AIMCAT 2010

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.

The nearest confirmed exoplanet – a planet orbiting a star other than the sun – is 113,000 billion kilometres away. ... Only in special circumstances can researchers see them. Mostly, they have to work with indirect measurements, like watching for slight dips in the intensity of a star's light when a planet passes in front of it, a phenomenon called 'transit'.... The most successful planet-hunting mission has been *Kepler*, a satellite launched in 2009 by NASA. ...

New ways of scrutinising exoplanets is a particular interest of Victoria Meadows [University of Washington] who recently explained how an exoplanet's atmospheric pressure may be measured. Only if that pressure is high enough, could liquid water – a prerequisite for life – exist on a planet's surface.

Dr Meadows proposes to make the measurement by looking at a planet's atmospheric oxygen. This consists mainly of diatomic molecules (O2), with a sprinkling of triatomic ones (ozone). But it also contains O2 dimers – associations between pairs of molecules, which aren't bound together strongly. The number of dimers depends on the atmospheric pressure. Higher the atmospheric pressure, more are the dimers created by oxygen molecules being squeezed together. Since molecules and dimers absorb different light frequencies, studying the spectrum of starlight that has passed through

a planetary atmosphere could reveal its atmospheric pressure. Sadly, no existing instrument is sensitive enough to use Dr Meadows's technique. But this should change in 2020 when NASA launches the *James Webb* space telescope with the largest mirror ever. ...

Dr Meadows is interested in planetary water and direct techniques for detecting oceans on other worlds. An ocean acts as a mirror, the bright reflection from which would give the ocean's existence away.

The optimum moment for seeing it is when [observed from Earth] a planet's parent star is approximately behind the planet. Then, starlight glancing off an ocean on the planet's limb will produce a glint that the same light glancing off a dull, rocky surface would not. …

This trick has been tried, using a probe bound for the moon to observe glints from Earth's oceans. Dr Meadows concludes that it would be possible to see glints from planets going around nearby stars.

Whether there will actually be any oceans to detect was the subject of a talk by Laura Schaefer [from the Harvard-Smithsonian Centre for Astrophysics] who has built a computer model to show how fast oceans will develop on different sorts of planets. This is not just a question of how much H_2O a planet harbours. On Earth, 50-90% of water is tied up in minerals. These minerals are heated and moved around by plate tectonics, liberating their aqueous content. Ms Schaefer assumes something similar goes on in rocky exoplanets (a brave assumption, since there is little sign of plate tectonics on Mercury, Venus or Mars), and put into her model information known about this grand hydrologic cycle.

She let the planets in the model evolve for ten billion years (the typical lifetime of the kind of star most planets orbit), and saw that they develop oceans, although on different schedules. An Earth-sized planet gets deep oceans quite quickly – within 500m years – but these become steadily shallower. A planet with five times Earth's mass takes about a billion years to form a shallow ocean, which then increases steadily in depth.

If oceans are crucial for life, then, on the basis of Ms Schaefer's model, biology could get a head start on an Earth-sized planet – if, as the model assumes, that planet has the same chemical composition as Earth. Finding what a planet's rocks are composed of is harder than analysing its air.

Preliminary studies suggest that the rocks may contain iron-rich silicates or corundum – a substance known as sapphire.

Q1. Which of the following best describes the function of the last sentence of the third paragraph of the passage?

a) It alludes to the fact that there is disagreement in the scientific community over the sensitivity of any existing planet-hunting space probe to spot any exoplanet currently.

b) It suggests that researchers may someday be able to determine the relationship between an exoplanet's atmospheric pressure and the liquid water it contains.

c) **It alerts the reader that current knowledge cannot completely explain the relationship suggested by the evidence presented in the passage.**

d) It indicates that scientists may someday be able to make reasonably accurate measurements of an exoplanet's atmospheric pressure.

Number of words and Explanatory notes for RC:

Number of words: 618

Refer to the third paragraph. Sadly, no existing instrument is sensitive enough to use Dr Meadows's technique. But this should change in 2020 when the *James Webb* space telescope with the largest mirror ever, will be launched by NASA.

Option A: The most successful planet-hunting mission so far has been *Kepler*, a satellite launched in 2009 by NASA. ...The penultimate sentence of the third para states: Sadly, no existing instrument is sensitive enough to use Dr Meadows's technique. So option A is incorrect because it says "sensitivity of any existing planet-hunting space probe to spot any exoplanet currently" and not "sensitive enough to use Dr Meadows's technique". Further " disagreement in the scientific community" cannot be inferred. Overall, option A does not refer to the last sentence of the third paragraph.

Option B: Victoria Meadows [University of Washington] recently explained how an exoplanet's atmospheric pressure may be measured. Only if that pressure is high enough could liquid water exist on a planet's surface.This is already known. So "researchers may someday be able to determine the relationship between an exoplanet's atmospheric pressure and the liquid water it contains" as mentioned in option B is incorrect. Option B is not specific to the last sentence of the third para.

Option C: Option C may, more or less, expand on what has been suggested in the penultimate sentence of the third para. It is negative in tone and does not point to the last sentence of the third para.

Option D: Victoria Meadows [University of Washington] recently explained how an exoplanet's atmospheric pressure may be measured. Only if that pressure is high enough could liquid water exist on a planet's surface. Since it looks likely that liquid water is a prerequisite for life, one must know a planet's atmospheric pressures. Dr Meadows proposes to make the measurement by looking at a planet's atmospheric oxygen. The third para explains how. So option D correctly describes the function of the last sentence of the third paragraph of the passage. Choice (D)

Q2. Which of the following experimental techniques has been mentioned in the passage as having already been employed in the study of exoplanets?

a) Studying the spectrum of starlight that has passed through an exoplanet's atmosphere so as to draw conclusions about its atmospheric pressure.

b) **Monitoring the stars, watching for tiny, repeated drops in their brightness caused by a planet moving in front of a star's disk.** ✓ **Your answer is correct**

c) **Direct detection of oceans on exoplanets by measuring the starlight reflected from oceans on the exoplanets.**

d) **Estimating the proportion of iron-rich silicates and corundum in the dusty tails of some exoplanets.**

Number of words and Explanatory notes for RC:

Number of words: 618

Option A: Since O2 molecules and O2 dimers absorb different light frequencies, studying the spectrum of starlight that has passed through a planetary atmosphere could reveal its atmospheric pressure. Sadly, no existing instrument is sensitive enough to use Dr Meadows's technique currently. So option A is not the answer.
Option B: Only in special circumstances can researchers actually see these bodies. Mostly, they have to work with indirect measurements, like watching for slight dips in the intensity of a star's light when a planet passes in front of it, a phenomenon called 'transit'.... So option B has been carried out and is the answer.
Option C: An ocean acts as a mirror. The bright reflection from such a mirror would give that ocean's existence away. The optimum moment for seeing it is when, as observed from Earth, a planet's parent star is more or less behind the planet in question. Then, starlight glancing off an ocean on the planet's limb will produce a glint that the same light glancing off a dull, rocky surface would not. That glint would give the ocean's existence away. This trick has actually been tried, using a probe bound for the moon to observe glints from Earth's oceans. The results of this experiment have let Dr Meadows conclude that it would be possible to see glints from planets going around nearby stars. But this has not yet been achieved in the case of exoplanets. Hence option C is not the answer.
Option D: Preliminary studies suggest that the rocks may contain iron-rich silicates or corundum – a substance known as sapphire (when of gem quality). Since it mentions 'preliminary studies' we can assume that option D has not yet been carried out.

Choice (B)

Q3. The passage suggests which of the following about Laura Schaefer's computer model prediction described in the seventh para?

a) A planet which has the same size as Earth gets deep oceans within 500m years and these increase steadily in depth.

b) **The model prediction described in the passage is insufficient to support the proposed hypothesis because it is based on a faulty assumption.**

c) **A planet which is five times heavier than earth will take much longer than 500m years to form a shallow ocean, which then steadily increases in depth.** ✓ **Your answer is correct**

d) **The model predictions and observed data differ fundamentally.**

Number of words and Explanatory notes for RC:

Number of words: 618

Option A: Laura Schaefer let the planets in the computer model evolve for ten billion years (the typical lifetime of the kind of star most planets orbit), and saw that they do indeed develop oceans, although on different schedules. An Earth-sized planet gets deep oceans quite quickly – within 500m years – but these then become steadily shallower. So the second half of option A cannot be said to be correct.
Option B: Ms Schaefer assumed something similar goes on in rocky exoplanets (a brave assumption, since there is little sign of plate tectonics on Mercury, Venus or Mars), and therefore put into her model what information is known about this grand hydrologic cycle. If oceans are crucial for life it looks, on the basis of Ms Schaefer's model, as though biology could get a head start on an Earth-sized planet – if, as the model assumes, that planet has the same chemical composition as Earth. But there is not enough in the passage to say that the model prediction is based on a faulty assumption.
Option C: She let the planets in the model evolve for ten billion years (the typical lifetime of the kind of star most planets orbit), and saw that they do indeed develop oceans, although on different schedules. An Earth-sized planet gets deep oceans quite quickly – within 500m years – but these then become steadily shallower. **A planet with five times Earth's mass takes about a billion years to form a shallow ocean, which then increases steadily in depth.** So option C is correct.
Option D: There is no observed data aligning with Laura Schaefer's computer model. So, that "model predictions and observed data differ fundamentally" is incorrect.

Choice (C)

Q4.
Which of the following would serve as the primary purpose of the author in the passage?

a) To explore new ways of scrutinising exoplanets.

b) **To revise a theory regarding the existence of exoplanets in the light of new evidence.**

c) **To cite the inadequacies of indirect measurements for studying exoplanets and recommend sophisticated direct measurements for the same.**

d) **To describe a controversy concerning the significance of evidence from studies of exoplanets.**

Number of words and Explanatory notes for RC:

Number of words: 618

Option A: New ways of scrutinising exoplanets is a particular interest of Victoria Meadows [University of Washington] who recently explained how an exoplanet's atmospheric pressure may be measured. ....The passage goes on to discuss indirect measurements, direct measurements, cites a computer model and explains some assumptions and conclusions with respect to the study of exoplanets. So we can say that option A is the correct answer.
Option B: Mostly, they have to work with indirect measurements, like watching for slight dips in the intensity of a star's light when a planet passes in front of it, a phenomenon called 'transit'.... The passage merely reports and does not make any attempt at revising existing theories. So option B is incorrect.
Option C: Mostly, they have to work with indirect measurements, like watching for slight dips in the intensity of a star's light when a planet passes in front of it, a phenomenon called 'transit'.... Dr Meadows is also interested in planetary water itself and techniques which could allow oceans on other worlds to be detected directly. The passage does not discuss the pros and cons of indirect measurements and direct measurements for studying exoplanets. So option C is farfetched. It does not serve as the main objective or primary purpose of the author in the passage.
Option D: The passage does not describe opposing arguments or viewpoints. It does not describe a controversy concerning the significance of evidence from studies of exoplanets. Hence option D can be ruled out. Choice (A)

Q5. According to the passage, a propitious moment for viewing an ocean on an exoplanet, from earth, is when

a) its atmospheric oxygen contains more O2 dimers than O2 molecules.

b) **the exomoon's orbital plane may be tilted with respect to its parent planet's orbit around the system's star.**

c) **the James Webb space telescope will be launched by NASA in 2020.**

d) an exoplanet's parent star is more or less behind the exoplanet in question.

Number of words and Explanatory notes for RC:

Number of words: 618

Option A: Option A is beside the point and is not the answer. Analysing the atmospheric pressure of an exoplanet is related to understanding the liquid water existing on a planet's surface.... Since molecules and dimers absorb different light frequencies, studying the spectrum of starlight that has passed through a planetary atmosphere could reveal its atmospheric pressure. Option A is nowhere suggested and is not the answer to the question.
Option B: No mention has been made of an exomoon of an exoplanet. Hence option B cannot be inferred and is not the answer.
Option C: Sadly, no existing instrument is sensitive enough to use Dr Meadows's technique. But this should change in 2020 when the *James Webb* space telescope with the largest mirror ever, will be launched by NASA. Option C is not specific to the question.
Option D: Dr Meadows is also interested in planetary water itself and techniques which could allow oceans on other worlds to be detected directly. An ocean acts as a mirror. The bright reflection from such a mirror would give that ocean's existence away. The optimum moment for seeing it is when, as observed from Earth, a planet's parent star is more or less behind the planet in question. Then, starlight glancing off an ocean on the planet's limb will produce a glint that the same light glancing off a dull, rocky surface would not. That glint would give the ocean's existence away. Hence option D is the correct answer. Choice (D)

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

… From Stranger Things to Harry Potter to Star Wars, fans do not just want to watch or read about their favourite characters— they want to be them. The owners of fantasy properties understand this, and they're rushing to capitalize on this growing value stream in new ways… Companies are increasingly using their merchandising rights — exclusive rights based on copyright and trademark to control and profit from commercial goods based on a fantasy property — to control how fans experience their favourite stories…As companies get more aggressive in licensing fan activity […] we should pause to think about the consequences of granting such exclusive rights to authorize experiences…

Until recently, companies have largely tolerated individuals who seek to bring their fictional worlds to life [since] going after one's fans is not good for business. But as the experience economy has grown, […] many owners of cultural property have reconsidered their laissez-faire attitude...

Companies are increasingly issuing cease-and-desist demands to third parties using their creative capital, and they're offering their own official alternatives.

At a basic level, this makes business sense. In today's economy, the value of merchandise, and merchandising experiences, far surpasses the value of the underlying intellectual properties themselves. Merchandising is a $262 billion-a-year industry. Where the market goes, the law has followed. Cultural practices once free as the air we breathe are increasingly becoming commodified and metered fare, regulated by licenses and royalties, requiring permission and payment. This has largely resulted from the Copyright Act of 1976, which gave companies control over not just substantially similar reproductions in the same medium, but also over derivatives in a wide range of media, even those far flung from the original work. …

However, the assertion of boundless intellectual property rights to control all potential after-markets rests on shaky legal foundations. The Supreme Court has never addressed what scholars refer to as "the so-called merchandising right." There is also the law of fair use, which seeks to ensure that copyright law stays true to its purpose: incentivizing the creation of new works without impeding follow-on creativity.

Even if the law permits it, companies should consider how efforts to shut down unlicensed fan activity may backfire. Asking fans to "cease and desist" can quickly turn fans' love to hate. It can also stifle creativity. ... It is unfair for companies to stymie fan innovation only to piggyback and try to monetize it later. Star Trek fans have similarly rebelled against prohibitions on fan activity. When Paramount published guidelines for fan film makers, demanding, for example, that fan films be no longer than 15 minutes long, fans viewed the limitations as a "declaration of war."

The law of intellectual property, which was intended to stimulate the creation of artistic works for humanity to enjoy, is being stretched by companies to commodify more and more forms of that enjoyment... Owners of beloved cultural properties ought to consider a measured approach to asserting intellectual property rights on fan experiences... Fan engagement extends both the lifespan and the value of the work. Fans make the work relevant to themselves and to others. Their love and devotion are what creators live for.

Q6. The laissez-faire attitude of companies is best demonstrated by the fact that

a) they have largely tolerated fan activity.

b) **they have issued cease-and-desist demands to those using their creative capital.**

c) **they have become more aggressive in licensing fan activity.**

d) they have commodified fantasy properties at the expense of fan activity.

Number of words and Explanatory notes for RC:

Number of words: 524

Consider the sentences: *'Until recently, companies have largely tolerated individuals who seek to bring their fictional worlds to life [since] going after one's fans is not good for business. But as the experience economy has grown, […] many owners of cultural property have reconsidered their laissez-faire attitude... Companies are increasingly issuing cease-and-desist demands to third parties using their creative capital, and they're offering their own official alternatives.'* Laissez-faire attitude means 'let do', or one of minimum interference.
Option A: This shows the laissez-faire attitude, as they have not interfered in what the fans have been doing. They haven't regulated the activities of the fans and have ***largely tolerated individuals who seek to bring their fictional worlds to life***.
Hence, Option A is the answer.
Option B: This is not a laissez-faire attitude. Rather, it is shows intolerance on the part of the companies towards fans and fan activity. Hence, Option B is not the answer.
Option C: Laissez-faire attitude is one of non-interference. So, aggression in licensing fan activity shows that they are interfering with fan activity and are trying to control it. Hence, Option C is not the answer.
Option D: Commodifying fantasy properties at the expense of fan activity goes against the grain of non-interference with what the fans are doing. So, this option doesn't represent the laissez-faire attitude that companies had adopted previously. Option D is not the answer. Choice (A)

Q7. The author mentions the Copyright Act of 1976 to explain that

a) it makes business sense in today's economy to claim all rights over merchandise and merchandising experiences.

b) **companies are given extensive control over their creative property by the law.**

c) **the intellectual property rights have quite a few loopholes.**

d) the law takes only the financial aspect into account and not the emotional attachment fans might have towards their favourite stories.

Number of words and Explanatory notes for RC:

Number of words: 524

Consider the sentences: '*Cultural practices once free as the air we breathe are increasingly becoming commodified and metered fare,* ***regulated by licenses and royalties, requiring permission and payment. This has largely resulted from the Copyright Act of 1976****, which gave companies control over not just substantially similar reproductions in the same medium, but also over derivatives in a wide range of media, even those far flung from the original work…*' The author mentions the Copyright Act of 1976 to explain how things have changed in the recent period when it comes to cultural practices.

Option A: The Act was not mentioned to discuss whether it makes ***business sense*** or not. In order to discuss the business sense, the author need not discuss which law allows it. Also, the underlined portions clearly show what the author's intentions for discussing the Act were. The business sense was discussed elsewhere in the passage but certainly not connected to why the author may have mentioned the Copyright Act. Hence, Option A is not the answer.

Option B: This is the reason the author mentions the law. It highlights that this law ***gave companies control*** *over not just substantially similar reproductions in the same medium, but also over derivatives in a wide range of media, even those far flung from the original work.* They can control their creative property, thanks to the law, and license fan activity. Hence, Option B is the answer.

Option C: Loopholes of the Act/law have neither been mentioned nor discussed anywhere in the passage. Hence, Option C is not the answer.

Option D: The author doesn't compare the financial and emotional aspects of the law where it has been mentioned. Yes, it has been mentioned that the law encourages commodifying certain cultural practices that were hitherto free. However, the mention of the law is not to draw attention to whether it is favours financial aspects or emotional aspects. Rather it is to draw attention to how companies are using it for their own benefits. Hence, Option D is not the answer. Choice (B)

Q8. According to the passage, all the following weaken the case for companies claiming boundless intellectual property rights over their creative capital EXCEPT that:

a) merchandising rights have not been strictly defined.

b) **Copyright law was framed not to discourage follow-on creativity.**

c) **fan engagement extends both the lifespan and the value of the work.**

d) merchandising is a $262 billion-a-year industry.

Number of words and Explanatory notes for RC:

Number of words: 524

Option A: This shows that companies cannot use the merchandising rights (from "shaky legal foundations") as a blanket mechanism to commodify all their creative capital and regulate fan activity. So, it will weaken the case for companies. Boundless intellectual property rights won't be valid if the definition of merchandising rights is not rigid and clearly defined. Hence, Option A is not the answer.
Option B: This sentence clearly shows that companies shouldn't misuse the Copyright Act to stymie or discourage fan creativity. If the law doesn't want to prevent follow-on creativity inspired from original creative capital, companies will have less leverage to regulate fan activity and commodify the creative capital under their control. Option B is, therefore, not the answer.
Option C: This clearly shows that fan engagement should be encouraged, and companies shouldn't try to regulate it or commodify it, dealing with fan activity with an aggressive hand. Hence, Option C is not the answer.
Option D: While this talks about the size of the merchandising market, it doesn't help us take a stand in favour of fan activity and therefore, against companies or vice-versa. Hence, Option D doesn't weaken the case for companies claiming boundless intellectual property rights. Option D is the answer. Choice (D)

Q9.

Which of the following, if true, will strengthen the author's argument in the passage?

a) Fan engagement doesn't diminish the value of intellectual property in question.

b) **Fans do not engage in creative work inspired by their favourite stories with a view to monetize it.**

c) **Stymying fan activity is not good for the profitability of the creative capital companies are trying to protect.**

d) Creators create stories not to please their fans but to monetize the creative property.

Number of words and Explanatory notes for RC:

Number of words: 524

The author's central argument is neatly summarised in the last few lines of the passage: '***Owners of beloved cultural properties ought to consider a measured approach to asserting intellectual property rights on fan experiences***... ' In other words, the author's chief argument is that companies shouldn't use property rights to clamp down on fan experiences.

Option A: This statement would allay the fears of companies if they were discouraging fan activity purely out of fear that fan creativity would reduce the value of their creative capital. However, that is not what the corporates are really worried about. They are not worried about the value of their creative capital going out. What they are looking to do is make as much revenue as possible from their creative capital, by stopping others to make use of the same, especially if there is profit being made by the fans. Hence, Option A is not the answer.

Option B: Even if this were true, it doesn't really make a case for corporates continuing their laissez-faire attitude towards fan creativity. All this statement is saying is that fans are not really competing with corporates or denting their revenues. However, corporates having such a concern has not been mentioned in the passage. Option B is not the answer.

Option C: This statement clearly has something for the corporations that are trying to commodify the cultural symbols/fan favourites. So, this statement, if true, is a reason why corporations shouldn't discourage fans from expressing their creativity. Because stymying such creativity would lower their own revenues. Hence, Option C is the answer.

Option D: This clearly shows that fans and fan experiences are not so important and the creators have monetary value in their mind. Option D, therefore, weakens the case of the author that corporations should continue to be tolerant towards fan creativity.

Choice (C)

Q10. The author mentions the case of Paramount's guidelines for fan filmmakers to show that

a) fans will boycott companies that assert their intellectual property rights to stymie fan activity

b) **companies will lose the goodwill of fans if they stymie fan innovation.**

c) **the merchandising industry is so huge that fans and their emotions will eventually lose out to monetary considerations.**

d) companies with intellectual property rights have declared war on fans creating unauthorised merchandise.

Number of words and Explanatory notes for RC:

Number of words: 524

Consider the para: '*Even if the law permits it,* ***companies should consider how efforts to shut down unlicensed fan activity may backfire****. Asking fans to "cease and desist" can quickly turn fans' love to hate. It can also stifle creativity ... It is unfair for companies to stymie fan innovation only to piggyback and try to monetize it later.* ***Star Trek fans have similarly rebelled*** *against prohibitions on fan activity. When Paramount published guidelines for fan film makers, demanding, for example, that fan films be no longer than 15 minutes long,* ***fans viewed the limitations as a "declaration of war."****'*

Option A: The author doesn't speak about 'boycott' of companies. The author merely mentions that the strategies of these companies could backfire. How it would backfire has not been discussed, leave alone a boycott. Hence, Option A is not the answer.

Option B: This is the apt reason for mentioning the example. The author wanted to demonstrate how fans would be unhappy with companies which go too aggressive with their property rights. So, such companies will definitely lose goodwill. Option B is the answer.

Option C: This is an extreme extrapolation and no way related to the Paramount example. Yes, the merchandising industry is huge, and yes, companies will put wealth ahead of fans' feelings. However, that is not why the Paramount example has been given by the author. The example was provided to show that fans do get outraged when companies try to assert property rights a little too much. Option C is not the answer.

Option D: This example was not to show that the companies have declared war. Yes, the fans see it as a 'declaration of war' but that's not the purpose of the author mentioning this example. The author clearly starts the para with the theory that the aggressive policies of companies in using their property rights to stymie fan activity could backfire. Option D is not the answer. Choice (B)

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

A long-standing idea about the ancient Maya is that for most of the civilization's 700-year-long Classic period, which lasted from 250 to 950 A.D., warfare – large-scale destruction and high numbers of civilian casualties – was supposedly rare. Researchers have generally believed that only towards the very end of the Classic period, increasing droughts would have reduced food supplies, in turn escalating tensions between Maya kingdoms and resulting in violent warfare that is believed to have precipitated their decline. Research presented today in the journal Nature Human Behaviour, however, is adding to the evidence that violent, destructive warfare targeting both military and civilian

resources, called “total warfare”, was taking place even before a changing climate imperilled Maya agriculture.

Evidence of drought in what’s known as the Terminal Classic period (800-950 A.D.), and how it may have affected agriculture, was what paleoclimatologist David Wahl of the U.S. Geological Survey set out to find in 2013 when he first made his way […] towards Laguna Ek’Naab, a lake situated at the bottom of a steep cliff topped by the ruins of the ancient Maya city, archaeologists call Witzna…

…The most remarkable thing Wahl found at the bottom of Laguna Ek’Naab was a 1.2-inch-thick layer [of sediment] comprised of large chunks of charcoal. “Because people often burn forest to clear land, charcoal is quite common in lake sediments in the area,” he explains. “But in 20 years of sampling lakes, I had never seen a layer this thick.”

While Wahl was still trying to make sense of this discovery, a team of archaeologists led by National Geographic Explorer Francisco Estrada-Belli of Tulane University started their first dig of Witzna… As they gradually uncovered what was left of the buildings, they found that […] traces of fire were all around, suggesting the fire may have been an intentional one lit by enemy invaders. They also found something quite rare: an inscription clearly stating the name the ancient Maya gave the city: Bahlam Jol.

The scientists contacted Alexandre Tokovinine, an expert in Maya writing at the University of Alabama, who recalled an inscribed stone monument discovered in the nearby city of Naranjo that documented a series of successful military campaigns against neighbouring kingdoms…Part of the Naranjo inscription stated on a date reconstructed as May 21, 697, “Bahlam Jol burned.”

Surprisingly, Bahlam Jol was far from the only city proudly proclaimed in the Naranjo monument to have “burned”. The same thing happened to at least three other cities in the area … This suggests it is very unlikely that total warfare only emerged about a century later, in the Terminal Classic period.

“Burning cities down appears to have been a common tactic much earlier than previously thought,” says Wahl, “so I think the idea that the emergence of violent warfare towards the end caused the Maya’s demise really needs reconsideration.” He is currently investigating the role the climate may have played. While corn production appears to have been severely decreased after the large fire, it only really disappears around 1,000 A.D., when there are strong indications from other studies of widespread regional droughts. This suggests the difficulty to grow food due to a changing climate

may have been an important driver of the Maya's decline even if it didn't do so by escalating warfare.

…

Q11. The main purpose of the passage is to

a) provide evidence in order to prove an existing hypothesis.

b) **investigate evidence that counters an earlier hypothesis and offer an alternative explanation.**

c) **inspect new evidence to refute an alternative explanation to an earlier hypothesis.**

d) evaluate the limitations of an earlier hypothesis in the light of new evidence.

Number of words and Explanatory notes for RC:

Number of words: 547

The main purpose of the passage can be understood from the following sentences: *'Researchers have generally believed that only towards the very end of the Classic period, **increasing droughts would have reduced food supplies, in turn escalating tensions between Maya kingdoms and resulting in violent warfare** that is believed to have precipitated their decline. Research presented today in the journal Nature Human Behaviour, **however**, is adding to the evidence that **violent, destructive warfare** targeting both military and civilian resources, called "total warfare**", was taking place even before a changing climate imperilled Maya agriculture**.'* The underlined portions clearly show that there was an existing hypothesis and thanks to new evidence (discussed in the passage) there is a new hypothesis.

Option A: Evidence was provided but not to prove an existing hypothesis. It was done more to perpetuate a new theory. Hence, Option A is not the answer.

Option B: The passage discusses new evidence which doesn't agree with a hitherto assumed theory (that droughts led to reduction in food supplies and that led to war), thereby leading to an alternative explanation (that warfare was a common tactic, unrelated to shortage of food supplies). Hence, Option B is the answer.

Option C: An alternative explanation is provided, ***not refuted*** (argued against/proven wrong) in the passage. Hence, Option C is not the answer.

Option D: The passage doesn't ***evaluate the limitations*** (shortcomings) of an earlier hypothesis. Evidence is evaluated and a theory is formed to explain the evidence. The flaws or loopholes in an earlier theory are not discussed. Hence, Option D is close but not the answer.

Choice (B)

Q12. Which of the following statements is strengthened by the finding of the 1.2-inch thick layer of sediment at the bottom of Laguna Ek'Naab?

a) It was a common practice for the Maya to burn forest to clear land.

b) **Drought conditions during the Terminal Classic Period affected agricultural practices of the Maya.**

c) **Burning cities down was probably a common practice amongst the Maya invaders.**

d) The decline of Maya was brought about by violent, destructive warfare.

Number of words and Explanatory notes for RC:

Number of words: 547

Option A: Consider the sentence: '*"Because people often burn forest to clear land, charcoal is quite common in lake sediments in the area," he explains. "**But in 20 years of sampling lakes, I had never seen a layer this thick**."* So, the thickness of the layer actually is an anomaly despite the usual practice of burning forest to clear land. So, the thick layer didn't strengthen the speculation about burning forest to clear land. It pointed to something more drastic. Option A is not the answer.
Option B: The thick layer implied (although not directly mentioned) that fires and warfare started way before the Terminal Classic Period. Also, this sediment layer was not mentioned to make any connection with agricultural practices. Hence, Option B is not the answer.
Option C: This was the hypothesis being discussed in the passage, as an alternative explanation for the fires, which didn't sit with the original theory that warfare was rare until the Terminal Classic Period. While the thick sediment directly doesn't prove the hypothesis, it is part of the evidential pieces the author discusses in the passage to build the case. Hence, Option C is the answer.
Option D: This is not the answer because firstly, the thick sediment wasn't connected to the demise of the Mayas, and secondly, the passage doesn't establish anywhere even later that the decline was brought about by violent warfare. The passage was more about how violent warfare was existent even before the drought and the final phase of demise. Option D, is therefore, not the answer. Choice (C)

Q13. The Naranjo inscription about Bahlam Jol implied that

a) cities burned down by invaders were far from the city of Bahlam Jol.

b) **Bahlam Jol wasn't the only city to have been burned down by invaders.**

c) **total warfare had probably emerged as a common tactic much before the Terminal Classic Period.**

d) violent warfare towards the end brought down the curtains on the Maya civilization.

Number of words and Explanatory notes for RC:

Number of words: 547

Option A: The city that was burned down was in fact, Bahlam Jol. The author was saying it was 'far from the only city being burned down,' meaning that there were other cities that were burned down too, and this wasn't the only one. Hence, Option A is not the answer.
Option B: While this may be true, this wasn't proven from the inscription itself. The author mentioned this as a side note that several cities were burned down, but the Naranjo inscription only proved that Bahlam Jol was burned down intentionally on a particular date. Hence, Option B is not the answer.
Option C: The inscription proved that there was evidence of intentional fires/total and violent warfare much before climate change lowered the food supplies. Hence, the author mentioned the inscription to show that warfare existed much before the onset of drought conditions to further the parallel hypothesis (as opposed to food reduction causing warfare). Hence, Option C is the answer.
Option D: The inscription was not from the ending period. It was from much before (697 AD). Hence, it couldn't have possibly proven anything about the eventual demise of the Maya. Hence, Option D is not the answer. Choice (C)

Q14.

Prior to finding the proof of fires in the form of the sediment at Laguna Ek'Naab and the inscription at Bahlam Jol, it was believed that

a) total warfare was quite common amongst Maya during the Classic period of 250 – 900 AD.

b) **total warfare started before changing climate imperilled Maya agriculture.**

c) **total warfare and climate change were two independent factors that caused the demise of the Maya.**

d) total warfare started as a result of droughts and reduction in food supplies.

Number of words and Explanatory notes for RC:

Number of words: 547

Option A: Total warfare was thought to be ***rare*** as per the earlier hypothesis (the one believed to be true before the new evidence surfaced). Hence, Option A is not the answer.
Option B: This was the hypothesis that the author provides as an alternative and new explanation. The question is about the hypothesis that was believed to be true earlier. Hence, Option B is not the answer.
Option C: This was not exactly true, as the original theory does convey that droughts led to escalating tensions. Hence, they were not thought to be independent factors. Option C is not the answer.
Option D: This can be understood from the sentences: '*Researchers have generally believed that only towards the very end of the Classic period,* ***increasing droughts would have reduced food supplies, in turn escalating tensions between Maya kingdoms*** *and resulting in violent warfare that is believed to have precipitated their decline*.' This was what was understood before the new evidence. Hence, Option D is the answer. Choice (D)

Q15. In the last para, the author mentions the disappearance of corn production to build the hypothesis that

a) there were widespread regional droughts during that period.

b) **climate was an important driver of the Maya's decline because it led to total warfare.**

c) **large fires severely affected corn production leading to the demise of Mayas.**

d) reduced food supplies contributed to the Maya's decline.

Number of words and Explanatory notes for RC:

Number of words: 547

The answer can be understood from the following sentences: '*He is currently investigating the role the climate may have played. While corn production appears to have been severely decreased after the large fire, it only really disappears around 1,000 A.D., when there are strong indications from other studies of widespread regional droughts.* ***This suggests the difficulty to grow food due to a changing climate may have been an important driver*** *of the Maya's decline even if* ***it didn't do so by escalating warfare****…*'

Option A: The discussion was not to prove that there were droughts. That was mentioned as a separate fact (and not an argument). This is a circular reasoning fallacy. It was mentioned that there were widespread droughts to explain the disappearance of corn (not the other way around). Hence, Option A is not the answer.

Option B: Climate (drought conditions) coincided with the disappearance of corn production. However, it was clearly stated that this may not have led to warfare although it was a driver for the Maya's decline. Hence, Option B is not the answer.

Option C: The fire was mentioned as a timeline, after which corn production did reduce. It was not to establish a causation between the fire and the corn production. Hence, Option C is not the answer.

Option D: The author mentions the corn production example to show that food was a driver for the demise. ***This suggests the difficulty to grow food due to a changing climate may have been an important driver*** *of the Maya's decline.* The author, however, doesn't really connect food supplies with warfare. Hence, Option D is the answer. Choice (D)

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

Something strange has happened to our way of thinking ... We have come to believe that everything is computable and resolved by the application of new technologies. But these technologies are not neutral facilitators: they embody our politics and biases. As a result, we understand less and less about the world as these powerful technologies assume more control over our everyday lives.

Across the sciences and society […] new technologies are not merely augmenting our abilities, they are actively shaping and directing them, for better and for worse. If we do not understand how complex technologies function, then their potential is more easily captured by selfish elites and corporations. The results of this can be seen all around us. There is a causal relationship between the complex opacity of the systems we encounter every day and global issues of inequality, violence, populism and fundamentalism.

Instead of a utopian future in which technological advancement casts a dazzling, emancipatory light on the world, we seem to be entering a new dark age characterised by ever more bizarre and unforeseen events. The ideal of distributing more information ever more widely has not led us to greater understanding and growing peace, but instead seems to be fostering social divisions, distrust, conspiracy theories and post-factual politics. To understand what is happening, it's necessary to understand how our technologies have come to be…

In the 1950s, a new symbol began to creep into the diagrams drawn by electrical engineers to describe the systems they built: a fuzzy circle, or a puffball, or a thought bubble. Eventually, its form settled into the shape of a cloud. Whatever the engineer was working on, it could connect to this cloud, and that's all you needed to know. The other cloud could be a power system, or a data exchange, or another network of computers. Whatever. It didn't matter. The cloud was a way of reducing complexity, it allowed you to focus on the issues at hand. Over time, as networks grew larger and more interconnected, the cloud became more important. It became a business buzzword and a selling point. It became more than engineering shorthand; it became a metaphor.

Today the cloud is the central metaphor of the internet: a global system of great power and energy that nevertheless retains the aura of something numinous, almost impossible to grasp. We work in it; we store and retrieve stuff from it; it is something we experience all the time without really understanding what it is. But there's a problem with this metaphor: the cloud is not some magical faraway place […] where everything just works. It is a physical infrastructure consisting of phone lines, fibre optics, satellites, cables on the ocean floor, and vast warehouses filled with computers, which consume huge amounts of water and energy. Absorbed into the cloud are many of the previously weighty edifices of the civic sphere: the places where we shop, bank, socialise, borrow books and vote. Thus obscured, they are rendered less visible and less amenable to critique, investigation, preservation and regulation…

Q16. The cloud became a metaphor for

a) the great power and energy that is the internet.

b) **the internet, which is useful but not well-understood by users.**

c) **the network of computers one could connect to using the internet.**

d) the business possibilities the internet opened up.

Number of words and Explanatory notes for RC:

Number of words: 508

The metaphor can be understood from: '*The cloud was a way of reducing complexity, it allowed you to focus on the issues at hand. Over time, as networks grew larger and more interconnected, the cloud became more important. It became a business buzzword and a selling point. It became more than engineering shorthand;* ***it became a metaphor****…Today the cloud is the central metaphor of the internet: a global system of great power and energy that nevertheless retains the aura of something numinous, almost impossible to grasp. We work in it; we store and retrieve stuff from it; it is something we experience all the time without really understanding what it is*.'
Option A: The great power and energy of the internet is mentioned in a positive way. However, the cloud represents the aspect that is numinous and less clear. No one knows how it functions but uses it anyway. Hence, Option A is not the answer.
Option B: The internet is a global system of great power and energy that ***nevertheless retains the aura of something numinous.*** So, the cloud – the metaphor – represents the internet. It is something that reduces the complexity/solves problems, and yet, cannot be understood well. This can also be seen in the following line: *it is something we experience all the time* ***without really understanding what it is***.' Hence, Option B is the answer.
Option C: The network is one of the manifestations of the cloud. It is not the only way information spreads. However, the cloud became a metaphor for the internet – for how we use it without knowing what it is in its entirety. Hence, Option C is not the answer.
Option D: This is too far-fetched from the actual theme. The cloud is a metaphor for something that is used and is useful without being understood. It has got nothing to do with the business opportunities that it throws up. Hence, Option D is not the answer.
Choice (B)

Q17. The author attributes global issues to

a) the lack of comprehension of the technologies we use in our daily lives.

b) **corporate greed.**

c) **political biases of those who design our new technologies.**

d) a lack of understanding of how technologies shape our lives.

d)

Number of words and Explanatory notes for RC:

Number of words: 508

Consider the sentence: '*There is a causal relationship between* ***the complex opacity of the systems we encounter every day and global issues*** *of inequality, violence, populism and fundamentalism.*' We can understand that the author believes the opacity is what is responsible for the global issues.
Option A: This option directly equates to the opacity of the technologies we use. This can be further understood from: '*If we do not understand how* ***complex technologies function, then their potential is more easily captured by selfish elites*** *and corporations.*' Option A is the answer.
Option B: Corporate greed is not directly responsible for the global issues. The author believes that lack of understanding of the systems makes people vulnerable to the elites and the corporates who can exploit them. So, it is the lack of comprehension of the systems which causes the inequality, not the greed. Hence, Option B is not the answer.
Option C: There are biases (politics and biases separated out by the author) which creep into the design and technology of the systems. This has been mentioned. However, the biases make the system difficult to understand. It is the opacity that leads to global issues. So, the biases are indirectly responsible in the chain. But, these biases cannot be equated to political biases. Hence, Option C is not the answer.
Option D: A lack of understanding of technologies is responsible for the global problems. This option says – a lack of understanding of ***how technologies shape our lives***, which cannot be equated to the same thing. Hence, Option D is not the answer.

Choice (A)

Q18. Which of the following best represents the central idea of the passage?

a) The systems we rely on have become so complex that our lack of understanding leads to the systems being exploited by elites.

b) **The technology we use is just as good as the biases of those who designed them.**

c) **Although technology enriches our lives, there are dangerous side-effects to its over-usage as well.**

d) Technology has become so complex that only a select few can wield its power and exploit the world.

Number of words and Explanatory notes for RC:

Number of words: 508

The author discusses the following ideas in the passage:
The complexity of technologies that are shaping the world.
The opacity of these technologies that are so prevalent in our life.
The advent of the cloud and how it is the central metaphor of the internet.
The physical aspects of the cloud/internet and how it is something that cannot be critiqued or investigated.
Option A: This option covers the central idea – the complexity of the systems we rely on, our lack of understanding of it, and how the elites can benefit from our lack of understanding of the systems. The option comprehensively covers everything. Option A is the answer.
Option B: While this is partially true, it is not the central idea. That is because this option focuses on biases, whereas biases are just a subsidiary idea to arrive at the main theme – the opacity of the systems we use. Hence, Option B is not the answer.
Option C: Over-usage of technology has not really been discussed as a central idea of the passage. Whatever dangers the author has mentioned are all unconditional – as in they are lurking irrespective of how much we are addicted to it. It is not that the author is making a case for lowering the usage of technology. Hence, Option C is not the answer.
Option D: While the complexity of technology has been discussed in the passage, the focus is not on who can wield power and who can exploit the world. It has more to do with how the technology is too complex to investigate or understand even though it shapes our world. So, Option D is not the answer. Choice (A)

Q19. The author of the passage is least likely to agree with which of the following about the cloud?

a) It is an abstraction to represent something hidden that need not be understood.

b) **It can be used to store and retrieve information.**

c) **It can get too complicated to regulate and investigate the data stored in the cloud.**

d) It is not environmental-friendly.

Number of words and Explanatory notes for RC:

Number of words: 508

Option A: Consider the sentences: '*Whatever the engineer was working on, it could connect to this cloud, and that's all you needed to know. The other cloud could be a power system, or a data exchange, or another network of computers. Whatever. It didn't matter. The cloud was a way of reducing complexity, it allowed you to focus on the issues at hand.*' From this we can understand both the parts – that it is an abstraction (could be anything, it didn't matter), and it need not be understood to solve the problem at hand. Hence, the author will not disagree with this. Option A is not the answer.
Option B: The cloud could be a data exchange. The cloud is also the central metaphor for the internet where we store and from where we retrieve information. So, whether we take the meaning of cloud as a fuzzy symbol or as a metaphor for the internet, Option B is valid, and the author won't disagree with it. Hence, Option B is not the answer.
Option C: The author will agree with it, because one case has been mentioned in the passage – the internet. Consider the following lines: *Absorbed into the cloud are many of the previously weighty edifices of the civic sphere: the places where we shop, bank, socialise, borrow books and vote**, Thus obscured, they are rendered less visible and less amenable to critique, investigation**, preservation and regulation*… So, yes, regulation of data might be difficult in the cloud. Option C is not the answer.
Option D: Although the author does mention that the physical system that makes up the internet/cloud uses tremendous amounts of resources – water and energy, the environmental concerns weren't really alluded to. So, the author won't probably agree with this. Hence, Option D is the answer. Choice (D)

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.

How may one characterise the relation between the disciplines of psychoanalysis and law? It will not do to say simply that it is a relation of friendly cooperation or one of hostile suspicion. The psychoanalyst, on one hand, regards the maintenance of a system of law and justice as a necessary condition for personal equilibrium. On the other hand, he regards much of the law as antiquated/outworn and often criticises it as based on theoretical/ moral ideas which have survived their usefulness. The men of law sometimes welcome the insights into human motivation which psychoanalysis has contributed. At other times, lawyers show hostile defensiveness in the face of the analysts" sweeping criticisms of the law. The principal focus of tension between psychoanalysis and law is the general concept of responsibility. Legal tradition asserts that men exercise free choice. However, Franz Alexander says that psychoanalysis considers the human psychic apparatus as a

system determined by psychological/biological causative factors, where free will is an illusion and where the Super-Ego rules. ...

Alexander identifies four categories of criminals. In psychotics and defectives, criminal acts are traceable to organic degeneration and ego participation is entirely absent. Among neurotic criminals, there is a variety in the degree of ego participation. Persons with specific neurotic symptoms (kleptomaniacs and pyromaniacs) re-enact an unconscious drama of crime and self-inflicted punishment. Here the action is compulsive; ego participation is almost zero. In general neurotic characters, the ego, which plays a larger role, assents to the overt conduct but there is no awareness of the subjective meaning of the conduct, and rationalisation and projection are typically involved. In normal (professional) criminals, Alexander finds a “criminal Super-Ego”; the criminal is without unconscious conflict, but his adjustment is to the law-breaking section of the community. In his conduct, there is a nearly full ego participation. These three categories include “chronic” criminals. In the “situational” (acute) criminal, there is complete ego participation – here the circumstances are so painful that the individual feels released from the “bargain” which normally keeps his behaviour within the law.

This summary of the psychoanalytic view of the criminal law function suggests that a working agreement is possible between "lawyer" and "analyst". They should be able to agree that individuals who are deterred by threat of punishment, those in whose conduct a high degree of ego participation is manifested, are to be held responsible as if their acts sprang from free choice. As to the mentally ill, neurotic criminals as well as psychotics, where criminal conduct isn"t deterred by punishment, it is inappropriate to treat them in the same fashion. …

However, lawyers have balked at any such working agreement with psychiatrists. The typical lawyer, … assumes that legal responsibility is related to moral responsibility… [which] presupposes freedom of choice. Judges and legislators have hesitated to follow the lead of psychiatrists in defining the class of the irresponsible. They insist on the traditional “right and wrong” test, under which evidence of mental illness may be considered only if it establishes that the accused was unable to understand the moral nature of his act. Psychoanalysts have criticised this formula because it apparently holds responsible many criminals who are seriously ill and who act compulsively despite an acute sense that their conduct is wrong. They recommended that no person shall be convicted .... when at the time of committing the act .... he was suffering from mental illness.

Q20. According to the passage, which of the following correctly represents the criminal categories of Franz Alexander, or the examples thereof, in the decreasing order of the degree of the ego participation in the crime?

a) acute criminals, professional criminals, pyromaniacs, persons with general neurotic symptoms, defectives

b) **psychotics and defectives, kleptomaniacs and pyromaniacs, persons with general neurotic symptoms, normal criminals, situational criminals**

c) **situational criminals, professional criminals, persons with general neurotic symptoms, persons with specific neurotic symptoms, psychotics** ✓ **Your answer is correct**

d) normal criminals, acute criminals, persons with general neurotic symptoms, kleptomaniacs and pyromaniacs, psychotics and defectives

Number of words and Explanatory notes for RC:

Number of words: 567

Alexander distinguishes four main categories of criminals:
Category 1: Psychotics and defectives – ego participation is entirely absent.
Category 2: Neurotic criminals:
(A) Persons with specific neurotic symptoms (kleptomaniacs and pyromaniacs) – ego participation is almost zero.
(B) Persons with general neurotic symptoms – the ego, which plays a larger role, assents to the overt conduct .....
Category 3: Normal (professional) criminals: Alexander finds a "criminal Super-Ego". There is a nearly-full ego participation.
Category 4: Acute or "situational" criminal – there is complete ego participation ...
Option A: The decreasing order of ego participation appears to be rightly represented in the criminal categories mentioned in option A. However, the categories "pyromaniacs" and "persons with general neurotic symptoms" need to be interchanged, so as to get the correct order. So, option A is not the correct answer.
Option B: In this option, the criminal categories, as explained by Franz Alexander, have been mentioned in the increasing order of the ego participation involved in the crime – and not in the decreasing order.
Option C: Option C correctly represents the criminal categories, in the decreasing order of the ego participation that the crime involves. So option C is the correct answer.
Option D: In normal criminals, there is a nearly full ego participation. In acute criminals, there is complete ego participation. So, the categories "normal criminals" and "acute criminals" need to be interchanged, for the order to be fully correct. Option D is not the answer.

Choice (C)

Q21. According to the passage, the relationship between the professions of psychoanalysis and law can be best described through

a) attitudes ranging from scepticism to friendly cooperation.

b) **an attitude of hostile defensiveness.**

c) **attitudes ranging from pointed criticism to great fascination.**

d)

attitudes that swing between acceptance and opposition.

Number of words and Explanatory notes for RC:

Number of words: 567

Refer to the first paragraph of the passage. The passage mentions that there is tension between the disciplines of psychoanalysis and law.
Option A: Option A mentions a range from a negative feature (scepticism or doubtfulness, suspicion) to a positive one (friendly cooperation). This is incorrect as it does not capture the "hostile defensiveness" of lawyers towards psychoanalysis. Scepticism is a much weaker word than hostility and hence, the range of attitudes is not accurate. Further 'friendly cooperation' can be ruled out as the second sentence of the first para mentions "It will not do to say simply that it is a relation of friendly cooperation". Option A is incorrect.
Option B: It will not do to say simply that it is a relation of friendly cooperation or one of hostile suspicion. At other times, lawyers show hostile defensiveness in the face of the analysts' sweeping criticisms of the law. But they sometimes welcome the insights into human motivation which psychoanalysis has contributed. So option B is incomplete and is not the answer. {Defensiveness means behaviour intended to defend or protect or the quality of being anxious to challenge or avoid criticism.}
Option C: The range presented here again represents negative ----> positive, as in option A. However, the tension between the two disciplines of psychoanalysis and law cannot be progressively described as moving towards 'great fascination' (too positive). Option C can be ruled out. We can say that the relationship between the professions of psychoanalysis and law can be best described as one ranging from pointed criticism to cautious optimism. {*The men of law sometimes welcome the insights into human motivation which psychoanalysis has contributed. At other times, lawyers show hostile defensiveness in the face of the analysts' sweeping criticisms of the law.*}
Option D: The **psychoanalyst**, on one hand, regards the maintenance of a system of law and justice as a necessary condition for personal equilibrium. On the other hand, **he** regards much of the law as antiquated and outworn and often criticises it as based on theoretical and moral ideas which have survived their usefulness. The **men of law** sometimes welcome the insights into human motivation which psychoanalysis has contributed. At other times, **lawyers** show hostile defensiveness in the face of the analysts' sweeping criticisms of the law. So the principal tension between psychoanalysis and law can be described as one that swings between acceptance and opposition). Option D is the correct answer. Choice (D)

Q22. If a paragraph were inserted between the first and second paragraphs of the passage, then the main point of discussion of the inserted paragraph could be:

a) **Challenges that the legal world is facing because the psychoanalytical world misunderstands it**

b) **An introduction to the understanding of criminal behaviour through the lens of law and psychoanalysis**

c) **The seeming incongruity that lawmakers have been experiencing in their profession for years due to their heedlessness of the 'ego'**

d) **The need for a dialogue between the professions of psychoanalysis and law**

Number of words and Explanatory notes for RC:

Number of words: 567

Option A: The first para does talk about a degree of misunderstanding between the representative members of the two professions, psychoanalysis and law. The second para talks about categories of criminals. Option A is too general and cannot serve to bridge the gap between the points of discussion of the first para and second para. Option A makes no mention of criminality or criminal behaviour, neither does it extend any thoughts presented in the first para of the passage. Option A can be eliminated.
Option B: As the author focuses on the seeming ambivalence between the disciplines of psychoanalysis and law in the first para, he makes an important point: The principal focus of tension between psychoanalysis and law is the general concept of responsibility. The second para of the passage jumps to Alexander's description of the four main categories of criminals. So in an intermediate para between the first and second paras, the author should lead an introductory discussion of criminality or unravel a few aspects of criminal behaviour and at least state that criminal behaviour has been same studied under the lens of law and psychoanalysis. So option B would be the best option that can serve as the focal point of discussion in an intermediate paragraph so as to bridge the thoughtflow between the first and second para of the passage.
Option C: Legal tradition asserts that most men have some measure of free choice. Psychoanalysis considers the human psychic apparatus as a system determined by psychological/ biological causative factors, where [f]ree will is an illusion and where the Super-Ego rules, supreme and unlimited. So "heedlessness of the ego" is slightly out of scope. Further option C does not serve to connect to the idea of 'criminal categories' mentioned in the second para. "seeming incongruity that law-makers have been experiencing in their profession" is a distortion of the 'ambivalent relation between the disciplines of psychoanalysis and law' explained in the first para. So option C cannot be the answer.
Option D: Option D sounds like "course correction". It can be a point of discussion of a paragraph that comes towards the end of the passage and not in a para inserted early on, between the first and the second paras of the passage. Option D will disrupt the thoughtflow of the passage. Choice (B)

Q23. With which of the following statements is the author of the passage least likely to agree?

a) **The integration of psychoanalysis and jurisprudence is not close at hand, but they will both together adequately explain criminality.**

b) **The professional and the situational criminals are more or less deterred by the threat of punishment.**

c) **Psychoanalysts recommend that the law should not hold criminally responsible a person suffering from such an emotional disorder that he didn't possess the power to prevent committing the crime.**

d) **The dichotomy between the traditions of psychoanalysis and law revolves around their disagreement with reference to 'responsibility', 'free will' and 'retribution'.**

Number of words and Explanatory notes for RC:

Number of words: 567

Option A: The first part of option A cannot be gathered from the passage. ...This summary of the psychoanalytic view of the criminal law function suggests that a working agreement is possible between 'lawyer' and 'analyst'. ... However, lawyers have balked at any such working agreement with psychiatrists. Even the penultimate para focuses on the tension still prevailing between the traditions of psychoanalysis and law. Also, that 'they will both together explain criminality' is very conclusive and cannot be inferred from the passage. So option A is the required answer.
Option B: The 'lawyer' and 'analyst' should be able to agree that ***individuals who are deterred by threat of punishment***, those in ***whose conduct a high degree of ego participation is manifeste***d, are to be held responsible as if their acts sprang from free choice. Now a high degree of ego participation is seen in the case of the professional and the situational criminals. So we can infer that the professional and the situational criminals are deterred by the threat of punishment. Hence option B is correct but is not the answer.
Option C: The legislators insist on the traditional "right and wrong" test, under which evidence of mental illness may be considered only if it establishes that the accused was unable to understand the moral nature of his act. ***Psychoanalysts have criticised this formula*** because it apparently holds responsible many criminals who are seriously ill and who act compulsively despite an acute sense that their conduct is wrong. They recommended that no person shall be convicted .... when at the time of committing the act .... he was suffering from mental illness. Hence option C is true and is not the answer.
Option D: The principal focus of tension between psychoanalysis and law is the general concept of ***responsibility***. The typical lawyer assumes that legal responsibility is related to moral responsibility and that moral responsibility presupposes freedom of choice. Judges and legislators have hesitated to follow the lead of psychiatrists in defining the class of the irresponsible.... Legal tradition asserts that men exercise ***free choice***. However, Franz Alexander says that psychoanalysis considers the human psychic apparatus as a system determined by psychological/ biological causative factors, where [f]ree will is an illusion and where the Super-Ego rules. ...The last three paragraphs talk about the dichotomy between the traditions of psychoanalysis and law in terms of retribution i.e. punishment i.e. when criminal responsibility should be imposed and not imposed. So option D is true and is not the answer. Choice (A)

Q24. The primary purpose of the author of the passage is to

a) **prove that followers of one tradition rightly regard the beliefs held by those of the other tradition as untenable.**

b) **contrast two traditions that analyse criminal behaviours.** ✓ **Your answer is correct**

c) **reconcile conflicting viewpoints between two traditions and advocate the 'best of both worlds' approach.**

d) **identify shortcomings of two traditions in providing an answer to a long-standing dilemma.**

Number of words and Explanatory notes for RC:

Number of words: 567

Option A: How may one characterise the relation between the disciplines of psychoanalysis and law? It may be described as one of tension and conflict. We can also infer that psychoanalysts find the traditional 'right and wrong' test advocated by the legal profession untenable and unworkable (from the penultimate para). But the words 'prove' and 'rightly regard' make this option incorrect. Option B: The first para of the passage begins to contrast the two traditions of law and psychoanalysis. The tension between the two traditions is further described in the remaining paras. This summary of the psychoanalytic view of the criminal law function suggests that a working agreement is possible between 'lawyer' and 'analyst'....So, we can say that the passage contrasts two traditions to analyse criminal behaviour and the aspects thereof. Hence option B is the correct answer.
Option C: Option C is incorrect. The author does not attempt at a reconciliation of conflicting viewpoints between the traditions of psychoanalysis and law. He says that a working agreement is possible between 'lawyer' and 'analyst'. They should be able to agree that .... However, he quickly dismisses this when he mentions "However, lawyers have balked at any such working agreement with psychiatrists." It must be noted that "working agreement" does not necessarily imply 'reconcile conflicting viewpoints'. Also "advocate the 'best of both worlds' approach" has nowhere been implied. Hence option C is not the answer.
Option D: No long-standing dilemma is discussed. There is only psychoanalytic view of the criminal law function. The disciplines of psychoanalysis and law are explored. The two traditions – psychoanalysis and law – are contrasted. The beliefs of the people in the two professions are contrasted. Their shortcomings have not being identified. So option D is distorted and is not the answer. Choice (B)

Q25. DIRECTIONS *for question 25*: 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. Even as he depicted Coca-Cola and Campbell's soup, Elvis Presley and Marilyn Monroe, as well as race riots and violent death, he never judged or editorialized, churning out the good and the bad, glitz and grunge, with the market's undiscriminating alacrity.

2. Beginning in the early 1960s, Andy Warhol and his Pop Art colleagues rejected Abstract Expressionism in favour of art that portrayed the experience of consumerism.
3. One of the quirks of Warhol's career is that the artist who invented the concept of "15 minutes of fame" has had a staying power few of his peers can match.
4. In this way, he became the foremost chronicler of a revolution in consciousness enacted as a world dominated by things morphed into one glutted by images: a marketplace where visibility was the only thing that mattered.
5. Using the photo-mechanical techniques of the mass media, Warhol depicted commercial products and pop-culture icons, as well as the underside of American success story.

Sentence 1: Sentence 1 gives us details about Warhol's style of work, along with some examples.
Sentence 2: Sentence 2 is a general sentence that can begin the paragraph. It has introductory words like 'Beginning'. It mentions the time period 'early 1960s'. It mentions the full name of the artist and his preference of art.
Sentence 3: Sentence 3 extolls the uniqueness of Warhol.
Sentence 4: Sentence 4 has the conclusive words "In this way".
Sentence 5: Sentence 5 talks more about Warhol's art (He depicted commercial products and pop-culture icons ...).
So, sentence 2 is the best sentence to begin the para. Apart from mentioning the year and the person, it establishes the background: Andy Warhol rejected Abstract Expressionism in favour of art that portrayed the experience of consumerism.
Sentences 2 and 5 form a logical block. "Warhol depicted commercial products and pop-culture icons, as well as the underside of American success story" in sentence 5 links with "art that portrayed the experience of consumerism" in sentence 2. "photo-mechanical techniques of the mass media" in sentence 5 points to "art" in sentence 2. So sentence 5 follows sentence 2.
Sentences 5 and 1 form another logical block. "Warhol depicted" in sentence 5 links with "Even as he depicted" in sentence 1. "Coca-Cola and Campbell's soup" in sentence 1 exemplify "commercial products" in sentence 5. "Elvis Presley and Marilyn Monroe" in sentence 1 exemplify "pop-culture icons" in sentence 5. "race riots and violent death" refers to "underside of American success story" in sentence 5. "depicted ... never judged or editorialized, churning out the good and the bad, glitz and grunge, with the market's undiscriminating alacrity" in sentence 1 portrays the style of Andy Warhol and links with or mirrors "art that portrayed the experience of consumerism" in sentence 2. So sentence 1 follows 5.
Sentence 4 concludes the paragraph. "**depicted** ..... **churning out** the good and the bad, glitz and grunge, with the market's undiscriminating alacrity" in sentence 1 links with "morphed into one **glutted by images**: a marketplace where visibility was the only thing that mattered" in sentence 4. So, 2514.
Sentence 3 is the odd sentence out. It is a point of view about the person (and not about his work) and this view can belong to another paragraph.

Ans: (3)

Q26. DIRECTIONS *for question 26*: Five sentences are given with a blank in the following question. Four words are also given below the sentences. The blank in each sentence can be filled by one or more of the four words given. Each word can go into any number of sentences. Note that the sentence can change contexts depending on the use of different words which can be appropriate. Identify the number of sentences each word can go into and enter the maximum number of sentences that any word can fit in. For example, if you think that a word goes into a maximum of three sentences, then enter 3 as your answer in the input box given below the question.

i. The popularity of the Harry Potter books _____ a healthy reading habit amongst teenagers who were mesmerised by the genre of popular fantasy.
ii. The growth of the comic book culture has been effectively _____ by a movie-going culture that has lured the masses away from reading.
iii. Keanu Reeves' image as the adorable 'internet boyfriend' has _____ his image as an action star with a cult following and has remained so despite the massive successes of his action movies like John Wick.
iv. The allure of Game of Thrones, largely driven by a 21st century emotional phenomenon called the fear of missing out, was _____ by the backlash received after a lacklustre season finale.
v. Jasprit Bumrah has _____ the sublime skills of opponents many a time, not only through prodigious skills but also through an unwavering discipline that goes way beyond his years.

A. transcended
B. thwarted
C. frayed
D. facilitated

Sentence (i) will do best with the word 'facilitated' since we are looking for something positive and encouraging (since mesmerise is also a positive word). So, the books encouraged more teenagers to read.
Sentence (ii) can make use of 'thwarted' (to oppose successfully). We need a negative word because the next part of the sentence uses the expression 'lured away'. We can 'fray' a culture but not the growth of the culture. So 'frayed' does not work in (ii) 'frayed' is used to indicate the deterioration of something that already exists (static, not growing).
Sentence (iii) will take the word 'transcended'. Although, 'facilitated' will fit, logically it is inconsistent because the second part of the sentence uses the term 'despite' the success of action movies. That means we can infer that the two themes don't exactly complement each other.
Sentence (iv) will take 'frayed' a negative word, because the second part talks about 'backlash'. The use of backlash also prevents the use of the word facilitate, since 'allure' is to attract. 'thwart' does not work in this case. 'thwart' cannot be used for a situation (in this case, for 'allure'). 'thwart' is normally used when something is impeded in its progression or movement or degree.
Sentence (v) takes 'thwarted'. Transcend the sublime skills although not an incorrect usage would give way to redundancy, because sublime itself means awe-inspiring. Also, 'many a time' indicates that it is a clash or a competition, and hence, thwarted would make sense, not transcend which is more about comparison rather than defeating (thwarting) or losing.
So, 'thwarted' is used the most number of times, in two of the sentences. The correct answer is 2. Ans: (2)

Q27. DIRECTIONS *for question 27*: 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. As well as electric blankets and mattress-chillers, sound machines and smart rings, there are also smart pillows, sleep-tracking watches and bracelets, intelligent sleep masks, brain-stimulating headbands and countless sleep-monitoring apps.
2. Techies obsess about OKRs (objectives and key results), KPIs (key performance indicators) and digital-analytics dashboards showing the performance of specific products and features, and applying similar techniques to sleep seems a logical step.
3. People who want to monitor and improve their sleep have no shortage of gadgets to choose from.
4. The mania for sleep technology makes perfect sense for the tech industry, combining as it does several existing trends and it fits with the industry's metrics-driven world-view.

Sentence 1: Sentence 1 provides examples of sleep-monitoring gadgets.
Sentence 2: Sentence 2 mentions examples of some indicators/ trends/ techniques and that these can be logically applied to sleep.
Sentence 3: Sentence 3 has the demonstrative pronoun 'those' and it mentions the topic of discussion: monitor and improve sleep.
Sentence 4: Sentence 4 talks about the mania for sleep technology and how it combines existing trends. Sentence 4 also mentions 'tech industry'.
Among the four sentences given in this question, either sentence 3 or 4 can begin the paragraph. The other two sentences viz sentence 1 and sentence 2 would need a precedent. Between sentences 3 and 4, it can be observed that sentence 3 needs to precede sentence 4. "People who want to monitor and improve their sleep" in sentence 3 is more introductory or general in tone than "the mania for sleep technology" given in sentence 4. i.e. The idea of 'sleep-monitoring' needs to precede the idea of 'the mania for sleep technology'. So sentence 3 begins the paragraph. Sentence 4 cannot begin the paragraph as it needs sentence 1 to precede it.
Sentences 3 and 1 form a logical block. "no shortage of gadgets" in sentence 3 is exemplified in sentence 1. So, 1 follows 3.
The idea of 'sleep-monitoring' in sentence 3, and which has been exemplified in sentence 1, is further extended in sentence 4 with 'the mania for sleep technology'. 'The mania for sleep technology makes perfect sense for the tech industry' in sentence 4 follows from "smart pillows, sleep-tracking watches ..... and countless sleep-monitoring apps" in sentence 1. So, sentence 4 follows sentence 1.
Sentences 4 and 2 form a logical block. "combining as it does several existing trends and it fits with the industry's **metrics-driven world-view**" in sentence 4 is substantiated by "OKRS (objectives and key results), KPIS (key performance indicators) and digital-analytics dashboards" in sentence 2. "applying similar techniques to sleep seems a logical step" in sentence 2 reiterates " The mania for sleep technology makes perfect sense for the tech industry" in sentence 4. Sentence 2 concludes the para. So, 3142. Ans: (3142)

Q28. DIRECTIONS *for question 28*: 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. Although a traditional ethnography might have shed light on the cultural phenomena that produced the Chasers, Rosaldo's transparency is even more telling.
2. Rosaldo's antropoesía – a word which bridges the cultural and social scientific fields of poetry and anthropology – is an emerging hybrid genre, a method of knowledge production that cannot be codified.
3. Anthropologist-poets can cross disciplinary boundaries, employing a scholarly lens while exploring the ambiguities that poetry allows.
4. It insists on highlighting nuances rather than erecting schemas.
5. Anthropology is an interpersonal discipline, and poetry delves ever deeper into the personal.

Sentence 3 and Sentence 5 are logically connected because the ideas talk about anthropology, poetry and the subsequent liberty offered to anthropologist-poets.
Sentence 2 talks about Rosaldo's antropoesia, which is mentioned to be a hybrid genre (thus connecting anthropology and poetry). Sentence 4 talks about avoiding 'erecting schemas' – which is synonymous to 'not being codified' (schema – is a plan/structure/chart/outline). So, 2 and 4 logically agree with each other.
Sentence 1 talks about the Chasers and Rosaldo's transparency. 1 connects to the rest of the lines if we assume that the Chasers is a work of Rosaldo of the antropoesia genre. However, even in that case, why is Rosaldo's transparency telling and what does it reveal is not mentioned in the remaining 4 lines. Also, 'it' in 4 shouldn't be taken as the Chasers, because the Chasers is one piece of work whereas 4 talks about not erecting schemas – a more generic term. Ans: (1)

Q29. DIRECTIONS *for question 29*: 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. Chinese experts also sound alike when explaining their own best-case scenario.
2. This will cause China, they hope, to look again at the global order and seek a leading role in it, rather than its remaking.
3. They describe a near future in which China over-reaches and stumbles and they imagine a China chastened by slowing growth at home and a backlash to its assertive ways overseas.
4. Ask American experts how a great-power competition with China might end well, and their best-case scenarios are strikingly similar.

Sentence 1: Sentence 1 is a sentence that needs a precedent. It has the clue 'also' and the subject 'Chinese experts'.
Sentence 2: Sentence 2 has the demonstrative pronoun 'this'. It expresses a hope about China. The pronoun 'they' is also present here.
Sentence 3: Sentence 3 has the demonstrative pronoun 'they'. The sentence makes comments about China's future.
Sentence 4: Sentence 4 sounds like an introduction sentence of a paragraph. It has the proper noun "China" and the proper adjective "American experts". It mentions some clues "great-power competition" and "best-case scenarios".
So sentence 4 is the best sentence that can begin the paragraph. It mentions the topic of discussion: American .... competition with China. Sentence 4 is followed by sentence 3. The pronoun 'they' in sentence 3 refers to American experts (**they** imagine a China). "Ask American experts how a great-power competition with China might end well" in sentence 4 links with "China over-reaches and stumbles, China chastened by slowing growth at home and a backlash to its assertive ways overseas" in sentence 3. So sentence 3 follows sentence 4.
Sentences 3 and 2 form a logical block. "China may seek a leading role in the global order, rather than its remaking" in sentence 2 is a hope expressed by the American experts as a consequence of the point mentioned in sentence 3 "China over-reaches and stumbles, China chastened by slowing growth at home and a backlash to its assertive ways overseas". So sentence 2 follows sentence 3.
Sentence 1 concludes the paragraph. After mentioning the comments and hope of the American experts, sentence 1 talks about the opinion of the Chinese experts: Chinese experts also sound alike ... Also "explaining their own best-case scenario" in sentence 1 mirrors the introduction "their best-case scenarios are strikingly similar" in sentence 4. So, 4321. Ans: (4321)

Q30. DIRECTIONS *for question 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. If you think your drinking doesn't affect anyone else, think again.
2. About 21% of women and 23% of men reported experiencing alcohol-related harms, with the most prevalent type being harassment.
3. Both gender and country need to be taken into consideration when assessing adverse drinking consequences.
4. One in five adults in the US said they've experienced harm from someone else's drinking in the past year, according to a new study, the harm ranging from property damage to physical injury.
5. The study had some limitations, mainly being that the data was self-reported, which lends itself to bias if a person in the study was not answering survey questions honestly.

Sentence 1 is a generic independent sentence about how drinking does affect others.
Sentence 2 and Sentence 4 both provide examples of drinking causing harm.
Sentence 4 and Sentence 5 are connected because 5 talks about the limitations of a study, mentioned in 4.
Sentence 3 talks about the importance of gender and country for adverse drinking consequences, which hasn't really been mentioned in any of the other sentences.
The order will be 1 followed by 4 (which gives the generic numbers) followed by 2 (which gives percentages of men and women in those generic numbers) followed by 5, which talks about limitations of the study. Ans: (3)

Q31. DIRECTIONS *for question 31*: Five sentences are given with a blank in the following question. Four words are also given below the sentences. The blank in each sentence can be filled by one or more of the four words given. Each word can go into any number of sentences. Note that the sentence can change contexts depending on the use of different words which can be appropriate. Identify the number of sentences each word can go into and enter the maximum number of sentences that any word can fit in. For example, if you think that a word goes into a maximum of three sentences, then enter 3 as your answer in the input box given below the question.

i. It only took a few thousand footsore refugees to get the worms of racism come crawling out of the _____ in civilised Europe.
ii. On their graduation day, the students gave _____ to cheers and threw their hats in the air.
iii. The _____ of the singer's voice excited the audience.
iv. The researcher cut the _____ from under their feet and ensured that funding for his pioneering work was obtained.
v. You need to _____ your temper if you wish to climb the corporate ladder.

A. ground
B. rule
C. ring
D. vent(s)

Sentence (i) can be filled with the word 'vent'. Here 'vent' is used as a noun and it means 'opening' permitting the escape of something.
Sentence (ii) can be filled with the word 'vent'. 'Vent' in its verb form means expression, utterance, release.
Sentence (iii) can be filled with the word 'ring'. Here 'ring' refers to loud, clear sound.
Sentence (iv) can be filled with the word 'ground'. "cut the ground from under their feet" is an idiom which means "to anticipate someone's action and make it irrelevant".
Sentence (v) can be filled with the word 'rule'. Here 'rule' means to control or check in.
The word 'vent' can go into two sentences. Each of the words 'ground', 'rule' and 'ring' can go into a maximum of one sentence. Hence the required answer is 2.
Ans: (2)

Q32. DIRECTIONS *for question 32*: 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. Chemists in Switzerland and the United Kingdom started with a triangle-shaped loop of 18 carbon atoms, with two carbon monoxide (CO) groups at each corner to provide stability, but eventually removing those CO groups to create their 18-carbon ring.
2. That has already led to one other novel compound, and it has opened the door to a wide array of novel ring-shaped structures that might one day be used in electronics and other nanodevices.
3. The carbon ring is also highly reactive, allowing the researchers to fuse it with other carbon and oxygen rings.
4. The new molecule, known as a cyclocarbon, is the smallest theoretically stable ring of carbon to exist.

Sentence 1 is an independent statement about what the chemists did and how they created an 18-carbon ring.
Sentence 2 uses the pronoun 'that' to point to something in a preceding sentence which led to another new compound.
Sentence 3 talks about the characteristics of 'the' carbon ring, so it probably follows a sentence that has introduced the carbon ring. It also has the connector word 'also' meaning that it follows another sentence that talks about some characteristic feature of the ring.
Sentence 4 talks about 'the' new molecule and introduces it as cyclocarbon. It is also mentioned that this is a ring.
14 is a mandatory block because 1 talks about its creation and 4 gives its name and theoretical possibility. 43 is a block because 3 'also' provides a characteristic feature – highly reactive. The 'also' fits because 4 says it is the smallest theoretically stable ring. So, 143 is a block.
If we compare 2 and 143, the two independent blocks, 2 is downstream to 143, because 2 has 'that' pointing to the research work mentioned in 3. Hence, **1432.**
Ans: (1432)

Q33. DIRECTIONS *for question 33*: Five sentences are given with a blank in the following question. Four words are also given below the sentences. The blank in each sentence can be filled by one or more of the four words given. Each word can go into any number of sentences. Note that the sentence can change contexts depending on the use of different words which can be appropriate. Identify the number of sentences each word can go into and enter the maximum number of sentences that any word can fit in. For example, if you think that a word goes into a maximum of three sentences, then enter 3 as your answer in the input box given below the question.

i. The mason has to ensure that the marbonite tiles are _____ with the ground.
ii. Blessed with an appealing _____ of phrase, Susan performed brilliantly in oratorical contests.

iii. It's wonderful to own a horse, but you wouldn't be able to ride him until you _____ him in.
iv. The railway engineers were called to fix a _____ in the railway track.
v. In a _____ of patriotism, I decided to quit my job and join the movement against terrorism.

A. turn
B. break
C. buckle
D. flush

Sentence (i) can be filled with the word 'flush'. In sentence (i), 'flush with the ground' means "surface exactly even with an adjoining one".
Sentence (ii) can be filled with the word 'turn'. 'turn of phrase' means 'distinctive style of expression or idiom.
Sentence (iii) can be filled with the word 'break'. 'break him in' is an idiom which means 'train or adapt for use'.
Sentence (iv) can be filled with the word 'buckle'. 'fix a buckle' means to 'fix a kink or bulge or distortion'.
Sentence (v) can be filled with the word 'flush'. 'flush' means 'strong feeling of emotion'.
The word 'flush' can go into two sentences. The remaining word can go into a maximum of one sentence each. Hence the required answer is 2. Ans: (2)

Q34. DIRECTIONS *for question 34*: 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. While marketed as an unlikely female buddy comedy, it is, instead, the story of two women who respect one another's creative solitude.
2. Molly and Katherine's shared love of writing, their desire to disappear into the work, and, not unrelatedly, a predisposition toward clinical depression is what bonds them.
3. Yet, the movie performs its own quiet subversion.
4. Beneath the bright colours, stylish clothes, and chic locales, it is this aspect that provides the movie's most compelling ingredient.

Sentence 1 talks about a story but uses a personal pronoun 'it'. So, this sentence follows the sentence that introduces the name of the story.
Sentence 2 talks about two characters and the bond between them. Since 1 introduces such an idea of the story of two women, and 2 gives details of those women, 2 has to follow 1.
Sentence 3 starts with a contrast 'Yet' followed by the term 'its own quiet subversion' meaning there is a deviation from the expected.
Sentence 4 talks about some aspect referred to as 'this' that adds to the quality of the movie.
12 is a block, because 2 is an elaboration of 1. 3 has to precede 12 because 12 is the actual story and 3 introduces that, contrasting with what is thought about the movie. 3 cannot follow 12 because then it would leave you wondering what the subversion is. Whatever has been mentioned in 12 is the subversion. So, 312 is a block. The other clue is the contrast provided by 'while' in Sentence 1. While marketed as something else (buddy comedy), the movie does something else (two women respecting each other's solitude). That is the elaboration of the subversion.
4 continues the positive tone towards the movie, because 'this' aspect is referred to as 'compelling'. Hence, 4 follows the 12 block. So, 3124. Ans: (3124)

DILR

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

In a class of ten students, all the students, namely A, B, C, D, E, F, G, H, I and J, attended six comprehensive tests, CT1, CT2, CT3, CT4, CT5 and CT6, conducted in that order chronologically. Once the results of all the six tests were out, the class teacher wanted to know how each of the students fared and also the variation in the marks of each student from test to test. It was observed that for each of the ten students, except one, the variation in the marks was in one of the following three patterns:

1. a continuous increase from the first test (i.e., CT1) to the last test (i.e., CT 6).
2. a continuous decrease from the first test to the last test.
3. a continuous increase from the first test to the fourth test (i.e., CT4) and a continuous decrease thereafter.

The class teacher wanted to display the results at the office and asked his absent minded assistant to copy the marks from the actual marks list and display the copied list. The assistant copied the marks of one student at a time. For each student, he first selected a pair of CTs, copied the marks of those two CTs, then selected another pair of CTs and copied the marks of those two CTs and then selected the third pair of CTs and copied the marks of those two CTs. While selecting the pairs of

CTs, the assistant did not follow any particular pattern. Once copying the marks of the first student in all the six CTs was completed, he started copying the marks of the second, third, fourth and so on upto the tenth student in the same manner that he followed for the first student. However, the pairs of CTs selected while copying the marks of any two students were not necessarily the same. Unfortunately, while copying the marks, the assistant got a bit confused and for some of the students he interchanged the values copied for some of the pairs, i.e., by copying the marks of the student in one of the CTs of that pair with the marks of the student in the other CT of that pair. For each student, he had done this mistake for one, two or possibly all three pairs of tests. He had not done any other type of mistake in the entire process and the final table obtained by him is given below.

Student	Marks in					
	CT1	CT2	CT3	CT4	CT5	CT6
A	68	96	84	76	74	70
B	58	70	76	84	52	48
C	76	62	64	70	60	54
D	84	94	88	90	86	96
E	80	79	81	73	82	83
F	75	78	82	67	72	62
G	87	98	92	91	89	83
H	77	69	75	61	90	65
I	87	91	93	77	71	63
J	76	85	73	61	67	93

Q1. DIRECTIONS *for questions 1 and 2:* Select the correct alternative from the given choices.
The marks of which student did not follow any of the given three patterns?

a) **C**

b) **J**

c) **G**

d) **H**

Of the three patterns given, let us analyse the first one. For a person having continuous increase, after the arrangement, the highest must be in CT6 and least in CT1. If the highest number is in any other position, we have to check whether it can be interchanged with the corresponding number i.e., for example if the highest number is in the column of CT1, then the least marks must be in the column of CT6, otherwise continuous increase is not possible. If the highest is in the column of CT2, then the 2nd least must be in the column of CT6. If the highest is in the column of CT3, then the 3rd least must be in the column of CT6. Same is the case with the highest in the columns of CT4 and CT5.
Similarly, if the 2nd highest is in the column of CT1, the least must be in the column of CT5. If the 2nd highest is in the column of CT2, the 2nd least must be in the column of CT5. Same is the case with other CTs.
Let us check this on any two students.

B:

CT1	CT2	CT3	CT4	CT5	CT6
58	70	76	84	52	48

B cannot have continuous increase in marks, the reason is in that case, his highest marks (i.e.84) must be under CT6, but in such a scenario, 48 must be his marks in CT4. As 48 is least, he cannot have a continuous increase in marks.

A:

CT1	CT2	CT3	CT4	CT5	CT6
68	96	84	76	74	70

A can have continuous increase if marks of CT4 and CT6 were interchanged and also marks of CT3 and CT5 were interchanged. Similarly we can check for continuous decrease and even the other pattern also.
Let the three mentioned patterns i.e., continuous increase, continuous decrease and continuous increase from first to fourth and a decrease thereafter be known as pattern 1, 2, 3 respectively.
The marks of students can be in the following possible patterns:

Name of the student	A	B	C	D	E	F	G	H	I	J
Possible patterns	1, 3	2, 3	2	1, 2, 3	3	2	3	–	2, 3	1, 3

For the third pattern, the highest number has to be in CT4 and if it is in any other position, we have to check whether it can be interchanged with the corresponding number i.e., for example if the highest number is in the column of CT1, then the number in CT4 cannot be 2nd or 3rd highest because at least three numbers are greater than the number in CT1. Similarly the lowest number has to be in CT1 or CT6. Similarly the lowest number has to be in CT1 or CT6. Similarly we can check for other numbers.

H's marks did not follow any of the patterns. Choice (D)

Q2. DIRECTIONS *for questions 1 and 2:* Select the correct alternative from the given choices.
At least how many students had a continuous increase in marks from the first test to the last test?

a) **0**

b) **1**

c) **2**

d) **3**

Q3. DIRECTIONS *for questions 3 and 4:* Type in your answer in the input box provided below the question.
At most how many students had a continuous decrease in marks from the first test to the last test?

Of the three patterns given, let us analyse the first one. For a person having continuous increase, after the arrangement, the highest must be in CT6 and least in CT1. If the highest number is in any other position, we have to check whether it can be interchanged with the corresponding number i.e., for example if the highest number is in the column of CT1, then the least marks must be in the column of CT6, otherwise continuous increase is not possible. If the highest is in the column of CT2, then the 2nd least must be in the column of CT6. If the highest is in the column of CT3, then the 3rd least must be in the column of CT6. Same is the case with the highest in the columns of CT4 and CT5.
Similarly, if the 2nd highest is in the column of CT1, the least must be in the column of CT5. If the 2nd highest is in the column of CT2, the 2nd least must be in the column of CT5. Same is the case with other CTs.
Let us check this on any two students.

B:

CT1	CT2	CT3	CT4	CT5	CT6
58	70	76	84	52	48

B cannot have continuous increase in marks, the reason is in that case, his highest marks (i.e.84) must be under CT6, but in such a scenario, 48 must be his marks in CT4. As 48 is least, he cannot have a continuous increase in marks.

A:

CT1	CT2	CT3	CT4	CT5	CT6
68	96	84	76	74	70

A can have continuous increase if marks of CT4 and CT6 were interchanged and also marks of CT3 and CT5 were interchanged. Similarly we can check for continuous decrease and even the other pattern also.
Let the three mentioned patterns i.e., continuous increase, continuous decrease and continuous increase from first to fourth and a decrease thereafter be known as pattern 1, 2, 3 respectively.
The marks of students can be in the following possible patterns:

Name of the student	A	B	C	D	E	F	G	H	I	J
Possible patterns	1, 3	2, 3	2	1, 2, 3	3	2	3	–	2, 3	1, 3

For the third pattern, the highest number has to be in CT4 and if it is in any other position, we have to check whether it can be interchanged with the corresponding number i.e., for example if the highest number is in the column of CT1, then the number in CT4 cannot be 2nd or 3rd highest because at least three numbers are greater than the number in CT1. Similarly the lowest number has to be in CT1 or CT6. Similarly the lowest number has to be in CT1 or CT6. Similarly we can check for other numbers.

It is not necessary for any of the students to have a continuous increase in marks.

Choice (A)

Q3. DIRECTIONS *for questions 3 and 4:* Type in your answer in the input box provided below the question.
At most how many students had a continuous decrease in marks from the first test to the last test?

Of the three patterns given, let us analyse the first one. For a person having continuous increase, after the arrangement, the highest must be in CT6 and least in CT1. If the highest number is in any other position, we have to check whether it can be interchanged with the corresponding number i.e., for example if the highest number is in the column of CT1, then the least marks must be in the column of CT6, otherwise continuous increase is not possible. If the highest is in the column of CT2, then the 2nd least must be in the column of CT6. If the highest is in the column of CT3, then the 3rd least must be in the column of CT6. Same is the case with the highest in the columns of CT4 and CT5.
Similarly, if the 2nd highest is in the column of CT1, the least must be in the column of CT5. If the 2nd highest is in the column of CT2, the 2nd least must be in the column of CT5. Same is the case with other CTs.
Let us check this on any two students.

B:

CT1	CT2	CT3	CT4	CT5	CT6
58	*70*	*76*	*84*	*52*	*48*

B cannot have continuous increase in marks, the reason is in that case, his highest marks (i.e.84) must be under CT6, but in such a scenario, 48 must be his marks in CT4. As 48 is least, he cannot have a continuous increase in marks.

A:

CT1	CT2	CT3	CT4	CT5	CT6
68	*96*	*84*	*76*	*74*	*70*

A can have continuous increase if marks of CT4 and CT6 were interchanged and also marks of CT3 and CT5 were interchanged. Similarly we can check for continuous decrease and even the other pattern also.
Let the three mentioned patterns i.e., continuous increase, continuous decrease and continuous increase from first to fourth and a decrease thereafter be known as pattern 1, 2, 3 respectively.
The marks of students can be in the following possible patterns:

Name of the student	A	B	C	D	E	F	G	H	I	J
Possible patterns	1, 3	2, 3	2	1, 2, 3	3	2	3	–	2, 3	1, 3

For the third pattern, the highest number has to be in CT4 and if it is in any other position, we have to check whether it can be interchanged with the corresponding number i.e., for example if the highest number is in the column of CT1, then the number in CT4 cannot be 2nd or 3rd highest because at least three numbers are greater than the number in CT1. Similarly the lowest number has to be in CT1 or CT6. Similarly the lowest number has to be in CT1 or CT6. Similarly we can check for other numbers.

B can have a decrease if (CT1 and CT4) and (CT2 and CT3) are interchanged. C had a decrease and his marks in (CT2 and CT4) are interchanged. D can have a decrease if his marks in (CT1 and CT6) and (CT3 and CT4) are interchanged. F had a decrease and his marks in (CT1 and CT3) and (CT4 and CT5) are interchanged.
I had a decrease and his marks in (CT1 and CT3) are interchanged. At most 5 persons had a decrease. Ans: (5)

Q4. DIRECTIONS *for questions 3 and 4:* Type in your answer in the input box provided below the question.
What is the minimum possible difference in the marks scored by D in CT1 and in CT6?

Of the three patterns given, let us analyse the first one. For a person having continuous increase, after the arrangement, the highest must be in CT6 and least in CT1. If the highest number is in any other position, we have to check whether it can be interchanged with the corresponding number i.e., for example if the highest number is in the column of CT1, then the least marks must be in the column of CT6, otherwise continuous increase is not possible. If the highest is in the column of CT2, then the 2nd least must be in the column of CT6. If the highest is in the column of CT3, then the 3rd least must be in the column of CT6. Same is the case with the highest in the columns of CT4 and CT5.
Similarly, if the 2nd highest is in the column of CT1, the least must be in the column of CT5. If the 2nd highest is in the column of CT2, the 2nd least must be in the column of CT5. Same is the case with other CTs.
Let us check this on any two students.

B:

CT1	CT2	CT3	CT4	CT5	CT6
58	70	76	84	52	48

B cannot have continuous increase in marks, the reason is in that case, his highest marks (i.e.84) must be under CT6, but in such a scenario, 48 must be his marks in CT4. As 48 is least, he cannot have a continuous increase in marks.

A:

CT1	CT2	CT3	CT4	CT5	CT6
68	96	84	76	74	70

A can have continuous increase if marks of CT4 and CT6 were interchanged and also marks of CT3 and CT5 were interchanged. Similarly we can check for continuous decrease and even the other pattern also.
Let the three mentioned patterns i.e., continuous increase, continuous decrease and continuous increase from first to fourth and a decrease thereafter be known as pattern 1, 2, 3 respectively.
The marks of students can be in the following possible patterns:

Name of the student	A	B	C	D	E	F	G	H	I	J
Possible patterns	1, 3	2, 3	2	1, 2, 3	3	2	3	–	2, 3	1, 3

For the third pattern, the highest number has to be in CT4 and if it is in any other position, we have to check whether it can be interchanged with the corresponding number i.e., for example if the highest number is in the column of CT1, then the number in CT4 cannot be 2nd or 3rd highest because at least three numbers are greater than the number in CT1. Similarly the lowest number has to be in CT1 or CT6. Similarly the lowest number has to be in CT1 or CT6. Similarly we can check for other numbers.

The difference will be minimum if there is a continuous increase from CT1 to CT4 and decrease from CT4 to CT6. The least difference will be 6. i.e. 84, 86, 88, 96, 94, 90.

Ans: (6)

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

Each of seven friends – A, B, C, D, E, F and G – plays one of the four games viz., Chess, Carroms, Tennis and Badminton, and wears a dress of one of the three colours, Red, Blue and White.

The following information is also known:

i. No two of A, B, C and D play the same game.
ii. The number of persons playing Carroms is one more than that playing Badminton.
iii. All those who wear a red dress play Carroms and no person who wears a blue dress plays Tennis.
iv. Each colour is worn by at least two persons.
v. A wears Blue, E wears White and F wears Red.
vi. A does not play Chess and B does not play Tennis, while D plays Carroms.
vii. B and D wear the same colour.

Q5. DIRECTIONS *for questions 5 to 8:* Select the correct alternative from the given choices.
The colour of G's dress is

a) **Red.**

b) **Blue.**

c) **White.**

d) **Blue or White.**

Given A, B, C and D play different games. Also all those who wear red play Carroms and no person who wears Blue, plays Tennis.
All the persons who play Tennis should wear white dress.
Given D plays Carroms, A does not play Chess. Also A cannot play Tennis (∵ he wears Blue).
⇒ A plays Badminton.
Given B does not play Tennis
⇒ B plays Chess
⇒ C plays Tennis
⇒ C wears white dress
F wears Red ⇒ F plays Caroms
Given each colour is worn by at least 2 persons
⇒ 2, 2 and 3 persons.
B and D wear the same coloured dress, which cannot be white.
(∵ C and E wear White) and cannot be Red (if Red, B would have played Caroms).
⇒ B and D wear Blue.
But Red should be worn by at least two
⇒ G wears Red.
⇒ G plays Carroms
Since the number of persons playing Carroms is one more than that playing Badminton, E plays Badminton.

The colour of G's dress is Red. Choice (A)

Q6. DIRECTIONS *for questions 5 to 8:* Select the correct alternative from the given choices.
E plays

a) **Chess.**

b) **Carroms.**

c) **Tennis.**

d) **Badminton.**

Given A, B, C and D play different games. Also all those who wear red play Carroms and no person who wears Blue, plays Tennis.
All the persons who play Tennis should wear white dress.
Given D plays Carroms, A does not play Chess. Also A cannot play Tennis (∵ he wears Blue).
⇒ A plays Badminton.
Given B does not play Tennis
⇒ B plays Chess
⇒ C plays Tennis
⇒ C wears white dress
F wears Red ⇒ F plays Caroms
Given each colour is worn by at least 2 persons
⇒ 2, 2 and 3 persons.
B and D wear the same coloured dress, which cannot be white.
(∵ C and E wear White) and cannot be Red (if Red, B would have played Caroms).
⇒ B and D wear Blue.
But Red should be worn by at least two
⇒ G wears Red.
⇒ G plays Carroms
Since the number of persons playing Carroms is one more than that playing Badminton, E plays Badminton.

E plays Badminton. Choice (D)

Q7. DIRECTIONS *for questions 5 to 8:* Select the correct alternative from the given choices.
Which of the following pairs of friends play the same game and wear the same coloured dress?

a) **A and E**

b) **D and F**

c) **F and G**

d) **D and G**

Given A, B, C and D play different games. Also all those who wear red play Carroms and no person who wears Blue, plays Tennis.
All the persons who play Tennis should wear white dress.
Given D plays Carroms, A does not play Chess. Also A cannot play Tennis (∵ he wears Blue).
⇒ A plays Badminton.
Given B does not play Tennis
⇒ B plays Chess
⇒ C plays Tennis
⇒ C wears white dress
F wears Red ⇒ F plays Caroms
Given each colour is worn by at least 2 persons
⇒ 2, 2 and 3 persons.
B and D wear the same coloured dress, which cannot be white.
(∵ C and E wear White) and cannot be Red (if Red, B would have played Caroms).
⇒ B and D wear Blue.
But Red should be worn by at least two
⇒ G wears Red.
⇒ G plays Carroms
Since the number of persons playing Carroms is one more than that playing Badminton, E plays Badminton.

F and G wear the same coloured dress and play the same game. Choice (C)

Q8. DIRECTIONS *for questions 5 to 8:* Select the correct alternative from the given choices.
Which of the following statements is true?

a) **All the friends who wear white dress play the same game.**

b) **All the friends who play Carroms wear the same coloured dress.**

c) **All the friends who play Badminton wear the same coloured dress.**

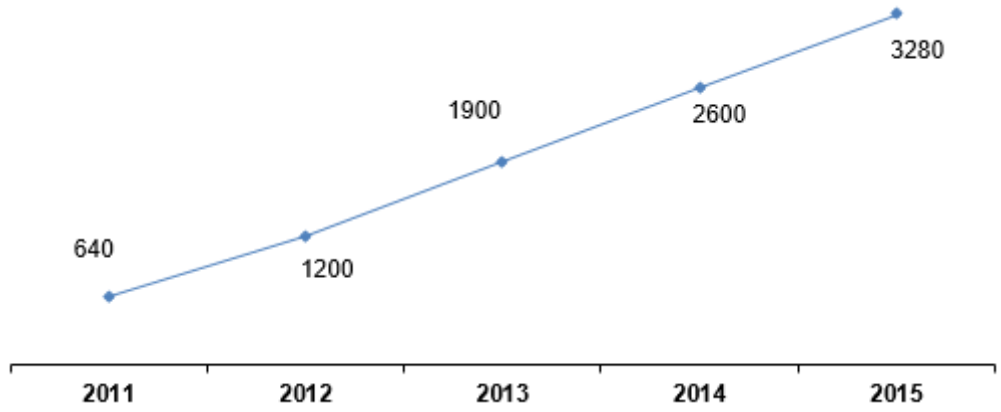
d) **All the friends who wear Blue dress play a different game.**

Given A, B, C and D play different games. Also all those who wear red play Carroms and no person who wears Blue, plays Tennis.
All the persons who play Tennis should wear white dress.
Given D plays Carroms, A does not play Chess. Also A cannot play Tennis (∵ he wears Blue).
⇒ A plays Badminton.
Given B does not play Tennis
⇒ B plays Chess
⇒ C plays Tennis
⇒ C wears white dress
F wears Red ⇒ F plays Caroms
Given each colour is worn by at least 2 persons
⇒ 2, 2 and 3 persons.
B and D wear the same coloured dress, which cannot be white.
(∵ C and E wear White) and cannot be Red (if Red, B would have played Caroms).
⇒ B and D wear Blue.
But Red should be worn by at least two
⇒ G wears Red.
⇒ G plays Carroms
Since the number of persons playing Carroms is one more than that playing Badminton, E plays Badminton.

Only the statement given in option D is true. Choice (D)

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

The following line graph gives the number of television sets of company XYZ which are in use in the market for the years 2011 to 2015. Every year, 25% of the television sets sold by company XYZ in the previous year are discarded due to defects, while the rest continue to be used for a period of another seven years, at the end of which they are replaced with new sets. The company started production in 2011 and sold all the television sets it manufactured in each of the given years.



Q9. DIRECTIONS *for question 9:* Select the correct alternative from the given choices.
In which of the given years did the company manufacture the highest number of television sets?

a) **2012**

b) **2013**

c) **2015**

d) **2014**

The number of Television sets manufactured in the different years are.

Year	No. of TVs manufactured
2011	640
2012	720 (1200 – 480)
2013	880 (1900 – 480 – 540)
2014	920 (2600 – 480 – 540 – 660)
2015	910 (3280 – 480 – 540 – 660 – 690)

The highest number of television sets were manufactured in 2014. Choice (D)

Q10. DIRECTIONS *for question 10:* Type in your answer in the input box provided below the question.
What is the total number of television sets sold by company XYZ in the given period?

The number of Television sets manufactured in the different years are.

Year	No. of TVs manufactured
2011	640
2012	720 (1200 – 480)
2013	880 (1900 – 480 – 540)
2014	920 (2600 – 480 – 540 – 660)
2015	910 (3280 – 480 – 540 – 660 – 690)

Total number of television sets sold = 640 + 720 + 880 + 920 + 910 = 4070.

Ans: (4070)

Q11. DIRECTIONS *for question 11:* Select the correct alternative from the given choices.
If the price of a television set increased by 10% every year, starting from 2011, then the sales revenue in 2014 was approximately what percentage more than that in 2011?

a) **63%**

b) **83%**

c) **91%**

d) **8%**

The number of Television sets manufactured in the different years are.

Year	No. of TVs manufactured
2011	640
2012	720 (1200 – 480)
2013	880 (1900 – 480 – 540)
2014	920 (2600 – 480 – 540 – 660)
2015	910 (3280 – 480 – 540 – 660 – 690)

Sales revenue in 2011 = 640 × x (assuming price of television in 2011 to be x)
Sales revenue in 2014 = 920 × 1.331x.

Percentage increase = $\frac{920 \times 1.331 - 640}{640} \cong 91.3\%$.

Choice (C)

Q12. DIRECTIONS *for question 12:* Type in your answer in the input box provided below the question.
What is the total number of television sets discarded during the given period?

The number of Television sets manufactured in the different years are.

Year	No. of TVs manufactured
2011	640
2012	720 (1200 – 480)
2013	880 (1900 – 480 – 540)
2014	920 (2600 – 480 – 540 – 660)
2015	910 (3280 – 480 – 540 – 660 – 690)

25% of the television sets sold between 2011 and 2014 will be discarded by 2015. (The sets purchased in 2015 will not be discarded in the given period)
Number of television sets sold from 2011 to 2014
= 640 + 720 + 880 + 920 = 3160
Number of television sets discarded
= 3160 × 0.25 = 790 Ans: (790)

Q13. DIRECTIONS *for questions 13 to 15:* Select the correct alternative from the given choices.
How is Naveen related to Mani?

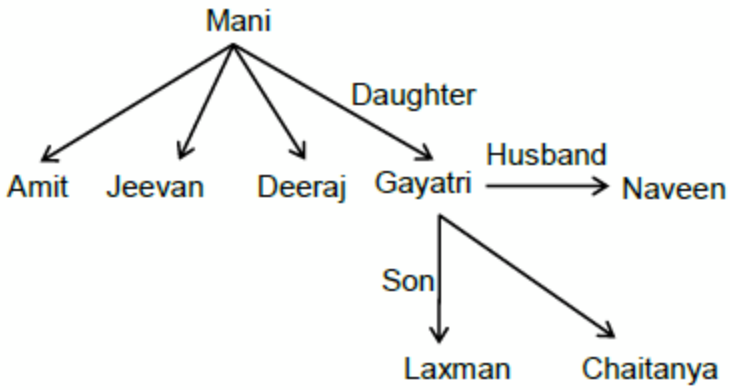
a) **Son-in-law**

b) **Son**

c) **Nephew**

d) **None of the above**

Given that Laxman is Dheeraj's nephew and Laxman and Chaitanya are siblings and Amit, Dheeraj and Jeevan are siblings. Hence, the two groups have one generation gap.
As each of Mani's sons is the uncle of Gayatri's child, Gayatri is the daughter of Mani. Also Mani belongs to the first generation, Gayatri to the second and Gayatri's child to the third generation.
Now Amit, Dheeraj and Jeevan are the uncles of Laxman and Chaitanya.



. Naveen is the son-in-law of Mani. Choice (A)

Q14. DIRECTIONS *for questions 13 to 15:* Select the correct alternative from the given choices. Who among the following belongs to the same generation as Mani?

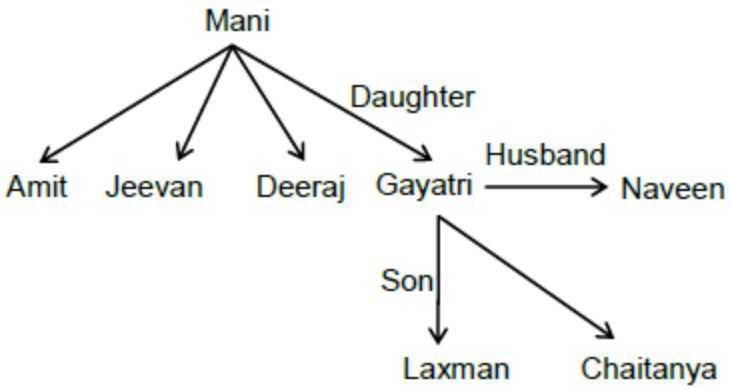
a) **Amit**

b) **Chaitanya**

c) **Gayatri**

d) **None of the above**

Given that Laxman is Dheeraj's nephew and Laxman and Chaitanya are siblings and Amit, Dheeraj and Jeevan are siblings. Hence, the two groups have one generation gap.
As each of Mani's sons is the uncle of Gayatri's child, Gayatri is the daughter of Mani. Also Mani belongs to the first generation, Gayatri to the second and Gayatri's child to the third generation.
Now Amit, Dheeraj and Jeevan are the uncles of Laxman and Chaitanya.



None of the given persons belongs to the same generation as Mani. Choice (D)

Q15. DIRECTIONS *for questions 13 to 15:* Select the correct alternative from the given choices.
Who are the children of Gayatri?

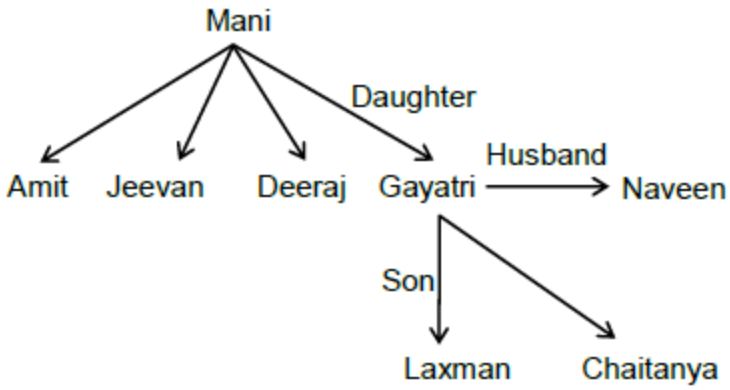
a) **Laxman and Chaitanya**

b) **Amit, Jeevan and Deeraj**

c) **Only Naveen**

d) **Cannot be determined**

Given that Laxman is Dheeraj's nephew and Laxman and Chaitanya are siblings and Amit, Dheeraj and Jeevan are siblings. Hence, the two groups have one generation gap.
As each of Mani's sons is the uncle of Gayatri's child, Gayatri is the daughter of Mani. Also Mani belongs to the first generation, Gayatri to the second and Gayatri's child to the third generation.
Now Amit, Dheeraj and Jeevan are the uncles of Laxman and Chaitanya.



Laxman and Chaitanya are the children of Gayatri. Choice (A)

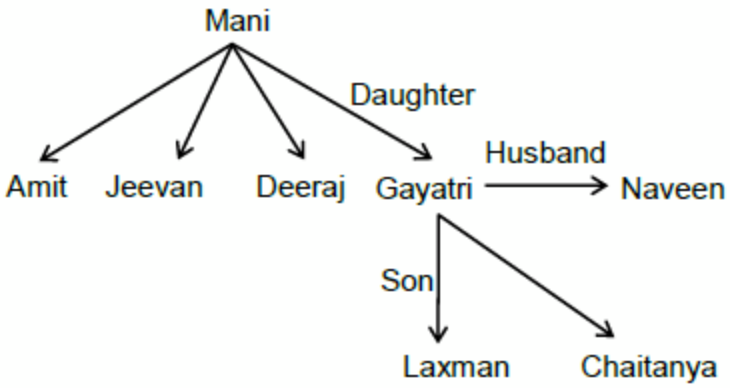
DIRECTIONS *for questions 13 to 16:* Answer the questions on the basis of the information given below.

Eight members – Amit, Chaitanya, Dheeraj, Gayatri, Jeevan, Laxman, Mani and Naveen – of a family stay in a certain house. It is also known that,

i. these eight persons belong to exactly three generations.
ii. Gayatri's son is the nephew of each of Mani's sons.
iii. Laxman is Dheeraj's nephew and only one of Dheeraj's parents stays in the house.
iv. Amit, Jeevan and Dheeraj are siblings. Also, Laxman and Chaitanya are siblings.
v. Naveen is the father of Chaitanya.

Q16. DIRECTIONS *for question 16:* Type in your answer in the input box provided below the question.
How many children does Mani have?

Given that Laxman is Dheeraj's nephew and Laxman and Chaitanya are siblings and Amit, Dheeraj and Jeevan are siblings. Hence, the two groups have one generation gap.
As each of Mani's sons is the uncle of Gayatri's child, Gayatri is the daughter of Mani. Also Mani belongs to the first generation, Gayatri to the second and Gayatri's child to the third generation.
Now Amit, Dheeraj and Jeevan are the uncles of Laxman and Chaitanya.



Mani has four children. Ans: (4)

Q17. DIRECTIONS *for questions 17 to 20:* Select the correct alternative from the given choices.
If Mr.Anand earned a 25% return on average during the year, then which of the following statements would necessarily be true?

I. Property B is located in either Chennai or Gurgaon.
II. Property D is located in either Bangalore or Hyderabad.
III. The returns from property A were 50% more than that initially expected.
IV. The returns from property B were more than that initially expected.

a) **Only I and II**

b) **Only II and III**

c) **Only I and IV**

d) **Only II and IV**

The expected returns from properties A, B, C and D are 10%, 20%, 40% and 60% respectively. The total amount invested is 50+ 50 + 75 + 75 = ₹250 lakh.

To get a 25% return on ₹250 lakh the returns should be ₹62.5 lakh. The only way to get a return of ₹62.5 lakh is

Property	A/C	B/D	C/A	D/B
Returns (%)	20	30	20	30
Investment	75 lakh	75 lakh	50 lakh	50 lakh
Returns (amount)	15 lakh	22.5 lakh	10 lakh	15 lakh

The amounts invested in A and C are ₹50 lakh and ₹75 lakh in any order. Same is the case for B and D.
So property B, which earned 50% more returns than expected was either in Chennai or Gurgaon. Nothing can be concluded about property D. Property A yielded 100% more returns than expected and property B earned 50% more returns than expected.
Only statements I and IV are true. Choice (C)

Q18. DIRECTIONS *for questions 17 to 20:* Select the correct alternative from the given choices.
What is the minimum average return that Mr. Anand would have earned during the year?

a) **22%**

b) **24%**

c) **25%**

d) **23%**

The expected returns from properties A, B, C and D are 10%, 20%, 40% and 60% respectively. The total amount invested is 50 + 50 + 75 + 75 = ₹250 lakh.

For the minimum appreciation, property A must give double the expected returns and property B one and half times that expected, while C and D would give only half that expected. So returns from for the different properties are, A → 20%, B → 30%, C → 20% and D → 30%. Now ₹75 lakh must be allotted to A and C (minimum returns) and ₹50 lakh to be allotted to B and D.

Minimum returns

$$= 75 \times \frac{20}{100} + 50 \times \frac{30}{100} + 75 \times \frac{20}{100} + 50 \times \frac{30}{100} = 15 + 15 + 15 + 15 = 60$$

$$\text{Percentage returns} = \frac{60}{250} \times 100 = 24\%$$

Choice (B)

Q19. DIRECTIONS *for questions 17 to 20:* Select the correct alternative from the given choices.
If property B is located in Bangalore and the returns on the property in Bangalore were twice that of the initially expected returns, then which of the following statements would necessarily be false?

I. Anand earned a return of not more than 48% on average.
II. Anand earned a return of not less than 28% on average.
III. If Anand earned an average return of 44%, Rs.75 lakh was invested in property D.
IV. If Anand earned an average return of 40.5%, Rs.75 lakh was invested in property A.

a) **Only I and II**

b) **Only II and IV**

c) **Only II and III**

d) **Only II**

If property B is in Bangalore, the maximum returns can be

Property	A	B	C	D
Returns (%)	5	40	20	90
Investment	50 lakh	75 lakh	50 lakh	75 lakh
Returns (amount)	2.5 lakh	30 lakh	10 lakh	67.5 lakh

$$\text{Returns (\%)} = \frac{110}{250} \times 100 = 44\%$$

$\therefore$ Statement I is true.
The minimum returns would be

Property	A	B	C	D
Returns (%)	15	40	20	30
Investment	75 lakh	50 lakh	75 lakh	50 lakh
Returns (amount)	11.25 lakh	20 lakh	15 lakh	15 lakh

$$\text{Returns (\%)} = \frac{61.25}{250} \times 100 = 24.5\%$$

So statement II is false. For a return of 44%, it has already been seen that ₹75 lakh is invested in property D. While a return of 40.5% is possible only when ₹75 lakh is invested in A and D, ₹50 lakh in B and C. Hence, both statements (III) and (IV) are true. Choice (D)

Q20. DIRECTIONS *for questions 17 to 20:* Select the correct alternative from the given choices. What is the maximum average return that Mr.Anand could have earned during the year?

a) **52.5%**

b) **57%**

c) **60.5%**

d) **62.5%**

The expected returns from properties A, B, C and D are 10%, 20%, 40% and 60% respectively. The total amount invested is 50+ 50 + 75 + 75 = ₹250 lakh.

The maximum average return occurs when actual returns from D (highest expected value) are double that expected and actual returns from C (second highest expected value) are one and half times that expected. A and B both gave only half the expected returns. Thus the highest amount (₹75 lakh each) must be in properties C and D.
Maximum returns

$$= 75 \times \frac{120}{100} + 75 \times \frac{60}{100} + 50 \times \frac{10}{100} + 50 \times \frac{5}{100} = 90 + 45 + 5 + 2.5 = 142.5$$

$$\text{Percentage returns} = \frac{142.5}{250} \times 100 = 57\%$$

Choice (B)

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

Five persons rated six different cities and scored them from 41 to 100. Based on the scores that each person gave, the cities were assigned a grade among A, B, C, D, E and F.

The following table represents the range of scores for each of the grades.

Grades	Range of Scores
A	91 – 100
B	81 – 90
C	71 – 80
D	61 – 70
E	51 – 60
F	41 – 50

Each person had to give a score (from the range of the respective grade) to each city and no two persons gave the same score to any city.

The following table represents the grades received by each of the six cities from each of the five persons.

City / Name	Mumbai	Delhi	Chennai	Pune	Hyderabad	Calcutta
Arun	A	B	C	D	E	F
Bhagat	F	A	B	C	D	E
Chetan	E	F	A	B	C	D
Dilsha	D	E	F	A	B	C
Ellen	A	C	B	D	F	E

Q21. DIRECTIONS *for questions 21 to 24:* Select the correct alternative from the given choices
Which of the following could be the overall score received by Mumbai and Chennai combined?

a) **745**

b) **700**

c) **790**

d) **More than one of the above**

The range of scores received by each of the cities can be evaluated.

City / Person	Mumbai	Delhi	Chennai
Arun	A (91 – 100)	B (81 – 90)	C (71 – 80)
Bhagat	F (41 – 50)	A (91 – 100)	B (81 – 90)
Chetan	E (51 – 60)	F (41 – 50)	A (91 – 100)
Dilsha	D (61 – 70)	E (51 – 60)	F (41 – 50)
Ellen	A (91 – 100)	C (71 – 80)	B (81 – 90)
Range	336 – 379	335 – 380	366 – 409

City / Person	Pune	Hyderabad	Calcutta
Arun	D (61 – 70)	E (51 – 60)	F (41 – 50)
Bhagat	C (71 – 80)	D (61 – 70)	E (51 – 60)
Chetan	B (81 – 90)	C (71 – 80)	D (61 – 70)
Dilsha	A (91 – 100)	B (81 – 90)	C (71 – 80)
Ellen	D (61 – 70)	F (41 – 50)	E (51 – 60)
Range	366 – 409	305 – 350	276 – 319

The range for Mumbai is 336-379, because both Arun and Ellen gave scores in the same range, and if one of them has given a least score of 91 then the other would have given a least score of 92. ($\because$ No two persons gave the same score to two different persons).

The overall score of Mumbai and Chennai lies in the range
(336 + 366) to (379 + 409)(702) to (788)
Thus 745 is the possible combined score. Choice (A)

Q22. DIRECTIONS *for questions 21 to 24:* Select the correct alternative from the given choices
If Hyderabad received a total score of 320, then how many cities received an overall score less than that of Hyderabad?

a) **0**

b) **1**

c) **2**

d) **Cannot be determined**

The range of scores received by each of the cities can be evaluated.

City / Person	Mumbai	Delhi	Chennai
Arun	A (91 – 100)	B (81 – 90)	C (71 – 80)
Bhagat	F (41 – 50)	A (91 – 100)	B (81 – 90)
Chetan	E (51 – 60)	F (41 – 50)	A (91 – 100)
Dilsha	D (61 – 70)	E (51 – 60)	F (41 – 50)
Ellen	A (91 – 100)	C (71 – 80)	B (81 – 90)
Range	336 – 379	335 – 380	366 – 409

City / Person	Pune	Hyderabad	Calcutta
Arun	D (61 – 70)	E (51 – 60)	F (41 – 50)
Bhagat	C (71 – 80)	D (61 – 70)	E (51 – 60)
Chetan	B (81 – 90)	C (71 – 80)	D (61 – 70)
Dilsha	A (91 – 100)	B (81 – 90)	C (71 – 80)
Ellen	D (61 – 70)	F (41 – 50)	E (51 – 60)
Range	366 – 409	305 – 350	276 – 319

The range for Mumbai is 336-379, because both Arun and Ellen gave scores in the same range, and if one of them has given a least score of 91 then the other would have given a least score of 92. ($\because$ No two persons gave the same score to two different persons).

Only Calcutta received a total score of less than 320. Choice (B)

Q23. DIRECTIONS *for questions 21 to 24:* Select the correct alternative from the given choices
If the total score received by Chennai is 47 more than that received by Calcutta, what was the score given by Dilsha to Chennai?

a) **41**

b) **42**

c) **50**

d) **Cannot be determined**

The range of scores received by each of the cities can be evaluated.

City / Person	Mumbai	Delhi	Chennai
Arun	A (91 – 100)	B (81 – 90)	C (71 – 80)
Bhagat	F (41 – 50)	A (91 – 100)	B (81 – 90)
Chetan	E (51 – 60)	F (41 – 50)	A (91 – 100)
Dilsha	D (61 – 70)	E (51 – 60)	F (41 – 50)
Ellen	A (91 – 100)	C (71 – 80)	B (81 – 90)
Range	336 – 379	335 – 380	366 – 409

City / Person	Pune	Hyderabad	Calcutta
Arun	D (61 – 70)	E (51 – 60)	F (41 – 50)
Bhagat	C (71 – 80)	D (61 – 70)	E (51 – 60)
Chetan	B (81 – 90)	C (71 – 80)	D (61 – 70)
Dilsha	A (91 – 100)	B (81 – 90)	C (71 – 80)
Ellen	D (61 – 70)	F (41 – 50)	E (51 – 60)
Range	366 – 409	305 – 350	276 – 319

The range for Mumbai is 336-379, because both Arun and Ellen gave scores in the same range, and if one of them has given a least score of 91 then the other would have given a least score of 92. (∵ No two persons gave the same score to two different persons).

Since Chennai received 47 points more than Calcutta, Calcutta must have a total score of 319 and Chennai, a total score of 366.
∴ Dilsha must have given a score of 41 to Chennai. Choice (A)

Q24. DIRECTIONS *for questions 21 to 24:* Select the correct alternative from the given choices

The maximum numbers of cities that could have received the same total score is

a) **6.**

b) **5.**

c) **4.**

d) **3.**

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

The following tables give the information about the number of participants, who belong to nine different districts – District 1 through District 9 – of five different states – State 1 through State 5 – in three events – 1, 2 and 3 – at the national games.

Number of participants

State	EVENT		
	1	2	3
State 1	2	0	0
State 2	2	2	3
State 3	1	2	3
State 4	0	1	0
State 5	4	1	0

Number of participants

District	EVENT		
	1	2	3
District 1	2	0	0
District 2	2	1	0
District 3	2	0	0
District 4	0	1	3
District 5	0	2	0
District 6	2	1	0
District 7	0	0	3
District 8	0	1	0
District 9	1	0	0

Q25. DIRECTIONS *for questions 25 and 26:* Select the correct alternative from the given choices. District 1 can belong to

a) **State 1.**

b) **State 2.**

c) **State 3.**

d) **State 4.**

The range of scores received by each of the cities can be evaluated.

City / Person	Mumbai	Delhi	Chennai
Arun	A (91 – 100)	B (81 – 90)	C (71 – 80)
Bhagat	F (41 – 50)	A (91 – 100)	B (81 – 90)
Chetan	E (51 – 60)	F (41 – 50)	A (91 – 100)
Dilsha	D (61 – 70)	E (51 – 60)	F (41 – 50)
Ellen	A (91 – 100)	C (71 – 80)	B (81 – 90)
Range	336 – 379	335 – 380	366 – 409

City / Person	Pune	Hyderabad	Calcutta
Arun	D (61 – 70)	E (51 – 60)	F (41 – 50)
Bhagat	C (71 – 80)	D (61 – 70)	E (51 – 60)
Chetan	B (81 – 90)	C (71 – 80)	D (61 – 70)
Dilsha	A (91 – 100)	B (81 – 90)	C (71 – 80)
Ellen	D (61 – 70)	F (41 – 50)	E (51 – 60)
Range	366 – 409	305 – 350	276 – 319

The range for Mumbai is 336-379, because both Arun and Ellen gave scores in the same range, and if one of them has given a least score of 91 then the other would have given a least score of 92. ($\because$ No two persons gave the same score to two different persons).

Four cities (Mumbai, Delhi, Chennai and Pune) could have received the same total score (366 – 379). Choice (C)

By observing we can say that District 8 is in State 4. As only one person from State 3 participated in event 1 that person must be from District 9.
Further, we can say that District 4 belongs to either State 2 or State 3.
If District 4 belongs to State 3, then there must be one more district from which only one participant each participated, in events 1 and 2 but there are no more districts, with this property. ∴ District 4 belongs to State 2.
∴ Either District 2 or District 6 belongs to State 2.
Also District 7 belongs to State 3.
⇒ District 5 must belong to State 3.
Also District 1 or District 3 belongs to State 1
∴ Also, District 1 or District 3 and District 2 or District 6 belongs to State 5.
∴ We have

S_1	D_1 or D_3
S_2	D_4, D_2 or D_6
S_3	D_5, D_7, D_9
S_4	D_8
S_5	D_1 or D_3, D_2 or D_6

District 1 can belong to State 1 or State 5. Choice (A)

Q26. DIRECTIONS *for questions 25 and 26:* Select the correct alternative from the given choices.
To which state does District 3 belong?

a) **State 1 or State 2 but not State 5**

b) **State 2 or State 5 but not State 1**

c) **State 1 or State 5 but not State 2**

d) **State 2 or State 3**

By observing we can say that District 8 is in State 4. As only one person from State 3 participated in event 1 that person must be from District 9.
Further, we can say that District 4 belongs to either State 2 or State 3.
If District 4 belongs to State 3, then there must be one more district from which only one participant each participated, in events 1 and 2 but there are no more districts, with this property. ∴ District 4 belongs to State 2.
∴ Either District 2 or District 6 belongs to State 2.
Also District 7 belongs to State 3.
⇒ District 5 must belong to State 3.
Also District 1 or District 3 belongs to State 1
∴ Also, District 1 or District 3 and District 2 or District 6 belongs to State 5.
∴ We have

S_1	D_1 or D_3
S_2	D_4, D_2 or D_6
S_3	D_5, D_7, D_9
S_4	D_8
S_5	D_1 or D_3, D_2 or D_6

District 3 belongs to either State 1 or State 5. Choice (C)

Q27. DIRECTIONS *for questions 27 and 28:* Type in your answer in the input box provided below the question.
Participants from how many districts from State 2 participated in any of the three events at the national games?

By observing we can say that District 8 is in State 4. As only one person from State 3 participated in event 1 that person must be from District 9.
Further, we can say that District 4 belongs to either State 2 or State 3.
If District 4 belongs to State 3, then there must be one more district from which only one participant each participated, in events 1 and 2 but there are no more districts, with this property. ∴ District 4 belongs to State 2.
∴ Either District 2 or District 6 belongs to State 2.
Also District 7 belongs to State 3.
⇒ District 5 must belong to State 3.
Also District 1 or District 3 belongs to State 1
∴ Also, District 1 or District 3 and District 2 or District 6 belongs to State 5.
∴ We have

S_1	D_1 or D_3
S_2	D_4, D_2 or D_6
S_3	D_5, D_7, D_9
S_4	D_8
S_5	D_1 or D_3, D_2 or D_6

Participants from two districts from State 2 participated in the national games.

Ans: (2)

Q28. DIRECTIONS *for questions 27 and 28:* Type in your answer in the input box provided below the question.
How many distinct possibilities exist for the group of districts which are in State 5?

By observing we can say that District 8 is in State 4. As only one person from State 3 participated in event 1 that person must be from District 9.
Further, we can say that District 4 belongs to either State 2 or State 3.
If District 4 belongs to State 3, then there must be one more district from which only one participant each participated, in events 1 and 2 but there are no more districts, with this property. ∴ District 4 belongs to State 2.
∴ Either District 2 or District 6 belongs to State 2.
Also District 7 belongs to State 3.
⇒ District 5 must belong to State 3.
Also District 1 or District 3 belongs to State 1
∴ Also, District 1 or District 3 and District 2 or District 6 belongs to State 5.
∴ We have

S_1	D_1 or D_3
S_2	D_4, D_2 or D_6
S_3	D_5, D_7, D_9
S_4	D_8
S_5	D_1 or D_3, D_2 or D_6

(D_1, D_2), (D_1, D_6), (D_3, D_2), (D_3, D_6) are the possible groups of districts which are in State 5. Ans: (4)

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

In an antiques shop, seven gramophone records labeled 1 to 7, are arranged in a shelf, in no particular order, one above the other. Among the records, three have English songs, two have Hindi songs and the remaining two, Tamil songs.

Further, it is known that

i. no two records of the same language are adjacent to each other, and no three consecutive records have labels that are consecutive numbers, not necessarily in the same order.
ii. none of the Tamil records is adjacent to any Hindi record, and none of the English records is labeled 5.
iii. there are exactly four records between the records labeled 4 and 5, and the record labeled 3 is the bottom most record.
iv. one of the Tamil records is labeled 1, and it is two places below the record labeled 7

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

If one of the Hindi records is labeled 5, then what is the maximum possible number of records between the two Hindi records?

There are a total of four records of Tamil and Hindi combined and from conditions (i) and (ii), no two of these can be adjacent to each other. Thus, the initial arrangement will be as follows:

T/H
E
T/H
E
T/H
E
T/H

From condition (iii), records labeled 4 and 5 must be the top most and second from bottom in any order.
However, from condition (ii), none of the English records is labeled 5 ⇒ The top most record is labeled 5 and the second from bottom is labeled 4.
From above and from condition (iv), the third record from the bottom must be labeled 1 and the fifth record from bottom must be labeled 7.
From above, the second record from top must be labeled either 2 or 6. However, if it is labeled 6 the top three records will bear labels 5, 6, and 7 which violates condition (i)
⇒ The second record form top is labeled 2 and the fourth record from top is labeled 6.
Thus, the final arrangement will be as follows.

Language	Label
T/H	5
E	2
T/H	7
E	6
T	1
E	4
T/H	3

One of the Hindi records is labeled 5 ⇒ The top most record is a Hindi one. The number of records in between the Hindi records can be maximized if the bottom most record is also a Hindi one. ⇒ The maximum possible number of records in between the two Hindi records is 5. Ans: (5)

Q30. DIRECTIONS *for questions 30 to 32:* Select the correct alternative from the given choices.
Which of the following records are adjacent to each other?

a) **The records labeled 3 and 6**

b) **The records labeled 2 and 6**

c) **The records labeled 7 and 6**

d) **The records labeled 6 and 5**

There are a total of four records of Tamil and Hindi combined and from conditions (i) and (ii), no two of these can be adjacent to each other. Thus, the initial arrangement will be as follows:

T/H
E
T/H
E
T/H
E
T/H

From condition (iii), records labeled 4 and 5 must be the top most and second from bottom in any order.
However, from condition (ii), none of the English records is labeled 5 ⇒ The top most record is labeled 5 and the second from bottom is labeled 4.
From above and from condition (iv), the third record from the bottom must be labeled 1 and the fifth record from bottom must be labeled 7.
From above, the second record from top must be labeled either 2 or 6. However, if it is labeled 6 the top three records will bear labels 5, 6, and 7 which violates condition (i)
⇒ The second record form top is labeled 2 and the fourth record from top is labeled 6.
Thus, the final arrangement will be as follows.

Language	Label
T/H	5
E	2
T/H	7
E	6
T	1
E	4
T/H	3

From the above table, records labeled 6 and 7 are adjacent to each other.

Choice (C)

Q31. DIRECTIONS *for questions 30 to 32:* Select the correct alternative from the given choices.
Which of the following is definitely a correct combination of the language of a record and the label on it?

a) **Tamil – 7**

b) **Hindi – 3**

c) **Hindi – 5**

d) **English – 6**

There are a total of four records of Tamil and Hindi combined and from conditions (i) and (ii), no two of these can be adjacent to each other. Thus, the initial arrangement will be as follows:

T/H
E
T/H
E
T/H
E
T/H

From condition (iii), records labeled 4 and 5 must be the top most and second from bottom in any order.
However, from condition (ii), none of the English records is labeled 5 ⇒ The top most record is labeled 5 and the second from bottom is labeled 4.
From above and from condition (iv), the third record from the bottom must be labeled 1 and the fifth record from bottom must be labeled 7.
From above, the second record from top must be labeled either 2 or 6. However, if it is labeled 6 the top three records will bear labels 5, 6, and 7 which violates condition (i)
⇒ The second record form top is labeled 2 and the fourth record from top is labeled 6.
Thus, the final arrangement will be as follows.

Language	Label
T/H	5
E	2
T/H	7
E	6
T	1
E	4
T/H	3

Records labeled 3, 5, and 7 can be of either Tamil or Hindi whereas record labeled 6 is definitely an English record. Choice (D)

Q32. DIRECTIONS *for questions 30 to 32:* Select the correct alternative from the given choices.

Which of the following represents the label on an English record?

a) **5**

b) **7**

c) **3**

d) **4**

There are a total of four records of Tamil and Hindi combined and from conditions (i) and (ii), no two of these can be adjacent to each other. Thus, the initial arrangement will be as follows:

T/H
E
T/H
E
T/H
E
T/H

From condition (iii), records labeled 4 and 5 must be the top most and second from bottom in any order.
However, from condition (ii), none of the English records is labeled 5 ⇒ The top most record is labeled 5 and the second from bottom is labeled 4.
From above and from condition (iv), the third record from the bottom must be labeled 1 and the fifth record from bottom must be labeled 7.
From above, the second record from top must be labeled either 2 or 6. However, if it is labeled 6 the top three records will bear labels 5, 6, and 7 which violates condition (i)
⇒ The second record form top is labeled 2 and the fourth record from top is labeled 6.
Thus, the final arrangement will be as follows.

Language	Label
T/H	5
E	2
T/H	7
E	6
T	1
E	4
T/H	3

The record labeled 4 is an English record. Choice (D)

Q1. DIRECTIONS *for questions 1 to 5:* Select the correct alternative from the given choices.

If the sum of n consecutive positive integers is 21, where $n > 1$, how many values can n assume?

a) **1**

b) **2**

c) **3**

d) **5**

It is given that, the sum of n ($n > 1$) consecutive integers is 21. By simple observation, we can observe the following cases:
Case I: $1 + 2 + 3 + 4 + 5 + 6 = 21$
Case II: $6 + 7 + 8 = 21$
Case III: $10 + 11 = 21$
We can conclude that these are the only three cases where the sum of consecutive numbers adds upto 21. (Sum of 4 consecutive numbers will be even and the sum of 5 consecutive numbers will be a multiple of 5)

Alternative Solution:

The sum of n natural consecutive numbers is 21, it means that the average of these numbers is $(21/n)$. Since this average can only be equal to a natural number or a (natural number $+\frac{1}{2}$), only three cases are possible, $n = 2$, 3 and 6. Going beyond $n = 6$, the numbers are not all natural. Choice (C)

Q2. DIRECTIONS *for questions 1 to 5:* Select the correct alternative from the given choices.
Let ab be a two-digit number, with $a > b$. The following algorithm is now performed using ab:

```
START
Y = 10a + b;
a = a + b;
b = a – b;
a = a – b;
Y = Y – (10a + b);
Print Y
END
```

Which of the following statements is/are true?

a) **Y is always divisible by 9.**

b) **Y is always divisible by 11.**

c) **Y is always even.**

d) **More than one of the above.**

The values of the variables a, b, Y change as follows after each of the 5 steps of the algorithm.

	a	b	Y
1.	a_1	b_1	$10a_1 + b_1$
2.	$a_1 + b_1$		
3.		a_1	
4.	b_1		
5.			$9(a_1 - b_1)$

$\therefore$ Y is always divisible by 9. Choice (A)

Q3. DIRECTIONS *for questions 1 to 5:* Select the correct alternative from the given choices.
If n years ago, Raghu's age was thrice the age of his son, and n years hence, Raghu's age will be twice the age of his son, find the ratio of the present ages of Raghu and his son.

a) **5 : 2**

b) **4 : 1**

c) **7 : 3**

d) **9 : 2**

Let the present ages of Raghu and his son be R years and x years respectively.

	Raghu	son	Given
Present age	R	x	
n years ago	$R - n$	$x - n$	$R - n = 3(x - n)$
After n years	$R + n$	$x + n$	$R + n = 2(x + n)$

Equating R, we get

$3x - 2n = 2x + n$

$\Rightarrow x = 3n$

$\therefore R = 2(3n) + n = 7n$

Therefore the ratio of the present ages of Raghu and his son is 7 : 3

Alternative Solution:

Let the age of Raghu and his son n years go be $3s$ and s respectively. Now, n years hence, i.e., $2n$ years later, Raghu is twice as old as his son.

$\therefore 3s + 2n = 2(s + 2n) \Rightarrow s = 2n$.

Present ages of Raghu and his son will be in the ratio $(3s + n) : (s + n)$,

i.e., $(3(2n) + n) : (2n + n) = 7n : 3n$ i.e., 7 : 3. Choice (C)

Q4. DIRECTIONS *for questions 1 to 5:* Select the correct alternative from the given choices.

If the sum to infinity of the series $2 + (2 - d)2/3 + (2 + d)\,4/9 + (2 + 3d)\,8/27 + (2 + 5d)\,16/81 + \ldots\ldots$ is 5/2, what is the value of d?

a) **7/12**

b) **–7/12**

c) **–5/12**

d) **5/12**

Let $S = (2-d)\left(\frac{2}{3}\right) + (2+d)\left(\frac{4}{9}\right) + (2+3d)\left(\frac{8}{27}\right)$

$\therefore S\left(\frac{2}{3}\right) = (2-d)\left(\frac{4}{9}\right) + (2+d)\left(\frac{8}{27}\right) + \ldots\ldots\ldots$

Subtracting,

$\frac{S}{3} = (2-d)\left(\frac{2}{3}\right) + 2d\left(\frac{4}{9}\right) + 2d\left(\frac{8}{27}\right) + \ldots\ldots$

$= (2-d)\left(\frac{2}{3}\right) + 2d\left[\frac{4}{9} + \frac{8}{27} + \ldots\ldots\right]$

$= (2-d)\left(\frac{2}{3}\right) + (2d)\left[\frac{4}{9}\left(\frac{3}{1}\right)\right] = \frac{4}{3} + 2d$

$\Rightarrow S = 4 + 6d$. Given $S = \frac{5}{2} - 2 = \frac{1}{2}$ $\therefore d = \frac{-7}{12}$ Choice (B)

Q5. DIRECTIONS *for questions 1 to 5:* Select the correct alternative from the given choices.
A mixture of alcohol and water comprises 80% alcohol. First, 20% of the mixture is replaced with water and then the volume of the resultant mixture is increased by 20% by adding only alcohol. If the entire process is then repeated once all over again, what is percentage of alcohol in the final mixture?

a) **63.33%**

b) **72.28%**

c) **61.25%**

d) **81.24%**

Let us consider the initial quantity of mixture as 100 litres
Therefore the quantity of alcohol = 80 litres and the quantity of water = 20 litres
When 20% of the mixture is replaced by water the quantity of alcohol remaining

$= \frac{80}{100}(80) = 64$ litres

Next, 20 litres alcohol is added.
Therefore, after the process is conducted once, the quantities of alcohol and water are 84 and 36 litres respectively
Next, we replace 20% of the mixture by water so quantity of alcohol remaining

$\frac{80}{100}(84) = 67.2$ litres

∴ Alcohol	Water
67.2	52.8

Next, volume of the mixture is increased by 20% by adding alcohol. So, the final quantity of alcohol = 67.2 + 24 = 91.2 litres

Final composition of the mixture is

Alcohol	Water	Total
91.2	52.8	144

Therefore, the final concentration of alcohol in the mixture

$= \frac{91.2}{144} \times 100 = 63.33\%$ Choice (A)

6. DIRECTIONS *for questions 6 and 7:* Type in your answer in the input box provided below the question.
A set P comprises 303 squares of natural numbers, selected at random. What is the maximum number of elements of P that one can always find such that each of them leaves the same remainder when divided by 9?

Any number when divided by 9 may leave 9 distinct remainders 0, 1, 2, ……8.
But squares of natural numbers will leave only 4 distinct remainders which can be obtained by finding the remainders of the squares 0^2, 1^2, 2^2,….8^2.
The four distinct remainders are 0, 1, 4 and 7.
Hence if 303 squares are present
Even if all the remainders are evenly distributed, (75, 76, 76, 76), we see that at least one remainder has to occur at least 76 times, i.e., the maximum number of occurrences of a remainder M is at least 76.
In other words one can always find 76 elements of P which leave the same remainder when divided by 9. Ans: (76)

Q7. DIRECTIONS *for questions 6 and 7:* Type in your answer in the input box provided below the question.

If '57' in the number system to the base x is equal to '75' in the number system to the base y, then find the minimum difference between x and y.

It is given that, $(57)_x = (75)_y$

$\Rightarrow 5x + 7 = 7y + 5$ ----- (1)

$\Rightarrow 5x = 7y - 2$

$5x = 5y + 2y - 2$

As L.H.S is divisible by 5, R.H.S must also be divisible by 5.

$\therefore 2y - 2$ must be divisible by 5.

Again, y must be more than 7.

The values of y satisfying the condition that $2y - 2$ is divisible by 5 are as follows:

1, 6, 11, ...

As y must be greater than 7, minimum possible value of y is 11.

Substituting y = 11 in equation (1), we get

$5x + 7 = 7(11) + 5$

$\Rightarrow x = 15$

therefore the minimum difference between x and y is $15 - 11 = 4$

The next set of (x, y) will be $(15 + 7, 11 + 5)$, $(15 + 2 \times 7, 11 + 2 \times 5)$..... and the difference will continuously increase and become 6, 8, 10..... Ans: (4)

Q8. DIRECTIONS *for questions 8 and 9:* Select the correct alternative from the given choices.

Two of the vertices of a regular pentagon drawn on the co-ordinate plane are known to be (10, 20) and (17, 40). What is the ratio of the maximum possible area to the minimum possible area of such a pentagon?

$\cos 36^\circ = \frac{(\sqrt{5}+1)}{4}$.

a)

$4 - \frac{\sqrt{5}}{2}$

b)

$2 + \frac{\sqrt{5}}{2}$

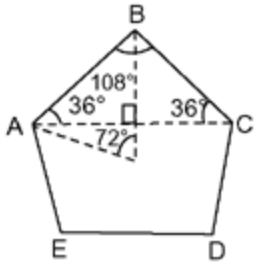
c)

$$\frac{3}{2}+\frac{\sqrt{5}}{2}$$

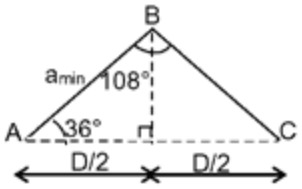
d)

$$3+\frac{2}{\sqrt{5}}$$

The area of a regular pentagon of side a = ka^2 (where k is a constant).
Consider a regular pentagon ABCDE shown below.



The two given vertices are (10, 20) and (17, 40). Let the distance between these points be D.
There are only 2 possible sizes for such a pentagon. The bigger one would be the pentagon for which the two given points form a side, say AB. The smaller one would be the pentagon for which the two given points form a diagonal, say AC. The figure below shows a portion of the pentagon for which AC is a diagonal.



Let the distance between the given points equal D units.
Now the area of the pentagon in the first case = $k(a_{max})^2$
Now, since a_{max} = D, area = kD^2.
In the second case, area = $k(a_{min})^2$

But from figure $a_{min} = \dfrac{\left(\frac{D}{2}\right)}{\cos 36^\circ} = D \times \dfrac{2}{\left(\sqrt{5}+1\right)}$

Hence, area = $\dfrac{k.4}{\left(\sqrt{5}+1\right)^2} \times D^2$

$\therefore$ Required ratio = $\dfrac{\left(kD^2\right)}{\left(k.\dfrac{4}{\left(\sqrt{5}+1\right)^2}.D^2\right)} = \dfrac{\left(\sqrt{5}+1\right)^2}{4} = \dfrac{3}{2}+\dfrac{\sqrt{5}}{2}$ Choice (C)

Q9. DIRECTIONS *for questions 8 and 9:* Select the correct alternative from the given choices.
If $27^x + 27^{x-1} = 252$, find the value of $(3x)^x$.

a)

$25\sqrt{25}$

b)

$5(25)^{\frac{1}{3}}$

c) **25**

d)

$25(5)^{\frac{1}{3}}$

$27^x + 27^{x-1} = 252$

$27^x + \frac{27^x}{27} = 252$

$\frac{28}{27}(27^x) = 252$

$\Rightarrow 27^x = 3^5 \Rightarrow 3^{3x} = 3^5$

$\therefore 3x = 5$

$\therefore (3x)^x = (5)^{\frac{5}{3}} = 5(25)^{\frac{1}{3}}$ Choice (B)

Q10. DIRECTIONS *for question 10:* Type in your answer in the input box provided below the question.

David had notes only in the denominations of Rs.50, Rs.20 and Rs.5. In how many ways can he settle a bill of Rs.120 for his lunch in a local hotel?

a can be a maximum of 2
If a = 2, 20b + 5c = 20
Possibilities for (b, c) are (1, 0) and (0, 4)
If a = 1, 20b + 5c = 70
Possibilities for (b, c) are (0, 14), (1, 10), (2, 6) and (3, 2)
If a = 0, 20b + 5c = 120
Possibilities for (b, c) are (0, 24), (1, 20), (2, 16), (3, 12), (4, 8), (5, 4) and (6, 0).
Therefore, total number of solutions is 2 + 4 + 7 = 13 Ans: (13)

Q11. DIRECTIONS *for questions 11 to 13:* Select the correct alternative from the given choices.
The sequence of positive integers $a_1, a_2, a_3, \ldots\ldots$ satisfies the relation $a_{n+1} = a_n + a_{n-1}$, for all $n \geq 2$.

If $a_7 = 144$ and $a_{10} = 610$, find the value of a_{11}.

a) **737**

b) **754**

c) **987**

d) **1024**

$a_{n+1} = a_n + a_{n-1}$
$a_7 = a_9 - a_8 = 144$ ..... (1)
$a_{10} = a_9 + a_8 = 610$ ....(2)
$\Rightarrow$ By adding (1) and (2)
$a_9 = 377$; Now $a_{11} = a_9 + a_{10} = 987$. Choice (C)

Q12. DIRECTIONS *for questions 11 to 13:* Select the correct alternative from the given choices.
If $f(x) = \frac{1}{x-1}$ and $h(x) = \frac{x}{x-1}$, find the value of $f(h(2))$.

a) **1**

b) **−1**

c) **2**

d) **3**

$h(2)=\frac{2}{2-1}=2$

$\Rightarrow f(h(2))=f(2)=\frac{1}{2-1}=1$

$\therefore f(h(2))=1$ Choice (A)

Q13. DIRECTIONS *for questions 11 to 13:* Select the correct alternative from the given choices.

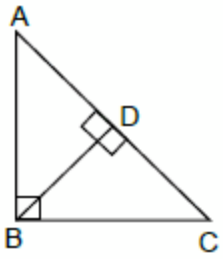
In triangle ABC, $\angle B = 90°$ and BD is the altitude drawn from B to AC. If the area of triangle ABC is X sq.cm, the product (AD) × (CD) cannot be

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

b) $\frac{11}{10}$ **X**

c) $\frac{7}{8}$ **X**

d) **X**



$\frac{AD}{AB} = \cos\angle A \Rightarrow AD = AB\cos\angle A$

$\frac{CD}{BC} = \cos\angle C \Rightarrow CD = BC\cos\angle C$

$(AD)(CD) = (AB)(BC)\cos\angle A\cos\angle C$

In a right angled triangle, cos (each acute angle) = sin (other acute angle)

$\therefore \cos\angle C = \sin\angle A$

$\therefore (AD)(CD) = (AB)(BC)\cos\angle A\sin\angle A = \frac{(AB)(BC)(2\sin A\cos A)}{2} = \frac{(AB)(BC)}{2}\sin 2A$

$\sin 2A \le 1 \Rightarrow (AD)(CD) \le \frac{(AB)(BC)}{2}$

[Alternately the product $\cos\angle A \times \cos\angle C$ is maximum of 1/2, i.e., when $\angle A = \angle C = 45°$]

The area $X = \frac{(AB)(BC)}{2}$

$\therefore (AD)(CD) \le X$.

Only Choice (B) violates this condition. Choice (B)

Q14. DIRECTIONS *for questions 14 and 15:* Type in your answer in the input box provided below the question.

Find the difference between the sum of the first 2016 even whole numbers and the sum of the first 2016 odd natural numbers.

The two sums could be arranged in the following manner.

S_1 = 1 + 3 + 5 + 7 + ... +4031
S_2 = 0 + 2 + 4 + 6 + ... +4030

$S_1 - S_2$ = 1 + 1 + 1 + 1 + ... +1(2016 times)

In other words, the difference between the n^{th} even whole number and n^{th} odd natural number is 1 (for all values of n).
$\therefore S_1 - S_2 = 1 \times 2016$.
Thus, the required difference is 2016

Alternative Solution:

Sum of the first 2016 odd natural numbers = $(2016)^2$
Sum of the first 2016 even whole numbers = sum of the first 2015 even natural numbers = 2015 (2015 + 1)
Difference = $2016^2 - 2016.2015 = 2016$ Ans: (2016)

Q15. DIRECTIONS *for questions 14 and 15:* Type in your answer in the input box provided below the question.
I have six identical oranges and six distinct apples. In how many ways can I have a basket of five fruits containing at least one apple and at least one orange?

The combination of apples and oranges can be (1, 4), (2, 3), (3, 2) and (4, 1).
The number of ways in which 1 apple and 4 oranges be selected = $^6C_1$ (1) = 6
(Any number of oranges can be selected in only 1 way).
Similarly 2 apples and 3 oranges can be selected in $^6C_2$ (1) = 15 ways
3 apples and 2 oranges can be selected in $^6C_3$ (1) = 20 ways and 4 apples and 1 orange can be selected in $^6C_4$ (1) = 15 ways
$\therefore$ Total number of ways = 6 + 15 + 20 + 15 = 56 ways. Ans: (56)

Q16. DIRECTIONS *for questions 16 and 17:* Select the correct alternative from the given choices.
Manohar bought 236 pens at a certain price. If he then sold all the pens at a fixed selling price each, such that he was able to recover his investment from the revenue obtained by selling exactly 200 pens, find his profit percentage.

a) **18%**

b) **24%**

c) **36%**

d) **Cannot be determined**

Let the cost price of the 236 pens be P

$\Rightarrow$ Selling price of 200 pens = P

Selling price of the remaining 36 pens = $36\frac{P}{200}$

Total selling price of the 236 pens = $P + \frac{36P}{200}$

Profit = SP – CP = $P + \frac{36P}{200} - P = \frac{36P}{200}$

Profit% = $\frac{\left(\frac{36P}{200}\right)}{P} \times 100 = 18\%$.

Choice (A)

Q17. DIRECTIONS *for questions 16 and 17:* Select the correct alternative from the given choices.
Five numbers are written in the descending order in a row. The averages of all the possible quadruplets (i.e., sets of four) of these numbers are written, in the descending order, in a second row. This process is repeated for the second row, the third row and so on for subsequent rows. If the difference between the first and the last numbers in the first row is 41 and the difference between the second and the fourth numbers in the second row is 4.1, find the approximate difference between the first and the last numbers in the seventh row.

a) **0.01**

b) **0.002**

c) **0.004**

d) **0.001**

Let the numbers in the i^{th} row be P_i, Q_i, R_i, S_i and T_i
It is given that $P_i > Q_i > R_i > S_i > T_i$.
Given : $P_1 - T_1 = 41$ and $Q_2 - S_2 = 4.1$

Row

I^{st} : P_1 Q_1 R_1 S_1 T_1

II^{nd}: $\frac{P_1+Q_1+R_1+S_1}{4}$ $\frac{P_1+Q_1+R_1+T_1}{4}$ $\frac{P_1+Q_1+S_1+T_1}{4}$ $\frac{P_1+R_1+S_1+T_1}{4}$ $\frac{Q_1+R_1+S_1+T_1}{4}$

Difference between the first and the last numbers in the second row = $P_2 - T_2$

$= \frac{P_1 - T_1}{4} = \frac{1}{4} \times$ (Difference for the previous row)

$\therefore P_n - T_n = \frac{P_{n-1} - T_{n-1}}{4} = \frac{P_1 - T_1}{4^{n-1}}$

$P_7 - T_7 = \frac{P_1 - T_1}{4^6} = \frac{41}{4096} \approx 0.01$ Choice (A)

Q18. DIRECTIONS *for question 18:* Type in your answer in the input box provided below the question.
A binary operator (*) is defined such that (a * b) = a^b, if $a \le b$ and = b^a, if $b < a$. Find the value of ((2* 3)*3) + ((3 * 2)*2).

$((2 * 3) * 3) = 2^3 * 3 = 3^8 = 6561$
$((3 * 2) * 2) = 2^3 * 2 = 2^8 = 256$
$\therefore$ required sum = 6561 + 256 = 6817. Ans: (6817)

Q19. DIRECTIONS *for questions 19 to 21:* Select the correct alternative from the given choices.
If the difference between the total compound interest and the total simple interest accrued on a certain sum at a certain rate of interest at the end of two years is 6.25% of the principal, find the number of years in which the sum will quadruple under simple interest.

a) **12**

b) **16**

c) **20**

d) **24**

The difference between the total CI and the total SI in 2 years = $\frac{Pr^2}{100^2} = \frac{6.25}{100}P$

$\Rightarrow r^2 = 625$

$\Rightarrow r = 25\%$

At 25% per annum, let the number of years taken for a sum to quadruple under SI be n.

$\therefore p + np\frac{25}{100} = 4p$

$\Rightarrow n\frac{p}{4} = 3p$

$\Rightarrow n = 12$

Therefore, the sum under SI will quadruple in 12 years. Choice (A)

Q20. DIRECTIONS *for questions 19 to 21:* Select the correct alternative from the given choices.
I bought a roll of barbed wire of length 300 m to fence all of my five square plots, each of which is of a different size. If the side (when considered in metres) of each plot is a natural number, then how many of the following four values cannot be the total area (in m^2) of my five plots together?

(i) 1125 (ii) 5045 (iii) 1135 (iv) 4255

a) **1**

b) **2**

c) **3**

d) **4**

Let the sides be a, b, c, d and e respectively
Given that $4(a + b + c + d + e) = 300$
$\Rightarrow a + b + c + d + e = 75$, and all are distinct natural numbers.
Consider $A = a^2 + b^2 + c^2 + d^2 + e^2$, it can have a maximum value when any four are given least possible values and the fifth is given the largest possible value
$\Rightarrow A \leq 1^2 + 2^2 + 3^3 + 4^2 + 65^2$, i.e., 4255
Also A is minimum when all of a, b, c, d and e are as close to each other as possible.
Hence, $A \geq 13^2 + 14^2 + 15^2 + 16^2 + 17^2 = 1135$
Hence 1125 and 5045 are not possible values. Choice (B)

Q21. DIRECTIONS *for questions 19 to 21:* Select the correct alternative from the given choices.
Let T_1 be an equilateral triangle of side *a*. Another equilateral triangle T_2 is formed by joining the midpoints of the sides of T_1. Another equilateral triangle T_3 is formed by joining the midpoints of the sides of T_2 and this process of drawing triangles is continued indefinitely. Let X denote the sum of the perimeters of all the triangles and let Y denote the sum of the areas of all the triangles. The ratio Y/X is

a)

$\frac{\sqrt{3}a}{12}$.

b)

$\frac{\sqrt{3}a}{24}$.

c)

$\frac{\sqrt{3}a}{36}$.

d)

$\frac{\sqrt{3}a}{18}$.

Perimeter of $T_1 = 3a$

Perimeter of $T_2 = \frac{3}{2}a$

Perimeter of $T_3 = \frac{3a}{4}$ and so on.

Area of $T_1 = \frac{\sqrt{3}}{4}a^2$

Area of $T_2 = \frac{\sqrt{3}}{16}a^2$

Area of $T_3 = \frac{\sqrt{3}}{64}a^2$ and so on.

$x = \frac{3a}{1-\frac{1}{2}} = 6a$

$y = \frac{\frac{\sqrt{3}}{4}a^2}{1-\frac{1}{4}} = \frac{\sqrt{3}}{3}a^2$

$\therefore \frac{y}{x} = \frac{\sqrt{3}}{18}a$. Choice (D)

Q22. DIRECTIONS *for questions 22 to 24:* Type in your answer in the input box provided below the question.

Find the minimum value of $8\tan^2\theta + 18\cot^2\theta$.

Let us find the minimum value of $a\tan^2\theta + b\cot^2\theta$

AM ≥ GM

$$\frac{a\tan^2\theta + b\cot^2\theta}{2} \geq \sqrt{a\tan^2\theta\, b\cot^2\theta}$$

$a\tan^2\theta + b\cot^2\theta \geq 2\sqrt{ab}$

$\therefore\ 8\tan^2\theta + 18\cot^2\theta \geq 2\sqrt{8\times 18}$

$8\tan^2\theta + 18\cot^2\theta \geq 24$

Alternative Solution:

Since the product of the two terms of the given expression is a constant ($8\tan^2\theta \times 18\cot^2\theta = 144$), the sum of the two terms will be minimum when each term is equal to the square root of the product, i.e., $\sqrt{144}=12$.

Hence, minimum sum = 12 + 12 = 24. Ans: (24)

Q23. DIRECTIONS *for questions 22 to 24:* Type in your answer in the input box provided below the question.

Five friends A_1, A_2, A_3, A_4 and A_5 take up an assignment. It is known that, for i = 1 to 4, A_i, when working alone, takes (i + 1) times as much time as the other four would take, when working together. If all the five friends work together on the assignment and they earn a total of Rs.600, what is the share (in Rs.) of A_5?

For a given work, A_1 takes 2 times the time taken by the other four together.

∴We have	A_1		$A_2\ A_3\ A_4\ A_5$
Ratio of time	2	:	1
Ratio of work done	1	:	2

∴ A_1 does 1/3rd total work done.

Similarly,	A_2		$A_1\ A_3\ A_4\ A_5$
Ratio of time	3	:	1
Ratio of work done	1	:	3

∴ A_2 does 1/4th total work done.

Similarly, A_3, A_4 do 1/5th and 1/6th of total work respectively.

A_1 receives $\frac{1}{3} \times 600 = 200$

A_2 receives $\frac{1}{4} \times 600 = 150$

A_3 receives $\frac{1}{5} \times 600 = 120$

A_4 receives $\frac{1}{6} \times 600 = 100$

570

∴ A_5 receives ₹600 – 570 = ₹30 Ans: (30)

Q24. DIRECTIONS *for questions 22 to 24:* Type in your answer in the input box provided below the question.

In an examination comprising T questions, Arif correctly solved 15 of the first 24 questions. Of the remaining questions, he answered one-fourth correctly. If he was able to correctly answer 40% of the questions in the paper overall, how many possible values can T assume?

Number of questions correctly answered by Arif

$= 15 + \frac{(T-24)}{4}$

It is given that, he correctly answered 40% of the questions in the paper overall.

$\therefore 15 + \frac{(T-24)}{4} = \frac{40}{100}T$

$15 + \frac{T}{4} - 6 = \frac{2}{5}T$

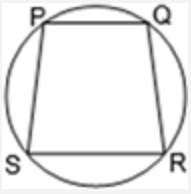
$\Rightarrow \frac{2}{5}T - \frac{T}{4} = 9$

$\therefore \frac{3}{20}T = 9$

$\Rightarrow T = 60$

Therefore T can assume only one value. Ans: (1)

Q25. DIRECTIONS *for questions 25 to 27:* Select the correct alternative from the given choices.



In the figure above, PQRS is a cyclic quadrilateral, where PQ = *p* cm, QR = *q* cm, RS = *r* cm and SP = *s* cm. If (PQ) (QR) = 3(SP) (RS) and ∠PQR = 120°, then *s* =

a)

$\frac{p+q-r}{3}$

b) ***p + r − q***

c) ***q + r − p***

d) ***p + q − r***

$PR^2 = PQ^2 + QR^2 - 2(PQ)(QR)\cos\angle PQR$
$= p^2 + q^2 + pq$
$PR^2 = PS^2 + SR^2 - 2(PS)(SR)\cos\angle PSR$
$= s^2 + r^2 - 2sr\cos(180° - \angle PQR)$
$p^2 + q^2 + pq = s^2 + r^2 - sr$
Adding pq both sides, $(p + q)^2 = s^2 + r^2 - sr + pq$
$= s^2 + r^2 - sr + 3sr = (s + r)^2$
$p + q = s + r$
$s = p + q - r$ Choice (D)

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

$f(x) = x^2 - px + q$. If $f(1)$ and $f(2)$ are of opposite signs, which of the following cannot be the value of $f(0)$?

a) **0**

b) **–3**

c) **1**

d) **2**

$f(0) = q$, $f(1) = 1 - p + q$, $f(2) = 4 - 2p + q$
Given $f(1)$ and $f(2)$ are of opposite signs.
$\Rightarrow f(1)\, f(2) < 0 \Rightarrow (1 - p + q)(4 - 2p + q) < 0$

$$(1 - p + q)(4 - 2p + q) = 2(1 + q - p)\left(2 + \frac{q}{2} - p\right)$$

If $1 + q = 2 + \frac{q}{2}$, i.e., $q = 2$ then the expression equals twice a perfect square, i.e., if $q = 2$,

i.e., if $q = 2$, $2(1 + q - p)\left(2 + \frac{q}{2} - p\right) = 2(3 - p)^2$ which cannot be less than zero.

$\therefore$ $q = 2$ is not possible.

Alternative Solution:

Since f(1) and f(2) are of opposite signs, either f(1) < f(2) or f(2) < f(1)
If f(1) < f(2), i.e., f(1) < 0, then 1 – p + q < 4 – 2p + q, i.e., 3 – p > 0 $\Rightarrow$ q < 2
If f(1) > f(2), i.e., f(1) > 0, then 1 – p + q > 4 – 2p + q, i.e., 3 – p < 0 $\Rightarrow$ q > 2.
In either case q ≠ 2. Choice (D)

Q27. DIRECTIONS *for questions 25 to 27:* Select the correct alternative from the given choices.
$\lceil x \rceil$ is defined as the least integer greater than or equal to x and $\lfloor x \rfloor$ is defined as the greatest integer less than or equal to x.

If the following definitions hold true,

$f(x, y) = \lfloor x \rfloor + \lfloor y \rfloor + \lceil x + y \rceil$

$g(x, y) = \lceil x \rceil + \lceil y \rceil + \lfloor x + y \rfloor$

$h(x, y) = \lfloor 2x \rfloor + \lfloor 2y \rfloor$

$k(x, y) = \lceil 2x \rceil + \lceil 2y \rceil$

which of the following is always true?

a) $\boldsymbol{k(x, y) \neq f(x, y)}$

b) $\boldsymbol{k(x, y) < g(x, y)}$

c) $\boldsymbol{2g(x, y) < h(x, y) + f(x, y)}$

d) **None of the above**

Consider x = 0 and y = 0.
Then, f = g = h = k = 0
Choice (A) k ≠ f is false
Choice (B) k < g is false
Choice (C) 2g < h + f is also false
∴ None of the choices is always true. Choice (D)

Q28. DIRECTIONS *for questions 28 and 29:* Type in your answer in the input box provided below the question.
If N = 888…up to 100 digits, what is the remainder when N is divided by 625?

Rem [N/625]

$$= \text{Rem}\left[\frac{\text{the number formed by the last four digits}}{625}\right]$$

$$= \text{Rem}\left[\frac{8888}{625}\right] = \text{Rem}\left[\frac{14\times625+138}{625}\right] = 138$$ Ans: (138)

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

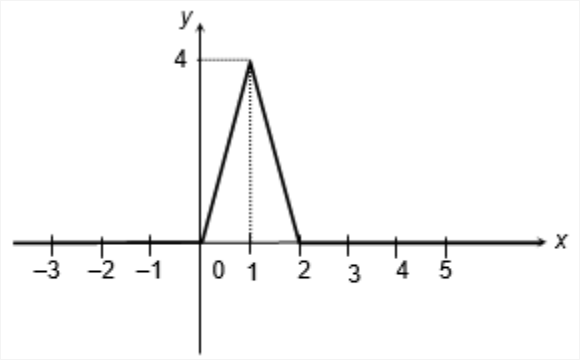
There is a 100-sided regular polygon. How many different types of regular polygons (other than the given one) can be formed by joining the vertices of this polygon?

To draw an n sided regular polygon using the 100 vertices, the vertices chosen must be equidistant from each other. This is possible only if n is a factor of 100.
Since $100 = 2^2 \times 5^2$ number of factors of 100 = (2 + 1)(2 + 1) = 9.
However the following cases have to be discarded:
(1) n = 100 – gives the original polygon itself.
(2) n = 1 and 2 – will not give a polygon.
Hence, 9 – 3 = 6 possible cases exist.

Alternative Solution:

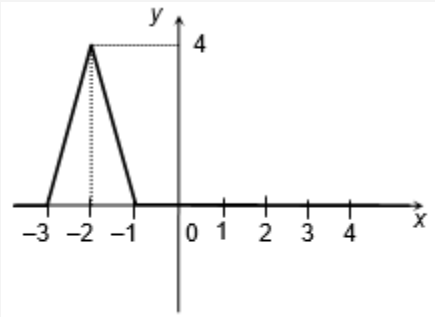
One could also directly enumerate the possible values of n as follows : 4, 5, 10, 20, 25 and 50. Ans: (6)

Q30. DIRECTIONS *for questions 30 and 31:* Select the correct alternative from the given choices.

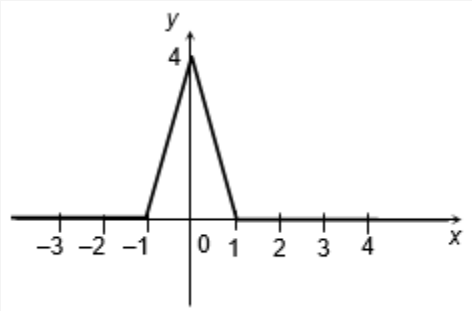


If the above graph represents $f(x + 4)$, then which of the following graphs would represent $f(3 - x)$.

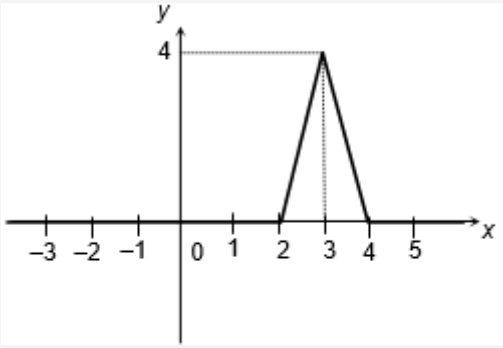
a)



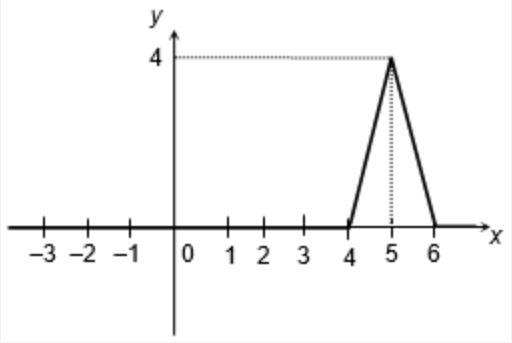
b)



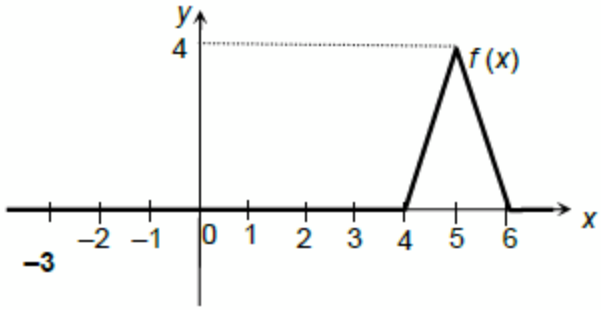
c)



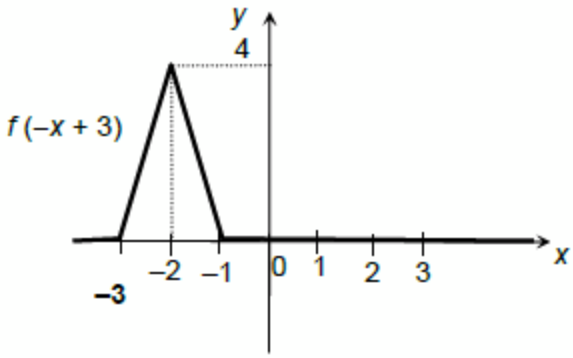
d)


y
4
x
–3
–2
–1
0
1
2
3
4
5
6

$f(x)$ is obtained by shifting the given graph of $f(x + 4)$ by 4 units to the right side,
$\therefore$ $f(x)$ is



$\therefore$ $f(-x + 3)$ is obtained, by first reflecting the above graph (of $f(x)$) about the y-axis (to obtain $f(-x)$ and then shifting it to the right by 3 units.



Note: In general, for $k > 0$, $f(x + k)$ is obtained by shifting $f(x)$ to the left, while $f(-x + k)$ is obtained by shifting $f(-x)$ to the right.

Alternative solution:

It can be seen from the graph that y is maximum when $x = 1$ i.e., $y = f(5)$. Since the function $f(3 - x)$ is only a linear transformation of $f(x + 4)$, $f(3 - x)$ will also attain its maximum when $f(3 - x) = f(5)$ or $3 - x = 5 \Rightarrow x = -2$. From the choices, only (A) satisfies. Choice (A)

Q31. DIRECTIONS *for questions 30 and 31:* Select the correct alternative from the given choices.

Just when Satabdhi Express started from the platform, Mr. Alonso, a motorcyclist also started on a road parallel to the railway track. He started from the rear end of the train, with a speed greater than that of the train. As soon as he reached the front end of the train, he immediately turned back towards the rear end of the train and by the time he reached the rear end he found that the train had travelled a distance equal to its own length and he had travelled a total distance of $400(1+\sqrt{2})$ m. Find the length (in m) of the train. (Assume that the train and Alonso travelled with their respective uniform speeds throughout).

a) **200**

b) $400(1+\sqrt{2})$

c) **400**

d) $400\sqrt{2}$

Let x m be the length of the train and y m be the distance travelled by the train by the time Alonso met the train.

Clearly, the ratio of the train's speed to Alonso's is $\frac{y}{x+y}$ ----- (1)

It is given that by the time Alonso met the last compartment again, the train travelled a total distance of x mts, out of which it had already travelled y mts. So the time in which the train travels remaining $x - y$, Alonso had travelled y exactly.

$\therefore$ The speeds ratio is $\frac{x-y}{y}$ ------(2)

Equating (1) and (2) $\frac{y}{x+y} = \frac{x-y}{y} \Rightarrow x = \sqrt{2}y$

Clearly, $x + 2y$ is the distance travelled by Alonso. It is given that $x + 2y = 400\,[1+\sqrt{2}]$

$\Rightarrow x(1+\sqrt{2}) = 400(1+\sqrt{2})$

$\Rightarrow x = 400$

Alternative solution:

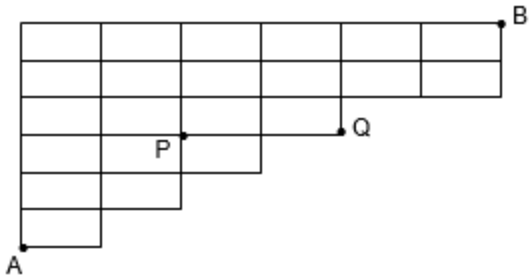
If L is the length of the train, the ratio of speed of Alonso to the speed of the train $= 400(1 + \sqrt{2}) : L$

This ratio has to be more than 2, since if it is equal to 2, Alonso would meet the engine when the train travels distance L.

Also, the ratio has to be less than 3, since if it is equal to 3, when Alonso meets the rear end, the train would not have travelled distance L.

Examining the given options, only option (C) meets these conditions. Choice (C)

DIRECTIONS *for questions 32 and 33:* Answer the questions on the basis of the information given below.



In the grid given above, some of the nodes (i.e., points of intersection of two gridlines) are labelled as A, B, P and Q. A person at one node can reach another node only by moving rightwards or upwards along the gridlines.

Q32. DIRECTIONS *for questions 32 and 33:* Select the correct alternative from the given choices.
In how many ways can a person at node P reach node B?

a) **21**

b) **31**

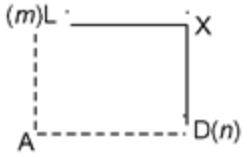
c) **32**

d) **56**

There are two conditions given for the movement between the nodes:

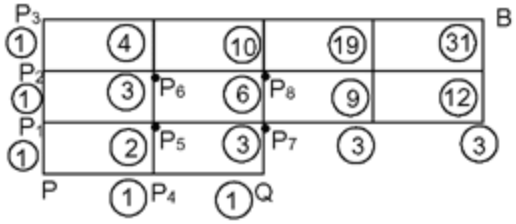
(i) Movement is allowed only along the grid lines.
(ii) Movement is allowed either rightwards or upwards

Now let us consider the number of ways of moving from node A to another node (say) X.



Let W be the node that is immediately to the left of X and D be the node that is immediately to the down of X. Let the number of ways to reach L from A be *m* and D from A be *n*. It may be observed that the number of ways of reaching X from L or D is 1. So, the number of ways of reaching X from A equals *m*(1) + *n*(1) i.e. *m* + *n*.

Let us use the above idea to solve this question.



The number of ways of reaching P to P_5 is equal to the number of ways of reaching P to P_1 + number of ways of reaching P to P_4 i.e. 1 + 1. Similarly *n*(P to P_6) = *n* (P to P_2) + *n*(P to P_5) = 1 + 2 = 3
Going this way and writing the number of ways of reaching a certain node (from P) at that node, we get *n*(P to B) = 31.

Alternative Solution:

Number of ways of going from P to P_1 is 1. Number of ways of going from P to P_5 (without going to P_1) is 1. Similarly, there is one way to reach P_7 (without going to P_1 or P_5). Now, using the standard formula $\frac{(m+n)!}{m!\,n!}$ for each individually and then adding, we get of P_1, P_5 and P_7 we get the total number of ways from P to B as 15 + 10 + 6 = 31. Choice (B)

Q33. DIRECTIONS *for questions 32 and 33:* Select the correct alternative from the given choices.
In how many ways can a person at node A reach node B, travelling via node Q?

a) **42**

b) **35**

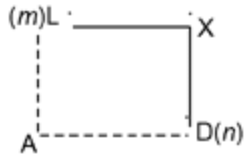
c) **56**

d) **84**

There are two conditions given for the movement between the nodes:

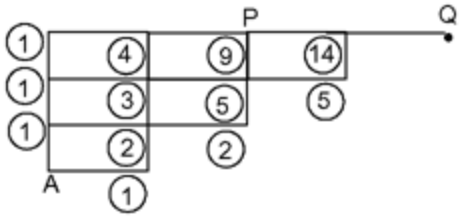
(i) Movement is allowed only along the grid lines.
(ii) Movement is allowed either rightwards or upwards

Now let us consider the number of ways of moving from node A to another node (say) X.

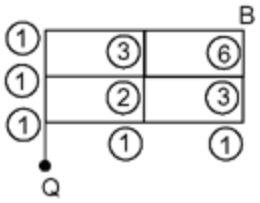


Let W be the node that is immediately to the left of X and D be the node that is immediately to the down of X. Let the number of ways to reach L from A be *m* and D from A be *n*. It may be observed that the number of ways of reaching X from L or D is 1. So, the number of ways of reaching X from A equals $m(1) + n(1)$ i.e. $m + n$.

The number of ways of reaching from A to B via Q = n (A to Q) × n(Q to B)



n(A to Q) = 14



n(Q to B) = 6
∴ n[A to B] via Q = 14 × 6 = 84.

Alternative Solution:

Since there are exactly six ways of going from Q to B, the answer must be a multiple of six. Only choices (A) and (D) are possible. Choice (A) i.e., 42 seems too small in light of the answer to question 12. Hence, Choice (D). Choice (D)

Q34. DIRECTIONS *for question 34:* Select the correct alternative from the given choices.

Ron Weasly, an amateur wizard from, Hogwarts, tried to teleport his brother's pet spider by casting a magical spell upon it. However, the spell had a rather different effect than what Ron intended it to have. The spider was thoroughly disoriented and started from the point where it was and first crawled 8 m towards South, then it crawled 4 m towards West, 2 m South, 1 m East, 50 cm South, 25 cm West, 12.5 cm South, 6.25 cm East and so on indefinitely. If P is the point from which the spider started, what is the location of the point Q that it finally approaches, in relation to P?

a) **Q is $\frac{32}{3}$ m to the South and $\frac{16}{5}$ m to the West of P.**

b) **Q is $\frac{32}{17}$ m to the South and $\frac{32}{3}$ m to the West of P.**

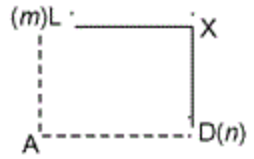
c) **Q is $\frac{16}{3}$ m to the South and $\frac{32}{17}$ m to the West of P.**

d) **Q is $\frac{32}{3}$ m to the South and $\frac{16}{17}$ m to the West of P.**

There are two conditions given for the movement between the nodes:

(i) Movement is allowed only along the grid lines.
(ii) Movement is allowed either rightwards or upwards

Now let us consider the number of ways of moving from node A to another node (say) X.



Let W be the node that is immediately to the left of X and D be the node that is immediately to the down of X. Let the number of ways to reach L from A be *m* and D from A be *n*. It may be observed that the number of ways of reaching X from L or D is 1. So, the number of ways of reaching X from A equals $m(1) + n(1)$ i.e. $m + n$.

Every alternate stretch is towards South. The second stretch is towards West, while the fourth is towards East. We can take distances covered towards East as negative distances towards West. The insect's motion can thus be viewed as follows.

Towards South	8		2		1/2		1/8
Towards West		4		–1		1/4	

$\therefore$ Net distance towards South is $\frac{8}{1-\frac{1}{4}} = \frac{8(4)}{3} = \frac{32}{3}$ and

Net distance towards West is $\frac{4}{1+\frac{1}{4}} = \frac{16}{5}$ Choice (A)