate in sauces to counteract the moist and wet properties supposedly possessed by most meat and fish. . . .

Where spices came from was known in a vague sense centuries before the voyages of Columbus. Just how vague may be judged by looking at medieval world maps . . . To the

medieval European imagination, the East was exotic and alluring. Medieval maps often placed India close to the so-called Earthly Paradise, the Garden of Eden described in the Bible.

Geographical knowledge has a lot to do with the perceptions of spices' relative scarcity and the reasons for their high prices. An example of the varying notions of scarcity is the conflicting information about how pepper is harvested. As far back as the 7th century Europeans thought that pepper in India grew on trees "guarded" by serpents that would bite and poison anyone who attempted to gather the fruit. The only way to harvest pepper was to burn the trees, which would drive the snakes underground. Of course, this bit of lore would explain the shriveled black peppercorns, but not white, pink or other colors.

Spices never had the enduring allure or power of gold and silver or the commercial potential of new products such as tobacco, indigo or sugar. But the taste for spices did continue for a while beyond the Middle Ages. As late as the 17th century, the English and the Dutch were struggling for control of the Spice Islands: Dutch New Amsterdam, or New York, was exchanged by the British for one of the Moluccan Islands where nutmeg was grown.

Q 10. In the context of the passage, the people who heard the story of pepper trees being guarded by snakes would be least likely to arrive at the conclusion that

[A] it is not advisable to go to India to harvest the pepper themselves.
[B] this is why pepper is so hot.
[C] pepper is costly for good reason.
[D] it is no surprise that the pepper supply is so limited.

Ques 11. It can be inferred that all of the following contributed to a decline in the allure of spices, EXCEPT:

[A] changes in the system of medical treatment.
[B] changes in European cuisine.
[C] increase in the availability of spices.
[D] the development of refrigeration techniques.

Q.12) If a trader brought white peppercorns from India to medieval Europe, all of the following are unlikely to happen, EXCEPT:
[A] Europeans would doubt the story of pepper harvesting
[B] medieval maps would be used as navigational aids
[C] pepper would no longer be considered exotic
[D] the price of spices would decrease

Q.13) In the context of the passage, which one of the following conclusions CANNOT be reached?
[A] The spice trade was a driver of colonial expansion.
[B] Tobacco was more marketable than spices.
[C] Colonialism was motivated by the demand for spices.

[D] India was colonised for its spices and gold

Instructions: The passage below is accompanied by four questions. Based on the passage, choose the best answer for each question.

The history of any major technological or industrial advance is inevitably shadowed by a less predictable history of unintended consequences and secondary effects - what economists sometimes call "externalities." Sometimes those consequences are innocuous ones, or even beneficial. Gutenberg invents the printing press, and literacy rates rise, which causes a significant part of the reading public to require spectacles for the first time, which creates a surge of investment in lens-making across Europe, which leads to the invention of the telescope and the microscope.

Oftentimes the secondary effects seem to belong to an entirely different sphere of society. When Willis Carrier hit upon the idea of air-conditioning, the technology was primarily intended for industrial use: ensuring cool, dry air for factories that required low-humidity environments.

But...it touched off one of the largest migrations in the history of the United States, enabling the rise of metropolitan areas like Phoenix and Las Vegas that barely existed when Carrier first started tinkering with the idea in the early 1900s.

Sometimes the unintended consequence comes about when consumers use an invention in a surprising way. Edison famously thought his phonograph, which he sometimes called "the talking machine," would primarily be used to take dictation....But then later innovators... discovered a much larger audience willing to pay for musical recordings made on descendants of Edison's original invention. In other cases, the original innovation comes into the world disguised as a plaything...the way the animatronic dolls of the mid-1700s inspired Jacquard to invent the first "programmable" loom and Charles Babbage to invent the first machine that fit the modern definition of a computer, setting the stage for the revolution in programmable technology that would transform the 21 st century in countless ways.

We live under the gathering storm of modern history's most momentous unintended consequence....carbon-based climate change. Imagine the vast sweep of inventors whose ideas started the Industrial Revolution, all the entrepreneurs and scientists and hobbyists who had a hand in bringing it about. Line up a thousand of them and ask them all what they had been hoping to do with their work. Not one would say that their intent had been to deposit enough carbon in the atmosphere to create a greenhouse effect that trapped heat at the surface of the planet. And yet here we are.

Ethyl (leaded fuel) and Freon belonged to the same general class of secondary effect innovations whose unintended consequences stem from some kind of waste by-product that they emit. But the potential health threats of Ethyl (unleaded fuel) were visible in the 1920s,

unlike, say, the long-term effects of atmospheric carbon build up in the early days of the Industrial Revolution...

Indeed, it is reasonable to see CFCs (chlorofluorocarbons) as a forerunner of the kind of threat we will most likely face in the coming decades, as it becomes increasingly possible for individuals or small groups to create new scientific advances - through chemistry or biotechnology or materials science - setting off unintended consequences that reverberate on a global scale.

Q.14) We can assume that the author would support all of the following views EXCEPT:
[A] While technological advances in the past have had innocuous or beneficial outcomes, more recent advances have the potential to be more threatening globally.
[B] The by-products of leaded fuel, rather than the fuel itself, were responsible for the build-up of carbon-related gases in the atmosphere.
[C] The emissions caused by the large-scale use of leaded fuel ought to have been addressed earlier than they were.
[D] It has become far easier for people today to bring out innovations with dire worldwide consequences than it was earlier.

Q.15) The author lists all of the following examples as "externalities" of major technical advances EXCEPT:
[A] application of the Jacquard loom to modern IT programming
[B] build-up of chlorofluorocarbons in the atmosphere
[C] extension of the phonograph to large-scale recording of music
[D] cooling and de-humidifying of factories through air-conditioning

Q.16) Carrier, Babbage, and Edison are mentioned in the passage to illustrate the author's point that
[A] despite the original intention, the unintended consequences of their inventions were largely beneficial.
[B] these inventors could not have visualised the eventual impact of their inventions on society
[C] the secondary effect of past inventions mostly resulted in the creation of new inventions
[D] inventions typically end up being used for entirely different purposes than the intended ones.

Instructions: The passage below is accompanied by four questions. Based on the passage, choose the best answer for each question.

The job of a peer reviewer is thankless. Collectively, academics spend around 70 million hours every year evaluating each other's manuscripts on the behalf of scholarly journals and they

usually receive no monetary compensation and little if any recognition for their effort. Some do it as a way to keep abreast with developments in their field; some simply see it as a duty to the discipline. Either way, academic publishing would likely crumble without them.

In recent years, some scientists have begun posting their reviews online, mainly to claim credit for their work. Sites like Publons allow researchers to either share entire referee reports or simply list the journals for whom they've carried out a review....

The rise of Publons suggests that academics are increasingly placing value on the work of peer review and asking others, such as grant funders, to do the same. While that's vital in the publish-or-perish culture of academia, there's also immense value in the data underlying peer review. Sharing peer review data could help journals stamp out fraud, inefficiency, and systemic bias in academic publishing.....

Peer review data could also help root out bias. Last year, a study based on peer review data for nearly 24,000 submissions to the biomedical journal eLife found that women and nonWesterners were vastly underrepresented among peer reviewers. Only around one in every five reviewers was female, and less than two percent of reviewers were based in developing countries.... Openly publishing peer review data could perhaps also help journals address another problem in academic publishing: fraudulent peer reviews. For instance, a minority of authors have been known to use phony email addresses to pose as an outside expert and review their own manuscripts....

Opponents of open peer review commonly argue that confidentiality is vital to the integrity of the review process; referees may be less critical of manuscripts if their reports are published, especially if they are revealing their identities by signing them. Some also hold concerns that open reviewing may deter referees from agreeing to judge manuscripts in the first place, or that they'll take longer to do so out of fear of scrutiny....

Even when the content of reviews and the identity of reviewers can't be shared publicly, perhaps journals could share the data with outside researchers for study. Or they could release other figures that wouldn't compromise the anonymity of reviews but that might answer important questions about how long the reviewing process takes, how many researchers editors have to reach out to on average to find one who will carry out the work, and the geographic distribution of peer reviewers.

Of course, opening up data underlying the reviewing process will not fix peer review entirely, and there may be instances in which there are valid reasons to keep the content of peer reviews hidden and the identity of the referees confidential. But the norm should shift from opacity in all cases to opacity only when necessary.

Q.17) Which of the following best conveys the main point of the first paragraph?
[A] The full impact of technological advances cannot be estimated in the short run as the ripple effects often extend far beyond the original intent.
[B] The secondary effects of most major technological advances in the past, especially if they were unintended, have turned out to be beneficial.
[C] The entire impact of a technological advance should be evaluated by the boost its secondary effects gives to generating further technological advances.

[D] It is important to judge an invention not by its immediate outcomes, but by the holistic impact of its secondary effects.

Q.18) All of the following are listed as reasons why academics choose to review other scholars' work EXCEPT:
[A] Some use this as an opportunity to publicise their own review work.
[B] It is seen as a form of service to the academic community.
[C] It helps them keep current with cutting-edge ideas in their academic disciplines.
[D] It is seen as an opportunity to expand their influence in the academic community.

Q.19) According to the passage, some are opposed to making peer reviews public for all the following reasons EXCEPT that it
[A] makes reviewers reluctant to review manuscripts, especially if these are critical of the submitted work.
[B] leaves the reviewers unexposed to unwarranted and unjustified criticism or comments from others.
[C] deters reviewers from producing honest, if critical, reviews that are vital to the sound publishing process.
[D] delays the manuscript evaluation process as reviewers would take longer to write their reviews.

Q.20) According to the passage, which of the following is the only reason NOT given in favour of making peer review data public?
[A] It could address various inefficiencies and fraudulent practices that continue in academic publishing process.
[B] It would highlight the gender and race biases currently existing in the selection of reviewers.
[C] It will deal with peer review fraud such as authors publishing bogus reviews of their work.
[D] It can tackle the problem of selecting appropriately qualified reviewers for academic writing.

The passage below is accompanied by four questions. Based on the passage, choose the best answer for each question.

The job of a peer reviewer is thankless. Collectively, academics spend around 70 million hours every year evaluating each other's manuscripts on the behalf of scholarly journals and they

usually receive no monetary compensation and little if any recognition for their effort. Some do it as a way to keep abreast with developments in their field; some simply see it as a duty to the discipline. Either way, academic publishing would likely crumble without them.

In recent years, some scientists have begun posting their reviews online, mainly to claim credit for their work. Sites like Publons allow researchers to either share entire referee reports or simply list the journals for whom they've carried out a review....

The rise of Publons suggests that academics are increasingly placing value on the work of peer review and asking others, such as grant funders, to do the same. While that's vital in the publish-or-perish culture of academia, there's also immense value in the data underlying peer review. Sharing peer review data could help journals stamp out fraud, inefficiency, and systemic bias in academic publishing.....

Peer review data could also help root out bias. Last year, a study based on peer review data for nearly 24,000 submissions to the biomedical journal eLife found that women and nonWesterners were vastly underrepresented among peer reviewers. Only around one in every five reviewers was female, and less than two percent of reviewers were based in developing countries.... Openly publishing peer review data could perhaps also help journals address another problem in academic publishing: fraudulent peer reviews. For instance, a minority of authors have been known to use phony email addresses to pose as an outside expert and review their own manuscripts....

Opponents of open peer review commonly argue that confidentiality is vital to the integrity of the review process; referees may be less critical of manuscripts if their reports are published, especially if they are revealing their identities by signing them. Some also hold concerns that open reviewing may deter referees from agreeing to judge manuscripts in the first place, or that they'll take longer to do so out of fear of scrutiny....

Even when the content of reviews and the identity of reviewers can't be shared publicly, perhaps journals could share the data with outside researchers for study. Or they could release other figures that wouldn't compromise the anonymity of reviews but that might answer important questions about how long the reviewing process takes, how many researchers editors have to reach out to on average to find one who will carry out the work, and the geographic distribution of peer reviewers.

Of course, opening up data underlying the reviewing process will not fix peer review entirely, and there may be instances in which there are valid reasons to keep the content of peer reviews hidden and the identity of the referees confidential. But the norm should shift from opacity in all cases to opacity only when necessary.

Q.21 Based on the passage we can infer that the author would most probably support

[A] greater transparency across the peer review process in academic publishing.
[B] publishing peer review data rather than the publication of actual reviews.
[C] preserving the anonymity of reviewers to protect them from criticism.
[D] more careful screening to ensure the recruitment of content-familiar peer reviewers.

Q.22) There is a sentence that is missing in the paragraph below. Look at the paragraph and decide where (option 1, 2, 3, or 4) the following sentence would best fit.

Sentence: [T]he Europeans did not invent globalization.

Paragraph: The first phase of globalization occurred long before the introduction of either steam or electric power...Chinese consumers at all social levels consumed vast quantities of spices, fragrant woods and unusual plants. The peoples of Southeast Asia who lived in forests gave up their traditional livelihoods and completely reoriented their economies to supply Chinese consumers....(1)….. These exchanges of the year 1000 opened some of the routes through which goods and peoples continued to travel after Columbus traversed the mid-Atlantic. ....(2)…... Yet the world of 1000 differed from that of 1492 in important ways....the travellers who encountered one another in the year 1000 were much closer technologically.

....(3)….. .They changed and augmented what was already there since 1000.

....(4)….. .If globalization hadn't yet begun, Europeans wouldn't have been able to penetrate the markets in so many places as quickly as they did after 1492.

[A] Option 3
[B] Option 1
[C] Option 4
[D] Option 2

Q.23) There is a sentence that is missing in the paragraph below. Look at the paragraph and decide where (option 1, 2, 3, or 4) the following sentence would best fit.

Sentence: Science has officially crowned us superior to our early-rising brethren.

Paragraph: My fellow night owls, grab a strong cup of coffee and gather around: I have great news. __(1)_. For a long time, our kind has been unfairly maligned. Stereotyped as lazy and undisciplined. Told we ought to be morning larks. Advised to go to bed early so we can wake before 5am and run a marathon before breakfast like all high-flyers seem to do. Now, however, we are having the last laugh. (2) . It may be a tad more complicated than that. A study published last week, which you may have already seen while scrolling at 1am, suggests that staying up late could be good for brain power. (3) Is this study a thinly veiled PR exercise conducted by a caffeine-pill company? Nope, it's legit. (4). Research led by academics at Imperial College London studied data on more than 26,000 people and found that "self-declared 'night owls' generally tend to have higher cognitive scores".

[A] Option 2
[B] Option 4
[C] Option 3
[D] Option 1

Q.24) The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

Different from individuals, states conduct warfare operations using the DIME model "diplomacy, information, military, and economics." Most states do everything they can to

inflict pain and confusion on their enemies before deploying the military. In fact, attacks on vectors of information are a well-worn tactic of war and usually are the first target when the charge begins. It's common for telecom data and communications networks to be routinely monitored by governments, which is why the open data policies of the web are so concerning to many advocates of privacy and human rights. With the worldwide adoption of social media, more governments are getting involved in low-grade information warfare through the use of cyber troops. According to a study by the Oxford Internet Institute in 2020, cyber troops are "government or political party actors tasked with manipulating public opinion online." The Oxford research group was able to identify 81 countries with active cyber troop operations utilizing many different strategies to spread false information, including spending millions on online advertising.

[A] Governments primarily use the DIME model to deploy cyber troops who practise lowgrade information warfare, seeking to manipulate public opinion with the objective of inflicting pain and confusion on their enemies.
[B] Using the DIME model, together with military operations, many governments simultaneously conduct information warfare with the help of cyber troops and routinely monitor telecom data and communications networks.
[C] As part of conducting information warfare as per the DIME model, many governments routinely monitor telecom data and communications networks, and use cyber troops on social media to manipulate public opinion.
[D] Following the DIME model, many governments have taken advantage of open data policies of the web to deploy cyber troops who manipulate domestic public opinion, using advertising and other strategies to spread false information.

CAT 2024 SLOT 2 DILR

Instruction: Eight gymnastics players numbered 1 through 8 underwent a training camp where they were coached by three coaches - Xena, Yuki, and Zara. Each coach trained at least two players. Yuki trained only even numbered players, while Zara trained only odd numbered players.
After the camp, the coaches evaluated the players and gave integer ratings to the respective players trained by them on a scale of 1 to 7, with 1 being the lowest rating and 7 the highest. The following additional information is known.
1. Xena trained more players than Yuki.
2. Player-1 and Player-4 were trained by the same coach, while the coaches who trained Player-2, Player-3 and Player-5 were all different.
3. Player-5 and Player-7 were trained by the same coach and got the same rating. All other players got a unique rating.
4. The average of the ratings of all the players was 4.
5. Player-2 got the highest rating.
6. The average of the ratings of the players trained by Yuki was twice that of the players trained by Xena and two more than that of the players trained by Zara.
7. Player-4's rating was double of Player-8's and less than Player-5's.

Q.1) What best can be concluded about the number of players coached by Zara?

[A] Exactly 2
[B] Exactly 3
[C] Either 2 or 3 or 4
[D] Either 2 or 3

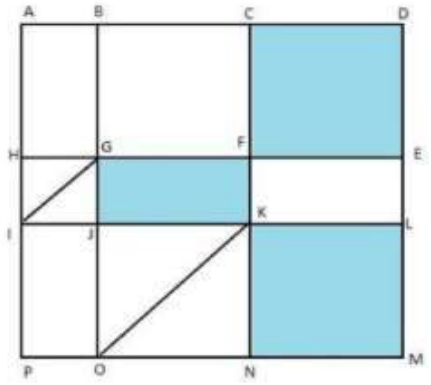
Q.2) What was the rating of Player-7?

Q.3) What was the rating of Player-6?

Q.4) For how many players the ratings can be determined with certainty?

Q.5) Who all were the players trained by Xena?
[A] Player-1, Player-4, Player-6, Player-8
[B] Player-1, Player-3, Player-4, Player-6
[C] Player-1, Player-3, Player-4
[D] Player-1, Player-3, Player-4, Player-8

Instruction:



The above is a schematic diagram of walkways (indicated by all the straight-lines) and lakes (3 of them, each in the shape of rectangles - shaded in the diagram) of a gated area. Different points on the walkway are indicated by letters (A through P) with distances being OP =150 m,ON=MN=300 m,ML=400 m,EL=200 m,DE=400 m.
The following additional information about the facilities in the area is known.
1. The only entry/exit point is at C.
2. There are many residences within the gated area; all of them are located on the path AH and ML with four of them being at A,H,M, and L.
3. The post office is located at P and the bank is located at B.

Q.6) One resident whose house is located at L, needs to visit the post office as well as the bank. What is the minimum distance (in m) he has to walk starting from his residence and returning to his residence after visiting both the post office and the bank?
[A] 3000
[B] 2700
[C] 3000
[D] 3200

Q.7) One person enters the gated area and decides to walk as much as possible before leaving the area without walking along any path more than once and always walking next to one of the lakes. Note that he may cross a point multiple times. How much distance (in m) will he walk within the gated area?
[A] 3800
[B] 2800
[C] 3200
[D] 3000

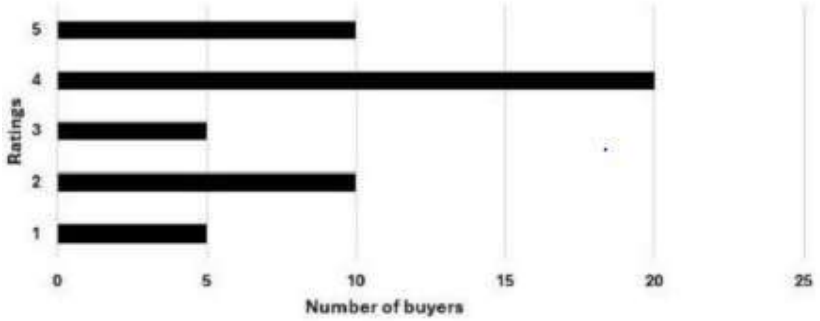
Q.8) One resident takes a walk within the gated area starting from A and returning to A without going through any point (other than A) more than once. What is the maximum distance (in m) she can walk in this way?

Q.9) Visitors coming for morning walks are allowed to enter as long as they do not pass by any of the residences and do not cross any point (except C) more than once. What is the maximum distance (in m) that such a visitor can walk within the gated area?

Instructions: An online e-commerce firm receives daily integer product ratings from 1 through 5 given by buyers. The daily average is the average of the ratings given on that day. The cumulative average is the average of all ratings given on or before that day.

The rating system began on Day 1, and the cumulative averages were 3 and 3.1 at the end of Day 1 and Day 2, respectively. The distribution of ratings on Day 2 is given in the figure below.

Distribution of Ratings on Day 2.



The following information is known about ratings on Day 3.

1. 100 buyers gave product ratings on Day 3.

2. The modes of the product ratings were 4 and 5 .

3. The numbers of buyers giving each product rating are non-zero multiples of 10.

4. The same number of buyers gave product ratings of 1 and 2 , and that number is half the number of buyers who gave a rating of 3 .

Q.10) How many buyers gave ratings on Day 1?

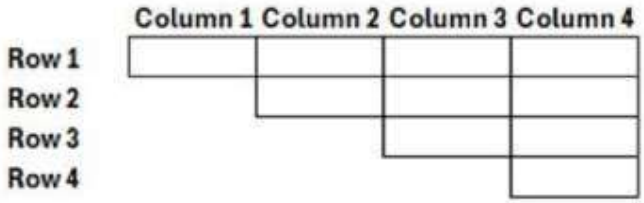
Q.11) What is the daily average rating of Day 3?
[A] 3.2
[B] 3.6

[C] 3.0
[D] 3.5

Q.12) What is the median of all ratings given on Day 3?

Q.13) Which of the following is true about the cumulative average ratings of Day 2 and Day 3 ?
[A] The cumulative average of Day 3 increased by more than 8% from Day 2
[B] The cumulative average of Day 3 increased by a percentage between 5% and 8% from Day 2
[C] The cumulative average of Day 3 increased by less than 5% from Day 2
[D] The cumulative average of Day 3 decreased from Day 2

Instructions: The numbers 1,2,3,4,5,6,7,8,9, and 10 are placed in ten slots of the following grid based on the conditions below.



1. Numbers in any row appear in an increasing order from left to right.

2. Numbers in any column appear in a decreasing order from top to bottom.

3. 1 is placed either in the same row or in the same column as 10

4. Neither 2 nor 3 is placed in the same row or in the same column as 10.

5. Neither 7 nor 8 is placed in the same row or in the same column as 9 .

6. 4 and 6 are placed in the same row.

Q.14) What is the row number which has the least sum of numbers placed in that row?

Q.15) Which of the following statements MUST be true?
I. 10 is placed in a slot in Row 1.
II. 1 is placed in a slot in Row 4.

[A] Only II
[B] Both I and II
[C] Only I
[D] Neither I nor II

Q.16) Which of the following statements MUST be true?
I. 2 is placed in a slot in Column 2.
II. 3 is placed in a slot in Column 3.

[A] Neither I nor II
[B] Both I and II
[C] Only I
[D] Only II

Q.17) For how many slots in the grid, placement of numbers CANNOT be determined with certainty?

Q.18) What is the sum of the numbers placed in Column 4?

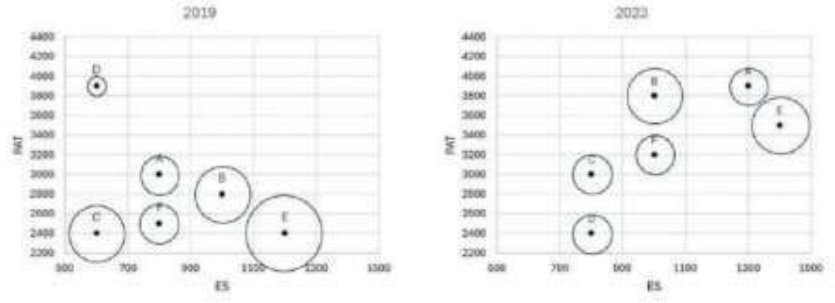
Instructions: The two plots below give the following information about six firms A, B, C, D, E, and F for 2019 and 2023.

PAT: The firm's profits after taxes in Rs. crores,

ES: The firm's employee strength, that is the number of employees in the firm, and

PRD: The percentage of the firm's PAT that they spend on Research and Development (R&D).

In the plots, the horizontal and vertical coordinates of point representing each firm gives their ES and PAT values respectively. The PRD values of each firm are proportional to the areas around the points representing each firm. The areas are comparable between the two plots, i.e., equal areas in the two plots represent the same PRD values for the two years.



Q.19) Assume that the annual rate of growth in PAT over the previous year (ARG) remained constant over the years for each of the six firms. Which among the firms A, B, C, and E had the highest ARG?

[A] Firm E
[B] Firm B

[C] Firm C
[D] Firm A

Q.20) The ratio of the amount of money spent by Firm C on R&D in 2019 to that in 2023 is closest to
[A] 9:4
[B] 5:9
[C] 9:5
[D] 5:6

Q.21) Which among the firms A, C, E, and F had the maximum PAT per employee in 2023?
[A] Firm C
[B] Firm F
[C] Firm A
[D] Firm E

Q.22) Which among the firms C, D, E, and F had the least amount of R&D spending per employee in 2023?
[A] Firm C
[B] Firm D
[C] Firm F
[D] Firm E

CAT 2024 SLOT 2 QUANT

Q.1) A bus starts at 9 am and follows a fixed route every day. One day, it traveled at a constant speed of 60 km per hour and reached its destination 3.5 hours later than its scheduled arrival time. Next day, it traveled two-thirds of its route in one-third of its total scheduled travel time, and the remaining part of the route at 40 km per hour to reach just on time. The scheduled arrival time of the bus is
[A] 7:00 pm
[B] 10:30 pm
[C] 7:30 pm
[D] 9:00 pm

Q.2) When 3^{333} is divided by 11, the remainder is
[A] 1
[B] 10
[C] 5
[D] 6

Q.3) Three circles of equal radii touch (but not cross) each other externally. Two other circles, X and Y , are drawn such that both touch (but not cross) each of the three previous circles. If the radius of X is more than that of Y , the ratio of the radii of X and Y is
[A] $7+4\sqrt{3}$:1
[B] $2+\sqrt{3}$:1
[C] $4+\sqrt{3}$:1
[D] $4+2\sqrt{3}$:1

Q.4) The sum of the infinite series

$$\frac{1}{5}\left(\frac{1}{5}-\frac{1}{7}\right)+\left(\frac{1}{5}\right)^2\left(\left(\frac{1}{5}\right)^2-\left(\frac{1}{7}\right)^2\right)+\left(\frac{1}{5}\right)^3\left(\left(\frac{1}{5}\right)^3-\left(\frac{1}{7}\right)^3\right)+$$

is equal to...
[A] 5/816
[B] 7/408
[C] 7/816
[D] 5/408

Q.5) ABCD is a trapezium in which AB is parallel to CD. The sides AD and BC when extended,intersect at point E . If , AB= cm ,CD=1 cm and perimeter of ABCD is cm, then the perimeter, in cm , of $\triangle$ AEB is

[A] 9
[B] 7
[C] 8
[D] 10

Q.6) A company has 40 employees whose names are listed in a certain order. In the year 2022, the average bonus of the first 30 employees was Rs. 40000, of the last 30 employees was Rs. 60000, and of the first 10 and last 10 employees together was Rs. 50000. Next year, the average bonus of the first 10 employees increased by 100%, of the last 10 employees increased by 200% and of the remaining employees was unchanged. Then, the average bonus, in rupees, of all the 40 employees together in the year 2023 was
[A] 95000
[B] 85000
[C] 90000
[D] 80000

Q.7) Anil invests Rs 22000 for 6 years in a scheme with 4% interest per annum, compounded half yearly. Separately, Sunil invests a certain amount in the same scheme for 5 years, and then reinvests the entire amount he receives at the end of 5 years, for one year at 10% simple interest. If the amounts received by both at the end of 6 years are equal, then the initial investment, in rupees, made by Sunil is
[A] 20808
[B] 20860
[C] 20480
[D] 20640

Q.8) If x and y satisfy the equations $|x|+x+y = 15$ and $x+|y|-y =20$, then $(x-y)$ equals
[A] 5
[B] 20
[C] 10
[D] 15

Q.9) All the values of x satisfying the inequality are

$$\frac{1}{x+5} \leq \frac{1}{2x-3}$$

[A] $-5<x<3/2$ or $3/2<x \leq 8$
[B] $-5<x<3/2$ or $x > 3/2$
[C] $x<-5$ or $3/2<x \leq 8$
[D] $x<-5$ or $x > 3/2$

Q.10)

The roots α, β of the equation $3x^2 + \lambda x - 1 = 0$, satisfy $\frac{1}{\alpha^2} + \frac{1}{\beta^2} = 15$.

The value of $\left(\alpha^3 + \beta^3\right)^2$, is

[A] 16
[B] 1
[C] 4
[D] 9

Q.11) If a,b and c are positive real numbers such that a >10 $\geq$ b $\geq$ c and

$$\frac{\log_8(a+b)}{\log_2 c}+\frac{\log_{27}(a-b)}{\log_3 c}=\frac{2}{3}$$

then the greatest possible integer value of a is

Q.12) If m and n are natural numbers such that n > 1, $m^n = 2^{25} \times 3^{40}$, then m-n equals
[A] 209947
[B] 209942
[C] 209937
[D] 209932

Q.13) If *x* and *y* are real numbers such that $4x^2 + 4y^2 - 4xy - 6y + 3$, then the value of (4x+5y) is

Q.14) The coordinates of the three vertices of a triangle are: (1, 2), (7, 2), and (1, 10). Then the radius of the incircle of the triangle is

Q.15) A fruit seller has a stock of mangoes, bananas and apples with at least one fruit of each type. At the beginning of a day, the number of mangoes make up 40% of his stock. That day, he sells half of the mangoes, 96 bananas and 40% of the apples. At the end of the day, he ends up selling 50% of the fruits. The smallest possible total number of fruits in the stock at the beginning of the day is

Q.16)

$$\text{If } (x+6\sqrt{2})^{\frac{1}{2}}-(x-6\sqrt{2})^{\frac{1}{2}}=2\sqrt{2}, \text{ then } x \text{ equals}$$

Q.17) Amal and Vimal together can complete a task in 150 days, while Vimal and Sunil together can complete the same task in 100 days. Amal starts working on the task and works for 75 days, then Vimal takes over and works for 135 days. Finally, Sunil takes over and completes the remaining task in 45 days. If Amal had started the task alone and worked on all days, Vimal had worked on every second day, and Sunil had worked on every third day, then the number of days required to complete the task would have been

Q.18) P, Q, R and S are four towns. One can travel between P and Q along 3 direct paths, between Q and S along 4 direct paths, and between P and R along 4 direct paths. There is no direct path between P and S , while there are few direct paths between Q and R , and between R and S . One can travel from P to S either via Q , or via R , or via Q followed by R , respectively, in exactly 62 possible ways. One can also travel from Q to R either directly, or via P, or via S, in exactly 27 possible ways. Then, the number of direct paths between Q and R is

Q.19) A function f maps the set of natural numbers to whole numbers, such that f(xy) =f(x)f(y) + f(x) +f(y) for all x,y and f(p)=1 for every prime number p. Then the value of f(16000) is

[A] 8191
[B] 1023
[C] 4095
[D] 2047

Q.20) A vessel contained a certain amount of a solution of acid and water. When 2 litres of water was added to it, the new solution had 50% acid concentration. When 15 litres of acid was further added to this new solution, the final solution had 80% acid concentration. The ratio of water and acid in the original solution was

[A] 5:4
[B] 3:5
[C] 4:5
[D] 5:3

Q.21) When Rajesh's age was same as the present age of Garima, the ratio of their ages was 3 : 2. When Garima's age becomes the same as the present age of Rajesh, the ratio of the ages of Rajesh and Garima will become
[A] 3:2
[B] 5:4
[C] 2:1
[D] 4:3

Q.22) Bina incurs 19% loss when she sells a product at Rs. 4860 to Shyam, who in turn sells this product to Hari. If Bina would have sold this product to Shyam at the purchase price of Hari, she would have obtained 17% profit. Then, the profit, in rupees, made by Shyam is

Explanations:

VARC

1. Correct Answer: 4

The correct order here is 1532 and option 4 is the odd-one out. This order flows from a general statement about the UK's leadership, to the benefits of cultivated meat, to the current status of the technology, and finally, the need for continued investment.
Sentence 1 sets the stage by introducing the UK's leadership in the development of cultivated meat and highlights an important milestone, the approval of cultivated pet food.
Sentence 5 follows logically, explaining the potential benefits of cultivated meat, particularly in terms of reducing the negative impacts of traditional animal agriculture, which is a key motivator for developing this technology.
Sentence 3 provides a specific update on the status of cultivated meat applications, mentioning that the first UK applications for human consumption are under review by the Food Standards Agency.
Sentence 2 concludes the paragraph by suggesting that government investment in research and infrastructure is essential for realizing the full benefits of cultivated meat.

2. Correct Answer: B

Option 1 is supported by the lines, "...Penteriani's team believes 50% could have been avoided if humans reacted differently. A 2017 study co-authored by Penteriani found that engaging in risky behaviour around large carnivores increases the likelihood of an attack." Two of the most common risky behaviours are parents leaving their children to play outside unattended and walking an unleashed dog, according to the study. Wilkinson says 66% of coyote attacks involve a dog. "[People] end up in a situation where their dog is being chased, or their dog chases a coyote, or maybe they're walking their dog near a den that's marked, and the coyote wants to escort them away," says Wilkinson. Option 2 is incorrect as attempting to photograph wild animals from within secured areas would not exacerbate the attacks.
Option 3 is incorrect as addressing the impact of climate change would also not increase the attacks as climate change is also cited to be one of the reasons behind the increasing number of attacks.
Option 4 is incorrect as implementing food waste management strategies would likely decrease the attacks.

3. Correct Answer: 3

For option 3, "The diversity and interspersion of working landscapes with carnivore habitats in rural areas increase the statistical probability of encounters between humans and carnivores", refer to the lines in the last paragraph, "There are a lot of working landscapes in the Global South that are really heterogeneous, that are interspersed with carnivore habitats, forests and savannahs, which creates a lot more opportunity for these encounters, just statistically."

Option 1 goes against the passage as low-income countries are more prone to human-carnivore conflict.
Option 2 is incorrect as it's not homogenous but it's heterogeneous landscapes that are more likely to experience such conflicts.
Option 4 is incorrect as it also goes against what is mentioned in the passage.

4. Correct Answer: B
For option 2 "The reduction in carnivores' instinctive fear response, resulting from their reliance upon human-provided food", refer to lines, "Carnivores that recognise humans as a means to get food, are a different story. As they become more reliant on human food they might find at campsites or in rubbish bins, they become less avoidant of humans." Option 1, 3 and 4 state reasons that could lead to more conflicts between animals and humans rather than lead to 'habituation' (becoming used to something), which is asked in the question.

5. Correct Answer: B
Option 4 is inconsistent with the passage, which mentions that climate change plays a part in escalating human-carnivore conflicts, although the exact correlation is still being studied. It highlights that scarcity of resources due to climate change leads to more frequent encounters between humans and carnivores, which could increase conflict. Therefore, stating that climate change has negligible effects directly contradicts this information.

Option 1: "Predatory attacks by carnivores are a common occurrence and have steadily increased over the Past Few decades."
This statement is incorrect because the passage states that predatory attacks are rare, accounting for only 17% of attacks in North America since 1955. Therefore, it would be inconsistent with the passage to say they are common or steadily increasing.

Option 2: "Human efforts to avoid risky behaviours around large carnivores have proven effective in reducing conflict incidents."
This statement is consistent with the passage, which refers to a 2017 study by Penteriani that found 50% of carnivore-human conflicts could have been avoided if humans had reacted differently, especially by avoiding risky behaviors like leaving children unattended or walking an unleashed dog.

Option 3: "Carnivores lose their instinctive fear of humans when consistently exposed to human food sources."
This statement is consistent with the passage, which describes how carnivores that come to associate humans with food (e.g., from campsites or rubbish bins) lose their instinctive fear of humans, leading to dangerous situations where the animals are often put down.

6. Correct Answer: C

The text's primary focus is physicists collaborating with experts from other fields to answer questions about our world. Their approaches might have some differences they nevertheless have resulted in benefits (means important findings, which is their objective). Option 3 includes this core.

Option 1 says they have "buried their differences in research methods applied in other fields", which has not been mentioned. In spite of their differences, they have been somewhat successful.

Option 2 There is no mention of large data sets and mathematical models in physics combined with research methods of other fields.

Option 4 There's no desire to diversify their research. There have been differences in approaches and that have stayed yet some benefits have been seen.

7. Correct Answer: 2

The theme of the paragraph is gender and whether it is a social or a biological construct.

Sentence 1 introduces the idea that gender is neither purely biological nor purely social, setting up the Context For The discussion.

Sentence 3 acknowledges people's discomfort with the idea that gender may not be purely social.

Sentence 4 adds that researchers studying the biological aspects of gender face political opposition, connecting to the earlier sentence on discomfort.

Sentence 5 elaborates on the political preference for viewing gender as a social construct, explaining why such pushback occurs.

"We should be complacent in the face of sexism" is taking the line of thought in a different direction.

So, the correct order is 1345 and sentence 2 is the odd-one out.

8. Correct Answer: B

The paragraph talks about how freedom is essential for comedians and when they are denied it, their creativity is stifled. Option 1 carries the crux of the paragraph.

Option 2 is incorrect as it is shifting the focus of the paragraph, "They must go where no one has gone before."

Option 3 is incorrect as it doesn't talk about freedom that is essential for comedians to move on.

Option 4 is incorrect as this option too is missing the theme that is freedom is essential for the comedians to survive.

9. Correct Answer: A

The sentence to be fitted in is, "Yet each day the flock produced eggs with calcareous shells though they apparently had not ingested any calcium from land which was entirely lacking in limestone." The sentence starts with 'Yet'. It means something totally different or opposite should come before it as it makes for a contrast pair. In blank 1, the previous sentence just talks about Louis Kervran's childhood and him noticing a strange fact in his father's poultry

yard. In blank 2, the sentence that comes before it and after it both talk about mica. There seems to be no gap.
In blank 3, the sentence that comes before it states the hens consumed mica and not calcium and the sentence starting with 'Yet' makes for a contrast pair. The observation, "why the chickens selected the mica, or why each time a bird was killed for the family cooking pot no trace of the mica could be found in its gizzard", makes for an interesting contrast as chickens had mica but what they delivered was calcium. The sentence that follows offers an explanation for it. So, nothing is required in Blank 4.

10. Correct Answer: B
The people who had heard the story of pepper trees being guarded by snakes evokes a sense of fear and its resultant limited supply. Option 1, 3 and 4 logically follow from these reasons. However, Option 2 is least likely to be arrived at.

11. Correct Answer: C
The third paragraph states why the spices were highly prized in Europe, "Medieval purchasers consumed meat much fresher than what the average city-dweller in the developed world of today has at hand. However, refrigeration was not available, and some hot spices have been shown to serve as an anti-bacterial agent. Salting, smoking or drying meat were other means of preservation. Most spices used in cooking began as medical ingredients, and throughout the Middle Ages spices were used as both medicines and condiments. Above all, medieval recipes involve the combination of medical and culinary lore in order to balance food's humeral properties and prevent disease." Spices acted both as medicines as well as condiments. From here it can be inferred that Option 2, 3 and 4 contributed to a decline in the allure of spices but their increased availability has not much to do with it.

12. Correct Answer: A
We have to select an option that states **what would happen** if a trader brought white peppercorns from India to medieval Europe. During those time, Europeans thought pepper in India grew on trees guarded by serpants, "The only way to harvest pepper was to burn the trees, which would drive the snakes underground. Of course, this bit of lore would explain the shriveled black peppercorns, but not white, pink or other colors." So, they would doubt the story of pepper harvesting.
Option 1, 3 and 4 are beyond the scope of the given text.

13. Correct Answer: D
The conclusion, "India was colonised for its spices and gold" is not directly supported by the passage. The East has been mentioned but direct reference to India being colonised for this is not there.
Option 2 can be concluded from the last paragraph. Refer to the line, "Spices never had the enduring allure or power of gold and silver or the commercial potential of new products such as tobacco, indigo or sugar."
For Option 3 and 4, refer to the line, "Still, demand was great enough to inspire the voyages of Christopher Columbus and Vasco Da Gama, launching the first fateful wave of European colonialism."

14. Correct Answer: A

It’s not given anywhere or hinted at that technological advances in the past have always had innocuous or beneficial outcomes. They may have it sometimes. Refer to lines in the first para, “Sometimes those consequences are innocuous ones, or even beneficial.”
For Option 1, refer to lines, “as it becomes increasingly possible for individuals or small groups to create new scientific advances through chemistry or biotechnology or materials science setting off unintended consequences that reverberate on a global scale”.
For Option 2 and 3, refer to lines, “Ethyl (leaded fuel) and Freon belonged to the same general class of secondary effect: innovations whose unintended consequences stem from some kind of waste by-product that they emit. But the potential health threats of Ethyl (unleaded fuel) were visible in the 1920s, unlike, say, the long-term effects of atmospheric carbon build up in the early days of the Industrial Revolution....”
So, the author supports Option 1, 2 and 3.

15. Correct Answer: D
By externalities, the author means unintended consequences or secondary effects. We need to pick an option that is not a secondary effect but it should be the primary invention. Here, the invention of Air Conditioners for a specific purpose is primary. Refer to the lines, “When Willis Carrier hit upon the idea of air-conditioning, the technology was primarily intended for industrial use: ensuring cool, dry air for factories that required low-humidity environments.”
Option 1, 2 and 4 are secondary effects. For option 1, refer to the last paragraph.
For option 2, refer to lines, “Edison famously thought his phonograph, which he sometimes called "the talking machine," would primarily be used to take dictation....But then later innovators... discovered a much larger audience willing to pay for musical recordings made on descendants of Edison's original invention. In other cases, the original innovation comes into the world disguised as a plaything...”
For option 4, “In other cases, the original innovation comes into the world disguised as a plaything...the way the animatronic dolls of the mid-1700s inspired Jacquard to invent the first "programmable" loom...”

16. Correct Answer: B
These inventors had their own individual objectives. The hardly had any idea regarding the externalities. The secondary effects or unintended consequences might have taken place after a big span of time like the Industrial Revolution and its effects on the environment. Consider the words, “Oftentimes the secondary effects seem to belong to an entirely different sphere of society”; “Sometimes the unintended consequence comes about when consumers use an invention in a surprising way. Edison famously thought his phonograph, which he sometimes called "the talking machine," would primarily be used to take dictation....But then later innovators... discovered a much larger audience willing to pay for musical recordings made on descendants of Edison's original invention.”
Option 2 is incorrect as the unintended consequences were largely beneficial is not supported by the passage.
Option 3 is incorrect as “inventions being used for entirely different purposes” is not right in all the cases that have been mentioned.
Option 4 is incorrect as the author is not trying to prove that past inventions mostly resulted in creation of new inventions.

17. Correct Answer: A
The first paragraph focuses on what economists sometimes call ‘externalities’ or the unintended consequences and secondary effects. The para also carries an example to support it. The printing press leads to a chain of effects.
Option 2 is incorrect as it’s not about judging an invention or about holistic impacts.
Option 3 is incorrect as there’s is no mention that the secondary effects of most major technological advances have been beneficial. The author has used the word ‘sometimes’.
Option 4 is incorrect as the word ‘entire’ here makes it a bit extreme and secondly, there’s no mention of evaluating it by the boost it gives to generating further technological advancements.

18. Correct Answer: D
We have to pick the option that is not a reason why academics choose to review other scholars work. Option 1, 2 and 3 can be traced to these lines, “Some do it as a way to keep abreast with developments in their field; some simply see it as a duty to the discipline” and “In recent years, some scientists have begun posting their reviews online, mainly to claim credit for their work.”
Option 4 is neither directly stated nor it can be derived as a reason for...

19. Correct Answer: B
Here, we need to pick an option that does not carry the reason why some are supposed to making peer reviews public. Option 1, 2 and 4 can be found in the passage as reasons. Refer to lines, “Opponents of open peer review commonly argue that confidentiality is vital to the integrity of the review process; referees may be less critical of manuscripts if their reports are published, especially if they are revealing their identities by signing them. Some also hold concerns that open reviewing may deter referees from agreeing to judge manuscripts in the first place, or that they'll take longer to do so out of fear of scrutiny....”

20. Correct Answer: D
Here, we have to pick an option that is not the reason for making peer review data public. Option 1, 2 and 3 are mentioned in the passage. Refer to lines, “Sharing peer review data could help journals stamp out fraud, inefficiency, and systemic bias in academic publishing.....”; “Peer review data could also help root out bias. Last year, a study based on peer review data for nearly 24,000 submissions to the biomedical journal eLife found that women and non-Westerners were vastly underrepresented among peer reviewers”; and “Openly publishing peer review data could perhaps also help journals address another problem in academic publishing: fraudulent peer reviews.”
However, Option 4 does not favour making peer review data public as it talks about the problem of selecting appropriately qualified peer reviewers.

21. Correct Answer: A
Option 1 can be inferred throughout the passage from the author’s line of thought and especially from the last line, “But the norm should shift from opacity in all cases to opacity only when necessary.”
Option 2, 3 and 4 can’t be inferred – peer review data has been mentioned but in a different context; option 3 and 4 are clearly beyond what has been stated.

22. Correct Answer: A

The sentence, "[T]he Europeans did not invent globalisation" hints that if they didn't invent it then it was already there. We need a context that what was there before the Europeans made the big leap. It was the trade that was going on between China and peoples of Southeast Asia.

In the first blank, there's no gap. People of Southeast Asia supplied goods to the Chinese and the same thing is mentioned after the blank...these exchanges.

Before the second blank, it has been mentioned that the exchanges of the year 1000 opened some of the routes...and after the blank a contrast pair is made with the use of 'Yet' that means something different from what has been said or opposite to what has been said. So, the second blank is not suitable for that sentence.

After the third blank, it is given, "they changed and augmented what was already there since 1000". It goes perfectly well with "The Europeans did not invent it but they just changed and made it greater.

There's no gap even in the fourth option as the words, "If the globalisation hadn't yet begun..." must have a fixed time before it, which is there in the previous sentence.

23. Correct Answer: A

The sentence, "Science has officially crowned us superior to our early-rising brethren" hints at there's something to be happy about. It also suggests that the early-rising brethren were considered superior earlier. The sentence before the first blank is just an introduction and doesn't call for the announcement. However, after the blank, a context has been made and it's taken to the peak with the words "we are having the last laugh". Now is the time to announce why, which is answered in the sentence to be filled in. The sentences before and after blank three talk about a study and there's no gap here. The sentences after that are further elaborating the study and why it's reliable.

24. Correct Answer: C

The para talks about how states conduct warfare using the DIME model (Diplomacy, information, military, and economics). The states try or do everything before deploying the military. Then the focus shifts to information, how the states monitor telecom data and communications and also use cyber troops on social media to influence public opinion. Option 4 includes the main focus.

Option 1 is incorrect as it says governments primarily use the DIME model to deploy cyber troops, which is not true. The DIME model includes diplomacy, information, military and economics. Using cyber troops is just further part of the information tool and not all of them.

Option 2 is incorrect as it is also confusing the trajectory of thought in the text and mismatching different parts. Further, the focus is lost amid other details.

Option 3 is incorrect as using the DIME Model and military simultaneously has not been talked about. Military is a part of the DIME model.

DILR:

1. Correct Answer: A

Considering Yuki trained only even numbered players, so Yuki would not be training odd numbered player.
Similarly, Zara trained only odd numbered players, so Zara would not be training even numbered players.
From point 2, Player 1 and Player 4 were trained by same coach, this is not possible for Yuki and Zara, so both of them are trained by Xena
From point 3, Player 5 and Player 7 were trained by same coach, which is possible either for Xena or Zara.
But if Xena coaches player 5 and player 7, the only possible player left for Zara to coach would be player 3, but it is given that each coach rained at least two players.
So, Zara coached player 5 and player 7.
From point 2, Player 2, Player 3 and Player 5 trained by different coaches.
So, player 3 wouldn't be coached by Zara as Zara coached player 5.
So, player 3 must be coached by Xena and player 2 must be coached by Yuki.
From point 3, Player 5 and Player 7 got the same rating = r (let) and rest all 6 players got unique ratings.
Also, from point 4, the average ratings of all the players = 4
So, the sum total of ratings of all the 8 players = 8 × 4 = 32
Sum of 7 unique integer values from 1 to 7 = 28
So, the value of same rating, r = 32 – 28 = 4
From point 5, player 2 got the highest rating = 7
From point 6, average of the ratings of the players trained by Zara
$= \frac{(4+4)}{2} = 4$
So, average of the ratings of the players trained by Yuki = 4 + 2 = 6 and average of the ratings of the players trained by Xena
$= \frac{6}{2} = 3$
Let the sum total of the ratings of Xena = X and the number of players coached
From point 7, player 4's rating = 2 × player 8's rating and player 4's rating < player 5's rating = 4
So, only possibility that player 4's rating = 2 and player's 8 rating = 1

The information till here can be gathered as follows-

Player	Xena	Yuki	Zara	Rating
1	✓	×	×	
2	×	✓	×	7
3	✓	×	×	
4	✓	×	×	2
5	×	×	✓	4
6			×	
7	×	×	✓	4
8			×	1
Sum total of the ratings (S)			8	28
Number of players coached (n)			2	
Average of the Ratings (= S/n)	3	6	4	

Now, let the number of the players coached by Xena = m
So, the sum total of the ratings of the players coached by Xena = 3 × m = 3m
Also, the number of the players coached by Yuki = 8 – 2 – m = 6 – m
So, the sum total of the ratings of the players coached by Yuki = 6 × (6 – m) = 36 – 6m
Also we know, 3m + 36 – 6m + 8 = 32
Solving, m = 4
So, the number of the players coached by Yuki = 6 – m = 2 and the sum total of the ratings of the players coached by Yuki = 36 – 6m = 12
Now one among the 2 players coached by Yuki is player 2 who had a rating of 7, so the other player must have rating 12 – 7 = 5.
So, that player must be player 6 who had a rating of 5.
So, player 8 must be coached by Xena along with player 1, player 3 and player 4 and the rating of player 1 and player 3 would be either 3 or 6 in any order.

The rest of the information can be gathered as follows-

Player	Xena	Yuki	Zara	Rating
1	✓	×	×	3/6
2	×	✓	×	7
3	✓	×	×	6/3
4	✓	×	×	2
5	×	×	✓	4
6	×	✓	×	5
7	×	×	✓	4
8	✓	×	×	1
Sum total of the ratings (S)	12	12	8	32
Number of players coached (n)	4	2	2	
Average of the Ratings (= S/n)	3	6	4	

Zara coached exactly 2 players (Player 5 and Player 7)

2. Correct Answer: 4

Considering Yuki trained only even numbered players, so Yuki would not be training odd numbered player.
Similarly, Zara trained only odd numbered players, so Zara would not be training even numbered players.
From point 2, Player 1 and Player 4 were trained by same coach, this is not possible for Yuki and Zara, so both of them are trained by Xena
From point 3, Player 5 and Player 7 were trained by same coach, which is possible either for Xena or Zara.
But if Xena coaches player 5 and player 7, the only possible player left for Zara to coach would be player 3, but it is given that each coach rained at least two players.
So, Zara coached player 5 and player 7.
From point 2, Player 2, Player 3 and Player 5 trained by different coaches.
So, player 3 wouldn't be coached by Zara as Zara coached player 5.
So, player 3 must be coached by Xena and player 2 must be coached by Yuki.
From point 3, Player 5 and Player 7 got the same rating = r (let) and rest all 6 players got unique ratings.
Also, from point 4, the average ratings of all the players = 4
So, the sum total of ratings of all the 8 players = 8 × 4 = 32
Sum of 7 unique integer values from 1 to 7 = 28
So, the value of same rating, r = 32 − 28 = 4
From point 5, player 2 got the highest rating = 7
From point 6, average of the ratings of the players trained by Zara

$= \frac{(4+4)}{2} = 4$

So, average of the ratings of the players trained by Yuki = 4 + 2 = 6 and average of the ratings of the players trained by Xena

$= \frac{6}{2} = 3$

Let the sum total of the ratings of Xena = X and the number of players coached
From point 7, player 4's rating = 2 × player 8's rating and player 4's rating < player 5's rating = 4
So, only possibility that player 4's rating = 2 and player's 8 rating = 1

The information till here can be gathered as follows-

Player	Xena	Yuki	Zara	Rating
1	✓	×	×	
2	×	✓	×	7
3	✓	×	×	
4	✓	×	×	2
5	×	×	✓	4
6			×	
7	×	×	✓	4
8			×	1
Sum total of the ratings (S)			8	28
Number of players coached (n)			2	
Average of the Ratings (= S/n)	3	6	4	

Now, let the number of the players coached by Xena = m
So, the sum total of the ratings of the players coached by Xena = 3 × m = 3m
Also, the number of the players coached by Yuki = 8 − 2 − m = 6 − m
So, the sum total of the ratings of the players coached by Yuki = 6 × (6 − m) = 36 − 6m
Also we know, 3m + 36 − 6m + 8 = 32
Solving, m = 4
So, the number of the players coached by Yuki = 6 − m = 2 and the sum total of the ratings of the players coached by Yuki = 36 − 6m = 12
Now one among the 2 players coached by Yuki is player 2 who had a rating of 7, so the other player must have rating 12 − 7 = 5.
So, that player must be player 6 who had a rating of 5.
So, player 8 must be coached by Xena along with player 1, player 3 and player 4 and the rating of player 1 and player 3 would be either 3 or 6 in any order.

The rest of the information can be gathered as follows-

Player	Xena	Yuki	Zara	Rating
1	✓	×	×	3/6
2	×	✓	×	7
3	✓	×	×	6/3
4	✓	×	×	2
5	×	×	✓	4
6	×	✓	×	5
7	×	×	✓	4
8	✓	×	×	1
Sum total of the ratings (S)	12	12	8	32
Number of players coached (n)	4	2	2	
Average of the Ratings (= S/n)	3	6	4	

The rating of player 7 = 4

3. Correct Answer: 5

Considering Yuki trained only even numbered players, so Yuki would not be training odd numbered player.
Similarly, Zara trained only odd numbered players, so Zara would not be training even numbered players.
From point 2, Player 1 and Player 4 were trained by same coach, this is not possible for Yuki and Zara, so both of them are trained by Xena
From point 3, Player 5 and Player 7 were trained by same coach, which is possible either for Xena or Zara.
But if Xena coaches player 5 and player 7, the only possible player left for Zara to coach would be player 3, but it is given that each coach rained at least two players.
So, Zara coached player 5 and player 7.
From point 2, Player 2, Player 3 and Player 5 trained by different coaches.
So, player 3 wouldn't be coached by Zara as Zara coached player 5.
So, player 3 must be coached by Xena and player 2 must be coached by Yuki.
From point 3, Player 5 and Player 7 got the same rating = r (let) and rest all 6 players got unique ratings.
Also, from point 4, the average ratings of all the players = 4
So, the sum total of ratings of all the 8 players = 8 × 4 = 32
Sum of 7 unique integer values from 1 to 7 = 28
So, the value of same rating, r = 32 − 28 = 4
From point 5, player 2 got the highest rating = 7
From point 6, average of the ratings of the players trained by Zara

$= \frac{(4+4)}{2} = 4$

So, average of the ratings of the players trained by Yuki = 4 + 2 = 6 and average of the ratings of the players trained by Xena

$= \frac{6}{2} = 3$

Let the sum total of the ratings of Xena = X and the number of players coached
From point 7, player 4's rating = 2 × player 8's rating and player 4's rating < player 5's rating = 4
So, only possibility that player 4's rating = 2 and player's 8 rating = 1

The information till here can be gathered as follows-

Player	Xena	Yuki	Zara	Rating
1	✓	×	×	
2	×	✓	×	7
3	✓	×	×	
4	✓	×	×	2
5	×	×	✓	4
6			×	
7	×	×	✓	4
8			×	1
Sum total of the ratings (S)			8	28
Number of players coached (n)			2	
Average of the Ratings (= S/n)	3	6	4	

Now, let the number of the players coached by Xena = m
So, the sum total of the ratings of the players coached by Xena = 3 × m = 3m
Also, the number of the players coached by Yuki = 8 − 2 − m = 6 − m
So, the sum total of the ratings of the players coached by Yuki = 6 × (6 − m) = 36 − 6m
Also we know, 3m + 36 − 6m + 8 = 32
Solving, m = 4
So, the number of the players coached by Yuki = 6 − m = 2 and the sum total of the ratings of the players coached by Yuki = 36 − 6m = 12
Now one among the 2 players coached by Yuki is player 2 who had a rating of 7, so the other player must have rating 12 − 7 = 5.
So, that player must be player 6 who had a rating of 5.
So, player 8 must be coached by Xena along with player 1, player 3 and player 4 and the rating of player 1 and player 3 would be either 3 or 6 in any order.

The rest of the information can be gathered as follows-

Player	Xena	Yuki	Zara	Rating
1	✓	×	×	3/6
2	×	✓	×	7
3	✓	×	×	6/3
4	✓	×	×	2
5	×	×	✓	4
6	×	✓	×	5
7	×	×	✓	4
8	✓	×	×	1
Sum total of the ratings (S)	12	12	8	32
Number of players coached (n)	4	2	2	
Average of the Ratings (= S/n)	3	6	4	

The rating of player 6 = 5

4. Correct Answer: 6

Similarly, Zara trained only odd numbered players, so Zara would not be training even numbered players.
From point 2, Player 1 and Player 4 were trained by same coach, this is not possible for Yuki and Zara, so both of them are trained by Xena
From point 3, Player 5 and Player 7 were trained by same coach, which is possible either for Xena or Zara.
But if Xena coaches player 5 and player 7, the only possible player left for Zara to coach would be player 3, but it is given that each coach rained at least two players.
So, Zara coached player 5 and player 7.
From point 2, Player 2, Player 3 and Player 5 trained by different coaches.
So, player 3 wouldn't be coached by Zara as Zara coached player 5.
So, player 3 must be coached by Xena and player 2 must be coached by Yuki.
From point 3, Player 5 and Player 7 got the same rating = r (let) and rest all 6 players got unique ratings.
Also, from point 4, the average ratings of all the players = 4
So, the sum total of ratings of all the 8 players = $8 \times 4 = 32$
Sum of 7 unique integer values from 1 to 7 = 28
So, the value of same rating, $r = 32 - 28 = 4$
From point 5, player 2 got the highest rating = 7
From point 6, average of the ratings of the players trained by Zara
$= \frac{(4+4)}{2} = 4$
So, average of the ratings of the players trained by Yuki = 4 + 2 = 6 and average of the ratings of the players trained by Xena
$= \frac{6}{2} = 3$
Let the sum total of the ratings of Xena = X and the number of players coached
From point 7, player 4's rating = 2 × player 8's rating and player 4's rating < player 5's rating = 4
So, only possibility that player 4's rating = 2 and player's 8 rating = 1

The information till here can be gathered as follows-

Player	Xena	Yuki	Zara	Rating
1	✓	×	×	
2	×	✓	×	7
3	✓	×	×	
4	✓	×	×	2
5	×	×	✓	4
6			×	
7	×	×	✓	4
8			×	1
Sum total of the ratings (S)			8	28
Number of players coached (n)			2	
Average of the Ratings (= S/n)	3	6	4	

Now, let the number of the players coached by Xena = m
So, the sum total of the ratings of the players coached by Xena = $3 \times m = 3m$
Also, the number of the players coached by Yuki = $8 - 2 - m = 6 - m$
So, the sum total of the ratings of the players coached by Yuki = $6 \times (6 - m) = 36 - 6m$
Also we know, $3m + 36 - 6m + 8 = 32$
Solving, m = 4
So, the number of the players coached by Yuki = $6 - m = 2$ and the sum total of the ratings of the players coached by Yuki = $36 - 6m = 12$
Now one among the 2 players coached by Yuki is player 2 who had a rating of 7, so the other player must have rating $12 - 7 = 5$.
So, that player must be player 6 who had a rating of 5.
So, player 8 must be coached by Xena along with player 1, player 3 and player 4 and the rating of player 1 and player 3 would be either 3 or 6 in any order.

The rest of the information can be gathered as follows-

Player	Xena	Yuki	Zara	Rating
1	✓	×	×	3/6
2	×	✓	×	7
3	✓	×	×	6/3
4	✓	×	×	2
5	×	×	✓	4
6	×	✓	×	5
7	×	×	✓	4
8	✓	×	×	1
Sum total of the ratings (S)	12	12	8	32
Number of players coached (n)	4	2	2	
Average of the Ratings (= S/n)	3	6	4	

For 6 players the ratings can be determined with certainty

5. Correct Answer:D

Considering Yuki trained only even numbered players, so Yuki would not be training odd numbered player.
Similarly, Zara trained only odd numbered players, so Zara would not be training even numbered players.
From point 2, Player 1 and Player 4 were trained by same coach, this is not possible for Yuki and Zara, so both of them are trained by Xena
From point 3, Player 5 and Player 7 were trained by same coach, which is possible either for Xena or Zara.
But if Xena coaches player 5 and player 7, the only possible player left for Zara to coach would be player 3, but it is given that each coach rained at least two players.
So, Zara coached player 5 and player 7.
From point 2, Player 2, Player 3 and Player 5 trained by different coaches.
So, player 3 wouldn't be coached by Zara as Zara coached player 5.
So, player 3 must be coached by Xena and player 2 must be coached by Yuki.
From point 3, Player 5 and Player 7 got the same rating = r (let) and rest all 6 players got unique ratings.
Also, from point 4, the average ratings of all the players = 4
So, the sum total of ratings of all the 8 players = $8 \times 4 = 32$
Sum of 7 unique integer values from 1 to 7 = 28
So, the value of same rating, $r = 32 - 28 = 4$
From point 5, player 2 got the highest rating = 7
From point 6, average of the ratings of the players trained by Zara
$= \frac{(4+4)}{2} = 4$

So, average of the ratings of the players trained by Yuki = 4 + 2 = 6 and average of the ratings of the players trained by Xena
$= \frac{6}{2} = 3$

Let the sum total of the ratings of Xena = X and the number of players coached
From point 7, player 4's rating = 2 × player 8's rating and player 4's rating < player 5's rating = 4
So, only possibility that player 4's rating = 2 and player's 8 rating = 1

The information till here can be gathered as follows-

Player	Xena	Yuki	Zara	Rating
1	✓	×	×	
2	×	✓	×	7
3	✓	×	×	
4	✓	×	×	2
5	×	×	✓	4
6			×	
7	×	×	✓	4
8			×	1
Sum total of the ratings (S)			8	28
Number of players coached (n)			2	
Average of the Ratings (= S/n)	3	6	4	

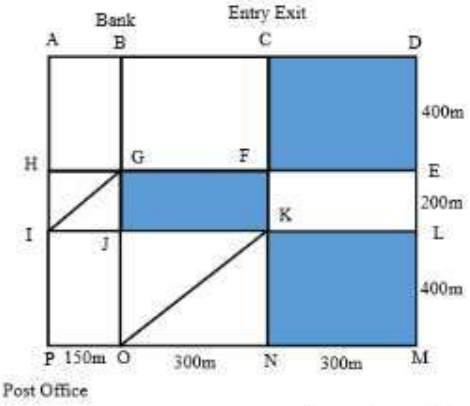
Now, let the number of the players coached by Xena = m
So, the sum total of the ratings of the players coached by Xena = 3 × m = 3m
Also, the number of the players coached by Yuki = 8 – 2 – m = 6 – m
So, the sum total of the ratings of the players coached by Yuki = 6 × (6 – m) = 36 – 6m
Also we know, 3m + 36 – 6m + 8 = 32
Solving, m = 4
So, the number of the players coached by Yuki = 6 – m = 2 and the sum total of the ratings of the players coached by Yuki = 36 – 6m = 12
Now one among the 2 players coached by Yuki is player 2 who had a rating of 7, so the other player must have rating 12 – 7 = 5.
So, that player must be player 6 who had a rating of 5.
So, player 8 must be coached by Xena along with player 1, player 3 and player 4 and the rating of player 1 and player 3 would be either 3 or 6 in any order.

The rest of the information can be gathered as follows-

Player	Xena	Yuki	Zara	Rating
1	✓	×	×	3/6
2	×	✓	×	7
3	✓	×	×	6/3
4	✓	×	×	2
5	×	×	✓	4
6	×	✓	×	5
7	×	×	✓	4
8	✓	×	×	1
Sum total of the ratings (S)	12	12	8	32
Number of players coached (n)	4	2	2	
Average of the Ratings (= S/n)	3	6	4	

The players trained by Xena are Player 1, Player 3, Player 4 and Player 8

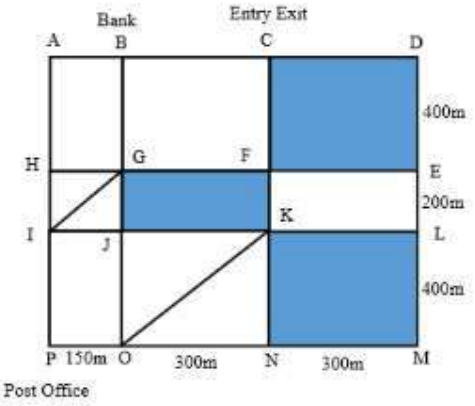
6. Correct Answer: D



In right angled triangle KNO, $KN^2 + ON^2 = KO^2$
KN = ML = 400 m and ON = 300 m
So, $KO^2 = 400^2 + 300^2 = 250000 \Rightarrow KO = 500$ m
Similarly, in right angled triangle GJI, $IG^2 = GJ^2 + IJ^2 = 200^2 + 150^2 = 62500 \Rightarrow IG = 250$ m

The shortest path required would be L – K – O – P – I – G – B – C – F – E – L
The minimum distance walked = LK + KO + OP + PI + IG + GB + BC + CF + FE + EL
= 300 + 500 + 150 + 400 + 250 + 400 + 300 + 400 + 300 + 200 = 3200 m

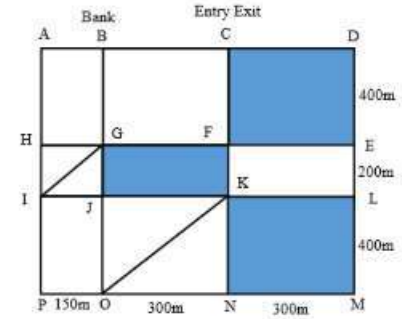
7. Correct Answer: A



In right angled triangle KNO, $KN^2 + ON^2 = KO^2$
KN = ML = 400 m and ON = 300 m
So, $KO^2 = 400^2 + 300^2 = 250000 \Rightarrow KO = 500$ m
Similarly, in right angled triangle GJI, $IG^2 = GJ^2 + IJ^2 = 200^2 + 150^2 = 62500 \Rightarrow IG = 250$ m

The possible path would be C – D – E – F – K – L – M – N – K – J – G – F – C
The distance walked = 300 + 400 + 300 + 200 + 300 + 400 + 300 + 400 + 300 + 200 + 300 + 400 = 3800 m

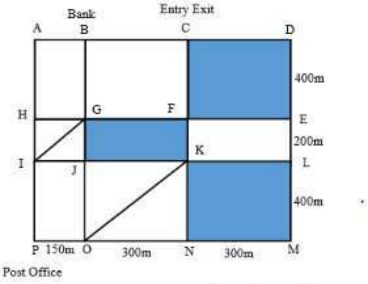
8. Correct Answer: 5100



In right angled triangle KNO, $KN^2 + ON^2 = KO^2$
KN = ML = 400 m and ON = 300 m
So, $KO^2 = 400^2 + 300^2 = 250000$ => KO = 500 m
Similarly, in right angled triangle GJI, $IG^2 = GJ^2 + IJ^2 = 200^2 + 150^2 = 62500$ => IG = 250 m

The possible path would be A – B – G – F – C – D – E – L – M – N – K – J – O – P – I – H – A
The maximum distance walked = 150 + 400 + 300 + 400 + 300 + 400 + 200 + 400 + 300 + 400 + 300 + 400 + 150 + 400 + 200 + 400 = 5100

9. Correct Answer: 3500



In right angled triangle KNO, $KN^2 + ON^2 = KO^2$
KN = ML = 400 m and ON = 300 m
So, $KO^2 = 400^2 + 300^2 = 250000$ => KO = 500 m
Similarly, in right angled triangle GJI, $IG^2 = GJ^2 + IJ^2 = 200^2 + 150^2 = 62500$ => IG = 250 m

The possible path would be C – D – E – F – K – N – O – P – I – J – G – B – C
The maximum distance walked = 300 + 400 + 300 + 200 + 400 + 300 + 150 + 400 + 150 + 200 + 400 + 300 = 3500 m

10. Correct Answer: 150

From the Bar Chart, the total sum of ratings given on Day 2 by all the buyers
= 5 × 1 + 10 × 2 + 5 × 3 + 20 × 4 + 10 × 5 = 170
Total number of ratings given by buyers on Day 2 = 5 + 10 + 5 + 20 + 10 = 50
So, the average rating on Day 2 = $\frac{170}{50}$ = 3.4

Let the number of ratings given by buyers on Day 1 = x
Sum of ratings on Day 1' = 3x
Also given, $\frac{(3x+170)}{(x+50)} = 3.1$
Solving, 3x + 170 = 3.1x + 155
=> x = 150
The number of buyers gave ratings on Day 1 = 150

11. Correct Answer: B

On Day 3,
The total number of buyers gave ratings = 100
Let the number of buyers gave product ratings of 1 = 10y = ratings of 2
So, the number of buyers gave product ratings of 3 = 20y
Also, the modes of the product ratings were 4 and 5
Let the number of buyers gave product ratings of 4 = 10z = ratings of 5
Solving, 10y + 10y + 20y + 10z + 10z = 100
$\Rightarrow 4y + 2z = 10 \Rightarrow 2y + z = 5$
Now, 10z to be mode, z = 3 and y = 1 (only possibility)

Rating	1	2	3	4	5
Buyers	10	10	20	30	30

Total sum ratings on Day 3 = 10 × 1 + 10 × 2 + 20 × 3 + 30 × 4 + 30 × 5 = 360
The daily average rating on Day 3
$= \frac{360}{100} = 3.6$

12. Correct Answer: 4

On Day 3,
The total number of buyers gave ratings = 100
Let the number of buyers gave product ratings of 1 = 10y = ratings of 2
So, the number of buyers gave product ratings of 3 = 20y
Also, the modes of the product ratings were 4 and 5
Let the number of buyers gave product ratings of 4 = 10z = ratings of 5
Solving, 10y + 10y + 20y + 10z + 10z = 100
$\Rightarrow 4y + 2z = 10 \Rightarrow 2y + z = 5$
Now, 10z to be mode, z = 3 and y = 1 (only possibility)

Rating	1	2	3	4	5
Buyers	10	10	20	30	30

The median of all the ratings given on Day 3 will be the average of 50^{th} and 51^{st} value which is same = 4

13. Correct Answer: B

From the Bar Chart, the total sum of ratings given on Day 2 by all the buyers
= 5 × 1 + 10 × 2 + 5 × 3 + 20 × 4 + 10 × 5 = 170
Total number of ratings given by buyers on Day 2 = 5 + 10 + 5 + 20 + 10 = 50
So, the average rating on Day 2
$= \frac{170}{50} = 3.4$
Let the number of ratings given by buyers on Day 1 = x
Sum of ratings on Day 1 = 3x
Also given, $\frac{(3x+170)}{(x+50)} = 3.1$
Solving, 3x + 170 = 3.1x + 155
$\Rightarrow x = 150$

On Day 3,
The total number of buyers gave ratings = 100
Let the number of buyers gave product ratings of 1 = 10y = ratings of 2
So, the number of buyers gave product ratings of 3 = 20y
Also, the modes of the product ratings were 4 and 5
Let the number of buyers gave product ratings of 4 = 10z = ratings of 5
Solving, 10y + 10y + 20y + 10z + 10z = 100
$\Rightarrow 4y + 2z = 10 \Rightarrow 2y + z = 5$
Now, 10z to be mode, z = 3 and y = 1 (only possibility)

Rating	1	2	3	4	5
Buyers	10	10	20	30	30

Total sum ratings on Day 3 = 10 × 1 + 10 × 2 + 20 × 3 + 30 × 4 + 30 × 5 = 360

The cumulative average rating of Day 2 = 3.1 (given)
The cumulative average rating of Day 3 =
$= \frac{(450+170+360)}{(150+50+100)} = \frac{49}{15}$
Percentage change from Day 2 to Day 3 = (49/15 − 3.1)/3.1 × 100 ≈ 5.38%
Hence, the cumulative average of Day 3 increased by a percentage between 5% and 8% from Day 2.

14. Correct Answer: 4

Let each of the ten slots is represented by the letters A to J as shown below-

	Column 1	Column 2	Column 3	Column 4
Row 1	A	B	C	D
Row 2		E	F	G
Row 3			H	I
Row 4				J

Now considering point 1 and 2,
A, E, H, J < B, F, I < C, G < D
So, definitely the value of D = 10
The value of C or G = 8 or 9
The value of B, F or I = 5, 6 or 7
The value of A, E, H or J = 1, 2, 3 or 4
From point 3, 1 is placed either in the same row or in the same column as 10
So, either A = 1 or J = 1
From point 4, neither 2 nor 3 is placed in the same row or in the same column as 10.
So, A, B, C, G, I and J cannot have value 2 or 3.
So, E, F or H can have value 2 or 3, but F cannot have value 2 or 3.
So, either E or H = 2 or 3. So, A or J have value 1 or 4.
Also, from point 6, 4 and 6 are placed in the same row.
So, J cannot have value 4 as that is the only slot in Row 4.
So, A = 4 and J = 1
So, the value of B = 6 (only possibility) as C cannot have value 6
Now, from point 5, neither 7 nor 8 is placed in the same row or in the same column as 9.
So, if G = 9, either F or I has to be 7 which is placed in the same row or column of G, not possible.
So, C is definitely 9 and G is 8 and I is 7 and F is 5
Regarding E and H, we have following two possibilities-

Case I: If E = 2 and H = 3

	Column 1	Column 2	Column 3	Column 4
Row 1	4	6	9	10
Row 2		2	5	8
Row 3			3	7
Row 4				1

Case II: If E = 3 and H = 2

	Column 1	Column 2	Column 3	Column 4
Row 1	4	6	9	10
Row 2		3	5	8
Row 3			2	7
Row 4				1

The row number which has the least sum of numbers is placed in row 4

15. Correct Answer: B

Let each of the ten slots is represented by the letters A to J as shown below-

	Column 1	Column 2	Column 3	Column 4
Row 1	A	B	C	D
Row 2		E	F	G
Row 3			H	I
Row 4				J

Now considering point 1 and 2,
A, E, H, J < B, F, I < C, G < D
So, definitely the value of D = 10
The value of C or G = 8 or 9
The value of B, F or I = 5, 6 or 7
The value of A, E, H or J = 1, 2, 3 or 4
From point 3, 1 is placed either in the same row or in the same column as 10
So, either A = 1 or J = 1
From point 4, neither 2 nor 3 is placed in the same row or in the same column as 10.
So, A, B, C, G, I and J cannot have value 2 or 3.
So, E, F or H can have value 2 or 3, but F cannot have value 2 or 3.
So, either E or H = 2 or 3. So, A or J have value 1 or 4.
Also, from point 6, 4 and 6 are placed in the same row.
So, J cannot have value 4 as that is the only slot in Row 4.
So, A = 4 and J = 1
So, the value of B = 6 (only possibility) as C cannot have value 6
Now, from point 5, neither 7 nor 8 is placed in the same row or in the same column as 9.
So, if G = 9, either F or I has to be 7 which is placed in the same row or column of G, not possible.
So, C is definitely 9 and G is 8 and I is 7 and F is 5
Regarding E and H, we have following two possibilities-

Case I: If E = 2 and H = 3

	Column 1	Column 2	Column 3	Column 4
Row 1	4	6	9	10
Row 2		2	5	8
Row 3			3	7
Row 4				1

Case II: If E = 3 and H = 2

	Column 1	Column 2	Column 3	Column 4
Row 1	4	6	9	10
Row 2		3	5	8
Row 3			2	7
Row 4				1

Statement I. 10 is placed in a slot in Row 1, true
Statement II. 1 is placed in a slot in Row 4, true
Hence, both statement I and II are true

16. Correct Answer: A

Let each of the ten slots is represented by the letters A to J as shown below-

	Column 1	Column 2	Column 3	Column 4
Row 1	A	B	C	D
Row 2		E	F	G
Row 3			H	I
Row 4				J

Now considering point 1 and 2,
A, E, H, J < B, F, I < C, G < D
So, definitely the value of D = 10
The value of C or G = 8 or 9
The value of B, F or I = 5, 6 or 7
The value of A, E, H or J = 1, 2, 3 or 4
From point 3, 1 is placed either in the same row or in the same column as 10
So, either A = 1 or J = 1
From point 4, neither 2 nor 3 is placed in the same row or in the same column as 10.
So, A, B, C, G, I and J cannot have value 2 or 3.
So, E, F or H can have value 2 or 3, but F cannot have value 2 or 3.
So, either E or H = 2 or 3. So, A or J have value 1 or 4.
Also, from point 6, 4 and 6 are placed in the same row.
So, J cannot have value 4 as that is the only slot in Row 4.
So, A = 4 and J = 1
So, the value of B = 6 (only possibility) as C cannot have value 6
Now, from point 5, neither 7 nor 8 is placed in the same row or in the same column as 9.
So, if G = 9, either F or I has to be 7 which is placed in the same row or column of G, not possible.
So, C is definitely 9 and G is 8 and I is 7 and F is 5
Regarding E and H, we have following two possibilities-

Case I: If E = 2 and H = 3

	Column 1	Column 2	Column 3	Column 4
Row 1	4	6	9	10
Row 2		2	5	8
Row 3			3	7
Row 4				1

Case II: If E = 3 and H = 2

	Column 1	Column 2	Column 3	Column 4
Row 1	4	6	9	10
Row 2		3	5	8
Row 3			2	7
Row 4				1

Statement I. 2 is placed in a slot in Column 2, may be or may not be true
Statement II. 3 is placed in a slot in Column 3, may be or may not be true
Hence, neither statement I nor II is true

17. Correct Answer: 2

Let each of the ten slots is represented by the letters A to J as shown below-

	Column 1	Column 2	Column 3	Column 4
Row 1	A	B	C	D
Row 2		E	F	G
Row 3			H	I
Row 4				J

Now considering point 1 and 2,
A, E, H, J < B, F, I < C, G < D
So, definitely the value of D = 10
The value of C or G = 8 or 9
The value of B, F or I = 5, 6 or 7
The value of A, E, H or J = 1, 2, 3 or 4
From point 3, 1 is placed either in the same row or in the same column as 10
So, either A = 1 or J = 1
From point 4, neither 2 nor 3 is placed in the same row or in the same column as 10.
So, A, B, C, G, I and J cannot have value 2 or 3.
So, E, F or H can have value 2 or 3, but F cannot have value 2 or 3.
So, either E or H = 2 or 3. So, A or J have value 1 or 4.
Also, from point 6, 4 and 6 are placed in the same row.
So, J cannot have value 4 as that is the only slot in Row 4.
So, A = 4 and J = 1
So, the value of B = 6 (only possibility) as C cannot have value 6
Now, from point 5, neither 7 nor 8 is placed in the same row or in the same column as 9.
So, if G = 9, either F or I has to be 7 which is placed in the same row or column of G, not possible.
So, C is definitely 9 and G is 8 and I is 7 and F is 5
Regarding E and H, we have following two possibilities-

Case I: If E = 2 and H = 3

	Column 1	Column 2	Column 3	Column 4
Row 1	4	6	9	10
Row 2		2	5	8
Row 3			3	7
Row 4				1

Case II: If E = 3 and H = 2

	Column 1	Column 2	Column 3	Column 4
Row 1	4	6	9	10
Row 2		3	5	8
Row 3			2	7
Row 4				1

For 2 slots (Row 2, Column 2 and Row 3, Column 3) in the grid where the placement of numbers cannot be determined with certainty

18. Correct Answer: 26

Let each of the ten slots is represented by the letters A to J as shown below-

	Column 1	Column 2	Column 3	Column 4
Row 1	A	B	C	D
Row 2		E	F	G
Row 3			H	I
Row 4				J

Now considering point 1 and 2,
A, E, H, J < B, F, I < C, G < D
So, definitely the value of D = 10
The value of C or G = 8 or 9
The value of B, F or I = 5, 6 or 7
The value of A, E, H or J = 1, 2, 3 or 4
From point 3, 1 is placed either in the same row or in the same column as 10
So, either A = 1 or J = 1
From point 4, neither 2 nor 3 is placed in the same row or in the same column as 10.
So, A, B, C, G, I and J cannot have value 2 or 3.
So, E, F or H can have value 2 or 3, but F cannot have value 2 or 3.
So, either E or H = 2 or 3. So, A or J have value 1 or 4.
Also, from point 6, 4 and 6 are placed in the same row.
So, J cannot have value 4 as that is the only slot in Row 4.
So, A = 4 and J = 1
So, the value of B = 6 (only possibility) as C cannot have value 6
Now, from point 5, neither 7 nor 8 is placed in the same row or in the same column as 9.
So, if G = 9, either F or I has to be 7 which is placed in the same row or column of G, not possible.
So, C is definitely 9 and G is 8 and I is 7 and F is 5
Regarding E and H, we have following two possibilities-

Case I: If E = 2 and H = 3

	Column 1	Column 2	Column 3	Column 4
Row 1	4	6	9	10
Row 2		2	5	8
Row 3			3	7
Row 4				1

Case II: If E = 3 and H = 2

	Column 1	Column 2	Column 3	Column 4
Row 1	4	6	9	10
Row 2		3	5	8
Row 3			2	7
Row 4				1

The sum of the numbers placed in Column 4 = 10 + 8 + 7 + 1 = 26

19. Correct Answer: A

The corresponding values of PAT and ES can be directly noted
For PRD
In 2019, let the area corresponding to firm D = P %, then the area corresponding to C = B = 9P %, A = F = 4P % and E = 16P %
Similarly, in 2023, D = C = F = A = 4P % and B = E = 9P %
The rest of the given information can be gathered as follows-

Year →	2019			2023		
Firm ↓	PAT (Rs. Crores)	ES	PRD (%)	PAT (Rs. Crores)	ES	PRD (%)
A	3000	800	4P	3900	1300	4P
B	2800	1000	9P	3800	1000	9P
C	2400	600	9P	3000	800	4P
D	3900	600	P	2400	800	4P
E	2400	1200	16P	3500	1400	9P
F	2500	800	4P	3200	1000	4P

Let A, B, C and E be the ARG of the respective firms from 2019 to 2023

For A, $3900 = 3000\left(\frac{1+A}{100}\right)^4$

So, $\left(\frac{1+A}{100}\right)^4 = \frac{3900}{3000} = 1.3$

Considering, rest of the factors same and we need to compare and not required the actual value, we need not to solve further

For B, $\left(\frac{1+B}{100}\right)^4 = \frac{3800}{2800} \approx 1.36$

For C, $\left(\frac{1+C}{100}\right)^4 = \frac{3000}{2400} \approx 1.25$

For E, $\left(\frac{1+E}{100}\right)^4 = \frac{3500}{2400} \approx 1.46$

Hence, firm E had the highest ARG

20. Correct Answer: C

The corresponding values of PAT and ES can be directly noted
For PRD
In 2019, let the area corresponding to firm D = P %, then the area corresponding to C = B = 9P %, A = F = 4P % and E = 16P %
Similarly, in 2023, D = C = F = A = 4P % and B = E = 9P %
The rest of the given information can be gathered as follows-

Year →	2019			2023		
Firm ↓	PAT (Rs. Crores)	ES	PRD (%)	PAT (Rs. Crores)	ES	PRD (%)
A	3000	800	4P	3900	1300	4P
B	2800	1000	9P	3800	1000	9P
C	2400	600	9P	3000	800	4P
D	3900	600	P	2400	800	4P
E	2400	1200	16P	3500	1400	9P
F	2500	800	4P	3200	1000	4P

The amount of money spent by firm C on R&D in 2019
$= \frac{9P}{100} \times 2400$

The amount of money spent by firm C on R&D in 2023
$= \frac{4P}{100} \times 3000$

Required ratio $= \frac{9P}{100} \times 2400 : \frac{4P}{100} \times 3000$

$= 9 : 5$

21. Correct Answer: A

The corresponding values of PAT and ES can be directly noted
For PRD
In 2019, let the area corresponding to firm D = P %, then the area corresponding to C = B = 9P %, A = F = 4P % and E = 16P %
Similarly, in 2023, D = C = F = A = 4P % and B = E = 9P %
The rest of the given information can be gathered as follows-

Year →	2019			2023		
Firm ↓	PAT (Rs. Crores)	ES	PRD (%)	PAT (Rs. Crores)	ES	PRD (%)
A	3000	800	4P	3900	1300	4P
B	2800	1000	9P	3800	1000	9P
C	2400	600	9P	3000	800	4P
D	3900	600	P	2400	800	4P
E	2400	1200	16P	3500	1400	9P
F	2500	800	4P	3200	1000	4P

PAT per employee in 2023 among A, C, E and F,

$$\text{Firm A} = \frac{3900}{1300} = 3$$

$$\text{Firm C} = \frac{3000}{800} = 3.75$$

$$\text{Firm E} = \frac{3500}{1400} = 2.5$$

$$\text{Firm F} = \frac{3200}{1000} = 3.2$$

Hence, firm C had the maximum PAT per employee in 2023 among the firms A, C, E and F

22. Correct Answer: B

The corresponding values of PAT and ES can be directly noted
For PRD
In 2019, let the area corresponding to firm D = P %, then the area corresponding to C = B = 9P %, A = F = 4P % and E = 16P %
Similarly, in 2023, D = C = F = A = 4P % and B = E = 9P %
The rest of the given information can be gathered as follows-

Year →	2019			2023		
Firm ↓	PAT (Rs. Crores)	ES	PRD (%)	PAT (Rs. Crores)	ES	PRD (%)
A	3000	800	4P	3900	1300	4P
B	2800	1000	9P	3800	1000	9P
C	2400	600	9P	3000	800	4P
D	3900	600	P	2400	800	4P
E	2400	1200	16P	3500	1400	9P
F	2500	800	4P	3200	1000	4P

PRD per employee in 2023 among the firms C, D, E and F
Firm C = (4P/100 × 3000)/800 = 0.15P
Firm D = (4P/100 × 2400)/800 = 0.12P
Firm E = (9P/100 × 3500)/1400 = 0.225P
Firm F = (4P/100 × 3200)/1000 = 0.128P
Hence, firm D had the least PRD per employee in 2023 among the firms C, D, E and F

QUANT:

1. Correct Answer: C

Let the usual time taken = t hours
Given, distance, d = 60 × (t + 3.5)
Next day, 2d/3 of the distance covered in t/3 of the time
Remaining distance, d/3 = 40 × 2t/3
=> d = 80t
=> 80t = 60t + 210
=> t = 10.5 hours
The usual scheduled arrival time = 9 AM + 10.5 hrs = 7:30 PM

2. Correct Answer: C

Remainder $\frac{[3^1]}{11} = 3$

Remainder $\frac{[3^2]}{11} = 9$

Remainder $\frac{[3^3]}{11} = 5$

Remainder $\frac{[3^4]}{11} = 4$

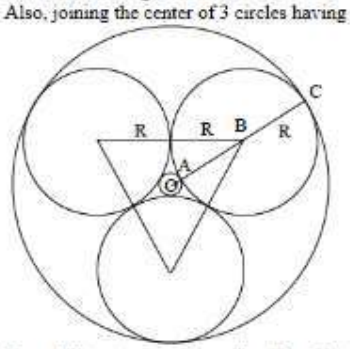
Remainder $\frac{[3^5]}{11} = 1$

So, the remainder cycle $\frac{3^n}{11}$ is of 5 (3, 9, 5, 4, 1)

Hence, remainder $\frac{[3^{333}]}{11}$ = remainder $\frac{[3^3]}{11} = 5$

3. Correct Answer: A

The given shape can be drawn as follows.
Due to symmetry, the center of both the circles X and Y coincides at O (let)
Let the radius of e circles of equal radu = R
Let the radius of smaller circle Y = OA
And radius of larger circle X = OC = OA + AC = OA + 2R
Also, joining the center of 3 circles having radius R forms an equilateral triangle with each side = 2R



Now, OB is circum-radius of equilateral triangle thus formed
OB = OA + AB = OA + R = (2/√3) × R
=> OA = 2R/√3 – R = (2 - √3)R/√3
Also, OC = OA + 2R = (2 - √3)R/√3 + 2R = (2 + √3)R/√3
Required ratio = OC : OA = (2 + √3)R/√3 : (2 - √3)R/√3
= $(2 + \sqrt{3})^2$: (2 - √3)(2 + √3)
= 7 + 4√3 : 1

4. Correct Answer: D

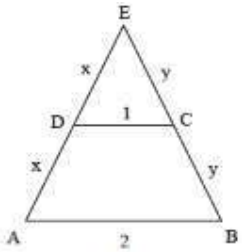
$$\frac{1}{5}\left(\frac{1}{5}-\frac{1}{7}\right)+\left(\frac{1}{5}\right)^2\left[\left(\frac{1}{5}\right)^2-\left(\frac{1}{7}\right)^2\right]+\left(\frac{1}{5}\right)^3\left[\left(\frac{1}{5}\right)^3-\left(\frac{1}{7}\right)^3\right]+\ldots\ldots\infty$$

$$=\left(\frac{1}{5}\right)^2-\left(\frac{1}{5}\right)\left(\frac{1}{7}\right)+\left(\frac{1}{5}\right)^4-\left(\frac{1}{5}\right)^2\left(\frac{1}{7}\right)^2+\left(\frac{1}{5}\right)^6-\left(\frac{1}{5}\right)^3\left(\frac{1}{7}\right)^3+\ldots\ldots\infty$$

$$=\left(\frac{1}{5}\right)^2+\left(\frac{1}{5}\right)^4+\left(\frac{1}{5}\right)^6+\ldots\ldots\infty-\left[\left(\frac{1}{5}\right)\left(\frac{1}{7}\right)+\left(\frac{1}{5}\right)^2\left(\frac{1}{7}\right)^2+\left(\frac{1}{5}\right)^3\left(\frac{1}{7}\right)^3+\ldots\ldots\infty\right]=\frac{\left(\frac{1}{5}\right)^2}{1-\left(\frac{1}{5}\right)^2}-\frac{\left(\frac{1}{5}\right)\left(\frac{1}{7}\right)}{1-\left(\frac{1}{5}\right)\left(\frac{1}{7}\right)}$$

$$=\frac{1}{24}-\frac{1}{34}=\frac{5}{408}$$

5. Correct Answer: C



Given perimeter of trapezium ABCD = 6
=> AB + BC + CD + DA = 6
Let BC = y and DA = x
=> 2 + y + 1 + x = 6
=> x + y = 3
Since, AB//CD and CD = 1/2 AB
=> D is mid-points of AE
and C is mid-point of BE
So, DE = x = AD
And CE = y = BC
Perimeter of AEB
= AB + BE + AE
= 2 + 2y + 2x
= 2 + 2(x + y)
= 8 units

6. Correct Answer: A

In 2022,
Let the sum of employees (1-10) = a
Let the sum of employees (11-30) = b
Let the sum of employees (31-40) = c
Given a + b = 30 × 40000 = 12 lakhs and b + c = 30 × 60000 = 18 lakhs
Also given, a + c = 20 × 50000 = 10 lakhs
Adding all 3 equations, 2 (a + b + c) = 40 lakhs
=> a + b + c = 20 lakhs
Solving, a = 2 lakhs, b = 10 lakhs and c = 8 lakhs
Now, if average is increased by certain percentage, sum will also increased by the same percentage
In 2023,
Sum of employees (1-10) = 2 lakhs × 2 = 4 lakhs and sum of employees (31-40) = 8 lakhs × 3 = 24 lakhs
Sum of employees (11-30) = 10 lakhs (remains unchanged)
Total sum = 4 + 10 + 24 = 38 lakhs
The new average of all employees in 2023 = 3800000/40 = 95000

7. Correct Answer: A

Amount received by Anil

$= 22000\left(1+\frac{(4/2)}{100}\right)^{6\times2} = 22000\,(1.02)^{12}$

Let the amount invested by Sunil = P

Amount received by Sunil

$= P\left(1+\frac{(4/2)}{100}\right)^{5\times2}\left(1+\frac{10}{100}\right)^{1} = P\,(1.02)^{10}\,(1.1)$

Given, $22000\,(1.02)^{12} = P\,(1.02)^{10}\,(1.1)$

Solving, P = Rs 20808

8. Correct Answer: D

$|x| + x + y = 15$ and $x + |y| - y = 20$

Case I $x \geq 0$ and $y \geq 0$

$2x + y = 15$ and $x = 20$

$\Rightarrow y = -25$ (not possible)

Case II $x \geq 0$ and $y < 0$

$2x + y = 15$ and $x - 2y = 20$

$4x + 2y = 30$ and $x - 2y = 20$

$\Rightarrow x = 10$ and $y = -5$

$\Rightarrow x - y = 10 - (-5) = 15$

Case III $x < 0$ and $y \geq 0$

$y = 15$ and $x = 20$ (not possible)

Case IV $x < 0$ and $y < 0$

$y = 15$ and $x - 2y = 20$

$\Rightarrow x = 50$ and $y = 15$ (not possible)

Hence, $x - y = 15$

9. Correct Answer: C

$$\frac{1}{x+5} \leq \frac{1}{2x-3}$$

$$\frac{1}{x+5} - \frac{1}{2x-3} \leq 0$$

$$\frac{2x-3-x-5}{(x+5)(2x-3)} \leq 0$$

$$\frac{x-8}{(x+5)(2x-3)} \leq 0$$

$$\frac{(x+5)(2x-3)(x-8)}{(x+5)^2(2x-3)^2} \leq 0$$

$$(x+5)(2x-3)(x-8) \leq 0$$

such that $x \neq -5$ or $\frac{3}{2}$ as it makes denominator zero

Now using wavy curve method,

$x < -5$ or $\frac{3}{2} < x \leq 8$

10. Correct Answer: C

Given, $3x^2 + \lambda x - 1 = 0$
$\alpha + \beta = -\lambda/3$ and $\alpha\beta = -1/3$

$$\frac{1}{\alpha^2}+\frac{1}{\beta^2}=15$$

$$\frac{\alpha^2+\beta^2}{\alpha^2\beta^2}=15$$

$$\frac{(\alpha+\beta)^2-2\alpha\beta}{(\alpha\beta)^2}=15$$

$$\frac{(-\lambda/3)^2-2(-1/3)}{(-1/3)^2}=15$$

$\Rightarrow \lambda^2 + 6 = 15$
$\Rightarrow \lambda = \pm 3$
$(\alpha^3 + \beta^3)^2 = [(\alpha + \beta)^3 - 3\alpha\beta(\alpha + \beta)]^2$
$= [(-\lambda/3)^3 - 3(-1/3)(-\lambda/3)]^2$
$= (-\lambda^3/27 - \lambda/3)^2$
$= (\pm 2)^2 = 4$

11. Correct Answer: 14

$$\frac{\log_6(a+b)}{\log_2 c}+\frac{\log_{27}(a-b)}{\log_3 c}=\frac{2}{3}$$

$$\frac{1}{3}\frac{\log_2(a+b)}{\log_2 c}+\frac{1}{3}\frac{\log_3(a-b)}{\log_3 c}=\frac{2}{3}$$

$$\frac{\log_2(a+b)}{\log_2 c}+\frac{\log_3(a-b)}{\log_3 c}=2$$

$$\log_c(a+b)+\log_c(a-b)=2$$

$\Rightarrow a^2 - b^2 = c^2$
$\Rightarrow a^2 = b^2 + c^2$
To maximize the value of a, we need to maximize the value of b and c
Also, $a > 10 \geq b \geq c$
So, a^2 (maximum) $= 10^2 + 10^2 = 200$
Hence, the maximum integral value of a = 14

12. Correct Answer: A

Since m and n are natural numbers and $n > 1$
$m^n = 2^{25} \times 3^{40}$
$m^n = (2^5)^5 \times (3^8)^5$
$m^n = (32)^5 \times (6561)^5$
$m^n = (209952)^5$
So, m = 209952 and n = 5
$\Rightarrow m - n = 209947$

13. Correct Answer: 7

$4x^2 + 4y^2 - 4xy - 6y + 3 = 0$
$4x^2 + y^2 + 3y^2 - 4xy - 6y + 3 = 0$
$4x^2 + y^2 - 4xy + 3y^2 - 6y + 3 = 0$
$(2x - y)^2 + 3(y - 1)^2 = 0$
$\Rightarrow 2x - y = 0$ and $y - 1 = 0$
$\Rightarrow y = 1$ and $x = \frac{1}{2}$

$$4x + 5y = 4 \times \frac{1}{2} + 5 \times 1 = 7$$

14. Correct Answer: 2

The given vertices are (1, 2), (7, 2) and (1, 10)
The distance between (1, 2) and (7, 2) = 6 units
The distance between (1, 2) and (1, 10) = 8 units
The distance between (7, 2) and (1, 10) = 10 units
So, the sides of the given triangle satisfies the Pythagoras Theorem, therefore forms a right angled triangle
Area of the right angled triangle
$= \frac{1}{2} \times 6 \times 8 = 24$ units

Also, the area of the triangle = r × s
where r is the in-radius and s is the semi-perimeter,
$s = \frac{(6+8+10)}{2} = 12$

Hence, r × 12 = 24 => r = 2 units

15. Correct Answer: 340

At the beginning, let the total number of fruits = 5x
=> Mangoes at the beginning = 40% of 5x = 2x
Let the Apples at the beginning = 5a
=> Bananas at the beginning = 3x – 5a
At the end of the day,
Mangoes sold = $\frac{2x}{2} = x$,

Bananas sold = 96 and Apples sold = 40% of 5a = 2a
Given, x + 96 + 2a = 50% of 5x
=> 1.5x = 2a + 96
=> 3x = 4a + 192
The smallest possible value of a = 3 (at least 1 fruit of each type)
Solving, x = 68 (smallest)
Hence, the smallest possible total number of fruits at the beginning = 5x = 340

16. Correct Answer: 11

$$\left(x+6\sqrt{2}\right)^{\frac{1}{2}} - \left(x-6\sqrt{2}\right)^{\frac{1}{2}} = 2\sqrt{2}$$

Squaring both sides,

$$\left(x+6\sqrt{2}\right) + \left(x-6\sqrt{2}\right) - 2\left(x+6\sqrt{2}\right)^{\frac{1}{2}}\left(x-6\sqrt{2}\right)^{\frac{1}{2}} = 8$$

$$2x - 2\left[x^2 - (6\sqrt{2})^2\right]^{\frac{1}{2}} = 8$$

$$x - 4 = \left[x^2 - 72\right]^{\frac{1}{2}}$$

Again squaring both sides,

$$x^2 + 16 - 8x = x^2 - 72$$

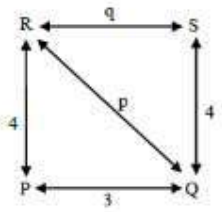
Solving, $x = 11$

17. Correct Answer: 139

Given, A + V = W/150 and V + S = W/100
Let work, W = 300 units
A + V = 2 units/day and V + S = 3 units/day
Also, 75A + 135V + 45S = 300
=> 75A + 75V + 15V + 45V + 45S = 300
=> 75 × 2 + 15V + 45 × 3 = 300
=> V = 1 unit/day => A = 1 unit/day and S = 2 units/day
Now A works every day, while V works on every 2^{nd} day and S words on every 3^{rd} day, that makes the cycle of 6 days
Work done by A on 1^{st} day = 1 unit
Work done by A and V on 2^{nd} day = 1 + 1 = 2 units
Work done by A and S on 3^{rd} day = 1 + 2 = 3 units
Work done by A and V on 4^{th} day = 1 + 1 = 2 units
Work done by A on 5^{th} day = 1 unit
Work done by A, V and S on 6^{th} day = 1 + 1 + 2 = 4 units
Work completed in 6 days = 1 + 2 + 3 + 2 + 1 + 4 = 13 units
After that the cycle will repeat
Work done in (6 × 23 = 138 days) = 299
Next day, work done by A = 1 unit
Hence, total number of days = 139

18. Correct Answer: 7

Given, paths between P and Q = 3, Q and S = 4 and P and R = 4
Let the number of paths between Q and R = p and R and S = q



Given, paths between P to Q to S + paths between P to R to S + paths between P to Q to R to S
= 3 × 4 + 4 × q + 3 × p × q = 62
=> 4q + 3pq = 50
=> q (4 + 3p) = 50
Possible values, q = 2 and p = 7 or q = 5 and p = 2
Also, paths between Q to R + paths between Q to P to R + paths between Q to S to R
= p + 3 × 4 + 4 × q = 27
=> p + 4q = 15
Now, q = 2 and p = 7 satisfies
Hence, the number of direct paths between Q and R = p = 7

19. Correct Answer: C

$f(xy) = f(x)f(y) + f(x) + f(y)$
Given, $f(p) = 1$ where p is a prime number
$\Rightarrow f(2) = 1$ and $f(5) = 1$
$\Rightarrow f(10) = f(2 \times 5) = f(2)f(5) + f(2) + f(5) = 1 \times 1 + 1 + 1 = 3$
$\Rightarrow f(100) = f(10 \times 10) = f(10)f(10) + f(10) + f(10) = 3 \times 3 + 3 + 3 = 15$
$\Rightarrow f(10000) = f(100 \times 100) = f(100)f(100) + f(100) + f(100) = 15 \times 15 + 15 + 15 = 255$
Now, $f(4) = f(2 \times 2) = f(2)f(2) + f(2) + f(2) = 1 \times 1 + 1 + 1 = 3$
$\Rightarrow f(16) = f(4 \times 4) = f(4)f(4) + f(4) + f(4) = 3 \times 3 + 3 + 3 = 15$
Now, $f(160000) = f(10000 \times 16) = f(10000)f(16) + f(10000) + f(16)$
= 255 × 15 + 255 + 15 = 4095

20. Correct Answer: B

Let the initial water = w and initial acid = a
Given, a = 50% (a + w + 2)
=> a = w + 2
Also, a + 15 = 80% (a + 15 + w + 2)
=> 5a + 75 = 8a + 60
=> a = 5 and w = 3
Hence, initially water : acid = 3 : 5

21. Correct Answer:B

Let the present age of Rajesh and Garima be R and G respectively
Also, let Rajesh's age was same as present age of Garima x years ago
=> x = R – G => G = R – x

$$\frac{R-x}{G-x}=\frac{3}{2}$$

=> 2G = 3G – 3x
=> G = 3x and R = 4x
Now, Garima's age becomes present age of Rajesh

$$\text{Required ratio} = \frac{R+x}{G+x}=\frac{5x}{4x}=\frac{5}{4}$$

22. Correct Answer: 2160

Explanation:

Let the cost price of Bina = 100x
Given, 100x – 19% of 100x = Rs 4860
=> x = 60
So, the cost price of Bina = 100x = Rs 6000
Certain Price = 6000 + 17% of 6000 = Rs 7020
Profit of Shyam = 7020 – 4860 = Rs 2160