AIMCAT 2002

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.

Donatella Versace finds it in the conflict of ideas, Jack White under pressure of deadlines. For William S Burroughs, an old Dadaist trick helped: cutting pages into pieces and rearranging the words. Every artist has their own way of generating original ideas, but what is happening inside the brain might not be so individual. In new research, scientists report signature patterns of neural activity that mark out those who are most creative.

"We have identified a pattern of brain connectivity that varies across people but is associated with the ability to come up with creative ideas," said Roger Beaty, a psychologist at Harvard University. "It's not like we can predict with perfect accuracy who's going to be the next Einstein, but we can get a pretty good sense of how flexible a given person's thinking is." Creative thinking is one of the primary drivers of cultural and technological change, but the brain activity that underpins original thought has been hard to pin down. In an effort to shed light on the creative process, Beaty teamed up with colleagues in Austria and China to scan people's brains as they came up with original ideas.

The scientists asked the volunteers to perform a creative thinking task as they lay inside a brain scanner. While the machine recorded their white matter at work, the participants had 12 seconds to come up with the most imaginative use for an object that flashed up on a screen. Three independent scorers then rated their answers.

One of the barriers to creative thinking is the ease with which common, unoriginal thoughts swamp the mind. Some people in the study could not get past these. For example, when asked for creative uses for a sock, soap and chewing gum wrapper, less creative people gave answers such as "covering the feet", "making bubbles" and "containing gum" respectively. For the same items, more original thinkers suggested a water filtration system, a seal for envelopes, and an antenna wire.

... The study found distinct patterns of brain activity in the most and least creative people. In the highly original thinkers, the scientists saw strong connectivity between three networks of the brain. One, known as the default mode network, is linked to spontaneous thinking and mind wandering, while a second, the executive control network, is engaged when people focus in on their thoughts. The third, called the salience network, helps to work out what best deserves our attention.

The first two of these three brain networks tend to work against one another, Beaty said, each dampening the other down. But the scans suggest that more creative people can better engage both networks at once. "It might be easier for creative thinkers to bring these resources to bear simultaneously," he said. ... Now, Beaty wants to look at brain activity in different creative pursuits, such as the arts and sciences, and investigate whether training helps boost creative powers.

In 2016, David Melcher, who studies creativity at the University of Trento, identified brain networks used in visual art. "A critical open question, for future research, is whether this ability to put the brain in creative mode transfers across tasks," he said. "Do we learn to network our brain regions for creativity in new domains once we learn to do it, for example, in painting or freestyle rap?" he adds…

Q1.   The study conducted by Roger Beaty and his colleagues doesn't assume that

 a) creativity can be summoned at will by original thinkers.

 b) creativity exhibited by people is proportional to the amount of time available to them.

 c) original thinkers are consistently more adept at coming up with imaginative uses for various objects.

 d) it is possible to tangibly differentiate between creative and unoriginal ways of using an object.

Number of words and Explanatory notes for RC:

Number of words: 555

Option A: This is an assumption as the creativity of those participating in the study was conducted by randomly showing them objects and asking them to come up with the most imaginative use for it. This is based on their belief that creative people are always creative in a tangible manner. Hence, Option A is not the answer.
Option B: Creativity exhibited by people is proportional to the amount of time available to them. If this were the assumption the participants of the study wouldn't be judged for their originality of answers within the stipulated time of 12 seconds to determine who is creative and who isn't. If creativity is a function of time, then no one can be ruled out as unoriginal. Hence, Option B is the answer.
Option C: This is an assumption too as the experiment studied the brain networks of the creative people picked on the basis of the creativity that they showed in predicting the uses of an everyday object. So, the underlying understanding is that those who think originally/creatively are the ones who come up with the imaginative uses all the time, and that unoriginal thinkers do not quite manage to do the same. Hence, Option C is not the answer.
Option D: Since there are scorers who would rate the creativity quotient for the use of each object as promoted, the assumption of those who conducted the study is that it is possible to calibrate or evaluate the various imaginative uses of the object. That's how the creative thinkers in the group were separated out from the rest. Hence, Option D is not the answer.   Choice (B)

Q2.   Which of the following, if true, will invalidate the study conducted by Roger Beaty and his colleagues?

 a) Two persons who came up with similarly creative uses for common objects were given different scores by the judges.

 b) **Strong connectivity between the three networks of the brain was seen in scientists as well as in painters and writers.**

 c) **Some persons who were considered unoriginal initially came up with imaginative uses for common objects later on.**   ✔ **Your answer is correct**

 d) The connectivity between the three networks of the brain couldn't be improved despite specific training to boost creative powers.

Number of words and Explanatory notes for RC:

Number of words: 555

Consider the sentences: '*In new research, scientists report signature patterns of neural activity that mark out those who are most creative...*"*We have identified a pattern of brain connectivity that varies across people but is associated with the ability to come up with creative ideas,*" *said Roger Beaty, a psychologist at Harvard University.*' This shows what the conclusion of the study was – that there is a link between creative thinking and the signature (unique) patterns

Option A: It is possible for two different participants to be rated differently by judges on their creativity. It is quite likely both are creative and give original answers but they need not have the exact same scores. Such an event wouldn't invalidate the argument/go against the assumptions made in the study. Option A is, therefore, not the answer.

Option B: Since the passage itself assumes that creative people can be in arts or in sciences, this doesn't really contradict the information given in the passage. Option B is not the answer.

Option C: This shows that the assumptions made in the study to separate out the original and creative thinkers from the unoriginal ones don't hold. So, this option invalidates the argument, by showing that unoriginal thinkers were later capable of creativity and hence, their answers for the first time certainly don't dub them as unoriginal or uncreative. And the study takes their answers for one question to fix one set of people as creative, assuming their answers are always creative. Hence, Option C is the answer.

Option D: This was an open-ended question that Beaty had as to whether creativity can be boosted through specific training. So, one way or the other, this option doesn't really affect the results of the study. Hence, Option D is not the answer.

Choice (C)

Q3.   A potential direction for research alluded to in the final para of the passage is whether

a) creativity in one area could trigger improvement in performance in another area.

b) **creative thinking is an art that people can be trained in.**

c) **creativity developed in one area can be exhibited in another area.**   ✔ **Your answer is correct**

d) the brain always operates in the creative mode.

Number of words and Explanatory notes for RC:

Number of words: 555

Consider the sentences: '*A critical open question, for future research, is whether this ability to put the brain in* **creative mode transfers across tasks**," *he said.* **"Do we learn to network our brain regions for creativity in new domains once we learn to do it,** *for example, in painting or freestyle rap?*'" So, the possibility discussed in the para is whether we could transfer creativity across domains, or whether creativity in one area can be put to use in other areas. For example, can someone with creativity in painting use the same creativity in say, music.
Option A: While this is close, the keywords used in the second half of the options aren't exactly accurate. The question is whether creative mode transfers across tasks. The question is not whether creativity in one mode translates to 'performance' in another. Hence, Option A is not the answer.
Option B: This is not the direction alluded to in the last para. This was discussed by Beaty in the penultimate para. Hence, Option B is easy to eliminate.
Option C: This was the main speculation discussed in the last para and the possible direction of study – to find out whether it is possible to transfer creativity across domains or exhibit creativity proven in one area, in a completely different domain. This can be understood from the underlined portions in the passage. Option C is the answer.
Option D: This is far-removed from the question that was raised in the last para of the passage. It is more about whether creativity is an absolute quality that can be exhibited across domains or whether it is restricted to one domain. It isn't about whether someone can be creative at all points (possibly in the same domain). Hence, Option D is easy to eliminate.   Choice (C)

Q4. The responses of the people in the study when asked about the creative uses for a sock, soap and chewing gum wrapper possibly imply that

 a) **original thinkers manage to find innovative uses for common objects.**   ✔ **Your answer is correct**

b) **some objects evoke creativity in people.**

c) **only when one gets rid of unoriginal thoughts does one manage to think creatively.**

d) creative thinkers manage to get past common, unoriginal thoughts instantaneously.

Number of words and Explanatory notes for RC:

Number of words: 555

Option A: The responses clearly show that original thinkers manage to find imaginative/innovative uses of commonplace objects, sweeping aside the unoriginal thoughts that swamp their brain. This helps monitor their creative activity and map it to the connectivity of the brain networks. Hence, Option A is the answer.

Option B: It was not just some objects that evoke creativity amongst people. In fact, nowhere in the study we get the idea that there are a certain set of objects which bring out the best out of creative people. The idea is that any random group of commonplace objects were presented to judge the participants for their imaginative use. Hence, Option B is not the answer.

Option C: Such a distinction has not been made in the passage – that one cannot have unoriginal and original thoughts together at the same time. So, it cannot be inferred from the choice of objects that only when one gets rid of unoriginal thoughts, one manages to think creatively. In fact, the influence of unoriginal thoughts on creativity hasn't been worked out either. Option C is not the answer.

Option D: While this was an important aspect of the study, this doesn't answer the question about the role of commonplace objects in the study – which is to help spark creativity amongst those participating in the study, in such a way that they could be compared with each other (followed by mapping that creativity with the connectivity of the brain networks). Also, from the responses we cannot really infer that they get past their unoriginal thoughts *instantaneously.* Option D is not the answer.

Choice (A)

Q5. According to the information given in the passage, which of the following is not true?

a) **The default mode network and the executive control network are at loggerheads with each other.**

b) **It is not possible to train someone to use all the three networks of his or her brain simultaneously.**

c) **Creativity is a function of the balance between the default mode network and the executive control network.**

d) Highly original thinkers can find the balance between letting their mind wander and focusing in on their thoughts.

Number of words and Explanatory notes for RC:

Number of words: 555

Option A: This is true and can be understood from '*The first two of these three brain networks (default mode and executive control networks) tend to work against one another, Beaty said, each dampening the other down.*' Hence, Option A is not the answer.

Option B: This was a conjecture that was left as an open-ended question in the passage, as understood from '*Beaty wants to look at brain activity in different creative pursuits, such as the arts and sciences, and investigate whether training helps boost creative powers.*' So, it is not true that *it is not possible to train someone.* Hence, Option B is the answer.

Option C: This is true as can be understood from the following sentences: '*But the scans suggest that more creative people can* better engage both networks at once. *"It might be easier for creative thinkers to bring these resources to bear simultaneously," he said.*' So, creativity is a function of the balance. More the balance, more the creativity. Or in other words, creative people demonstrate a balance between those two networks. Hence, Option C is not the answer.

Option D: Consider the sentences: '*One, known as the default mode network, is linked to spontaneous thinking and mind wandering, while a second, the executive control network, is engaged when people focus in on their thoughts. The third, called the salience network, helps to work out what best deserves our attention…The first two of these three brain networks tend to work against one another, Beaty said, each dampening the other down. But the scans suggest that more creative people can better engage both networks at once. "It might be easier for creative thinkers to bring these resources to bear simultaneously," he said.*' From the underlined portions, it can be understood that creative people can manage to engage both networks at once. In other words, they manage to *let their mind wander* (default mode network) and also *focus in on their thoughts (executive control network).* Option D is not the answer.

Choice (B)

DIRECTIONS for questions 6 to 9: The passage given below is accompanied by a set of four questions. Choose the best answer to each question.

In a surprising marriage of science and art, researchers at MIT have developed a system for converting the molecular structures of proteins, the basic building blocks of all living beings, into audible sound that resembles musical passages. Then, reversing the process, they can introduce some variations into the music and convert it back into new proteins never before seen in nature.

Although it's not quite as simple as humming a new protein into existence, the new system comes close. It provides a systematic way of translating a protein"s sequence of amino acids into a musical sequence, using the physical properties of the molecules to determine the sounds. Although the sounds are transposed in order to bring them within the audible range for

humans, the tones and their relationships are based on the actual vibrational frequencies of each amino acid molecule itself, computed using theories from quantum chemistry.

The system was developed by Markus Buehler, the McAfee Professor of Engineering and head of the Department of Civil and Environmental Engineering at MIT, along with postdoc Chi Hua Yu and two others. As described in the journal ACS Nano, the system translates the 20 types of amino acids, the building blocks that join together in chains to form all proteins, into a 20-tone scale. Any protein"s long sequence of amino acids then becomes a sequence of notes.

While such a scale sounds unfamiliar to people accustomed to Western musical traditions, listeners can readily recognize the relationships and differences after familiarizing themselves with the sounds. Buehler says that after listening to the resulting melodies, he is now able to distinguish certain amino acid sequences that correspond to proteins with specific structural functions. "That's a beta sheet," he might say, or "that's an alpha helix."

The whole concept, Buehler explains, is to get a better handle on understanding proteins and their vast array of variations. Proteins make up the structural material of skin, bone, and muscle, but are also enzymes, signalling chemicals, molecular switches, and a host of other functional materials that make up the machinery of all living things. But their structures, including the way they fold themselves into the shapes that often determine their functions, are exceedingly complicated. "They have their own language, and we don't know how it works," he says. "We don't know what makes a silk protein a silk protein or what patterns reflect the functions found in an enzyme. We don"t know the code."

By translating that language into a different form that humans are particularly well-attuned to, and that allows different aspects of the information to be encoded in different dimensions – pitch, volume, and duration – Buehler and his team hope to glean new insights into the relationships and differences between different families of proteins and their variations, and use this as a way of exploring the many possible tweaks and modifications of their structure and function. As with music, the structure of proteins is hierarchical, with different levels of structure at different scales of length or time.

Q6.   Which of the following studies, if possible, will add the least depth to the research discussed in the passage?

 a) A study of the music sequences produced by the actual vibrational frequencies of each of the 20 amino acid molecules   Your answer is correct

 b) A study of how musical notes created from proteins can be modified and then converted back to the corresponding protein structures

 c) A study of how information related to the protein structures can be stored in various fundamental aspects of music

d) A study of the melodies representing the most significant amino acid sequences

Number of words and Explanatory notes for RC:

Number of words: 500

Option A: This has already been done as part of the research, as understood from 'Although the sounds are transposed in order to bring them within the audible range for humans, the tones and their relationships are based on the actual vibrational frequencies of each amino acid molecule itself'. So, this adds the least depth to the research discussed in the passage. Option A is the answer.
Option B: This, if possible, will help throw light on the tweaks and modifications possible in the protein structures as understood from the following lines: 'Buehler and his team hope to glean new insights into the relationships and differences between different families of proteins and their variations, and use this as a way of exploring the many possible tweaks and modifications of their structure and function.' Hence, Option B will add depth to the research.
Option C: From 'By translating that language into a different form that humans are particularly well-attuned to, and that allows different aspects of the information to be encoded in different dimensions -- pitch, volume, and duration', we can understand that this theory has been discussed as a possibility. So, a study that implements this will add depth to the research. Hence, Option C is not the answer.
Option D: Consider this: '*Buehler says that after listening to the resulting melodies, he is now able to distinguish certain amino acid sequences that correspond to proteins with specific structural functions. "That's a beta sheet," he might say, or "that's an alpha helix."*' So, a study of the melodies representing the most significant amino acid sequences will add depth to the research, as it will help the common ones more easily (that identification as understood from the passage in itself is a goal). Option D is, therefore, not the answer.   Choice (A)

Q7. The central idea of the passage is that

a) **humming a new protein into existence is not an easy task.**

b) **converting amino acid molecules into musical notes can help reveal protein structures.**

c) **the structures of amino acids are as complicated as musical passages.**

d) the possibility of converting protein structures into musical notes can be exploited to research their functions vis-à-vis the structures.

Number of words and Explanatory notes for RC:

Number of words: 500

Option A: This has more of a negative tone to it, whereas the passage is about how the translation of proteins into musical notes is opening up new avenues of research. This option is both inaccurate and tangential to the actual line of discussion in the passage. Option A is not the answer.

Option B: We are already aware of the protein structures and what we don't necessarily have clarity on is the correlation between those structures and the functions which is what converting amino acid molecules into musical notes can help us understand. It will not reveal the protein structures. Hence, Option B is not the answer.

Option C: Once again, this may be true, but it is not the main idea of the passage since the passage doesn't focus on the complicated nature of the structures; rather it focuses on the realms of possibility of understanding those structures once translated to musical notes which are familiar to us. Option C is not the answer.

Option D: This is apt since this is what has made the research and the discussion in the passage possible. In fact, the author ends the passage with '*As with music, the structure of proteins is hierarchical, with different levels of structure at different scales of length or time*' to highlight the correlation. Also, the passage starts with '*In a surprising marriage of science and art, researchers at MIT have developed a system for converting the molecular structures of proteins, the basic building blocks of all living beings, into audible sound that resembles musical passages.*' This shows that the passage is predominantly about the conversion of protein structures to musical notes and how we can exploit that possibility to understand these protein structures better with respect to their functions. Option D is the answer.   Choice (D)

Q8.   It cannot be inferred from the penultimate para ('The whole concept...We don't know the code.") that

 a) **different protein structures correspond to different individual functions they perform within the body.**

 b) **the variation in the protein structures with respect to their functionalities is little understood.**

 c) **how the variations in protein structures determine their functionalities has not been established.**

d) the functional machinery that makes up living beings cannot be understood without understanding protein structures.

Number of words and Explanatory notes for RC:

Number of words: 500

Option A: This can be understood from '*Proteins make up the structural material of skin, bone, and muscle, but are also enzymes, signalling chemicals, molecular switches, and a host of other functional materials that make up the machinery of all living things. But **their structures, including the way they fold themselves into the shapes that often determine their functions**, are exceedingly complicated.*' We can understand that there is a correlation between functions and structures of the proteins. This is an inference. Hence, Option A is not the answer.
Option B: This can be inferred from '"*They have their own language, and **we don't know how it works***," he says. "*We don't know what makes a silk protein a silk protein or what patterns reflect the functions found in an enzyme. We don't know the code.*'" All we know is that there are variations which determine their functions. We don't understand the variation in the protein structures with respect to their functionalities. That is little understood. This is a valid inference. Option B is not the answer.
Option C: How the variations in protein structures determine their functionalities has not been established, can be understood from the para since it says we don't know the correlation between structures and functions. It is also important to note the difference between Option B and C. While B points to [variation in protein structures with respect to their functionalities], C points to how the variations ***determine the functionalities*** (inducing a causation relationship). Neither of these are known as inferred from the para. So, this option can be inferred from the para. Option C is not the answer.
Option D: Consider this: '*Proteins make up the structural material of skin, bone, and muscle, but are also enzymes, signalling chemicals, molecular switches, and a host of other functional materials that make up the machinery of all living things.*' While it has been mentioned that proteins make up the functional materials that make up the machinery of all living things, it has not been stated explicitly or implicitly that the functional machinery cannot be understood without understanding the protein structures. Hence, Option D is the answer.   Choice (D)

Q9.   The author mentions the 'different dimensions' of music to drive home the point that

a) **humans are well-attuned to understanding music.**

b) **music is an apt analogy for proteins which are equally complicated.**

c) **the various dimensions of music offer enough scope to store information about protein structures.**

d) translating the protein structures into corresponding music is the only way of unravelling possible tweaks and modifications.

Number of words and Explanatory notes for RC:

Number of words: 500

Option A: While this is true, the author doesn't mention the various dimensions of music to talk about how humans are well-attuned to it. The dimensions were mentioned just for one purpose: that the information about proteins can be encoded in various dimensions of the music. Hence, Option A is not the answer.

Option B: The author isn't talking about music as an analogy for protein structures. The term analogy is used for comparison of two unrelated but similar situations. Here, music is actually part of the process, and is used to encode the protein structure information. Option B is not the answer.

Option C: Consider this: '*By translating that language into a different form that humans are particularly well-attuned to, and **that allows different aspects of the information to be encoded in different dimensions -- pitch, volume, and duration** -- Buehler and his team hope to glean new insights into the relationships and differences between different families of proteins and their variations, and use this as a way of exploring the many possible tweaks and modifications of their structure and function.*' This option is apt as it conveys what the author was trying to say, that the pitch, volume and duration of music can be used to encode different aspects of the information related to proteins. Hence, Option C is the answer.

Option D: The passage doesn't reveal that this is the only way of understanding possible tweaks and foundations. Also, while converting the structures to music will help in exploring tweaks and modifications, the dimensions of music were not discussed to bring out this possibility. They were discussed to show how information can be efficiently transferred/stored using various aspects of music. Option D is not the answer.   Choice (C)

DIRECTIONS *for questions 10 to 14*: The passage given below is accompanied by a set of five questions. Choose the best answer to each question.

What choices do societies curtail? For most other species, the constraint appears to be that members affiliate with each other and consort little if at all with outsiders. Chimpanzees attack all foreign conspecifics, while the related bonobo can have friends in other communities but always return to their territory at the end of the day. In both instances, there's a clean separation of the societies, based on the animals' knowledge of each other.

Human societies come with further obligations. People must look and act appropriately, adhering within accepted limits to whatever differences set us apart from them. [Call] such distinctions markers of identity. These markers, which other primates lack, can include devotion to a particular flag, manners of dress, hairstyles, languages, gestures, moral attitudes, and even slight differences, detected subconsciously, in how we walk and smile. These traits are so numerous and ever-present that human beings are walking billboards for their identities.

We feel free insofar as our actions and appearance fall within the socially sanctioned bounds of these sometimes-unstated rules […] The more adversities a society has undergone, the more rigid the expectations put on its people. In a thriving democracy, persons with radical takes retain citizenship, but things can get nasty for those who don't conform to the required markers when times are tough. Further, the repulsion felt toward social deviants can be so profound that we treat them more harshly for the same offense than we do a foreigner – an overreaction known in psychology as the 'black sheep' effect. Outliers poorly matching what is "normal" are ostracized, stigmatized, pressured to change or treated as foreign, depending on the kind and extent of the aberrance. Such censure puts a rein on what goes on in a society.

Extremist regimes aside, by and large citizens everywhere gladly embrace the restrictions placed upon them, believing in the rightness of their society and finding comfort within the restraints it imposes… The return from the society is substantial: a sense of ease, even camaraderie, around like-minded others; security and social support; access to resources, choices for employment, suitable marriage partners, the arts, and much more.

…Regardless of a society's permissiveness, unity falters if its citizens have the freedom to act outside the comfort zone of others, whether that means women voting, or non-traditional couples claiming the right to marry. Often our discomfort around such acts is expressed as disgust or fear, and we verbalize the sensations in terms of morality. ... The schism makes constructive communication between social factions all but impossible…

Ethnic diversity presents even greater complications in the pursuit of freedom. ... The difficulty is balancing one group's pursuit of freedom with another group's comfort. All too often, inequalities in personal freedom emerge between groups. Minorities must fit in with what the society finds acceptable – which often means the preferences of the dominant group, which holds primary sway over the identity, symbols, and power of a nation…

In short, human beings give up a degree of freedom, and to some extent equality, to gain the security and social and economic payoffs of belonging to a nation, with some ethnicities relinquishing more than others. Still, the pleasure that freedom gives us is undeniable. What's hard is recognizing that dissimilar peoples elsewhere feel the same thing, and for equally good reason…

Q10. The author calls human beings 'walking billboards for their identities' because

a) **they affiliate a lot more with members of their ilk.**

b) **they care more about their looks and actions than other animals.**

c) **they adhere to specific markers of identity that set them apart from other primates.**

d) **they adhere to innumerable characteristic traits that set them apart from each other.** ✔

Your answer is correct

Number of words and Explanatory notes for RC:

Number of words: 549

Option A: This is true for animals as well as can be understood from the sentences: *'For most other species, the constraint appears to be that members affiliate with each other and consort little if at all with outsiders.'* So, this is not an apt description of what the author meant by 'walking billboards'.
Option B: The author doesn't really state that humans care about their looks and actions compared to other animals. What the author says is that humans need to look and act appropriately based on certain standards, as can be understood from *'Human societies come with further obligations. People must look and act appropriately, adhering within accepted limits to whatever differences set us apart from them'.* So, Option B is not the answer.
Option C: Other primates do not have these markers of identity. However, if all humans have these markers of identity, we cannot really state that humans are walking billboards of their identities. There are more differences and obligations based on a lot many more characteristics. Hence, Option C is not the answer.
Option D: Consider the sentences: *'These markers, which other primates lack, can include devotion to a particular flag, manners of dress, hairstyles, languages, gestures, moral attitudes, and even slight differences, detected subconsciously, in how we walk and smile. These traits are so numerous and ever-present that human beings are walking billboards for their identities.'* It can be understood that the author calls human beings walking billboards for their identities because the number of traits that set them apart are numerous and are always there. Hence, Option D is the answer.

Choice (D)

What choices do societies curtail? For most other species, the constraint appears to be that members affiliate with each other and consort little if at all with outsiders. Chimpanzees attack all foreign conspecifics, while the related bonobo can have friends in other communities but always return to their territory at the end of the day. In both instances, there's a clean separation of the societies, based on the animals' knowledge of each other.

Human societies come with further obligations. People must look and act appropriately, adhering within accepted limits to whatever differences set us apart from them. [Call] such distinctions markers of identity. These markers, which other primates lack, can include devotion to a particular flag, manners of dress, hairstyles, languages, gestures, moral attitudes, and even slight differences, detected subconsciously, in how we walk and smile. These traits are so numerous and ever-present that human beings are walking billboards for their identities.

We feel free insofar as our actions and appearance fall within the socially sanctioned bounds of these sometimes-unstated rules […] The more adversities a society has undergone, the more rigid the expectations put on its people. In a thriving democracy, persons with radical takes retain citizenship, but things can get nasty for those who don't conform to the required markers when times are tough. Further, the repulsion felt toward social deviants can be so profound that we treat them more harshly for the same offense than we do a foreigner – an overreaction known in psychology as the 'black sheep' effect. Outliers poorly matching what is "normal" are ostracized, stigmatized, pressured to change or treated as foreign, depending on the kind and extent of the aberrance. Such censure puts a rein on what goes on in a society.

Extremist regimes aside, by and large citizens everywhere gladly embrace the restrictions placed upon them, believing in the rightness of their society and finding comfort within the restraints it imposes… The return from the society is substantial: a sense of ease, even camaraderie, around like-minded others; security and social support; access to resources, choices for employment, suitable marriage partners, the arts, and much more.

…Regardless of a society's permissiveness, unity falters if its citizens have the freedom to act outside the comfort zone of others, whether that means women voting, or non-traditional couples claiming the right to marry. Often our discomfort around such acts is expressed as disgust or fear,

and we verbalize the sensations in terms of morality. ... The schism makes constructive communication between social factions all but impossible…

Ethnic diversity presents even greater complications in the pursuit of freedom. ... The difficulty is balancing one group's pursuit of freedom with another group's comfort. All too often, inequalities in personal freedom emerge between groups. Minorities must fit in with what the society finds acceptable – which often means the preferences of the dominant group, which holds primary sway over the identity, symbols, and power of a nation…

In short, human beings give up a degree of freedom, and to some extent equality, to gain the security and social and economic payoffs of belonging to a nation, with some ethnicities relinquishing more than others. Still, the pleasure that freedom gives us is undeniable. What's hard is recognizing that dissimilar peoples elsewhere feel the same thing, and for equally good reason…

Q10.   The author calls human beings 'walking billboards for their identities' because

a) **they affiliate a lot more with members of their ilk.**

b) **they care more about their looks and actions than other animals.**

c) **they adhere to specific markers of identity that set them apart from other primates.**

d) **they adhere to innumerable characteristic traits that set them apart from each other.**

Number of words and Explanatory notes for RC:

Number of words: 549

Option A: The author discusses censure/criticism to explain that the censure of the actions of outliers helps put a rein on what goes on in society. This still doesn't explain the essence of the black sheep effect, just the causation behind it, or rather why such an effect is observed/implemented.
Option B: This is apt since it mentions how deviant members (nonconformists/radical) of society are excoriated (censured/criticised/ostracised) even more than those who do not even belong to that society (foreigners). In other words, those who are part of the society are punished more for their deviations than those who are not part of that society. Hence, Option B is the answer.
Option C: This doesn't explain the black sheep effect. It talks about social deviations, whereas the black sheep effect is about society's response to social deviants. Hence, Option C is easy to eliminate.
Option D: While this may be true that 'In a thriving democracy, persons with radical takes retain citizenship,' that those who are different from the rest still manage to find space, this doesn't explain what is the 'black sheep' effect, which is more about society's reaction to social deviants (people who behave differently from the set norms). Hence, Option D is not the answer.   Choice (B)

Q12.   Which of the following best explains the complications presented by ethnic diversity in the pursuit of freedom?

a) **One group's comfort is attained at the expense of another group's freedom.**

b) **Different groups are comfortable with different degrees of personal freedom.**

c) **Socially acceptable norms imposed on all are defined on the basis of the preferences of the majority groups.**

d) **Minorities are offered freedom in exchange for acquiescing to the majority opinion.**

Number of words and Explanatory notes for RC:

Number of words: 549

Option A: The author points out that it is hard to balance the freedom of one group with respect to the comfort of another. However, it is not clear what comes at the expense of what. It is quite possible that comfort becomes the price a group has to pay to offer another group freedom (need not be the case that freedom is the price for the comfort of another group). Hence, Option A is not the answer.

Option B: The author doesn't really indicate that there are multiple levels or degrees of personal freedom that keep different communities comfortable. The author does talk about groups giving up a certain degree of freedom, but it cannot be inferred that comfort and degrees of freedom are interchangeable or can be exchanged, and that those degrees are different for different groups. Hence, Option B is not the answer.

Option C: Consider the sentences: *'Ethnic diversity presents even greater complications in the pursuit of freedom. ... The difficulty is balancing one group's pursuit of freedom with another group's comfort. All too often, inequalities in personal freedom emerge between groups. Minorities must fit in with* **what the society finds acceptable – which often means the preferences of the dominant group,** *which holds primary sway over the identity, symbols, and power of a nation...'* So, it can be understood that it is the majority group's preferences that hold sway over social context, thereby forcing the minorities to toe the majority line. Hence, Option C is the answer.

Option D: While minorities are forced to accept norms set by majority groups, the para in no way indicates that the minorities 'earn their freedom' by following the 'majority' opinion. We are not sure what happens when minorities refuse to follow the norms. We are also not sure whether it is freedom that the minorities are offered in exchange for following social norms set by majority groups. Option D is not the answer.

Choice (C)

Q13.   The author reasons that citizens embrace the restrictions placed upon them by society

a) **with the belief that social restrictions are for the common good.**

b) **because they are pressured to do so by extremist regimes.**

c) **to benefit from the substantial returns that society promises to those who accept its**
norms.   ✗ **Your answer is incorrect**

d) **in order to avoid being ostracized for being the 'black sheep'.**

Number of words and Explanatory notes for RC:

Number of words: 549

Option A: This can be understood from the following lines: '*by and large citizens everywhere gladly* **embrace the restrictions placed upon them, believing in the rightness of their society** *and finding comfort within the restraints it imposes...*' People embrace the restrictions, believing that the social rules are right, and they find comfort in those restrictions. Hence, Option A is the answer.

Option B: The author clearly talks about people, by and large, keeping extremist regimes aside (such regimes are not being discussed by the author here). Hence, this is an easy option to eliminate.

Option C: The returns from society are substantial, no doubt. But, this is more correlation-causation fallacy. The author doesn't mention the returns of being part of society to necessarily suggest that this is what people follow rules for. Option C is not the answer.

Option D: The author discusses the black sheep effect under a different context to explain how nonconformists are treated. That has got nothing to do with the author's reasoning about why members of society accept its restrictions. Hence, Option D is not the answer.   Choice (A)

Q14.   The author is most likely to agree with all of the following EXCEPT that

a) **human societies curtail a lot more choices than other species do.**

b) **the pleasure that freedom gives different peoples is not as important as the security that society offers to them.**   ✓ **Your answer is correct**

c) **outliers deal with greater censure from society during tough times.**

d) **tough times make social norms more rigid.**

Number of words and Explanatory notes for RC:

Number of words: 549

Option A: Consider these sentences: *'What choices do societies curtail? For most other species, the constraint appears to be that members affiliate with each other and consort little if at all with outsiders.'* Also, *'Human societies come with further obligations.'* From these two sentences it can be understood that human societies do impose more restrictions, according to the author. Option A is not the answer.
Option B: Such a comparison has not been made by the author. In fact, in the last line the author says that the pleasure of freedom is undeniable, and it is important to empathize with those who are different from us. The author has not downplayed the importance of freedom. Hence, Option B is the answer.
Option C: This can be understood from *'but things can get nasty for those who don't conform to the required markers when times are tough'*. In thriving democracies, things are not as tough for nonconformists or outliers (those who don't conform to the required markers) as they are when times are tough. The author will agree with the statement that outliers/nonconformists deal with greater censure during tougher times. Hence, Option C is not the answer.
Option D: This can be understood from *'The more adversities a society has undergone, the more rigid the expectations put on its people.'* The author clearly mentions that the more adversities (tough times) a society has undergone, the more rigid the expectations of the society. Hence, Option D is not the answer.

Choice (B)

DIRECTIONS *for questions 15 to 19*: The passage given below is accompanied by a set of five questions. Choose the best answer to each question.

Juries are flawed: they sometimes get the wrong answer. Algorithms are already helping US courts come to some decisions regarding sentencing and parole, drawing on data such as information about recidivism rates, to considerable controversy. There are fears that this can help entrench existing biases against certain groups. But imagine that we've reached the point at which feeding all the available evidence into a computer has led to more accurate verdicts than those reached by juries. In such a case, the computer would be able to pool and analyse all data with speed and accuracy and efficiency. Compare how actual juries work, where individuals might have made differing notes about the case, recall different things and, even after hours of deliberations, still have different views of evidence. With the use of AI, these shortcomings would be addressed. But we care about more than simply getting things right. Even if, by using a machine, we get a more accurate answer, there can still be some reason to value the distinctive contribution of having humans serving on juries. Perhaps we want to hand that over to an AI – but perhaps not.

The bias that humans can display, the tendency to be swayed by emotion, is of course a potential weakness in reaching a verdict. But it has also been the impetus for changes in the law. There are instances of 'jury nullification' where juries have failed to convict, even though the defendant is clearly guilty in terms of a strict application of the law. No matter how good at assessing a machine might be, we're a long way off developing machines with a finely tuned sense of justice, an eye for the underdog, and the moral backbone to defy the apparatus of the legal system.

But the more general idea remains that juries perform the role of an independent source of judgment as a counter to potential vested interests of the most powerful. And note this: the strength of AI – the pooling of information, the melding of insights – in the context of the law directly undermines the basic moral principle of independence of juries. A critic might say that we need this independence only because humans are so unreliable: the legal profession alone can't be left in charge of justice, but an accurate AI would solve the problem and maybe, with the passage of time, we'd get used to the idea, and hand over our justice system to the machines.

But it's utterly utopian to think that we'll ever escape the power imbalances and vested interests that are the reason for having juries. There are alternatives to the miscarriage of justice problem than handing over justice to the machines, such as a fast, accessible appeals system. Perhaps, in the future, AI might *assist* juries to come to decisions – but this is different to envisaging that AI might *replace* humans in legal decision making. The law developed as a human political and social system through much struggle. But the use of AI within the law could, over time, help to change this. We need to consider this carefully, in full awareness of the many implications for justice and democracy.

Q15.   According to the passage, which of the following is a rationale against the use of algorithms in US courts to arrive at decisions?

 a) The algorithms may be overridden and exploited to meet the needs of those with vested interests.

 b) **The use of algorithms in the judiciary may result in firmly establishing prejudices against certain sections of society.**

 c) **Unlike humans, AI is devoid of emotion and therefore, the judgments made by solely relying on AI may turn out to be detrimental to society in general.   ✗ Your answer is incorrect**

d) With legal reforms constantly taking place, updating the algorithms all the time may cause significant delays in serving justice.

Number of words and Explanatory notes for RC:

Number of words: 526

Algorithms are already helping US courts come to some decisions regarding sentencing and parole, drawing on data such as information about recidivism rates, to considerable controversy. There are fears that this can help entrench existing biases against certain groups.

Option A: Although in the last paragraph, it is almost impossible to escape the power imbalance and vested interests, which would mean that even with AI, the power imbalance would not go away. From this, it can be inferred that those with vested interests may still be able to exploit potential loopholes. But it need not necessarily mean that they might exploit AI itself to get what they want. Also, nothing has been mentioned in the passage regarding how AI would be exploited. Hence, this is not the answer.

Option B: From "...to considerable controversy. There are fears that this can help entrench existing biases against certain groups", we can infer that the use of algorithms with respect to the judiciary is cause for concern for people because they fear that this may result in firmly establishing prejudices against certain sections of society. Hence, this is the answer.

Option C: It has been mentioned in the passage that we're a long way off developing machines with a finely tuned sense of justice. While it means that it might be far-fetched, it does not entirely rule out the possibility of the same. Besides, nothing has been mentioned about how AI could turn out to be detrimental to society. This cannot be inferred from the passage. Hence, this is not the answer.

Option D: The cause for concern for those opposing it has got nothing to do with the updating of algorithms. In fact, it has been mentioned in the passage that AI could speed up the process of arriving at decisions. Therefore, this cannot be a reason for people to oppose the use of algorithms in the legal context. Hence, this is not the answer.   Choice (B)

Q16.   Which of the following can be understood regarding juries in the legal system?

a) Juries give judges a sense of independence while arriving at decisions.

b) **The independence of juries counter-attacks the vested interests of the most powerful.**

c) **Juries have been proven to be foolproof in arriving at justice.**

d) The freedom that juries possess enables them to make decisions that are devoid of the influence of the powerful.

Number of words and Explanatory notes for RC:

Number of words: 526

Option A: The purpose of having a trial is to deliver justice and not to give a sense of independence to the jury. The sense of independence is a feature of trial by jury, but it is not the purpose. Therefore, this is not true.
Option B: A counterattack is a response to an attack. In the passage, it is stated that juries perform the role of an independent source of judgement as a counter to **_potential_** vested interests of the powerful. Also, in the last paragraph, it is stated that there is always the possibility of vested interests interfering in judgements. So the independence that juries have is to make decisions exclusive of these interests and not as a counterattack. Therefore, this is not true.
Option C: The passage starts with the argument that juries are flawed. Therefore, it cannot be said that they are fool proof in arriving at justice. Hence, this is not true.
Option D: From "...juries perform the role of an independent source of judgment as a counter to potential vested interests of the most powerful", it can be understood that they have the freedom to make decisions so that they can prevent any vested interests from interfering in the decision making process. Therefore, this is true.

Choice (D)

Q17.   Which of the following arguments, if true, would strengthen the case for handing over the justice system to machines?

a) **The law, once written, will never ever be changed.**   ✗ **Your answer is incorrect**

b) **The juries can be influenced by the vested interests of others.**

c) **AI can be programmed to act only in the interest of justice.**

d) AI does not get swayed by emotions.

Number of words and Explanatory notes for RC:

Number of words: 526

An argument for strengthening the case of handing over the legal system to machines should be a case where the jury can fall short while a machine would make no mistake.

Option A: Juries can effect changes in the law (from para 2). Handing over the justice system to machines may result in the laws not changing. Hence, the statement in this option can be a consequence of handing over justice system to AI. However, the passage does not explore how constancy of laws affects AI. Hence, this need not strengthen the case.

Option B: From the first line of the last para, the reason juries exist is the vested interests and power imbalances. If juries can be influenced by vested interest, this weakens the reason for using juries. Hence, this option will strengthen the case for handing the justice system to machines.

Option C: As mentioned above, this may not work in case of legal reforms, where a jury is more likely to do a better job than a machine. Hence, this does not necessarily strengthen the case of handing over the legal system to machines.

Option D: As mentioned above, this may not work in case of legal reforms, where a jury is more likely to do a better job than a machine. Hence, this does not necessarily strengthen the case of handing over the legal system to machines.   Choice (B)

Q17.   Which of the following arguments, if true, would strengthen the case for handing over the justice system to machines?

a) **The law, once written, will never ever be changed.**   ✗ **Your answer is incorrect**

b) **The juries can be influenced by the vested interests of others.**

c) **AI can be programmed to act only in the interest of justice.**

d) AI does not get swayed by emotions.

Number of words and Explanatory notes for RC:

Number of words: 526

In the second paragraph of the passage, the author talks about how humans' tendency to get swayed by emotions is an impetus for changes in law and gives the example of jury nullification for the same.

Option A: In the second paragraph of the passage, the author focuses on a scenario where humans might be better off than machines, which strengthens the argument that machines should not replace juries. Hence, this is not the answer.

Option B: Although the author does mention the shortcomings of the legal system by referring to the human tendency of getting swayed by emotions, the focus here is on how AI may fall short. Hence, this is not the answer.

Option C: Although the case of jury nullification itself seems like a loophole, the example given is not to highlight this loophole but to demonstrate the contrary, a case where AI may not be as effective as humans. Hence, this is not the answer.

Option D: The author is trying to shed light on a scenario where AI might not be as effective as humans and makes a case for not letting machines take over the legal system. From "...we're a long way off developing machines with a finely tuned sense of justice...", it can be understood that juries have a finely tuned sense of justice unlike AI and this makes a case for not relying on AI to arrive at legal decisions. Hence, this is the answer.   Choice (D)

Q19.   The situation of AI assisting juries in arriving at decisions and AI replacing humans in legal decision making (presented in the last para) is most analogous to

a) **a woodcutter using an axe to cut a tree and the very axe leading to the man's demise.**

b) **a painter who uses a paintbrush to create art and a software that creates art based on a set of inputs from the painter.**

c) **a manager who has an assistant to aid him in his work and the assistant taking up the manager's work, rendering that manager jobless.   ✔ Your answer is correct**

d) a young boy trained in boxing goes on to defeat his trainer for the World Boxing Championship.

The situation of AI assisting juries and AI replacing juries is that the former refers to a case where tasks are replaced, and the latter refers to a case where jobs are replaced.

Option A: In this situation, the axe is not replacing a task nor is it replacing the woodcutter in cutting a tree. This is not analogous to the given situation.

Option B: In this situation, both the paintbrush and the software are tools that perform a specific task. The job of the painter need not be taken over by the software, which still requires inputs from the painter. Hence, this is not the answer.

Option C: Here, the assistant in the first case is aiding the manager with his work while in the second case, the assistant is replacing the manager by rendering him jobless and doing that very work. This is analogous to the given situation. Hence, this is the answer.

Option D: Here, the trainer's purpose was to train the young boy and the young boy is not helping the trainer with the tasks the trainer is supposed to do. Also, by winning the World Boxing Championship, the boy is not replacing the job of his trainer. This is not analogous to the given situation.   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 International Monetary Fund (IMF) is faced with its own financial crisis. Many of its resources come from temporary loans provided by a subset of members through a pair of ad hoc agreements. One is set to expire at the end of next year, the other in 2022. This crisis could be met by increasing its permanent resources. But these permanent contributions ("quotas" in IMF-speak) also determine voting power in the Fund, where the US has a 17 per cent share, China just 6 per cent. In any discussion of larger quotas China will insist on a greater share, and a bigger vote. But this will diminish American influence – especially because if the US share drops below 15 per cent, it loses its effective veto – and so elicits Washington's opposition. The Fund could instead seek to extend the system of bilateral and multilateral credits. But as contributions that come in this form don't ensure additional votes, China would be resistant.

China is already responding to the emerging IMF impasse by providing regional assistance more directly. Its central bank has currency swap arrangements with 32 foreign central banks and in 2016 Beijing enlisted its state banks to provide an emergency loan to Pakistan. It participated in the creation of a regional rescue fund for East Asia. The danger is that the IMF will be side-lined. The Fund could attempt to work together with regional lenders capable of contributing additional

resources when it cannot. But what would happen if it disagreed with them on substantive policy? This is what happened with the Greek bailout, when the IMF favoured restructuring the country's debt, but the French and German governments disagreed. Collaboration broke down.

The fundamental problem is that instead of being a technical function, the job of international lender-of-last-resort is politicised. Countries are reluctant to expand IMF resources and powers out of fear that they will be used to advance Donald Trump's "America First" policies. Similarly, they worry that European governments, when acting together, can twist IMF policies to their advantage. Politicisation makes it hard for the IMF to commit to desirable ways forward. In 2010 the Fund adopted an "exceptional access policy" prohibiting large loans to countries whose debts were of questionable sustainability. But when the stability of French and German banks hung in the balance, the Fund was pressed by the Europeans to give Greece what was at the time the single largest loan in IMF history.

But the same politicisation can undermine regional and bilateral alternatives to the IMF. If Pakistan is unable to repay the rescue loan received from China, Beijing may demand some strategic asset – witness the 99-year lease on the port of Hambantota it obtained from Sri Lanka in lieu of defaulted debts. There are rising fears that China is pushing loans on poor countries with precisely this strategic endgame in mind.

The solution is the same one used to limit political interference with our domestic lenders-of-last-resort – to delegate decisions to an independent management committee. Member countries would set the broad mandate, and the committee would then be left to take specific decisions without undue interference by creditor countries. Specifying the institution's mandate could be fraught and holding the management team accountable for its decisions would be tough…

Q20.   Which of the following explains the roadblock IMF faces while trying to increase its permanent resources?

 a) **While China wants a greater voting power, America is reluctant to relinquish its own effective veto.**

 b) **China's offer for a bigger permanent contribution depends on the voting power it holds.**

c) **China will provide bilateral and multilateral credits only in exchange for greater voting power.**

d) Ad hoc agreements providing temporary loans are set to expire in the near future.

Number of words and Explanatory notes for RC:

Number of words: 541

Consider the sentences: 'One *is set to expire at the end of next year, the other in 2022. This crisis could be met by increasing its permanent resources. But these permanent contributions ("quotas" in IMF-speak) also determine voting power in the Fund, where the US has a 17 per cent share, China just 6 per cent. In any discussion of larger quotas China will insist on a greater share, and a bigger vote*. *But this will diminish American influence — especially because if the US share drops below 15 per cent, it loses its effective veto — and so elicits Washington's opposition*. *The Fund could instead seek to extend the system of bilateral and multilateral credits. But as contributions that come in this form don't ensure additional votes, China would be resistant.'*

Option A: This option explains the roadblock — China can extend credit only if it gets the voting power, but America isn't letting China offer the funds because that may effectively bring America's share below 15%, which will end its effective veto in the IMF. Hence, Option A is the answer as it depicts the tussle in the IMF.

Option B: This is not the roadblock as China is willing to offer a bigger contribution if it gets the voting power. So, China's demand is not so much a roadblock as a possible solution. The roadblock is America's opposition to the same. Option B is not the answer.

Option C: From '*But as contributions that come in this form don't ensure additional votes, China would be resistant*' it can be understood that China resists extending bilateral and multilateral credits as they don't bring voting power/additional votes. Option C is not the answer.

Option D: While this is true, it is the reason why IMF is looking for permanent resources. This option doesn't explain the roadblock in getting those resources (this is the cause, and not the roadblock to the solution). Option D is not the answer.

Choice (A)

Q21.   The author thinks that 'the IMF will be side-lined' (Para 2) because

a) **it is unable to find middle ground with regional lenders on substantive policy.**

b) **French and German governments are at loggerheads with IMF's proposals.**

c) **China is filling the IMF's shoes by offering assistance at a regional level.**

d) IMF's role has been politicised to a great extent.

Number of words and Explanatory notes for RC:

Number of words: 541

Option A: The passage doesn't mention that IMF is unable to find middle ground. It merely argues that in trying to increase its resources, there is no protocol to settle disputes or disagreements with major lenders. This can be understood from '*The Fund could attempt to work together with regional lenders capable of contributing additional resources when it cannot. But what would happen if it disagreed with them on substantive policy?*' Also, this is discussed after the author points out that the IMF could be side-lined (maybe as a solution). Hence, Option A is not the answer.

Option B: This was mentioned as an example of a past disagreement between the IMF and the two governments, French and German, over the Greek bailout. This doesn't explain the potential side-lining of IMF. It explains possible issues with IMF trying to work together with regional lenders. Hence, Option B is not the answer.

Option C: The IMF could be side-lined because it is being rendered irrelevant/unimportant largely because '*China is already responding to the emerging IMF impasse (deadlock) by providing regional assistance more directly. Its central bank has currency swap arrangements with 32 foreign central banks*'. So, China is already offering debts/regional assistance to countries that need it making IMF irrelevant in its region. That's why the author feels IMF could be side-lined. Option C is the answer.

Option D: While this is true, it doesn't explain why the author talks about IMF side-lining. This option discusses the issues facing IMF leading to its financial crisis but ignores the context of the 'side-lining' mentioned in the para. Option D is not the answer.   Choice (C)

Q22.   Which of the following doesn't strengthen the author's opinion that 'the same politicisation can undermine regional and bilateral alternatives to the IMF'?

 a) **China's strategic endgame in providing regional assistance is stoking apprehensions amongst other countries.**

b) **China pushed Sri Lanka to give them a 99-year lease on the Port of Hambantota in return for the unpaid debts.**

c) **In 2016, Beijing enlisted its state banks to provide an emergency loan to Pakistan, which, many fear, could be used to demand strategic assets if Pakistan defaults.**

d) China's central bank has currency swap arrangements with 32 foreign central banks making it a regional and bilateral alternative to the IMF.

Number of words and Explanatory notes for RC:

Number of words: 541

Consider this: '*But the same politicisation can undermine regional and bilateral alternatives to the IMF. If Pakistan is unable to repay the rescue loan received from China, Beijing may demand some strategic asset – witness the 99-year lease on the port of Hambantota it obtained from Sri Lanka in lieu of defaulted debts. There are rising fears that China is pushing loans on poor countries with precisely this strategic endgame in mind.*' The para mentions that politicisation can undermine regional and bilateral alternatives to IMF – China has been established as a bilateral alternative to IMF.

Option A: This as understood from '*There are rising fears that China is pushing loans on poor countries with precisely this strategic endgame in mind*' shows that the bilateral alternatives to IMF aren't really inspiring a lot of confidence either, and a major reason for that is the politicisation (China's politics or strategic endgame is what is making other countries wary or cautious of its role as the regional money-lender). Option A is not the answer.

Option B: This was mentioned by the author to buttress the argument as to why China is not a reliable money-lender and why there is a rising fear it **may demand some strategic asset if a country like Pakistan doesn't manage to repay the rescue loan China had offered.** China did this in case of Sri Lanka obtaining a 99-year lease and, hence, there are rising fears of how China will use its muscle as a moneylender. Option B is not the answer.

Option C: This option explains why politicisation has undermined regional alternatives to IMF – China's politics weaken its status as a regional alternative to IMF, and its strategy has stoked fears that it is pushing loans on poor countries with ulterior motives of demanding strategic assets. This option strengthens the author's argument. Option C is not the answer.

Option D: This doesn't explain why politicisation is undermining the regional alternatives, as it only throws light on how China ended up being the regional alternative (positive about China, rather than negative). Option D is the answer.

Choice (D)

Q23.   The author's suggestion to resolve the central concern discussed in the passage is that

a) **there must be a domestic lender-of-last-resort that should be available as an alternative to IMF.**

b) the management committee of the IMF should be held accountable for its decisions.

c) to set up a management committee which can function without undue political interference.

d) to allow creditor countries to call the shots.

Number of words and Explanatory notes for RC:

Number of words: 541

Consider the sentences: '*The solution is the same one used to limit political interference with our domestic lenders-of-last-resort—to delegate decisions to an independent management committee. Member countries would set the broad mandate, and the committee would then be left to take specific decisions without undue interference by creditor countries. Specifying the institution's mandate could be fraught and holding the management team accountable for its decisions would be tough...*' The solution has been explained in the underlined portions.

Option A: The author doesn't mention that there should be a domestic lender-of-last-resort. The author gives the example of the lenders-of-last resort to discuss what works elsewhere, not to offer this as a possible solution. Option A is not the answer.

Option B: The author mentions that holding the management committee accountable is tough when there is political interference from the creditor countries. The solution is to share the agenda and mandate between the creditor countries and the management committee which will have the final decision, away from political interference. Option B is not the answer.

Option C: This is the solution the author had suggested – that the final decisions should be taken by an independent committee once the broader mandate or agenda is set by the creditor/member countries. So, setting up such a committee and then, letting it take decisions without undue political interference is what the author would approve of. Hence, Option C is the answer.

Option D: The creditor countries being allowed to call the shots (take important decisions) is not the solution proposed by the author. The creditor countries/member countries *would set the broad mandate* in the author's proposed solution. Hence, Option D is not the answer.   Choice (C)

Q24.   The author uses the example of the exceptional access policy adopted by the IMF to suggest that

a) the Fund rightly prohibits large loans to countries which look incapable of repaying.

b) IMF doesn't have complete freedom when it comes to denying debts of questionable sustainability.

c) political interference prevents IMF from lending loans to countries in dire need of funds.

d) powerful banks arm-twist the IMF to get their agenda passed.

Number of words and Explanatory notes for RC:

Number of words: 541

Option A: This is the policy that IMF has – to not extend debts to countries when the repaying or sustainability looks doubtful. The author mentions this policy to suggest that politicisation doesn't allow IMF to carry out its policies without interference. An example of that was witnessed in case of the loan lent to Greece. Hence, Option A is not the answer.

Option B: The author was trying to suggest that politicisation leads to the arm-twisting of IMF when it comes to following its policies, as in the case of "exceptional access policy" prohibiting large loans to countries whose debts were of questionable sustainability. The IMF was pressured by the Europeans to give Greece the loan as understood from '*But when the stability of French and German banks hung in the balance, the Fund was pressed by the Europeans to give Greece what was at the time the single largest loan in IMF history.*' So, it can be understood that the IMF didn't have complete freedom when it comes to denying loans. Hence, Option B is the answer.

Option C: The example was to prove the reverse – that political interference makes IMF lend money even when the repayment becomes highly doubtful. Hence, Option C is not the answer.

Option D: It is not the banks that the author is arguing against here, but the countries and the politics. French and German banks were mentioned to indicate how delicate the situation was at the time the IMF had to give Greece the single largest loan in IMF history. Option D is not the answer.   Choice (B)

Q25.   DIRECTIONS *for questions 25 and 26:* 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.   Consequently, more than 300000 students leave each year.
2.   The premium on foreign experience in China has created perverse incentives.
3.   Chinese universities have great difficulty fostering talent at home.

4. It sends the message to today's best and brightest that they should still spend their most productive years abroad.

Sentence 1: Sentence 1 sounds like a sentence highlighting a consequence – students leave (China) every year.
Sentence 2: Sentence 2 highlights a problem created by the importance attached to 'foreign experience'.
Sentence 3: Sentence 3 talks about the great difficulty faced by Chinese universities. 'great difficulty' sounds introductory in tone.
Sentence 4: Sentence 4 has the subjective pronoun 'it' and the clue 'productive years spent abroad'.
So sentence 3 is a general sentence that can begin the paragraph. Sentence 2 also sounds like an opening sentence but it can only follow sentence 3. The remaining sentences need a precedent and more substantiation. Sentence 3 is followed by sentence 2. "great difficulty fostering talent at home" in sentence 3 is followed by "premium on foreign experience in China" in sentence 2. "great difficulty at home" in sentence 3 is contrasted by "perverse incentives (of) foreign experience" in sentence 2. So, 32.
Sentence 2 is followed by sentence 4. "It sends the message" in sentence 4 is followed by "created perverse incentives" in sentence 2. "spend their most productive years abroad" in sentence 4 links with "foreign experience in China" in sentence 2.
Sentence 4 is followed by sentence 1 which concludes the para. "today's best and brightest that they should still spend their most productive years abroad" in sentence 4 is exemplified by "More than 300000 students leave" in sentence 1. So, 3241.
Ans: (3241)

Q26. DIRECTIONS *for questions 25 and 26:* 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. Those who take the time to see 'Joker' will find that it isn't the ultra-violent juggernaut some have anticipated.
2. The film is a throwback in style to 1970s filmmaking and has direct nods to both 'Taxi Driver' (1976) and 'The King of Comedy' (1980), which Robert De Niro alluded to in a recent interview.
3. Instead of being action-driven like most superhero films, 'Joker' is a nuanced look at mental illness and the impact of trauma in a society that prefers to look the other way.
4. Viewers may also see some comparison to 'Network' (1976), the prophetic film about a television personality taking his anger out on the world with his contagious line 'I'm mad as hell and I'm not going to take it anymore!'

Sentence 1 and Sentence 3 are independent sentences compared to Sentence 2 ('the film') and Sentence 4 ('viewers' may 'also' see…). Also, 1 and 3 are upstream to 2 and 4 because the former talk about what the movie is about while the latter brings parallels with other movies using connectors (as mentioned above).
So, the first decision to make is which sentence is upstream, 1 or 3. 1 talks about what the movie 'Joker' isn't about. 3 talks about what the movie is about. So, between the two 1 comes first, because we start with negated information before explaining the right information. Once we talk about what the movie was about, there is no point mentioning that it is not what people expected it to be. Also, the beginning of Sentence 3 corresponds to the ending of Sentence 1. 'It isn't the ultra-violent juggernaut' corresponds to 'Instead of being action-driven'. So, 13 is a logical block.
Similarly, between 2 and 4, it is an easy decision to make. Both are sentences that talk about the similarities of 'Joker' with other movies. Sentence 4 uses the connector 'also' which would be the case if 2 precedes it. So, 24.   Ans: (1324)

Q27.   DIRECTIONS for question 27: The paragraph given below is followed by four summaries. Choose the option that best represents the author's primary position in the paragraph.

The overblown rhetoric that mindfulness will usher in a global renaissance – that helping corporations like Google to maintain the productivity of their stressed engineers will eventually bring about world peace – is pure marketing hyperbole. Nothing has been overturned or transformed as the result of mindfulness. And nothing will be. Mindfulness is complicit with the smooth functioning of capitalism and its institutions, and that is because mindfulness is extremely conservative. How else can we explain why it has been so warmly received by governments, corporations, and educational institutions? Mindfulness tells us the problem is our minds rather than with these institutions and how they function. So, of course, they love it.

a) Mindfulness is acceptable to capitalists because it holds the extremely conservative view that stress is caused by the way our minds function rather than the way our institutions do.

b) **Mindfulness is warmly received by capitalists because it abets the way their institutions function and attributes the cause of the problem to our minds.**

c) That mindfulness will help in the renaissance of capitalism is just an exaggerated narrative supported by governments, corporations, and educational institutions.

d) Capitalist institutions love mindfulness because it absolves them by advocating the idea that capitalism is not to be blamed for our problems.

The para has three parts. Firstly, mindfulness bringing in a renaissance is pure rhetoric/exaggerated. Secondly, mindfulness is being promoted/advocated by capitalists. Thirdly, mindfulness involves believing that the problem is our minds and not in the way capitalist institutions function.

Option A: There are several digressions in this option. Firstly, the para calls mindfulness itself conservative. The option indicates that the view about stress is extremely conservative. Stress is not the focus of the para. Also, the expressions 'stress is caused by the way our minds function' and 'the problem is our mind' (the problem could be a lot more than just stress, because stress is only part of the problem here as per the para and not the only problem) are different. Hence, Option A is not the answer.

Option B: This option covers the author's position by pointing out that capitalists warmly receive mindfulness because it abets (please note that abet, like complicit, is a negative word that involves supporting capitalists in something bad/wrong) their purpose. This is because mindfulness doesn't blame the capitalist system. It blames an individual (problem is the mind, is the conservative opinion of mindfulness according to the para). Option B is the answer.

Option C: This option can be eliminated because of the distortion of information that mindfulness will result in the renaissance of capitalism. The para doesn't mention that it is the renaissance of capitalism. It mentions global renaissance (much bigger idea than just a capitalistic renaissance). Secondly, it doesn't mention the more important idea about mindfulness attributing our problem to our minds (the way we think). Option C is not the answer.

Option D: This option wrongly points out that mindfulness advocates the idea that capitalism is not to be blamed for our problems. This is not the same as what the para suggests which is that mindfulness advocates that the problem is our minds. The focus of mindfulness is not to absolve capitalism or defend it; it is to attribute the problem to our minds. Option D is, therefore, not the answer.   Choice (B)

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. Also, rancour of this nature is not entirely unknown in American history.
2. Nevertheless, we can take some comfort that we have not yet come to mortal blows on the Senate floor, as did Romans, who finally settled intractable political disputes by assassinating opponents.
3. It is hard to deny that, in our lifetimes, the level of anger and the degree of polarization in today's politics has never been as high.
4. Are we in the United States at the same critical inflection point as the ancient Romans in the first century BCE?

Sentence 1 starts with an 'also' followed by a justification for the hostility, implying that this level of animosity (rancour) is not a first. So, Sentence 1 should be preceded by sentences that this level of hostility in the US is not a totally unfamiliar situation.
Sentence 2 compares current levels of hostility with those of the Roman times when things apparently were much worse, starting with the contrast marker, nevertheless.
Sentence 3 establishes the levels of hostility seen presently are probably the highest of our lifetimes.
Sentence 4 raises the question if things are as bad now as they were during the time of the Romans.
4 is the most upstream of all statements since it raises the question – are things as bad as they were during the Roman times? 4 and 3 form a block because 3 begins with 'it is hard to deny that', a response to the question raised in 4. 2 on the other hand has a soothing or mollifying tone that things are not as bad, which means 2 is downstream to 43. This brings it down to whether the order is 4321 or 4312. Since, it is 2 with the contrast marker 'nevertheless', and 1 with 'also' 21 would be the block, as 1 continues the tone of 2, by implying that this situation (bad) is not a first.

Ans: (4321)

Q29.   DIRECTIONS *for questions 29 and 30:* 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. Since NOMAD is 20 times more sensitive than the methane detector on board *Curiosity*, the American Mars Rover used in the past, this is bad news.
2. It was to find signs of this more widespread material that a spectroscopic instrument called NOMAD (Nadir and Occultation for MARS Discovery), which is on board *ExoMars Trace Gas Orbiter*, was designed.
3. The optimists will not be deflected, though.
4. And, as Ann Carine Vandaele of the Belgian Institute for Space Aeronomy told the American Geophysical Union, NOMAD has failed to find the slightest hint of methane in the Martian atmosphere.
5. Regardless of their source, any methane molecules in Mars's atmosphere would, on the basis of experiments on Earth, be expected to hang around for centuries.

Sentence 1: Sentence 1 sounds negative in tone.
Sentence 2: Sentence 2 has the demonstrative adjective 'this more widespread material'. It also provides the full form of NOMAD.
Sentence 3: Sentence 3 has the contrast conjunction 'though'.
Sentence 4: Sentence 4 mentions a specific failure of NOMAD.
Sentence 5: Sentence 5 sounds like an introductory sentence. It establishes the background: methane molecules in Mars' atmosphere are expected to hang around for centuries.

So sentence 5 (Regardless of their source) is a general sentence that can begin the paragraph. It mentions an expectation which serves to establish the background of this paragraph. The topic of discussion is mentioned: any methane molecules in Mars's atmosphere would be expected to hang around for centuries.

Sentences 5 and 2 form a logical block. "this more widespread material" in sentence 2 points to "any methane molecules in Mars's atmosphere" in sentence 5. "find signs of this more widespread material" in sentence 2 is parallel to "any methane molecules in Mars's atmosphere would be expected to hang around for centuries" in sentence 5. So sentence 2 follows sentence 5.

Sentences 2 and 4 form another logical block. "a spectroscopic instrument called NOMAD (Nadir and Occultation for MARS Discovery) was designed to find signs of this more widespread material (methane)" in sentence 2 links with "NOMAD has failed to find the slightest hint of methane in the Martian atmosphere" in sentence 4. So sentence 4 follows sentence 2.

Sentence 4 is followed by sentence 1. "NOMAD is 20 times more sensitive than the methane detector on board *Curiosity*" and "this is bad news" in sentence 1 links with "NOMAD has failed to find the slightest hint of methane in the Martian atmosphere" in sentence 4. So, 5241.

Sentence 3 is the odd sentence. It contrasts the negative tone of sentence 1. However, sentence 3 needs a precedent and more substantiation. It can be a part of another paragraph.   Ans: (3)

Q30.   DIRECTIONS *for questions 29 and 30:* 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. There is a good case for arguing that the UK's "Leave" vote was a vote against globalisation rather than a vote specifically against the European Union.
2. In the UK, the insurgency against the European Union, against immigration, against London and the south-east, against globalisation – all exposed by the Leave campaign's victory in the Brexit referendum in 2016 – largely by-passed London's thinkocrats.
3. The think-tanks thus failed in one of their primary functions: to analyse and clarify the main trends of the day, and consequently to advocate relevant policies.
4. In America, the policy jocks missed similar signs of anger on both the right and the left, whether the issue was the culture wars or the economy.
5. Accustomed to making the weather, think-tanks were victims of an intellectual storm.

Sentence 1 talks about how the UK's 'Leave' vote is not so much a vote against EU as it was against globalisation.

Sentence 2 talks about an insurgency against the EU/immigration/globalisation/London and the south-east exposed by the Leave campaign's victory. So, Sentence 2 is not so much about the Leave vote as it is about the results bypassing the thinkocrats.

Sentence 3 discusses the failure of think-tanks thus connecting to 2.

Sentence 4 discusses how policy jocks missed 'similar' sigs of anger – connecting to 2 which talks about think tanks failing to advocate relevant policies.

Sentence 5 talks about think tanks facing an intellectual storm, 'victims' connecting this to other sentences talking about their failure.

2 and 3 is a block, because 4 brings the case of 'America' and connects it to UK with the word 'similar'. 3 is paired with 2 because of 'thus' as a summary of what 2 states. So, 234 is a block.5 is the conclusion. Ans: (1)

Q31. DIRECTIONS *for question 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. And new materials that have greater heat and chemical resistance can be used in various spots in a product, as needed.
2. In the aerospace and automotive industries, 3-D printing will most often be used in the pursuit of performance gains.
3. The new technology allows manufacturers to hollow out a part to make it lighter and more fuel-efficient and incorporate internal structures that provide greater tensile strength, durability and resistance to impact.
4. Previously, the fuel efficiency of jet fighters and vehicles could be enhanced by reducing their weight, but this frequently made them less structurally sound.

Sentence 1: Sentence 1 has the conjunction 'and'. It mentions some more benefits of the new materials.
Sentence 2: Sentence 2 mentions the names of some sectors: aerospace and automotive industries. It establishes the topic of discussion: 3-D printing will be used...
Sentence 3: Sentence 3 talks about the new technology and its benefits.
Sentence 4: Sentence 2 mentions some technical details about jet fighters and vehicles. It has the clue word 'previously'.
So sentence 2 is a general sentence that can begin the para. It tells us the application of 3-D printing in the aerospace and automotive industries. Sentence 2 and sentence 4 form a logical block. "jet fighters and vehicles" in sentence 4 points to "aerospace and automotive industries" in sentence 2. "fuel efficiency could be enhanced" in sentence 4 links with "pursuit of performance gains" in sentence 2. So sentence 2 is followed by sentence 4.
Sentence 4 is followed by sentence 3. "previously" in sentence 4 contrasts "the new technology" in sentence 3. "the new technology" in sentence 3 points to "3-D printing" in sentence 2. "the fuel efficiency could be enhanced by reducing their weight" in sentence 4 links with "hollow out a part to make it lighter and more fuel-efficient" in sentence 3. "made them less structurally sound" in sentence 4 is contrasted by "incorporate internal structures that provide greater tensile strength, durability and resistance to impact" in sentence 3.
Sentence 1 concludes the para. "greater heat and chemical resistance" in sentence 1 continues after "greater tensile strength, durability and resistance to impact" in sentence 3. So, 2431.   Ans: (2431)

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.

I do think it's absolutely worth engaging with the great many people who are worried, who are afraid, but have convinced themselves that activism doesn't ever accomplish anything, that it's a waste of time, and who have no lived experience with it, have never really learned about history in school except as the work of singular 'great men.' And yes, that is fertile territory for us. I think there are a lot of minds that can be changed. I think hope is a muscle that we practice, so the more we're able to have experiences with one another, having wins, even though they're small, the more we shed that sense of inevitability about the future.

a) Even the smallest of collective wins can alter the negative outlook nursed by those who are anxious about the future and cynical about change.

b) **While there are many who are anxious and afraid, they don't take up activism for fear of failure.**

c) Activism may not always reap rich rewards, but only through incremental growths can we avoid the inevitable.

d) Those who are anxious and afraid do not generally have the motivation to believe that activism can lead to a positive change.

Option A: Consider the para: '*I do think it's absolutely* <u>worth engaging with the great many people</u> *who are* <u>worried, who are afraid</u>, *but have* <u>convinced themselves that activism doesn't ever accomplish anything</u>, *that it's a waste of time, and who have no lived experience with it, have never really learned about history in school except as the work of singular 'great men.' And yes, that is fertile territory for us. I think there are a lot of minds that can be changed. I think hope is a muscle that we practice, so* **the more we're able to have experiences with one another**, *having wins, even though they're small,* **<u>the more we shed that sense of inevitability about the future</u>**.' The main points have been underlined in the para.
This option rightly summarises the author's position by talking about small collective wins which can bring about a positive change ('shed the sense of inevitability' – which is negative because of the tone set by the starting line of the para) amongst those who are cynical about activism and believe that not much good can come out of it. Hence, Option A is the answer.
Option B: This option focuses on something totally different and inaccurate that it is the fear of failure that stops people from taking up activism. The para talks about people's cynical attitude towards activism, that it doesn't change anything (not that they will fail). Hence, Option C is not the answer.
Option C: This para talks about how activism may not always help, which is incorrect because the author doesn't doubt the results that can be produced through activism. Also, the option doesn't talk about changing the minds of the people who are anxious and afraid. Hence, Option C is not the answer.
Option D: While this option largely represents one part of the story, it doesn't reflect the positive nature of the para, the optimism that activism can change things hasn't been reflected in the option. Option D is not the answer.   Choice (A)

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. Since the one famously annihilates the other, the result should be a universe full of radiation, but without the stars, planets and nebulae that make up galaxies.
2. The inference is that matter and antimatter are not quite as equal and opposite as the models predict.
3. When physicists bring the Standard Model of particle physics and Einstein's general theory of relativity together, they get a clear prediction that in the very early universe, equal amounts of matter and antimatter should have come into being.
4. This problem has troubled physics for the past half-century, but it may now be approaching resolution.

5. Yet stars, planets and nebulae do exist.

Sentence 1: Sentence 1 has the pronouns 'the one" and "the other".. It talks about the effects of the annihilation of one by the other.
Sentence 2: Sentence 2 mentions the inference of/ for the physicists.
Sentence 3: Sentence 3 mentions some names of scientific theories: Standard Model of particle physics and Einstein's general theory of relativity. It mentions the clear prediction of the physicists: in the very early universe, equal amounts of matter and antimatter should have come into being.
Sentence 4: Sentence 4 is a point of view about the problem which has plagued physicists for a long time but it says there might be a solution to it (the problem).
Sentence 5: Sentence 5 has the contrast conjunction 'yet'.
So, sentence 3 is a general sentence that can begin the para. It establishes the topic of discussion by stating the prediction: equal amounts of matter and antimatter should have come into being. Sentence 3 and sentence 1 form a logical block. "the one famously annihilates the other" in sentence 1 refers to "matter and antimatter" in sentence 3. Sentence 1 also mentions a result.
Sentence 1 is contrasted by sentence 5. "**Yet** stars, planets and nebulae do exist" in sentence 5 contrasts "universe should be full of radiation, but without the stars, planets and nebulae that make up galaxies" in sentence 1. So sentence 5 follows sentence 1.
Sentence 2 follows as inference from the observation given in sentence 5. "matter and antimatter are not quite as equal and opposite as the models predict" in sentence 2 contrasts the prediction in the introduction sentence 3 "in the very early universe, equal amounts of matter and antimatter should have come into being". Sentence 2 concludes the para.
Sentence 4 is the odd sentence out. "it may now be approaching resolution" in sentence 4 leaves the thought flow incomplete. This sentence can be further explained in another para.   Ans: (4)

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.
It's possible to lie with facts and to tell the truth with fiction. In fact, truth is the main concern of literary fiction. Good fiction is about choosing details that are so strange and rooted in a singular place and time that the memory clings to them. It's also about finding quiet moments that, though they may go unseen or unmentioned, permanently alter a life. Call these moments 'undoings.' Fiction opens up the imagination and makes readers empathetic, and beautiful language makes people curious. It keeps them from tiring of the story. So, yes, fiction as a craft is an immensely powerful tool for telling true stories.

a) Contrary to what people believe, there is more truth in fiction than there is in facts.

b) **By making one empathetic and curious, fiction can efficiently deliver true stories.**

c) Fiction works best when one can find a quiet moment to imagine and empathize with a story.

d) Fiction is the craft of telling the truth, as strange as it may seem, through a story that clings to the memory.

Option A: The para doesn't, in any way, compare the amount of truth in facts and in fiction. All it talks about is the possibility of lying through facts and telling a true story through fiction. Option A is not the answer.
Option B: Fiction's ability to deliver true stories is based on how it *opens up imagination* and *makes readers empathetic* and by keeping them from tiring of the story, fiction tells true stories. The para is largely about how it is possible to tell the truth through fiction and why it is possible. Hence, Option B is the answer.
Option C: The author doesn't imply that fiction '**works best**' when one finds a quiet moment. The author says that it is all about finding quiet moments that can alter one's life – when what is impactful, as strange as it may seem, sticks to the mind. Also, it is not the quiet moments which can make us imagine. It is fiction **that opens up imagination.** Option C is not the answer.
Option D: Fiction is **not the craft of telling the truth.** It is possible to **tell true stories through fiction.** These two positions are not one and the same. The former means that fiction always tells the truth, which is not what the author implies. 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.**

In a class, four students – A, B, C and D – got the top four ranks in three subjects, Mathematics, Physics and Chemistry, such that no two of them got the same rank in a subject and no student got the same rank in any two subjects. We know the following information:

   i.   **The student who got the first rank in Mathematics got the fourth rank in Physics.**
   ii. **The student who got the second rank in Chemistry got the third rank in Physics.**
   iii. **A got the second rank in Physics.**

Q1. DIRECTIONS *for questions 1 to 4:* Select the correct alternative from the given choices.

What rank did A get in Chemistry?

a) 1

b) **3**

c) 4

d) Cannot be determined

Since the student name is not given in the first two statements, let us assume the student who got the first rank in mathematics as X and the student who got the second rank in chemistry as Y.
By representing the following information in a table, we will get

Rank \ Subject	Mathematics	Physics	Chemistry
1	X		
2		A	Y
3		Y	
4		X	

Since no student got the same rank in any two subjects X's rank in chemistry is three and Y's rank in mathematics is four. Let Z be the name of the student who got first rank in Physics. Since, no student got the same rank in any two subjects, A's rank in Chemistry has to be one. Similarly, on representing the following information in a table, we will get

Rank \ Subject	Mathematics	Physics	Chemistry
1	X	Z	A
2	Z	A	Y
3	A	Y	X
4	Y	X	Z

A got first rank in Chemistry.   Choice (A)

Q2. DIRECTIONS *for questions 1 to 4:* **Select the correct alternative from the given choices.**
If the absolute difference between the ranks of A and C in Chemistry is three, then what is the absolute difference between their ranks in Mathematics?

a) 1

b) 2

c) 3

d) Cannot be determined

Since the student name is not given in the first two statements, let us assume the student who got the first rank in mathematics as X and the student who got the second rank in chemistry as Y.
By representing the following information in a table, we will get

Subject / Rank	Mathematics	Physics	Chemistry
1	X		
2		A	Y
3		Y	
4		X	

Since no student got the same rank in any two subjects X's rank in chemistry is three and Y's rank in mathematics is four. Let Z be the name of the student who got first rank in Physics. Since, no student got the same rank in any two subjects, A's rank in Chemistry has to be one. Similarly, on representing the following information in a table, we will get

Subject / Rank	Mathematics	Physics	Chemistry
1	X	Z	A
2	Z	A	Y
3	A	Y	X
4	Y	X	Z

From the given information, C got fourth rank in chemistry
⇒ he got second rank in mathematics.
∴ The absolute difference between their ranks in mathematics is one.

Choice (A)

Q3. DIRECTIONS *for questions 1 to 4:* **Select the correct alternative from the given choices.**

If A's rank in Mathematics is same as B's rank in Chemistry, then what rank did B get in Physics?

a) 1

b) 2

c) 3

d) 4

Since the student name is not given in the first two statements, let us assume the student who got the first rank in mathematics as X and the student who got the second rank in chemistry as Y.
By representing the following information in a table, we will get

Subject / Rank	Mathematics	Physics	Chemistry
1	X		
2		A	Y
3		Y	
4		X	

Since no student got the same rank in any two subjects X's rank in chemistry is three and Y's rank in mathematics is four. Let Z be the name of the student who got first rank in Physics. Since, no student got the same rank in any two subjects, A's rank in Chemistry has to be one. Similarly, on representing the following information in a table, we will get

Subject / Rank	Mathematics	Physics	Chemistry
1	X	Z	A
2	Z	A	Y
3	A	Y	X
4	Y	X	Z

From the given information, B got third rank in chemistry i.e., X is B.
∴ The rank of B in Physics is four.   Choice (D)

Q3.   DIRECTIONS *for questions 1 to 4:* **Select the correct alternative from the given choices.**

If A's rank in Mathematics is same as B's rank in Chemistry, then what rank did B get in Physics?

a) 1

b) 2

c) 3

d) 4

Since the student name is not given in the first two statements, let us assume the student who got the first rank in mathematics as X and the student who got the second rank in chemistry as Y.
By representing the following information in a table, we will get

Rank \ Subject	Mathematics	Physics	Chemistry
1	X		
2		A	Y
3		Y	
4		X	

Since no student got the same rank in any two subjects X's rank in chemistry is three and Y's rank in mathematics is four. Let Z be the name of the student who got first rank in Physics. Since, no student got the same rank in any two subjects, A's rank in Chemistry has to be one. Similarly, on representing the following information in a table, we will get

Rank \ Subject	Mathematics	Physics	Chemistry
1	X	Z	A
2	Z	A	Y
3	A	Y	X
4	Y	X	Z

In each of the subjects, A got a better rank than Y
⇒ Y is D and the rank of Y in chemistry is two.   Choice (A)

DIRECTIONS *for questions 5 to 8:* **Answer the questions on the basis of the information given below.**

A conference on Human Behaviour was attended by delegates specializing in three subjects – Psychology, Physiology and Sociology. Any delegate who attended the conference specialized in at least one subject. The following information is known about the number of delegates who specialized in each subject:

    i. **The number of delegates who specialize in Psychology is four times the number of delegates who specialize only in Sociology.**
    ii. **The number of delegates who specialize in either Physiology or Sociology but not both is the same as the number of delegates who specialize in both Psychology and Physiology.**
    iii. **The ratio of the number of delegates who specialize in Sociology to the number of delegates who specialize in Physiology is 16:17.**
    iv. **The number of delegates who specialize only in Physiology is the same as the number of delegates who specialize only in Sociology.**
    v. **The number of delegates who specialize only in Psychology and Sociology is one fourth the number of delegates who specialize only in Physiology.**
    vi. **The number of delegates who specialize only in Sociology is twice the number of delegates who specialize only in Psychology and Physiology.**
    vii. **The number of delegates who specialized only in Psychology and Sociology is a two-digit prime number less than 20.**

Q5. DIRECTIONS *for questions 5 and 6:* **Type in your answer in the input box provided below the question.**
What is the minimum number of delegates that could have attended the conference?

Let the number of delegates who specialize only in Sociology be y.
From (i), the number of delegates who specialize in Psychology will be 4y.
From (iv), the number of delegates who specialize only in Physiology is also y.
From (v), the number of delegates who specialize only in Psychology and Sociology will be y/4.
From (vi), the number of delegates who specialize only in Psychology and Physiology will be y/2.
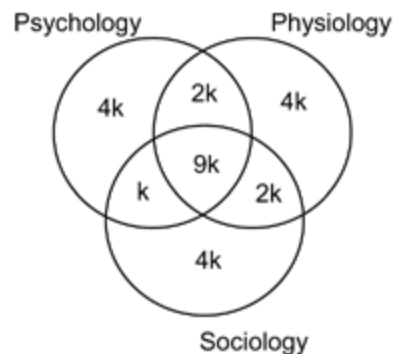Let the number of delegates who specialize in all three subjects be a.

From (ii), $y + \frac{y}{2} + y + \frac{y}{4} = a + \frac{y}{2} \Rightarrow a = \frac{9y}{4}$

Let the number of delegates who specialize only in Psychology be b.
Since the number of delegates who specialize in Psychology is 4y, we get $b + \frac{y}{2} + \frac{9y}{4} + \frac{y}{4} = 4y \Rightarrow b = y$

Let the number of delegates who specialize in Sociology be 16c and the number of delegates who specialize in Physiology will be 17c (from (iii)).

Psychology   Physiology

4k   2k   4k
      9k
   k   2k
      4k

Sociology

Number of people who specialize in only Sociology and Physiology
$= 16c - y - \frac{y}{4} - \frac{9y}{4}$

Total number of people who specialize in Physiology $= 17c = y + \frac{y}{2} + \frac{9y}{4} + \left(16c - y - \frac{y}{4} - \frac{9y}{4}\right)$

$\Rightarrow c = \frac{y}{4}$

Number of people who specialize only in Sociology and Physiology = y/2
Let y = 4k.
The adjacent Venn diagram provides the number of delegates of each specialization in terms of k.
The number of delegates who specialize in Psychology and Sociology can be a two-digit prime number, i.e., k can be 11 or 13 or 17 or 19.

The minimum number of delegates who attended the conference will be when k = 11.
Number of delegates who attended the conference = 26k = 26 ×11 = 286

Ans: (286)

Q5.   DIRECTIONS *for questions 5 and 6:* **Type in your answer in the input box provided below the question.**
What is the minimum number of delegates that could have attended the conference?

Let the number of delegates who specialize only in Sociology be y.

From (i), the number of delegates who specialize in Psychology will be 4y.

From (iv), the number of delegates who specialize only in Physiology is also y.

From (v), the number of delegates who specialize only in Psychology and Sociology will be y/4.

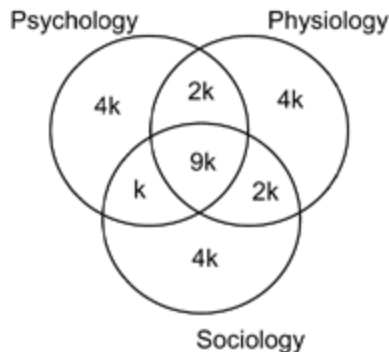From (vi), the number of delegates who specialize only in Psychology and Physiology will be y/2.

Let the number of delegates who specialize in all three subjects be a.

From (ii), $y + \frac{y}{2} + y + \frac{y}{4} = a + \frac{y}{2} \Rightarrow a = \frac{9y}{4}$

Let the number of delegates who specialize only in Psychology be b.

Since the number of delegates who specialize in Psychology is 4y, we get $b + \frac{y}{2} + \frac{9y}{4} + \frac{y}{4} = 4y \Rightarrow b = y$

Let the number of delegates who specialize in Sociology be 16c and the number of delegates who specialize in Physiology will be 17c (from (iii)).

Psychology Physiology

Sociology

Number of people who specialize in only Sociology and Physiology
$= 16c - y - \frac{y}{4} - \frac{9y}{4}$

Total number of people who specialize in Physiology $= 17c = y + \frac{y}{2} + \frac{9y}{4} + \left(16c - y - \frac{y}{4} - \frac{9y}{4}\right)$

$\Rightarrow c = \frac{y}{4}$

Number of people who specialize only in Sociology and Physiology = y/2

Let y = 4k.

The adjacent Venn diagram provides the number of delegates of each specialization in terms of k.

The number of delegates who specialize in Psychology and Sociology can be a two-digit prime number, i.e., k can be 11 or 13 or 17 or 19.

Given difference = 17k − 4k = 13k = 221 ⇒ k = 17.

Number of delegates who specialized in both Psychology and Physiology = 11k = 187

Ans: (187)

Q5. DIRECTIONS *for questions 5 and 6:* **Type in your answer in the input box provided below the question.**

What is the minimum number of delegates that could have attended the conference?

Let the number of delegates who specialize only in Sociology be y.
From (i), the number of delegates who specialize in Psychology will be 4y.
From (iv), the number of delegates who specialize only in Physiology is also y.
From (v), the number of delegates who specialize only in Psychology and Sociology will be y/4.
From (vi), the number of delegates who specialize only in Psychology and Physiology will be y/2.
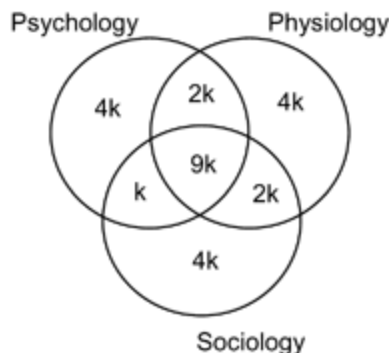Let the number of delegates who specialize in all three subjects be a.

From (ii), $y + \frac{y}{2} + y + \frac{y}{4} = a + \frac{y}{2} \Rightarrow a = \frac{9y}{4}$

Let the number of delegates who specialize only in Psychology be b.
Since the number of delegates who specialize in Psychology is 4y, we get $b + \frac{y}{2} + \frac{9y}{4} + \frac{y}{4} = 4y \Rightarrow b = y$

Let the number of delegates who specialize in Sociology be 16c and the number of delegates who specialize in Physiology will be 17c (from (iii)).

Number of people who specialize in only Sociology and Physiology
$= 16c - y - \frac{y}{4} - \frac{9y}{4}$

Total number of people who specialize in Physiology $= 17c = y + \frac{y}{2} + \frac{9y}{4} + \left(16c - y - \frac{y}{4} - \frac{9y}{4}\right)$

$\Rightarrow c = \frac{y}{4}$

Number of people who specialize only in Sociology and Physiology = y/2
Let y = 4k.
The adjacent Venn diagram provides the number of delegates of each specialization in terms of k.
The number of delegates who specialize in Psychology and Sociology can be a two-digit prime number, i.e., k can be 11 or 13 or 17 or 19.

The ratio of the number of delegates who specialized in all three subjects to the number of delegates who specialized in exactly two subjects = 9k : 5k = 9 : 5

Choice (B)

Q8. DIRECTIONS *for questions 7 and 8:* **Select the correct alternative from the given choices. Which of the following is the highest?**

a) The number of delegates who specialize only in Psychology.

b) The number of delegates who specialize only in Physiology and Sociology.

c) The number of delegates who specialize only in Physiology and Psychology.

d) The number of delegates who specialize only in Psychology and Sociology.

Let the number of delegates who specialize only in Sociology be y.

From (i), the number of delegates who specialize in Psychology will be 4y.

From (iv), the number of delegates who specialize only in Physiology is also y.

From (v), the number of delegates who specialize only in Psychology and Sociology will be y/4.

From (vi), the number of delegates who specialize only in Psychology and Physiology will be y/2.

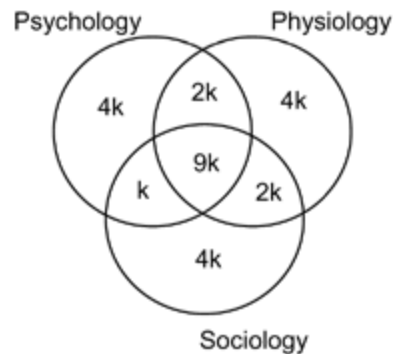Let the number of delegates who specialize in all three subjects be a.

From (ii), $y + \frac{y}{2} + y + \frac{y}{4} = a + \frac{y}{2} \Rightarrow a = \frac{9y}{4}$

Let the number of delegates who specialize only in Psychology be b.

Since the number of delegates who specialize in Psychology is 4y, we get $b + \frac{y}{2} + \frac{9y}{4} + \frac{y}{4} = 4y \Rightarrow b = y$

Let the number of delegates who specialize in Sociology be 16c and the number of delegates who specialize in Physiology will be 17c (from (iii)).

Psychology   Physiology

4k   2k   4k

9k

k   2k

4k

Sociology

Number of people who specialize in only Sociology and Physiology
$= 16c - y - \frac{y}{4} - \frac{9y}{4}$

Total number of people who specialize in Physiology $= 17c = y + \frac{y}{2} + \frac{9y}{4} + \left(16c - y - \frac{y}{4} - \frac{9y}{4}\right)$

$\Rightarrow c = \frac{y}{4}$

Number of people who specialize only in Sociology and Physiology = y/2
Let y = 4k.
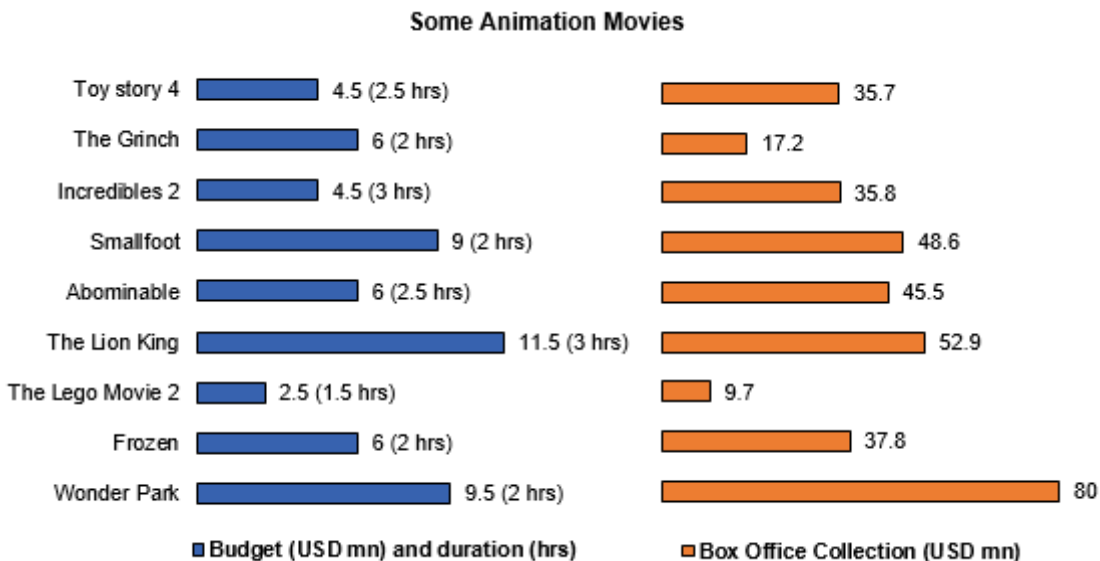The adjacent Venn diagram provides the number of delegates of each specialization in terms of k.
The number of delegates who specialize in Psychology and Sociology can be a two-digit prime number, i.e., k can be 11 or 13 or 17 or 19.

The number of delegates who specialized only in Psychology is greater than the number of delegates who specialized only in any two of the three subjects.

Choice (A)

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

The following graphs give the details of the production costs of a half-hour long animation movie in different countries and the budget (i.e., total cost), duration and box office collections of a few animation movies.

Some Animation Movies

Movie	Budget (USD mn) and duration (hrs)	Box Office Collection (USD mn)
Toy story 4	4.5 (2.5 hrs)	35.7
The Grinch	6 (2 hrs)	17.2
Incredibles 2	4.5 (3 hrs)	35.8
Smallfoot	9 (2 hrs)	48.6
Abominable	6 (2.5 hrs)	45.5
The Lion King	11.5 (3 hrs)	52.9
The Lego Movie 2	2.5 (1.5 hrs)	9.7
Frozen	6 (2 hrs)	37.8
Wonder Park	9.5 (2 hrs)	80

■ Budget (USD mn) and duration (hrs)　　■ Box Office Collection (USD mn)

Q9. DIRECTIONS *for questions 9 to 11:* **Select the correct alternative from the given choices.**

Which of the given movies had the highest ratio of box office collections to budget?

a) Toy Story 4

b) Incredibles 2

c) Abominable

d) Wonder Park ✔ **Your answer is correct**

Only Wonder Park has a ratio greater than 8.   Choice (D)

Production cost savings = $(3,00,000) \times 6$
              $= 18,00,000$.
              $= 1.8$ million USD.

Current profits $= 52.9 \times \dfrac{60}{100} - 11.5$

              $= 31.74 - 11.5 = 20.24$.

Profits had it been produced in Philippines
$= 20.24 + 1.8 = 22.04$.

$\therefore$ Change in profit $= \dfrac{22.04 - 20.24}{20.24} \times 100$

$\cong 8.9\%$.   Choice (B)

Q12.   DIRECTIONS *for question 12:* **Type in your answer in the input box provided below the question.**

For how many movies was the total production cost as a percentage of its budget not more than 30%?

Production cost of Toy story 4 will be $400,000 × 2.5 × 2 = $2 mn
This as a percentage of its budget will be more than 30%.
Similarly for The Grinch, the percentage will be

$$\frac{400000 \times 2 \times 2}{6000000} = 26.67\%$$

Hence, The Grinch is one of the movies.
Checking for the other movies, we find that Smallfoot, The Lion King, Frozen and Wonder Park also satisfy the given condition.
Hence, 5 movies satisfy the given condition.   Ans: (5)

India hosted a cricket tournament involving four teams – India, Pakistan, Srilanka and Bangladesh. In the league stage of the tournament, each team played exactly one match with every other team and the winner of each match was awarded one point, while no points were awarded to the loser. The top two teams at the end of the league stage played the final and the winner of the final was declared the champion of the tournament. None of the matches in the tournament ended in a tie or a draw. The matches were held in four cities – Bangalore, Chennai, Delhi and Mumbai – with no city hosting more than two matches.

Further it is known that,

   i. **Pakistan lost to Srilanka in the match played at Bangalore and no two teams have the same number of points at the end of the league stage.**
   ii. **India won the matches it played at Mumbai and at Chennai, while Bangladesh lost the match it played at Bangalore.**
   iii. **Pakistan lost the match it played at Mumbai and Srilanka lost the match it played at Chennai, whereas Bangladesh won the league match at Delhi, the city where Pakistan did not play any match.**
   iv. **at the end of the tournament, exactly two teams won the same number of matches and no team played more than one match at any venue.**

Q13. DIRECTIONS *for questions 13 to 16:* **Select the correct alternative from the given choices. Which of the following venues hosted only one match?**

a) Delhi – Bangladesh vs Srilanka

b) Mumbai – India vs Pakistan ✗ **Your answer is incorrect**

c) Mumbai – India vs Srilanka

d) Delhi – Bangladesh vs India

The number of matches played in the league stage = $^4C_2$ = $\dfrac{4 \times (4-1)}{2}$ = 6

Total number of matches in the tournament = 6(league stage) + 1(Final) = 7
⇒ Each venue hosts exactly two matches, except one venue which hosts only one match.
From condition (i), each team won a different number of matches in the league, stage.
As the maximum number of matches that a team can win is 3, the number of matches won by each of the teams must be a different number among 0, 1, 2 and 3.
From condition (iv), the team with two wins in the league stage must have won the final.
Thus, at the end of the tournament, two teams won three matches each and one team won one match and one team didn't win even a single match.
From condition (i), (ii) & (iv), India and Bangladesh must have played a match at Bangalore, which India won.
From the above conclusions and from condition (ii), India must be one of the finalists.
Let us try to represent the data in a tabular form

Venue	Match 1	Winner	Match 2	Winner
Bangalore	Sri Lanka Vs Pakistan	Sri Lanka	India Vs Bangladesh	India
Mumbai	India Vs ?	India		
Chennai	India Vs ?	India		
Delhi	Bangladesh Vs ?	Bangladesh		

As Pakistan didn't play a match at Delhi, there must be only one match held at Delhi.
As India is one of the finalists, India must have played matches at all the venues
⇒ India lost to Bangladesh at Delhi, which is given to be a league match.
As India and Bangladesh also played a match at Bangalore, it would be the finals of the tournament, which India won.
From above, the following conclusions can be made: India won the tournament.
In the league stage Bangladesh won three matches, India won two matches, Sri Lanka won one match and Pakistan lost all the matches.

Delhi hosted only one match and it was between India and Bangladesh.

Choice (D)

Q14. DIRECTIONS *for questions 13 to 16:* **Select the correct alternative from the given choices.**

Which of the following teams is the champion of the tournament?

a) India

b) Bangladesh   ✗ **Your answer is incorrect**

c) Sri Lanka

d) Pakistan

The number of matches played in the league stage = $^4C_2 = \dfrac{4 \times (4-1)}{2} = 6$

Total number of matches in the tournament = 6(league stage) + 1(Final) = 7

⇒ Each venue hosts exactly two matches, except one venue which hosts only one match.

From condition (i), each team won a different number of matches in the league, stage. As the maximum number of matches that a team can win is 3, the number of matches won by each of the teams must be a different number among 0, 1, 2 and 3.

From condition (iv), the team with two wins in the league stage must have won the final.

Thus, at the end of the tournament, two teams won three matches each and one team won one match and one team didn't win even a single match.

From condition (i), (ii) & (iv), India and Bangladesh must have played a match at Bangalore, which India won.

From the above conclusions and from condition (ii), India must be one of the finalists.

Let us try to represent the data in a tabular form

Venue	Match 1	Winner	Match 2	Winner
Bangalore	Sri Lanka Vs Pakistan	Sri Lanka	India Vs Bangladesh	India
Mumbai	India Vs ?	India		
Chennai	India Vs ?	India		
Delhi	Bangladesh Vs ?	Bangladesh		

As Pakistan didn't play a match at Delhi, there must be only one match held at Delhi. As India is one of the finalists, India must have played matches at all the venues ⇒ India lost to Bangladesh at Delhi, which is given to be a league match.

As India and Bangladesh also played a match at Bangalore, it would be the finals of the tournament, which India won.

From above, the following conclusions can be made: India won the tournament. In the league stage Bangladesh won three matches, India won two matches, Sri Lanka won one match and Pakistan lost all the matches.

India won the tournament.   Choice (A)

Q15. DIRECTIONS *for questions 13 to 16:* **Select the correct alternative from the given choices.**
Which venue hosted the final match of the tournament?

a) Mumbai

b) Bangalore

c) Delhi

d) Chennai

The number of matches played in the league stage = $^4C_2 = \dfrac{4 \times (4-1)}{2} = 6$

Total number of matches in the tournament = 6(league stage) + 1(Final) = 7
$\Rightarrow$ Each venue hosts exactly two matches, except one venue which hosts only one match.
From condition (i), each team won a different number of matches in the league, stage.
As the maximum number of matches that a team can win is 3, the number of matches won by each of the teams must be a different number among 0, 1, 2 and 3.
From condition (iv), the team with two wins in the league stage must have won the final.
Thus, at the end of the tournament, two teams won three matches each and one team won one match and one team didn't win even a single match.
From condition (i), (ii) & (iv), India and Bangladesh must have played a match at Bangalore, which India won.
From the above conclusions and from condition (ii), India must be one of the finalists.
Let us try to represent the data in a tabular form

Venue	Match 1	Winner	Match 2	Winner
Bangalore	Sri Lanka Vs Pakistan	Sri Lanka	India Vs Bangladesh	India
Mumbai	India Vs ?	India		
Chennai	India Vs ?	India		
Delhi	Bangladesh Vs ?	Bangladesh		

As Pakistan didn't play a match at Delhi, there must be only one match held at Delhi.
As India is one of the finalists, India must have played matches at all the venues
$\Rightarrow$ India lost to Bangladesh at Delhi, which is given to be a league match.
As India and Bangladesh also played a match at Bangalore, it would be the finals of the tournament, which India won.
From above, the following conclusions can be made: India won the tournament.
In the league stage Bangladesh won three matches, India won two matches, Sri Lanka won one match and Pakistan lost all the matches.

Bangalore hosted the finals of the tournament.   Choice (B)

Q16. DIRECTIONS *for questions 13 to 16:* **Select the correct alternative from the given choices.**

In which of the following venues did each of the two finalists win the match that it played in that venue?

a) Delhi

b) Bangalore

c) Mumbai

d) More than one of the above

The number of matches played in the league stage = $^4C_2$ = $\dfrac{4 \times (4-1)}{2}$ = 6

Total number of matches in the tournament = 6(league stage) + 1(Final) = 7
⇒ Each venue hosts exactly two matches, except one venue which hosts only one match.
From condition (i), each team won a different number of matches in the league, stage.
As the maximum number of matches that a team can win is 3, the number of matches won by each of the teams must be a different number among 0, 1, 2 and 3.
From condition (iv), the team with two wins in the league stage must have won the final.
Thus, at the end of the tournament, two teams won three matches each and one team won one match and one team didn't win even a single match.
From condition (i), (ii) & (iv), India and Bangladesh must have played a match at Bangalore, which India won.
From the above conclusions and from condition (ii), India must be one of the finalists.
Let us try to represent the data in a tabular form

Venue	Match 1	Winner	Match 2	Winner
Bangalore	Sri Lanka Vs Pakistan	Sri Lanka	India Vs Bangladesh	India
Mumbai	India Vs ?	India		
Chennai	India Vs ?	India		
Delhi	Bangladesh Vs ?	Bangladesh		

As Pakistan didn't play a match at Delhi, there must be only one match held at Delhi.
As India is one of the finalists, India must have played matches at all the venues
⇒ India lost to Bangladesh at Delhi, which is given to be a league match.
As India and Bangladesh also played a match at Bangalore, it would be the finals of the tournament, which India won.
From above, the following conclusions can be made: India won the tournament.
In the league stage Bangladesh won three matches, India won two matches, Sri Lanka won one match and Pakistan lost all the matches.

. In both Mumbai and Chennai, the two finalists (India and Bangladesh) won all the matches that they played there. From the options, the answer is Mumbai.

Choice (C)

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

In a city, there are four local trains, Train 1, Train 2, Train 3 and Train 4, that travel between four stations, A, B, C, and D, which are, in that order, in a circle such that each train travels from A to B, B to C, C to D, and D to A. Each train always travels with a constant speed and stops at each station for 5 minutes. Further, each train starts its journey from a different station – Train 1 starts at Station A, Train 2 starts at Station B, Train 3 starts at Station C, and Train 4 starts at Station D. Any train which travels through all the stations once and again reaches its starting station is said to have completed one *round trip*. The chart below gives the time taken (in minutes) by each train to travel from one station to another. The time represented in the graph does not include the duration for which the trains stop at each station.
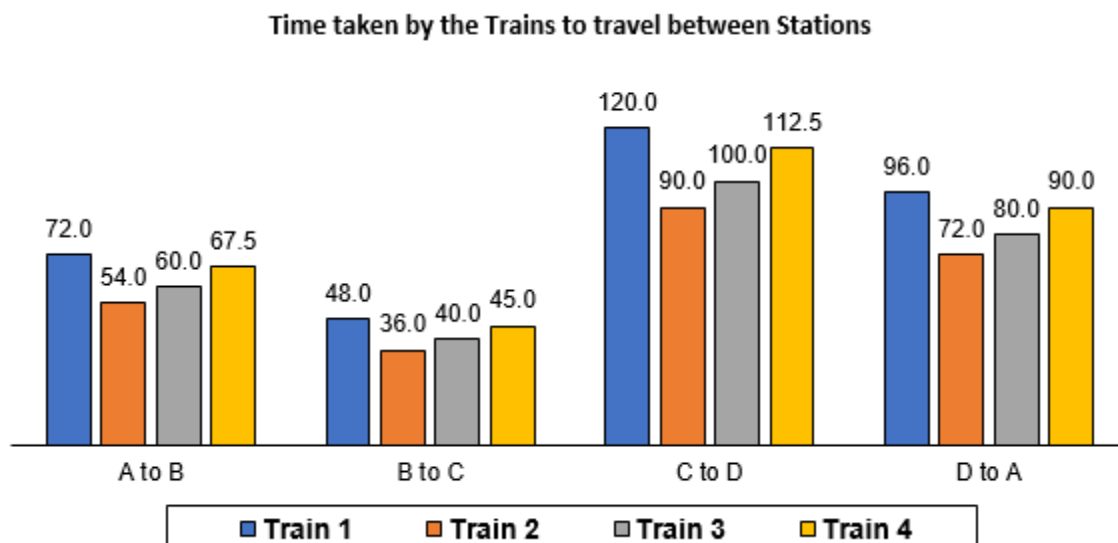
Time taken by the Trains to travel between Stations

Q17. DIRECTIONS *for questions 17 to 20:* **Select the correct alternative from the given choices. At Station A, a person gets on to Train 1 that started from its initial station at 10:00 am, and on that day, each of the other three trains started from their respective starting stations 126 minutes after Train 1 started. What is the approximate earliest time the person can reach Station D provided he can switch trains at any station, if the trains are present in the same station?**

a) 1:46 pm

b) 2:16 pm

c) 1:59 pm

d) 12 noon

Train 1 will be at Station B from 11:12 am to 11:17 am, at Station C from 12:05 pm to 12:10 pm, and will reach Station D at 2:10 pm.
Train 2 will start from Station B at 12:06 pm, and be at Station C from 12:37 pm to 12:42 pm, and reach Station D at 2:12 pm.
Train 3 will start from Station C at 12:06 pm, and reach Station D at 1:46 pm.
Train 4 will not reach Station D after finishing a round trip before any of these trains.
Hence, a person switch trains at Station C at 12:06 pm and reach station D at 1:46 pm.   Choice (A)

Q18. DIRECTIONS *for questions 17 to 20:* **Select the correct alternative from the given choices. If all the trains start at the same time at their respective stations on a certain day, what is the maximum number of trains simultaneously present at any station at any point of time before Train 3 completes its first two round trips?**

a) 3

b) 2

c) 1

d) 4

Let all the trains start their trips at 0 minutes. The following table gives the times which the trains spend at stations during the first two round trips.

Train	A	B	C	D
Train 3	-	-	-	100-105 min
	185-190 min	250-255 min	295-300 min	400-405 min
	485-490 min	550-555 min	595-600 min	
Train 1	-	72-77 min	125-130 min	250-255 min
	351-356 min	428-433 min	481-486 min	606-611 min
Train 2	-	-	36-41 min	131-136 min
	208-213 min	267-272 min	308-313 min	403-408 min
	480-485 min	539-544 min	580-585 min	675-680 min
Train 4	-	-	-	-
	90-95 min	162.5-167.5 min	212.5-217.5 min	330-335 min
	425-430 min	497.5-502.5 min	547.5-552.5 min	665-670 min

By observing the above table, we see that at Station D, Train 2 and Train 3 are present at the same time between 403 minutes and 405 minutes. Hence, there are two trains at a single station during the first two round trips. Choice (B)

Q19. DIRECTIONS *for questions 17 to 20:* **Select the correct alternative from the given choices. If all the trains start at the same time at their respective stations on a certain day, what is the maximum number of trains simultaneously present at Station C at any point of time before Train 2 completes its first two round trips?**

a) 4

b) 1

c) 2

d) 3

From the table given above, we can see that no two trains are simultaneously present at Station C at any point of time before Train 2 completes its first two round trips (i.e., before 585 minutes).   Choice (B)

On a particular day, a person, who wanted to board a train at Station B to travel to Station C, saw a train leave the station just as he entered Station B but managed to board the very next train to arrive at the station. If all the trains started at 10:00 AM at their respective stations on that day, what is the minimum time that the person could have waited in Station B (before boarding a train to Station C), given he boarded a train before 8:00 PM on that day?

a) 15 minutes

b) 12 minutes

c) 6 minutes

d) 36.5 minutes

From the table given above, if he missed Train 2 when it left the station at 544 minutes, he would have boarded the next train, i.e., Train 3, at 550 minutes. This is the minimum time that he would have taken to board the next train. Hence, the minimum time = 6 minutes.   Choice (C)

A war was declared between the kingdoms of two types of ants – type A and type B. In the war, all the 50 ants of A are in a queue facing all the 60 ants of B which are again in queue. These two queues move towards each other. Every ant of type A kills every fourth ant of type B that it encounters and every ant of type B kills every seventh ant of type A that it encounters. Any ant that is killed will be out of the queue. In the war, it is possible that an ant of one of the two types can kill as well as can be killed by the same ant. The war will be over, once the queues pass each other.

Q21.   DIRECTIONS *for questions 21 and 22:* **Type in your answer in the input box provided below the question.**
What is the maximum number of ants that any ant of type B killed in the war?

As each ant of type B kills every 7th ant of type A for first 6 ants of type A, there is no threat. Let these six ants be a_1, a_2, a_3, a_4, a_5 and a_6.

Now, a_1 kills 15 ants $\left(i.e., \dfrac{60}{4}\right)$ of type B, by leaving 45 ants, by the time it passes through the queue.
a_2 kills 11 ants of the remaining 45 ants of type B by leaving 34 ants, by the time it passes through the queue.
a_3 kills 8 ants of type B, by leaving 26 ants, by the time it passes through the queue.
a_4 kills 6 ants of type B, by leaving 20 ants, by the time it passes through the queue.
a_5 kills 5 ants of type B, by leaving 15 ants, by the time it passes through the queue.
a_6 kills 3 ants of type B, by leaving 12 ants, by the time it passes through the queue.
By this time, all those 12 ants of type B passed 6 ants of type A.
Let the first three ants be b_1, b_2, b_3.

Now, b_1 kills 7 ants $\left(i.e., \dfrac{50}{7}\right)$ of type A, by leaving 43 ants, by the time it passes through the queue.
b_2 kills 6 ants of type A, by leaving 37 ants, by the time it passes through the queue.
b_3 kills 5 ants of type A, by leaving 32 ants, by the time of passes through the queue.
Now, all these 32 ants of type A passed three ants of type B and all the 12 ants of type B passed six ants of type A.
Now, these 9 ants (i.e., 12 – 3) of type B kill and also been killed by 9 ants of type A in mutual killing.
∴ 23 (i.e., 32 – 9) ants of type A are alive.
∴ Only first three ants of type B are alive.

The maximum number of ants that any Type B ant kills is 7 (for b_1).   Ans: (7)

Q22. DIRECTIONS *for questions 21 and 22:* **Type in your answer in the input box provided below the question.**

How many ants of type A are killed?

As each ant of type B kills every 7th ant of type A for first 6 ants of type A, there is no threat. Let these six ants be a_1, a_2, a_3, a_4, a_5 and a_6.

Now, a_1 kills 15 ants $\left(\text{i.e.,}\dfrac{60}{4}\right)$ of type B, by leaving 45 ants, by the time it passes through the queue.

a_2 kills 11 ants of the remaining 45 ants of type B by leaving 34 ants, by the time it passes through the queue.

a_3 kills 8 ants of type B, by leaving 26 ants, by the time it passes through the queue.
a_4 kills 6 ants of type B, by leaving 20 ants, by the time it passes through the queue.
a_5 kills 5 ants of type B, by leaving 15 ants, by the time it passes through the queue.
a_6 kills 3 ants of type B, by leaving 12 ants, by the time it passes through the queue.
By this time, all those 12 ants of type B passed 6 ants of type A.
Let the first three ants be b_1, b_2, b_3.

Now, b_1 kills 7 ants $\left(\text{i.e.,}\dfrac{50}{7}\right)$ of type A, by leaving 43 ants, by the time it passes through the queue.

b_2 kills 6 ants of type A, by leaving 37 ants, by the time it passes through the queue.
b_3 kills 5 ants of type A, by leaving 32 ants, by the time of passes through the queue.
Now, all these 32 ants of type A passed three ants of type B and all the 12 ants of type B passed six ants of type A.
Now, these 9 ants (i.e., 12 – 3) of type B kill and also been killed by 9 ants of type A in mutual killing.
∴23 (i.e., 32 – 9) ants of type A are alive.
∴Only first three ants of type B are alive.

50 – 23 = 27 of type A are killed.   Ans: (27)

Q23. DIRECTIONS *for question 23:* **Select the correct alternative from the given choices.**

How many ants of type B are alive after the war?

a) 20

b) 10

c) 3

d) 16

As each ant of type B kills every 7th ant of type A for first 6 ants of type A, there is no threat. Let these six ants be a_1, a_2, a_3, a_4, a_5 and a_6.

Now, a_1 kills 15 ants $\left(\text{i.e.,}\dfrac{60}{4}\right)$ of type B, by leaving 45 ants, by the time it passes through the queue.

a_2 kills 11 ants of the remaining 45 ants of type B by leaving 34 ants, by the time it passes through the queue.

a_3 kills 8 ants of type B, by leaving 26 ants, by the time it passes through the queue.

a_4 kills 6 ants of type B, by leaving 20 ants, by the time it passes through the queue.

a_5 kills 5 ants of type B, by leaving 15 ants, by the time it passes through the queue.

a_6 kills 3 ants of type B, by leaving 12 ants, by the time it passes through the queue.

By this time, all those 12 ants of type B passed 6 ants of type A.

Let the first three ants be b_1, b_2, b_3.

Now, b_1 kills 7 ants $\left(\text{i.e., }\dfrac{50}{7}\right)$ of type A, by leaving 43 ants, by the time it passes through the queue.

b_2 kills 6 ants of type A, by leaving 37 ants, by the time it passes through the queue.

b_3 kills 5 ants of type A, by leaving 32 ants, by the time of passes through the queue.

Now, all these 32 ants of type A passed three ants of type B and all the 12 ants of type B passed six ants of type A.

Now, these 9 ants (i.e., $12 - 3$) of type B kill and also been killed by 9 ants of type A in mutual killing.

$\therefore 23$ (i.e., $32 - 9$) ants of type A are alive.

$\therefore$ Only first three ants of type B are alive.

Only three ants of type B are alive.   Choice (C)

Q24.   DIRECTIONS *for question 24:* **Type in your answer in the input box provided below the question.**
In total, how many ants are killed in the war?

As each ant of type B kills every 7th ant of type A for first 6 ants of type A, there is no threat. Let these six ants be a_1, a_2, a_3, a_4, a_5 and a_6.

Now, a_1 kills 15 ants $\left(\text{i.e.,}\dfrac{60}{4}\right)$ of type B, by leaving 45 ants, by the time it passes through the queue.

a_2 kills 11 ants of the remaining 45 ants of type B by leaving 34 ants, by the time it passes through the queue.

a_3 kills 8 ants of type B, by leaving 26 ants, by the time it passes through the queue.

a_4 kills 6 ants of type B, by leaving 20 ants, by the time it passes through the queue.

a_5 kills 5 ants of type B, by leaving 15 ants, by the time it passes through the queue.

a_6 kills 3 ants of type B, by leaving 12 ants, by the time it passes through the queue.

By this time, all those 12 ants of type B passed 6 ants of type A.

Let the first three ants be b_1, b_2, b_3.

Now, b_1 kills 7 ants $\left(\text{i.e.,}\right)\dfrac{50}{7}$ of type A, by leaving 43 ants, by the time it passes through the queue.

b_2 kills 6 ants of type A, by leaving 37 ants, by the time it passes through the queue.

b_3 kills 5 ants of type A, by leaving 32 ants, by the time of passes through the queue.

Now, all these 32 ants of type A passed three ants of type B and all the 12 ants of type B passed six ants of type A.

Now, these 9 ants (i.e., 12 – 3) of type B kill and also been killed by 9 ants of type A in mutual killing.

∴23 (i.e., 32 – 9) ants of type A are alive.

∴ Only first three ants of type B are alive.

In total, 110 – 3 – 23 = 84 ants are killed.   Ans: (84)

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

Company XYZ Pvt. Ltd. has six employees P, Q, R, S, T and U who joined in either May or June of 2009 and have salaries (in Rs.'000 per month) of 20, 12, 25, 15, 18 and 10 (not necessarily in the same order). There are three departments – Finance, Sales and HR – in the company and two persons in each of the departments.

The following information is also known :

   i.   **P, who does not receive the highest salary, gets a salary which is not less than that of S.**
   ii. **No person who joined in May has a salary greater than that of those who joined in June.**

iii. P and T belong to the same department and joined in the same month.
iv. Q and S did not join in the same month.
v. R and U joined in the same month and T joined one month after U.
vi. The sum of the salaries of Q and P is same as the sum of the salaries of R and S.
vii. The sum of the salaries of Q and U is the second least among all possible combinations of the salaries of any two persons.
viii. The person who gets the least salary in the HR department gets a salary, which is greater than that of the person who gets the highest salary in the Finance department.
ix. The person who gets the highest salary in the HR department gets a salary which is less than that of the person who gets the least salary in the Sales department.

Q25. DIRECTIONS *for questions 25 to 27:* Select the correct alternative from the given choices.
Which of the following persons did not join in June?

a) P

b) T

c) S

d) Q

From the last two points, the persons who work in the Finance department. have salaries of ₹10,000 and ₹12,000, those who work in the HR department. have salaries of ₹15,000 and ₹18,000 and those who work in Sales department. have salaries of ₹20,000 and ₹25,000. From (i), P's salary is higher than that of S's. From (i), (iii) and (v), P and T do not work in the Finance department. and both of them joined in June. (∵ T joined one month after U, who must have joined in May).

From the above observations (P, T) joined in June, (R, U) joined in May and one among Q and S joined in May and the other person joined in June.

From (vii), Q and U must have salaries of ₹10,000 and ₹15,000 (∵ least combination is ₹10,000 and ₹12,000).

If P and T belonged to the sales department. their salaries must be ₹15,000 and ₹18,000. But this is a contradiction as one among, Q and U has a salary of ₹15,000. ∴ The salaries of R and S must be ₹12,000 and ₹18,000 respectively. (∵ R joined in May and the salary of a person who joined in May is less than that of any other person who joined in June). Also from (ii) and the above observations, Q must have joined in May and S in June.

The above observations can be tabulated as follows:

	Month of joining	Salary (in ₹ '000 per month)	Department
P	June	20	Sales
Q	May	10	Finance
R	May	12	Finance
S	June	18	HR
T	June	25	Sales
U	May	15	HR

Q did not join in June.   Choice (D)

Q26.   DIRECTIONS *for questions 25 to 27:* Select the correct alternative from the given choices.

The combined salaries of which of the following persons is the least?

a) Q, R

b) S, Q

c) S, R

d) S, U

From the last two points, the persons who work in the Finance department. have salaries of ₹10,000 and ₹12,000, those who work in the HR department. have salaries of ₹15,000 and ₹18,000 and those who work in Sales department. have salaries of ₹20,000 and ₹25,000. From (i), P's salary is higher than that of S's. From (i), (iii) and (v), P and T do not work in the Finance department. and both of them joined in June. (∵ T joined one month after U, who must have joined in May).

From the above observations (P, T) joined in June, (R, U) joined in May and one among Q and S joined in May and the other person joined in June.

From (vii), Q and U must have salaries of ₹10,000 and ₹15,000 (∵ least combination is ₹10,000 and ₹12,000).

If P and T belonged to the sales department. their salaries must be ₹15,000 and ₹18,000. But this is a contradiction as one among, Q and U has a salary of ₹15,000. ∴ The salaries of R and S must be ₹12,000 and ₹18,000 respectively. (∵ R joined in May and the salary of a person who joined in May is less than that of any other person who joined in June). Also from (ii) and the above observations, Q must have joined in May and S in June.

The above observations can be tabulated as follows:

	Month of joining	Salary (in ₹ '000 per month)	Department
P	June	20	Sales
Q	May	10	Finance
R	May	12	Finance
S	June	18	HR
T	June	25	Sales
U	May	15	HR

The combined salaries is the least for Q and R.   Choice (A)

Q27.   DIRECTIONS *for questions 25 to 27:* **Select the correct alternative from the given choices.**

Which department does R work in?

a) Sales

b) Finance

c) HR

d) Either Sales or HR

From the last two points, the persons who work in the Finance department. have salaries of ₹10,000 and ₹12,000, those who work in the HR department. have salaries of ₹15,000 and ₹18,000 and those who work in Sales department. have salaries of ₹20,000 and ₹25,000. From (i), P's salary is higher than that of S's. From (i), (iii) and (v), P and T do not work in the Finance department. and both of them joined in June. (∵ T joined one month after U, who must have joined in May).

From the above observations (P, T) joined in June, (R, U) joined in May and one among Q and S joined in May and the other person joined in June.

From (vii), Q and U must have salaries of ₹10,000 and ₹15,000 (∵ least combination is ₹10,000 and ₹12,000).

If P and T belonged to the sales department. their salaries must be ₹15,000 and ₹18,000. But this is a contradiction as one among, Q and U has a salary of ₹15,000. ∴ The salaries of R and S must be ₹12,000 and ₹18,000 respectively. (∵ R joined in May and the salary of a person who joined in May is less than that of any other person who joined in June). Also from (ii) and the above observations, Q must have joined in May and S in June.

The above observations can be tabulated as follows:

	Month of joining	Salary (in ₹ '000 per month)	Department
P	June	20	Sales
Q	May	10	Finance
R	May	12	Finance
S	June	18	HR
T	June	25	Sales
U	May	15	HR

R works in the Finance department.   Choice (B)

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

The number of employees who joined in May and do not work in the sales department is

From the last two points, the persons who work in the Finance department. have salaries of ₹10,000 and ₹12,000, those who work in the HR department. have salaries of ₹15,000 and ₹18,000 and those who work in Sales department. have salaries of ₹20,000 and ₹25,000. From (i), P's salary is higher than that of S's. From (i), (iii) and (v), P and T do not work in the Finance department. and both of them joined in June. (∵ T joined one month after U, who must have joined in May).

From the above observations (P, T) joined in June, (R, U) joined in May and one among Q and S joined in May and the other person joined in June.

From (vii), Q and U must have salaries of ₹10,000 and ₹15,000 (∵ least combination is ₹10,000 and ₹12,000).

If P and T belonged to the sales department. their salaries must be ₹15,000 and ₹18,000. But this is a contradiction as one among, Q and U has a salary of ₹15,000. ∴ The salaries of R and S must be ₹12,000 and ₹18,000 respectively. (∵ R joined in May and the salary of a person who joined in May is less than that of any other person who joined in June). Also from (ii) and the above observations, Q must have joined in May and S in June.

The above observations can be tabulated as follows:

	Month of joining	Salary (in ₹ '000 per month)	Department
P	June	20	Sales
Q	May	10	Finance
R	May	12	Finance
S	June	18	HR
T	June	25	Sales
U	May	15	HR

The required number of employees is 3.   Ans: (3)

DIRECTIONS *for questions 29 to 32:* **Answer the questions on the basis of the information given below.**

There are six persons, A, B, C, D, E and F, who together completed tasks 1 to 6, with each person doing some part of each task. The following graph shows the distribution of the efforts put in by each of the six persons in these six tasks.
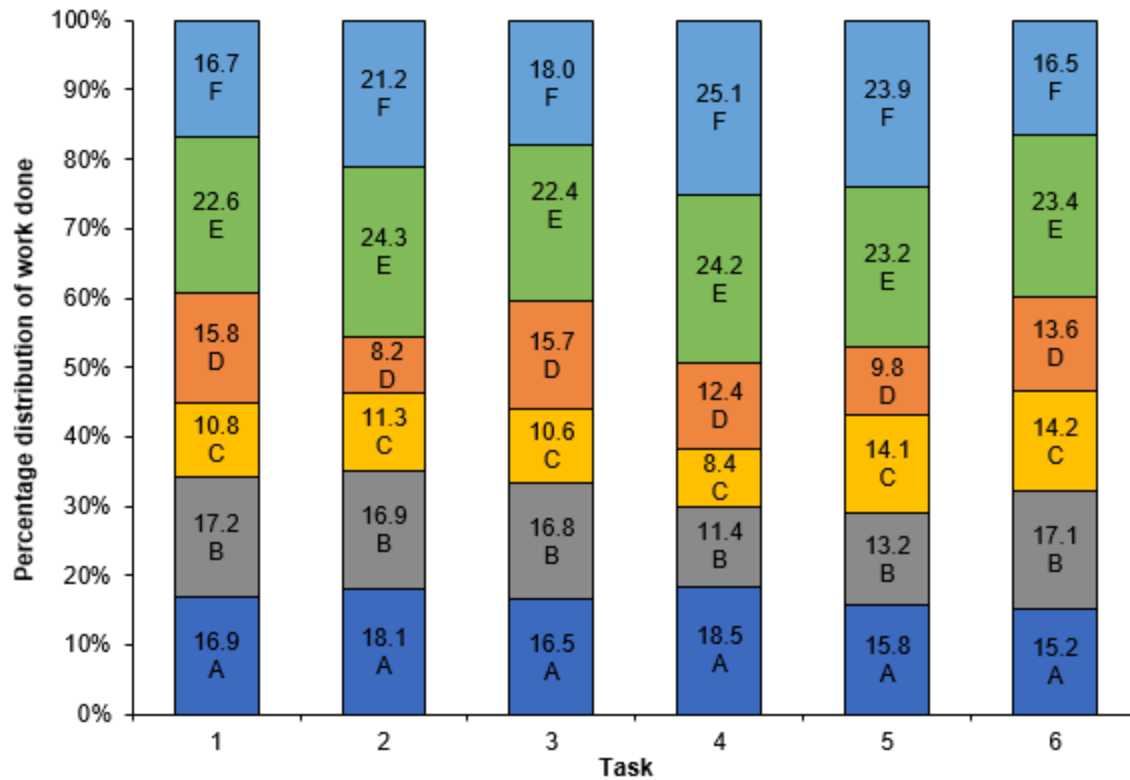
Q29.
DIRECTIONS *for questions 29 to 31:* Select the correct alternative from the given choices.

Suppose the given graph was for the work intended to be done, but the persons interchanged their work as follows: First B and C, then C and D, and then D and E. After this the work is done. Now if task 3 is considered and the six persons are ranked according to the distribution of work done in the descending order, what is the rank of E?

a) 2

b) 3

c) 4

d) 5

The interchange of work is as follows:

B ↔ C, C ↔ D and D ↔ E

∴ The work intended for B is done by E.

∴E will do 16.8% of task 3, which is the third highest.   Choice (B)

Q30.
DIRECTIONS *for questions 29 to 31:* Select the correct alternative from the given choices.

If for task 4, all persons other than A decide to evenly share their work, what would be the change in the percentage distribution of work done by E?

a) Reduction of 5.2 percentage points

b) Reduction of 6.4 percentage points

c) Reduction of 7.9 percentage points

d) Reduction of 9.2 percentage points

Total work = 100 – 18.5 = 81.5
No. of persons = 5

∴Work done by each persons $\dfrac{81.5}{5} = 16.3$

Change for E = 24.2 – 16.3 = 7.9   Choice (C)

Q31.
DIRECTIONS *for questions 29 to 31:* Select the correct alternative from the given choices.

Suppose persons B, C and D drop out and the remaining persons redistribute the work of these persons equally among themselves. Then, across all tasks, who has the maximum share in any task?

a) Person E, task 1

b) Person F, task 5

c) Person E, task 6

d) Person E, task 2

By observation, the maximum contribution of B, C and D is in task 6 which is approximately 45% when 1/3 of the work done by B, C and D gets added to each of the others. The maximum will be for E, in task 6, which is 23.4 + 15 = 38.4% of total work.   Choice (C)

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

If F dropped out of all the six tasks and his share of work is equally distributed between C and D, the number of tasks in which E's share of work is more than that of C's share of work is

If F's share of work is equally distributed between C and D, then C's shares of work in tasks 1, 2, 3, 4, 5 and 6 become 19.15, 21.9, 19.6, 20.95, 26.05 and 22.45 respectively.
By observation, we can see that E's share of work is more than C's in five tasks, i.e., tasks 1, 2, 3, 4 and 6.   Ans: (5)

QA

Q1. DIRECTIONS *for questions 1 and 2:* **Select the correct alternative from the given choices. The age of a father was three times that of his son when the father was as old as the son is now. Find the ratio of the present ages of the father and the son.**

a) 3 : 2

b) 2 : 1

c) 5 : 3 ✓ **Your answer is correct**

d) 5 : 2

Let the present age of the son be x.

When the age of the father was x, the age of the son was $\dfrac{x}{3}$ .We can tabulate this as follows:

	Father	Son
Present		x
Past	x	$\dfrac{x}{3}$

∴ The difference in the time periods = $x - \dfrac{x}{3} = \dfrac{2x}{3}$

∴ Present age of father = $x + \dfrac{2x}{3} = \dfrac{5x}{3}$

∴ Ratio of the ages = $\dfrac{5x}{3} : x = 5 : 3.$ Choice (C)

Q2. DIRECTIONS *for questions 1 and 2:* **Select the correct alternative from the given choices. If the average of 60 numbers is 40, whereas the average of 40 other numbers is 60, what is the average of all the 100 numbers taken together?**

a) 48 ✓ **Your answer is correct**

b) 50

c) 52

d) None of the above

The sum of all 100 numbers = 60 × 40 + 40 × 60 = 4800

Therefore the average of all 100 numbers = $\dfrac{4800}{100}$ = 48   Choice (A)

Q3. DIRECTIONS *for question 3:* **Type in your answer in the input box provided below the question.**
The cost of 20 pens, 22 erasers and 25 sharpeners is Rs.196. The cost of 23 pens, 27 erasers and 30 sharpeners is Rs.233. If the cost of 109 pens, 125 erasers and 140 sharpeners is Rs.K, what is the value of K?

Let the costs of each pen, each eraser and each sharpener be ₹p, ₹e and ₹s respectively,
20p + 22e + 25s = 196 --------- (1)
23p + 27e + 30s = 233 --------- (2)
109p + 125e + 140s = K --------- (3)
Suppose multiplying (1) by x and (2) by y results in the third equation, then (20x + 23y)
p = 109 p
i.e., 20x + 23y = 109 --------- (4)
and (22x + 27y) e = 125 e
i.e. ⇒ 22x + 27y = 125 ----------- (5)
Solving (4) and (5), x = 2 and y = 3.
Further, (25x + 30y)s = 140s is also satisfied if x = 2 and y = 3.
Hence, K = 196(2) + 233(3) = 1091.   Ans: (1091)

Q4. DIRECTIONS *for question 4:* **Select the correct alternative from the given choices.**
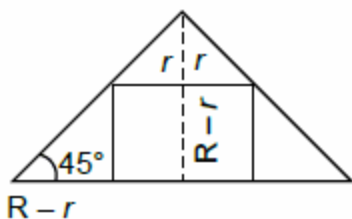
In a right circular cone, AB is a diameter of the base, V is the vertex and $\angle AVB = 90°$. Of all the right circular cylinders that can be inserted in the cone, the one with the greatest volume is L. If the radius of L is $6\frac{2}{3}$ cm, find the volume of the cone.

a) $\dfrac{100\pi}{3}$ cc

b) $\dfrac{500\pi}{3}$ cc

c) $\dfrac{1000\pi}{3}$ cc

d) $\dfrac{2000\pi}{3}$ cc

Let R and r be the radii of the cone and inscribed cylinder respectively. Volume of cylinder $(V) = \pi r^2 (R - r) = 4\pi \left(\dfrac{r}{2}\right)\left(\dfrac{r}{2}\right)(R-r)$. As the sum of the 3 factors is constant $\left(\dfrac{r}{2} + \dfrac{r}{2} + R - r = R\right)$, the product is max when they are all equal i.e., when $\dfrac{r}{2} = R - r$ or

$r = \dfrac{2}{3}R$. As $r = 6\dfrac{2}{3}$, if follows that R = 10.

Volume of cone $= \dfrac{1}{3}\pi R^2(R) = \dfrac{1000\pi}{3}$ cc.   Choice (C)

Q5. DIRECTIONS *for question 5:* **Type in your answer in the input box provided below the question.**

If x + y + xy = 44, where x and y are positive integers, then how many ordered pairs (x, y) satisfy the given condition?

$x + y + xy = 44 \Rightarrow x + y + xy + 1 = 45$

$(x + 1)(y + 1) = 45$

Thus we need to write 45 as a product of two factors

$45 = 1 \times 45$

$\qquad 3 \times 15$

$\qquad 5 \times 9$

As x and y are positive integers the case of 1, 45 is not possible. Thus the ordered pairs (x, y) can be (2, 14), (14, 2), (4, 8) and (8, 4).

Thus four ordered pairs satisfy the given condition.   Ans: (4)

Q6. DIRECTIONS *for question 6 and 7:* **Select the correct alternative from the given choices.**

If the sum of four consecutive positive odd integers is a perfect cube, which of the following can be one of the numbers?

a) 253   ✔ **Your answer is correct**

b) 133

c) 49

d) 343

Let x be the average of the four consecutive odd numbers.

∴ Sum of the four numbers = 4x. Given this is a perfect cube. If 4x has to be a perfect cube, then x must be of the form $2k^3$.

⇒ The numbers must be of the from $2k^3 - 3$, $2k^3 - 1$, $2k^3 + 1$, $2k^3 + 3$

K = 3, ⇒ The numbers are 51, 53, 55, 57

K = 4, ⇒ The numbers are 125, 127, 129, 131

K = 5 ⇒ the numbers are 247, 249,. 251, 253

K = 6 ⇒ the numbers are 509, 511, 513, 515

⇒ only 253 is possible.

Alternative Solution:

Assume the four odd numbers. as 2n − 3, 2n − 1, 2n + 1, 2n + 3.

Sum = 8n.

If 8n is a perfect cube, then n is a perfect cube.

n = 27, the numbers are 51, 53, 55, 57

n = 64, the numbers are 125, 127, 129, 131

n = 125, the number are 247, 249, 251, 253.

Of the given choices, only 253 satisfies.   Choice (A)

Q7. DIRECTIONS *for question 6 and 7:* **Select the correct alternative from the given choices.**
The lines **4x + 5y = 134** and **y = mx + 16** intersect at points whose coordinates are integers.
Find the number of positive integer values that **m** can assume.

a) 1

b) 2

c) 3

d) 4

Given $4x + 5y = 134$

$\Rightarrow y = \dfrac{134 - 4x}{5}$ --------- (A)

$y = mx + 16$ -------------- (B)

From (A) and (B), $mx + 16 = \dfrac{134 - 4x}{5}$

$5mx + 80 = 134 - 4x \Rightarrow (5m + 4) x = 54$
Since $m \in N$, $x \in N$.
Now consider the factors of 54 i.e., 1, 2, 3, 6, 9, 18, 27 and 54.
Out of these only 9 and 54 can be expressed as $5m + 4$ i.e., $m = 1$ and $m = 10$ are the
two possible values.   Choice (B)

Q8. DIRECTIONS *for question 8:* **Type in your answer in the input box provided below the question.**
There are 88 students in a class. Each student likes at least one of the three games Cricket, Football and Volleyball, while 4 students like all the three games. The number of students who like only Volleyball is twice the number of students who like only Cricket. The number of students who like only Cricket and Volleyball, the number of students who like only Football and Volleyball and the number of students who like only Cricket and Football are in the ratio 1 : 2 : 2. The number of students who like only Football and Volleyball and those who like only Football are in the ratio 2 : 3. Find the maximum possible number of students who like only Cricket and Football.

Q9. DIRECTIONS *for questions 9 to 12:* **Select the correct alternative from the given choices.**
Rinku goes to a shop with Rs.60 to purchase two types of chocolates – 'Tik-Tak' and 'Rock-n-Roll', each costing Rs.2 and Rs.3 respectively. If Rinku buys at least one chocolate of each type and the number of Rock-n-Roll chocolates purchased are more than those of Tik-Tak, then the number of possible combinations of the two types of chocolates that Rinku could have bought spending the entire amount is

a) 4

b) 3 ✔ **Your answer is correct**

c) 10

d) 9

Let x and y be the number of Tik-Tak and 'Rock-n-Roll' chocolates purchased.
Since the entire amount has to be spent
$2x + 3y = 60$
$\Rightarrow x + \dfrac{3y}{2} = 30.$
Since y is an integer, $y = 2k$ where k is an integer greater than or equal to 1.
$\Rightarrow x = 30 - 3k$ since both x, y ≥ 1, $30 - 3k \geq 1$
$\Rightarrow k \leq 9.$
Given that the number of Rock-n-Roll chocolates purchased must be higher than that of Tik-Tak.
$\Rightarrow 2k > 30 - 3k \Rightarrow k > 6$
$\therefore 9 \geq K > 6$
$\Rightarrow K = 7, 8, 9$ i.e., 3 values.   Choice (B)

Q10. DIRECTIONS *for questions 9 to 12:* **Select the correct alternative from the given choices.**

M and N are two stations on a railway line. A single rail track is present between these stations. X, Y and Z are three trains that run between M and N. X runs half as fast as Y, which, in turn, runs at a speed $33\dfrac{1}{3}$% less than that of Z. Each day, X leaves M at 7:00 a.m., for N, and as soon as it reaches N, Z starts from N and reaches M at 9:00 a.m. One day, X started 24 minutes behind schedule but increased its speed by $11\dfrac{1}{9}$% to try to catch up on the schedule. If Z also increased its speed and reached M at the usual time, find the ratio of the speeds of Z and X, on that day.

a) 23 : 5

b) 31 : 5

c) 27 : 5

d) 29 : 5

Let the initial speeds of X, Y and Z be x, y and z respectively.

$x = \dfrac{y}{2}$ and $y = z - \dfrac{1}{3}z = \dfrac{2}{3}z$

$\therefore x = \dfrac{1}{3}\,z$ ------- (1)

Total time of travel of x and z, usually = 2 hours.

$\Rightarrow$ Usually z runs for 30 minutes and x runs for 90 minutes. On the day that X runs 24 minutes behind schedule, total time of travel = 96 minutes. X increased its speed by $11\dfrac{1}{9}$ %. i.e., by $\dfrac{1}{9}$th of its original speed.

$\therefore$ New time travel of $x = \dfrac{9}{10}(90) = 81$ minutes. Z must have travelled for 96 − 81 = 15 minutes.

$\therefore$ z doubled its speed (since it usually takes 30 minutes).

$\therefore$ Required ratio = $(z)\,(2) : (x)\left(\dfrac{10}{9}\right)$

$= (3x)\,(2) : (x)\left(\dfrac{10}{9}\right) = 27 : 5.$ Choice (C)

Q11. DIRECTIONS *for questions 9 to 12:* **Select the correct alternative from the given choices.**
Anoop found the product, P, of two two-digit natural numbers, M and N. He then reversed the digits of each of M and N and found the product of the resultant numbers. Interestingly, he found both products to be the same. If the product of the tens digit of M and the tens digit of N is prime, find the sum of all the possible values of P that Anoop could have obtained.

a) 2604

b) 2712

c) 4664

d) 4684

Let the two digit numbers be $10a + b$ and $10c + d$
∴ $p = (10a + b)(10c + d) = (10b + a)(10d + c)$
$100ac + 10ad + 10bc + bd = 100bd + 10bc + 10ad + 10ac$
$99ac = 99bd$
$ac = bd$
It is known that ac is prime. Whenever the product of two whole numbers is prime, one of them must be 1 and the other must be the prime number.
As product of a and c is prime, one of them must be one. The other digit must be prime.
∴ The other digit could be 2 or 3 or 5 or 7.
∴ $ac = bd = 2$ or 3 or 5 or 7.
bd must also have one digit as prime and the other digit as 2 or 3 or 5 or 7.
The possible products of (ab) and (cd) are (11) (22), (12) (21), (11) (33), (13) (31), (11) (55), (15) (51), (11) (77) and (17) (71) i.e., 242, 252, 363, 403, 605, 765, 847 and 1207. Therefore the sum of all possible products = 4684.   Choice (D)

Q12. DIRECTIONS *for questions 9 to 12:* **Select the correct alternative from the given choices.**
At a particular instant, the angle of elevation of a bird, as observed from a point P, 200 m above a lake, is found to be 30°. At the same instant, the angle of depression of the bird's reflection in the lake, as observed from the same point P, is found to be 60°. Find the height at which the bird is flying above the lake at the given instant.

Note: Assume that the bird and its reflection are equidistant from the surface of the lake.
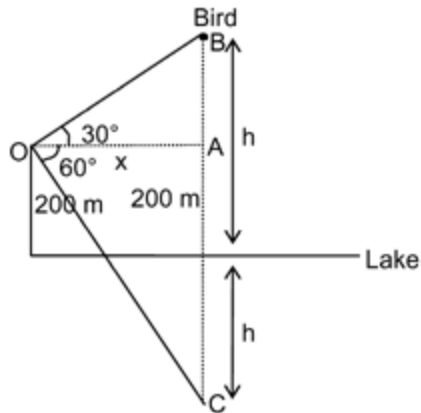
a) $400\,\dfrac{\sqrt{3}}{3}$ m

b) 800 m

c) 400 m

d) $400\sqrt{3}$ m

The given situation can be represented as follows.

Let 'O' be the point of observation.

In $\triangle OAB$, $\tan 30° = \dfrac{h - 200}{x}$

$\Rightarrow x = \sqrt{3}\,(h - 200)$ ------- (1)

In $\triangle OAC$, $\tan 60° = \dfrac{h + 200}{x}$

$x = \dfrac{h + 200}{\sqrt{3}}$ ------ (2)

From (1) and (2)

$\sqrt{3}\,(h - 200) = \dfrac{h + 200}{\sqrt{3}}$

$3h - 600 = h + 200$ or $h = 400$ m.   Choice (C)

Note: The image (or reflection) of an object in a mirror (or a water surface) is formed at a distance equal to that between the object and the mirror (or water surface), but on the other side.

Q13.   DIRECTIONS *for question 13:* **Type in your answer in the input box provided below the question.**

In how many ways can three girls and four boys be seated in a row comprising seven chairs, such that both the extreme positions are occupied by boys and no two girls occupy adjacent positions?

The given conditions of seating will be satisfied if the boys sit in seat 1, seat 3, seat 5 and seat 7.
We arrange the four boys in 4! Or 24 ways.
Let us denote one such arrangement as follows:
B _ B _ B _ B
Now, the three girls can be arranged in between the boys in 3! Or 6 ways.
Therefore, total number of arrangements = (4!) (3!)
= 144 ways   Ans: (144)

Q14. DIRECTIONS *for question 14:* **Select the correct alternative from the given choices.**

In a series, the nth term $t_n = \dfrac{n^2}{n^2-1}[t_{n+1}]$, for all $n \geq 2$. If $t_5 = 6$, find the value of t_{25}.

a) 26

b) 26/5

c) 5

d) 13/5   ✗ **Your answer is incorrect**

$t_{n+1} = t_n \left(\dfrac{n-1}{n}\right)\left(\dfrac{n+1}{n}\right) \quad ------ (1)$

Replacing n with $n + 1$

$t_{n+2} = t_{n+1} \dfrac{n}{n+1} \dfrac{n+2}{n+1} \quad ----- (2)$

$\therefore t_{n+2} = t_n \dfrac{n-1}{n} \dfrac{n+2}{n+1}$ (from (1), (2))

Similarly, $t_{n+3} = t_n \left(\dfrac{n-1}{n}\right)\left(\dfrac{n+3}{n+2}\right)$ and $t_{n+20} = t_n \left(\dfrac{n-1}{n}\right)\left(\dfrac{n+20}{n+19}\right)$

$\therefore t_{25} = t_5 \left(\dfrac{4}{5}\right)\left(\dfrac{25}{24}\right) = 5$ Choice (C)

Q15. DIRECTIONS *for question 15:* **Type in your answer in the input box provided below the question.**

If N is the greatest possible number which leaves remainders of 3 and 7 when it divides 171 and 247 respectively, what is the remainder when N divides 800?

N = Largest possible number
= H.C.F. (171 − 3, 247 − 7)
= H.C.F. (168, 240) = 24
When 24 divides 800, the remainder is 8.   Ans: (8)

DIRECTIONS *for questions 16 and 17:* **Answer the questions on the basis of the information given below.**

Each of six friends A, B, C, D, E and F can complete a piece of work in *a, b, c, d, e* and *f* days respectively, when working alone. The six friends were scheduled to work in such a way that exactly two of the six persons work on any day, with no group of the same two persons working on more than one day. However, working in this manner, they could finish only $1/k$th of the work by the time all the possible pairs of persons had worked once.

Q16. DIRECTIONS *for question 16:* **Type in your answer in the input box provided below the question.**
If $k = 11/5$ and it is known that $a = 2b$, $b = 3c$, $c = 4d$, $d = 5e$, $e = 6f$, then find the number of days in which the entire work was completed, given that all the six friends worked together on the remaining part of the work.

It is not necessary to refer to the individual capacities of the persons for their question. This is since, by the time all possible pairs of person have worked together, each of six persons would have worked on exactly 6 days (each day with a different person among the other five persons).

∴ In $^6C_2$ (= 15) days, each person worked on exactly 5 days and completed $\dfrac{5}{11}$ of the work.

∴ All persons, working 5 days each → $\dfrac{5}{11}$ th of the work.

⇒ All persons working together for, say, 'x' days do the rest of the work

$\left(\text{i.e., } 1 - \dfrac{5}{11} = \dfrac{6}{11} \right)$ in 6 days.

⇒ Total of 15 + 6 = 21 days for the entire work to the completed.   Ans: (21)

Q17. DIRECTIONS *for question 17:* **Select the correct alternative from the given choices.**
If $k = \dfrac{10}{7}$ and it is known that $e = 3c = 2f = 5d = 4b = 6a$, then find the minimum number of days in which the work can be completed, given that the remaining part of the work was completed with exactly three persons (out of the six) working on any day, with no group of the same three persons working on more than one day.

a)

$17\dfrac{50}{51}$

b)

$17\dfrac{21}{52}$

c)

$18\dfrac{3}{13}$

d)

$18\dfrac{1}{4}$

The capacities (work done per day) of the persons will be $\dfrac{1}{a}, \dfrac{1}{b}, \dfrac{1}{c}, \dfrac{1}{d}, \dfrac{1}{e}$ and $\dfrac{1}{f}$

Given $e = 3c = 2f = 5d = 4b = 6a = k$ (say) (the relation among number of days)

$\Rightarrow$ The ratio of efficiencies of e, c, f, d, b and a

$= \dfrac{1}{k} : \dfrac{3}{k} : \dfrac{2}{k} : \dfrac{5}{k} : \dfrac{4}{k} : \dfrac{6}{k}$

$= 1 : 3 : 2 : 5 : 4 : 6.$

∴ Let actual work done per day by e, c, f, d, b and a be w, $3w$, $2w$, $5w$, $4w$ and $6w$ respectively.

Also, working in pairs each person worked on 5 days (from previous solution)

$\Rightarrow 5 \times (w + 2w + 3w + 4w + 5w + 6w)$

$= \dfrac{7}{10}$ of W (total work)

$\Rightarrow$ remaining work $= \dfrac{3}{10}$ of W

$= \dfrac{3}{7} \times 5 \times 21w = 45w$

Now, the most efficient triplets should work on successive days to finish the work the quickest.

Hence, $45w - (6w + 5w + 4w) - (6w + 5w + 3w) - (6w + 5w + 2w) = 3w$

Hence, after 18 days, only $3w$ of the work is remaining.

This $3w$ work will be completed by

the triplet $(6w + 4w + 3w)$ in $\dfrac{3w}{13w} = \dfrac{3}{13}^{th}$ of a day.

∴ $15 + 3 + \dfrac{3}{13} \Rightarrow$ a minimum of $18\dfrac{3}{13}$ days.   Choice (C)

Q18.   DIRECTIONS *for questions 18 to 20:* **Select the correct alternative from the given choices. Aman and Bhanu ran a business after investing some money together. At the end of the first year, out of a total profit of Rs.1000, Aman gets Rs.400, which is Rs.25 more than what he would have got if he had invested Rs.3000 less and Bhanu had invested Rs.1000 less. Find Bhanu's share of the profit, if Aman had invested Rs.3000 more and Bhanu had invested Rs.3000 less. (Assume the same profit in all cases)**

a) Rs.320

b) Rs.375

c) Rs.550

d) Rs.500

Let the capitals of Aman and Bhanu be in the ratio of $a : b$
i.e., $a/b = 400/600 = 2/3$ --------- (1)
further $a - 3000/ b - 1000 = 375/625 = 3/5$ --------- (2)
Solving (1) and (2)
We get $3a - 2b = 0$
$\qquad 5a - 3b = 12000$
or $9a - 6b = 0$
$\quad 10a - 6b = 24000$
$\quad - \qquad + \qquad -$

$\Rightarrow a = 24000$
where $b = 36,000$
If Aman had invested 3000 more and Bhanu had invest 3000 less then
$a : b = (24000 + 3000) : (36000 - 3000)$
$9 : 11$
$\therefore$ Bhanu's share = Profit $\times$ 11/(11 + 9)
$= 1000 \times 11/20 = 550$ 　　　　　　　　　　　　　　　　Choice (C)

Q19. DIRECTIONS *for questions 18 to 20:* **Select the correct alternative from the given choices.**
If a and c are positive, and the roots of the quadratic equation $(a^2 + b^2)x^2 + 2(ab + bc)x + (b^2 + c^2) = 0$ are real, find the minimum possible value of the quadratic expression $ax^2 + bx + c$.

a)

$$\frac{-3c}{4}$$

b)

$$-\frac{c}{2}$$

c)

$$\frac{c}{2}$$

d)

$$\frac{3c}{4}$$

Discriminant of the quadratic equation
$= [2(ba + bc)]^2 - 4 (a^2 + b^2) (b^2 + c^2) = - 4(b^2 - ac)^2$
As the roots are real the discriminant ≥ 0. Hence, $b^2 - ac$ must be equal to 0.
$\Rightarrow b^2 = ac$
$\therefore$ The minimum value of the quadratic expression $ax^2 + bx + c$

$$= \frac{4ac - b^2}{4a} = \frac{4ac - ac}{4a} = \frac{3c}{4}$$

Alternative solution:

Rearranging the terms in the given expression, we can arrive at $(ax + b)^2 + (bx + c)^2 = 0$

$$\Rightarrow x = \frac{-b}{a} = \frac{-c}{a} \Rightarrow b^2 = ac.$$

Now, proceed as given above   Choice (D)

Q20. DIRECTIONS *for questions 18 to 20:* **Select the correct alternative from the given choices.**
Grant the Ant crawled two miles north, then one mile east, then half a mile south, then one-fourth mile west, one-eighth mile north, one-sixteenth mile east, and so on indefinitely. The point at which Grant converged (where it found itself going around in circles) was how far from the starting point?

a)

$$\frac{4}{\sqrt{5}} \text{ miles}$$

b)

$\dfrac{6}{\sqrt{5}}$ miles

c)

$\sqrt{5}$ miles

d)

$2\sqrt{2}$ miles

Let the ant be initially at O.
The vertical displacement made

$$= 2 - \frac{1}{2} + \frac{1}{8} - \frac{1}{32} + \ldots = \frac{2}{1 - \left(-\frac{1}{4}\right)} = \frac{8}{5}$$
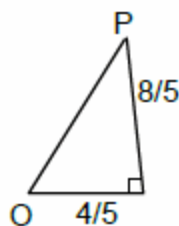
[The series is an infinite G.P with common ratio of (–1/4)]
The horizontal displacement made

$$= 1 - \frac{1}{4} + \frac{1}{16} - \frac{1}{64} + \ldots = \frac{1}{1 - \left(-\frac{1}{4}\right)} = \frac{4}{5}$$

[The series is an infinite GP with common ratio of (–1/4)]
Let the point to which the ant converges be P.

$$\overline{OP} = \sqrt{\left(\frac{8}{5}\right)^2 + \left(\frac{4}{5}\right)^2} = \frac{4}{5} \times \sqrt{5} = \frac{4}{\sqrt{5}}$$

Choice (A)

Q21. DIRECTIONS *for question 21:* **Type in your answer in the input box provided below the question.**

Ajay added the first _n_ natural numbers. However, he added one of the numbers twice, by mistake, and obtained the sum as 640. Find the number that was added twice.

Let the mistake be _x_ and the number of natural numbers added be _n_.

The sum of the first _n_ natural numbers is $S_n = \dfrac{n(n+1)}{2}$.

$\dfrac{n(n+1)}{2} + x = 640$

When $n = 35$, $S_n = 630$

Hence $x = 640 - 630 = 10$

When $n = 36$, $S_n = 666$

For $n = 34$, $S_n = 595$ and x has to be 45, which is not possible.   Ans: (10)

Q22. DIRECTIONS *for question 22:* **Select the correct alternative from the given choices.**
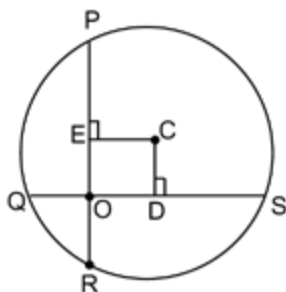
Along the periphery of a circular park of radius 80 m, are located four Gulmohar trees at points P, Q, R, S. Supandi, a regular visitor to the park, notices that the line joining points P and R perpendicularly intersects the line joining point Q and S at point O. Find PS$_2$ + QR$_2$.

a) 6400 sq.m

b) 25600 sq.m

c) 12800 sq.m

d) Cannot be determined

From secant theorem
OQ . OS = OP . OR
From the figure,
$OD = CE \Rightarrow OD^2 = CE^2$

$$OD^2 = (QD - QO)^2 = \left(\frac{QS}{2} - QO\right)^2 = \left(\frac{OQ + OS}{2} - OQ\right)^2$$

$$CE^2 = CP^2 - PE^2 = r^2 - \left(\frac{PR}{2}\right)^2 = r^2 - \left(\frac{OP + OR}{2}\right)^2$$

$$\Rightarrow \left(\frac{OQ + OS}{2} - OQ\right)^2 = r^2 - \left(\frac{OP + OR}{2}\right)^2$$

$\Rightarrow (OS - OQ)^2 = 4r^2 - (OP + OR)^2$
$\Rightarrow OS^2 + OQ^2 - 2(OS)(OQ)$
$= 4r^2 - (OP^2 + OR^2 + 2(OP) \cdot (OR)$
$\Rightarrow OP^2 + OQ^2 + OR^2 + OS^2 = 4r^2$
$\Rightarrow QR^2 + PS^2 = 4r^2 = 25600$

Alternative Solution:

The intersection point could be considered to be either the center of the circle or on the periphery of the circle (as limiting cases)
If it is centre of circle then it is obvious that
$QR^2 + PS^2 = 4r^2$
If it is on periphery, let Q, O & R coincide

OPS is right angled triangle $\Rightarrow$ PS is diameter.
$QR^2 + PS^2 = 4r^2$ Choice (B)

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

Find the value of x, if $\log_4 32 + \log_4 128 = \log_2 16 + \log_2 \sqrt{x}$

$\log_4 32 + \log_4 128 = \log_4 (32)(128)$

$\log_{2^2} (2^5)(2^7)$

$\dfrac{1}{2}\log (2^{12})$

$\dfrac{12}{2}\log_2 2 = 6$

$\therefore \log_2 16 + \log_2 \sqrt{x} = 6 \Rightarrow 4 + \log_2 \sqrt{x} = 6$

$\Rightarrow \log_2 \sqrt{x} = 2 \Rightarrow \sqrt{x} = 4$

$\Rightarrow x = 16$
                                                                                          Ans: (16)

Q24. DIRECTIONS *for question 24:* **Select the correct alternative from the given choices.**

If a, b, c, d are four positive numbers, not all of which are equal, and $\dfrac{a^2 + b^2 + c^2 + d^2}{ab + bc + cd + da} = x$, which of the following is necessarily true?

a) $x > 2$

b) $x < 3$

c) $x > 1$ ✔ **Your answer is correct**

d) $x < 4$

a, b, c, d are 4 real numbers, not all of which are equal.

$\therefore 2ab \le a^2 + b^2$

$2bc \le b^2 + c^2$

$2cd \le c^2 + d^2$

$2da \le d^2 + a^2$

$\therefore ab + bc + cd + da \le a^2 + b^2 + c^2 + d^2$

In each relation above, the equality holds if and only if the two quantities in the relation are equal. As all the numbers a, b, c, d are not equal.

$ab + bc + cd + da < a^2 + b^2 + c^2 + d^2$

Take a = 2, b = c = d = 1,

$\therefore x = \dfrac{a^2 + b^2 + c^2 + d^2}{ab + bc + cd + da} = \dfrac{7}{6} < 2$

Choice (B), (D) need not be true.

Take a = b = c = 1 and d = 10

$a^2 + b^2 + c^2 + d^2 = 103$ and $ab + bc + cd + da = 22$

and $\dfrac{a^2 + b^2 + c^2 + d^2}{ab + bc + cd + da} = \dfrac{103}{22} = 4\dfrac{5}{22} > 4$ Choice (C)

Q25.   DIRECTIONS *for questions 25 and 26:* **Type in your answer in the input box provided below the question.**

A certain calculator has a faulty display which can display only the digits 1, 2, 3 and 4. Find the sum of all the four-digit numbers with distinct digits that the calculator can display.

Consider the digit 1. 1 can be present in either units, tens, hundreds or thousands place.

Contribution of 1 when in units place = 1×10^0

Contribution of 1 when in tens place = 1×10^1

Contribution of 1 when in hundreds place = 1×10^2

Contribution of 1 when in thousands place = 1×10^3

With 1 in units place, there can exist a total of 3! numbers. Same is the case with 1 in each of the other places.

$\therefore$ Total contribution of 1 to the sum

$= 1(10^0 + 10^1 + 10^2 + 10^3) \times 3! = (111)3! \times 1$

Similarly, contribution of 2, 3 and 4 to the sum is (1111)3! $\times$ 2, (1111) 3! $\times$ 3, (1111)3! $\times$ 4 respectively.

$\therefore$ Total sum = sum of contributions of all the digits

$= (1111)3! (1 + 2 + 3 + 4) = 66660$ Ans: (66660)

Q26. DIRECTIONS *for questions 25 and 26:* **Type in your answer in the input box provided below the question.**

If the seven-digit number N = 47a342b is divisible by 22, find the number of possible values of N.

N should be divisible by both 2 and 11
$\Rightarrow$ b should be even and (4 + a + 4 + b) − (7 + 3 + 2) = 11K
[k = 0, 1, 2, ...]
$\Rightarrow$ 8 + a + b − 12 = 11K
$\Rightarrow$ a + b − 4 = 11K
$\Rightarrow$ a + b = 11K + 4
∴ a + b = 4 or 15 and cannot be 26 or more.
When a + b = 4, b can be 0, 2 or 4 $\Rightarrow$ 3 possible values
when a + b = 15, b can be 6 or 8 $\Rightarrow$ 2 possible values
∴ A total of 5 possible values.   Ans: (5)

Q27. DIRECTIONS *for question 27:* **Select the correct alternative from the given choices.**

Two distinct positive odd integers *m* and *n* have their highest common factor as seven. What is the highest common factor of the sum and the difference of *m* and *n*?

a) 7

b) 14   ✔ **Your answer is correct**

c) 21

d) Cannot be determined

m, n are distinct positive odd integers
HCF (m, n) = 7
$m = 7k_1, n = 7k_2$
where k_1, & k_2 are distinct odd integers.
$m + n = 7(k_1 + k_2)$
Here $k_1 + k_2$ is even since k_1 & k_2 are odd.
$m - n = 7(k_1 + k_2)$
Here $k_1 - k_2$ is even since k_1, k_2 are odd.
so (m + n), (m – n) has 7 & 2 as common factors.
so HCF (m + n, m – n) = 7 x 2 = 14.   Choice (B)

Note: If the sum of two odd natural numbers is divisible by 4, the difference of the same is divisible by 2 but not by 4.

Q28.   DIRECTIONS *for question 28:* **Type in your answer in the input box provided below the question.**
There are four apples with A, four oranges with B, four bananas with C and four mangoes with D. Any two persons among A, B, C and D can exchange any number and kind of fruits as long as they exchange an equal number of fruits. Each such exchange is termed as a *transaction*. Find the minimum number of *transactions* required so that every person possess one fruit of each variety.

Let AAAA; OOOO; BBBB and MMMM denote apples, oranges, bananas and mangoes respectively.
First consider the exchange of two apples and two oranges between A and B and exchange of two bananas and two mangoes between C and D. Then after these two transactions, the fruits with A, B, C and D will be respectively: AAOO; AAOO; BBMM and BBMM.
Now an exchange of AO and BM between the persons A and C, and B and D will lead to the possession of one fruit of each variety with every person.
Hence, the minimum number of transactions required is 4.   Ans: (4)

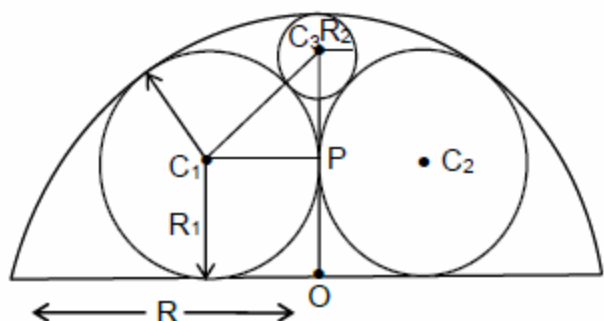Q29.   DIRECTIONS *for questions 29 to 32:* **Select the correct alternative from the given choices.**
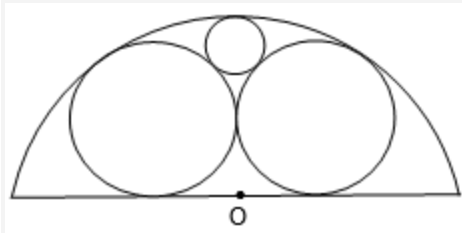
Two identical circles and a smaller circle are inscribed, (as shown in the figure) in a semi-circle of radius R. Find the radius of the smaller circle.

a) $\left(\dfrac{5\sqrt{2}}{3} - 2\right) R$

b) $\left(3 - 2\sqrt{2}\right) R$

c) $\left(2\sqrt{3} - 3\right) R$

d) $\left(\dfrac{5\sqrt{2}}{2} + 2\right) R$

In $\triangle$ PC$_1$C$_3$, PC$_1{}^2$ + PC$_3{}^2$ = C$_1$ C$_3{}^2$

$\Rightarrow$ R$_1{}^2$ + [R – (R$_1$ + R$_2$)]^2 = [R$_1$ + R$_2$]^2

$\Rightarrow$ R$_1{}^2$ + R^2 – 2R (R$_1$ + R$_2$) = 0 $\Rightarrow$ R$_2$ = $\dfrac{(R - R_1)^2}{2R}$

Also R$_1$ + $\sqrt{2}$ R$_1$ = R $\Rightarrow$ R$_1$ = $\left(\sqrt{2} - 1\right)$R

$\Rightarrow$ R$_2$ = $\dfrac{\left[1 - \left(\sqrt{2} - 1\right)\right]^2}{2}$ R = $\dfrac{\left(2 - \sqrt{2}\right)^2}{2}$ R = $\left(3 - 2\sqrt{2}\right)$R   Choice (B)

Q30. DIRECTIONS *for questions 29 to 32:* **Select the correct alternative from the given choices.**
Prithvi found that for every set of non-zero real values L, M and N, chosen such that 2(L + M) = 3(M – N), the equation Lx + My + N = 0, represents a straight line in the co-ordinate plane. If he further observed that all such straight lines pass through a common point P, then find the co-ordinates of the point P?

a) $\left(\dfrac{2}{3}, \dfrac{-1}{3}\right)$

b) $\left(\dfrac{-2}{3}, \dfrac{1}{3}\right)$

c) $\left(\dfrac{-2}{3}, \dfrac{-1}{3}\right)$

d) None of these

As the triplets satisfy the condition
$2(L + M) = 3(M - N)$,

$\Rightarrow 2L - M + 3N = 0$. By dividing by 3, we get, $L\left(\dfrac{2}{3}\right) + M\left(\dfrac{-1}{3}\right) + N = 0$

Hence, the coordinates of the point $\left(\dfrac{2}{3}, \dfrac{-1}{3}\right)$ satisfy the equations of the concurrent lines and it lies on each of these lines, i.e. it is the point of concurrence.

Choice (A)

Q31. DIRECTIONS *for questions 29 to 32:* **Select the correct alternative from the given choices.**
A shopkeeper sells a radio at 10% discount and yet manages a 10% profit. Find his profit/loss percentage, if he were to instead sell the same radio at a discount of 20%.

a)

$1\dfrac{1}{9}$% profit

b)

$1\dfrac{1}{9}$% loss

c)

$2\dfrac{2}{9}$% loss

✔ **Your answer is correct**

d)

$1\dfrac{1}{11}$% loss

Let the selling price of the radio after 10% discount be ₹99.
Then cost price must be ₹90.
(∵ he made 10% profit)
Also, the original market price = 110 (i.e., after 10% discount, selling price = ₹99)
Now, if discount is 20% new selling price = ₹110 – ₹22
= ₹88

⇒ loss = ₹90 – ₹88 = ₹2 and loss % = $\dfrac{2}{90}$ = 2.22%

= $2\dfrac{2}{9}$% loss.   Choice (C)

Q32. DIRECTIONS *for questions 29 to 32:* **Select the correct alternative from the given choices.**
Find the units digits of the LCM of $7^{3001} - 1$ and $7^{3001} + 1$.

a) 8

b) 6

c) 9

d) 4 ✔ **Your answer is correct**

$7^{3001} - 1$ and $7^{3001} + 1$ are consecutive even natural numbers.

$\therefore$ their GCD = 2

$$LCM = \frac{product}{GCD} = \frac{\left(7^{3001}\right)^2 - 1}{2} = \frac{7^{6002} - 1}{2}$$

7^{6002} ends with 9 $\Rightarrow$ ($7^{6002} - 1$) ends with 8

Since 7^{6002} is a perfect square of an odd number, its penultimate digit (tens digit) will be even.

$\therefore$ the required units digit is 4.   Choice (D)

Q33.   DIRECTIONS *for questions 33 and 34:* **Type in your answer in the input box provided below the question.**

If *p*, *q* and *r* are real numbers, such that $9p - 7q + 2r - 6 = 0$ and $2p - 6q - 9r + 7 = 0$, find the value of $q^2 - p^2 - r^2$.

It is given that,
$9p + 2r = 7q + 6$ and $2p - 9r = 6q - 7$
Squaring both sides of the two equations, we get,

$81p^2 + 36pr + 4r^2 = 49q^2 + 84q + 36$ and
$4p^2 - 36pr + 81r^2 = 36q^2 - 84q + 49$

Adding, we get
$85p^2 + 85r^2 = 85q^2 + 85$
$\Rightarrow p^2 + r^2 = q^2 + 1$
$\therefore q^2 - p^2 - r^2 = -1$ Ans: (–1)

Q34.   DIRECTIONS *for questions 33 and 34:* **Type in your answer in the input box provided below the question.**

In the number system to the base *n* (where *n* is a natural number) the difference of 5554 and 666 is 4666. Find the sum of 4555 and 444 in that number system.

Given 5554 – 666 = 4666

⇒ 4666 + 666 = 5554

Consider the sum 6 + 6 = 12.

But we have 4 in the right most place. So 12 – 4 = 8 is the base of that number system

∴ 4555
  +444

  5221

Ans: (5221)