CAT 2024 Slot 2

Question Paper with Solutions

SECTION I - VERBAL ABILITY & READING COMPREHENSION (VARC)

Q1. 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 4
B) Option 3
C) Option 1
D) Option 2

Answer: D (Option 2)

Solution:

The sentence before option 2 states "Now, however, we are having the last laugh." The reason they are having the last laugh is given in the sentence: 'Science has officially crowned us superior to our early-rising brethren.' Therefore, it fits here perfectly forming a coherent paragraph.

Option 4: Placing the sentence here would seem a bit disconnected. The sentence before and after Blank 4 flows continuously and placing the sentence here would break this flow.

Option 3: This placement would disrupt the flow of the sentences before and after Blank 3. The study mentioned before Blank 3 is the moment where the night owl's position is validated, so introducing the idea of 'superiority' will be out of place and feel redundant.

Option 1: It may seem plausible initially, but it would not be right to talk about the claim without first mentioning the negative stereotypes, making this placement less effective.

Q2. 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.

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

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

3. Many people are uncomfortable with the idea that gender is not purely a social construct.

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

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

Answer: 2

Solution:

Sentence 2 is the odd one out. Sequence 1→4→3→5 forms a coherent paragraph:

Sentence 1 introduces the debate about gender being influenced by both biological and social factors. Sentence 4 follows logically — even with the acknowledgement of both nature and nurture, researchers studying gender's biological basis still face political challenges. Sentence 3 builds on Sentence 4, highlighting why researchers face resistance. Sentence 5 connects to Sentence 3 by elaborating on the political preference for viewing gender purely as a social construct.

Sentence 2 doesn't fit — the rest of the sentences are focused on the complexities of gender as a mix of nature and nurture and the political and societal challenges researchers face. Sentence 2 shifts the focus to the issue of sexism, which does not directly tie into the nature vs. nurture debate.

Q3. 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 1

B) Option 4

C) Option 2

D) Option 3

Answer: D (Option 3)

Solution:

The given sentence would best fit Blank (3).

The passage breaks into three segments: (1) early globalization through trade routes; (2) comparisons between year 1000 and 1492; (3) European continuation of pre-existing systems.

At position 3, the declaration 'The Europeans did not invent globalization' is followed immediately by 'They changed and augmented what was already there since 1000', which reinforces this idea perfectly.

Q4. The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

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) 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.

B) Governments primarily use the DIME model to deploy cyber troops who practise low-grade information warfare, seeking to manipulate public opinion with the objective of inflicting pain and confusion on their enemies.

C) 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.

D) 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.

Answer: D

Solution:

Option D: best captures all the key points: governments use the DIME model in warfare, they routinely monitor telecom data and communications networks (raising privacy concerns), and they deploy cyber troops on social media to manipulate public opinion online.

Option A: Incorrectly focuses on open data policies being used to deploy cyber troops — the passage does not emphasise this. Option B: Fails to address monitoring of telecom data and networks.

Option C: The passage does not indicate that governments conduct warfare simultaneously with military forces — they act before involving the military.

Q5. The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

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) Creativity and critical thinking cannot work together. Comedians must first be creative, and later be critical.

C) Comedians are being prevented from saying what they want and that is the death of this art form.

D) Freedom and creativity are essential for comedy. Fear about offending people hinders originality.

Answer: D

Solution:

John Cleese argues that comedians need freedom to be creative and that fear of offending people hinders their ability to be original. Option D reflects this — stressing the importance of freedom and creativity in comedy, while warning against the fear that stifles innovation.

Option A: While Cleese advocates for freedom in comedy, he doesn't say that comedians 'must go where no one has gone before.'

Option B: This option focuses too much on the relationship between creativity and critical thinking.

Option C: Focuses on the 'death of the art form,' but Cleese's main point is about how fear of repercussions impacts creativity.

Q6. 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 1
B) Option 3
C) Option 2
D) Option 4

Answer: B (Option 3)

Solution:

The sentence about the eggs fits perfectly at position 3 because it explains a key element of the puzzle: the hens are producing eggs with calcareous shells despite not having an obvious source of calcium. This provides a crucial piece of information that explains why Kervran was puzzled in the first place.

Option 1: The paragraph is introducing Kervran's initial observations. Inserting this sentence would feel disjointed because the paragraph hasn't yet explained the significance of the eggs.

Option 2: The focus here is on what the hens are doing (pecking mica), and the egg sentence feels disconnected.

Option 4: The paragraph has already shifted to Kervran's conclusion about transmutation.

Instructions [Q7–Q10]:
Read the passage and answer the questions.

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 21st 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.

Q7. The author lists all of the following examples as 'externalities' of major technical advances EXCEPT:

A) build-up of chlorofluorocarbons in the atmosphere
B) cooling and de-humidifying of factories through air-conditioning
C) application of the Jacquard loom to modern IT programming
D) extension of the phonograph to large-scale recording of music

Answer: B

Solution:

Option B is NOT an externality — cooling and de-humidifying factories was the original intended use of air-conditioning. The passage explicitly states the technology was 'primarily intended for industrial use: ensuring cool, dry air for factories that required low-humidity environments.'

All other options represent unintended consequences: CFCs (A), the Jacquard loom leading to computers (C), and the phonograph being adapted for music (D).

Q8. Which of the following best conveys the main point of the first paragraph?

A) The secondary effects of most major technological advances in the past, especially if they were unintended, have turned out to be beneficial.

B) The full impact of technological advances cannot be estimated in the short run as the ripple effects often extend far beyond the original intent.

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

D) The entire impact of a technological advance should be evaluated by the boost its secondary effects gives to generating further technological advances.

Answer: B

Solution:

The first paragraph discusses how technological advances are often accompanied by unintended consequences or secondary effects. It gives the example of the printing press, which led to unexpected developments such as the creation of spectacles, and later, the telescope and microscope. Option B best captures the unpredictability and far-reaching nature of these effects. Option A is too optimistic (not all are beneficial). Option C is not the paragraph's main point. Option D is too narrow in scope.

Q9. Carrier, Babbage, and Edison are mentioned in the passage to illustrate the author's point that

A) the secondary effect of past inventions mostly resulted in the creation of new inventions.

B) these inventors could not have visualised the eventual impact of their inventions on society.

C) despite the original intention, the unintended consequences of their inventions were largely beneficial.

D) inventions typically end up being used for entirely different purposes than the intended ones.

Answer: B

Solution:

The author mentions Carrier, Babbage, and Edison to emphasise that the inventors' original intentions were not related to the unexpected societal impacts their inventions had: Carrier created air-conditioning for industrial use, but it triggered mass migration;

Babbage's machine and Edison's phonograph were intended for specific purposes but led to far-reaching consequences. Therefore we can infer that the inventors did not anticipate the full impact of their inventions.

Q10. 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) It has become far easier for people today to bring out innovations with dire worldwide consequences than it was earlier.

D) The emissions caused by the large-scale use of leaded fuel ought to have been addressed earlier than they were.

Answer: A

Solution:

Option A is NOT supported by the author. The author does not imply that recent advances are more threatening than past ones. Instead, he suggests that the nature of technological progress (with more individuals and smaller groups able to innovate) has changed, leading to new risks — but this is about who can cause harm, not a comparison of past vs. recent advances.

Options B, C, and D are all supported by the passage.

Q11. The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

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) Despite differences in their research styles, physicists' research collaborations with scholars from other disciplines have yielded important research findings.

B) Large data sets and mathematical models in physics research combined with the research methods of non-physicist collaborators have yielded important scientific findings.

C) The desire to diversify their research and answer important questions has led to several collaborations between physicists and other social scientists.

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

Answer: A

Solution:

Option A captures the core idea: cross-disciplinary collaborations between physicists and other scientists have produced important research findings, despite differences in their research styles. Option B incorrectly focuses on 'large data sets' as the main contributor.

Option C is partially true but doesn't mention the cultural differences.

Option D is inaccurate — the passage does not state that physicists have 'buried' their differences.

Q12. 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.

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

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

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

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

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

Answer: 4

Solution:

Sentences 1, 2, 3, and 5 all focus on the current status and future prospects of cultivated meat in the UK - leadership in the field, regulatory assessments, and the importance of government investment in research. Sentence 4 refers to the previous UK government's efforts to fast-track approval, which is a past action disconnected from the current-developments focus of the other sentences.

Instructions [Q13–Q16]:
Read the passage and answer the questions.

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 non-Westerners 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.

Q13. According to the passage, which of the following is the only reason NOT given in favour of making peer review data public?

A) It will deal with peer review fraud such as authors publishing bogus reviews of their work.

B) It would highlight the gender and race biases currently existing in the selection of reviewers.

C) It could address various inefficiencies and fraudulent practices that continue in academic publishing process.

D) It can tackle the problem of selecting appropriately qualified reviewers for academic writing.

Answer: D

Solution:

The passage provides several arguments in favour of making peer review data public, but it does not mention that making this data public would help in selecting appropriately qualified reviewers.

Options A (fraudulent reviews), B (gender/race biases), and C (inefficiencies and systemic bias) are all explicitly mentioned in the passage.

Q14. All of the following are listed as reasons why academics choose to review other scholars' work EXCEPT:

A) It helps them keep current with cutting-edge ideas in their academic disciplines.

B) Some use this as an opportunity to publicise their own review work.

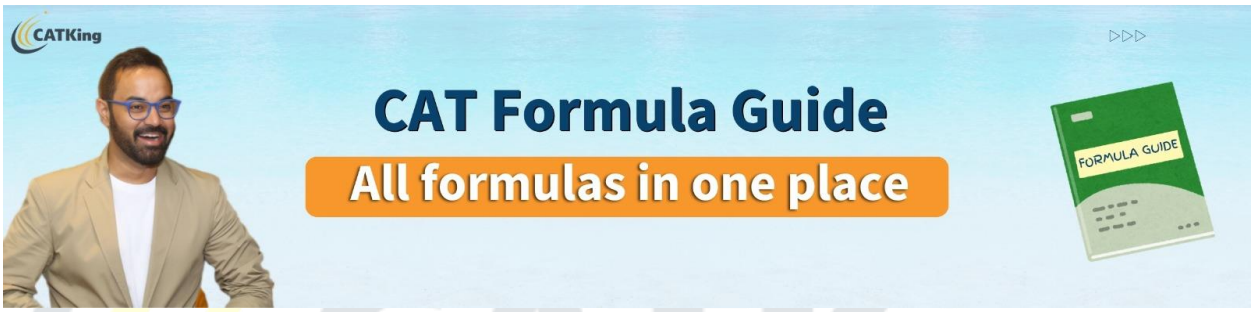
C) It is seen as a form of service to the academic community.

D) It is seen as an opportunity to expand their influence in the academic community.

Answer: D

Solution:

Option D is not mentioned as a reason in the passage. The focus is on staying informed (A), claiming credit/publicising work (B), and contributing to the field as a duty (C). Expanding influence is never cited as a motivation for peer review in the passage.



Q15. Based on the passage we can infer that the author would most probably support

A) more careful screening to ensure the recruitment of content-familiar peer reviewers.

B) preserving the anonymity of reviewers to protect them from criticism.

C) publicising peer review data rather than the publication of actual reviews.

D) greater transparency across the peer review process in academic publishing.

Answer: D

Solution:

The author advocates for a shift 'from opacity in all cases to opacity only when necessary,' implying strong support for greater transparency. Option A (careful screening) is not prioritised. Option B (preserving anonymity) contradicts the author's push for transparency. Option C (publicising data rather than reviews) is partially true but the author's broader position is D — greater transparency overall.

Q16. 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.

Answer: B

Solution:

Option B is the correct answer.

The passage does not mention protecting reviewers from unwarranted criticism as a reason to oppose open peer review. Instead, the concerns cited are: reviewers may be less critical if their reports are published (C), they may deter referees from agreeing to judge manuscripts (A), and they may take longer to submit reviews out of fear of scrutiny (D).

Instructions [Q17–Q20]:
Read the passage and answer the questions.

[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....

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.

Q17. It can be inferred that all of the following contributed to a decline in the allure of spices, EXCEPT:

A) the development of refrigeration techniques.

B) increase in the availability of spices.

C) changes in the system of medical treatment.

D) changes in European cuisine.

Answer: B

Solution:

Option B is the correct answer.

The demand for spices was not necessarily tied to their availability — the passage states that medieval Europeans had limited geographical knowledge of where spices came from and were highly prized despite their relative scarcity. The demand was driven by cultural and medical factors rather than availability.

Options A, C, and D are all inferable from the passage as factors that could contribute to declining demand.

Q18. 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) this is why pepper is so hot.

B) pepper is costly for good reason.

C) it is not advisable to go to India to harvest the pepper themselves.

D) it is no surprise that the pepper supply is so limited.

Answer: A

Solution:

Option A is the least likely conclusion because the story confuses the physical heat from the harvesting process (burning trees) with the pepper's actual spiciness. The process of using fire for harvesting could not logically be connected to why pepper tastes hot — that would be a non-sequitur.

Options B, C, and D are all reasonable conclusions from the myth about dangerous and difficult harvesting.

Q19. 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) India was colonised for its spices and gold.

C) Tobacco was more marketable than spices.

D) Colonialism was motivated by the demand for spices.

Answer: B

Solution:

Option B cannot be reached from the passage. While spices were a major part of European trade with the East, the passage does not claim that gold was a motivation for colonising India. The main focus is on spices, not gold.

Options A and D are directly supported. Option C can be inferred from the passage's statement that 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.'

Q20. If a trader brought white peppercorns from India to medieval Europe, all of the following are unlikely to happen, EXCEPT:

A) medieval maps would be used as navigational aids.

B) Europeans would doubt the story of pepper harvesting.

C) the price of spices would decrease.

D) pepper would no longer be considered exotic.

Answer: B

Solution:

If white peppercorns were brought to Europe, Europeans would likely doubt the myth of harvesting pepper by burning trees, as white peppercorns would not be burnt/shrivelled as described in the story. This inconsistency would make them question the accuracy of the myth.

Option A: Medieval maps were symbolic and inaccurate — not used for navigation.

Option C: White peppercorns would still be rare and expensive.

Option D: Pepper would still be considered exotic due to its rarity.

Instructions [Q21–Q24]: Read the passage and answer the questions.

(…) 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.

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.

(…) 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.

Q21. 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 increased scarcity of resources due to climate change, forcing carnivores to venture outside their natural habitats in search of sustenance.

C) The predatory perception of humans as potential prey within the carnivores' food chain.

D) The reduction in carnivores' instinctive fear response, resulting from their reliance upon human-provided food.

Answer: D

Solution:

The passage states: '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.' This directly corresponds to Option D.

Options A, B, and C describe other factors but are not cited as the primary mechanism of habituation.

Q22. 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) 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.

B) 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.

C) Homogeneous landscapes with uniform agricultural practices are more likely to experience high rates of human-carnivore conflicts due to the predictability of resources.

D) The diversity and interspersion of working landscapes with carnivore habitats in rural areas increase the statistical probability of encounters between humans and carnivores.

Answer: D

Solution:

Wilkinson states that heterogeneous landscapes 'interspersed with carnivore habitats, forests and savannahs' create more opportunity for encounters 'just statistically.' Option D captures this exactly.

Option A contradicts the passage.

Option B directly contradicts Wilkinson's point.

Option C is not what the passage argues.

Q23. 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) Climate change has had negligible effects on the frequency of carnivore-human interactions in affected regions.

B) Predatory attacks by carnivores are a common occurrence and have steadily increased over the past few decades.

C) Carnivores lose their instinctive fear of humans, when consistently exposed to human food sources

D) Human efforts to avoid risky behaviours around large carnivores have proven effective in reducing conflict incidents.

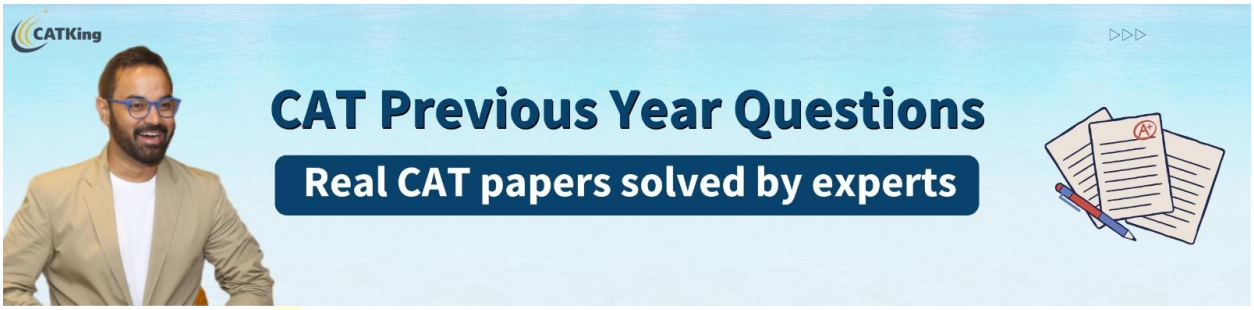
Answer: A

Solution:

Statement A: If climate change had NEGLIGIBLE effects, this would be inconsistent with the passage's claim that climate change plays a part in the escalation of conflicts (as finite resources become scarcer). The false version of A directly contradicts the passage.

Statement B: The passage says predatory attacks are RARE (17%) — so statement B is already inconsistent with the passage; its falsification doesn't create further inconsistency.

Statements C and D: Their falsification goes beyond the scope of the passage.



Q24. According to the passage, which of the following scenarios would MOST likely exacerbate the frequency of carnivore-human conflicts?

A) Implementing 'food waste' management strategies to prevent wild animals being attracted to human food sources.

B) Addressing the impact of climate change on the availability of resources for wildlife.

C) Attempting to photograph wild animals from within secured viewing areas in national parks and protected zones.

D) Unleashing dogs by pet owners in areas with known high concentrations of large carnivores.

Answer: D

Solution:

The passage mentions that 66% of coyote attacks involve a dog, and walking an unleashed dog is cited as one of the most common risky behaviours. In areas with large carnivores, unleashing dogs dramatically increases the likelihood of encounters and conflicts.

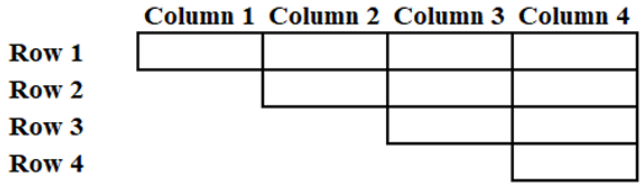
Options A and B would REDUCE conflicts.

Option C is unlikely to exacerbate conflicts as it involves secured areas.

SECTION II - LOGICAL REASONING & DATA INTERPRETATION (LRDI)

Instructions [Q25–Q29]

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.

Q25. What is the row number which has the least sum of numbers placed in that row?

Answer: 4

Solution:

10 must be in Row 1 Col 4 (any other placement requires a number > 10 above or to its right). 1 must be in Row 4 by the same logic (any number to its left must be smaller, but it is the smallest). Conditions 4 and 5 are used to place 2, 3 in columns 2 or 3 and 7, 8 in column 4. Condition 6 places 4 and 6 in Row 1. The final arrangement gives Row 4 only the number 1, which has the least sum.

Q26. 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) Both I and II

B) Neither I nor II

C) Only II

D) Only I

Answer: A (Both I and II)

Solution:

10 must be in Row 1 Col 4 — any other placement would require a number greater than 10 to its right or above it, which is impossible. By the same logic, 1 must be in Row 4, Col 4 — any other placement would require a number smaller than 1 below it or to its left, which is impossible. Both statements are necessarily true.

Q27. 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) Only I

B) Both I and II

C) Neither I nor II

D) Only II

Answer: C (Neither I nor II)

Solution:

Positions 2 and 3 can be switched. Either of them can be in column 2 or column 3 — the grid conditions allow both configurations. Therefore, neither statement is necessarily true.

Q28. For how many slots in the grid, placement of numbers CANNOT be determined with certainty?

Answer: 2

Solution:

The positions of all numbers except 2 and 3 can be determined with certainty from the given conditions. Since 2 and 3 can each be in either column 2 or column 3 (two valid configurations), placement for exactly 2 slots cannot be determined with certainty.

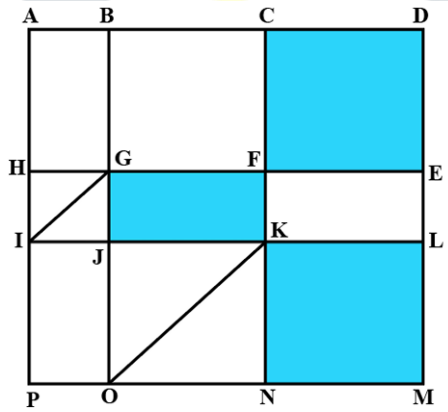
Q29. What is the sum of the numbers placed in Column 4?

Answer: 26

Solution:

Column 4 contains: 10 (Row 1), 8 (Row 2), 7 (Row 3), and 1 (Row 4). Sum = 10 + 8 + 7 + 1 = 26.

Instructions [Q30–Q33]



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.

Q30. 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) 2700
B) 3200
C) 3000
D) 3400

Answer: B (3200 m)

Solution:

The shortest path from L to B (bank) and then to P (post office) or vice versa uses the hypotenuse walkways where possible. The optimal route is: L → E → D → C → B → G → I → P → O → K → L.

Distance = LE + ED + DC + CB + BG + GI + IP + PO + OK + KL = 200 + 400 + 300 + 300 + 400 + 250 + 400 + 150 + 500 + 300 = 3200 m.

Q31. 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) 2800
B) 3000
C) 3800
D) 3200

Answer: C (3800 m)

Solution:

Since we can only walk along the sides of lakes, the maximum path that uses each edge at most once is: C → D → E → F → K → L → M → N → K → J → G → F → C (or its reverse).

We travel: 4 walkways of 400 m (DE, LM, KN, EF) + 6 walkways of 300 m (CD, EF, KL, MN, KJ, GF) + 2 walkways of 200 m (FK, JG).

Total = 4 × 400 + 6 × 300 − 400 (EF counted once) + 2 × 200 = 1600 + 1800 − 400 + 400 = 3800 m. (Detailed: 1600 + 1800 + 400 = 3800 m).

Q32. 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?

Answer: 5100 m

Solution:

To maximise distance without repeating points, we should avoid the hypotenuse walkways (they are shorter than the two legs they replace) and traverse through the edges of rectangles, touching each point exactly once.

Total = AH + HI + IP = 400 + 200 + 400 = 1000; DE + EL + LM = 400 + 200 + 400 = 1000; PO + JK + NM = 150 + 300 + 300 = 750; DC + FG + BA = 150 + 300 + 300 = 750; JO + KN = 400 + 400 = 800; CF + GB = 400 + 400 = 800. Total = 1000 + 1000 + 750 + 750 + 800 + 800 = 5100 m.

Q33. 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?

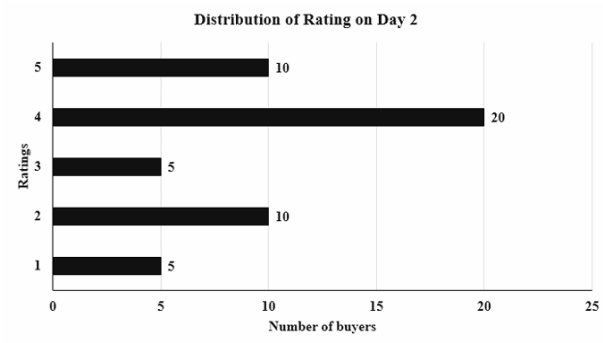
Answer: 3500 m

Solution:

Avoiding residences (at A, H, M, L) and path AH and ML, the visitor can walk: 300 (CD) + 400 (DE) + 300 (EF) + 200 (FK) + 400 (KN) + 300 (NO) + 150 (OP) + 400 (PI) + 150 (IJ) + 200 (JG) + 400 (GB) + 300 (BC) = 3500 m.

Instructions [Q34–Q37]

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 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.

Q34. How many buyers gave ratings on Day 1?

Answer: 150

Solution:

Day 2 average = (5×10 + 4×20 + 3×5 + 2×10 + 1×5) / 50 = (50 + 80 + 15 + 20 + 5) / 50 = 170 / 50 = 3.4.
Let x = number of buyers on Day 1 (average = 3). Cumulative average at end of Day 2 = (3x + 50 × 3.4) / (x + 50) = 3.1. Solving: 3x + 170 = 3.1x + 155 → 0.1x = 15 → x = 150.

Q35. What is the daily average rating of Day 3?

A) 3.6
B) 3.0
C) 3.2
D) 3.5

Answer: A (3.6)

Solution:

Let ratings-1 count = 10a, ratings-2 = 10a, ratings-3 = 20a, ratings-4 = 10b, ratings-5 = 10b. Total: 40a + 20b = 100 → 2a + b = 5. For modes to be 4 and 5 (tied, and not 3), we need b > 2a and a ≠ 0, b ≠ 0.
Solution: a = 1, b = 3 (giving count-3 = 20, count-4 = count-5 = 30; if a = 2, b = 1 then mode would be 3).
Distribution: 10 ones, 10 twos, 20 threes, 30 fours, 30 fives. Average = (10×1 + 10×2 + 20×3 + 30×4 + 30×5) / 100 = (10 + 20 + 60 + 120 + 150) / 100 = 360 / 100 = 3.6.

Q36. What is the median of all ratings given on Day 3?

Answer: 4

Solution:

With 100 ratings: 10 ones, 10 twos, 20 threes, 30 fours, 30 fives. The 50th and 51st values (for median of 100 terms) both fall in the '4' category (first 40 values are 1, 2, and 3; values 41–70 are all 4). So the median = 4.

Q37. 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 less than 5% from Day 2.

B) The cumulative average of Day 3 decreased from Day 2.

C) The cumulative average of Day 3 increased by a percentage between 5% and 8% from Day 2.

D) The cumulative average of Day 3 increased by more than 8% from Day 2.

Answer: C

Solution:

Cumulative average at end of Day 3 = (3.1 × 200 + 3.6 × 100) / 300 = (620 + 360) / 300 = 980 / 300 ≈ 3.267.

Percentage increase = (3.267 − 3.1) / 3.1 × 100 ≈ 0.167 / 3.1 × 100 ≈ 5.34%. This is between 5% and 8%, confirming Option C.

Instructions [Q38–Q41]

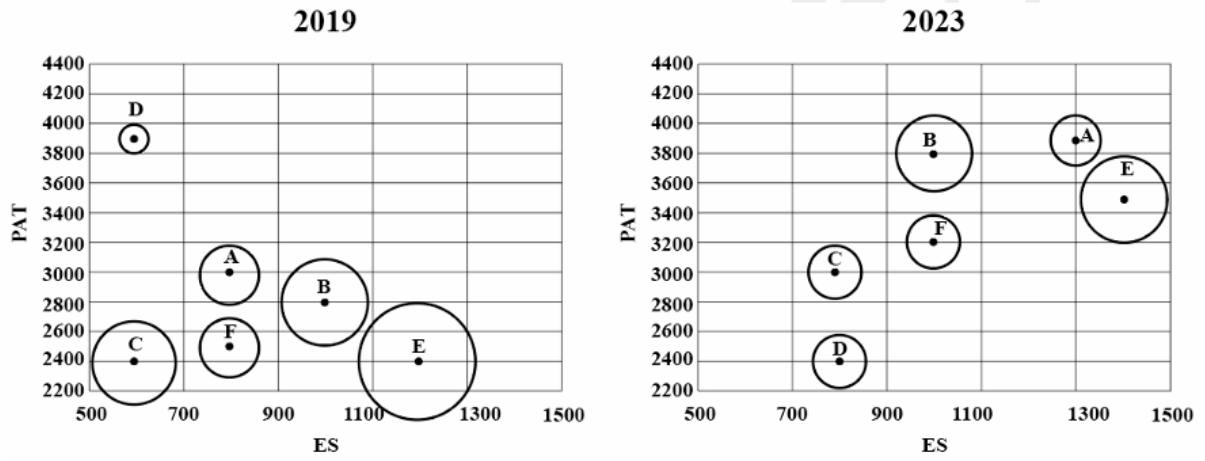
The two plots below give the following information about six firms A, B, C, D, E, and F for 2019 and 2023.

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 rm'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 rm. 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.



Q38. 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 A

B) Firm C

C) Firm E

D) Firm B

Answer: C (Firm E)

Solution:

ARG is proportional to $(PAT_{2023} - PAT_{2019}) / PAT_{2019}$:

Firm A: (3900 − 3000) / 3000 = 900/3000 = 0.30

Firm C: (3000 − 2400) / 2400 = 600/2400 = 0.25

Firm E: (3500 − 2400) / 2400 = 1100/2400 ≈ 0.458

Firm B: (3800 − 2800) / 2800 = 1000/2800 ≈ 0.357

Firm E has the highest ratio (≈0.458), so it has the highest ARG.

Q39. 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 : 6

C) 5 : 9

D) 9 : 5

Answer: D (9 : 5)

Solution:

R&D spending = PRD% × PAT. PRD is proportional to bubble area. From the plots, bubble diameter of C in 2019 ≈ 3 units, in 2023 ≈ 2 units. Area ratio = $(3/2)^2 = 9/4$. PAT ratio $C_{2019}/C_{2023} = 2400/3000 = 4/5$.

R&D ratio = $(Area_{2019} \times PAT_{2019}) / (Area_{2023} \times PAT_{2023}) = (9/4) \times (4/5) = 9/5$. So the ratio is 9 : 5.

Q40. Which among the firms A, C, E, and F had the maximum PAT per employee in 2023?

A) Firm E

B) Firm A

C) Firm F

D) Firm C

Answer: D (Firm C)

Solution:

PAT per employee in 2023 (PAT / ES):

Firm E: 3500 / 1400 = 2.5; Firm A: 3900 / 1300 = 3.0; Firm F: 3200 / 1000 = 3.2; Firm C: 3000 / 800 = 3.75.

Firm C has the highest PAT per employee at 3.75 crores per employee.

Q41. Which among the firms C, D, E, and F had the least amount of R&D spending per employee in 2023?

A) Firm F

B) Firm D

C) Firm C

D) Firm E

Answer: B (Firm D)

Solution:

R&D per employee = (PRD% × PAT) / ES. From the plots, bubble areas for C, D, and F in 2023 are approximately equal. For equal PRD areas, R&D spending per employee is proportional to PAT/ES:

Firm F: PAT/ES = 3200/1000 = 3.2; Firm C: 3000/800 = 3.75; Firm D: 2400/800 = 3.0. Since equal bubbles → equal PRD%, D has the lowest PAT and similar ES, giving the lowest R&D spending.

Comparing Firm E (larger bubble but PAT/ES = 2.5): E's R&D per employee = (5/2) × k × $(3/2)^2$ ≈ higher than D's (3 × k × 1^2). So Firm D has the least R&D spending per employee.

Instructions [Q42–Q46]

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.

Q42. What best can be concluded about the number of players coached by Zara?

A) Either 2 or 3 or 4
B) Exactly 2
C) Either 2 or 3
D) Either 3

Answer: B (Exactly 2)

Solution:

If Yuki had trained 3 players, Xena would need at least 4, leaving only 1 for Zara — violating the minimum of 2. So Yuki trained exactly 2. From condition 6, with Yuki avg = 2 × Xena avg and sum analysis, Zara must have exactly 2 players (5 and 7).

Q43. What was the rating of Player-7?

Answer: 4

Solution:

Players 5 and 7 were trained by Zara and received the same rating. The repeated rating = 32 (total) – 28 (1+2+…+7) = 4. Therefore both Player-5 and Player-7 received a rating of 4.

Q44. What was the rating of Player-6?

Answer: 5

Solution:

Player-2 (Yuki's) = 7 (highest). Zara's players get 4 each. Yuki's total = 12 (avg 6 × 2 players). So Player-6 = 12 – 7 = 5.

Q45. For how many players the ratings can be determined with certainty?

Answer: 6

Solution:

Certain ratings: Player-2 = 7; Player-4 = 2; Player-5 = 4; Player-6 = 5; Player-7 = 4; Player-8 = 1. That is 6 players. Players 1 and 3 (both under Xena) can each be 6 or 3 — we cannot determine which is which with certainty.

Q46. 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-8

C) Player-1, Player-3, Player-4, Player-6

D) Player-1, Player-3, Player-4

Answer: B — Player-1, Player-3, Player-4, Player-8

Solution:

From the solution: Yuki trained Players 2, 6 (even-only). Zara trained Players 5, 7 (odd-only). Conditions 2 and 7 establish that Players 1 and 4 share a coach (Xena, since Player-1 is odd — Zara's — but Player-4 is even — Yuki's — they can only both be with Xena). Player-3 must be with Xena (different coach from Player-2 and Player-5). Player-8 is with Xena to give Xena more players than Yuki.

SECTION III - QUANTITATIVE ABILITY

Q47. 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

Answer: Rs. 2160

Solution:

Bina sells at 19% loss: Selling price = 0.81 × Cost price = Rs. 4860 → Cost price = 4860 / 0.81 = Rs. 6000.

Hari's purchase price gives Bina 17% profit: Hari's price = 1.17 × 6000 = Rs. 7020.

Shyam's profit = Hari's price − Shyam's cost = 7020 − 4860 = Rs. 2160.

Q48. 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

Answer: 2

Solution:

The triangle has a right angle at (1, 2). Side lengths: base = 7 − 1 = 6, height = 10 − 2 = 8, hypotenuse = √(6² + 8²) = √(36 + 64) = √100 = 10.

Inradius formula: r = Area / semi-perimeter. Area = (1/2) × 6 × 8 = 24. Semi-perimeter s = (6 + 8 + 10) / 2 = 12.

Inradius r = 24 / 12 = 2.

Q49. 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

Answer: 340

Solution:

Let total stock = S. Mangoes = 2S/5, apples = a (non-mango, non-banana). Fruits sold = (S/5) + 96 + (2a/5) = S/2.

Solving: (S/5) + 96 + (2a/5) = S/2 → S = (4a + 960)/3 = (4a/3) + 320.

For S to be an integer: a must be a multiple of 3. For 2a/5 to be integer: a must be a multiple of 5. So a must be a multiple of 15. Minimum a = 15 (at least 1 apple, so a ≥ 1, but must be multiple of 15).

S = [4(15)]/3 + 320 = 20 + 320 = 340.

Q50. If a, b and c are positive real numbers such that a > 10 ≥ b ≥ c and $\{[\log_8(a+b)]/[\log_2 c]\} + \{[\log_{27}(a-b)]/[\log_3 c]\} = 2/3$, then the greatest possible integer value of a is

Answer: 14

Solution:

Using change-of-base: $\{[\log_8(a+b)]/[\log_2 c]\} = [\log_2(a+b)]^{(1/3)} / \log_2 c = \log_c(a+b)^{(1/3)}$

Similarly $(\log_{27}(a-b)/\log_3 c) = \log_c(a+b)^{(1/3)}$

LHS = $\log_c[(a+b)^{(1/3)}(a-b)^{(1/3)}] = \log_c(a^2-b^2)^{(1/3)} = 2/3$.

So $c^{(2/3)} = (a^2-b^2)^{(1/3)}$ → $c^2 = a^2 - b^2$.

Therefore $a^2 = b^2 + c^2$. Maximum a^2 occurs when b = c = 10 (maximum values), giving $a^2 = 200$. But √200 is not an integer. Largest integer a where $a^2 < 200$: $a^2 = 196 = 14^2$. Greatest possible integer value of a = 14.

Q51. 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(160000) is

A) 4095

B) 8191

C) 2047

D) 1023

Answer: A (4095)

Solution:

160000 = $2^8 \times 5^4$. For any prime p: f(p) = 1. Using the functional equation:

$f(p^2) = f(p)f(p) + f(p) + f(p) = 1 + 1 + 1 = 3$; $f(p^3) = 3\times1 + 3 + 1 = 7$; $f(p^4) = 7\times1 + 7 + 1 = 15$; $f(p^5) = 31$; $f(p^6) = 63$; $f(p^7) = 127$; $f(p^8) = 255$.

$f(2^8 \times 5^4) = f(2^8)f(5^4) + f(2^8) + f(5^4) = 255 \times 15 + 255 + 15 = 3825 + 255 + 15 = 4095$.

Q52. The roots α, β of the equation $3x^2 + \lambda x - 1 = 0$, satisfy $(1/\alpha^2) + (1/\beta^2) = 15$. The value of $(\alpha^3 + \beta^3)^2$ is

A) 16

B) 4

C) 1

D) 9

Answer: B (4)

Solution:

From Vieta's formulas: $\alpha + \beta = -\lambda/3$, $\alpha\beta = -1/3$.

$1/\alpha^2 + 1/\beta^2 = (\alpha^2 + \beta^2)/(\alpha\beta)^2 = (\alpha^2 + \beta^2) / (1/9) = 9(\alpha^2 + \beta^2) = 15 \rightarrow \alpha^2 + \beta^2 = 15/9 = 5/3$.

$(\alpha + \beta)^2 - 2\alpha\beta = \lambda^2/9 + 2/3 = 5/3 \rightarrow \lambda^2/9 = 5/3 - 2/3 = 1 \rightarrow \lambda^2 = 9$.

$\alpha^3 + \beta^3 = (\alpha + \beta)(\alpha^2 - \alpha\beta + \beta^2) = (-\lambda/3)(5/3 - (-1/3)) = (-\lambda/3)(2) = -2\lambda/3$.

$(\alpha^3 + \beta^3)^2 = (-2\lambda/3)^2 = 4\lambda^2/9 = 4 \times 9 / 9 = 4$.

Q53. 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) 4 : 3

C) 5 : 4

D) 2 : 1

Answer: C (5 : 4)

Solution:

Let Rajesh = R, Garima = G, and age difference = x, so R = G + x.

When Rajesh's age = G (i.e., x years ago), Garima was G − x. Ratio: G / (G − x) = 3/2 → 2G = 3G − 3x → G = 3x → R = 4x.

When Garima's age = R = 4x (i.e., x years into the future), Rajesh's age = 5x. Ratio = 5x : 4x = 5 : 4.

Q54. 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) $4 + 2\sqrt{3} : 1$

C) $4 + \sqrt{3} : 1$

D) $2 + \sqrt{3} : 1$

Answer: A ($7 + 4\sqrt{3} : 1$)

Solution:

Let radius of each equal circle = R. Centres form an equilateral triangle of side 2R. Distance from centroid to each centre = $2R/\sqrt{3}$.

For inner circle (Y) of radius r: $R + r = 2R/\sqrt{3} \rightarrow r = R((2/\sqrt{3}) - 1) = R(2 - \sqrt{3})/\sqrt{3}$.

For outer circle (X) of radius r_2: $r_2 + R = 2R/\sqrt{3} + 2R$ (centroid to outer tangent) ≠; using correct formula with $R = \sqrt{3}a$ and $R + r_2 = 2a$: $r_2 = R(2 - \sqrt{3}):\sqrt{3}$. The outer circle has radius 2R + r(inner). Ratio = (2R + r_inner) / r_inner.

Let $r = (2 - \sqrt{3})/\sqrt{3} \times R$, outer radius = (2R + r) from the large circle: ratio = $r_2/r(\text{inner}) = (2+\sqrt{3})/(2-\sqrt{3}) = (2+\sqrt{3})^2 / (4-3) = (4 + 4\sqrt{3} + 3) = 7 + 4\sqrt{3}$.

Q55. ABCD is a trapezium in which AB is parallel to CD. The sides AD and BC when extended, intersect at point E. If AB = 2 cm, CD = 1 cm, and perimeter of ABCD is 6 cm, then the perimeter, in cm, of △AEB is

A) 8

B) 10

C) 9

D) 7

Answer: A (8 cm)

Solution:

Since AB || CD and AB = 2CD, triangles AEB and DEC are similar with ratio 2:1. So D is the midpoint of AE and C is the midpoint of BE.

Let AD = x, BC = 3 − x (since AB + CD + AD + BC = 6 → AD + BC = 3).

DE = x (since D is midpoint of AE), CE = 3 − x (since C is midpoint of BE). AE = 2x, BE = 2(3−x) = 6−2x.

Perimeter of △AEB = AE + BE + AB = 2x + (6−2x) + 2 = 8 cm. This is independent of x!

Q56. 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) 90000

C) 80000

D) 85000

Answer: A (Rs. 95000)

Solution:

Let the four groups (each 10 employees) have total bonuses: A_1, A_2, A_3, A_4. Given: $(A_1+A_2+A_3)/30 = 40000 \rightarrow A_1+A_2+A_3 = 1,200,000$; $(A_2+A_3+A_4)/30 = 60000 \rightarrow A_2+A_3+A_4 = 1,800,000$; $(A_1+A_4)/20 = 50000 \rightarrow A_1+A_4 = 1,000,000$.

Adding first two: $(A_1+A_4) + 2(A_2+A_3) = 3,000,000 \rightarrow 2(A_2+A_3) = 2,000,000 \rightarrow A_2+A_3 = 1,000,000$. So $A_1 = 200,000$, $A_4 = 800,000$.

In 2023: A_1 doubles → 400,000; A_4 triples → 2,400,000; A_2+A_3 unchanged → 1,000,000. Total = 400,000 + 1,000,000 + 2,400,000 = 3,800,000. Average = 3,800,000 / 40 = Rs. 95,000.

Q57. 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

Answer: 139 days

Solution:

Let work rates be A, V, S per day. A+V = T/150; V+S = T/300 (T = 300V). 75A + 135V + 45S = T.

From conditions: S = 2V (using (1)+(2) and substituting). Total work T = 300V. A = V.

New scenario: In each 6-day cycle: Amal works 6 days (6V), Vimal works 3 days (3V), Sunil works 2 days (4V). Work per cycle = 13V.

23 complete cycles = 23 × 6 = 138 days, completing 23 × 13V = 299V. Remaining = 1V. On day 139, Amal works (V per day ≥ 1V). Total = 139 days.

Q58. All the values of x satisfying the inequality $[1/(x+5)] \leq [1/(2x-3)]$ are

A) $x < -5$ or $3/2 < x \leq 8$

B) $-5 < x < 3/2$ or $x > 3/2$

C) $x < -5$ or $x > 3/2$

D) $-5 < x < 3/2$ or $3/2 < x \leq 8$

Answer: A ($x < -5$ or $3/2 < x \leq 8$)

Solution:

Critical points: $x = -5$ (denominator of LHS) and $x = 3/2$ (denominator of RHS).

Region I ($x > 3/2$): Both sides positive. Cross-multiplying: $2x-3 \leq x+5 \rightarrow x \leq 8$. Valid range: $(3/2) < x \leq 8$. ✓

Region II ($-5 < x < 3/2$): RHS is negative, LHS positive. Inequality fails (positive ≤ negative). ✗

Region III ($x < -5$): Both sides negative. Same boundary as Region I: $x \leq 8$, but $x < -5$ already satisfies this. Valid range: $x < -5$. ✓

Solution: $x < -5$ or $3/2 < x \leq 8$.

Q59. 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) 20860

B) 20640

C) 20480

D) 20808

Answer: D (Rs. 20808)

Solution:

Anil's amount after 6 years = $22000 \times (1.02)^{12}$ (4% p.a. compounded half-yearly = 2% per half-year, 12 periods).

Let Sunil's investment = P. After 5 years = $P \times (1.02)^{10}$. After 1 year at 10% SI = $P(1.02)^{10} \times 1.1$.

Setting equal: $P \times (1.02)^{10} \times 1.1 = 22000 \times (1.02)^{12}$. $P = 22000 \times (1.02)^2 / 1.1 = 22000 \times 1.0404 / 1.1 = 22888.8 / 1.1 \approx$ Rs. 20808.

Q60. 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

travelled 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 : 30 pm

B) 7 : 00 pm

C) 9 : 00 pm

D) 10 : 30 pm

Answer: A (7:30 pm)

Solution:

Let scheduled time = t hours, distance = D km, scheduled speed = D/t.

Day 2: Two-thirds distance in one-third time → speed for first part = (2D/3) / (t/3) = 2D/t. Remaining one-third distance in two-thirds time → 40 km/h. So D/3 = 40 × (2t/3) → D = 80t.

Day 1: Distance = 60 × (t + 3.5) = 80t → 60t + 210 = 80t → 20t = 210 → t = 10.5 hours.

Scheduled arrival = 9 am + 10.5 hours = 7:30 pm.

Q61. If m and n are natural numbers such that n > 1, and $m^n = 2^{25} \times 3^{40}$, then m − n equals

A) 209932

B) 209937

C) 209942

D) 209947

Answer: D (209947)

Solution:

m^n = $2^{25} \times 3^{40}$. We need m^n to be a perfect power. Factor 40 and 25 have GCD = 5.

Try n = 5: m = $2^5 \times 3^8$ = 32 × 6561 = 209952. m − n = 209952 − 5 = 209947.

Verification: $(209952)^5 = (2^5 \times 3^8)^5 = 2^{25} \times 3^{40}$. ✓

Q62. When 3^{333} is divided by 11, the remainder is

A) 5

B) 10

C) 1

D) 6

Answer: A (5)

Solution:

Find the pattern of 3^k mod 11: 3^1=3, 3^2=9, 3^3=27≡5, 3^4=15≡4, 3^5=12≡1 (mod 11). Period = 5.

333 = 5 × 66 + 3. So $3^{333} \equiv 3^3 = 27 \equiv 5 \pmod{11}$.

The remainder is 5.

Q63. If x and y are real numbers such that $4x^2 + 4y^2 - 4xy - 6y + 3 = 0$, then the value of (4x + 5y) is

Answer: 7

Solution:

Complete the square: $4x^2 - 4xy + y^2 + 3y^2 - 6y + 3 = 0$.

$= (2x - y)^2 + 3(y^2 - 2y + 1) = 0$

$= (2x - y)^2 + 3(y - 1)^2 = 0$.

Both squares = 0 (since they are non-negative). So $y = 1$ and $2x - y = 0 \rightarrow x = 1/2$.

$4x + 5y = 4(1/2) + 5(1) = 2 + 5 = 7$.

Q64. If $(x + 6\sqrt{2})^{(1/2)} - (x - 6\sqrt{2})^{(1/2)} = 2\sqrt{2}$, then x equals

Answer: 11

Solution:

Let $A = \sqrt{(x + 6\sqrt{2})}$, $B = \sqrt{(x - 6\sqrt{2})}$. Given $A - B = 2\sqrt{2}$.

Squaring: $(A - B)^2 = 8 \rightarrow A^2 + B^2 - 2AB = 8 \rightarrow (x + 6\sqrt{2}) + (x - 6\sqrt{2}) - 2AB = 8 \rightarrow 2x - 2AB = 8$.

$AB = \sqrt{((x + 6\sqrt{2})(x - 6\sqrt{2}))} = \sqrt{(x^2 - 72)}$. So $2x - 2\sqrt{(x^2 - 72)} = 8 \rightarrow x - 4 = \sqrt{(x^2 - 72)}$.

Squaring: $(x-4)^2 = x^2 - 72 \rightarrow x^2 - 8x + 16 = x^2 - 72 \rightarrow 8x = 88 \rightarrow x = 11$.

Q65. 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

Answer: 7

Solution:

Let Q-R paths = b, R-S paths = a, P-to-S via Q = 3 × 4 = 12; via R = 4a; via Q then R = 3 × b × a. Total = $12 + 4a + 3ab = 62 \rightarrow 4a + 3ab = 50$. ①

Q-to-R directly = b; via P = 12; via S = 4a. Total = $b + 12 + 4a = 27 \rightarrow 4a + b = 15$. ②

From ① and ②: $3ab - b = 35 \rightarrow b(3a - 1) = 35$. Possible (a,b): (1,35/2) ✗; (2,7) ✓ check: 4(2)+7=15 ✓, 8+42=50 ✓; (5,2.5) ✗; (6,1.4) ✗.

With a = 2, b = 7. Number of direct paths between Q and R = 7.

Q66. If x and y satisfy the equations $|x| + x + y = 15$ and $x + |y| - y = 20$, then $(x - y)$ equals

A) 20

B) 15

C) 5

D) 10

Answer: B (15)

Solution:

Check four quadrant cases:

Case (x > 0, y < 0): Equations become: 2x + y = 15 and x − 2y = 20. Solving: 2x + y = 15 and x − 2y = 20.

From second: x = 20 + 2y. Substituting: 40 + 4y + y = 15 → 5y = −25 → y = −5, x = 10. Check x > 0 ✓, y < 0 ✓. x − y = 10 − (−5) = 15.

Q67. 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 : 3

B) 3 : 5

C) 5 : 4

D) 4 : 5

Answer: B (3 : 5)

Solution:

After adding water: solution has 50% acid. Let total volume at this stage = 2T (T acid, T water). After adding 15L acid: acid = T + 15, total = 2T + 15. Concentration = (T+15)/(2T+15) = 0.8 → T + 15 = 1.6T + 12 → 3 = 0.6T → T = 5.

So after adding water: 5L acid and 5L water. Before adding water: 5L acid and 5−2 = 3L water. Ratio water:acid = 3:5.

Q68. The sum of the infinite series $(1/5)*((1/5) - (1/7)) + (1/5)^2*[(1/5)^2 - (1/7)^2] + (1/5)^3*[(1/5)^3 - (1/7)^3] + \ldots$ is equal to

A) 7/816

B) 5/408

C) 7/408

D) 5/816

Answer: B — 5/408

Solution:

Expanding the series: $[(1/5)^2 + (1/5)^4 + (1/5)^6 + \ldots] - [(1/5)*(1/7) + (1/5)^2*(1/7)^2 + \ldots]$

$= [(1/5)^6 + (1/5)^6 + \ldots] - \ldots$

First series (GP, ratio = $(1/5)^2$): Sum = $(1/25)/(1 - (1/25)) = (1/25)/(24/25) = 1/24$.

Second series (GP, ratio = (1/35)): Sum = $(1/35)/(1 - (1/35)) = (1/35)/(34/35) = 1/34$.

Answer = $(1/24) - (1/34) = 34/(24\times34) - 24/(24\times34) = 10/816 = 5/408$.
