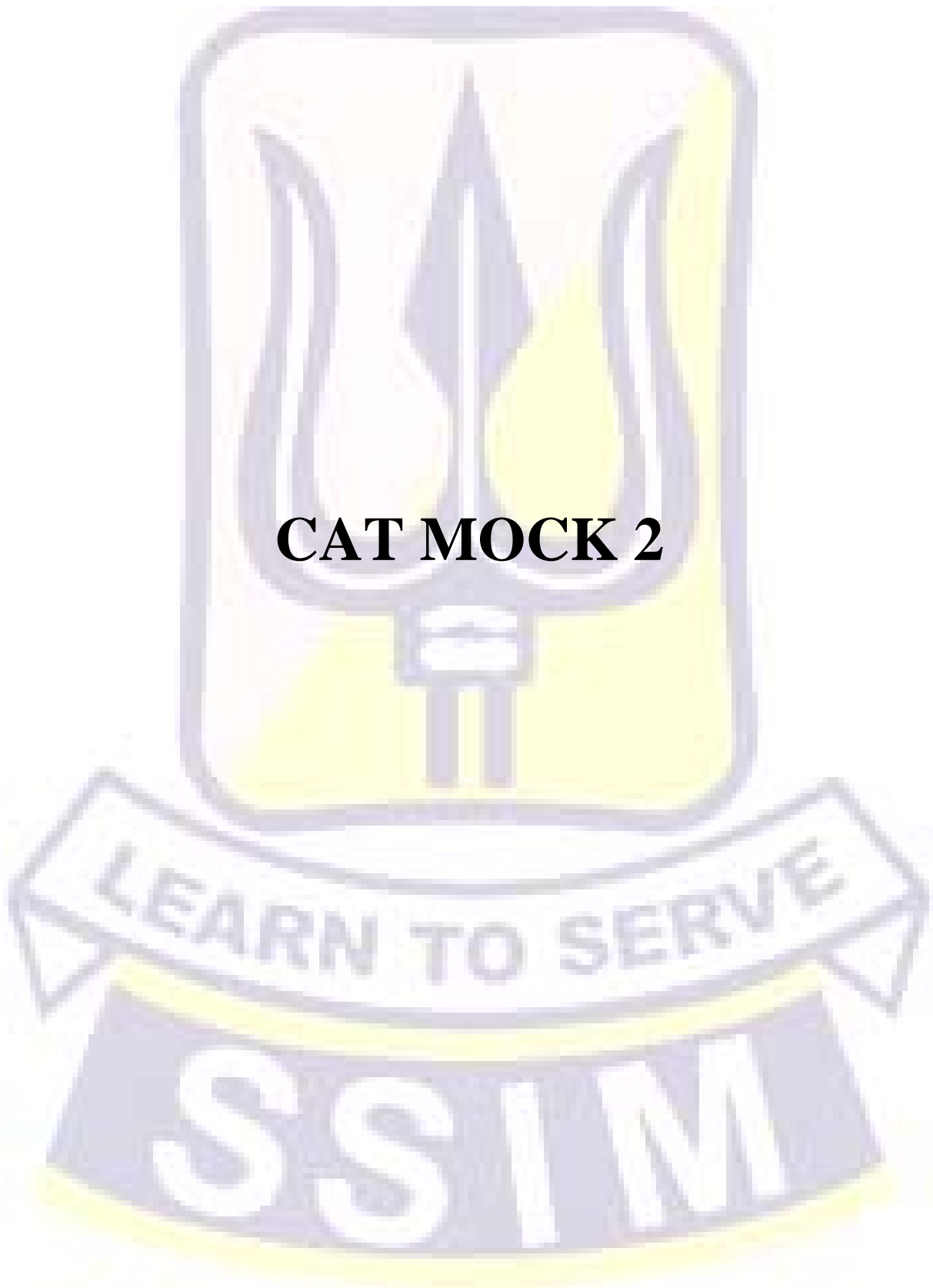# CAT MOCK 2

CAT MOCK 2

(1-4) Read the following passage and answer the questions that follow:

Assuming it therefore as an established truth that the several States, in case of disunion, or such combinations of them as might happen to be formed out of the wreck of the general Confederacy, would be subject to those vicissitudes of peace and war, of friendship and enmity, with each other, which have fallen to the lot of all neighboring nations not united under one government, let us enter into a concise detail of some of the consequences that would attend such a situation.

War between the States, in the first period of their separate existence, would be accompanied with much greater distresses than it commonly is in those countries where regular military establishments have long obtained. The disciplined armies always kept on foot on the continent of Europe, though they bear a malignant aspect to liberty and economy, have, notwithstanding, been productive of the signal advantage of rendering sudden conquests impracticable, and of preventing that rapid desolation which used to mark the progress of war prior to their introduction. The art of fortification has contributed to the same ends. The nations of Europe are encircled with chains of fortified places, which mutually obstruct invasion. Campaigns are wasted in reducing two or three frontier garrisons, to gain admittance into an enemy's country. Similar impediments occur at every step, to exhaust the strength and delay the progress of an invader. Formerly, an invading army would penetrate into the heart of a neighboring country almost as soon as intelligence of its approach could be received; but now a comparatively small force of disciplined troops, acting on the defensive, with the aid of posts, is able to impede, and finally to frustrate, the enterprises of one much more considerable. The history of war, in that quarter of the globe, is no longer a history of nations subdued and empires overturned, but of towns taken and retaken; of battles that decide nothing; of retreats more beneficial than victories; of much effort and little acquisition.

In this country the scene would be altogether reversed. The jealousy of military establishments would postpone them as long as possible. The want of fortifications, leaving the frontiers of one state open to another, would facilitate inroads. The populous States would, with little difficulty, overrun their less populous neighbors. Conquests would be as easy to be made as difficult to be retained. War, therefore, would be desultory and predatory. Plunder and devastation ever march in the train of irregulars. The calamities of individuals would make the principal figure in the events which would characterize our military exploits.

This picture is not too highly wrought; though, I confess, it would not long remain a just one. Safety from external danger is the most powerful director of national conduct. Even the ardent love of liberty will, after a time, give way to its dictates. The violent destruction of life and property incident to war, the continual effort and alarm attendant on a state of continual danger, will compel nations the most attached to liberty to resort for repose and security to institutions which have a tendency to destroy their civil and political rights. To be more safe, they at length become willing to run the risk of being less free.

1. Which of the following can be said to be the motive of the author behind writing the passage?

A. To emphasize the fact that the purpose of having a military is not to fight wars, but to prevent them.

B. To explain that each stake in his country should have a military of its own since it would turn out to be helpful if the country dissolves.

C. To explain that if his country breaks down into individual states, the consequences will not be pleasant.

D. To emphasize that though having a military in his country has considerable ill-effects, the benefits outweigh the cons.

Sol. The entire passage explains what would happen if the states of the nation the author belongs to break away from the union. The purpose of the passage is not to promote the idea of breaking away from the union. Rather, it is to warn about the repercussions if such an incident occurs. The author uses Europe merely as an illustration and to explain how the fate of the states of his country would be different from that of the European Nations. Therefore, the purpose of the passage is to warn the readers that the results of the dissolution of the country will not be pleasant. Therefore, option C is the right answer.

2. 4 hypothetical statements are given below. Which of the following statements can definitely be said to be false using the information given in the passage?

A. The country that the author is describing is a union of states.

B. The country described by the author is located in Europe.

C. The country that the author is describing is in the middle of a civil war.

D. Each state in the country wants to have a separate military of its own.

Sol. In the passage, the author uses the term "in that quarter of the globe" while describing Europe. The sentence conveys that the country that the author is from is located at a considerable distance from Europe. Therefore, option B is definitely false and hence, it is the right answer.

3. Why does the author give the example of European nations?

A. To explain how the nature of war has changed over the years in European nations due to fortifications and a strong military.

B. To illustrate how having a strong military presence can often act as a B deterrent to wars.

C. To explain how his country is ill-prepared to face a war as compared to the European nations.

D. To explain that the fate of the states of his country will be different from that of the European nations if the country dissolves.

Sol. The author explains how the European nations co-exist due to their strong military presence and fortifications. Due to these 2 advancements, wars in Europe are mostly limited to capturing and recapturing cities. The author explains how these 2 advancements have made wars less brutal. As the states of his country lack both, it will result in never ending wars, plunders, consecutive captures and recaptures of places. The author gives the example of

Europe to illustrate that the fate of the states will be very different from that of the European nations. Therefore, option D is the right answer.

4. Which of the following is not a valid inference that can be made on reading the passage?

A. The author believes that the need for safety would undermine the sense of nationalism.

B. The author is of the view that the presence of a military undermines the values of liberty.

C. The author does not believe that the lack of military establishments would be a permanent feature.

D. The wars prior to the development of military in the European Nations resulted in quick captures.

Sol. From the line "though they bear a malignant aspect to liberty and economy,", we can infer that the author is of the view that the presence of military undermines liberty. From the line 'Of preventing that rapid desolation which used to mark the progress of war prior to their introduction', we can infer that the wars before the development of military resulted in quick captures.

Before talking about safety and liberty in the last paragraph, the author uses the line "This picture is not too highly wrought; though, I confess, it would not long remain a just one". Thus, we can infer that the author believes that the situation described will quickly lead to the establishment of military fortifications.

Nowhere in the passage does the author suggest that there is a trade-off between nationalism and need for safety. Hence, option A is not a valid inference.

(5-8) Read the passage given below and answer the following questions.

Here is an undeniable but seldom-stated fact: The quickest way to destroy terrorism as a tool would be to institute a news media policy of information blackout regarding terrorist attacks. The terrorist act itself only creates a few corpses (9/11 notwithstanding). But it is actually the dissemination of information which creates the state of terror among the population.

Of course, in the age of social media we could never implement such a policy. But it's worth noting that our collective addiction to information—and the inability of for-profit media to pull itself away from ratings—that creates among the collective brain of our population, a deep susceptibility to be terrorized.

There is actually one way in which we already, tacitly recognize the role of media in creating and aiding terror. In the wake of mass shootings, assassination attempts, and other kinds of "high profile" acts, the media itself is sensitive to the role it plays in potentially spurring on "copycat" attacks. I've seen this kind of thing discussed since Columbine, and perhaps even before. Yet I've never seen anyone pull on the thread and unravel it all the way down to its core, to ask: "What if our media itself is the medium which makes mass terrorism possible?"

Media coverage is the oxygen that sustains this fire. Media does the terrorizing, more than any particular act. When Jihadi John slits a throat in a country on the other side of the world,

how is his knife, and how is that throat, any different than the thousands of people around the world who are murdered by knives and bullets on a daily basis?

Our modern information dissemination structures themselves amplify this act and weave it into the fabric of our national story. We have come to rely on this legacy mechanism of "journalism" and "news reporting" for sense-making about the world. We've tacitly ceded control of narrative creation about our tribe from the priests over to a for-profit complex of radio, print, TV, web, etc. And this entire edifice—of top-down, broadcast synchrony of a singular, dominant narrative—has a particular failure mode. Since it has no explicit control (it is an emergent hive of activity), and since it has no actual architecture that would prevent it from catastrophic, systemic failure, it can get hijacked. Very easily.

That vulnerability, when exploited by jihadist groups, creates a standing wave pattern, namely, the fear of random acts of violence. But terrorism, by definition, is the creation of a state of fear or hysteria among a population. ISIL doesn't operate any radio towers in the US, nor does it configure internet routers in our data centers. Jihadists kill people—that is true. But our media environment creates and sustains the sense of terror.

Peter Wang

5. Which of the following would contradict the author's main argument?

A. The media self-censors itself to provide privacy to victims and their families.

B. Media provides information during terrorist attacks that can prevent people from going to that area.

C. The awareness that media creates against terrorism is instrumental in preventing youths from joining terrorist organisations.

D. Countries that ban reporting of terrorist attacks face as many terror attacks as those that don't.

Sol. The author's main argument is that terrorism exists because of media coverage - that media coverage is the oxygen that sustains that fire. It encourages more terror attacks. If option D is true, the assertion is completely refuted. If the number of terror incidents are the same with or without media coverage then media coverage does not encourage terrorism.

The other options, though in favour of media coverage, do not directly refute the main assertion. Thus, option D is the correct answer.

6. Why does the author cite the example of 'Jihadi John'?

A. To explain how the hype created by media gives more attention to some attacks than others.

B. To show how the media causes 'copycat' attacks.

C. To show that terrorism is not that widespread but receives a disproportionate amount of attention.

D. To question why terrorist attacks in other countries receive more attention than those at home.

Sol. Read the following lines: "Media coverage is the oxygen that sustains this fire. Media does the terrorizing, more than any particular act. When Jihadi John slits a throat in a country on the other side of the world, how is his knife, and how is that throat, any different than the thousands of people around the world who are murdered by knives and bullets on a daily basis?". From these lines we can infer that Jihadi John is mentioned to explain why some deaths are given more attention than others. So, Option A is correct. Option B is incorrect because 'copycat' attacks have been mentioned in the earlier paragraph and the example of Columbine Shooting was given for them. Option C is incorrect because the author does not believe terrorism is not widespread. Option D is incorrect because although the 'Jihadi John' attack happened in a foreign nation, the author is speaking of all attacks.

7. What is the purpose of the penultimate paragraph?

A. To explain how modern dissemination structures are different from the ones that existed earlier.

B. To argue against allowing media to set the national narrative.

C. To highlight the fact that media's narrative setting ability can easily be hijacked.

D. To illustrate how easy it is to manipulate the media.

Sol. In the paragraph, the author first mentions how media now has the ability to set the narrative. Then she goes on to show that the current information dissemination structure has vulnerabilities that can be exploited by people so that they can hijack the narrative. Hence, through the paragraph, the author highlights how people can exploit the vulnerabilities in media's information dissemination mechanism to set the narrative. Thus, option C is the right answer.

Option A is incorrect because previous dissemination structures have not been mentioned in the passage.

Option B is incorrect as the author does not say that the media should not be allowed to set the national narrative.

Option D is incorrect as the author provides no illustration of manipulation.

Hence, option C.

8. Which of the following cannot be inferred from the passage?

A. No one in the media acknowledges the role played by it in mass terrorism.

B. The media takes partial responsibility for 'copycat' attacks.

C. Media creates fear of terrorism amongst people.

D. Jihadi John was heavily publicized.

Sol. The author has stated in the passage that "Yet I've never seen anyone pull on the thread and unravel it all the way down to its core, to ask: "What if our media itself is the medium which makes mass terrorism possible?"". But from this we cannot infer that no one in media acknowledges the role by it in spurring mass terrorism. We can only infer that the author has not seen anyone in media discuss this publicly. Hence, option A cannot be inferred.

Option B is incorrect because the media does take responsibility for 'copycat attacks'. This can be understood from the lines "There is actually one way in which we already, tacitly recognize the role of media in creating and aiding terror. In the wake of mass shootings, assassination attempts, and other kinds of "high profile" acts, the media itself is sensitive to the role it plays in potentially spurring on "copycat" attacks."

Option C is incorrect because explaining this is the primary purpose of the passage. Option D can be inferred from the lines "Media coverage is the oxygen that sustains this fire. Media does the terrorizing, more than any particular act. When Jihadi John slits a throat in a country on the other side of the world, how is his knife, and how is that throat, any different than the thousands of people around the world who are murdered by knives and bullets on a daily basis?". Hence, we can eliminate option D.

(9-12) Read the passage and answer the questions that follow.

Discussions over misinformation, disinformation, and 'fake news' have reignited interest in news literacy. A wide range of different actors — from educators to technology companies — believe that raising news literacy would make people better able to separate fact from fiction, potentially limiting the spread of false information and leaving them better equipped to navigate partisan media environments. Others, however, have struck a note of caution by arguing that we need to think carefully about what news literacy should look like. In the past, news literacy largely meant teaching people to be sceptical or giving them ways of questioning the stories told by the mass media. How useful are such skills in a world where many believe that trust in institutions, including the news media, is already dangerously low? The answer lies in considering the relationship between trust and news literacy. Many people hope that increasing overall levels of news literacy will reverse the decline in news trust we see in many countries as people will have better judgement. This sounds like a reasonable assumption, but news literacy may also go hand in hand with a high degree of scepticism. Even if we focus on news production, the more people know about how the news is made, the more knowledgeable they will be about its limitations and imperfections. This may be why we see only a very small increase in trust levels as news literacy increases. We must also consider the possibility that those with higher levels of news literacy may rely less on social media for news, yet they appear to be more discerning when they do use it. When deciding whether to click through to a story, they are more likely to pay attention to a range of different credibility cues. Compared to those with lower levels of news literacy, they are more likely to say that the news brand, the headline, and the person who shared the story are important in deciding whether it is worth their time.

The exception to this rule is the number of comments, likes, or shares, which is the least important cue across all groups but is more important among those with the lowest level of news literacy. However, they are also less likely to share or comment on news themselves, so the simple idea that low-quality news is primarily spread by people with low news literacy may only be partly true. The use of social media for news has often been associated with more diverse news diets, increases in political participation, and modest depolarization of political attitudes. So as search engines and social media become more important to the news

ecosystem, any attempt to raise news literacy should also aim to improve the knowledge of both the positive and negative outcomes.

Richard Fletcher [This article has been altered]

9. Which of the following statements is the author most likely to disagree with?

A. The number of comments, likes, or shares is a relatively unimportant factor for people with higher news literacy in sharing news.

B. There is a positive correlation between the levels of news literacy and trust in news.

C. The tendency to spread news increases with increase in news literacy.

D. News literacy campaigns should aim to increase skepticism of stories on social media but not on mass media.

Sol. The author does not distinguish between the two sources in terms of which source a reader should trust more. Moreover, the author says that use of social media for news does have a lot of positive outcomes. Therefore, the author is unlikely to agree with the statement in option D which is biased towards mass media over social media.

Option A is incorrect as we can see from the lines "The exception to this rule is the number of comments, likes, or shares, which is the least important cue across all groups, but is more important among those with the lowest level of news literacy." We can see that it is a relatively unimportant factor.

From the lines " This may be why we see only a very small increase in trust levels as news literacy increases." we can infer that though these two factors are not strongly correlated, the correlation is positive. That means, increase in levels of news literacy, increases trust levels slightly and vice versa.

From the line "However, they are also less likely to share or comment on news themselves, so the simple idea that low-quality news is primarily spread by people with low news literacy may only be partly true", we can infer that people with low levels of news literacy generally do not spread news. Thus, we can infer that people with higher levels of news literacy are more like to comment on and share news. Thus, option C would be true.

10. According to the passage, why is there a very small increase in trust levels as news literacy increases?

A. Increase in transparency lays bare the imperfections and limitations of news production.

B. News literacy encourages people to treat all news with skepticism and given the low levels of trust in news organisations, this creates an environment of mistrust.

C. Increase in transparency increases trust while knowledge of the limitations of the news production process encourages skepticism.

D. Increase in news literacy makes people more discerning and less mistrustful while knowledge of news production process encourages skepticism.

Sol. There are two factors that counteract each other when it comes to news literacy and trust. Increase in news literacy reduces blind mistrust of news media. On the other hand, it also exposes the limitations in news production which increases skepticism about news. The first factor increases trust while the second factor reduces trust. Acting together, there is an overall increase in trust with increase in news literacy but this gain is very little. The correct option should identify both the forces. Hence, we can eliminate options A and B.

Between options C and D, option C incorrectly identifies the cause for increase in trust. Increase in news literacy increases trust because people are able to rely on their own judgement regarding the veracity of the news. Thus, the correct answer is option D.

11. 'Low-quality news is primarily spread by people with low news literacy.' What can be said about this statement?

A. The author believes this statement is false.

B. The author believes this statement is true.

C. The author believes this statement may or may not be true.

D. The author's opinion on this statement has not been given in the passage.

Sol. Look at the following lines "The exception to this rule is the number of comments, likes, or shares, which is the least important cue across all groups, but is more important among those with the lowest level of news literacy. However, they are also less likely to share or comment on news themselves, so the simple idea that low-quality news is primarily spread by people with low news literacy may only be partly true." From these we can see that the author believes that this statement is only partly true, so Option C is most accurate. Option A is incorrect because the author does not say that people with low literacy DO NOT spread low quality news. Option B is incorrect because he says the statement is only PARTLY true. Option D is incorrect because his opinion has been given in the passage.

12. Which of the following is a person with higher news literacy least likely to read?

A. A Facebook post of a trending news article shared by over a million people.

B. An Instagram post on recent events shared by a trusted friend.

C. A news blog shared on Twitter by a reliable journalist.

D. A leading magazine at a newspaper-stand with a sensational cover story.

Sol. From the passage, we can understand that a person with higher news literacy would consider factors like the news brand, the headline, and the person who shared the story over things like the number of comments, likes, or shares.
Option B: Being shared by a trusted friend would increase the reliability of the content. Hence, it is unlikely that this would be avoided by a person with higher news literacy.
Option C: A news blog shared by a reliable journalist will have better news brand factor. Hence, it is unlikely that this would be avoided by a person with higher news literacy.
Option D: Though the cover story would factor in as a good headline, it is not on social media. The factors given can be accounted only for social media. Hence, we cannot consider

this.

Option A: Since the only information we have is the number of likes which is a factor that would be less prefered by a person with higher news literacy is less likely to consider. Hence, the correct answer is Option A.

(13-16) Read the following passage and answer the set of five questions that follow.

Those who speak out against bad treatment are often dismissed as 'playing the victim', accused of dwelling on imagined slights or indulging in an exaggerated sense of grievance. In the face of ridicule or, worse, the threat of violence, it would be easier to keep quiet. And yet, victims of injustice often do speak up: far from any desire for glory, they are often morally motivated, and act from a sense of duty.

Someone who is subjected to demeaning treatment might owe it to herself to protest and to undermine the apparatus of assumptions, stereotypes and norms that enable this treatment. But, importantly, she might also owe it to others who are vulnerable to similar treatment - fellow victims - to resist the injustices they face collectively and repeatedly. This is especially the case for what the US political theorist Iris Marion Young in 2003 called structural injustices, which are perpetuated through seemingly benign institutions, everyday practices, background assumptions and expected behaviours. Even where there is no explicit discriminatory policy, in fact when such discrimination is publicly, repeatedly and earnestly disavowed, oppression on the basis of, for example, class, race and sex prevails.

Such structural injustice is manifested in a number of ways, from lower life expectancies and the prevalence of sexual and intimate partner violence, to the perception of diminished competence in the workplace and casual condescension in conversation. Structural injustice is typically characterised by ambiguity. It is often unclear whether a particular interaction is, in fact, a manifestation of structural injustice. It is also unclear how to delineate between perpetrators, bystanders and victims, given that so many of the mechanisms of structural injustice are unconscious, driven by social norms as much as by individuals, such that victims can be complicit in their own oppression, and that victims of one form of injustice can be perpetrators of another. And finally, it is unclear what a remedy would consist of.

The insidiousness of structural injustice rests on this ambiguity. Often, there is no intentional wrongdoing as such; perpetrators are unaware of their wrongdoing, and might genuinely disavow the values and norms implicit in their conduct. To bystanders, nothing noteworthy has taken place. The insult is unseen and unheard - except perhaps by those on the receiving end. In such cases, victims are epistemically privileged: they are aware that some set of seemingly benign norms or behaviour are in fact wrongs, they are aware that these norms might be harmful, and they notice when this harm is being done. In effect, they might be the only bystanders aware of the wrongdoing and therefore in a position to seek a remedy; in such cases, they will have a prima facie duty to do so. Unlike self-regarding duties, this duty is owed primarily to the class of victims, actual and prospective, who face wrongful treatment. For well-meaning but fallible individuals aiming to do right, victims potentially play a crucial role in helping them realise that aim; for fellow victims, they are collaborators in curing unjust practices and institutions.

Ashwini Vasanthakumar

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13. Last paragraph of the passage suggests that

A. victims are epistemically privileged because they are at the receiving end of the unjust treatment and are privy to the unseen and unheard insults.

B. victims are responsible for discrimination against them and it is their duty to stand united and act sternly against their perpetrators.

C. perpetrators and bystanders may be ignorant of the harm caused by structural injustice, but victims are aware of it, and thus they need to speak up about it.

D. victims seeking a remedy to the oppression faced by them are not self-centred; rather they are serving the society as a whole by speaking out loud and clear.

Sol. "Often, there is no intentional .... in their conduct."

"they are aware that ....harm is being done."

"In effect, they might be........................prima facie duty to do so. "

From these lines, option C can be inferred.

Option A does not mention that since victims know the insults and unjust practices, they can seek a remedy to the problem and this is the real reason they are epistemically privileged.

Option B blatantly holds victims to be responsible for injustices against them which is not suggested in the passage.

The second part of option D is wrong. Victims seek a remedy to the discriminatory practices which serves the victim class, and not the society as a whole because even bystanders and perpetrators are part of the society.

Hence, option C is the correct answer.

14. Which of the following is correct about 'structural injustice'?

A. The sources of structural injustice are ambiguous.

B. Sometimes victims may themselves be responsible for structural injustice against them.

C. There is no difference between perpetrators, bystanders and victims in the case of structural injustice.

D. Although structural injustice is manifested in a number of ways, ambivalence is the characteristic that binds all of them.

Sol. It is given in the passage that structural injustice is characterised by ambiguity. From this statement, inferring that the sources of structural injustice are ambiguous, would at best be an exaggeration. Option A is incorrect.
In the last few lines of the penultimate paragraph, it has been stated that victims can be complicit in their own oppression. Option B is correct.
The author mentions that the difference between perpetrators, bystanders and victims is not clear. She does not say that there is no difference at all. Option C is a distortion.

It is true that structural injustice is manifested in many ways. Also, structural injustice is typically characterised by ambiguity. However, to state that ambivalence binds all the structural injustices would need more evidence in support than provided in the passage. Option D is also an exaggeration due to the word 'all'.
Hence, option B is the correct answer.

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

I: It is the responsibility of the victim to speak out loud against any discrimination he/she faces.
II: The measures to rectify structural injustices are often obscure.
III: Accusing people of dwelling on imagined slights or indulging in an exaggerated sense of grievance is used to deter people from speaking out against injustice

A. I only

B. I and II only

C. I, II and III

D. II and III only

Sol. In the second paragraph, the author states that the victims have a duty to speak against any injustice against them. Statement I can be inferred.
From the last line of the third paragraph, statement II can be inferred.
It has been mentioned in the passage that people are accused of exaggeration and playing victims to garner sympathy. However, we cannot infer that this is done with the intention of preventing people from speaking out. Nothing of that sort has been implied in the passage. Statement III cannot be inferred.
Hence, option B is the correct answer.

16. As per the author, which of the following is a misconception about people who are referred to as 'playing the victim'?

A. Victims, who speak out about discrimination against them, are often motivated by a need for attention.

B. Victims, who speak out about injustice done to them, are driven by the ulterior motive of teaching the perpetrator a lesson.

C. Victims, who speak out about injustice done to them, have a strong will to protect others from experiencing the same.

D. Victims, who speak out about unfairness against them, perceive keeping quiet as the easier option.

Sol. The keyword in the question is 'misconception'.
From the first sentence of the passage, we can infer that speaking about injustice is often misconstrued as a way to get positive attention. Then the author clears up the misconception by saying that victims don't speak up for "glory" but from a sense of duty. Thus, option A, which highlights this misconception would be the right answer.
It is nowhere mentioned in the passage that victims have an ulterior motive of teaching

perpetrators a lesson. Option B is out of the scope of the passage.

Option C: The author mentions that the victims have a duty to seek remedy against unjust practices because they are aware of the wrongdoings. However, it can not be considered as misconception.

Option D is what the author thinks and not what victims believe.

Hence, option A is the correct answer.

17. The passage given below is followed by four summaries. Choose the option that best captures the author's position.

Anxiety is not the same as fear. Although people experiencing anxiety are often afraid of both the anxiety and what they presume to be its cause, these two states have different triggers. Anxiety, unlike real fear, is always caused by uncertainty. It is caused, ultimately, by predictions in which you have little confidence. When you predict that you will be fired from your job and you are certain the prediction is correct, you don't have anxiety about being fired. You might have anxiety about the things you can't predict with certainty, such as the ramifications of losing the job. Predictions in which you have high confidence free you to respond, adjust, feel sadness, accept, prepare, or to do whatever is needed.

A. Anxiety is caused by uncertainty and lack of confidence in predictions; Better predictions free a person from anxiety and allow them to respond appropriately.

B. Anxiety, unlike fear, is always caused by uncertainty; when we have little confidence in our predictions, we suffer from anxiety which prevents us from responding to the situation.

C. Anxiety can be eliminated by focusing on a decision's known aspects rather than being worried about the uncertain aspects.

D. Anxiety precedes fear; anxiety, caused by the fear of uncertainty, can be reduced by improving our prediction, thus increasing our certainty.

Sol. In the passage, the author states that anxiety and fear are different and are triggered differently. Anxiety is always caused by uncertainty, i.e., predictions that we have very little confidence in. When we have confidence in our predictions, we are freed from anxiety and then we can respond and adjust to the situation. Option A captures both aspects and hence is the right answer.

Option B misses the key point of how better predictions free a person from anxiety.

Option C talks about known aspects of a *decision*, which is tangential to the discussion.

Option D states that anxiety precedes fear- this inference cannot be drawn.

18. Read the following paragraph and choose the option that best captures its essence:

Social scientists have been asking for decades whether boastful, self-aggrandising beliefs and behaviours are beneficial to those who make such claims. According to one school of thought, claiming to be better than others *feels good*, and when we feel good, we are happier and better adjusted. This argument suggests that bragging to others can satisfy the motive to craft and maintain a positive self-image. According to another line of research, however, consistently viewing oneself as superior entails a distortion of reality. Inaccurate individuals with low self-

knowledge have weaker relationships and a tendency to make riskier decisions than their accurate, self-aware counterparts.

Patrick Heck

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A. Bragging can make us feel good in the short run but distorts our reality and leads us to make risky decisions in the long run.

B. While some believe that bragging can make us feel good by projecting a positive self-image, others believe it distorts our reality.

C. One must strike a balance while bragging as it can make us feel good, happy, and adjusted but at the same time distorts our reality.

D. Social scientists believe that though bragging can help us maintain a positive self-image, it can also distort our reality, leading to risky decisions.

Sol. In the paragraph, the author explores whether boastful, self-aggrandising beliefs and behaviours are beneficial to those who make such claims.

He presents the views of two schools of thought.

One group believes that bragging to others can satisfy the motive to craft and maintain a positive self-image, which makes us happy.

The other group believes that consistently viewing oneself as superior entails a distortion of reality.

Option B captures the essence of this. Hence, it is the correct answer.

19. Read the following paragraph and choose the option that best captures its essence:

That Nicholson would have carried out his intention if the council had come to a different conclusion I have not the slightest doubt, and I quite believe that his masterful spirit would have effected its purpose and borne down all opposition. Whether his action would have been right or wrong is another question, and one on which there is always sure to be great difference of opinion. At the time it seemed to me that he was right. The circumstances were so exceptional and the consequences of any delay would have been calamitous and far-reaching, that even now, after many years have passed, and after having often thought over Nicholson's intended action and discussed the subject with other men, I have not changed my opinion.

A. Nicholson and the council were not on the same page with respect to the issue. The author's view that Nicholson was right in disregarding the commands of the council has managed to remain unchanged over the years.

B. Nicholson and the council reached the same conclusion. The author feels that Nicholson would have overridden the orders of the council had they reached different conclusions and has always been approving of such a scenario.

C. Nicholson and the council differed in their opinion about the course of action that needed to be taken. The author is supportive of Nicholson's decision to override the command since he felt that it was the need of the hour.

D. Nicholson and the council agreed to go ahead with the same course of action. Had they differed in their opinion, Nicholson would have prevailed over the council. The author was approving of such a scenario back then but his views have changed over the years.

Sol. From the first line of the paragraph, we can infer that Nicholson and the council agreed to go ahead with the same course of action. The author is describing a hypothetical scenario in the paragraph given. He is reasonably certain that had the council disagreed, Nicholson would have gone ahead to establish his intentions disregarding the orders of the council. Therefore, we can easily eliminate options A and C since they state that Nicholson and the council differed in their opinion.

Option D states that the author felt the action to be just back then but does not feel the same now. However, the author has mentioned that he has retained his views through out the years. We can eliminate option D too. Therefore, option B is the right answer.

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

1. A major study finds that seabirds in the Northern Hemisphere are already struggling.

2. Seabirds are "sentinels" of ocean health because if the marine ecosystems suffer, the birds will be among the first to show it.

3. And without extra precautions, those in the Southern Hemisphere might be next.

4. These findings point to broader patterns of environmental change across the world's oceans.

Sol. A brief reading of the sentences tells us that the paragraph is about the deteriorating conditions of oceans, of which seabirds are an indicator.

Sentence 2 will be the starting sentence as it introduces the topic. Sentence 3 will follow 1 because the 'and' in 3 joins both the sentences to inform us about the condition of seabirds in the Northern and the Southern hemisphere. These two make a pair. Sentence 4 will follow 3 because 'these findings' in 4 refer to the results of the study that indicate that the birds of the Northern hemisphere are struggling. Hence, the sequence 2134.

21. **Four sentences are given below. These sentences, when rearranged in proper order, form a logical and meaningful paragraph. Rearrange the sentences and enter the correct order as the answer.**

1. Societies were held together by loyalty to civil and ecclesiastical rulers; not by that cooperation which springs from the common interests of the people.
2. How stood this ever-changing world four hundred years ago?
3. Unhallowed were all things real; divine the unsubstantial and potential.
4. Already Asia was prematurely old and America was in swaddlings.

Sol. After reading all the sentences, we know that the paragraph is talking about time 400 years ago. Statement 2 is the opening sentence as it sets the context by asking a question

which is to be answered in the paragraph. Other three sentences are about continents, society, and individual things. So, these must be arranged from largest to smallest. Therefore, statement 4 should be followed by statement 1 which should be followed by statement 3. Thus, the correct order is 2-4-1-3.

Hence, 2413 is the correct answer.

22. Four sentences are given below. These sentences, when rearranged in proper order, form a logical and meaningful paragraph. Rearrange the sentences and enter the correct order as the answer.

1. If the writer who ventures to say something more about books and their uses is wise, he will not begin with an apology.
2. Not only does each new generation read them, but it is compelled to form some judgment of them.
3. So rich is the vitality of the great books of the world that men are never done with them.
4. For he will know that, despite all that has been said and written on this engrossing theme, the interest of books is inexhaustible, and that there is always a new constituency to read them.

Sol. After reading all the sentences, we know that the paragraph is about books and how they are received by each generation. Statement 1 is the opening sentence as it mentions that a writer writing about books will not start with an apology. Statement 4 provides the reason for the same. Statement 3 further explains how there is a new constituency to read books as discussed in statement 4. Statement 2 further mentions that the new generation not only read those books, but it also forms an opinion about them. Thus, the correct order is 1 - 4 - 3 - 2.

Hence, 1432 is the correct answer.

23. Five sentences related to a topic are given below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out.

1. The idea of immortality has enticed many and historically much time, effort and money have been directed at this goal.

2. Cara was, of course, singing about the posthumous longevity that fame can confer.

3. Big names in this industry have sunk funding into ventures to solve the problem of death as if it were just an upgrade to your smartphone's operating system.

4. The chorus of the theme song for the movie *Fame,* performed by actress Irene Cara, includes the line "I'm gonna live forever."

5. But a literal expression of this hubris resonates in some corners of the world—especially in the technology industry.

Sol. After a quick read, we can see that the paragraph is primarily about conquering death, and how people consider it to be feasible because of their hubris. The author introduces this concept with the help of a song, which was about 'living forever', as art provides fame even after a person has passed on. 42 is a mandatory pair that provides this introduction. 5 then contrasts this with a literal interpretation of 'living forever', that people are actually trying to conquer death. 3 then provides a further explanation that a huge amount of capital is being invested in the idea. Hence, the arrangement is 4253.

1 does not fit the context here, as it talks about the historical quest for immortality. The rest of the sentences speak of the present pursuit of immortality. Hence, 1 is the odd one out.

24. **Five sentences are given below labelled as 1, 2, 3, 4 and 5. Of these, four sentences, when arranged properly, make a meaningful and coherent paragraph. Identify the odd one out.**

1) Now, how and under what circumstances is this act of faith produced?
2) While the individual obeys, or imagines he obeys, only those motives of which he is fully conscious, and upon which he can at will decline or consent to act.
3) Now, unlike other species of animals, which, like him, are governed at the same time by individual desires and collective impulses, man has the privilege of perceiving and designating to his own mind the instinct or fatum which leads him.
4) If I follow the God-idea through its successive transformations, I find that this idea is pre-eminently social: I mean by this that it is much more a collective act of faith than an individual conception.
5) From the moral and intellectual point of view, society, or the collective man, is especially distinguished from the individual by spontaneity of action,—in other words, instinct.

Sol. From a cursory reading of the sentences, we understand that the paragraph is about theism. Sentence 4 should start the paragraph as it introduces the idea and how the author feels about theism. Sentence 4 and 1 form a pair as sentence 1 refers back to sentence 4 which talks about 'collective act of faith'. So, the odd sentence must be one among 2, 3, or 5. Now, the main objective of the para is to explain how faith is produced in individuals. Sentence 5 and 2 make a pair as 2 refers back to the 'individual' that is being discussed in sentence 5.
Sentence 3 also talks about the topic of discussion but is a much more matured discussion that needs some build-up before it comes into the discussion. Thus, adding 3 in the para leads to an abrupt transition.

Thus, the correct sequence is 4-1-5-2 and the odd sentence is 3.

Instructions

Akshat and Akanksha were given some toffees and a bar of chocolate. They could divide the toffees among themselves equally, but each wanted the complete bar of chocolate for themselves. So they decided to play a game.

Akshat took 12 toffees and arranged them in two columns as shown.
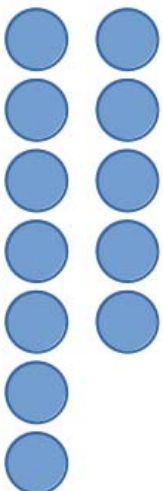
The rules of the game are as follows:

1. Each person will get a turn alternately. During a turn, a person has to pick up at least 1 toffee. A person can pick up any number of toffees during their turn as long as they all belong to the same column.

For example, the first person to play can pick up 7 toffees, but not 8 as the eighth would belong to the other column.

2. The last person to pick up a toffee will win. He/She will be given the chocolate bar as well as half of the remaining toffees, which were not used in the game. The loser of the game will get the remaining half of the unused toffees. A person is allowed to keep the toffees he/she picked up during the game.

Each person plays logically and to win.

25. Akshat went first and picked up some toffees which ensured that he wins. What is the number of toffees that he picked up in the first turn?

Sol. In these types of games, one has to rely on backward induction. This means that we start from the end of the game and work towards the start.

Let (a,b) denote that there are 'a' and 'b' toffees in the two columns.

Since there is no constraint on how many toffees a person can pick up from a single column, the number of toffees left in a single column does not matter if the other column is empty. Hence to win, a player should never pick up all the toffees from a column. Since the players are playing logically and to win, they will never do this.

Hence on the second last turn, at least 1 toffee is left in each column.

If (1,1) toffees are left in each column, then the person whose turn it is next can pick up only one toffee and has to pick one up as per the rules. This leaves 1 toffee on the table, and the other person wins.

Hence if (1,1) toffees are left, the person whose turn it is next will lose.
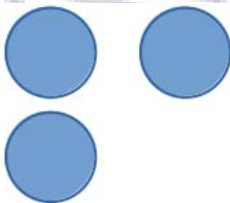
But if a person wants to win, and leaves 1 toffee in one column and 2 or more toffees in the other, then the other player will just pick up one toffee from the column which has 2 toffees.

But if Player X leaves 2 toffees in each column after his/her turn, then no matter how many toffees are picked up next, he/she will always win:

Case 1: If Player Y person picks 1, the X has to pick 1 from the other column, leaving (1,1) toffees, which is a winning situation for the X

Y cannot pickup 2, as explained earlier that a logical player will not empty a column, as it means immediate defeat.

Hence if (2,2) toffees are left, the person whose turn it is next will lose.

Hence we can see the pattern that a person has to leave an equal number of toffees in each column after their turn to ensure winning. Hence a person must pickup the number of toffees which makes the toffees equal in both the columns.

Initially, the number of toffees were (7,5). So Akshat will pick up 2 toffees to make it (5,5).

26. Akshat went first and picked up some toffees which ensured that he wins. What is the total number of toffees that Akanksha picks up during the game?
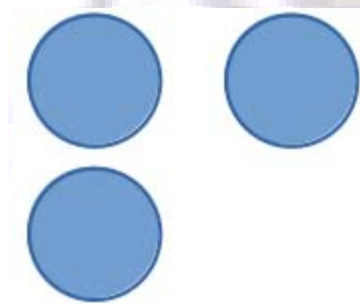
A. 5

B. 6

C. 7

D. 8

Sol. In these types of games, one has to rely on backward induction.

Let (a,b) denote that there are 'a' and 'b' toffees in the two columns.

Since there is no constraint on how many toffees a person can pick up from a single column, the number of toffees left in a single column does not matter if the second column is empty. Hence to win, a player should never pick up all the toffees from a column. Since the players are playing logically and to win, they will never do this.

Hence on the second last turn, at least 1 toffee is left in each column.

But if a person wants to win, and leaves 1 toffee in one column and 2 or more toffees in the other, then the other player will just pick up one toffee from the column which has 2 toffees. Because of this, the first player will be forced to pick a toffee and a toffee will be left in the other column.

Hence if (1,1) toffees are left, the person whose turn it is next will lose.

But if he leaves 2 toffees two toffees in each column after his/her turn, then no matter how many toffees are picked up next, he/she will always win.

If the second person picks 1, the first has to pick 1 from the other column, leaving (1,1) toffees, which is a winning situation for the first.

The second player cannot pick up 2, as explained earlier that a logical player will not empty a column, as it means immediate defeat.

Hence if (2,2) toffees are left, the person whose turn it is next will lose.

Hence we can see the pattern that a person has to leave an equal number of toffees in each column after their turn to ensure winning. Hence a person must pick up the number of toffees which makes the toffees equal in both the columns.

Initially, the number of toffees were (7,5). So Akshat will pick up 2 toffees to make it (5,5).

After this, If Akanksha picks up 1 toffee, Akshat will also pick up 1 toffee, making it (4,4). The same will go on till (1,1) toffees are left. So after the first turn, Akshat will ensure that both of them pick up the same number of toffees. Hence Akshat will have picked up (2+5)=7 toffees and Akanksha will have picked up 5 toffees by the time the game ends.

27. Akshat went first and picked up some toffees which ensured that he wins. After the game was completed and he received the chocolate and the toffees as promised, he went to a shop and sold the bar of chocolate and all the toffees he had. He noticed that the bar of chocolate was sold for Rs. 10, which is ten times the price at which each toffee was sold. He also saw that the money he received from selling the toffees alone is a perfect square and an integer.
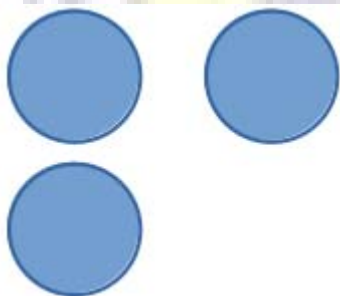
If the number of toffees used for the game was less than half of the total number of toffees given to them initially, what can be the least number of toffees they were initially given?

Sol. In these types of games, one has to rely on backward induction.

Let (a,b) denote that there are 'a' and 'b' toffees in the two columns.

Since there is no constraint on how many toffees a person can pick up from a single column, the number of toffees left in a single column does not matter if the second column is empty. Hence to win, a player should never pick up all the toffees from a column. Since the players are playing logically and to win, they will never do this.

Hence on the second last turn, at least 1 toffee is left in each column.

But if a person wants to win, and leaves 1 toffee in one column and 2 or more toffees in the other, then the other player will just pick up one toffee from the column which has 2 toffees. Because of this, the first player will be forced to pick a toffee and a toffee will be left in the other column.

Hence if (1,1) toffees are left, the person whose turn it is next will lose.

But if he leaves 2 toffees two toffees in each column after his/her turn, then no matter how many toffees are picked up next, he/she will always win.

If the second person picks 1, the first has to pick 1 from the other column, leaving (1,1) toffees, which is a winning situation for the first.

The second player cannot pick up 2, as explained earlier that a logical player will not empty a column, as it means immediate defeat.

Hence if (2,2) toffees are left, the person whose turn it is next will lose.

Hence we can see the pattern that a person has to leave an equal number of toffees in each column after their turn to ensure winning. Hence a person must pick up the number of toffees which makes the toffees equal in both the columns.

Initially, the number of toffees were (7,5). So Akshat will pick up 2 toffees to make it (5,5).

After this, If Akanksha picks up 1 toffee, Akshat will also pick up 1 toffee, making it (4,4). The same will go on till (1,1) toffees are left. So after the first turn, Akshat will ensure that both of them pick up the same number of toffees. Hence Akshat will have picked up (2+5)=7 toffees and Akanksha will have picked up 5 toffees by the time the game ends.

So the possible number of toffees that Akshat had after he got the half of the remaining toffees: 9, 16, 25 and any other square number.

Since we have to find the least number of toffees possible, we start with 9. Also the total number of toffees should be more than or equal to 12 × 2=24 as per the question

If he has 9 toffees, this means he received 2 toffees and 2 × 2=4 toffees were left after 12 were used for the game.

Total number of toffees= 12+4= 16. Since it is less than 24, we have to reject this.

Now we check for 16 toffees:

If he has 16 toffees, this means he received 9 toffees and 2 × 9=18 toffees were left after 12 were used for the game.

Total number of toffees= 12+18= 30. Hence this is our answer

28. Akshat went first and picked up some toffees which ensured that he wins. After the game was completed and he received the chocolate and the toffees as promised, he went to a shop and sold the bar of chocolate and all the toffees he had. He noticed that the bar of chocolate was sold for Rs. 10, which is ten times the price at which each toffee was sold. He also saw that the money he received from selling the toffees alone is a perfect square and an integer. The number of toffees used for the game was less than half of the total number of toffees given to them initially, and the total number of toffees is as less as possible.

If Akanksha also sells the toffees with her, what is the difference between the money that they earn from their sales? (In Rupees).
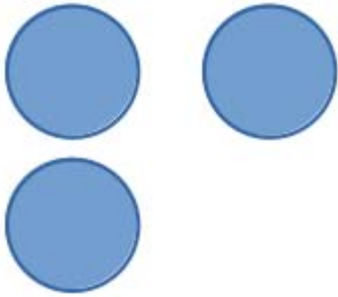
A. 12

B. 5

C. 10

D. 36

Sol. In these types of games, one has to rely on backward induction.

Let (a,b) denote that there are 'a' and 'b' toffees in the two columns.

Since there is no constraint on how many toffees a person can pick up from a single column, the number of toffees left in a single column does not matter if the second column is empty. Hence to win, a player should never pick up all the toffees from a column. Since the players are playing logically and to win, they will never do this.

Hence on the second last turn, at least 1 toffee is left in each column.

But if a person wants to win, and leaves 1 toffee in one column and 2 or more toffees in the other, then the other player will just pick up one toffee from the column which has 2 toffees. Because of this, the first player will be forced to pick a toffee and a toffee will be left in the other column.

Hence if (1,1) toffees are left, the person whose turn it is next will lose.

But if he leaves 2 toffees two toffees in each column after his/her turn, then no matter how many toffees are picked up next, he/she will always win.

If the second person picks 1, the first has to pick 1 from the other column, leaving (1,1) toffees, which is a winning situation for the first.

The second player cannot pick up 2, as explained earlier that a logical player will not empty a column, as it means immediate defeat.

Hence if (2,2) toffees are left, the person whose turn it is next will lose.

Hence we can see the pattern that a person has to leave an equal number of toffees in each column after their turn to ensure winning. Hence a person must pick up the number of toffees which makes the toffees equal in both the columns.

Initially, the number of toffees were (7,5). So Akshat will pick up 2 toffees to make it (5,5).

After this, If Akanksha picks up 1 toffee, Akshat will also pick up 1 toffee, making it (4,4). The same will go on till (1,1) toffees are left. So after the first turn, Akshat will ensure that both of them pick up the same number of toffees. Hence Akshat will have picked up (2+5)=7 toffees and Akanksha will have picked up 5 toffees by the time the game ends.

So the possible number of toffees that Akshat had after he got half of the remaining toffees: 9, 16, 25 and any other square number.

Since we have to find the least number of toffees possible, we start with 9. Also, the total number of toffees should be more than or equal to $12 \times 2 = 24$ as per the question

If he has 9 toffees, this means he received 2 toffees and $2 \times 2 = 4$ toffees were left after 12 were used for the game.

Total number of toffees= 12+4= 16. Since it is less than 24, we have to reject this.

Now we check for 16 toffees:

If he has 16 toffees, this means he received 9 toffees and $2 \times 9 = 18$ toffees were left after 12 were used for the game.

Total number of toffees= 12+18= 30.

After the remaining toffees have been distributed, Akshat has 16 toffees and Akanksha has 14 toffees

Hence Akshat earns 16+10=26 Rupees and Akanksha earns 14 Rupees.

Difference=Rs. 12

29. Akshat won this game and he played the first turn. A few years later, they decided to play the same game again. They again took out 12 toffees from the lot they received. But Akanksha remembered that she had lost last time when she went second, so she decided to go first. But shrewd Akshat arranged the toffees in two columns in such a manner that Akanksha lost again.

Which of the following can be the number of toffees in the first column?
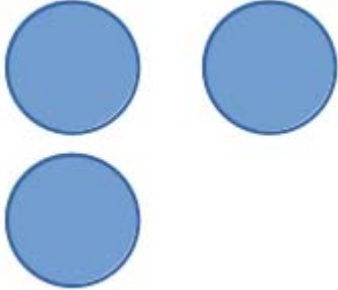
A. 1

B. 5

C. 6

D. 7

Sol. In these types of games, one has to rely on backward induction.

Let (a,b) denote that there are 'a' and 'b' toffees in the two columns.

Since there is no constraint on how many toffees a person can pick up from a single column, the number of toffees left in a single column does not matter if the second column is empty. Hence to win, a player should never pick up all the toffees from a column. Since the players are playing logically and to win, they will never do this.

Hence on the second last turn, at least 1 toffee is left in each column.

But if a person wants to win, and leaves 1 toffee in one column and 2 or more toffees in the other, then the other player will just pick up one toffee from the column which has 2 toffees. Because of this, the first player will be forced to pick a toffee and a toffee will be left in the other column.

Hence if (1,1) toffees are left, the person whose turn it is next will lose.

But if he leaves 2 toffees two toffees in each column after his/her turn, then no matter how many toffees are picked up next, he/she will always win.

If the second person picks 1, the first has to pick 1 from the other column, leaving (1,1) toffees, which is a winning situation for the first.

The second player cannot pick up 2, as explained earlier that a logical player will not empty a column, as it means immediate defeat.

Hence if (2,2) toffees are left, the person whose turn it is next will lose.

Hence we can see the pattern that a person has to leave an equal number of toffees in each column after their turn to ensure winning. Hence a person must pick up the number of toffees which makes the toffees equal in both the columns.

So if the number of toffees, in the beginning, is (6,6), there is no way the player to go first can win. Hence the number of toffees in the first column can only be 6.

30. Akshat won this game and he played the first turn. A few years later, they decided to play the same game again. They again took out 12 toffees from the lot they received. But Akanksha remembered that she had lost last time when she went second, so she decided to go first. But shrewd Akshat arranged the toffees in two columns in such a manner that Akanksha lost again.

What is the difference between the number of toffees picked up by Akshat and Akanksha?
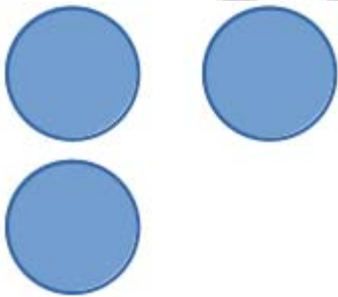
A. 0

B. 1

C. 2

D. 5

Sol. In these types of games, one has to rely on backward induction.

Let (a,b) denote that there are 'a' and 'b' toffees in the two columns.

Since there is no constraint on how many toffees a person can pick up from a single column, the number of toffees left in a single column does not matter if the second column is empty. Hence to win, a player should never pick up all the toffees from a column. Since the players are playing logically and to win, they will never do this.

Hence on the second last turn, at least 1 toffee is left in each column.

But if a person wants to win, and leaves 1 toffee in one column and 2 or more toffees in the other, then the other player will just pick up one toffee from the column which has 2 toffees. Because of this, the first player will be forced to pick a toffee and a toffee will be left in the other column.

Hence if (1,1) toffees are left, the person whose turn it is next will lose.

But if he leaves 2 toffees two toffees in each column after his/her turn, then no matter how many toffees are picked up next, he/she will always win.

If the second person picks 1, the first has to pick 1 from the other column, leaving (1,1) toffees, which is a winning situation for the first.

The second player cannot pick up 2, as explained earlier that a logical player will not empty a column, as it means immediate defeat.

Hence if (2,2) toffees are left, the person whose turn it is next will lose.

Hence we can see the pattern that a person has to leave an equal number of toffees in each column after their turn to ensure winning. Hence a person must pick up the number of toffees which makes the toffees equal in both the columns.

So if the number of toffees, in the beginning, is (6,6), there is no way the player to go first can win. Hence the number of toffees in the first column can only be 6.

After Akanksha has picked up 'n' toffees from a column, Akshat has to just pick up 'n' toffees from the other column. Hence the number of toffees that they pick up will be equal in every case and the difference will be 0.

Alex, Cane and John are three drivers who drive a passenger bus, in shifts, from Paris to Luxembourg every day. Due to the heavy traffic at peak hours, the time it takes for them to travel between the two cities depends on their starting times at the originating city. If they start at 8:00 AM, 9:00 AM or 10:00 AM, it takes 18 hours to travel between the two cities. If they start at 7:00 PM, 8:00 PM or 9:00 PM, it takes them 20 hours to travel between the two cities. If they start at any other time, it takes them 15 hours to travel between the two cities. Each time they reach their destination city, they take rest for 1 hour before proceeding to the next   city.
1 trip is defined as the journey from one city to another.

31. If they start from Paris at 8:00 PM, what is the average time taken by them to travel from Paris to Luxembourg in their first 80 trips?

A. 17.5 hours

B. 16 hours

C. 19 hours

D. 18.5 hours

Sol. Let's solve this set by converting the times into 24-hour format.

If they start at 8, 9, 10 hours, they will take 18 hours. If they start at 19, 20, 21 hours, they will take 20 hours. Else, they take 15 hours.

 They start at 20:00 hours from Paris, they'll reach Luxembourg at 16:00 hours.

Let's continuously represent their journeys:

 20:00 (P) - 16:00 (L) = 20 hours

 17:00 (L) - 08:00 (P) = 15 hours

 9:00 (P) - 3:00 (L) = 18 hours

 4:00 (L) - 19:00 (P) = 15 hours

 20:00 (P) -

 Now, this cycle will continue.

In 80 trips, there will be 20 such cycles. 40 trips from Paris to Luxembourg.

2 trips each of 20 and 18 hours from Paris to Luxembourg.

Thus, average time from Paris to Luxembourg $= \dfrac{20 \times (20 + 18)}{40} = 19$ hours.

32. If they start at 6:00 AM from Luxembourg, what is the average time per trip for their first 25 trips?

A. 15 hours

B. 16.5 hours

C. 17.5 hours

D. 18.2 hours

Sol. Let's solve this set by converting the times into 24-hour format.

If they start at 8, 9, 10 hours, they will take 18 hours. If they start at 19, 20, 21 hours, they will take 20 hours. Else, they take 15 hours.

They start at 6:00 hours from Luxembourg. They'll reach Paris at 21:00 hours.

Let's represent their trips -

6:00 (P) - 21:00 (L) = 15 hours

22:00 (L) - 13:00 (P) = 15 hours

14:00 (P) - 5:00 (L) = 15 hours

6:00 (L) - 21:00(P) = 15 hours

22:00 (P) - 13:00 (L) = 15 hours

14:00 (L) - 5:00 (P) = 15 hours

6:00(P) -

Now, this cycle will repeat. Since all the trips take 15 hours, the average trip time will also be 15 hours.

33. If they start at 4:00 AM from Paris, after a minimum of how many trips (including the first one) will they start from Luxembourg at 8:00 AM?

A. 10

B. 11

C. 2

D. Never

Sol. Let's solve this set by converting the times into 24-hour format.

If they start at 8, 9, 10 hours, they will take 18 hours. If they start at 19, 20, 21 hours, they will take 20 hours. Else, they take 15 hours.

They start at 4:00 hours from Paris. They'll reach at 19:00 hours in Luxembourg.

Let's represent the bus journey:

4:00 (P) - 19:00 (L)

20:00 (L) - 16:00 (P)

17:00(P) - 8:00 (L)

9:00(L) - 3:00 (P)

4:00(P) - 19:00 (L)

This cycle will repeat.

They'll never start at 8:00 AM from Luxembourg.

34. If they start at 2: 00 PM from Luxembourg, how many times will they start between 1:00 PM and 11:00 PM from Paris in their first 100 trips?

A. 48

B. 33

C. 50

D. 32

Sol. Let's solve this set by converting the times into 24-hour format.

If they start at 8, 9, 10 hours, they will take 18 hours. If they start at 19, 20, 21 hours, they will take 20 hours. Else, they take 15 hours.

Let's compute their trip times.

14:00 (L) - 5: 00 (P)

6: 00 (P) - 21: 00 (L)

22:00 (L) - 13:00 (P)

14:00 (P) - 5:00 (L)

6:00 (L) - 21:00 (P)

22:00(P) - 13:00 (L)

This cycle will repeat itself.

In each cycle they will start twice between 1:00 PM and 11:00 PM from Paris.

The cycle will repeat 16 times. Thus, 32 times they will start between the given times.

Further, in the next 4 trips, they'll start once. Thus, they'll start 33 times.

The World Archery Field Championship is being conducted in Dublin for three categories: Men's Individual Archery event, Women's Individual Archery event and Mixed Team event. Two participants represent each nation in the Individual categories. The higher-seeded player among the two archers from the Men's event and those from the Women's event are paired to represent a nation in the Mixed-team event. The archers representing different nations are listed below:

Country	Players	
	MEN'S INDIVIDUAL EVENT	WOMEN'S INDIVIDUAL EVENT
India	Atanu Das	Deepika Kumari
	Tarundeep Rai	Ankita Bhakat
China	Feng Hao	Wu Jiaxin
	Wang Dapeng	Zheng Yichai
USA	James Lutz	Paige Pearce
	Kris Schaff	Samantha Taylor
Russia	Galsan Bazarzhapov	Elena Osipova
	Vladimir Yesheyev	Ksenia Perova

The Individual Archery Event is broken down into a Ranking Round followed by Individual Round.

Rules for the Ranking round:

There are 5 trials in total. In each trial, an archer gets 2 shots on a target kept 70 meters away. There are only two possible outcomes - a Hit (10 points awarded) or a Miss (5 points deducted). The sum of points obtained in all the trials is used to determine an archer's seed/rank for the Individual Round. The higher the total points obtained, the higher the player is seeded. Furthermore, the sum of the seeds of two players from the same country is used to determine the rank of their nation. The lower the sum of the seed, the higher the rank that is assigned.

In both the Men's and Women's Individual even, exactly three players scored a total of 25 points in this round (which is the lowest recorded score). Except for these three archers, all remaining players had a distinct number of hits and misses, thereby resulting in a distinct total score.

In the Men's Individual Event, the Chinese players scored a total of 170 points, while the Indian players scored a total of 125 points. In the Women's Individual Event, the Chinese players scored a total of 140 points, while the Russian players scored a total of 155 points.

The final rank of the nations at the end of the Ranking Round is as follows:

Country	Rank (Men's)	Rank (Women's)
China	1	2
USA	3	4
Russia	4	1
India	2	3

Rules for the Individual Round:

The top 4 seeded players in the Ranking Round move onto the Individual round, which is a straightforward elimination round, where higher-seeded players face off against lower-seeded players.

35. If James Lutz was seed 7, what is the sum of the seeds of the Russian archers in the Men's event? (Enter '-1' if the answer cannot be determined)

Sol. In the ranking round, it has been provided that for every 'Hit' - 10 points are awarded, while for every 'Miss' - 5 points are deducted. Since each archer gets a total of 10 shots, the maximum number of points any archer can obtain is 100. Furthermore, it is stated that exactly three players obtained 25 points each (the lowest recorded value). This is possible only if they hit the target 5 times and missed it in the remaining 5 shots. [25 = 5(10) - 5(5)] The resulting five archers had a unique score (along with a unique number of Hits and Miss). This is possible only in the following way:

Hits	Miss	Points
10	0	100
9	1	85
8	2	70
7	3	55
6	4	40
5	5	25
5	5	25
5	5	25

Furthermore, it is stated that the Chinese team scored 170 points in the Men's event. They could have obtained this score only in one way = [100 + 70]. Additionally, the Indian team scored 125 points in the Men's event. This is possible in two ways = [100 + 25] or [85 + 40]. However, since we have discerned that the Chinese team obtained 100 points, we deduce that the Indian team scored the following combination of [85 + 40].

Similarly, the Chinese team scored a total of 140 points in the Women's event. This is possible in two ways = [100 + 40] or [85 + 55]. On the other hand, the Russian women's team scored 155 points cumulatively. This is again possible in two ways = [100 + 55] or [85 + 70]. Considering the potential cases, it becomes evident that the Chinese team obtained the total score in the form [100 + 40] while the Russian teamed obtained the total score in the form [85 + 70]. For instance, let us assume that one of the Russian archers scored 100 points; this would imply that the second Russian archer scored 55 to bring the total to 155. Consequently, the Chinese team must have scored [85 + 55] since 100 points have already been scored. However, this is not possible since 55 points have also been scored. Thus, we fall back to the second choice, wherein the Chinese team scored 100 and 40 points respectively, while the Russian team had a total score of the form [85 + 70].

Using the above information, we can extend the aforementioned table in the following manner: [Here, C, I, U and R respectively correspond to an archer's nationalities - China, India, USA and Russia]

Hits	Miss	Points	Player (Men's)	Seed	Player (Women's)
10	0	100	C	(1)	C
9	1	85	I	(2)	R
8	2	70	C	(3)	R
7	3	55	U or R	(4)	I or U
6	4	40	I	(5)	C
5	5	25	U or R	(6)	I or U
5	5	25	U or R	(7)	I or U
5	5	25	U or R	(8)	I or U

It is imperative to note that the sum of the seeds of the players determines their nations rank. It is evident from the table that China ranks above India in the Men's event at the end of the Ranking Round. Similarly, for further scrutiny of the seeding of Men's events, we can consider two cases for seed 4:

CASE 1: Seed 4 player belongs to the US team

In this situation, the sum of the seeds of the US team could be either [4 + 6 = 10] or [4 + 7 = 11] or [4 + 8 = 12]

The corresponding sum of the seeds of the Russian team in this case would be [7 + 8 = 15] or [6 + 8 = 14] or [6 + 7 = 13]

In all of these cases, (the sum of the seeds of the Russian archers) > (the sum of the seeds of the US archers) ---> therefore, (rank of Russian team) < (rank of US team) - a relation that corresponds to the final ranking of the countries at the end of the Ranking round.

CASE 2: Seed 4 player belongs to the Russian team

In this situation, the sum of the seeds of the Russian team could be either [4 + 6 = 10] or [4 + 7 = 11] or [4 + 8 = 12]

The corresponding sum of seeds of the US team in this case would be [7 + 8 = 15] or [6 + 8 = 14] or [6 + 7 = 13]

In all of these cases, (the sum of the seeds of the Russian archers) < (the sum of the seeds of the US archers) ---> therefore, (rank of Russian team) > (rank of US team) - a relation that contradicts the final ranking of the countries at the end of the Ranking round.

Hence, we determine that the seed 4 player belongs to the US team.

Similar reasoning can be used to determine the seed 4 player in the Women's Individual event. In this regard the final table appears as follows:

Hits	Miss	Points	Player (Men's)	Seed	Player (Women's)
10	0	100	C	(1)	C
9	1	85	I	(2)	R
8	2	70	C	(3)	R
7	3	55	U	(4)	I
6	4	40	I	(5)	C
5	5	25	U or R	(6)	I or U
5	5	25	U or R	(7)	I or U
5	5	25	U or R	(8)	I or U

If James Lutz was seed 7, this would indicate that the seed 6 and seed 8 players belong to the Russian team. The sum of their seeds = (6 + 8) = **14**

36. **If Kris Schaff, Atanu Das and Feng Hao were seed 8, seed 2 and seed 3 respectively, for how many archers in the Men's event can we uniquely determine their ranks? (Enter '-1' if the answer cannot be determined)**

Sol. In the ranking round, it has been provided that for every 'Hit' - 10 points are awarded, while for every 'Miss' - 5 points are deducted. Since each archer gets a total of 10 shots, the maximum number of points any archer can obtain is 100. Furthermore, it is stated that exactly three players obtained 25 points each (the lowest recorded value). This is possible only if they hit the target 5 times and missed it in the remaining 5 shots. [25 = 5(10) - 5(5)] The resulting five archers had a unique score (along with a unique number of Hits and Miss). This is possible only in the following way:

Hits	Miss	Points
10	0	100
9	1	85
8	2	70
7	3	55
6	4	40
5	5	25
5	5	25
5	5	25

Furthermore, it is stated that the Chinese team scored 170 points in the Men's event. They could have obtained this score only in one way = [100 + 70]. Additionally, the Indian team scored 125 points in the Men's event. This is possible in two ways = [100 + 25] or [85 + 40]. However, since we have discerned that the Chinese team obtained 100 points, we deduce that the Indian team scored the following combination of [85 + 40].

Similarly, the Chinese team scored a total of 140 points in the Women's event. This is possible in two ways = [100 + 40] or [85 + 55]. On the other hand, the Russian women's team scored 155 points cumulatively. This is again possible in two ways = [100 + 55] or [85 + 70]. Considering the potential cases, it becomes evident that the Chinese team obtained the total

score in the form [100 + 40] while the Russian teamed obtained the total score in the form [85 + 70]. For instance, let us assume that one of the Russian archers scored 100 points; this would imply that the second Russian archer scored 55 to bring the total to 155. Consequently, the Chinese team must have scored [85 + 55] since 100 points have already been scored. However, this is not possible since 55 points have also been scored. Thus, we fall back to the second choice, wherein the Chinese team scored 100 and 40 points respectively, while the Russian team had a total score of the form [85 + 70].

Using the above information, we can extend the aforementioned table in the following manner: [Here, C, I, U and R respectively correspond to an archer's nationalities - China, India, USA and Russia]

Hits	Miss	Points	Player (Men's)	Seed	Player (Women's)
10	0	100	C	(1)	C
9	1	85	I	(2)	R
8	2	70	C	(3)	R
7	3	55	U or R	(4)	I or U
6	4	40	I	(5)	C
5	5	25	U or R	(6)	I or U
5	5	25	U or R	(7)	I or U
5	5	25	U or R	(8)	I or U

It is imperative to note that the sum of the seeds of the players determines their nations rank. It is evident from the table that China ranks above India in the Men's event at the end of the Ranking Round. Similarly, for further scrutiny of the seeding of Men's events, we can consider two cases for seed 4:

CASE 1: Seed 4 player belongs to the US team

In this situation, the sum of the seeds of the US team could be either [4 + 6 = 10] or [4 + 7 = 11] or [4 + 8 = 12]

The corresponding sum of the seeds of the Russian team in this case would be [7 + 8 = 15] or [6 + 8 = 14] or [6 + 7 = 13]

In all of these cases, (the sum of the seeds of the Russian archers) > (the sum of the seeds of the US archers) ---> therefore, (rank of Russian team) < (rank of US team) - a relation that corresponds to the final ranking of the countries at the end of the Ranking round.

CASE 2: Seed 4 player belongs to the Russian team

In this situation, the sum of the seeds of the Russian team could be either [4 + 6 = 10] or [4 + 7 = 11] or [4 + 8 = 12]

The corresponding sum of seeds of the US team in this case would be [7 + 8 = 15] or [6 + 8 = 14] or [6 + 7 = 13]

In all of these cases, (the sum of the seeds of the Russian archers) < (the sum of the seeds of the US archers) ---> therefore, (rank of Russian team) > (rank of US team) - a relation that contradicts the final ranking of the countries at the end of the Ranking round.

Hence, we determine that the seed 4 player belongs to the US team.

Similar reasoning can be used to determine the seed 4 player in the Women's Individual event. In this regard, the final table appears as follows:

Hits	Miss	Points	Player (Men's)	Seed	Player (Women's)
10	0	100	C	(1)	C
9	1	85	I	(2)	R
8	2	70	C	(3)	R
7	3	55	U	(4)	I
6	4	40	I	(5)	C
5	5	25	U or R	(6)	I or U
5	5	25	U or R	(7)	I or U
5	5	25	U or R	(8)	I or U

If Kris Schaff, Atanu Das and Feng Hao were seed 8, seed 2 and seed 3, respectively, we can deduce that James Lutz, Tarundeep Rai and Wand Dapeng would be seed 4, seed 5 and seed 1, respectively. Therefore, we can conclusively determine the ranks of **6** archers.

37. If Ankita Bhakat and Tarundeep Rai represented India in the Mixed-team Event, what is the difference between their scores?

A. 30

B. 15

C. 50

D. 45

Sol. In the ranking round, it has been provided that for every 'Hit' - 10 points are awarded, while for every 'Miss' - 5 points are deducted. Since each archer gets a total of 10 shots, the maximum number of points any archer can obtain is <u>100</u>. Furthermore, it is stated that exactly three players obtained 25 points each (the lowest recorded value). This is possible only if they hit the target 5 times and missed it in the remaining 5 shots. [25 = 5(10) - 5(5)] The resulting five archers had a unique score (along with a unique number of Hits and Miss). This is possible only in the following way:

Hits	Miss	Points
10	0	100
9	1	85
8	2	70
7	3	55
6	4	40
5	5	25
5	5	25
5	5	25

Furthermore, it is stated that the Chinese team scored 170 points in the Men's event. They could have obtained this score only in one way = [100 + 70]. Additionally, the Indian team scored 125 points in the Men's event. This is possible in two ways = [100 + 25] or [85 + 40]. However, since we have discerned that the Chinese team obtained 100 points, we deduce that the Indian team scored the following combination of [85 + 40].

Similarly, the Chinese team scored a total of 140 points in the Women's event. This is possible in two ways = [100 + 40] or [85 + 55]. On the other hand, the Russian women's team scored 155 points cumulatively. This is again possible in two ways = [100 + 55] or [85 + 70]. Considering the potential cases, it becomes evident that the Chinese team obtained the total score in the form [100 + 40] while the Russian teamed obtained the total score in the form [85 + 70]. For instance, let us assume that one of the Russian archers scored 100 points; this would imply that the second Russian archer scored 55 to bring the total to 155. Consequently, the Chinese team must have scored [85 + 55] since 100 points have already been scored. However, this is not possible since 55 points have also been scored. Thus, we fall back to the second choice, wherein the Chinese team scored 100 and 40 points respectively, while the Russian team had a total score of the form [85 + 70].

Using the above information, we can extend the aforementioned table in the following manner: [Here, C, I, U and R respectively correspond to an archer's nationalities - China, India, USA and Russia]

Hits	Miss	Points	Player (Men's)	Seed	Player (Women's)
10	0	100	C	(1)	C
9	1	85	I	(2)	R
8	2	70	C	(3)	R
7	3	55	U or R	(4)	I or U
6	4	40	I	(5)	C
5	5	25	U or R	(6)	I or U
5	5	25	U or R	(7)	I or U
5	5	25	U or R	(8)	I or U

It is imperative to note that the sum of the seeds of the players determines their nations rank. It is evident from the table that China ranks above India in the Men's event at the end of the Ranking Round. Similarly, for further scrutiny of the seeding of Men's events, we can consider two cases for seed 4:

CASE 1: Seed 4 player belongs to the US team

In this situation, the sum of the seeds of the US team could be either [4 + 6 = 10] or [4 + 7 = 11] or [4 + 8 = 12]

The corresponding sum of the seeds of the Russian team in this case would be [7 + 8 = 15] or [6 + 8 = 14] or [6 + 7 = 13]

In all of these cases, (the sum of the seeds of the Russian archers) > (the sum of the seeds of the US archers) ---> therefore, (rank of Russian team) < (rank of US team) - a relation that corresponds to the final ranking of the countries at the end of the Ranking round.

CASE 2: Seed 4 player belongs to the Russian team

In this situation, the sum of the seeds of the Russian team could be either [4 + 6 = 10] or [4 + 7 = 11] or [4 + 8 = 12]

The corresponding sum of seeds of the US team in this case would be [7 + 8 = 15] or [6 + 8 = 14] or [6 + 7 = 13]

In all of these cases, (the sum of the seeds of the Russian archers) < (the sum of the seeds of the US archers) ---> therefore, (rank of Russian team) > (rank of US team) - a relation that contradicts the final ranking of the countries at the end of the Ranking round.

Hence, we determine that the seed 4 player belongs to the US team.

Similar reasoning can be used to determine the seed 4 player in the Women's Individual event. In this regard, the final table appears as follows:

Hits	Miss	Points	Player (Men's)	Seed	Player (Women's)
10	0	100	C	(1)	C
9	1	85	I	(2)	R
8	2	70	C	(3)	R
7	3	55	U	(4)	I
6	4	40	I	(5)	C
5	5	25	U or R	(6)	I or U
5	5	25	U or R	(7)	I or U
5	5	25	U or R	(8)	I or U

If Ankita Bhakat and Tarundeep Rai represented India in the Mixed-team Event, it indicates that both archers were seeded higher in their respective events. Therefore, Tarundeep would have scored 85 points and ranked second in the Men's event. While Ankita would have scored 55 points and ranked fourth in the Women's event. The difference between their scores = (85 - 55) = **30**

38. **An upset happens when a lower-seeded player defeats a higher-seeded player. If Kris Schaff and Deepika Kumari won the Men's and Women's Individual Rounds respectively, how many total upsets took place in the tournament?**

A. 4

B. 2

C. 6

D. Cannot be determined

Sol. In the ranking round, it has been provided that for every 'Hit' - 10 points are awarded, while for every 'Miss' - 5 points are deducted. Since each archer gets a total of 10 shots, the maximum number of points any archer can obtain is 100. Furthermore, it is stated that exactly three players obtained 25 points each (the lowest recorded value). This is possible only if they hit the target 5 times and missed it in the remaining 5 shots. [25 = 5(10) - 5(5)] The resulting five archers had a unique score (along with a unique number of Hits and Miss). This is possible only in the following way:

Hits	Miss	Points
10	0	100
9	1	85
8	2	70
7	3	55
6	4	40
5	5	25
5	5	25
5	5	25

Furthermore, it is stated that the Chinese team scored 170 points in the Men's event. They could have obtained this score only in one way = [100 + 70]. Additionally, the Indian team scored 125 points in the Men's event. This is possible in two ways = [100 + 25] or [85 + 40]. However, since we have discerned that the Chinese team obtained 100 points, we deduce that the Indian team scored the following combination of [85 + 40].

Similarly, the Chinese team scored a total of 140 points in the Women's event. This is possible in two ways = [100 + 40] or [85 + 55]. On the other hand, the Russian women's team scored 155 points cumulatively. This is again possible in two ways = [100 + 55] or [85 + 70]. Considering the potential cases, it becomes evident that the Chinese team obtained the total score in the form [100 + 40] while the Russian teamed obtained the total score in the form [85 + 70]. For instance, let us assume that one of the Russian archers scored 100 points; this would imply that the second Russian archer scored 55 to bring the total to 155. Consequently, the Chinese team must have scored [85 + 55] since 100 points have already been scored. However, this is not possible since 55 points have also been scored. Thus, we fall back to the second choice, wherein the Chinese team scored 100 and 40 points respectively, while the Russian team had a total score of the form [85 + 70].

Using the above information, we can extend the aforementioned table in the following manner: [Here, C, I, U and R respectively correspond to an archer's nationalities - China, India, USA and Russia]

Hits	Miss	Points	Player (Men's)	Seed	Player (Women's)
10	0	100	C	(1)	C
9	1	85	I	(2)	R
8	2	70	C	(3)	R
7	3	55	U or R	(4)	I or U
6	4	40	I	(5)	C
5	5	25	U or R	(6)	I or U
5	5	25	U or R	(7)	I or U
5	5	25	U or R	(8)	I or U

It is imperative to note that the sum of the seeds of the players determines their nations rank. It is evident from the table that China ranks above India in the Men's event at the end of the Ranking Round. Similarly, for further scrutiny of the seeding of Men's events, we can consider two cases for seed 4:

CASE 1: Seed 4 player belongs to the US team

In this situation, the sum of the seeds of the US team could be either [4 + 6 = 10] or [4 + 7 = 11] or [4 + 8 = 12]

The corresponding sum of the seeds of the Russian team in this case would be [7 + 8 = 15] or [6 + 8 = 14] or [6 + 7 = 13]

In all of these cases, (the sum of the seeds of the Russian archers) > (the sum of the seeds of the US archers) ---> therefore, (rank of Russian team) < (rank of US team) - a relation that corresponds to the final ranking of the countries at the end of the Ranking round.

CASE 2: Seed 4 player belongs to the Russian team

In this situation, the sum of the seeds of the Russian team could be either [4 + 6 = 10] or [4 + 7 = 11] or [4 + 8 = 12]

The corresponding sum of seeds of the US team in this case would be [7 + 8 = 15] or [6 + 8 = 14] or [6 + 7 = 13]

In all of these cases, (the sum of the seeds of the Russian archers) < (the sum of the seeds of the US archers) ---> therefore, (rank of Russian team) > (rank of US team) - a relation that contradicts the final ranking of the countries at the end of the Ranking round.

Hence, we determine that the seed 4 player belongs to the US team.

Similar reasoning can be used to determine the seed 4 player in the Women's Individual event. In this regard, the final table appears as follows:

Hits	Miss	Points	Player (Men's)	Seed	Player (Women's)
10	0	100	C	(1)	C
9	1	85	I	(2)	R
8	2	70	C	(3)	R
7	3	55	U	(4)	I
6	4	40	I	(5)	C
5	5	25	U or R	(6)	I or U
5	5	25	U or R	(7)	I or U
5	5	25	U or R	(8)	I or U

Kris Schaff and Deepika Kumari could have proceeded to their respective Individual Rounds only if they were seeded 4 (since the first 4 seeds face off in a knockout tournament in the Individual round). They would each have caused at least 2 upsets in this round to win the tournament. However, we do not know if the seed 3 players caused an upset. Therefore, we

cannot determine the total number of upsets that took place in the tournament. Option D is the correct answer.

39. What is the total sum of scores of the US Men's and Women's teams at the end of the Ranking Round?

A. 105

B. 125

C. 130

D. Cannot be determined

Sol. In the ranking round, it has been provided that for every 'Hit' - 10 points are awarded, while for every 'Miss' - 5 points are deducted. Since each archer gets a total of 10 shots, the maximum number of points any archer can obtain is 100. Furthermore, it is stated that exactly three players obtained 25 points each (the lowest recorded value). This is possible only if they hit the target 5 times and missed it in the remaining 5 shots. [25 = 5(10) - 5(5)] The resulting five archers had a unique score (along with a unique number of Hits and Miss). This is possible only in the following way:

Hits	Miss	Points
10	0	100
9	1	85
8	2	70
7	3	55
6	4	40
5	5	25
5	5	25
5	5	25

Furthermore, it is stated that the Chinese team scored 170 points in the Men's event. They could have obtained this score only in one way = [100 + 70]. Additionally, the Indian team scored 125 points in the Men's event. This is possible in two ways = [100 + 25] or [85 + 40]. However, since we have discerned that the Chinese team obtained 100 points, we deduce that the Indian team scored the following combination of [85 + 40].

Similarly, the Chinese team scored a total of 140 points in the Women's event. This is possible in two ways = [100 + 40] or [85 + 55]. On the other hand, the Russian women's team scored 155 points cumulatively. This is again possible in two ways = [100 + 55] or [85 + 70]. Considering the potential cases, it becomes evident that the Chinese team obtained the total score in the form [100 + 40] while the Russian teamed obtained the total score in the form [85 + 70]. For instance, let us assume that one of the Russian archers scored 100 points; this

would imply that the second Russian archer scored 55 to bring the total to 155. Consequently, the Chinese team must have scored [85 + 55] since 100 points have already been scored. However, this is not possible since 55 points have also been scored. Thus, we fall back to the second choice, wherein the Chinese team scored 100 and 40 points respectively, while the Russian team had a total score of the form [85 + 70].

Using the above information, we can extend the aforementioned table in the following manner: [Here, C, I, U and R respectively correspond to an archer's nationalities - China, India, USA and Russia]

Hits	Miss	Points	Player (Men's)	Seed	Player (Women's)
10	0	100	C	(1)	C
9	1	85	I	(2)	R
8	2	70	C	(3)	R
7	3	55	U or R	(4)	I or U
6	4	40	I	(5)	C
5	5	25	U or R	(6)	I or U
5	5	25	U or R	(7)	I or U
5	5	25	U or R	(8)	I or U

It is imperative to note that the sum of the seeds of the players determines their nations rank. It is evident from the table that China ranks above India in the Men's event at the end of the Ranking Round. Similarly, for further scrutiny of the seeding of Men's events, we can consider two cases for seed 4:

CASE 1: Seed 4 player belongs to the US team

In this situation, the sum of the seeds of the US team could be either [4 + 6 = 10] or [4 + 7 = 11] or [4 + 8 = 12]

The corresponding sum of the seeds of the Russian team in this case would be [7 + 8 = 15] or [6 + 8 = 14] or [6 + 7 = 13]

In all of these cases, (the sum of the seeds of the Russian archers) > (the sum of the seeds of the US archers) ---> therefore, (rank of Russian team) < (rank of US team) - a relation that corresponds to the final ranking of the countries at the end of the Ranking round.

CASE 2: Seed 4 player belongs to the Russian team

In this situation, the sum of the seeds of the Russian team could be either [4 + 6 = 10] or [4 + 7 = 11] or [4 + 8 = 12]

The corresponding sum of seeds of the US team in this case would be [7 + 8 = 15] or [6 + 8 = 14] or [6 + 7 = 13]

In all of these cases, (the sum of the seeds of the Russian archers) < (the sum of the seeds of the US archers) ---> therefore, (rank of Russian team) > (rank of US team) - a relation that contradicts the final ranking of the countries at the end of the Ranking round.

Hence, we determine that the seed 4 player belongs to the US team.

Similar reasoning can be used to determine the seed 4 player in the Women's Individual event. In this regard the final table appears as follows:

Hits	Miss	Points	Player (Men's)	Seed	Player (Women's)
10	0	100	C	(1)	C
9	1	85	I	(2)	R
8	2	70	C	(3)	R
7	3	55	U	(4)	I
6	4	40	I	(5)	C
5	5	25	U or R	(6)	I or U
5	5	25	U or R	(7)	I or U
5	5	25	U or R	(8)	I or U

The US men's archery team would have scored (55+25) = 80 points while the US women's archery team would have scored (25+25) = 50. Their total score = (80+50) = **130**

Option C is the correct choice.

40. In the final seed table at the end of the Ranking round for the Women's event, instead of adding a player's name in front of the rank, the officials used the first letter of their country to denote their position. It was observed that for 'x' players, the letters could be determined conclusively. What is the value of 'x'? (Enter '-1' if the answer cannot be determined)

Sol. In the ranking round, it has been provided that for every 'Hit' - 10 points are awarded, while for every 'Miss' - 5 points are deducted. Since each archer gets a total of 10 shots, the maximum number of points any archer can obtain is 100. Furthermore, it is stated that exactly three players obtained 25 points each (the lowest recorded value). This is possible only if they hit the target 5 times and missed it in the remaining 5 shots. [25 = 5(10) - 5(5)] The resulting five archers had a unique score (along with a unique number of Hits and Miss). This is possible only in the following way:

Hits	Miss	Points
10	0	100
9	1	85
8	2	70
7	3	55
6	4	40
5	5	25
5	5	25
5	5	25

Furthermore, it is stated that the Chinese team scored 170 points in the Men's event. They could have obtained this score only in one way = [100 + 70]. Additionally, the Indian team

scored 125 points in the Men's event. This is possible in two ways = [100 + 25] or [85 + 40]. However, since we have discerned that the Chinese team obtained 100 points, we deduce that the Indian team scored the following combination of [85 + 40].

Similarly, the Chinese team scored a total of 140 points in the Women's event. This is possible in two ways = [100 + 40] or [85 + 55]. On the other hand, the Russian women's team scored 155 points cumulatively. This is again possible in two ways = [100 + 55] or [85 + 70]. Considering the potential cases, it becomes evident that the Chinese team obtained the total score in the form [100 + 40] while the Russian teamed obtained the total score in the form [85 + 70]. For instance, let us assume that one of the Russian archers scored 100 points; this would imply that the second Russian archer scored 55 to bring the total to 155. Consequently, the Chinese team must have scored [85 + 55] since 100 points have already been scored. However, this is not possible since 55 points have also been scored. Thus, we fall back to the second choice, wherein the Chinese team scored 100 and 40 points respectively, while the Russian team had a total score of the form [85 + 70].

Using the above information, we can extend the aforementioned table in the following manner: [Here, C, I, U and R respectively correspond to an archer's nationalities - China, India, USA and Russia]

Hits	Miss	Points	Player (Men's)	Seed	Player (Women's)
10	0	100	C	(1)	C
9	1	85	I	(2)	R
8	2	70	C	(3)	R
7	3	55	U or R	(4)	I or U
6	4	40	I	(5)	C
5	5	25	U or R	(6)	I or U
5	5	25	U or R	(7)	I or U
5	5	25	U or R	(8)	I or U

It is imperative to note that the sum of the seeds of the players determines their nations rank. It is evident from the table that China ranks above India in the Men's event at the end of the Ranking Round. Similarly, for further scrutiny of the seeding of Men's events, we can consider two cases for seed 4:

CASE 1: Seed 4 player belongs to the US team

In this situation, the sum of the seeds of the US team could be either [4 + 6 = 10] or [4 + 7 = 11] or [4 + 8 = 12]

The corresponding sum of the seeds of the Russian team in this case would be [7 + 8 = 15] or [6 + 8 = 14] or [6 + 7 = 13]

In all of these cases, (the sum of the seeds of the Russian archers) > (the sum of the seeds of the US archers) ---> therefore, (rank of Russian team) < (rank of US team) - a relation that corresponds to the final ranking of the countries at the end of the Ranking round.

CASE 2: Seed 4 player belongs to the Russian team

In this situation, the sum of the seeds of the Russian team could be either [4 + 6 = 10] or [4 + 7 = 11] or [4 + 8 = 12]

The corresponding sum of seeds of the US team in this case would be [7 + 8 = 15] or [6 + 8 = 14] or [6 + 7 = 13]

In all of these cases, (the sum of the seeds of the Russian archers) < (the sum of the seeds of the US archers) ---> therefore, (rank of Russian team) > (rank of US team) - a relation that contradicts the final ranking of the countries at the end of the Ranking round.

Hence, we determine that the seed 4 player belongs to the US team.

Similar reasoning can be used to determine the seed 4 player in the Women's Individual event. In this regard the final table appears as follows:

Hits	Miss	Points	Player (Men's)	Seed	Player (Women's)
10	0	100	C	(1)	C
9	1	85	I	(2)	R
8	2	70	C	(3)	R
7	3	55	U	(4)	I
6	4	40	I	(5)	C
5	5	25	U or R	(6)	I or U
5	5	25	U or R	(7)	I or U
5	5	25	U or R	(8)	I or U

Based on the table, we can definitively comment on the nationalities of the first five seeds in the Women's category. Hence, the correct answer is **5.**

Instructions

The following table gives information about the number of seats available in each of the five courses offered by an MBA college.

Specialization	No. of seats
Finance	58
Operation	60
Marketing	68
Industrial Management (IM)	72
General Management (GM)	75

This term 500 students have applied for a seat in the college. These students are ranked from 1 to 500 by merit. While filling the form, each one of them was asked to give his/her preference (1-5) for each course, 1 being the most preferred and 5 being the least preferred. The seat allocation is done by merit, i.e. each student is allotted a seat in his/her most preferred course, provided all the students ranked better than him/her are allotted seats in the department of their preference and seats are available. If seats are not available in a preferred course, students are allotted seats in the next preferred course, and so on.

The following table gives information about the preference of students for various courses.

Preference	Finance	Operations	Marketing	IM	GM
1	220	75	55	120	30
2	135	40	65	135	125
3	100	30	130	70	170
4	20	240	85	80	75
5	25	115	165	95	100

Further following information is also known-

(i)   Any student who is not allocated a seat in the course of his/her three highest preference will opt out of the admission process and will not join the college.

(ii)   Any rejected seats will be offered to students still in the admission process.

41. What is the minimum possible number of students who join GM?

A. 30

B. 8

C. 45

D. 67

Sol. GM has 75 and 100 students for 4th and 5th preference. These students will not join GM. Remaining students = 500-175=325

To minimize the number of students joining GM, we want the least number of students available to join GM. So, let's assume that all other courses are full. This means that (58+60+68+72)=258 students have joined the college. We will assume that these 258 are from the pool of remaining 325 students. Thus 325-258=67 students are remaining and they have to join GM. Thus, the answer is 67.

42. What is the minimum possible number of students who joined the course of their first preference?

A. 58

B. 60

C.65

D. None of these

Sol. The question wants us to minimize the number of students who got admission in the course of their first preference. But you can't reduce this number beyond a point. It is because some students will always get their first preference. For example, the student with rank 1 will always join the course of his/her first preference. So, in order to minimize the number, we want relatively higher ranked students to have first preference in a course that is already

filled. We can see that maximum students have filled Finance as their first preference. So, assume the students ranked 1-220 filled finance as their first preference, 221-340 filled IM as their first preference and so on.

Now, students ranked 1-58 will get finance which is their first preference. To minimize the first preference admits we will assume that the students ranked 59-130 (72 students) had IM as their second preference. Thus, they will join IM and fill all of its seats. Similarly, students ranked 131-205 (75) had GM as their second preference and will join it. The next 206-270(65) had Marketing as second preference and joined it. In a similar fashion, we can arrange all other students in such a manner that they don't get their first preference. Thus, minimum students joining their first preference course is 58.

43. What is the minimum possible number of students who did not join the college?

A. 183

B. 167

C. 175

D. 166

Sol. The students who will not join the college will be minimized when all the seats are filled. Let's assume students ranked 1-58 have finance as their first preference. Thus, they join it and fill all of its seats. Next (59-118) ,60 students, have operations as their first preference and thus get their seats. Similarly, the next (119-190) ,72 students, have IM as their first preference, (191-247) ,55 students, filled marketing seats as first preference, and (248-277) ,30 students, filled GM seats as their first preference. Now, 13 marketing and 45 GM seats didn't get filled in the first preference. So, assume that students ranked (278-290), 13 students, had finance as their first preference and Marketing as second. But since Finance seats are filled, they will fill the remaining marketing seats. Similarly, the next 45 students also had finance as their first preference, but their second preference was GM. So they joined GM. Thus, all the seats in the college got filled.

Total number of seats available in the college are (58+60+68+72+75)=333, all of which got filled.

Thus, the students who will not join the college are- (500-333)=167

44. What is the ratio of the maximum number of students who joined Finance as their first preference to the maximum number of people who joined Operations as their second preference?

A. 30:29

B. 29:20

C. 29:30

D. None of these

Sol. Let's assume that students ranked 1-58 are those who had Finance as their first preference. Thus, they will join Finance as their first preference. Now, assume that the next 40 ranked people (59-99) have Finance as their first preference and Operations as their second preference. But all the finance seats are filled. So, they will join Operations as second preference. These 40 are the maximum since only 40 people filled operations as their second preference. Thus the ratio becomes- 58:40= 29:20. Thus, the answer is B.

45. There are 105, 160 and 270 students in Grade 1, 2 and 3 of a school. The students in a grade are subdivided into teams of equal size such that 3, 7 and 15 students are left over from each of the respective grades. What is the largest possible team size that would produce this result?

A. 17

B. 19

C. 47

D. 51

Sol. The number of students in the class should be a divisor of 105-3 = 102. It should also be divisor of 160-7 = 153 and of 270 - 15 = 255.

The largest divisor to leave these remainders is the HCF of (105-3,160-7, 270-15) = HCF(102, 153, 255) = 51.

46. For a natural number X, P(X) represents the probability that a palindrome natural number (chosen randomly) less than X is divisible by 11. Then,

A. P(5000) > P(1000) > P (10000)

B. P(10000) > P(5000) > P(1000)

C. P(1000) > P(100) > P(10)

D. P(100)>P(10)>P(1000)

Sol. An even digit palindrome number is always divisible by 11, while an odd digit palindrome number is not always divisible by 11. So, P(10000) > P(5000) > P(1000).

47. The cost price of a gold coin was Rs. 11000 in the year 2014. It increased by an equal amount in the year 2015, 2016, 2017 and 2018. Gold price index (GPI) is defined as percentage increment in the price of the gold coin in any year over the previous year. Which of the following can't be the ratio of GPI in the year 2018 to GPI in the year 2016?

A. 1 : 2

B. 5 : 6

C. 6 : 5

D. 4 : 7

Sol. Let the increment in the price be Rs. *x*. Thus, the price of the gold coin in year 2015, 2016, 2017 and 2018 would be Rs. (11000 + *x*), Rs. (11000+2*x*), Rs. (11000 + 3*x*) and Rs. (11000 + 4*x*) respectively.

Therefore, the required ratio $= \dfrac{\frac{x}{11000\,+\,3x}\times100}{\frac{x}{11000+x}\times100}$ $\Rightarrow$ $\dfrac{11000+x}{11000+3x}$

We can see that denominator is greater than numerator hence the ratio can't be greater than 1. In option c, we have the ratio $= \dfrac{6}{5} > 1$ this is not possible.

Hence, option C is the correct answer.

48. 2 trains pass through a tunnel at an equal speed of 10 m/s. The first train takes twice as much time as the second train to cross the tunnel completely. The trains can cross each other completely in 2 minutes if they are travelling in the opposite directions on parallel tracks. How much time (in seconds) will a train thrice the length of the shorter train take to cross the tunnel travelling at the same speed as these 2 trains? (Enter 0 if the answer cannot be determined)

Sol. We know that the 2 trains travel with the same speed.
Let the length of the tunnel be T m.
Let the length of the shorter train be 'x' and the length of the longer train be 'y'.

The 2 trains cross each other completely in 2 minutes (120 seconds) if they are travelling on opposite tracks.
When 2 trains travel in the opposite directions, the total distance that should be traveled by the 2 trains to cross each other completely will be equal to the sum of the length of the trains.

We know that both the trains travel at 10 m/s. Since the trains are moving in the opposite directions, the relative velocity is 10+10 = 20 m/s.

Sum of the lengths of the trains, x+y = 120*20
=> x+y = 2400 m
y = 2400-x

It has been given that the longer train takes twice as long as the shorter train to cross the tunnel.
Distance traveled by a train to completely cross a tunnel = Length of the train + length of the tunnel.

2*(T+x)/10 = (T+2400-x)/10

2T+2x = T-x+2400
T+3x = 2400 m

We have to find out the time taken by a train thrice as longer as the shorter train to cross the tunnel at the same speed as these 2 trains. Therefore, we have to find the time taken by a train of length 3x to cross the tunnel at 10 m/s.

A train of length 3x will have to cover a distance of T+3x to cross the tunnel completely.
We know that T+3x = 2400 m
=> Time taken to cross the tunnel = 2400/10 = 240 seconds.

Therefore, 240 is the right answer.

49. The line $x - 2y - 1 = 0x - 2y - 1 = 0$ intersects the circle $x^2 + y^2 + 4x - 2y = 5$ at points M and N. What is the ratio of the perpendicular distance of the circle's centre from line segment MN to that of the perpendicular distance of the circle's centre from the line $4x + 2y + 1 = 0$?

A. 2:1

B. 5:2

C. 3:1

D. 1:1

Sol. The center of the circle $x^2 + y^2 + 4x - 2y - 5 = 0$ is at C(-2,1). The perpendicular distance of a point (x,y) from any given line of the form $Ax + By + C = 0$ is given as: d = $\frac{|Ax+By+C|}{\sqrt{A^2+B^2}}$

Hence, the distance of the point from $x-2y-1 = \frac{5}{\sqrt{5}}$

Similarly, the distance of the point from $4x+2y+1 = \frac{5}{2\sqrt{5}}$

Therefore, the required ratio $= \frac{\frac{5}{\sqrt{5}}}{\frac{5}{2\sqrt{5}}} = \textbf{2}.$

50. Amit takes 1 hour less than Bindu to complete a project. If both of them work together, they complete the project in 2(2/9) hours. Find the time taken by Amit to complete the project if he works alone.

A. 3 hours

B. 6 hours

C. 5 hours

D. 4 hours

Sol. Let the time taken by Bindu be x hours.
Time taken by Amit = x-1 hours.
1/[1/x + 1/(x-1)] = 2(2/9) = 20/9
=> 1/x + 1/(x-1) = 9/20.
Solving this, we get x = 5 or x = 4/9.
Since Bindu can't complete the work in less than 2(2/9) hours, x = 5 => x-1 =4.
Amit takes 4 hours to complete the project.

51. On giving a discount of 30%, the shopkeeper makes a profit of 26%. If the discount given is reduced by 33.33% then what is the approximate profit percentage?

A. 44

B. 36

C. 54

D. 26

Sol. Assuming the marked price as 100x, then after 30% discount the new price = 70x
The cost price = 70x/1.26 = 500x/9
After reducing the discount by 33.33%, new discount = 20x
Then the new selling price = 100x-20x=80x
The profit percentage = ((80×9/500)-1)×100 = 44

52. Sayna buys erasers, sharpeners and pencils for a total of 42 rupees. If the price of a pencil, sharpener and an eraser is Rs 10, Rs 5 and Rs 4 respectively and at least one of each item is bought, how many sharpeners are bought given that the number of sharpeners is maximum possible?

A. 5

B. 4

C. 3

D. 2

Sol. Assuming the number of pencil, sharpener and eraser = a, b and c respectively.
10a+5b+4c=42
Assuming a = 1, then 5b+4c=32
Using trial and error, b=4 and c=3 (only value possible)
Assuming a=2, then 5b+4c=22
Using trial and error, b=2 and c=3 (only value possible)
Assuming a=3, then 5b+4c=12 (No values possible)
Hence, the number of sharpeners is 4.

53. The value of $\dfrac{\left(\dfrac{x^2 \cdot y^2 \cdot z}{x^{-3} \cdot y^2 \cdot z^3}\right)^5}{\left(\dfrac{x^{-1} \cdot y^3 \cdot z^{-2}}{x^2 \cdot y^{-1} \cdot z}\right)^4}$

A. $\dfrac{x^{27} \cdot z^2}{y^{40}}$

B. $\dfrac{x^{35} \cdot z^2}{y^{41}}$

C. $\dfrac{x^{37} \cdot z^2}{y^{41}}$

D. $\dfrac{x^{37} \cdot z^3}{y^{40}}$

Sol. $= \dfrac{\left(\dfrac{x^5}{y^5 \cdot z^2}\right)^5}{\left(\dfrac{y^4}{y^3 \cdot z^3}\right)^4}$ $\qquad \Rightarrow \qquad$ $\dfrac{\left(\dfrac{x^{25}}{y^{25} \cdot z^{10}}\right)}{\left(\dfrac{y^{16}}{y^{12} \cdot z^{12}}\right)}$ $\qquad \Rightarrow \qquad$ $\dfrac{x^{37} \cdot z^2}{y^{41}}$

54. **From a can of 50 litres of milk, 10 litres are withdrawn and replaced with water. Again, 8 litres are removed and replaced with water. Similarly, the quantity of mixture withdrawn and replaced by water is decreased by 2 litres and repeated until the step when 2 litres of the mixture is removed and replaced with water. What will be the quantity of milk left in the final mixture?**

A. $\dfrac{2 \times 24!}{19!} \times \dfrac{1}{25^4}$

B. $\dfrac{24!}{19!} \times \dfrac{1}{50^4}$

C. $\dfrac{2^5 \times 24!}{9!} \times \dfrac{1}{25^9}$

D. $\dfrac{2^5 \times 24!}{9!} \times \dfrac{1}{50^9}$

Sol. Quantity of milk left after the 1st iteration $= 50 \times \dfrac{40}{50}$

Similarly, after the 2nd iteration, quantity left $= 50 \times \dfrac{40}{50} \times \dfrac{42}{50}$

This will be repeated 5 times with quantity withdrawn decreasing by 2 litres each time.

So, Quantity of milk in final mixture $= 50 \times \dfrac{40}{50} \times \dfrac{42}{50} \times \dfrac{44}{50} \times \dfrac{46}{50} \times \dfrac{48}{50}$

$= 2^5 (20 \times 21 \times 22 \times 23 \times 24) \times \dfrac{1}{50^4}$

$= \dfrac{2 * 24!}{19!} \times \dfrac{1}{25^4}$

Hence, option A is the correct answer.

55. In the figure, ABC is an equilateral triangle. Circles with centers P, Q and R are drawn in such a way that they touch the big circle and the sides of the triangle and are of the maximum possible radius. The radius of the big circle is 8 cm. Find the area of triangle PQR.
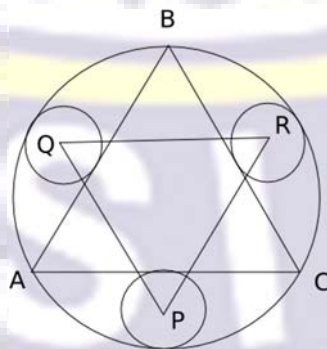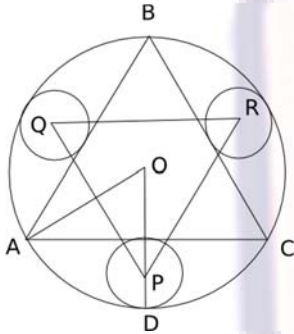

A. $36\sqrt{3}\,cm^2$

B. $12\sqrt{3}\,cm^2$

C. $27\sqrt{3}cm^2$

D. $48\sqrt{3}cm^2$

Sol.

Since the radii of the small circles are maximum, the centres of the small circles should lie on the lines joining the vertices of the big triangle with the center of the big circle. Let the radius of the small circle be r.

OA = 8

OP = 8*sin 30 + r = 4+r

OD = 4+2r = radius of the big circle = 8 => r = 2

So, OP = 6 => side of triangle PQR = OP cos 30 * 2 = 6 * √3/2 * 2 = 6 * √3

Triangle PQR is also an equilateral triangle.

So, area of the triangle PQR = √3/4 * side² = √3/4*side² = √3/4 * 36 * 3 = 27√3 cm²

56. Let *a* and *b* be the roots of the quadratic equation $x^2+(\alpha-3)x-4\alpha-3=0$ for some real number α. What is the minimum value of a^2+b^2?

A. 6

B. 8

C. 12

D. 14

Sol. a + b = 3 - α and ab = $-4\alpha-3$

$a^2+b^2=(a+b)^2-2ab$

$= \alpha^2-6\alpha+9+8\alpha+6$

$= \alpha^2+2\alpha+15$

The mimium value is $\dfrac{(4 \cdot 1 \cdot 15 - 2^2)}{4 \cdot 1} = 14$

57. Three boys Anil, Bhalu and Chotu are running in an triangular park ABC from points A,B,C respectively. All three sides are equal and boys will run only along the sides of the park in the direction given below. If the speeds of Anil, Bhalu and Chotu are in 3:2:1, at which point will all three of them meet for the second time?
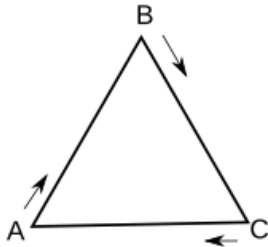
A. A

B. B

C. C

D. They will never meet simultaneously

**Sol.** As we know that the speed of Anil, Bhalu and Chotu is in the ratio 3:2:1 and all the three sides are equal.

a:b:c = 3:2:1 (Assuming speeds of Anil, Bhalu and Chotu are a, b and c respectively)

∴ By the time Chotu will cover one side, Bhalu will cover two sides of triangle and Anil will cover three sides of triangle.
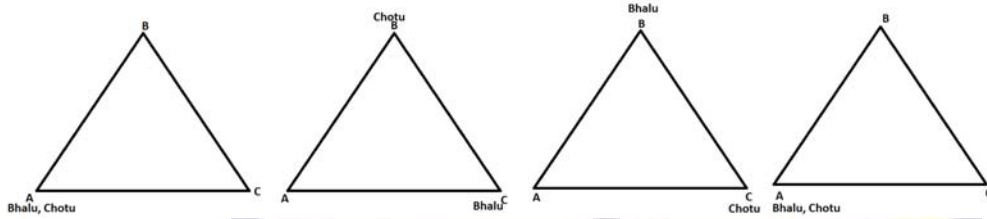
Thus if Chotu travel CA, Bhalu will travel BC and CA, Anil will travel AB,BC and CA.

So all the three will meet for the first time at A.

Now since the speeed of Anil and Chotu is in ratio 3:1, they will meet at 3-1=2 points as shown in the diagram.
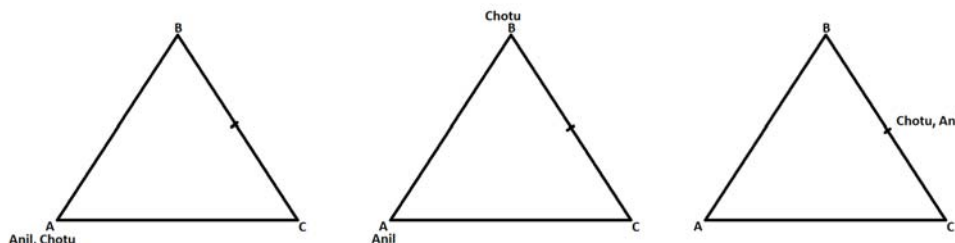
Also Bhalu and Chotu have their speeds in the ratio 2:1, they will meet at 2-1 = 1 point i.e. A as shown in figure.

So all three can meet only at A.

58. Find the sum to infinity of the series $1 + 3(0.4) + 6(0.4)^2 + 10(0.4)^3 + 15(0.4)^4 +...$

A. 125/27

B. 125/64

C. 25/8

D. 25/16

Sol. $S = 1 + 3x + 6x^2 + 10x^3 +.....$ where $x = \frac{2}{5}$
$Sx = x + 3x^2 + 6x^3 + 10x^4 +....$

$S(1-x) = 1 + 2x + 3x^2 + 4x^3 + ...$
$Sx(1-x) = x + 2x^2 + 3x^3 + 4x^4 + ...$

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

$S(1-x)^2 = \frac{1}{1-x}$

$S = \frac{1}{(1-x)^3} = \frac{125}{27}$

59. In a school of 600 students, 350 students are boys and the rest are girls. Ravi and Shweta were standing for the post of General Secretary. 60% of the boys voted for Ravi and the rest of the boys voted for Shweta. 60% of the girls voted for Shweta and the rest of the girls voted for Ravi. It was later found out that the voting machine was faulty and 50% of the boys who voted for Ravi had actually voted for Shweta and 60% of the boys who voted for Shweta had actually voted for Ravi. Also, 39% of the girls who voted for Ravi had actually voted for Shweta and $\frac{1}{3}$ rd of the girls who voted for Shweta had actually voted for Ravi. What is the absolute difference between the votes received by Ravi and Shweta?

(Assume that all the students voted)

Sol. The number of boys in the school = 350 and the number of girls in the school = 250
Initially, 60% of the boys = 210 boys voted for Ravi and 140 boys voted for Shweta.
Also, 40% of the girls = 100 girls voted for Ravi and 150 girls voted for Shweta.
50% of the boys who voted for Ravi had actually voted for Shweta I.e. 105 boys who voted for Ravi had actually voted for Shweta
Thus, the vote count right now Ravi = 105 boys and 100 girls
Shweta = 140+105 boys and 150 girls.

60% of the boys who voted for Shweta had actually voted for Ravi.

Thus, the vote count now becomes Ravi = 189 boys and 100 girls

Shweta = 161 boys and 150 girls.

39% of the girls who voted for Ravi had actually voted for Shweta

Thus, the vote count now becomes Ravi = 189 boys and 61 girls

Shweta = 161 boys and 150+39 girls.

$\frac{1}{3}$ rd of the girls who voted for Shweta had actually voted for Ravi

Thus, the final vote count becomes = 189 boys and 111 girls = 300 votes

Shweta = 161 boys and 139 girls = 300 votes.

Thus, the difference between the votes received by Ravi and Shweta = 0

60. A watch which gains uniformly was observed to be 1 minute slow at 8 a.m. on a day. At 6:00 p.m. on the same day, it was 1 minute fast. At what time did the watch show the correct time?

A. 12:00 noon

B. 2:00 p.m.

C. 1:00 p.m.

D. 3:00 p.m.

Sol. From 8:00 a.m to 6:00 p.m. i.e., in 10 hours the clock gained 2 minutes.

So, it gains 1 minute in 5 hours.

So it shows the correct time at 1:00 pm on the same day.

61. There are 24 points on a plane such that 10 of them are collinear. No 4 points are vertices of a cyclic quadrilateral. Find the maximum number of circles that can be drawn through any three points.

A. 1823

B. 1824

C. 1904

D. 1905

Sol. A circle can be drawn through any three points on a given plane, provided they are not collinear.

Now, there are 24 points, so the total number of ways three points can be chosen = $^{24}C_3$

However, if we choose any three of the given ten points that are colinear, we won't be able to form a circle.

Hence, those cases need to be excluded.

Total number of ways = $^{10}C_3$

The total number of circles = $^{24}C_3$ - $^{10}C_3$ = $\frac{(24\times23\times22-10\times9\times8)}{3\times2\times1}$ = $\frac{12144-720}{6}$ = $\frac{11424}{6}$ = 1904

62. An amount of Rs 15000 is invested in 2 schemes A and B for 3 years. Scheme A provides 10% Simple Interest and Scheme B provides 10% Compound Interest (compounded annually). If the amount obtained at the end of 3 years is Rs.19,790.625, then what percent of the original sum is invested in scheme B ?

A. 25%

B. 37.5%

C. 50%

D. 62.5%

Sol. The answer can be found out by using trial and error.
Let scheme B have 50% of the total sum. Then, amount after 3 years in scheme B = 7500(1.1)³ = 9982.5
amount after 3 years in scheme A = 7500 + (7500 x .1 x 3) = 9750
Thus the total amount we receive = 19732.5
This amount is less than the actual amount we have to receive. Thus, we have to invest more than 50% in scheme B to get the actual amount.
Option D is the only option that satisfies this criteria ∴option D is correct.

63. Balu digs a cylindrical well in his backyard. Just the top surface of the ground (sand) is exposed to the air initially. He heaps the sand excavated in the form of a cone such that the diameter of the well is equal to the diameter of the heap of sand. If the amount of sand exposed to the air has increased by 25% and the diameter of the well is 'n' times the depth of the well, the value of 'n' is

Sol. Just the top surface of the ground is exposed initially. Therefore, the area of sand exposed will be equal to the area of the base circle of the cylinder (well).

It has been given that the diameter of the well is equal to the diameter of the heap.
Let the radius of the cylinder and cone be r, depth of the cylinder be h and the height of the heap (cone) be c.
Let the slant height of the cone be s.

It has been given that the amount of sand exposed has increased by 25%.

Area of the ground (sand) exposed initially = base area of the cylinder = $\pi * r^2$.
Area of sand exposed in the heap = Curved surface area of the cone = $\pi * r * s = \pi * r * \sqrt{c^2 + r^2}$

We know that the area exposed has increased by 25%.

=> $1.25 * \pi * r^2 = \pi * r * \sqrt{c^2 + r^2}$

=> $1.25 * r = \sqrt{c^2 + r^2}$

$$=> \frac{5}{4} * r = \sqrt{c^2 + r^2}$$

Squaring on both sides, we get,

$$\frac{25}{16} * r^2 = c^2 + r^2$$

$$\frac{9}{16} * r^2 = c^2$$

Taking square root on both sides, we get,

$$\frac{3}{4} * r = c \quad \text{...............(1)}$$

Now, we know that the volume of sand excavated will be equal to the volume of the heap.

$$=> \pi * r^2 * h = \frac{1}{3} * \pi * r^2 * c$$

$$=> c = 3h \text{...............(2)}$$

Substituting (2) in (1), we get,

$$\frac{3}{4} * r = 3h$$

$$r = 4h$$

=> Diameter, d=8h

Diameter of the well is *n* times the depth of the well.
=> n = 8.
Therefore, 8 is the right answer.

64. The solution set of the inequality $|x^3-6x^2+12x – 6| \geq (x-2)^3$ is?

A. $[2,\infty]$

B. $[-2, 2]$

C. $(-\infty, \infty)$

D. $[0,\infty]$

Sol. $|x^3 - 6x^2 + 12x – 6| \geq x^3 - 6x^2 + 12x - 8$

Let a = $x^3 -\backslash 6x^2 + 12x - 8$, then given inequality is $|a+2| \geq a$

Now for $a < 0$, as $|a+2| \geq 0$, $|a+2| > a$

and for $a \geq 0$, $|a+2| = a+2$ and $a+2 > a$.||

Hence the inequality is true for all values of x

65. 4x-3y+2=0. If (a,b) is a solution of the equation, find the value of the expression $-8^b \left(\frac{492a-369b}{16^a}\right)$.

(Enter your answer as the nearest integer. Enter -1 if cannot be determined)

Sol. 4x-3y+2=0

4x-3y=-2

Since (a,b) is a solution of the equation, we have 4a-3b=-2.

$$-8^b \left(\frac{492a-369b}{16^a}\right) = \frac{-123(4a-3b)}{2^{4a-3b}} = \frac{(123\times2)}{2^{-2}} = 123 \times 8 = 984$$

Hence, the answer is 984.

66. In the given rectangle, the midpoints of each side are joined to meet at T. If the area of quadrilaterals TRCQ and STPA are 43 cm² and 17 cm², then what is the sum of the areas of △SDR and △QCR
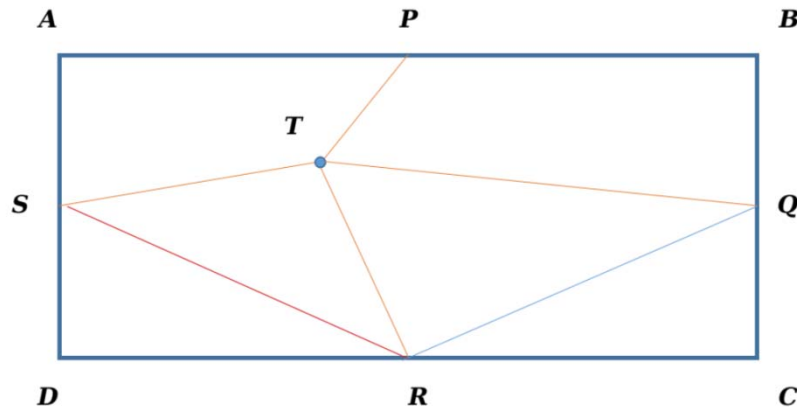
Sol. The sum of the areas of quadrilaterals TRCQ and STPA = The sum of the areas of quadrilaterals TRDS and QTPB = $\frac{1}{2}$ × (area of rectangle ABCD)

Therefore, the area of the rectangle = 2× (43+17) =120cm²

Let *l* and *b* be the length and breadth of the rectangle. Then,

Area (△ SDR) = Area (△QCR) = $\frac{1}{2} \times \frac{l}{2} \times \frac{b}{2} = \frac{lb}{8}$

The sum of both the triangles = $\frac{lb}{4}$

We know that (*l* × *b*) = 120 *cm²*

On substituting the value of (*l* × *b*), we get the sum of triangles = 30 cm²