AIMCAT 2001
VARC

DIRECTIONS *for questions 1 to 5*: The passage given below is accompanied by a set of five questions. Choose the best answer to each question.

Plants have long been known to react to changes in their environment, and may respond to light, temperature, and touch. But are they listening too? For the Arabidopsis plant, the answer is a loud and clear "yes." The distinct, high-amplitude vibrations produced by a cabbage butterfly caterpillar munching on a leaf of this flowering mustard plant, commonly called mousear cress, throws its defences into high gear, according to a study published in Oecologia this month by two researchers at the University of Missouri.

The study, which combined audio and chemical analysis, is the first to find evidence that plants respond to an ecologically relevant sound in the environment, said Heidi Appel, a senior research scientist in the Division of Plant Sciences at Missouri. Appel, along with Rex Cocroft, a professor in the Division of Biological Sciences, used a laser and a small piece of reflective material to record the caterpillar's chewing vibrations, which moves an Arabidopsis leaf up and down about 1/10,000 of an inch. They then played two-hour recordings of the vibrations to one set of plants and left another set in silence. The plants that heard the recording of chewing vibrations created an increased amount of mustard oil, a defence meant to deter an insect attacker. "[The vibrations] trigger them to be better prepared for subsequent attacks," said Appel. "So, they make more defences, faster, when they've been primed by these feeding vibrations."

The plants were also selective about what type of vibrations they responded to. Shortly after the first experiment, Appel and Cocroft exposed the plants to other vibratory sounds, including those from the wind and nonthreatening insects. The other sounds did not trigger any response. "We don't think it's anything as simple as some frequencies or pitches of sound are better than others," Cocroft said. "They responded to the chewing vibrations and not to the insect song, even though they had the

same frequencies in them. It suggests that the plants" acoustic perception is more complicated than simply looking for a particular pitch of sound."

Appel and Cocroft predict that although their research focused on one plant and one predator, their results suggest a widespread response throughout the plant kingdom. The next phase of research will explore the phenomenon with other types of plants and herbivores. It is too early, they say, to speculate on what applications their finding may have for commercial agriculture.

Appel and Cocroft's results join "a growing list of really interesting pieces of information that we really never appreciated that is useful for plants," said John Orrock, associate professor of zoology at the University of Wisconsin-Madison. Orrock, who studies "the ecology of fear" between plants and their predators and has researched the effect snail slime has on a plant's defence system, said he believes the Missouri findings “open up a rich array of new and interesting questions” about the field of plant behaviour.

"There are so many other forms of information that we know plants respond to," he said. "We know they pay attention to light; we know they pay attention to a vast array of chemicals both in the soil and in the air around them ... Plants are balancing a lot of information at any given moment in time. And now we know that acoustic information is something they're also balancing. "It suggests that plants, in some ways, are listening."

Q1. Cocroft reasons that the plants responded to the chewing vibrations and not to the insect song because

a) singing insects are nonthreatening to plants.

b) the plants hadn’t been primed for such stimuli.

c) the acoustic perception of plants is tuned towards identifying threats and not just towards identifying specific pitches.

d) it was of a pitch similar to that of the vibratory sounds of the wind.

Number of words and Explanatory notes for RC:

Number of words: 560

Option A: We cannot generalise from the passage that all singing insects are nonthreatening plants. Co-relation doesn't mean causation, and just because the insect was a singing insect and it was mentioned earlier as a nonthreatening insect, we cannot infer that non singing insect produces a response from the plants. Option A is not the answer.
Option B: The plants are primed to identify threats and based on '*So, they make more defences, faster, when they've been primed by these feeding vibrations*', it can be said that their defences get more efficient. So, the plants need not be primed for the stimuli for them to identify dangers. They can do so on their own, and if anything, the priming makes them sharper. So, Option B is not the answer.
Option C: The acoustic perception of plants is complicated because it doesn't respond based on pitch but based on the perceived threat. That is why for the same pitch, the plant responds on certain occasions and doesn't in other cases. In other words, plants don't just stop at differentiating between pitches, but perceive deeper to check for threats. Hence, they didn't respond in case of the singing insect. Option C is the answer.
Option D: Whether it was of the same pitch as the wind or of a different pitch doesn't really answer the question as to why the plants didn't respond to that pitch. So, being of the same pitch as the wind isn't relevant enough. They didn't respond because of the threat level which is non-existent as perceived by the plants in this case. Also please note that it doesn't matter whether the herbivores are those the plants have encountered before or not in this case. Option D is not the answer.

Choice (C)

Q2. Which of the following is not known to have encouraged a response from plants as understood from the passage?

a) Chemicals both in the soil and in the air around them

b) The light and temperature of the environment around the plants

c) Vibrations that the plants are primed to consider a threat to the ecology around them

d) Variations in the environment around the plants

Number of words and Explanatory notes for RC:

Number of words: 560

Option A: From the passage it can be understood that plants do respond to chemicals in the soil and in the air as seen in: '*we know they pay attention to a vast array of chemicals both in the soil and in the air around them*'. Hence, Option A is not the answer.
Option B: Plants do respond to light and temperature of the environment as understood from *'Plants have long been known to react to changes in their environment, and may respond to light, temperature, and touch*'. Hence, Option B is not the answer.
Option C: Plants are primed to react faster to some threats. Similarly, plants do listen and respond to vibrations which are ***ecologically relevant*** to their environment. However, this is completely different from what the option seems to suggest which is that plants are primed to consider those vibrations which are a threat to the ecology (not to them). That is something not mentioned in the passage. Plants understand a threat to them, not necessarily to the ecology around them. Hence, Option C is the answer.
Option D: That plants respond to variations in the environment around the plants can be understood from '*Plants have long been known to react to changes in their environment*'. So, Option D is not the answer. Choice (C)

Q3. Answers to which of the following will add the least depth to the discussion in the passage?

a) Does the response of the defence systems of plants affect the plant's yield in any way?

b) Do plants react differently to different types of herbivores?

c) Do all plants react to similar herbivores in a similar fashion?

d) Does altering the cabbage butterfly caterpillar, whose chewing vibrations were recorded, affect the plant's response to the sound?

Number of words and Explanatory notes for RC:

Number of words: 560

Option A: While this is about plant behaviour, it also connects to another important question raised in the para about commercial agriculture – '*It is too early, they say, to speculate on what applications their finding may have for commercial agriculture.*' So, the answer to this question will have bearing on the applications of these findings about commercial agriculture (definitely connected to the 'yield' of the plants). Hence, Option A is a valid question, and therefore, not the answer.
Option B: Since one of the speculations is about the response of other plants and other herbivores, this is a valid question. This can be understood from '*Appel and Cocroft predict that although their research focused on one plant and one predator, their results suggest a widespread response throughout the plant kingdom. The next phase of research will explore the phenomenon with other types of plants and herbivores. It is too early, they say, to speculate on what applications their finding may have for commercial agriculture.*' So, the next phase will explore other types of plants and herbivores (predators as far as plants are concerned). So, this choice is a question that needs to be answered since the response of plants to various herbivores is not understood. It is a valid question to ask if they react differently to different herbivores/predators. Option B is not the answer.
Option C: This is different from the previous option in that here we are trying to address the response of all plants for the same stimuli – similar herbivores. In the previous option it was the response of one plant to different herbivores, but here, it is about the response of different plants to the same herbivore. Both these questions help understand plant behaviour vis-à-vis different predators/herbivores. Option C is not the answer.
Option D: Consider this: '*Appel and Cocroft predict that although their research focused on one plant and one predator, their results suggest a widespread response throughout the plant kingdom.*' So, changing the caterpillar doesn't change the species and it has already been established how this plant reacts to this particular species of caterpillars. This question will not add depth to the argument. Hence, Option D is the answer.

Choice (D)

Q4.The conclusions of the study conducted by Cocroft and Appel would be undermined by which of the following research findings conducted on a fresh set of mustard plants?

a) They produce the same amount of oil when exposed to the song of nonthreatening insects as they do when exposed to no sound.

b) They produce more oil in response to the chewing vibrations of certain kinds of caterpillars compared to those of other kinds of caterpillars.

c) They produce less oil in response to the chewing vibrations of caterpillar species they have not encountered before, compared to the chewing vibrations of those they have already encountered.

d) Mustard plants that have not been primed to the chewing vibrations of cabbage butterfly caterpillars produce the same amount of oil in response to the chewing vibrations as they do in response to the song of nonthreatening insects.

Number of words and Explanatory notes for RC:

Number of words: 560

The conclusions of the study conducted by Cocroft and Appel are two-fold: they produce more oil in the face of a perceived threat, and pitch of the sound has got nothing to do with their increased production of mustard oil.
Option A: The passage states that the mustard plants produce an increased amount of oil when there is a threat (increased amount suggests that there is oil produced even during normal times). According to this option there is no increased amount in case of silence or in case of nonthreatening insects. This is expected as there is no threat. Hence, there is no increase in amount of oil produced. So, this option doesn't undermine the conclusion of the study. Option A is not the answer.
Option B: It is open to speculation, according to the passage, as to what the response of various plants will be with respect to various caterpillar species/herbivores. So, if this research finding is true, it continues to strengthen the conclusion of the study that these plants produce oil in response to a perceived threat. The quantity of the oil was discussed with respect to whether the plants were primed with those vibrations (used to them) or not. However, the quantity was not discussed with respect to differing types of caterpillar species/herbivores. This research finding will not undermine the conclusions. Hence, Option B is not the answer.
Option C: This sits well with the second finding of the study that as the plants are primed towards the vibrations of the perceived threat, they start producing more oil, as a sign of their increasingly perceptive defence. This can be understood from '"*[The vibrations] trigger them to be better prepared for subsequent attacks," said Appel. "So, they make more defences, faster, when they've been primed by these feeding vibrations."*' So, their making less oil (as long as they are making) in response to unfamiliar herbivores compared to what they make in response to familiar herbivores doesn't undermine the study, rather buttresses it (that defences are faster when they are primed). Hence, Option C is not the answer.
Option D: The study simply establishes that the mustard plants produce 'an increased amount of oil' dubbed as the response to the threat. So, producing same amount of oil in case of a perceived threat (even if they have not been primed to it) and in case of nonthreatening insects undermines the conclusion of the study, as it means that there was no response to the threat. Option D is the answer. Choice (D)

Q5. The last two lines of the passage imply that plants can differentiate between

a) the pitches of chewing vibrations created by different herbivores chewing their leaves.

b) the vibrations caused by a nonthreatening insect and the vibrations caused by herbivores chewing their leaves.

c) silence and the song of nonthreatening insects.

d) feeding vibrations that they have been primed with and those they haven't been primed with.

Number of words and Explanatory notes for RC:

Number of words: 560

Consider the sentences: '*And now we know that acoustic information is something they're also balancing. "It suggests that plants, in some ways, are listening.*'' By listening, it is implied that plants can differentiate between what is a threat and what isn't, which is why the acoustic information is being discussed (a reference to an earlier discussion in the passage where it is mentioned that '*the plants' acoustic perception is more complicated than simply looking for a particular pitch of sound*').
Option A: From the passage it can be understood that the mustard plants could differentiate between the threat from a specific caterpillar and sounds which weren't threats. However, we have not discussed whether they can differentiate between two different pitches from two different threats. Hence, Option A is not the answer.
Option B: This difference is the perceived threat and this difference is what the passage establishes as the difference that plants can spot and respond to. Hence, when it is mentioned that plants are listening, it implies that plants are looking for the acoustic information beyond pitch, the information that helps them respond to a threat. Hence, Option B is the answer.
Option C: Neither of these factors is a threat and the passage doesn't help us infer the response of plants to nonthreatening situations. Also, the last two lines of the passage definitely don't allude to nonthreatening situations. Hence, Option C is not the answer.
Option D: Plants do distinguish between these two types of vibrations as understood from the passage. When they are primed their defences are more alert. So, this statement is true. However, the last two lines don't imply this difference. The aim of the passage was not to discuss the ability of plants in responding to threats they are used to and threats they are not used to. It was more about their response to threats and their response to non-threats. Hence, Option D is not the answer. Choice (B)

DIRECTIONS *for questions 6 to 10*: The passage given below is accompanied by a set of five questions. Choose the best answer to each question.

Regardless of its focus, any compelling play is composed of many strains of struggle in concert, feeding and enforcing and intensifying one another. Inner conflicts pitch your characters into conflicts with other characters. Likewise, the world around them influences your characters' private and social

conflicts in sometimes palpable, often subliminal ways. At the conclusion of the psychologically well-made play, the resolution of the exterior conflict has resolved the interior. If theirs is a truly happy ending, then your characters retire from the field of battle blissfully unconflicted in all spheres of life…

Actors will talk of their intentions […] inside the skins of their characters. They pursue their desires across a rope-course of choices and actions. The other characters are likewise impelled by their own inner conflicts into conflicts with one another, as together these actions braid into the action and events of a play. [However], conflict will soon bore the audience if the playwright hasn't instilled a vivid sense of why it matters. So, despite my distaste for the word, because it reminds me of Wall Street and equestrian contests, we must talk of stakes, of risk and cost, of the propulsive value and captivating power of a prize won or lost, and how conflict without stakes is mere spectacle.

In drama and comedy (and on the spectrum between) the stakes are life-and-death, yes, but also particular, because each of us has different ideas about what is profoundly threatening and desirable… And the character doesn't need to always understand why they do what they do – in fact they probably shouldn't; this awareness is most dramatic when it's hard-won in the sweat and froth of conflict – but the audience needs to incrementally learn what the playwright knows: the reasons for this behaviour and why these reasons matter.

When structuring a play – that is, shaping conflict – it is helpful to think in terms of a protagonist, or protagonists if you must. Love stories are dual-protagonist stories in which our main characters share the same objective – though inner and external conflicts, [and] conflicts with secondary and tertiary characters, will undoubtedly get in the way. Multi-protagonist plays, [or] ensemble plays, are the more difficult to write because they tend to bloat or dissipate with characters and their conflicts rambling and ranging every which way. Writing an ensemble play requires the deft knitting together of equally important conflicts so that they escalate and resonate and culminate with one another. …

The modern American theatre seems to have largely abandoned the antagonist. Playwrights may write a relative or structural antagonist, a less sympathetic character whose wants and needs and, therefore, actions, conflict with what our protagonist is after; but the villain of old is often nowhere to be found. The neoliberal theatre seems to believe that an antagonist is simply a protagonist we have not yet understood.

But it can be useful as a playwright to remember […] the truth that dramatic conflict is in its purest form the depiction of the struggle between good and evil. Us and them. Protagonist versus antagonist […]; theirs is the essential conflict. If we can believe in an enemy, then our attention will be total. Because in the end we all want to win – or at least to survive… Our objective in the audience is to vicariously achieve a resolution to the story that will feel like justice, maybe even like peace.

Q6. The author believes we must talk of stakes in a conflict because

a) a conflict is not worth discussing if there were no stakes.

b) people have a strong distaste for the word.

c) conflict without stakes offers not much beyond drama.

d) audiences will not be captivated by the conflict if they do not know what's at stake.

Number of words and Explanatory notes for RC:

Number of words: 564

Consider the sentences: '[However], conflict will soon bore the audience if the playwright hasn't instilled a vivid sense of why it matters. So, despite my distaste for the word, because it reminds me of Wall Street and equestrian contests, we must talk of stakes, of risk and cost, of the propulsive value and captivating power of a prize won or lost, and how conflict without stakes is mere spectacle.'

Option A: The author doesn't really mention anywhere that the conflict is not worth discussing if there are no stakes. The author never really ventures into the territory of when a conflict is worth discussing and when it isn't. The discussion is from the perspective of what's in it for the audience. So, Option A is not the answer.

Option B: The author mentions that the word 'stakes' has to be used despite his distaste for the word (because of its association with Wall Street and equestrian contests) because it is important to understand the risk and loss. So, others having a distaste for the word is not the reason why the word 'stakes' should be used; it is quite contrary to what the author is conveying. Hence, Option B is easy to eliminate.

Option C: While the author calls conflict without stakes 'a mere spectacle' (something that is interesting to gaze at but nothing beyond), this is not the reason why the author wants to discuss stakes. The author in the last sentence clearly says we must talk of a. stakes b. of risk and cost c. of the propulsive value and captivating power of a prize and d. how conflict without stakes is mere spectacle. The author says we must talk of all these because of what has been mentioned in the previous sentence - that audiences will be bored if it is not instilled in them as to why all of the conflict matters. Hence, Option C is not the answer.

Option D: This according to the author is the reason why we must discuss stakes - to make sure the audience is not bored, that the audience understands, quite vividly, why the conflict matters. Only that will keep them interested. Hence, Option D is the answer. Choice (D)

Q7. The difference between love stories and multi-protagonist stories is that

a) in the former there is only one conflict while in the latter, there are several.

b) in the former the main characters have similar conflicts while in the latter the conflicts may not be aligned to each other.

c) in the former the conflicts are between main and secondary characters while in the latter the conflicts are between the main characters.

d) in the former the objective is singular, while in the latter multiple objectives could overlap with one another.

Number of words and Explanatory notes for RC:

Number of words: 564

Consider the sentences: '*Love stories are dual-protagonist stories in which our main characters share the same objective – though inner and external conflicts, [and] conflicts with secondary and tertiary characters, will undoubtedly get in the way. Multi-protagonist plays, [or] ensemble plays, are the more difficult to write because they tend to bloat or dissipate with characters and their conflicts rambling and ranging every which way. Writing an ensemble play requires the deft knitting together of equally important conflicts so that they escalate and resonate and culminate with one another.*'

Option A: While it is mentioned clearly that characters in ensemble stories have several important conflicts and all of them need to be deftly managed, we cannot really say that there is only one conflict in case of a love story. Yes, the main characters share an objective according to the para, but there are several conflicts possible with secondary and tertiary characters. Hence, Option A is not the answer.

Option B: The main characters share an objective in a love story. And there are conflicts that get in the way. From these two pieces of information, we cannot really infer that the main characters have similar conflicts. Also, the characters in ensemble plays may have conflicts that are aligned with each other, as understood from last line of the para (mentioned above) where the author says conflicts should escalate and resonate and culminate with one another. Hence, Option B is not the answer.

Option C: In case of an ensemble play, distinction has not been made between main and tertiary characters. So, this option is incorrect. Also, it has not been mentioned that the conflicts are between main and secondary characters in case of a love stories. All that is said is that there are conflicts which get in the way of the shared objective. Option C is not the answer.

Option D: This is apt since the main characters share the same objective in case of love stories. So, it can be understood that the objective is singular and clear. However, in case of ensemble plays, there are multiple conflicts which need to resonate with each other (should be done deftly by the playwright according to the author of the passage). So, it can be said that the objective of the characters may not be clear. And even if they are, there could be multiple objectives/conflicts that may or may not resonate with one another. Option D is the answer. Choice (D)

Q8. It can be inferred about the author's idea of an antagonist that

a) an antagonist is a character with grey shades akin to what the neoliberal theatre believes.

b) an antagonist need not be a misunderstood protagonist, unlike what the neoliberal theatre believes.

c) the antagonist is just a less sympathetic character than the protagonist akin to what the modern American theatre believes.

d) the antagonist is someone whose wants and needs conflict with those of the protagonist.

Number of words and Explanatory notes for RC:

Number of words: 564

Consider the sentences: '*The modern American theatre seems to have largely abandoned the antagonist. Playwrights may write a relative or structural antagonist, a less sympathetic character whose wants and needs and, therefore, actions, conflict with what our protagonist is after; but the villain of old is often nowhere to be found. The neoliberal theatre seems to believe that an antagonist is simply a protagonist we have not yet understood… But it can be useful as a playwright to remember, […] the truth that dramatic conflict is in its purest form the depiction of the struggle between good and evil. Us and them. Protagonist versus antagonist […]; theirs is the essential conflict. If we can believe in an enemy, then our attention will be total.*'

Option A: It can be clearly understood from the lines above ('*The neoliberal theatre seems to believe that an antagonist is simply a protagonist we have not yet understood… But it can be useful as a playwright to remember, […] the truth that dramatic conflict is in its purest form the depiction of the struggle between good and evil')* that the author doesn't really agree with the neoliberal theatre's idea of an antagonist. The author's idea has more to do with the good old-fashioned antagonist who is the evil compared to the good represented by the protagonist. Hence, Option A is not the answer.

Option B: This is true, since the author doesn't believe in the neoliberal theatre's idea that the antagonist is just a protagonist who has been misunderstood. The author differs from such a perspective. According to the author, the antagonist represents evil or bad. Hence, this option can be inferred from the author's opinion.

Option B: This is true, since the author doesn't believe in the neoliberal theatre's idea that the antagonist is just a protagonist who has been misunderstood. The author differs from such a perspective. According to the author, the antagonist represents evil or bad. Hence, this option can be inferred from the author's opinion.

Option C: The author mentions that it is the modern American theatre which has abandoned the antagonist and playwrights treat the antagonist as just a character less sympathetic than the protagonist. However, it can be inferred from the para that the author doesn't buy the standpoint of the modern American theatre as understood from the last para of the passage. (This option can also be eliminated on tone because it says 'akin' to what the modern American theatre believes, but the author doesn't really agree with that version.) Hence, Option C is not the answer.

Option D: *The modern American theatre seems to have largely abandoned the antagonist. Playwrights may write a relative or structural antagonist, a less sympathetic character whose wants and needs and, therefore, actions, conflict with what our protagonist is after…* From this it can be understood that the author's idea of an antagonist is not someone whose needs and actions conflict with that of the protagonist. This is the case with playwrights who subscribe to the modern American theatre (that the author does not quite agree with). Option D is not the answer.

Choice (B)

Q9. All of the following are part of a compelling play according to the author EXCEPT

a) interweaving layers of conflicts

b) a resolution of the exterior conflict

c) characters that retire unconflicted in all spheres of life

d) a resolution of the interior conflict based on the resolution of the exterior conflict

Number of words and Explanatory notes for RC:

Number of words: 564

Option A: From '*any compelling play is composed of many strains of struggle in concert, feeding and enforcing and intensifying one another*' (first para) it can be understood that a compelling play has several conflicts that feed from each other and intensify each other. Hence, Option A is not the answer.
Option B: From '*At the conclusion of the psychologically well-made play, the resolution of the exterior conflict has resolved the interior*', we can understand that a well-made play has an external conflict that is resolved leading to the resolution of the inner conflicts of the characters. Hence, Option B is not the answer.
Option C: *If theirs is a truly happy ending, then your characters retire from the field of battle blissfully unconflicted in all spheres of life…* The characters retire without any conflicts if theirs is a truly happy ending. However, the author doesn't state that well-made plays need to have a happy ending, which means this is not a necessary aspect of a well-made/compelling play. Option C is the answer.
Option D: This can also be understood from the author clarifying that at the end of a psychologically well-made play, the resolution of the exterior conflict resolves the interior one. Hence, Option D is not the answer. Choice (C)

Q10. Which of the following best summarises the author's central idea about how a compelling play should end?

a) Audiences are not at peace if it doesn't end the way they would have resolved it.

b) It gives the audience a sense of peace and justice.

c) The playwright's sense of justice must align with the audience's sense of justice.

d) It must resolve the conflicts of all the characters before ending.

Number of words and Explanatory notes for RC:

Number of words: 564

Option A: The author doesn't really mean that audiences find peace if they disagree with the ending of the story. For that matter, the word 'peace' has been used differently here than in the passage. The audiences look for an ending that gives them a sense of justice or peace (not that they find peace based on how they feel about the play or its ending). Also, the authors believe that the audience should be invested in a compelling play. It is never mentioned that they have to agree with the conflict resolution. Option A is not the answer.

Option B: This can be understood by combining '*At the conclusion of the psychologically well-made play, the resolution of the exterior conflict has resolved the interior*' and '*Our objective in the audience is to vicariously achieve a resolution to the story that will feel like justice, maybe even like peace.*' So, it can be understood that a psychologically well-made play resolves its exterior conflicts resulting in the resolutions of the interior conflicts of the characters. And this is furthered in the last line of the passage where the author brings in the objective of the audience – which is to vicariously (indirectly, through someone else, in this case characters of the play) get a sense of justice and peace. Hence, Option B represents the essence of what the author thinks about the ending of a compelling play.

Option C: The author never really draws a line connecting the two. All the author says is that the audience's objective is to vicariously achieve a resolution to the story that feels like justice, maybe even like peace. Since it is vicarious, it is through what they feel with the play. We do not have enough information to differentiate between whether this vicarious sense of resolution is only achieved when they agree and what would happen in the case when they disagree. So, it is hard to believe the author wrote this passage to argue that the sense of justice of the audience has to align with that of the playwright. It is more about how a playwright should give the characters conflicts and then resolve them. Option C is not the answer.

Option D: The author doesn't indicate whether every compelling play must end with complete conflict resolution of all the characters. All the author talks about is what should happen in plays with happy endings, where characters walk away unconflicted. So, Option D is not the answer.

Choice (B)

DIRECTIONS *for questions 11 to 15*: The passage given below is accompanied by a set of five questions. Choose the best answer to each question.

The Treaty signed in the Palace of Versailles on June 28th, 1919, to create peace, [after the First World War] was a catastrophic failure. Within just 14 years, Adolf Hitler had become German chancellor and was dragging the world back towards the Second World War. The blame, it is often said, lay with the leaders of America, Britain and France, who imposed a vengeful "Carthaginian" peace on Germany, visiting a punishment that crushed the fragile Weimar Republic. If only Versailles had been more generous, the second world war might never have taken place.

The peacemakers […] certainly made mistakes, but they deserve a sympathetic hearing. At the end of the first world war the Allies were not too harsh on Germany. If anything, they were not harsh enough.

Critics of Versailles got their attack in early. Just six months after the treaty was signed John Maynard Keynes published “The Economic Consequences of the Peace” … Keynes combined intricate tabulations of German coal consumption […] to show that Germany could not afford large reparations, that weakness, vanity and vindictiveness blinded the Allies to German suffering and [the] reparations would poison European relations. …

Yet Keynes was protesting too much – and too soon. He was writing in 1919, two years before the size of the reparations was actually determined. The sums being talked of at Versailles were as much as 16 times bigger than the final bill. The reparations imposed in 1921, in what Germans called the “London ultimatum”, were large, but not impossibly so. Germany was asked to pay 132bn German marks, but this included 82bn marks in bonds that were never likely to become payable. The remaining 50bn marks – worth about $12.5bn then – was less than what Germany itself had earlier offered to pay. It was about 160% of the country’s GDP... Moreover, Versailles also gave Germany a “peace dividend” by limiting its military spending, which was by some calculations, worth about as much as the reparations cost.

Neither did reparations cripple Germany’s economy. … Germany produced 30% more iron and 38% more steel in 1927 than it had in 1913, the previous record. ... [Y]et Germany appeared to struggle. It repeatedly failed to pay its reparations bills on time – its failure to make coal shipments in January 1923, for instance, was its 34th in 36 months. ... Overall, Weimar Germany ended up paying a total of just 20bn marks. Do the defaults and rescheduled debts prove that Germany had been asked to pay too much in 1921?

In fact, Germany’s behaviour had less to do with its capacity to pay than its incentives. Article 234 of the Versailles treaty said that the reparations should be adjusted if Germany could show that it could not afford them. Second, the Weimar government spread the idea that Versailles was fundamentally unjust [insisting] the war had been defensive, a response to the threat from imperial Russia and its ally, France. ... Many believed that they had lost the war only because, in 1918, a cabal of Jews and Socialists had “stabbed them in the back”. The Allies inadvertently played into this punishment narrative…

Versailles failed chiefly because it was being asked to finish the job that the exhausted Allied armies had left unfinished. Unlike France and Belgium, Germany ended the war with its factories and mines intact. Germans felt undefeated. Upended by the depression and goaded by Hitler, they were ready to take up arms again.

Q11. Which of the following best depicts the central idea of the passage?

a) The Versailles Treaty failed in its objective to humiliate Germany after the First World War.

b) The punitive measures imposed against Germany by the Allied Forces were not harsh enough to prevent Germany from waging the next war.

c) The Second World War was a result of the failure of the Versailles Treaty in reining in Germany's imperial ambitions.

d) The Allied Forces didn't do enough to crush Weimar Germany, thus allowing it to consolidate and wage another war.

Number of words and Explanatory notes for RC:

Number of words: 573

Option A: The author's main idea in the passage was not to talk about how the Versailles Treaty 'failed' in its objective to humiliate Germany. Firstly, that the Treaty's objective was to humiliate Germany was something not established in the passage. Secondly, the author's tone throughout the passage is sympathetic towards the peacemakers who chalked out the Versailles Treaty as understood from '*The peacemakers […] certainly made mistakes, but they deserve a sympathetic hearing. At the end of the first world war the Allies were not too harsh on Germany. If anything, they were not harsh enough.*' Hence, Option A is not the answer.

Option B: The author clearly states that the Versailles Treaty failed (leading to the loss of peace and the next war) because it was expected to finish the unfinished business of the Allied Forces. The Versailles Treaty as understood from the passage was primarily about the reparations Germany was expected to pay, as the cost of peace. However, its failure was owing to the incorrect assessment, since the author clearly states that '*At the end of the first world war the Allies were not too harsh on Germany. If anything, they were not harsh enough.*' In other words, the author disagrees with the punishment meted out to Germany and connects the consequences to the eventual war. The author opines that the terms were not harsh enough allowing Germany to be in a position to wage a war again. Option B is the answer.

Option C: While it is true that the author does eventually derive how the shortcomings of the Versailles Treaty play a role in the next major war, it cannot really be understood that the author attributed the cause of the Second World War to the failure of the Versailles Treaty alone. Secondly, that the treaty was aimed at reining in the imperial ambitions of Germany can easily be ruled out as such a point hasn't been made in the passage. Option C is not the answer.

Option D: The tone of the passage nowhere supports the conjecture that the author suggests that Weimar Germany should have been crushed. The passage doesn't really put it in a straightforward manner either, that the Allied Forces didn't do enough to crush Germany. The closest the author gets to it is in mentioning that '*Versailles failed chiefly because it was being asked to finish the job that the exhausted Allied armies had left unfinished*'. However, that the unfinished business was akin to crushing Germany is something we cannot infer from the passage. Option D is not the answer.

Choice (B)

2. The author mentions Article 234 of the Versailles Treaty to highlight that

a) the defaults and rescheduled debts prove that Germany had been asked to pay too much in 1921.

b) the Versailles Treaty was fundamentally unjust to Weimar Germany.

c) Germany's behaviour was influenced by the incentive it had for paying the reparations on time.

d) Germany's behaviour was not influenced by its capacity to pay the reparations.

Number of words and Explanatory notes for RC:

Number of words: 573

Consider this: '*In fact, Germany's behaviour had less to do with its capacity to pay than its incentives. Article 234 of the Versailles treaty said that the reparations should be adjusted if Germany could show that it could not afford them.*' So, the author brought it up at the point where we discuss Germany's behaviour (not paying the reparations and missing schedules on time) and the possible reasons.
Option A: The author wouldn't agree to this since it is clearly mentioned by the author that Germany hadn't been asked to pay too much in 1921, and in fact, the Allied Forces should've been harsher with Germany. Article 234 was about possible readjustments of the reparations if Germany couldn't afford to pay what was originally demanded of it. However, the author didn't bring it up to show that what was demanded of it was too much, because in that case, the author wouldn't mention that Germany's behaviour *had less to do with its capacity*. Option A is not the answer.
Option B: The author was largely in favour of stricter sanctions against Weimar Germany and has clearly mentioned that Germany got away lightly. So, we can be sure that the author doesn't support the allegation that the Treaty was unjust to Germany. It was a narrative fanned by the Germans (something the author had pointed out as well). Option B is not the answer.
Option C: It is the other way around. Germany, according to the author, didn't pay up because it didn't have an incentive to do so. Its missed schedules for paying the reparations according to the author were less out of incapacity and more out of a lack of incentive. So, it is incorrect to state that the Article was mentioned to show that Germany's behaviour was influenced by the incentive it had for paying the reparations. The focus was on proving that lack of capacity was not the reason for missing payments. Option C is not the answer.
Option D: The Article 234 ensures Germany is not overstressed to pay something it cannot afford to pay. In other words, it is like a lifeline for Germany. So, the only reason why the author would mention something that favours Germany is to show that it is not the lack of capacity that caused Germany's missed payments. It is the lack of incentive, or in other words, encouragement to default on the payments, so that the conditions can be relaxed further. This also sits in tone with the data that Germany was in fact doing quite well during those years with increased production capacities. Hence, Option D is the answer. Choice (D)

Q13. By using the term 'Carthaginian' peace [first para], critics of the Versailles Treaty possibly implied that

a) a very brutal "peace" achieved by completely crushing the enemy was imposed upon Germany.

b) Germany was not punished as severely as it should have been.

c) the peace was an unstable one that dragged the world back to another war.

d) the peace was largely misused by humiliating Germany economically.

Number of words and Explanatory notes for RC:

Number of words: 573

. Option A: This is apt since this is what has been mentioned in the first para. Consider this: '*The blame, it is often said, lay with the leaders of America, Britain and France, who imposed a vengeful "Carthaginian" peace on Germany, visiting a punishment that crushed the fragile Weimar Republic. If only Versailles had been more generous, the second world war might never have taken place.*' From this it can be understood that whatever Carthaginian peace stands for is negative – 'vengeful' and 'visiting a punishment that crushed the fragile Weimar Republic'. So, something negative has been implied by the critics of the treaty, which is rightly described as brutal peace. Option A is the answer.
Option B: If this were the case, the critics wouldn't call it 'vengeful' or crushing. So, the critics were of the opinion that the severe penalty imposed by the Allied Forces was what led to the war again. So, this is opposite in tone to what the critics believed (and is similar in tone to what the author believed). Hence, Option B is not the answer.
Option C: While the peace was an unstable one, there is nothing to indicate that the critics called it unstable, for the critics commented about the nature of the peace achieved – that it was vengefully imposed by the Allied Forces. Nothing in the nature of the peace was described as unstable. The critics applied the term 'less generous'. Hence, Option C is not the answer.
Option D: The two words here that stand out which cannot be attributed to the critics were 'humiliated economically' and 'misused' neither of which was referred to in any way in the first para of the passage. There was nothing about the Treaty that talks about what is proper usage and what is misuse. Also, the critics blamed the Allied Forces for the next war, but not for humiliation of Germany. Hence, Option D is not the answer. Choice (A)

Q14. All the following were facts mentioned by the author to prove that 'the economic consequences of the peace' weren't too high for Germany EXCEPT

a) Reparations in the tune of 160% of Germany's GDP were comfortably below what Germany could afford to pay.

b) The payable part of the London Ultimatum was less than what Germany had initially offered to pay.

c) 82bn of the 132bn German marks in bonds had little chance of becoming payable.

d) An amount similar in magnitude as the punitive compensation imposed upon Germany could be saved by limiting its military spending.

Number of words and Explanatory notes for RC:

Number of words: 573

Option A: The author's opinion about 52 bn marks or 160% of Germany's GDP is that it was below what Germany had offered to pay. However, nowhere has the author mentioned that this amount was 'comfortably' within Germany's range or that this is below what Germany could 'afford to pay'. Those two terms are ill-defined and cannot really be compared with hard numbers mentioned in the passage. All we know is that the author calls these numbers '*large but not impossibly so'.* Option A is the answer.
Option B: Consider this: '*The reparations imposed in 1921, in what Germans called the "London ultimatum", were large, but not impossibly so. Germany was asked to pay 132bn German marks, but this included 82bn marks in bonds that were never likely to become payable. The remaining 50bn marks—worth about $12.5bn then – was less than what Germany itself had earlier offered to pay. It was about 160% of the country's GDP...*' It can be understood from this that the payable part was just about 50 billion marks or 160% of the country's GDP. The author clearly says that this (equivalent of $12.5bn) was less than what Germany itself had offered to pay. So, Option B was mentioned by the author to prove that the economic consequences of the peace (or reparations imposed on Germany) weren't too high. Option B is not the answer.
Option C: This was directly mentioned by the author to point out that while the reparations look large, they weren't indeed impossible to pay. The author also clearly points out that 82bn of the 132bn that Germany was asked to pay was in bonds which was never really going to become payable. So, this was part of the author's explanation that the economic ramifications weren't dire. Option C is not the answer.
Option D: This option is basically reiterating what the sentence '*Moreover, Versailles also gave Germany a "peace dividend" by limiting its military spending, which was by some calculations, worth about as much as the reparations cost*' means. Peace dividend being a positive term implies it was a saving for Germany whose military spending was limited by the treaty as understood from the above sentence. Hence, Option D is not the answer. Choice (A)

Q15. Which of the following, if true, repudiates Keynes' argument about 'The Economic Consequences of the Peace' as implied in the passage?

a) The eventual reparations mentioned in the London Ultimatum were much smaller than what Keynes had presumed.

b) America, Britain and France aimed to make a lesson out of Germany using the Versailles Treaty.

c) The Versailles Treaty imposed large reparations on Germany despite the Allied Forces' understanding that Germany's manufacturing capacity was low.

d) The punitive measures in the Versailles Treaty caused the hostility that eventually led to the Second World War.

Number of words and Explanatory notes for RC:

Number of words: 573

. The information about Keynes can be found here: '*Critics of Versailles got their attack in early. Just six months after the treaty was signed John Maynard Keynes published "The Economic Consequences of the Peace" … Keynes combined intricate tabulations of German coal consumption […] to show that Germany could not afford large reparations, that weakness, vanity and vindictiveness blinded the Allies to German suffering and [the] reparations would poison European relations. …*'
Option A: This clearly shows that Keynes' numbers were not correct. Also, it proves that Keynes' criticism of the Versailles Treaty (that it was too harsh towards Germany and reeked of vanity and vindictiveness) is unjust. It repudiates Keynes' theory because the numbers Keynes called unfair weren't even the right/final numbers. Hence, this option weakens/repudiates Keynes' theory about how the treaty was unfair to the Germans. Option A is the answer.
Option B: If this is true, it feeds what Keynes mentions about the treaty as understood from '*that weakness, vanity and vindictiveness blinded the Allies to German suffering*'. This option strengthens such an argument made by Keynes – that the Allied Forces were unnecessarily and unfairly harsh to the Germans largely because of the attitude of the Allied Forces - and hence, this is not the answer.
Option C: If the Versailles Treaty imposed large reparations on Germany despite the Allied Forces knowing and understanding that Germany's manufacturing capacity is low (it is not low, but the question stem says 'if true') the Treaty could be called unfair. That will strengthen Keynes' argument. Option C is not the answer.
Option D: While this is more in line with Keynes' theory (and doesn't weaken it), it is easily to eliminate since Keynes said nothing of the war it will lead to or German discontent. Keynes only criticised what was in the treaty from a German perspective. Option D is not the answer. Choice (A)

DIRECTIONS *for questions 16 to 19*: The passage given below is accompanied by a set of four questions. Choose the best answer to each question.

… Steven Johnson, [in his book *How We Got To Now: Six Innovations That Made The Modern World*], points out that, much like the evolution of bees gave flowers their colours and the evolution of pollen altered the design of the hummingbird's wings, the most remarkable thing about innovations is the way they precipitate unanticipated changes that reverberate far and wide beyond the field or discipline or problem at the epicentre of the particular innovation.

Pointing to the Gutenberg press, Johnson writes: “Johannes Gutenberg’s printing press created a surge in demand for spectacles, as the new practice of reading made Europeans across the continent suddenly realize that they were farsighted; the market demand for spectacles encouraged a growing number of people to produce and experiment with lenses, which led to the invention of the microscope, which shortly thereafter enabled us to perceive that our bodies were made up of microscopic cells. You wouldn’t think that printing technology would have anything to do with the expansion of our vision down to the cellular scale, just as you wouldn’t have thought that the evolution of pollen would alter the design of a hummingbird’s wing. But that is the way change happens.”

Johnson terms these complex chains of influences the “hummingbird effect,” named after the famous “butterfly effect” concept from chaos theory – Edward Lorenz’s famous metaphor for the idea that a change as imperceptible as the flap of a butterfly’s wings can result in an effect as grand as a hurricane far away several weeks later – but different in a fundamental way:

The extraordinary (and unsettling) property of the butterfly effect is that it involves a virtually unknowable chain of causality; you can’t map the link between the air molecules bouncing around the butterfly and the storm system brewing in the Atlantic. They may be connected, because everything is connected on some level, but it is beyond our capacity to parse those connections or, even harder, to predict them in advance. But something very different is at work with the flower and the hummingbird: while they are very different organisms, with very different needs and aptitudes, not to mention basic biological systems, the flower clearly influences the hummingbird’s physiognomy in direct, intelligible ways.

Under the “hummingbird effect,” an innovation in one field can trigger unexpected breakthroughs in wholly different domains, but the traces of those original influences often remain obscured. Illuminating them allows us to grasp the many dimensions of change, its complex and often unintended consequences, the multiple scales of experience that have always defined human history and, perhaps above all, to lend much-needed dimension to the flat myth of genius. Playing off the sentiment at the heart of Richard Feynman’s famous ode to a flower, Johnson writes:

History happens on the level of atoms, the level of planetary climate change, and all the levels in between. If we are trying to get the story right, we need an interpretative approach that can do justice to all those different levels.

Q16. Which of the following statements regarding innovations can be inferred to be true?

a) Innovations seldom lead to unanticipated changes that influence changes in different disciplines and domains.

b) The most salient feature about innovations is the way they accurately predict changes that reverberate far and wide beyond the discipline at the centre of the particular innovation.

c) Innovations in any domain lead to innovations within the same domain, in ways that can be traced back to the original innovation.

d) Innovations in one field can drive significant changes in another field, which is only remotely related to the former.

Number of words and Explanatory notes for RC:

Number of words: 498

"…the most remarkable thing about innovations is the way they precipitate unanticipated changes that reverberate far and wide beyond the field or discipline or problem at the epicentre of the particular innovation."

Choice (A): It is stated in the first paragraph that *the remarkable thing about innovations* is the way they lead to unanticipated changes that influence changes in different disciplines and domains. From this, it can be understood that innovations often trigger changes in other fields and not *seldom*, as mentioned in this choice. Hence, this is not true.

Choice (B): It is mentioned in the first paragraph that "…they precipitate unanticipated changes…". From this, it can be understood that the changes that follow an innovation are something unexpected and something that *cannot be predicted* beforehand. Hence, this is not true.

Choice (C): The author is setting the tone for what is termed as "hummingbird effect" in the first paragraph of the passage and the author mentions how an innovation in one field can trigger innovations in other fields, something that is discussed in the fifth paragraph of the passage. Whether these innovations drive changes in that very domain has not been discussed. Also, it has been stated in the fifth paragraph that the traces of the original invention remain obscure. But this is in the context of different domains. Whether this is true in the case of innovations leading to innovations within the same domain has not been discussed in the passage. Hence, this cannot be said to be true.

Choice (D): ""*…the most remarkable thing about innovations is the way they precipitate unanticipated changes that reverberate far and wide beyond the field or discipline or problem at the epicentre of the particular innovation."* From this, it can be inferred that innovations in one field can, indeed, lead to breakthroughs or drive significant changes in other fields, that are not even closely related to each other. Hence, this is the answer. Choice (D)

Q17. According to the passage, which of the following was directly responsible for the invention of the microscope?

a) The new practice of reading in Europe

b) The surge in demand for spectacles

c) Experiments with lenses

d) Discovery of magnification through the use of lenses

Number of words and Explanatory notes for RC:

Number of words: 498

Choice (A): The practice of reading in Europe led to a surge in demand for spectacles, which in turn led to experimenting with lenses, which led to the invention of microscope. The practice of reading itself, cannot be ascribed as being directly responsible for the invention of the microscope, because had there been no surge in demand for spectacles, none of the events that followed may not have occurred. Hence, this is not the answer.
Choice (B): The surge in demand for spectacles itself cannot be said to be directly responsible for the invention of the microscope. Had there been no experimenting with the lenses, the surge in demand for spectacles would not have led to the invention of the microscope. Hence, this is not mainly responsible for the invention of the microscope.
Choice (C): There is no mention of any other event or breakthrough that could have happened between the experiments with lenses and the invention of the microscope. Also, it is mentioned in the passage that the market demand for spectacles encouraged a growing number of people to produce and experiment with lenses, *which led to the invention of the microscope.* Therefore, we can say that this is directly responsible for the invention of the microscope. Hence, this is the answer.
Choice (D): It has not been mentioned anywhere in the passage that it was the discovery of magnification that led to the invention of the microscope. This cannot be inferred from the passage. Hence, this is not the answer. Choice (C)

Q18. Which of the following situations best exemplifies the hummingbird effect?

a) Moving a grain of sand changes something throughout all parts of the world.

b) The discovery of the atom led to proving that the earth's age was in the billions.

c) The number of restaurants in the country has gone up after the entry of food delivery services like Swiggy and Zomato.

d) The introduction of the 'Stories' feature on Snapchat led to the feature being incorporated into other social media platforms like Facebook, WhatsApp and Instagram.

Number of words and Explanatory notes for RC:

Number of words: 498

In the fifth paragraph of the passage, the author states that under the "hummingbird effect," an innovation in one field can trigger unexpected breakthroughs in wholly different domains, but the traces of those original influences often remain obscured. So we need to look for a situation where innovation in one field has led to the innovation in a wholly different domain.

Choice (A): This does not talk about any innovation. In fact, this is similar to how a change as imperceptible as the flap of a butterfly's wings can result in an effect as grand as a hurricane far away several weeks later. This can be said to exemplify the butterfly effect and not the hummingbird effect. Also, 'moving a grain of sand' cannot be called an innovation, which is integral to the hummingbird effect. Hence, this is not the answer.

Choice (B): Here, a breakthrough in one domain (measuring time) triggered a breakthrough in an altogether different domain (finding out the age of the earth) and it might be difficult to establish that it was the *first breakthrough that led to the second one because both the events are not directly connected and that means, various other events might have occurred in between the two.* This is a good example of the hummingbird effect, wherein an innovation in one field can trigger unexpected breakthroughs in wholly different domains, but the traces of those original influences often remain obscured. Hence, this is the answer.

Choice (C): The number of restaurants in the country increasing can be a consequence of the entry of businesses like Swiggy and Zomato. Had their entries led to *some kind of an innovation or a breakthrough in the restaurant business*, we may have a case for attributing it to the hummingbird effect. But that did not happen. Hence, this does not exemplify the hummingbird effect.

Choice (D): Although the 'Stories' feature on Snapchat was an innovation, in this particular example, *it did not trigger any unexpected breakthroughs in different domains*. All the platforms mentioned fall more or less under the same domain, even though each of them has its own USP. This feature was merely added to the other platforms. Hence, this is not the answer. Choice (B)

Q19. Which of the following is an attribute of the butterfly effect and is not at odds with the hummingbird effect?

a) Little is known about the origin of any chain of events

b) By shedding light on the causes and effects for different events, the link between any two events can be mapped.

c) How one event influences another and the connections between them are not immediately obvious.

d) The chain of causality between different events cannot be established.

Number of words and Explanatory notes for RC:

Number of words: 498

The difference in between the butterfly effect and the hummingbird effect has been discussed in the fourth paragraph of the passage.
Choice (A): Under the butterfly effect, there is a virtually unknowable chain of causality. Also, there is no mention of 'origin' in the passage in the context of the butterfly effect. Since no link can be established between different events, it is not possible to narrow down on some kind of an origin for any event. Besides, this is at odds with the hummingbird effect because the origin can be traced. Hence, this is not the answer.
Choice (B): Under the butterfly effect, it is stated that "…but it is beyond our capacity to parse those connections…". From this, it can be understood that the link between two events cannot be mapped. Therefore, this is not an attribute of the butterfly effect. Hence, this is not the answer.
Choice (C): From the fourth paragraph, it can be understood that this is an attribute of the butterfly effect because the chain of causality cannot be established. Under the hummingbird effect, it has been mentioned that traces of the original influence often remain obscured. Although connections can be established once these traces are illuminated, it can be understood that at first glance, these connections are not immediately obvious. Therefore, this is an attribute of the butterfly effect that is not at odds with the hummingbird effect. Hence, this is the answer.
Choice (D): The chain of causality between different events cannot be established for events ascribed to the butterfly effect but this can be done for events that can be ascribed to the hummingbird effect. Although this is an attribute of the butterfly effect, this is at odds with the hummingbird effect. Hence, this is not the answer.

Choice (C)

DIRECTIONS *for questions 20 to 24*: The passage given below is accompanied by a set of five questions. Choose the best answer to each question.

The premium on emotional intelligence can only rise as organizations become increasingly dependent on the talents and creativity of workers who are independent agents. Even now 77 percent of American "Knowledge workers" say they decide what to do on the job, rather than being told by someone else.

The rising popularity of telecommuting is accelerating this trend. Autonomy can work only if it goes hand in hand with self-control, trustworthiness, and conscientiousness. And as people work less "for

the company" and more for themselves, emotional intelligence will be required to maintain the relationships vital for workers' survival.

Such free agents suggest a future for work somewhat akin to the functioning of the immune system, where roaming cells spot a pressing need, spontaneously collect into a tightly knit, highly coordinated working group to meet that need, and dissipate into free agency once again as the job finishes. In an organizational context, such groups, each with a specialized mix of talent and expertise, may arise within and across organizational boundaries as demands require, then cease to exist once their task is accomplished. That mode already typifies the entertainment industry, where a pseudo-organization coalesces for the duration of a project, then disbands. This, many suggest, will be a standard mode for work in the future.

Such virtual teams can be especially agile because they are headed by whoever has the requisite skills, rather than by someone who happens to have the title "manager." Ad hoc project groups and task forces are proliferating within many organizations; other companies are creating the talent capacity for such groups by linking people together to chat and to share information and ideas.

The question for us all is whether the new world of work will become increasingly grim, with relentless job pressures and apprehensions robbing us of both a sense of security and a place in our lives for even the simple pleasures – or whether, even in the face of this new reality, we can find ways to work that excite, fulfill, and nurture us.

The good news is that emotional intelligence can be learned. Individually, we can add these skills to our tool kit for survival at a time when "job stability" seems like a quaint oxymoron. Our level of emotional intelligence is not fixed genetically, nor does it develop only in early childhood. Unlike IQ, which changes little after our teen years, emotional intelligence seems to be largely learned, and it continues to develop as we go through life and learn.

For businesses of all kinds, the fact that emotional competencies can be assessed and improved suggests another area in which performance – and so competitiveness – can be upgraded. What's needed amounts to an emotional competence tune-up for the corporation.

At the individual level, elements of emotional intelligence can be identified, assessed, and upgraded. At the group level, it means fine-tuning the interpersonal dynamics that make groups smarter. At the

organizational level, it means revising the value hierarchy to make emotional intelligence a priority – in the concrete terms of hiring, training and development, performance evaluation, and promotions.

To be sure, emotional intelligence is no magic bullet, no guarantee of more market share or a healthier bottom line. The ecology of a corporation is extraordinarily fluid and complex, and no single intervention or change can fix every problem. But, as the saying goes, “It’s all done with people,” and if the human ingredient is ignored, then nothing else will work as well as it might. In the years to come, companies in which people collaborate best will have a competitive edge. And so to that extent emotional intelligence will be more vital.

But apart from the emotional intelligence of the organizations we work for, having these capabilities offers each of us a way to survive with our humanity and sanity intact, no matter where we work. And as work changes, these human capacities can help us not just compete, but also nurture the capacity for pleasure, even joy, in our work.

Q20. In the organizational context, an agglomeration of emotional intelligence of workers is seen by the author as a requirement

a) to meet greater than normal business demands on the organization.

b) to meet situational exigencies in the organization.

c) to meet the unwieldy demands of the top echelons of the organization.

d) to meet human resources assessment needs.

Number of words and Explanatory notes for RC:

Number of words: 663

In the third paragraph of the passage, the author talks about free agents suggesting a future for work is somewhat akin to the functioning of the immune system and extends this to the organizational context.
Choice (A): From "*...where roaming cells spot a pressing need...*" mentioned in the third paragraph, we can infer that the author is talking about situations where the demand is more. It does not suggest that the demands on the organization are greater than normal. Hence, this is not the answer.
Choice (B): From "*...where roaming cells spot a pressing need...*" mentioned in the third paragraph, we can infer that the author is talking about situations where the demand is more. In such cases, the author says that "...such groups may arise.....cease to exist once the task is accomplished." From this, it can be understood that the groups coming together is a requirement to deal with the situational exigencies in the organization. Hence, this is the answer.
Choice (C): The passage does not suggest that the demands of the top echelons in the organization are unwieldy. This cannot be inferred from the passage. Hence, this is not the answer.
Choice (D): The question is related to why there is a need for an agglomeration of the emotional intelligence of workers. It does not have anything to do with the assessment of the workers. Hence, this is not the answer. Choice (B)

Q21. The author looks upon present days as times when

a) high paying jobs are dime a dozen.

b) jobs are abound.

c) guarantee of jobs is mostly assured.

d) job guarantee is a misnomer.

Number of words and Explanatory notes for RC:

Number of words: 663

The author mainly talks about the present times in the sixth paragraph of the passage.
Choice (A): This means that high paying jobs are pretty common or abundant. But there has been no mention of high paying jobs in the passage. Therefore, this cannot be inferred. Hence, this is not the answer.
Choice (B): It has not been stated anywhere in the passage that there are jobs abound. This cannot be inferred. Hence, this is not the answer.
Choice (C): In the sixth paragraph, from "*…at a time when "job stability" seems like a quaint oxymoron*", it can be understood that the time the author refers to is the present times where job stability feels like an oxymoron. As in job and stability allude to things that are opposite in nature. From this, it can be inferred that one cannot take one's job for granted because it does not come with a guarantee. This choice contradicts the same. Hence, it is not the answer.
Choice (D): In the sixth paragraph, from "*…at a time when "job stability" seems like a quaint oxymoron*", it can be understood that the time the author refers to is the present times where job stability feels like an oxymoron. As in job and stability allude to things that are opposite in nature. From this, it can be inferred that one cannot take one's job for granted because it does not come with a guarantee. Hence, the phrase 'job guarantee' is a misnomer. Hence, this is the answer. Choice (D)

Q22. At the individual level, emotional intelligence is looked upon by the author as a

a) means to achieve security of employment.

b) competitive edge provider.

c) normal job requirement.

d) ladder for scaling the hierarchy.

Number of words and Explanatory notes for RC:

Number of words: 663

Choice (A): In the sixth paragraph of the passage, from "*Individually, we can add these skills to our toolkit for survival at a time….*", it can be understood that improving emotional intelligence will help one to achieve the security of employment. Hence, this is the answer.
Choice (B): With respect to emotional intelligence at an individual level, the author only looks upon it as a means to survival and not as something that will provide a competitive edge. Hence, this is not the answer.
Choice (C): It is mentioned that they are skills that we can add to our toolkit for survival. Form this, it can be understood that emotional intelligence is more of an add-on than a normal job requirement. Hence, this is not the answer.
Choice (D): The passage does not talk about how emotional intelligence will help one scale the hierarchy. Hence, this is not the answer. Choice (A)

Q23. The author feels that the importance of emotional intelligence is felt in organizations because of

a) its link with autonomy, a growing trend.

b) the rapid expansion of the business world.

c) globalisation bringing greater interpersonal encounters.

d) the requirements of technological advancement.

Number of words and Explanatory notes for RC:

Number of words: 663

The importance of emotional intelligence is mainly discussed in the first two paragraphs of the passage.
Choice (A): It is mentioned in the first paragraph that the premium on emotional intelligence will only increase because organizations are increasingly becoming dependent on independent agents. In the second paragraph, it is given that this autonomy is an accelerating trend. From this, it can be understood that it is because of this growing autonomy that the demand for emotional intelligence is going up. Hence, this is the answer.
Choice (B): It has not been suggested anywhere in the passage as to how the rapid expansion of the business world is related to emotional intelligence. Hence, this is not the answer.
Choice (C): It has not been mentioned anywhere in the passage that globalization will bring greater interpersonal encounters. Also, how globalization is related to emotional intelligence has not been discussed. Hence, this is not the answer.
Choice (D): There is nothing in the passage to suggest that there is a causality between the requirements of technological advancement and emotional intelligence. Hence, this is not the answer. Choice (A)

Q24. According to the author, unlike Emotional quotient, Intelligence Quotient develops

a) little in teens.

b) mainly in early childhood.

c) mostly prior to adulthood.

d) continously through life span.

CORRECT ANS :C

Q25. DIRECTIONS *for question 25:* The sentences given in the following question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper order for the four sentences and key in the sequence of four numbers as your answer, in the input box given below the question.

1. We have by no means yet found the basis.
2. A society fast fragmenting at the level of values and life styles challenges all the old integrative mechanisms and cries out for a totally new basis for reconstitution.
3. For the multiplication of life styles challenges our ability to hold the very self together.

4. Yet if we shall face disturbing problems of social integration, we shall confront even more agonising problems of individual integration.

Sentence 1: Sentence 1 has a reference to 'the basis'.
Sentence 2: Sentence 2 is an independent sentence that can begin the paragraph.
Sentence 3: Sentence 3 explains the reason for something as it begins with 'for'.
Sentence 4: Sentence 4 begins with the contrast marker 'yet'. It has the 'If then' sequence.
On a careful reading of the sentences, it can be observed that sentence 2 is a general sentence that can begin the paragraph. It establishes the background "society fast fragmenting'. It talks about 'a new basis' for reconstitution of the fast fragmenting society. Sentences 2 and 1 form a mandatory pair. "not yet found the basis" in sentence 1 contrasts "cries out for a new basis for reconstitution" in sentence 2.
Sentence 1 is followed by sentence 4. Even though there is no overlapping clue between sentences 1 and 4, we can understand that there is a flow of idea between sentences 2→1→4. "face disturbing problems of social integration, we shall confront even more agonising problems of individual integration" in sentence 4 links with "challenges all the old integrative mechanisms" given earlier in sentence 2.
Sentence 4 is followed by sentence 3. "For the multiplication of life styles" in the conclusion sentence 3 links with "fragmenting at the level of values and life styles" in the introductory sentence 2. "challenges our ability to hold the very self together" in sentence 3 points to "agonising problems of individual integration". So, 2143.

Ans: (2143)

Q26. DIRECTIONS *for questions 26 and 27:* Five sentences related to a topic are given in the question below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out. Choose its number as your answer and key it in.

1. The movement of so many stones can cause erosion, damage animal ecosystems, disrupt river flow, and confuse hikers, who depend on sanctioned cairns for navigation in places without clear trails.
2. Stone stacks, or cairns, have prehistoric origins.
3. The balancing of stones is an elementary kind of creation, not unlike the building of sandcastles.
4. They marked Neolithic burial grounds in what is now Scotland, guided nautical travels in Scandinavia, and served as shrines to the Inca goddess Pachamama in Peru.
5. Contemporary stone stackers, then, are taking up the mantle of an ancient and artistic tradition.

Sentence 1 talks about a movement of 'so many stones' thus indicating that there has been a mention of stone movement earlier in the para. This sentence talks about the negative consequences of the movement of so many stones.
Sentence 2 is an independent sentence about the origins of stone stacks.
Sentence 3 elaborates on the idea of stone stacks (balancing of stones) explaining or rather, beginning to explain why someone may want to stack up stones over each other.
Sentence 4 has a pronoun 'they' and talks about Neolithic burial grounds. It is not hard to see that 24 is a block since 2 talks about history and 4 gives the example of something from history.
Sentence 5 has the conclusion indicator 'then' as if to say 'in a way' or 'therefore' and talks about what contemporary stone stackers aim to achieve. There is a mention of an ancient and artistic tradition, thus connecting to the 24 block. So, 5 follows 24.
1 talks about negative consequences while 3 introduces the idea of stone stacking (balancing of stones). So, 1 is the odd one out and 3245 is the rest of the para.

Ans: (1)

Q27. DIRECTIONS *for questions 26 and 27:* Five sentences related to a topic are given in the question below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out. Choose its number as your answer and key it in.

1. The surprise is that all of its supporting columns are made of glulam – wooden beams laminated together.
2. Many governments in the rich world want to reduce greenhouse gas emissions from construction and using buildings.
3. These are lighter than steel of comparable strength, require just one-sixth as much energy to produce, and their creation and transportation emits few greenhouse gases.
4. But it is not the pine cladding of the world's tallest wooden skyscraper that makes it special.
5. The Mjostarnet tower in Norway currently looks like a naked tree rising spectacularly above Brumunddal's low-rise concrete housing.

Q28. DIRECTIONS *for question 28:* The sentences given in the following question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper order for the four sentences and key in the sequence of four numbers as your answer, in the input box given below the question.

1. His attention to dramatic content, form, and music in creating a unified production is what crystallized the form by the end of the century.
2. Petipa created a marriage between Italian and French ballet in Russia, thereby leading ballet into a new style and school, the Russian ballet.
3. Russia is famous for ballet, but it was a Frenchman who shaped Russian classical dance as we know it today.
4. Marius Petipa emigrated from France to St. Petersburg in 1847 and worked in the Imperial theatres until the end of his life.

Sentence 1: Sentence 1 has the clue 'surprise'. It has the possessive pronoun 'it'.
Sentence 2: Sentence 2 mentions what governments in the rich world want to achieve.
Sentence 3: Sentence 3 has the demonstrative pronoun 'these'.
Sentence 4: Sentence 4 begins with the contrast marker 'but'. Towards the end of this sentence, there is a reference to the subjective pronoun 'it'.
Sentence 5: Sentence 5 has some proper nouns. It can begin the paragraph.
So sentence 5 is a general sentence that can begin the para. "pine cladding" in sentence 4 links with "looks like a naked tree" in sentence 5. "world's tallest wooden skyscraper" in sentence 4 links with "The Mjostarnet tower .... rising spectacularly above Brumunddal's low-rise concrete housing" in sentence 5. So sentence 4 follows sentence 5.
Sentence 4 is contrasted by sentence 1. "The surprise is that" in sentence 1 contrasts "But it is not .... that makes it special" in sentence 4. So sentence 1 follows sentence 4.
Sentence 1 is followed by sentence 3. "glulam – wooden beams laminated together" in sentence 1 links with "These are lighter..." in sentence 3. Sentence 3 concludes the para. So 5413.
Sentence 2 is the odd sentence out. It mentions the goal of the governments in the rich world. It can be a part of another para. "want to reduce greenhouse gas emissions from construction and using buildings" in sentence 2 may seem to overlap with "emits few greenhouse gases" in sentence 3 but sentence 2 does not specifically relate to the description of the Mjostarnet tower in Norway, in terms of its construction.

Ans: (2)

Q28. DIRECTIONS *for question 28:* The sentences given in the following question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper order for the four sentences and key in the sequence of four numbers as your answer, in the input box given below the question.

1. His attention to dramatic content, form, and music in creating a unified production is what crystallized the form by the end of the century.
2. Petipa created a marriage between Italian and French ballet in Russia, thereby leading ballet into a new style and school, the Russian ballet.
3. Russia is famous for ballet, but it was a Frenchman who shaped Russian classical dance as we know it today.
4. Marius Petipa emigrated from France to St. Petersburg in 1847 and worked in the Imperial theatres until the end of his life.

Sentence 1 refers to a person ('his') and also talks about 'the form'. So we need to know what form has been introduced in the para.
Sentence 2 talks about the creation of Russian ballet – the form specified in Sentence 1. Also, 2 comes after 4 because it uses first name (Petipa). So, 2 comes after 4 but comes before 1.
Sentence 3 talks about a Frenchman who shaped Russian classical dance as we know it today. Such a sentence has to come ahead of any mention of this particular person.
So, 3 comes first because the remaining three sentences talk about Marius Petipa directly.
Sentence 4 is an independent sentence that introduces the Frenchman – full name given. So, the order is 3421. Ans: (3421)

Q29. DIRECTIONS *for question 29:* The paragraph given below is followed by four summaries. Choose the option that best represents the author's primary position in the paragraph.
We spend our lives trying to discern where we end, and the rest of the world begins. We snatch our freeze-frame of life from the simultaneity of existence by holding on to illusions of permanence, congruence, and linearity; of static selves and lives that unfold in sensical narratives. All the while, we mistake chance for choice, our labels and models of things for the things themselves, our records for our history. History is not what happened, but what survives the shipwrecks of judgment and chance.

a) History is a record of things that survived despite all our endeavours against it.

b) It is not what happened, but what remains despite our judgements, that becomes our history.

c) **Our inability to differentiate between chance and choice is what creates our history.**

d) Our history is what happens while we are busy making choices that distinguish us from the rest of the world.

Option A: This option seems to indicate that our endeavours are targeted against things (but they are not) and whatever has survived our attempts goes down in history. That's not what the author meant in the para. The author talks about history being the survivor of all the negative consequences of our choices and judgments, which we busy ourselves with. Option A is not the answer.
Option B: This resonates with the author's opinion which is that we don't make history, our records don't construct history, and not our choices. History is what has survived all these things. In other words, history is what survives or isn't killed by all our choices and judgments (which the author conveys are mostly wrong) to make/construct something (metaphorically speaking). Option B is the answer.
Option C: This option is totally off the target by attributing false causation. The para doesn't talk about what constitutes the difference between chance and choice. It simply states that we mistake chance for choice (we think we have control, but we don't is what the para is trying to convey). So, our inability to differentiate between chance and choice – our false perception doesn't create history. History is what survives our false perception, according to the para. Option C is not the answer.
Option D: This completely removes the correlation between our actions and history by stating that history happens separately from what we are doing or trying to do. The para however connects what we are doing to the existence of history by conveying that history 'survives' our judgment. History is ***not*** what happens when we are looking or focussing elsewhere. Option D is not the answer. Choice (B)

Q30. DIRECTIONS *for questions 30 and 31:* The sentences given in the following question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper order for the four sentences and key in the sequence of four numbers as your answer, in the input box given below the question.

1. But it should be a call to arms.
2. The act of imagining one's own children on the receiving end of unmitigated horror is, for most of us, just that – an act of the imagination.
3. If we instigate or participate in abuse, or if we turn a blind eye to it, how will we be remembered?
4. How will the smallest humans among us endure without a mother or father, or without adequate food, water, and shelter?

Sentence 1 starts with a negative connector – 'but' followed by something that suggests a protest/fight – call to arms.
Sentence 2 talks about how imagining something bad happening to children is just an act of imagination – contrasting with how it should be more. That is what justifies Sentence 1 – should not just be imagination, but a call of arms.
Sentence 3 talks about our response to scenarios – instigating/participating/ignoring (turning a blind eye) and how we will be remembered for those responses.
Sentence 4 asks a question – about the consequences of negative acts towards the smallest humans – connecting to Sentence 2 – children.
Sentence 3 and 4 raise the question about how we would respond to something bad. 4 follows 3 because 3 is more generic/upstream while 4 talks specifically about children.
21 is a block because of the connector in 1. Once, the discussion moves to call of arms, it can't lead to the questions in 3 and 4. Also, 4 raises the question, while 2 talks about empathy by bringing the action closer from any children, to 'one's own children'. So, 3421. Ans: (3421)

Q31. DIRECTIONS *for questions 30 and 31:* The sentences given in the following question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper order for the four sentences and key in the sequence of four numbers as your answer, in the input box given below the question.

1. A Pareto chart analysis can help one classify the stock into fast moving and slow moving categories, or essential and non-essential categories.
2. This will help bring down the overall investment on inventory and reduce costs.
3. Based on the results of a Pareto chart analysis, the managers can focus their resources towards better inventory control and strict management of vital and essential items (and introduce systems like Just In Time inventory for these), and lesser controls for non-essential stock categories.
4. Imagine that a retail chain wants to reduce its investment on inventory and storage costs, wanting to maintain the inventory at an optimum level for fast moving goods and only stock minimum levels of slow moving products.

Sentence 1: Sentence 1 talks about the use of a Pareto chart analysis.
Sentence 2: Sentence 2 begins with 'this. It sounds like a sentence mentioning a consequence.
Sentence 3: Sentence 3 mentions how managers can apply the results of the Pareto chart analysis.
Sentence 4: Sentence 4 sounds like a general sentence. It begins with 'Imagine'.
So sentence 4 is a general sentence that can begins the paragraph. It begins with the starter 'Imagine that' and mentions the goal of the retail chain.
Sentences 4 and 1 form a logical block. "maintain the inventory at an optimum level for fast moving goods and only stock minimum levels of slow moving products" in sentence 4 links with "classify the stock into fast moving and slow moving categories, or essential and non-essential categories" in sentence 1. So sentence 1 which talks about the use of a Pareto chart follows sentence 4.
Sentence 1 is followed by sentence 3. "A Pareto chart analysis can help one classify" in sentence 1 links with "Based on the results of a Pareto chart analysis" in sentence 3. "the managers" in sentence 3 points to "retail chain" in sentence 4. "better inventory control" in sentence 3 points to "maintain the inventory at an optimum level" in sentence 4. So 413.
Sentence 2 concludes the para. "bring down the overall investment on inventory and reduce costs" in sentence 2 is a consequence of the step(s) mentioned in sentence 3.
Hence 4132. Ans: (4132)

Q32. DIRECTIONS *for question 32:* The paragraph given below is followed by four summaries. Choose the option that best represents the author's primary position in the paragraph.
To be sure, techies may know more than most people do about the technical details of the systems they build, but that's a far cry from having expertise in child development or the broader social implications of technologies. Indeed, most are beholden to the same myths and media narratives about the supposed evils of screen time as the rest of us, just as they can be susceptible to the same myths about, say, vaccines or fad diets. Nothing in their training, in other words, makes them uniquely able to understand arenas of knowledge or practice far from their own.

a) Techies do not know much beyond the technical details of the systems they help to build.

b) Techies are expected to know a lot more about technology despite not being trained to understand things outside their purview.

c) **Techies are as gullible as everyone else in all arenas of knowledge except in case of the systems they build.**

d) Techies are not trained for expertise in arenas far beyond the systems they help to build.

Option A: This option has two parts: techies do not much beyond and technical details of the systems they help to build. The para talks about the second part by admitting that techies know about the systems they build. However, the para mentions that this doesn't lead us to believe that they have knowledge in arenas far from what they know, 'far from' being the key term. The option here takes the extreme extrapolation that they do not know anything beyond what they build. That is not apt. Hence, Option A is not the answer.
Option B: There are two problems in this option. Firstly, techies are not 'expected' to know a lot. The author is trying to convey the idea that they do not have expertise in areas far beyond the systems they build. Secondly, the author doesn't talk about their expertise only in technology. The author mentions that techies may not have the training to hold unique comprehension about various arenas of knowledge (not necessarily just technology). Option B is not the answer.
Option C: The para talks about the knowledge and unique expertise of the techies who build some of the technological systems. The para doesn't mention the gullibility of the techies in any way. The para only talks about the lack of knowledge of the techies, not about how easily they can be made to believe wrong stuff (gullible). Hence, Option C is easy to eliminate.
Option D: This option mentions both the parts that make up the author's position in the para – that they are not trained for expertise in arenas of knowledge far beyond (1) those systems that they help to build and are expected to know about (2). Option D is the answer. Choice (D)

Q33. DIRECTIONS *for question 33:* Five sentences related to a topic are given in the question below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out. Choose its number as your answer and key it in.

1. Some investigative and enterprising jobs, such as scientific research, are, indeed off limits to the degreeless.
2. However, a recent report in *Psychological Science* suggests that it was not the case that university broadened minds; rather, work seemed to narrow them.
3. That assertion is presumably made in contradistinction to training for work straight after school, which might not be so stimulating.
4. Going to university is supposed to be a mind-broadening experience.
5. Those who have been to university do indeed seem to leave with broader and more inquiring minds than those who have spent their immediate post-school years in vocational training for work.

Sentence 1: Sentence 1 has the adverb 'indeed'. It is negative in tone.
Sentence 2: Sentence 2 begins with the conjunctive adverb 'however'. It mentions a conclusion of some research.
Sentence 3: Sentence 3 has a reference to 'that assertion'.
Sentence 4: Sentence 4 mentions a supposition. It sounds like an ideal introductory sentence.
Sentence 5: Sentence 5 has the adverb 'indeed'. It talks about how people leaving university have more inquiring minds than those who work or engage themselves in vocational training.
Between sentences 4 and 5, sentence 4 is a more general sentence that can begin the para. Sentence 4 talks about 'going to university'. Sentence 5 compares the benefits of 'going to university' vis-a-vis 'vocational training for work'. So there has to be a sentence introducing 'training for work' before sentence 5.
Hence sentence 4 begins the para. It mentions the supposition: university education is a mind-broadening experience. Sentence 4 is followed by sentence 3. "That assertion" in sentence 3 points to the supposition given in sentence 4. We understand from sentences 4 and 3 that "going to university" is a different experience than "training for work". "supposed to be a mind-broadening experience" in sentence 4 contrasts "might not be so stimulating" in sentence 3.
Sentence 3 is followed by sentence 5. "do indeed seem" in sentence 5 reiterates the point made in sentence 3. "seem to leave with broader and more inquiring minds" in sentence 5 points to "mind-broadening experience" in sentence 4 and contrasts "might not be so stimulating" in sentence 3.
Sentence 5 is followed by sentence 2 which concludes the para. "it was not the case that university broadened minds; rather, work seemed to narrow them" is an outcome that contradicts the supposition "supposed to be a mind-broadening experience" in the opening sentence 4. So, 4352.
Sentence 1 is the odd sentence out. It needs a precedent and more substantiation. It runs tangent to the thought flow. Ans: (1)

Q34. DIRECTIONS *for question 34:* The paragraph given below is followed by four summaries. Choose the option that best represents the author's primary position in the paragraph.

Some observers believe that the American era is coming to an end, as the Western-oriented world order is replaced by one increasingly dominated by the East. The historian Niall Ferguson has written that the bloody twentieth century witnessed "the descent of the West" and "a reorientation of the world" toward the East. Realists go on to note that as China gets more powerful and the United States' position erodes, two things are likely to happen: China will try to use its growing influence to reshape the rules and institutions of the international system to better serve its interests, and other states in the system – especially the declining hegemon – will start to see China as a growing security threat. The result of these developments, they predict, will be tension, distrust, and conflict, the typical features of a power transition.

a) Niall Ferguson's prediction about the ascendancy of the East is likely to come true as China uses its growing influence amidst a power transition.

b) Realists foresee an atmosphere of distrust and conflict because of the likelihood of China's use of its growing influence, through American decline, to manipulate the system for its own interests.

c) **With the American era coming to an end, China will go against other countries and use its clout for its own interests.**

d) One of the consequences of the decline of the American era is the rise of the Chinese hegemony which, realists believe, will give way to conflict and strife.

Option A: Niall Ferguson's prediction is not central to the author's position and is not accurate either, with respect to what the para is trying to convey. Also, Niall Ferguson wrote about what happened, and didn't 'make a prediction' that takes this option farther away from the essence of the para. Hence, Option A is not the answer.
Option B: This option represents all the attributes of what the author is trying to convey – realists foreseeing an atmosphere of conflict caused by the likelihood of China tweaking rules to suit its own interests, while there is a decline in the powers of America. Hence, Option B rightly depicts the author's position.
Option C: The para doesn't really convey information as presented by the 'realists', who believe that there will be an atmosphere of conflict. It is not explicitly stated that China will go against other countries. Rather, China will use its power to manipulate the system to suit its own interests. Hence, Option C is not the answer.
Option D: The rise of the Chinese hegemony isn't a 'consequence' of the decline of the American era. It is something, the realists believe will happen. Also, this option misses out on an important aspect of what the author states – the reason for the possible conflict between China and other countries. Hence, Option D is not the answer.

Choice (B)

DILR

DIRECTIONS *for questions 1 to 4:* Answer the questions on the basis of the information given below.

The King of Nowhere came to know that a dishonest merchant is deceiving the people of his kingdom. So, he called his minister, his commander and a priest. These three persons and the king visited the merchant, one after the other, each disguised as one among a peasant, a blacksmith, a cobbler and a druid, not necessarily in any order. Also, the following information is known:

i. If the peasant is the king, then the blacksmith is not the minister.

ii. If the cobbler is not the priest, then the peasant is the commander.
iii. If the blacksmith is the commander, then the druid is the priest.
iv. If the druid is not the commander, then the cobbler is not the king.
v. If the peasant is not the minister, then the druid is the king.
vi. If the cobbler is not the minister, then the blacksmith is not the king.

Q1. DIRECTIONS *for questions 1 to 4:* Select the correct alternative from the given choices.
The minister was disguised as

a) the blacksmith.

b) the cobbler.

c) **the druid.**

d) Cannot be determined

Since the six statements given can be a little cumbersome to deal with, it is recommended to pick a statement of the form "If A is NOT X, then B IS Y". This type of statement maximizes the information available in both cases, i.e., "If A is X" or "If A is NOT X". With these two cases, all other statements can be systematically cross verified and a consistent pattern of distribution can be obtained, to the extent possible.
For instance, we could start with statement (ii).
From (ii), we can say that the cobbler cannot be the commander and the peasant cannot be the priest.
From (v), we can say that the druid cannot be the minister and the peasant cannot be the king
⇒ The peasant is either commander or minister

Case a:
Let the peasant be the commander
From (v), the druid is the king
Hence, the blacksmith and the cobbler are the minister and the priest (in any order).
This satisfies all the remaining conditions.

Case b:
Let the peasant be the minister
From (ii), the cobbler is the priest
From (vi), the blacksmith is the commander and the druid is the king, which contradicts (iii).
Hence,
the peasant is the commander
the blacksmith is the minister/priest
the cobbler is the priest/minister
the druid is the king

The minister could have been either the blacksmith or the cobbler. Choice (D)

Q2. DIRECTIONS *for questions 1 to 4:* Select the correct alternative from the given choices.
The peasant's disguise was worn by the

a) king.

b) minister.

c) **commander.**

d) priest.

Since the six statements given can be a little cumbersome to deal with, it is recommended to pick a statement of the form "If A is NOT X, then B IS Y". This type of statement maximizes the information available in both cases, i.e., "If A is X" or "If A is NOT X". With these two cases, all other statements can be systematically cross verified and a consistent pattern of distribution can be obtained, to the extent possible.
For instance, we could start with statement (ii).
From (ii), we can say that the cobbler cannot be the commander and the peasant cannot be the priest.
From (v), we can say that the druid cannot be the minister and the peasant cannot be the king
⇒ The peasant is either commander or minister

Case a:
Let the peasant be the commander
From (v), the druid is the king
Hence, the blacksmith and the cobbler are the minister and the priest (in any order).
This satisfies all the remaining conditions.

Case b:
Let the peasant be the minister
From (ii), the cobbler is the priest
From (vi), the blacksmith is the commander and the druid is the king, which contradicts (iii).
Hence,
the peasant is the commander
the blacksmith is the minister/priest
the cobbler is the priest/minister
the druid is the king

The peasant disguise was worn by the commander. Choice (C)

Q3. DIRECTIONS *for questions 1 to 4:* Select the correct alternative from the given choices.
In how many ways could the four persons have disguised themselves?

a) 8

b) 5

c) **2**

d) 4

Since the six statements given can be a little cumbersome to deal with, it is recommended to pick a statement of the form "If A is NOT X, then B IS Y". This type of statement maximizes the information available in both cases, i.e., "If A is X" or "If A is NOT X". With these two cases, all other statements can be systematically cross verified and a consistent pattern of distribution can be obtained, to the extent possible.
For instance, we could start with statement (ii).
From (ii), we can say that the cobbler cannot be the commander and the peasant cannot be the priest.
From (v), we can say that the druid cannot be the minister and the peasant cannot be the king
⇒ The peasant is either commander or minister

Case a:
Let the peasant be the commander
From (v), the druid is the king
Hence, the blacksmith and the cobbler are the minister and the priest (in any order).
This satisfies all the remaining conditions.

Case b:
Let the peasant be the minister
From (ii), the cobbler is the priest
From (vi), the blacksmith is the commander and the druid is the king, which contradicts (iii).
Hence,
the peasant is the commander
the blacksmith is the minister/priest
the cobbler is the priest/minister
the druid is the king

The four persons could have disguised themselves in 2 ways. Choice (C)

Q4. DIRECTIONS *for questions 1 to 4:* Select the correct alternative from the given choices.
Which of the following statements is sufficient to determine who was disguised as what?

a) If the peasant is not the king, then the cobbler is not the commander.

b) If the blacksmith is the priest, then the druid is not the king.

c) **If the druid is not the minister, then the cobbler is not the commander.**

d) None of the above

Since the six statements given can be a little cumbersome to deal with, it is recommended to pick a statement of the form "If A is NOT X, then B IS Y". This type of statement maximizes the information available in both cases, i.e., "If A is X" or "If A is NOT X". With these two cases, all other statements can be systematically cross verified and a consistent pattern of distribution can be obtained, to the extent possible.
For instance, we could start with statement (ii).
From (ii), we can say that the cobbler cannot be the commander and the peasant cannot be the priest.
From (v), we can say that the druid cannot be the minister and the peasant cannot be the king
⇒ The peasant is either commander or minister

Case a:
Let the peasant be the commander
From (v), the druid is the king
Hence, the blacksmith and the cobbler are the minister and the priest (in any order).
This satisfies all the remaining conditions.

Case b:
Let the peasant be the minister
From (ii), the cobbler is the priest
From (vi), the blacksmith is the commander and the druid is the king, which contradicts (iii).
Hence,
the peasant is the commander
the blacksmith is the minister/priest
the cobbler is the priest/minister
the druid is the king

From choice (B), the blacksmith cannot be the priest.
⇒ the blacksmith is the minister
the cobbler is the priest
Hence choice (B) is sufficient. Choice (B)

729 small cubelets are painted pink on each face and then arranged together so as to form 27 identical medium-sized cubes. Each of these 27 medium-sized cubes is painted black on all the outside faces. The 27 medium-sized cubes are now arranged to form one large cube and the faces of this large cube are painted pink again.

Q5. DIRECTIONS *for questions 5 and 6:* Type in your answer in the input box provided below the question.
What is the number of small cubelets that have at least one face painted black?

Here, all the small cubes are painted in pink and the medium sized cubes are painted in black and then the large cube is painted in pink.

Consider the medium sized cube which is at the centre of the larger cube:
It has only one small cube (at the centre of it) painted in pink.
$\therefore$ Number of small cubes with at least one face painted black = 26.
Consider the middle block of each face of the larger cube. In each of these six blocks, there is only one small cube which initially has only one face painted black. (Now it is painted pink)
$\therefore$ Number of small cubes with at least one face painted black = $6 \times (27 - 2) = 150$.
(of the 2, another one is that at the centre of the cube)
There are twelve edges.
Consider the middle medium sized cube of each edge:
in each of these twelve cubes, the small cube which is at the middle of the edge, the two small cubes which are at the centre of the outer surface and the one which is at the centre of the cube are painted fully pink.
$\therefore$ Number of small cubes with at least one face painted black = $12 \times (27 - 4) = 276$.
Consider the eight medium sized cubes at each of the corners of the large cube. In each of these cubes eight small cubes are painted fully pink.
$\therefore$ Number of small cubes with at least one face painted black = $8 \times (27 - 8) = 152$.
$\therefore$ Total number of small cubes with at least one face painted black = 26 + 150 + 276 + 152 = 604. Ans: (604)

Q6. DIRECTIONS *for questions 5 and 6:* Type in your answer in the input box provided below the question.
What is the number of small cubelets that have at least one face painted pink?

Here, all the small cubes are painted in pink and the medium sized cubes are painted in black and then the large cube is painted in pink.

For each of the small cubes, there are at most three faces painted black. Hence at least three faces are painted pink.
As the total number of small cubes is 729, the required answer is 729. Ans: (729)

Q7. DIRECTIONS *for questions 7 and 8:* Select the correct alternative from the given choices.
What is the number of small cubelets which have an equal number of faces painted pink and black?

a) 0

b) 42

c) **64**

d) None of the above

Here, all the small cubes are painted in pink and the medium sized cubes are painted in black and then the large cube is painted in pink.

Each corner cubelet of the medium size cubes that is to the inside of the large cube will have three faces in pink and three in black. The total number of corners $= 8 \times 27 = 216$.
Those not exposed $= (1 \times 8) + (12 \times 2) + (6 \times 4) + (8 \times 1) = 64$. Choice (C)

Q8. DIRECTIONS *for questions 7 and 8:* Select the correct alternative from the given choices. What is the number of small cubelets that have all the faces painted pink?

a) 100

b) 116

c) **104**

d) 125

From the above solution, the number of cubes that have at least one face painted black = 604
Total number of cubes = 729
Number of cubes with no face painted Black = Number of cubes with all the faces painted pink = Total number of cubes – Number of cubes that have at least one face painted black = 729 – 604 = 125 Choice (D)

DIRECTIONS *for questions 9 to 12:* Answer the questions on the basis of the information given below.

A company has six regional dealers, seven wholesale dealers and nine sub-dealers. The regional dealers are A, B, C, D, E and F. The wholesale dealers are G, H, I, J, K, L and M, and the sub-dealers are N, O, P, Q, R, S, T, U and V. Table-A gives the cost of transporting one truckload of the company's products from any regional dealer to any wholesale dealer. Table-B gives the cost of transporting the same quantity of products from any wholesale dealer to any sub-dealer.

Table-A

(in Rupees)

	A	B	C	D	E	F
G	4641	2685	2839	2949	2949	4001
H	1555	2984	4428	3799	3799	3969
I	2255	0	1601	3901	3603	5001
J	1855	751	1751	3751	3252	4901
K	5568	1572	0	5788	5788	5117
L	3085	2584	3782	5329	5329	2032
M	3222	1496	2686	5466	5466	3119

Table-B

(in Rupees)

	G	H	I	J	K	L	M
N	2814	4216	1572	4446	0	3774	2686
O	2664	4016	1423	3953	476	3298	2210
P	2503	3901	0	2286	1028	2746	1658
Q	1164	1811	1431	1377	2618	2626	3358
R	1726	1343	1581	816	2779	2086	1139
S	2251	3221	1731	1861	4663	2014	1891
T	3272	0	2983	1113	4428	1938	1742
U	4021	748	3136	1802	5172	2686	2491
V	3230	1275	2168	688	3488	566	808

Q9. DIRECTIONS *for question 9:* Type in your answer in the input box provided below the question. What is the least cost (in Rs.) of transporting one truckload of the company's products from any regional dealer to the sub-dealer O?

From C to K = 0
From K to O = 476
Minimum total cost = ₹476. Ans: (476)

Q10. DIRECTIONS *for questions 10 and 11:* Select the correct alternative from the given choices.

What is the least cost of transporting one truckload of the company's products from the regional dealer A to any sub-dealer?

a) Rs.1423

b) Rs.1555

c) **Rs.2255**

d) Rs.475

The minimum cost is when sending from A to H, 1555 and then H to T = 0
∴ Total minimum cost = ₹1555. Choice (B)

Q11. DIRECTIONS *for questions 10 and 11:* Select the correct alternative from the given choices.
What is the least cost of transporting one truckload of the company's products from the regional dealer A to the sub-dealer N?

a) Rs.3827

b) Rs.5568

c) **Rs.5771**

d) Rs.4235

Minimum cost is for sending from A to I and then from I to N ₹2255 + ₹1572 = ₹3827.
Choice (A)

Q12. DIRECTIONS *for question 12:* Type in your answer in the input box provided below the question.
If the cost of transporting one truckload of the company's products from the regional dealer D to one of the sub-dealers, X, is more than Rs.9000, how many possibilities exist for X?

Since the truckload can pass through any wholesale dealer, we can consider each wholesale dealer and identify the number of sub-dealers for whom the cost exceeds ₹9000.
From D to G, the cost is ₹2949. Hence, for any sub-dealer, if the cost of transportation from G is more than ₹9000 – ₹2949 = ₹6051, those sub-dealers can be a possibility.
By observation, we can see that for G, no such possibility exists.
From D to H, the cost is ₹3799. From H, the cost must be more than ₹5201. No possibility exists.
Similarly, for I, the cost from I must be greater than ₹5099. No such sub-dealer exists.
For J, the cost from J must be greater than ₹5249. No such sub-dealer exists.
For K, the cost from K must be greater than ₹3212. The possibilities are S, T, U and V.
For L, the cost from L must be greater than ₹3671. The only possibilities is N.
For M, the cost from M must be greater than ₹3534. No such possibility exists.
Hence, five possibilities exist for X (N, S, T, U and V). Ans: (5)

DIRECTIONS *for questions 13 to 16:* Answer the questions on the basis of the information given below.

In the year 2018, Mr. Rajan, a financial analyst at McNiksey consultants Ltd., gathered the values of the sales, gross profit and the net profit of each of the eight companies in a particular city. In the year 2017 also, he had gathered these values for the same set of eight companies. However, in each of the years, being in a hurry, he did not pay any attention to the exact order in which he noted down the three values for each company. The data as per his records is given in the table below:

(All values in ₹crore)

Company	Values of Sales, Gross Profit and Net Profit (in no particular order)	
	2017	2018
P	37, 29, 132	196, 27, 21
Q	29, 297, 42	39, 28, 331
R	68, 19, 16	29, 105, 24
S	521, 61, 78	762, 131, 109
T	23, 25, 187	61, 69, 242
U	11, 243, 17	78, 239, 56
V	72, 89, 382	129, 511, 113
X	2, 2, 79	17, 28, 115

Note: It is known that none of the companies made a loss in any of the years.

Gross Profit = Sales − Expenses

Net Profit = Gross Profit − Taxes

$$\text{Profitability} = \frac{\text{NetProfit}}{\text{Sales}}$$

Q13. DIRECTIONS *for questions 13 to 16:* Select the correct alternative from the given choices.
Which of the given companies had the highest profitability in the year 2018?

a) P

b) R

c) **U**

d) None of the above

Sales – Expenses = Gross Profit
Gross Profit – Taxes = Net Profit ⇒ Sales > Gross Profit > Net Profit
Hence, for each company, among the given three values for each year, the largest value will be of the sales, the second largest value will be of the gross profit and the lowest value, the net profit.
Also, the difference between the gross profit (i.e., second highest value) and the net profit (lowest value) would give the taxes paid.

As profitability = Net Profit/Sales

$\Rightarrow \frac{\text{Net profit}}{\text{Sales}}$ is to be the highest,

$\Rightarrow \frac{\text{Sales}}{\text{Net profit}}$ is to be the least.

This value is less than 4 for only company T. Choice (D)

Q14. DIRECTIONS *for questions 13 to 16:* Select the correct alternative from the given choices.
In the year 2018, taxes paid as a percentage of the gross profit were the highest for company

a) X.

b) Q.

c) **U.**

d) R.

Sales – Expenses = Gross Profit
Gross Profit – Taxes = Net Profit ⇒ Sales > Gross Profit > Net Profit
Hence, for each company, among the given three values for each year, the largest value will be of the sales, the second largest value will be of the gross profit and the lowest value, the net profit.
Also, the difference between the gross profit (i.e., second highest value) and the net profit (lowest value) would give the taxes paid.

As Taxes Paid = Gross Profit – Net Profit, it can be found that taxes paid as a percentage of gross profit are the highest, if the net profit as a percentage of the gross profit is the least. This is so for company X, (i.e. slightly more than 60%.)

Choice (A)

Q15. DIRECTIONS *for questions 13 to 16:* Select the correct alternative from the given choices.
For how many of the given companies was the increase in expenses from 2017 to 2018, greater than 30%?

a) 3

b) 4

c) **5**

d) 6

Sales – Expenses = Gross Profit
Gross Profit – Taxes = Net Profit ⇒ Sales > Gross Profit > Net Profit
Hence, for each company, among the given three values for each year, the largest value will be of the sales, the second largest value will be of the gross profit and the lowest value, the net profit.
Also, the difference between the gross profit (i.e., second highest value) and the net profit (lowest value) would give the taxes paid.

Expenses = Sales – Gross Profit

Expenses	2017	2018
P	95	169
Q	255	292
R	49	76
S	443	631
T	162	173
U	226	161
V	293	382
X	77	87

For companies P, R, S, V the expenses increased by more than 30%. Choice (B)

Q16. DIRECTIONS *for questions 13 to 16:* Select the correct alternative from the given choices.
For how many of the given companies was the taxes paid in 2018 less that that paid in 2017?

a) 2

b) 5

c) **3**

d) 4

Sales – Expenses = Gross Profit
Gross Profit – Taxes = Net Profit ⇒ Sales > Gross Profit > Net Profit
Hence, for each company, among the given three values for each year, the largest value will be of the sales, the second largest value will be of the gross profit and the lowest value, the net profit.
Also, the difference between the gross profit (i.e., second highest value) and the net profit (lowest value) would give the taxes paid.

The taxes paid by the companies in 2011 and 2012 are given in the table below:

Company	Taxes Paid	
	2017	2018
P	8	6
Q	13	11
R	3	5
S	17	22
T	2	8
U	6	22
V	17	16
X	0	11

The taxes paid in 2018 was less than that in 2017 for three companies, i.e., P, Q and V. Choice (C)

DIRECTIONS *for questions 17 to 20:* Answer the questions on the basis of the information given below.

At the finals of the "Gaana Sunao" contest, which was conducted all over India, five contestants – C_1, C_2, C_3, C_4 and C_5 – participated. Before the announcement of the results, six mischievous persons – Azad, Bose, Chand, Dev, Ehsaan and Fardeen – managed to get hold of the result sheet, which contained the scores of each of the five participants. Each of the six persons then decided to announce the sum of the final scores of exactly four contestants. So, Azad, Bose, Chand, Dev, Ehsaan and Fardeen announced their sums as 220, 260, 230, 240, 210 and 250 points respectively. However, one of them made a mistake in adding the scores. Also, the organizers of the contest decided to award an amount of Rs.10,000 for each point that a contestant scored. The score of each contestant is an integral value.

Q17. DIRECTIONS *for questions 17 to 20:* Select the correct alternative from the given choices.
What is the highest possible amount that any of the five contestants can be eligible for?

a) Rs.8 lakh

b) Rs.8.5 lakh

c) **Rs.8.75 lakh**

d) Rs.9 lakh

Let us refer to each person by the first letter of his name.
First, let us find the possible scores of the contestants
As the values given by five persons are correct, the sum of the values of these five people will be the sum of the five contestants score multiplied by 4. [because each got a different sum]
Let us add all the values given by the six persons.
$\Rightarrow 220 + 260 + 230 + 240 + 210 + 250 = 1410$.
Assume A made the mistake. So, $1410 - 220 = 1190$

Then, the sum of the five contestants = $\frac{1190}{4}$ = 297.5 which is not possible.

Assume B made the mistake. So, $1410 - 260 = 1150$

Then the sum of the five contestants = $\frac{1150}{4}$ = 287.5 which is not possible.

Assume C made the mistake. So, $1410 - 230 = 1180$

Then the sum of the five contestants = $\frac{1180}{4} = 295$

Now, the possible scores are
$295 - 210 = 85$, $295 - 220 = 75$, $295 - 240 = 55$, $295 - 250 = 45$ and $295 - 260 = 35$.
Assume D made the mistake. So, $1410 - 240 = 1170$.

Then the sum of the five contestants = $\frac{1170}{4}$ = 292.5 which is not possible.

Assume E made the mistake. So, $1410 - 210 = 1200$

Then, the sum of the five contestant = $\frac{1200}{4}$ = 300.

Now, the possible scores are $300 - 220 = 80$, $300 - 230 = 70$, $300 - 240 = 60$, $300 - 250 = 50$ and $300 - 260 = 40$
Assume F made a mistake. So, $1410 - 250 = 1160$

Then the sum of the five contestants = $\frac{1160}{4}$ = 290

Now, the possible scores are $290 - 210 = 80$, $290 - 220 = 70$, $290 - 230 = 60$ and $290 - 260 = 30$ and $290 - 240 = 50$

If C made the mistake, then a maximum score of 85 is obtained. So, $85 \times 10{,}000$ = ₹8.5 lakh. Choice (B)

Q18. DIRECTIONS *for questions 17 to 20:* Select the correct alternative from the given choices.

If one of the contestants is eligible for Rs.5 lakh, then what is the total amount that the organizers have to give away to all the five contestants put together?

a) Rs.29.5 lakh

b) Rs.29 lakh

c) **Rs.30 lakh**

d) Cannot be determined

Let us refer to each person by the first letter of his name.
First, let us find the possible scores of the contestants
As the values given by five persons are correct, the sum of the values of these five people will be the sum of the five contestants score multiplied by 4. [because each got a different sum]
Let us add all the values given by the six persons.
$\Rightarrow 220 + 260 + 230 + 240 + 210 + 250 = 1410$.
Assume A made the mistake. So, $1410 - 220 = 1190$

Then, the sum of the five contestants = $\frac{1190}{4}$ = 297.5 which is not possible.

Assume B made the mistake. So, $1410 - 260 = 1150$

Then the sum of the five contestants = $\frac{1150}{4}$ = 287.5 which is not possible.

Assume C made the mistake. So, $1410 - 230 = 1180$

Then the sum of the five contestants = $\frac{1180}{4} = 295$

Now, the possible scores are
$295 - 210 = 85$, $295 - 220 = 75$, $295 - 240 = 55$, $295 - 250 = 45$ and $295 - 260 = 35$.
Assume D made the mistake. So, $1410 - 240 = 1170$.

Then the sum of the five contestants = $\frac{1170}{4}$ = 292.5 which is not possible.

Assume E made the mistake. So, $1410 - 210 = 1200$

Then, the sum of the five contestant = $\frac{1200}{4}$ = 300.

Now, the possible scores are $300 - 220 = 80$, $300 - 230 = 70$, $300 - 240 = 60$, $300 - 250 = 50$ and $300 - 260 = 40$
Assume F made a mistake. So, $1410 - 250 = 1160$

Then the sum of the five contestants = $\frac{1160}{4}$ = 290

Now, the possible scores are $290 - 210 = 80$, $290 - 220 = 70$, $290 - 230 = 60$ and $290 - 260 = 30$ and $290 - 240 = 50$

If E made the mistake a total sum of ₹30 lakh is possible with one contestant receiving ₹5 lakhs. Also, if F made the mistake, then a total sum of ₹29 lakh is possible with one contestant receiving ₹5 lakhs. Choice (D)

Q19. DIRECTIONS *for questions 17 to 20:* Select the correct alternative from the given choices.
If two of the contestants put together are eligible to receive exactly Rs.15 lakh, then who among the following could have made the mistake while adding the scores?

a) Chand

b) Dev

c) **Ehsaan**

d) None of the above

Let us refer to each person by the first letter of his name.
First, let us find the possible scores of the contestants
As the values given by five persons are correct, the sum of the values of these five people will be the sum of the five contestants score multiplied by 4. [because each got a different sum]
Let us add all the values given by the six persons.
$\Rightarrow 220 + 260 + 230 + 240 + 210 + 250 = 1410$.
Assume A made the mistake. So, $1410 - 220 = 1190$

Then, the sum of the five contestants = $\frac{1190}{4}$ = 297.5 which is not possible.

Assume B made the mistake. So, $1410 - 260 = 1150$

Then the sum of the five contestants = $\frac{1150}{4}$ = 287.5 which is not possible.

Assume C made the mistake. So, $1410 - 230 = 1180$

Then the sum of the five contestants = $\frac{1180}{4} = 295$

Now, the possible scores are
$295 - 210 = 85$, $295 - 220 = 75$, $295 - 240 = 55$, $295 - 250 = 45$ and $295 - 260 = 35$.
Assume D made the mistake. So, $1410 - 240 = 1170$.

Then the sum of the five contestants = $\frac{1170}{4}$ = 292.5 which is not possible.

Assume E made the mistake. So, $1410 - 210 = 1200$

Then, the sum of the five contestant = $\frac{1200}{4} = 300$.

Now, the possible scores are $300 - 220 = 80$, $300 - 230 = 70$, $300 - 240 = 60$, $300 - 250 = 50$ and $300 - 260 = 40$
Assume F made a mistake. So, $1410 - 250 = 1160$

Then the sum of the five contestants = $\frac{1160}{4} = 290$

Now, the possible scores are $290 - 210 = 80$, $290 - 220 = 70$, $290 - 230 = 60$ and $290 - 260 = 30$ and $290 - 240 = 50$

If E made a mistake, 80 + 70 = 150, and hence a sum of ₹15 lakh is possible
If F made a mistake, 80 + 70 = 150 and hence a sum of 15 lakh is possible
But if C made a mistake, the sum of no two candidates' scores equals 150.
Hence from the choices given, E could have made the mistake. Choice (C)

Q20. DIRECTIONS *for questions 17 to 20:* Select the correct alternative from the given choices.
If the amount awarded to C_1 was half of that awarded to C_3, which, in turn, was less than the amount awarded to C_5, who made the mistake while adding the scores?

a) Ehsaan

b) Chand

c) **Fardeen**

d) Cannot be determined

Let us refer to each person by the first letter of his name.
First, let us find the possible scores of the contestants
As the values given by five persons are correct, the sum of the values of these five people will be the sum of the five contestants score multiplied by 4. [because each got a different sum]
Let us add all the values given by the six persons.
$\Rightarrow 220 + 260 + 230 + 240 + 210 + 250 = 1410$.
Assume A made the mistake. So, $1410 - 220 = 1190$
Then, the sum of the five contestants = $\frac{1190}{4}$ = 297.5 which is not possible.
Assume B made the mistake. So, $1410 - 260 = 1150$
Then the sum of the five contestants = $\frac{1150}{4}$ = 287.5 which is not possible.
Assume C made the mistake. So, $1410 - 230 = 1180$
Then the sum of the five contestants = $\frac{1180}{4} = 295$
Now, the possible scores are
$295 - 210 = 85$, $295 - 220 = 75$, $295 - 240 = 55$, $295 - 250 = 45$ and $295 - 260 = 35$.
Assume D made the mistake. So, $1410 - 240 = 1170$.
Then the sum of the five contestants = $\frac{1170}{4}$ = 292.5 which is not possible.
Assume E made the mistake. So, $1410 - 210 = 1200$
Then, the sum of the five contestant = $\frac{1200}{4}$ = 300.
Now, the possible scores are $300 - 220 = 80$, $300 - 230 = 70$, $300 - 240 = 60$, $300 - 250 = 50$ and $300 - 260 = 40$
Assume F made a mistake. So, $1410 - 250 = 1160$
Then the sum of the five contestants = $\frac{1160}{4}$ = 290
Now, the possible scores are $290 - 210 = 80$, $290 - 220 = 70$, $290 - 230 = 60$ and $290 - 260 = 30$ and $290 - 240 = 50$

Now, the possible scores are $300 - 220 = 80$, $300 - 230 = 70$, $300 - 240 = 60$, $300 - 250 = 50$ and $300 - 260 = 40$
Assume F made a mistake. So, $1410 - 250 = 1160$
Then the sum of the five contestants = $\frac{1160}{4}$ = 290
Now, the possible scores are $290 - 210 = 80$, $290 - 220 = 70$, $290 - 230 = 60$ and $290 - 260 = 30$ and $290 - 240 = 50$

Since C_1 was awarded half of C_3, the score of C_1 must have been half of C_3. This is possible only if Ehsaan or Fardeen made the mistake.
Further, if Ehsaan made the mistake, then C_1 must have scored 40 points, while C_3 must have scored 80 points. But it is given that C_5 received more than $C_3 \Rightarrow C_5$ scored more than C_3. However, this is not possible in this case because C_3 scored the highest.
If Fardeen made the mistake, C_1 must have scored 30 points and C_3 must have scored 60 points. C_5 could have received more than C_3 by scoring 70 or 80 points.
Hence, Fardeen is the only person who could have made the mistake in counting.

Choice (C)

DIRECTIONS *for questions 21 to 24:* Answer the questions on the basis of the information given below.

Each of the five batsmen – A, B, C, D and E – belongs to exactly one team among Rajasthan, Bangalore, Mumbai, Kolkata and Punjab, not necessarily in that order. No two of them belong to the same team. In a twenty-20 tournament, the total runs scored by each of them is unique and is among 96, 112, 64, 72 and 80, in no particular order. The number of balls faced by each of them is a multiple of 4. Each of them faced at least 16 and at most 36 balls. The runs scored per ball by each of them is an integer and is not more than 4.

Further the following information is known:

i. The total runs scored by the batsman of team Mumbai is 24 more than that scored by C.
ii. The difference between the runs scored by the batsmen of teams Bangalore and Rajasthan is half the difference between the runs scored by batsmen D and E.
iii. No one scored less runs per ball than the batsman who scored 16 runs less than that scored by the batsman of team Kolkata. E does not belong to team Mumbai.
iv. B faced the least number of balls and scored 8 runs more than a batsman, who is not a player of team Bangalore.

Q21. DIRECTIONS *for question 21:* Select the correct alternative from the given choices.
Who among the following belongs to team Punjab?

a) A

b) B

c) **C**

d) E

Given,
Runs scored : 96, 112, 64, 72, 80
Balls faced : 16, 20, 24, 28, 32, 36
As runs scored per ball is an integer and is not more than 4, hence,

Runs scored	Balls faced	Runs per ball
64	16/32	4/2
72	24/36	3/2
80	20	4
96	24/32	4/3
112	28	4

∴From the above discussion, we can see that the batsmen who scored 80 and 112 runs faced 20 and 28 balls respectively.
From (i), we can conclude that the batsman of Mumbai scored 96 runs and C scored 72 runs.
From (iv), B faced either 16 or 20 balls.
But, if B scored 16 balls, then his score must be 64, which contradicts (iv) as no one scored 64 – 8 i.e., 56 runs.
∴B faced 20 balls and scored 80 runs and C is not from Bangalore.
∴Every other player faced more than 20 balls.
⇒ The player who scored 64 runs faced 32 balls and scored at 2 runs per ball.
From (iii) and the above discussion, the player of team Kolkata must have scored 80 runs.
∴The runs scored by the players of teams Bangalore and Rajasthan are any two among 64, 72 and 112.
Also, the runs scored by D and E are any two among 64, 96 and 112.
For condition (ii) to be satisfied, the only possibility is that, the players of teams Bangalore and Rajasthan scored 64 and 72 runs in any order and D and E scored 96 and 112 runs in any order. From (iii), as E is not from Mumbai (96 runs), D must be from Mumbai and scored 96 runs.
∴E scored 112 runs.
⇒ A scored 64 runs.
As C (72 runs) is not from Bangalore, C must be from Rajasthan and the player from Bangalore scored 64 runs.
∴E is from Punjab.
We get the final distribution as follows:

Batsman	Team	Runs scored	Balls faced
A	Bangalore	64	32
B	Kolkata	80	20
C	Rajasthan	72	36/24
D	Mumbai	96	24/32
E	Punjab	112	28

E belongs to Punjab. Choice (D)

Q22. DIRECTIONS *for question 22:* Type in your answer in the input box provided below the question.

What is the difference between the scores of the batsman of team Kolkata and that of team Rajasthan?

Given,
Runs scored : 96, 112, 64, 72, 80
Balls faced : 16, 20, 24, 28, 32, 36
As runs scored per ball is an integer and is not more than 4, hence,

Runs scored	Balls faced	Runs per ball
64	16/32	4/2
72	24/36	3/2
80	20	4
96	24/32	4/3
112	28	4

∴From the above discussion, we can see that the batsmen who scored 80 and 112 runs faced 20 and 28 balls respectively.
From (i), we can conclude that the batsman of Mumbai scored 96 runs and C scored 72 runs.
From (iv), B faced either 16 or 20 balls.
But, if B scored 16 balls, then his score must be 64, which contradicts (iv) as no one scored 64 – 8 i.e., 56 runs.
∴B faced 20 balls and scored 80 runs and C is not from Bangalore.
∴Every other player faced more than 20 balls.
⇒ The player who scored 64 runs faced 32 balls and scored at 2 runs per ball.
From (iii) and the above discussion, the player of team Kolkata must have scored 80 runs.
∴The runs scored by the players of teams Bangalore and Rajasthan are any two among 64, 72 and 112.
Also, the runs scored by D and E are any two among 64, 96 and 112.
For condition (ii) to be satisfied, the only possibility is that, the players of teams Bangalore and Rajasthan scored 64 and 72 runs in any order and D and E scored 96 and 112 runs in any order. From (iii), as E is not from Mumbai (96 runs), D must be from Mumbai and scored 96 runs.
∴E scored 112 runs.
⇒ A scored 64 runs.
As C (72 runs) is not from Bangalore, C must be from Rajasthan and the player from Bangalore scored 64 runs.
∴E is from Punjab.
We get the final distribution as follows:

Batsman	Team	Runs scored	Balls faced
A	Bangalore	64	32
B	Kolkata	80	20
C	Rajasthan	72	36/24
D	Mumbai	96	24/32
E	Punjab	112	28

The required difference = 80 – 72 = 8. Ans: (8)

Q23. DIRECTIONS *for question 23:* Select the correct alternative from the given choices.
What is the number of balls faced by the batsman of team Rajasthan?

a) 20

b) 36

c) **24**

d) Cannot be determined

Given,
Runs scored : 96, 112, 64, 72, 80
Balls faced : 16, 20, 24, 28, 32, 36
As runs scored per ball is an integer and is not more than 4, hence,

Runs scored	Balls faced	Runs per ball
64	16/32	4/2
72	24/36	3/2
80	20	4
96	24/32	4/3
112	28	4

∴From the above discussion, we can see that the batsmen who scored 80 and 112 runs faced 20 and 28 balls respectively.
From (i), we can conclude that the batsman of Mumbai scored 96 runs and C scored 72 runs.
From (iv), B faced either 16 or 20 balls.
But, if B scored 16 balls, then his score must be 64, which contradicts (iv) as no one scored 64 – 8 i.e., 56 runs.
∴B faced 20 balls and scored 80 runs and C is not from Bangalore.
∴Every other player faced more than 20 balls.
⇒ The player who scored 64 runs faced 32 balls and scored at 2 runs per ball.
From (iii) and the above discussion, the player of team Kolkata must have scored 80 runs.
∴The runs scored by the players of teams Bangalore and Rajasthan are any two among 64, 72 and 112.
Also, the runs scored by D and E are any two among 64, 96 and 112.
For condition (ii) to be satisfied, the only possibility is that, the players of teams Bangalore and Rajasthan scored 64 and 72 runs in any order and D and E scored 96 and 112 runs in any order. From (iii), as E is not from Mumbai (96 runs), D must be from Mumbai and scored 96 runs.
∴E scored 112 runs.
⇒ A scored 64 runs.
As C (72 runs) is not from Bangalore, C must be from Rajasthan and the player from Bangalore scored 64 runs.
∴E is from Punjab.
We get the final distribution as follows:

Batsman	Team	Runs scored	Balls faced
A	Bangalore	64	32
B	Kolkata	80	20
C	Rajasthan	72	36/24
D	Mumbai	96	24/32
E	Punjab	112	28

It is either 24 or 36. Choice (D)

Q24. DIRECTIONS *for question 24:* Type in your answer in the input box provided below the question.

What is the difference between the number of balls faced by the batsman of team Bangalore and that faced by E?

Given,
Runs scored : 96, 112, 64, 72, 80
Balls faced : 16, 20, 24, 28, 32, 36
As runs scored per ball is an integer and is not more than 4, hence,

Runs scored	Balls faced	Runs per ball
64	16/32	4/2
72	24/36	3/2
80	20	4
96	24/32	4/3
112	28	4

∴From the above discussion, we can see that the batsmen who scored 80 and 112 runs faced 20 and 28 balls respectively.
From (i), we can conclude that the batsman of Mumbai scored 96 runs and C scored 72 runs.
From (iv), B faced either 16 or 20 balls.
But, if B scored 16 balls, then his score must be 64, which contradicts (iv) as no one scored 64 – 8 i.e., 56 runs.
∴B faced 20 balls and scored 80 runs and C is not from Bangalore.
∴Every other player faced more than 20 balls.
⇒ The player who scored 64 runs faced 32 balls and scored at 2 runs per ball.
From (iii) and the above discussion, the player of team Kolkata must have scored 80 runs.
∴The runs scored by the players of teams Bangalore and Rajasthan are any two among 64, 72 and 112.
Also, the runs scored by D and E are any two among 64, 96 and 112.
For condition (ii) to be satisfied, the only possibility is that, the players of teams Bangalore and Rajasthan scored 64 and 72 runs in any order and D and E scored 96 and 112 runs in any order. From (iii), as E is not from Mumbai (96 runs), D must be from Mumbai and scored 96 runs.
∴E scored 112 runs.
⇒ A scored 64 runs.
As C (72 runs) is not from Bangalore, C must be from Rajasthan and the player from Bangalore scored 64 runs.
∴E is from Punjab.
We get the final distribution as follows:

Batsman	Team	Runs scored	Balls faced
A	Bangalore	64	32
B	Kolkata	80	20
C	Rajasthan	72	36/24
D	Mumbai	96	24/32
E	Punjab	112	28

The difference between the number of balls faced by the batsman of team Bangalore and E is 4. Ans: (4)

DIRECTIONS *for questions 25 to 28:* Answer the questions on the basis of the information given below.

Foreign Direct Investment Flows

	Outflows (Area of origin)			Inflows (Destination)		
Year	1995	2005	2015	1995	2005	2015
High Income Countries (FDI as a percentage of total)						
U.S.A.	44	19.5	20.3	10.9	21.6	18.5
Europe	40.6	49.5	42.6	44.2	38.2	37.4
Japan	5.1	13.6	5.1	0.6	0.5	0.5
Oceania	1	2.1	1	6	4.5	2.3
Total	90.7	84.7	69.0	61.7	64.8	58.7
Developing and Transition Countries (FDI as a percentage of total)						
Latin America	1.2	2.1	2.7	9	11	12.6
Africa	1.6	0.5	0.4	2.7	2.0	1.8
Asia	3.9	9.2	13.1	12.5	14.2	18.5
Eastern Europe	0	0.4	0.5	0.5	2.8	3.1
Total	6.7	12.2	16.7	24.7	30.0	36.0
World (in billion dollars)						
FDI	148.5	512.5	864.2	118.2	526.2	911.2

Q25. DIRECTIONS *for questions 25 to 28:* Select the correct alternative from the given choices.

Among all the high income countries, the region/country that has the maximum share in FDI outflows in all the three years put together is

a) U.S.A.

b) Europe.

c) **Japan.**

d) Oceania.

By observation, amongst all the high income countries, the region which has the maximum share of FDI outflows in the three years put together is Europe. It may be noted that except in 1995, Europe had, by far, the highest share in outflows. The excess in 2005 and 2015 more than compensates for the minor shortfall in 1995.

Choice (B)

Q26. DIRECTIONS *for questions 25 to 28:* Select the correct alternative from the given choices.

Based on the table, which of the following statements is FALSE?

a)

FDI inflows into the U.S.A. have risen by almost 4.5 times in the two decades given.

b) Though outflows have risen for high income countries, inflows have risen even faster for them.

c) **Both outflows and inflows have risen for Asia.**

d) Japan has consistently been a net FDI provider to the world.

It can be seen that the statement "FDI inflows into the USA have risen by almost 4.5 times in two decades is false". The total figure has risen by about eight fold (from 118 to 911) and the percentage figure has increased by about 70% (from 10.9% to 18.5%). Hence, there would be a rise of about 13 times.

Choice (A)

Q27. DIRECTIONS *for questions 25 to 28:* Select the correct alternative from the given choices.

Based on the above table, which of the following statements is TRUE?

a) While inflows have increased for the developing and transition countries, outflows have decreased for them.

b) Eastern Europe has not seen much growth of FDI inflows relative to other developing and transition countries.

c) **Though inflows have increased for the developing and transition countries, outflows have increased at a faster rate.**

d) None of the above

It can be seen that though inflows have increased for developing and transition countries, outflows have increased at a much faster rate. Choice (C)

Q28. DIRECTIONS *for questions 25 to 28:* Select the correct alternative from the given choices.

If Net FDI is defined as FDI Outflow – FDI Inflow, then which of the following countries has the highest Net FDI in 2005?

a) U.S.A

b) Europe

c) **Japan**

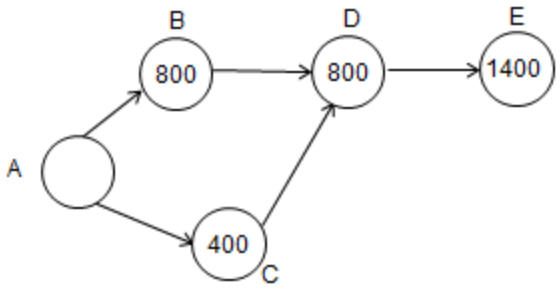
d) Oceania

By observation, only Europe and Japan have positive Net FDI. Further, the total FDI Outflow is around 2% less than the total FDI Inflow.
Japan has 13.1 percentage points difference between Outflow and Inflow while Europe has 11.3 percentage points difference.
Combining the two points, we can infer that Japan has the highest Net FDI.

Choice (C)

DIRECTIONS *for questions 29 to 32:* Answer these questions based on the pipeline diagram given below.

The figure given below shows the pipelines carrying material from one location to another. Each location has a certain demand for material. The demand at B is 800 units, at D is 800 units, at E is 1400 units and at C is 400 units. Each arrow indicates the direction of material flow through the pipeline. The flow from B to D is 600 units. The quantity of material flow is such that demand at all locations is exactly met. The maximum capacity of each pipeline is 2000 units.



Note: Assume that A can satisfy the total demand of all the four locations.

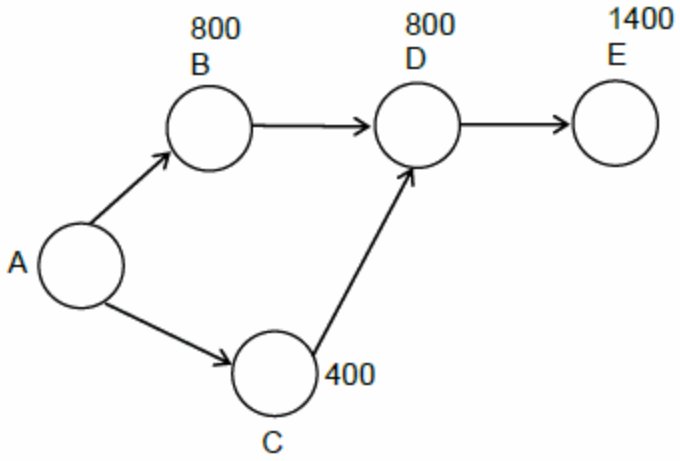
Q29. DIRECTIONS *for questions 29 and 30:* Select the correct alternative from the given choices. The quantity (in units) moved from A to C is

a) 2000.

b) 1600.

c) **1900.**

d) 1200.



Since D + E = 2200 and only 600 is flowing from B to D, quantity flowing from C to D must be 2200 – 600
= 1600 and that from A to C is 1600 + 400 = 2000 Choice (A)

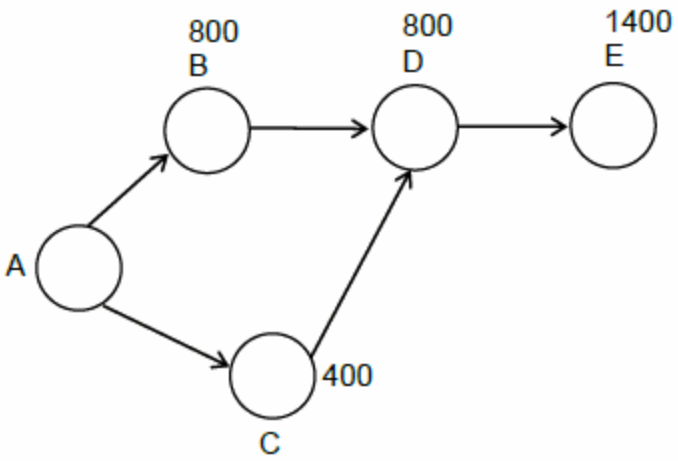
Q30. DIRECTIONS *for questions 29 and 30:* Select the correct alternative from the given choices. The free capacity (in units) available in the pipeline connecting A and B is

a) 0.

b) 200.

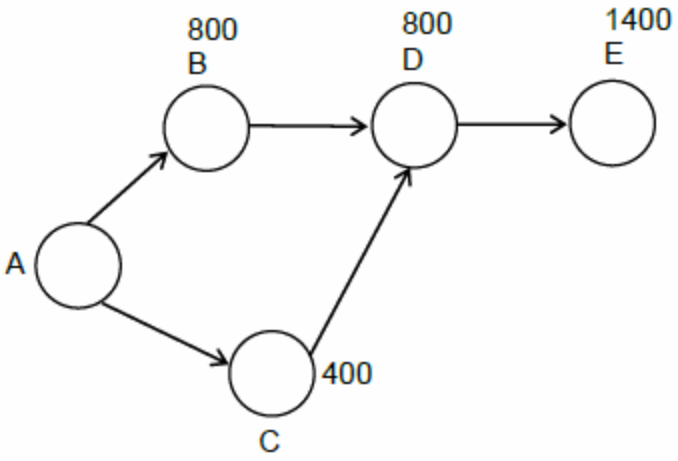
c) **400.**

d) 600.



2000 – (800 + 600) = 600 Choice (D)

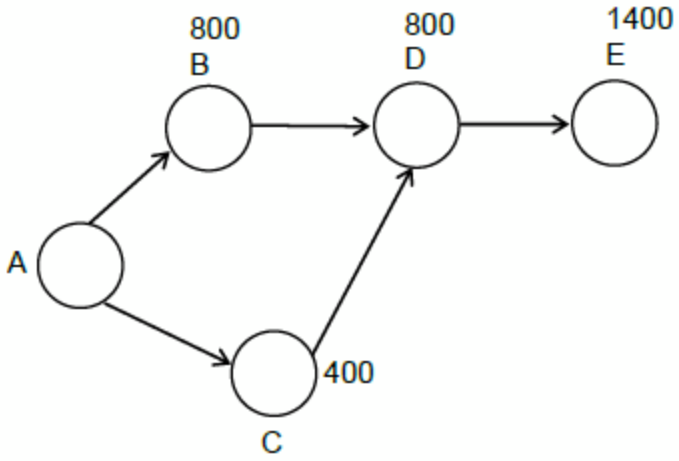
Q31. DIRECTIONS *for questions 31 and 32:* Type in your answer in the input box provided below the question.
What is the free capacity (in units) available in the pipeline connecting A and C?



The free capacity in the pipeline connecting A and C = 0. Ans: (0)

Q32. DIRECTIONS *for questions 31 and 32:* Type in your answer in the input box provided below the question.

If a new pipeline of capacity 2000 units is constructed connecting B directly to E and the flow in the pipeline from B to D remains at 600 units, what is the maximum possible free capacity (in units) that is available in the pipeline connecting D and E?



To maximize the free capacity in the pipeline connecting D and E, we need to minimize its flow. Hence, we can maximize the flow in the new pipeline.
2000 units will flow from A to B. After satisfying the demand of B, there will be 1200 units left. Of these 1200 units, 600 units flow from B to D. Hence, 600 units will flow from B to E.
From C, 200 units must flow to D and 800 units (1400 – 600) must flow to E. Since C has a demand of 400, from A to C, 1400 units will flow. From C to D, 1000 units will flow and from D to E, 800 units will flow.
Hence, the maximum possible free capacity of the pipeline connecting D and E is 2000 – 800 = 1200 units. Ans: (1200)

QA

Q1. DIRECTIONS *for question 1:* Type in your answer in the input box provided below the question.
How many integral values of x satisfy the equation $x = |2x - |120 - 3x||$?

It is given that $x = |2x - |120 - 3x||$
If $120 - 3x \geq 0$, then $|120 - 3x| = 120 - 3x$
i.e. $x \leq 40$
$x = |2x - 120 + 3x|$
$\Rightarrow x = |5x - 120|$
if $5x - 120 \geq 0$
$\Rightarrow x \geq 24$
for $24 \leq x \leq 40$, we get
$x = 5x - 120$
$\Rightarrow x = 30$
if $5x - 120 < 0$
i.e. $x < 24$
$x = 120 - 5x \Rightarrow x = 20$
again, if $120 - 3x < 0$ i.e. $x > 40$
$x = |2x + 120 - 3x|$
$x = |120 - x|$
Now, if $120 - x > 0$ i.e. $x < 120$
$46 < x < 120$
$x = 120 - x \Rightarrow x = 60$
If $120 - x < 0$ i.e. $x > 120$, we get
$x = x - 120$ (Which is inadmissible)
Therefore, if $x < 24$, we get $x = 20$
For $24 \leq x \leq 40$, we get $x = 30$ and
for $40 < x < 120$, we get $x = 60$
Thus, three integer values of x satisfy the given equation. Ans: (3)

Q2. DIRECTIONS *for question 2:* Select the correct alternative from the given choices.

If t is a real number, such that $81^{(t+1)}$ when divided by $27^{(t-1)}$ equals $243^{(t-1)}$, find t.

a) 2

b) 3

c) $\frac{1}{2}$

d) $\frac{1}{3}$

It is given that, $81^{(t+1)} = 27^{(t-1)} \times 243^{(t-1)}$
$\Rightarrow (3^4)^{(t+1)} = (3^3)^{(t-1)} \times (3^5)^{(t-1)}$
$\Rightarrow 3^{(4t+4)} = 3^{(3t-3)} \times 3^{(5t-5)}$
$\Rightarrow 3^{(4t+4)} = 3^{(8t-8)}$
Equating the powers (as the bases are same), we get
$4t + 4 = 8t - 8$
$\Rightarrow 4t = 12$
$\therefore t = 3$ Choice (B)

Q3. DIRECTIONS *for questions 3 to 6:* Type in your answer in the input box provided below the question.
If X = {0, 1, 2, 5, 6, 8, 9}, how many six-digit numbers divisible by 3 can be formed using the elements of X, without repetition?

Sum of the elements of X = 31 --------- (1)
X has 7 elements. Six-digit numbers divisible by 3 have to be formed.
$\therefore$ Only 6 elements of X have to be used i.e., 1 element has to be eliminated. The sum of the digits of each number formed must be divisible by 3.
(1) $\Rightarrow$ Only possible element which can be eliminated is 1.
The six-digit numbers have the digits 0, 2, 5, 6, 8 and 9.
The number of possible digits in the first, second, third, fourth, fifth and sixth positions are 5, 5, 4, 3, 2 and 1 respectively.
$\therefore$ Number of numbers which can be formed = 5(5) (4) (3) (2) (1) = 600
Ans: (600)

Q4. DIRECTIONS *for questions 3 to 6:* Type in your answer in the input box provided below the question.
If *p*, *q*, *r* and *s* are numbers chosen one after the other, at random, with replacement, from the set {1, 2, 3, 4, 5, 6, 7}, in how many ways can *p*, *q*, *r* and *s* be chosen such that *pqr* + *s* is even?

pqr + *s* will be even when both *pqr* and *s* are even, or when both *pqr* and *s* are odd.
pqr will be odd when each of *p*, *q* and *r* is odd
No. of ways pqr is odd = (4) (4) (4) = 64
($\because$ Each of *p*, *q* and *r* is an integer among 1, 3, 5 and 7)
Therefore, the number of ways when *pqr* is even
= (7) (7) (7) – (4) (4) (4) = 279
Therefore, *pqr* and *s* are both odd in (64 × 4) ways and *pqr* and *s* are both even in (279 × 3) ways.
Thus, the number of ways in which *pqr* + *s* is even is 64(4) + 279(3) = 1093 ways.
Ans: (1093)

Q5. DIRECTIONS *for questions 3 to 6:* Type in your answer in the input box provided below the question.

If P is the perimeter of a triangle, two of the sides of which measure 7 cm and 12 cm, how many of the following values of P do not belong to the valid range of values that P can assume?

i. P = 22
ii. P = 24
iii. P = 28
iv. P = 32
v. P = 38
vi. P = 39

Let the measure of the third side be x
By triangle inequality,
$x + 7 > 12$ and $7 + 12 > x$
$\Rightarrow x > 5$ $\Rightarrow x < 19$
Therefore, the perimeter of the triangle, $P > 7 + 12 + 5$,
i.e., $P > 24$ and $P < 7 + 12 + 19$, i.e., $P < 38$.
$\therefore 24 <$ perimeter < 38.
The perimeter of the triangle cannot be equal to 22 or 24 or 38 or 39, i.e., four values.
Ans: (4)

Q6. DIRECTIONS *for questions 3 to 6:* Type in your answer in the input box provided below the question.
If the sum of a three-digit number and the number obtained by reversing the order of the digits is 1232, then find the tens digit of the number.

Let the three digit number be denoted by abc.
Now, $abc + cba = 1232$
$(100a + 10b + c) + (100c + 10b + a) = 1232$
$101(a + c) + 20b = 1232$.
Now, $20b$ will always end in a zero. Hence $101\ (a + c)$ must end in a 2. Only $(a + c) = 2$ or 12 are possible.
Of these two possibilities, only $(a + c) = 2$ doesn't satisfy the required condition, since for $a + c = 2$, b cannot be a single-digit number.
$\therefore$ Only for $a + c = 12$, we get $b = 1$.
$\therefore b = 1$
Ans: (1)

Q7. DIRECTIONS *for questions 7 to 12:* Select the correct alternative from the given choices.

A contractor observed that with the existing number of workers, he could finish a project in 12 days. However, if he added 20 more workers to the existing team, the project will be completed in 10 days. How many days would a single worker take to complete the entire project?

a) 480

b) 600

c) **800**

d) 1200

Let us consider the existing number of workers as n
The total work in man days = $12n$
Similarly, the total work = $(n + 20)10$
$\Rightarrow 12n = (n + 20)\ 10$
$\Rightarrow 2n = 200$
$\therefore n = 100$
Therefore a single worker will take 12×100
= 1200 days to complete the work. Choice (D)

Q8. DIRECTIONS *for questions 7 to 12:* Select the correct alternative from the given choices.
There is a sequence of numbers whose n^{th} term is t_n. It is given that $t_n = (t_{(n-1)} - 1)^2 + 1$, where n is a positive integer greater than 1. If $t_1 = 3$, what is the product of the first 10 terms of the sequence?

a) $2^{1023} - 1$

b) $2^{1024} - 1$

c) $\mathbf{2^{512} - 1}$

d) $2^{2048} - 1$

Given $t_n = (t_{n-1} - 1)^2 + 1$
$t_1 = 3 = 2^1 + 1$
$t_2 = 2^2 + 1$
$t_3 = 2^4 + 1$
$t_4 = 2^8 + 1$
$t_5 = 2^{16} + 1$
.
.
.
The exponents of the 2's powers in the terms are
$1, 2^1, 2^2, 2^3, 2^4, \ldots\ldots\ldots$
$\therefore t_n = 2^{2^{n-1}} + 1$
So let P be the required product of the first ten terms.
$P = (2^1 + 1)(2^2 + 1)(2^4 + 1)\ldots\ldots\ldots\ldots\ldots\ldots(2^{512} + 1)$
By multiplying both sides by $(2^1 - 1)$, we get
$(2^1 - 1)P = (2^1 - 1)(2^1 + 1)(2^2 + 1)(2^4 + 1)\ldots\ldots(2^{512} + 1)$
$\Rightarrow P = (2^2 - 1)(2^2 + 1)(2^4 + 1)\ldots\ldots\ldots\ldots\ldots(2^{512} + 1)$
$= (2^4 - 1)(2^4 + 1)\ldots\ldots\ldots\ldots\ldots\ldots\ldots(2^{512} + 1)$
$= (2^{512} - 1)(2^{512} + 1) = 2^{1024} - 1$
$\therefore$ The required product is $2^{1024} - 1$.

Alternative Solution:

Given $t_1 = 3$, we first evaluate the first few terms as $t_2 = 5$, $t_3 = 17,\ldots$
Now, the product

of first term	$= 3$	$= 2^2 - 1$
of the first two terms	$= 3 \cdot 5$	$= 2^4 - 1$
of the first three terms	$= 17.15$	$= 2^8 - 1$

Hence, a pattern is established as product of first n terms $= (2)^{\left(2^n\right)} - 1$

Hence, product of first 10 terms $= (2)^{(2^{10})} - 1 = 2^{1024} - 1$, i.e., option (B)

Choice (B)

Q9. DIRECTIONS *for questions 7 to 12:* Select the correct alternative from the given choices.

Which of the following gives the value of $(6561)^{-2^{-3}}$?

a) 3

b) $\frac{1}{3}$

c) **6561^{-8}**

d) 6561^{6}

$$(6561)^{-2^{-3}} = (6561)^{\frac{1}{(-2)^3}} = (6561)^{-\frac{1}{8}} = \frac{1}{\left((6561)^{\frac{1}{8}}\right)}$$

$$= \frac{1}{\left((3^8)^{\frac{1}{8}}\right)} = \frac{1}{3}$$

Choice (B)

Q10. DIRECTIONS *for questions 7 to 12:* Select the correct alternative from the given choices.
A vertical cylindrical vessel has a radius of 7 cm. At what speed, in cm/sec (approximately), should water flow through a pipe, of 100 sq.cm cross-section, opening into the vessel, so that the water level in the vessel rises by 4 m in 3 minutes?

a) 3.42

b) 10

c) **7.84**

d) 5.26

The volume of water that fills up the pipe in 3 minutes is = πr^2 (400) cm^3

$= \frac{22}{7}(7)(7)(400)\ cm^3 = (22)\ (7)\ (400)\ cm^3$

The time taken is 3 minutes
Let the speed of the water in the inlet pipe be S (cm/sec)
$\therefore$ (100) (3) (60) S = (22) (7) (400)

$\Rightarrow S = \frac{22(7)(4)}{3(60)} = \frac{154}{45}\ cm/sec$

$\cong$ 3.42 cm/sec

Choice (A)

Q11. DIRECTIONS *for questions 7 to 12:* Select the correct alternative from the given choices.
A microbiologist studied two types of bacteria – Type I and Type II – and observed that the number of Type I bacteria doubled every four minutes, whereas the number of Type II bacteria tripled every five minutes. If at the end of 20 minutes there were a total of 2000 bacteria, then what was difference between the number of bacteria of the two types initially?

a) 4

b) 6

c) **8**

d) 9

Let the initial number of type-I and type-II bacteria be denoted by a and b respectively.
As type-I bacteria doubled every 4 minutes, so at the end of 20 minutes we would get
$2^{\left(\frac{20}{4}\right)} \times (a) = 2^5 \times (a) = 32a$ bacteria.
The number of type-II bacteria at the end of 20 minutes would be
$3^{\left(\frac{20}{5}\right)} \times (b) = 3^5 \times (b) = 81b$.
It is given that,
$32a + 81b = 2000$
$\Rightarrow 81b = 2000 - 32a$
$\Rightarrow 81b = 16(125 - 2a)$
Therefore $81b$ is a multiple of 16, which implies that b is a multiple of 16.
Therefore the minimum possible value of b is 16.
Hence, $32a + 81(16) = 2000$
$\Rightarrow 32a = 704$
$\therefore a = 22$
The next multiple of 16 is 32, but 81×32 gives 2592 which is more than 2000.
$\therefore a = 22$ and $b = 16$
Thus, the initial difference between the number of bacteria of the two types taken is 6.
Choice (B)

Q12. DIRECTIONS *for questions 7 to 12:* Select the correct alternative from the given choices.
If the principal at the beginning of the fifth year on a certain sum at a certain rate of interest, compounded annually, is 20% more than that at the beginning of the fourth year, then by what

percent does the compound interest for the eleventh year exceed the compound interest for the eighth year?

a) 44%

b) 72.8%

c) **69%**

d) 61.6%

Let P_i and I_i denote the principal at the beginning of the i^{th} year respectively.
Given $P_5 = 1.2\ P_4$
But we know that $P_5 = (1 + r)\ (P_4)$
$\Rightarrow r = 0.2$
Now, $I_8 = r\ .\ P_8$ and $I_{11} = r\ .\ P_{11}$, where $P_{11} = (1 + r)^3\ P_8$

$$\Rightarrow \frac{I_{11}}{I_8} = \frac{P_{11}}{P_8} = (1+r)^3 = (1.2)^3 = 1.728$$

Hence, I_{11} is 72.8% more than I_8. Choice (B)

Q13. DIRECTIONS *for question 13:* Type in your answer in the input box provided below the question.
Find the number of ordered pairs (x, y) that satisfy the equation $x^3 + y^3 + 144xy = 110592$, where x and y are non-negative integers.

Since the form of the equation given in the question does not lend itself to any standard approach for simplification, we will need to check if it corresponds to any standard result/expression. The first possibility is to check if it can be reduced to the form $(x + y)^3 = k^3$. Since $\sqrt[3]{110592} = 48$ (using calculator), we proceed further.
Hence $x^3 + y^3 + 3xy\,(x + y) = 48^3$, i.e., $3\,(x + y) = 144$ (by comparing the coefficient of xy.)
$\therefore$ Given equation is simply $(x + y)^3 = 48^3$, i.e., $x + y = 48$.
Hence (x, y) can be (0, 48), (1, 47), (2, 46) ..... (48, 0).
$\therefore$ 49 ordered pairs (x, y) are possible.

Alternative Solution:

$x^3 + y^3 + 144xy = 48^3$ [$\because 11052 = 48^3$]
$\Rightarrow x^3 + y^3 - 48^3 + 144\,xy = 0$
$\Rightarrow x^3 + y^3 - (48)^3 - 3(x)\,(y)\,(-48) = 0$
now, $a^3 + b^3 + c^3 - 3abc = (a + b + c)\,(a^2 + b^2 + c^2 - ab - bc - ac)$

$$\because x^3 + y^3 + (-48)^3 - 3(x)(y)(-48) = (x + y - 48)\left[\frac{1}{2}\left((x-y)^2 + (x+48)^2 + (y+48)^2\right)\right]$$

$$\because (x + y - 48)\left[\frac{1}{2}\left((x-y)^2 + (x+48)^2 + (y+48)^2\right)\right] = 0$$

$\Rightarrow (x + y - 48) = 0$ or $x = y = -48$
As x, y are non negative integers $x = y = -48$ is not possible
$x + y - 48 = 0$ will give us 49 solutions

x	0	1	2	.	.	.	48
y	48	47	46	.	.	.	0

Therefore, the number of ordered pairs (x, y) is 49. Ans: (49)

Q14. DIRECTIONS *for questions 14 to 20:* Select the correct alternative from the given choices.
If the first four terms of an arithmetic progression are p, $p + 2q$, $3p + q$ and 30 respectively, find the value of the 2016^{th} term of the progression.

a) 12344

b) 14532

c) **15130**

d) 16126

It is given that, p, $p + 2q$, $3p + q$ and 30 are in Arithmetic Progression.
$\therefore\ p + (3p + q) = 2(p + 2q)$
$2p = 3q$

Therefore the terms (in terms of q) are $\frac{3q}{2}, \frac{7q}{2}, \frac{11q}{2}$ and $\frac{15q}{2}$

But $\frac{15q}{2}$, i.e., the fourth term = 30 (given)

$\Rightarrow q = 4$ and $p = 6$, i.e, 1st term = 6
and common difference = $2p = 8$.
Thus the 2016th term = $6 + (2016 - 1)8 = 16126$ Choice (D)

Q15. DIRECTIONS *for questions 14 to 20:* Select the correct alternative from the given choices.
A boat started from a point in a river and traveled a certain distance upstream, after which it turned back and returned to its starting point. If the boat covered the round trip journey in two hours and the net speed of the boat upstream was 25% of that downstream, how much more time (in minutes) did the boat take to travel upstream than what it took to travel downstream?

a) 48

b) 54

c) **60**

d) 72

Net Speed of the boat upstream = v
Net Speed of the boat downstream = $4v$

Time taken Upstream = $\frac{d}{v}$

Time take Downstream = $\frac{d}{4v}$

Total time = $\frac{d}{v} + \frac{d}{4v} = 2 \times 60$ minutes (given)

$\Rightarrow \frac{5d}{4v} = 120 \Rightarrow$ difference of time = $\frac{3d}{4v} = \left(\frac{5d}{4v}\right) \times \frac{3}{5} = 120 \times \frac{3}{5} = 72$

Therefore, the boat took 72 minutes more while travelling upstream than what it took to travel downstream. Choice (D)

Q16. DIRECTIONS *for questions 14 to 20:* Select the correct alternative from the given choices.

Find the distance (in cm) between two parallel chords, drawn one on each side of the centre of a circle of radius 65 cm, if the lengths of the two chords are 104 cm and 120 cm respectively.

a) 14

b) 30

c) **60**

d) 64

OB = OD = 65 (Given)

In ΔOND, $ND = \frac{1}{2}(120) = 60$

$\therefore ON = \sqrt{65^2 - 60^2} = 25$

In ΔOMB, $MB = \frac{1}{2}(108) = 52$

$\therefore OM = \sqrt{65^2 - 52^2} = 39$

Thus the distance between the two chords is 25 + 39 = 64. Choice (D)

Q17. DIRECTIONS *for questions 14 to 20:* Select the correct alternative from the given choices.

Find the maximum value of x such that $\sqrt{x} \geq 3x$.

a) $\frac{1}{\sqrt{3}}$

b) $\frac{1}{3}$

c) $\frac{1}{9}$

d) $\frac{1}{6}$

It is given that, $\sqrt{x} > 3x$
Let $x = t^2$, so $t > 3t^2$
$\Rightarrow 3t^2 - t < 0$
$\Rightarrow t(3t - 1) < 0$
Therefore $0 \le t \le \frac{1}{3}$ satisfies the above inequality.
The maximum value of t is $\frac{1}{3}$ and the maximum value of x is $\frac{1}{9}$ $(\because x = t^2)$

Choice (C)

Q18. DIRECTIONS *for questions 14 to 20:* Select the correct alternative from the given choices.

If an article is marked up by 60% above its cost price and then sold at $\frac{3}{4}^{th}$ of its marked price, find the percentage of profit made on the article.

a) 20%

b) 25%

c) **30%**

d) 40%

Let the cost price of the article be ₹100
$\Rightarrow$ Its marked price = ₹160
Its selling price = $\frac{3}{4}(160) = ₹120$
$\therefore$ Profit percentage on the article
$= 100 \times \frac{(120 - 100)}{100} = 20\%$

Choice (A)

Q19. DIRECTIONS *for questions 14 to 20:* Select the correct alternative from the given choices.

A person has five tickets of a lucky draw for which a total of 12 tickets were sold and exactly six prizes are to be given. The probability that the person will win at least one prize is

a) $\frac{61}{132}$.

b) $\frac{131}{132}$.

c) $\frac{31}{132}$.

d) $\frac{11}{12}$.

A person doesn't win a prize if all the 5 tickets that he picked are not prized. The probability that the person wins no prize is $\frac{^{7}C_{6}}{^{12}C_{6}} = \frac{1}{132}$

$\therefore$ the probability that the person wins at least one prize

$= 1 - \frac{1}{132} = \frac{131}{132}$. Choice (B)

Q20. DIRECTIONS *for questions 14 to 20:* Select the correct alternative from the given choices. Shankerlal's daughter, Lajwanti, has twice as many sisters as brothers, whereas her brother, Bhola, has thrice as many sisters as brothers. How many children does Shankerlal have?

a) 8

b) 9

c) **11**

d) 13

Let the number of sons and daughters of Shankerlal be denoted by s and d respectively. The number of brothers and sisters of Lajwanti and Bhola are as follows

	Brothers	Sisters
Lajwanti	s	$(d-1)$
Bhola	$(s-1)$	d

It is given that, $(d-1) = 2s$ and $d = 3(s-1)$
$\Rightarrow 2s + 1 = 3(s-1)$
$\Rightarrow s = 4$ and $d = 9$
Thus , Shankerlal has 13 children in all Choice (D)

Q21. DIRECTIONS *for questions 21 to 23:* Type in your answer in the input box provided below the question.
The scores obtained by a student in five AIMCAT's were 104, 125, 133, 148 and 175, not necessarily in the same order. If the student observed that his average score per test, which he evaluated after each test, was always an integer, find the difference between his score in the third test and that in the fourth test.

For the average score per test at the end of each test to be an integer, the sum of the scores in the first two tests must be even, the sum of the scores at the end of three tests must be divisible by 3 and the sum of the scores at the end of four tests must be divisible by 4.

We start by considering his score at the end of three tests.
We determine the remainders when the scores are divided by 3.

Score	104	125	133	148	175
Remainder	2	2	1	1	1

For the sum of the three scores to be divisible by 3, we need to take the first three scores such that the sum of the remainders is divisible by 3. Thus the scores to be taken are 133, 148 and 175, with the exact order not yet known.
Again, for the sum of the first two scores to be even, we need to take 133 and 175, in any order. Therefore, the third score is 148. Sum of the first three scores = 133 + 175 + 148 = 456. For the sum of the first four scores to be divisible by 4, the fourth score must therefore be 104, and the fifth score will be 125.

	1st	2nd	3rd	4th	5th
Scores	(133/175)	(175/133)	148	104	125

Therefore, the difference between the scores in the third and the fourth test is 148 − 104 =44 Ans: (44)

Q22. DIRECTIONS *for questions 21 to 23:* Type in your answer in the input box provided below the question.

Find the sum of the digits of the number $8^{672} \times 25^{1010}$.

$8^{672} \times 25^{1010} = (2^3)^{672} (5^2)^{1010}$
$= (2^{2016}) (5)^{2020}$
$= 5^4(10^{2016})$
$= 625(10^{2016})$
This gives us 625 followed by 2016 zeroes.
Therefore, the sum of the digits will be 6 + 2 + 5 = 13. Ans: (13)

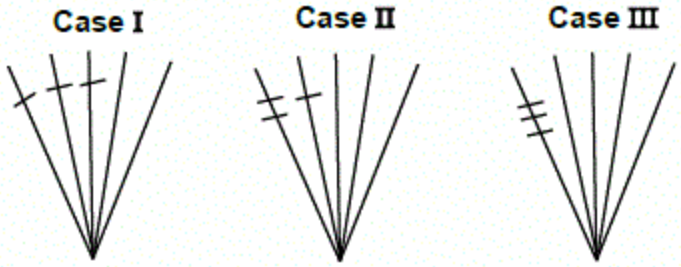
Q23. DIRECTIONS *for questions 21 to 23:* Type in your answer in the input box provided below the question.

Find the total number of ways in which one can wear three distinct rings on the five fingers of one's right hand, given that one is allowed to wear more than one ring on a finger.

One can wear the rings in 3 ways.
1. One ring on each of the 3 fingers.
2. 2 rings on one finger and 1 ring on another.
3. All 3 rings on a single finger.

Case I: (111) The 3 fingers can be chose in $^5C_3$ ways.
Now 3 rings can be arranged in those 3 fingers in 3! ways.
Total 3! $^5C_3$ = 60 ways.

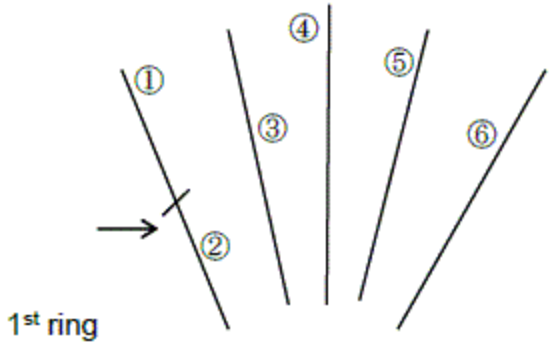
Case II: (2, 1, 0) The 2 fingers with rings can be chosen $^5C_2$ ways. Among them the finger with 2 rings in $^2C_1$ or 2 ways. Then the 2 rings on that finger can be chosen in $^3C_2$ ways and arranged in that finger in 2! ways.
Total $^5C_2$ $^2C_1$ $^3C_2$ (2!) = 120 ways.
Case III: (3, 0, 0) The finger can be chosen in $^5C_1$ ways and the 3 rings arranged on it in 3! ways.
Total = $^5C_1$ 3! = 30 ways
Total number of ways = 120 + 60 + 30 = 210



Alternative Solution 1:

There are 5 places for the first ring.
Now for each way in which one wears the 1st ring, the second ring can be worn in 6 ways, for there are 6 places for the 2nd ring.

Similarly after wearing 2 rings, the situation would be as either.



OR

Q24. DIRECTIONS *for questions 24 and 25:* Select the correct alternative from the given choices.
If $f(x) + f(y) = f(x + y)$, where $f(t) > 0$ for any $t > 0$, find the value of $f(1) + f(3) + f(5) + f(7) + \ldots + f(19)$, given $f(10) = \frac{1}{8}$.

a) $\frac{3}{4}$

b) $\frac{5}{4}$

c) **20**

d) 200

Putting $x = y = 1$
$f(1 + 1) = f(1) + f(1)$
$\Rightarrow f(2) = 2f(1)$
Similarly, by putting $x = 2$ and $y = 1$, we get
$f(2 + 1) = f(2) + f(1)$
$f(3) = 2f(1) + f(1) = 3f(1)$
Proceeding similarly, we get $f(n) = n f(1)$

$$\therefore f(10) = 10f(1) = \frac{1}{8} \therefore f(1) = \frac{1}{80}$$

Now, $f(1) + f(3) + f(5) + \ldots + f(19)$
$= f(1)[1 + 3 + 5 + \ldots + 19]$

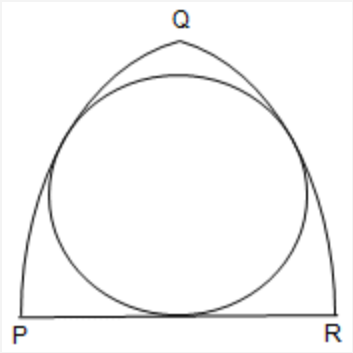
$$= 100 f(1) = 100 \times \frac{1}{80} = \frac{5}{4}$$

Alternative Solution:

$f(1) + f(19) = f(3) + f(17) = \ldots = f(9) + f(11) = f(20) = f(10) + f(10) = 2(f(10))$

Hence, required sum $= 5 \times 2(f(10)) = 5 \times 2 \times \frac{1}{8} = \frac{5}{4}$. Choice (B)

Q25. DIRECTIONS *for questions 24 and 25:* Select the correct alternative from the given choices.
In the figure given below, PQ and QR are equal arcs, drawn with centers at R and P respectively. If PR measures 40 cm, find the measure of the radius (in cm) of the circle inscribed as shown.



a) 15

b) 16

c) **18**

d) 20

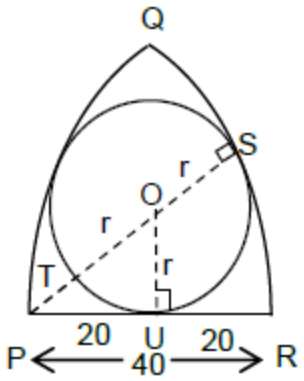
Let us denote the centre of the inscribed circle by O and its radius by r.
Now, PR = PS = 40 (given)
We know that, (PT) (PS) = $(PU)^2$
$\Rightarrow$ (PS − TS)(PS) = $(PU)^2$

$\Rightarrow (40 - 2r)(40) = (20)^2$ [$\because$ PU = $\frac{1}{2}$ PR]

$\Rightarrow 40 - 2r = 10$
$\therefore\ r = 15.$

Alternative solution:

In triangle POU, $PO^2 = PU^2 + OU^2$
Also, PO = PS – OS = $(40 - r)$



$\therefore\ (40 - r)^2 = (20)^2 + r^2$
$1600 - 80r + r^2 = 400 + r^2$
$\Rightarrow 80r = 1200$
$\therefore\ r = 15.$ Choice (A)

Q26. DIRECTIONS *for question 26:* Type in your answer in the input box provided below the question.

If each of p_1, p_2 and $(p_1 - p_2)$ is a prime number less than 50, how many possible values can p_1 assume?

As p_1, p_2 and $(p_1 - p_2)$ are all prime numbers, if p_1 and p_2 are both odd, then $(p_1 - p_2)$ will be even. It can be a prime number only if it is 2. Thus p_1 and p_2 must be twin primes (i.e. prime numbers that differ by 2). For eg. 5, 3 and (5 – 3) or 13, 11 and (13 – 11)
Again, if $(p_1 - p_2)$ is odd, then p_1 must be odd and p_2 must be 2 and p_1 and $(p_1 - 2)$ must be twin primes.
Therefore p_1 is always the higher of the two twin primes.
As p_1 is less than 50, the possible values that p_1 can assume are 5, 7, 13, 19, 31 and 43, i.e., six values. Ans: (6)

Q27. DIRECTIONS *for question 27:* Select the correct alternative from the given choices.
If the value of a two-digit number is six times the difference between the number and its reverse, the sum of the digits of the number is

a) 6.

b) 7.

c) **8.**

d) 9.

Let the two digit number be denoted by ab
It is given that,

$10a + b = 6(ab - ba)$ or	$10a + b = 6(ba - ab)$
$10a + b = 6[9(a - b)]$	$10a + b = 6[9(b - a)]$
$10a + b = 54a - 54b$	$10a + b = 54\,b - 54\,a$
$55b = 44a$	$64a = 53b$
$\frac{b}{a} = \frac{4}{5}$	$\frac{a}{b} = \frac{53}{64}$ (not possible)

Therefore, the number is ab i.e., 54 and the sum of its digits in 9.

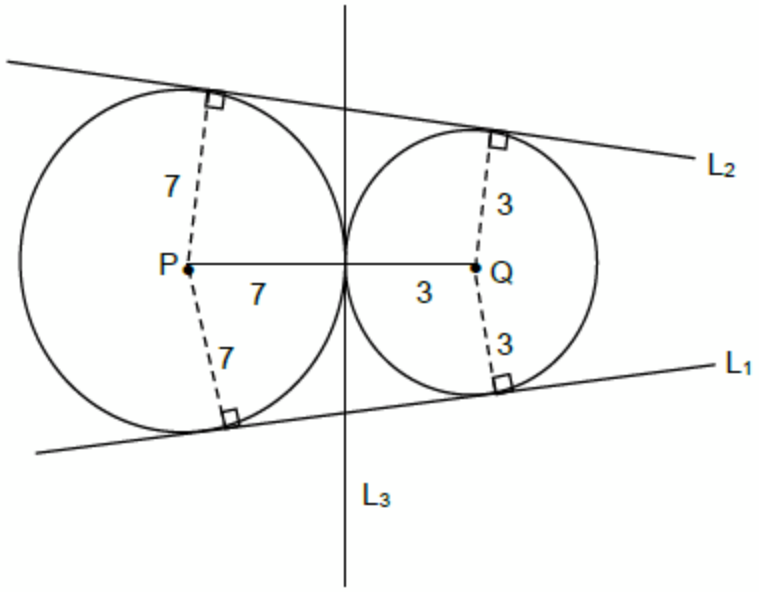
Alternative Solution:

Given $10a + b = 6 \times 9\,|b - a|$. Now, $|b - a|$ will be a single-digit number.
Further, since $(10a + b)$ is a two-digit number, $54\,|b - a|$ must also be a two digit number.
That is, $|b - a|$ can only be 1 and $10b + a = 54 \times 1 = 54$.
Hence, $a + b = 5 + 4 = 9$. Choice (D)

Q28. DIRECTIONS *for questions 28 and 29:* Type in your answer in the input box provided below the question.

P and Q are two points in a plane, separated by a distance of 10 cm. How many lines in the plane are at a distance of 7 cm from P and 3 cm from Q?

The set of all possible lines that are 7 cm from P will be all the possible tangents that can be drawn to the circle of radius 7 cm, centered at P.
Similarly, the set of all possible lines that are 3 cm from Q will be all the possible tangents that can be drawn to the circle of radius 3 cm, centered at Q.
Also, since distance between the two centres, i.e., P and Q = 10 cm, which is equal to the sum of the two radii, the circles would be exactly touching each other externally.
The question now becomes equivalent to finding the number of common tangents to these two circles, of radii 7 cm and 3 cm, touching externally.
As shown in the figure below, there are three such lines: L_1, L_2 and L_3



Ans: (3)

Q29. DIRECTIONS *for questions 28 and 29:* Type in your answer in the input box provided below the question.

How many natural numbers when expressed in base-6, base-5 and base-4 form four-digit, five-digit and six-digit numbers respectively?

Four-digit numbers in base 6 : are 6^3 to $6^4 - 1$ i.e., 216 to 1295.
Five-digit numbers in base 5 : are 5^4 to $5^5 - 1$ i.e., 625 to 3124.
Six-digit numbers in base 4 : are 4^5 to $4^6 - 1$ i.e., 1024 to 4095.
So, the numbers that satisfy all the three conditions are 1024 to 1295 i.e., 1295 – 1024 + 1 = 272 numbers. Ans: (272)

Q30. DIRECTIONS *for questions 30 to 32:* Select the correct alternative from the given choices.
The distance between two cities, A and B, is partly uphill, partly on level ground and partly downhill. It took three hours for a bus to go from A to B, whereas it took 40 minutes more to make the return journey. Find the distance (in km) between A and B, if the uphill speed, the downhill speed and that on the level ground of the bus are 40 km/hr, 60 km/hr and 48 km/hr respectively?

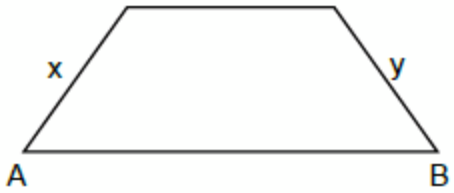
a) 240

b) 160

c) **200**

d) Cannot be determined

Let us denote the total distance, the uphill distance and the downhill distance by d, x and y respectively.



The distance covered on level ground = $d - (x + y)$

On his onward journey, $\frac{x}{40} + \frac{d-(x+y)}{48} + \frac{y}{60} = 3$

On his return journey, $\frac{x}{60} + \frac{d-(x+y)}{48} + \frac{y}{40} = 3\frac{2}{3}$

Adding the two equations, we get

$$\left(\frac{x}{40}+\frac{x}{60}\right)+\frac{2d}{48}-\frac{2(x+y)}{48}+\left(\frac{y}{40}+\frac{y}{60}\right)=6\frac{2}{3}$$

$$\Rightarrow \frac{x}{24}+\frac{d}{24}-\frac{x}{24}-\frac{y}{24}+\frac{y}{24}=\frac{20}{3}$$

$$\Rightarrow \frac{d}{24}=\frac{20}{3} \Rightarrow d = 160 \text{ km.}$$

Choice (B)

Q31. DIRECTIONS *for questions 30 to 32:* Select the correct alternative from the given choices.
The density of a liquid is defined as the mass per unit volume of the liquid. The densities of two liquids, A and B, are in the ratio 2 : 1. 70 kg of liquid A is mixed with 30 kg of liquid of B to form a mixture. In this mixture, liquid B evaporates at a rate (in kg/hr) which is twice as fast compared to that of liquid A, which evaporates at a rate of 1 kg/hour. Find the number of hours for which the mixture needs to be evaporated, for the density of the resultant mixture to become 1.04 times that of the original mixture (i.e., before evaporation).

a) 2.5

b) 3

c) **3.5**

d) 4

Given that the vessel contains a mixture of 70 kg of A and 30 kg of B.
Let the densities of A and B be $2d$ and d (kg/litre) respectively.

$\therefore$ Volumes of X and Y in the vessel are $\frac{70}{2d}l$ and $\frac{30}{d}l$ respectively.

$\therefore$ The (initial) density of the mixture

$$= \frac{total\ weight}{total\ volume} = \frac{100}{\frac{35}{d}+\frac{30}{d}} = \frac{100\,d}{65}$$

After the mixture is evaporated for n hours,

	X	Y
Weight	$(70 - n)$	$(30 - 2n)$
Volume	$\left(\frac{70-n}{2d}\right)$	$\left(\frac{30-2n}{d}\right)$

$\therefore$ The (new) density of the mixture = $\frac{100-3n}{\frac{35-\frac{n}{2}+30-2n}{d}}$ ..... (1)

But it is given that the new density = $1.04\left(\frac{100d}{65}\right)$ ... (2)

Equating (1) and (2)

$$\frac{100-3n}{65-\frac{5n}{2}} = \frac{8}{5} \Rightarrow 5(100-3n) = 8\left(65-\frac{5n}{2}\right)$$

$\Rightarrow n = 4$

Alternative Solution:

This question can also be solved using the options given. Let the densities be 2 kg/litre and 1 kg/litre.

Original mass = 70 + 30 = 100 kg

Original volume = $\frac{70}{2} + \frac{30}{1} = 65$ litres

Original density = $\frac{100}{65}$ and

Final density = $\frac{100}{65} \times 1.04 = 1.6$

Option (A): After 2.5 hours

Mass = 70 – (2.5) (1) + 30 – (2.5) (2) = 92.5

Volume = $\frac{67.5}{2} + \frac{25}{1} = 58.75$

$\Rightarrow$ Density = $\frac{92.5}{58.75} \cong 1.57$, i.e., not 1.6.

Hence, option (A) is not the answer.

In this manner each of the other choices can be evaluated for the density and checked if the value is equal to 1.6. Only for choice (D) we get density = 1.6. Choice (D)

Q32. DIRECTIONS *for questions 30 to 32:* Select the correct alternative from the given choices.
Find the equation of the circle that touches the coordinate axes at the points (3, 0) and (0, 3).

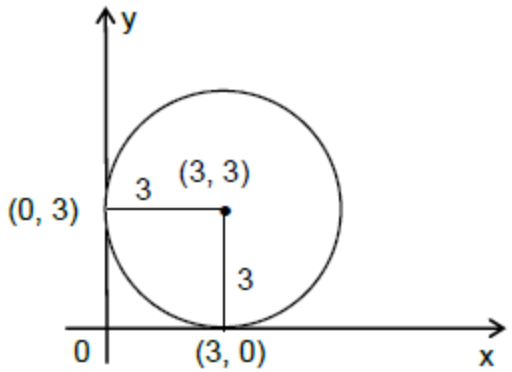
a) $x^2 + y^2 = 3^2$

b) $x^2 + y^2 + 6x + 6y - 9 = 0$

c) $\mathbf{x^2 + y^2 = 6 (x + y)}$

d) $x^2 + y^2 - 6x - 6y + 9 = 0$

Given the circle touches the coordinate axes at (3, 0) and (0, 3).



$\Rightarrow$ centre of the circle is (3, 3) and radius = 3 units.
$\therefore$ Equation of the required circle is
$(x - 3)^2 + (y - 3)^2 = 3^2$
i.e., $x^2 + y^2 - 6x - 6y + 9 = 0$. Choice (D)

Q33. DIRECTIONS *for question 33:* Type in your answer in the input box provided below the question.
In how many ways can 16200 be written as a product of two factors which are relatively prime?

$16200 = 2^3 \times 3^4 \times 5^2$
The number of prime factors is 3 (i.e. 2, 3, 5)
Then, the number of ways in which it can be expressed as a product of 2 co-primes
$= 2^{3-1} = 2^2 = 4$ ways. Ans: (4)

Q34. DIRECTIONS *for question 34:* Select the correct alternative from the given choices.
If the average of nine consecutive even natural numbers, the greatest of which is y, is x, find the average of 17 consecutive natural numbers, the least of which is x?

a) $y - 2$

b) y

c) **$y - 1$**

d) $y + 4$

The nine consecutive even numbers ending with y are as follows:
$y - 16$, $y - 14$, ... up to $y - 2$, y
Their average will be the middle value i.e., $y - 8$.
It is given that, $y - 8 = x$
Now, the average of 17 consecutive natural numbers starting with x (i.e., $y - 8$) will be the 9^{th} number starting with x, out of $y - 8$, $y - 7$, $y - 1$, y, $y + 1$....$y + 7$, $y + 8$.
Hence the required answer is y.

Alternative Solution:

Considering a simple case of nine consecutive even numbers, say from 2 to 18, we get x = average = 10 and y = 18. Now, the average of 17 consecutive natural numbers, starting from x, i.e., 10, upto 26, we get average = $\left(\frac{10+26}{2}\right) = 18$, (i.e., y itself). Only option (B) fits. Choice (B)