



CAT 2018 Slot 2

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Verbal Ability

Instructions

Read the passage carefully and answer the following questions

NOT everything looks lovelier the longer and closer its inspection. But Saturn does. It is gorgeous through Earthly telescopes. However, the 13 years of close observation provided by Cassini, an American spacecraft, showed the planet, its moons and its remarkable rings off better and better, revealing finer structures, striking novelties and greater drama. . . .

By and large the big things in the solar system—planets and moons—are thought of as having been around since the beginning. The suggestion that rings and moons are new is, though, made even more interesting by the fact that one of those moons, Enceladus, is widely considered the most promising site in the solar system on which to look for alien life. If Enceladus is both young and bears life, that life must have come into being quickly. This is also believed to have been the case on Earth. Were it true on Enceladus, that would encourage the idea that life evolves easily when conditions are right.

One reason for thinking Saturn's rings are young is that they are bright. The solar system is suffused with comet dust, and comet dust is dark. Leaving Saturn's ring system (which Cassini has shown to be more than 90% water ice) out in such a mist is like leaving laundry hanging on a line downwind from a smokestack: it will get dirty. The lighter the rings are, the faster this will happen, for the less mass they contain, the less celestial pollution they can absorb before they start to discolour. . . . Jeff Cuzzi, a scientist at America's space agency, NASA, who helped run Cassini, told the Lunar and Planetary Science Conference in Houston that combining the mass estimates with Cassini's measurements of the density of comet-dust near Saturn suggests the rings are no older than the first dinosaurs, nor younger than the last of them—that is, they are somewhere between 200m and 70m years old.

That timing fits well with a theory put forward in 2016, by Matija Cuk of the SETI Institute, in California and his colleagues. They suggest that at around the same time as the rings came into being an old set of moons orbiting Saturn destroyed themselves, and from their remains emerged not only the rings but also the planet's current suite of inner moons—Rhea, Dione, Tethys, Enceladus and Mimas. . . .

Dr Cuk and his colleagues used computer simulations of Saturn's moons' orbits as a sort of time machine. Looking at the rate at which tidal friction is causing these orbits to lengthen they extrapolated backwards to find out what those orbits would have looked like in the past. They discovered that about 100m years ago the orbits of two of them, Tethys and Dione, would have interacted in a way that left the planes in which they orbit markedly tilted. But their orbits are untitled. The obvious, if unsettling, conclusion was that this interaction never happened—and thus that at the time when it should have happened, Dione and Tethys were simply not there. They must have come into being later. . . .

Question 1

Based on information provided in the passage, we can infer that, in addition to water ice, Saturn's rings might also have small amounts of:

- A methane and rock particles.
- B helium and methane.
- C helium and comet dust.
- D rock particles and comet dust.

Answer: D

Explanation:

In the fourth paragraph, it is mentioned that "they suggest that at around the same time as the rings came into being an old set of moons orbiting Saturn destroyed themselves, and from their remains emerged not only the rings.....". From this, we can infer that the rings were formed from the moons. Also, from the third paragraph, it can be inferred that Saturn's rings consist of comet dust. Hence, option D is the correct answer.

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Question 2

Based on information provided in the passage, we can conclude all of the following EXCEPT:

- A none of Saturn's moons ever had suitable conditions for life to evolve.
- B Tethys and Dione are less than 100 million years old.

- C Saturn's lighter rings discolour faster than rings with greater mass.
- D Saturn's rings were created from the remains of older moons.

Answer: A

Explanation:

In the last paragraph, it is given that about 100m years ago, Thethys and Dione were not there. From the last line of the passage we can conclude that Thethys and Dione are less than 100 million years old. Option B can be concluded.

In the third paragraph, it is mentioned "The lighter the rings are, the faster this will happen". Option C can be concluded.

From the fourth paragraph, option D can be concluded.

Sufficient information has not been provided from which we can conclude that none of Saturn's moons ever had suitable conditions for life to evolve.

Hence, option A is the correct answer.

Question 3

The phrase "leaving laundry hanging on a line downwind from a smokestack" is used to explain how the ringed planet's:

- A rings lose mass over time.
- B rings discolour and darken over time.
- C moons create a gap between the rings.
- D atmosphere absorbs comet dust.

Answer: B

Explanation:

The phrase explains how clothes would darken over time if left hanging and facing smokestack. The phrase refers to the darkening of the Saturn's rings under the influence of comet dust.

Hence, option B is the correct answer.

Question 4

Data provided by Cassini challenged the assumption that:

- A new celestial bodies can form from the destruction of old celestial bodies.
- B all big things in the solar system have been around since the beginning.
- C there was life on earth when Saturn's rings were being formed.
- D Saturn's ring system is composed mostly of water ice.

Answer: B

Explanation:

Referring to the first paragraph and first few lines of the second paragraph, it was believed that the celestial bodies had been existing from the beginning. However, the data provided by Cassini gave an insight that the rings and moons of Saturn are newly created. Thus, it challenged the earlier held notion.

Hence, option B is the correct answer.

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Question 5

The main objective of the passage is to:

- A highlight the beauty, finer structures and celestial drama of Saturn's rings and moons.
- B establish that Saturn's rings and inner moons have been around since the beginning of time.

- C provide evidence that Saturn's rings and moons are recent creations.
- D demonstrate how the orbital patterns of Saturn's rings and moons change over time.

Answer: C

Explanation:

Refer to the lines from the passage - "The suggestion that rings and moons are new is," "One reason for thinking Saturn's rings are young is that they are bright.", "Cassini's measurements of the density of comet-dust near Saturn suggests the rings are no older than the first dinosaurs, nor younger than the last of them."

Throughout the passage, the author has emphasized on the fact that the rings and the moons of Saturn are recent phenomena. Option C is the most relevant in this context.

Option A is not the primary objective of the passage otherwise the author would not have detailed the timeline of the formation of the moons and the rings of Saturn.

Option B is factually wrong as per the information given in the passage.

Option D is out of context.

Hence, option C is the correct answer.

Instructions

Read the passage carefully and answer the questions given

More and more companies, government agencies, educational institutions and philanthropic organisations are today in the grip of a new phenomenon: 'metric fixation'. The key components of metric fixation are the belief that it is possible - and desirable - to replace professional judgment (acquired through personal experience and talent) with numerical indicators of comparative performance based upon standardised data (metrics); and that the best way to motivate people within these organisations is by attaching rewards and penalties to their measured performance.

The rewards can be monetary, in the form of pay for performance, say, or reputational, in the form of college rankings, hospital ratings, surgical report cards and so on. But the most dramatic negative effect of metric fixation is its propensity to incentivise gaming: that is, encouraging professionals to maximise the metrics in ways that are at odds with the larger purpose of the organisation. If the rate of major crimes in a district becomes the metric according to which police officers are promoted, then some officers will respond by simply not recording crimes or downgrading them from major offences to misdemeanours. Or take the case of surgeons. When the metrics of success and failure are made public - affecting their reputation and income - some surgeons will improve their metric scores by refusing to operate on patients with more complex problems, whose surgical outcomes are more likely to be negative. Who suffers? The patients who don't get operated upon.

When reward is tied to measured performance, metric fixation invites just this sort of gaming. But metric fixation also leads to a variety of more subtle unintended negative consequences. These include goal displacement, which comes in many varieties: when performance is judged by a few measures, and the stakes are high (keeping one's job, getting a pay rise or raising the stock price at the time that stock options are vested), people focus on satisfying those measures - often at the expense of other, more important organisational goals that are not measured. The best-known example is 'teaching to the test', a widespread phenomenon that has distorted primary and secondary education in the United States since the adoption of the No Child Left Behind Act of 2001.

Short-termism is another negative. Measured performance encourages what the US sociologist Robert K Merton in 1936 called 'the imperious immediacy of interests ... where the actor's paramount concern with the foreseen immediate consequences excludes consideration of further or other consequences'. In short, advancing short-term goals at the expense of long-range considerations. This problem is endemic to publicly traded corporations that sacrifice long-term research and development, and the development of their staff, to the perceived imperatives of the quarterly report.

Question 6

All of the following can be a possible feature of the No Child Left Behind Act of 2001, EXCEPT:

- A school funding and sanctions are tied to yearly improvement shown on tests.
- B standardised test scores can be critical in determining a student's educational future.
- C assessment is dependent on the teacher's subjective evaluation of students' class participation.
- D the focus is more on test-taking skills than on higher order thinking and problem-solving.

Answer: C

Explanation:

The author has criticized the No Child Left Behind Act of 2001. So, it should be against what the author has supported in the passage. We know that the author has been critical of metric fixation. Therefore, the No Child Left Behind Act of 2001 must have the features of metric

fixation.

Option C cannot be a feature of the No Child Left Behind Act of 2001 as it mentions the subjective evaluation of students based on their participation in the class which is against the theory of metric fixation.

Hence, option C is the correct answer.

Question 7

What main point does the author want to convey through the examples of the police officer and the surgeon?

- A Some professionals are likely to be significantly influenced by the design of performance measurement systems.
- B Metrics-linked rewards may encourage unethical behaviour among some professionals.
- C Critical public roles should not be evaluated on metrics-based performance measures.
- D The actions of police officers and surgeons have a significantly impact on society.

Answer: B

Explanation:

In the second paragraph, the author discusses that one of the major drawbacks of metric fixation is the rise in unethical behaviour in order to maximize the metrics. The author, further, goes on to give the examples of the police officer and the surgeon to substantiate his claims. Therefore, option B is the correct answer.

Option A does not mention that the influence would be unethical and harmful in nature.

Option C is the underlying message of the author but, he does not explicitly provide the examples of the police officer and the surgeon to prove this.

Option D is too broad and has no specifics about the unethical behaviour which could be encouraged by metric fixation.

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Question 8

Which of the following is NOT a consequence of the 'metric fixation' phenomenon mentioned in the passage?

- A Finding a way to show better results without actually improving performance.
- B Improving cooperation among employees leading to increased organisational effectiveness in the long run.
- C Deviating from organisationally important objectives to measurable yet less important objectives.
- D Short-term orientation induced by frequent measurement of performance.

Answer: B

Explanation:

From the second paragraph, we can say that metric fixation encourages professionals to maximize the metrics in ways that are at odds with the larger purpose of the organization. Option A is a consequence of metric fixation.

From the third paragraph, we can infer that metric fixation leads to goal displacement.

The author has stated short-termism as a consequence of metric fixation in the penultimate paragraph.

Option B as a consequence of metric fixation has not been discussed in the paragraph.

Hence, option B is the correct answer.

Question 9

Of the following, which would have added the least depth to the author's argument?

- A Assessment of the pros and cons of a professional judgment-based evaluation system.
- B An analysis of the reasons why metrics fixation is becoming popular despite its drawbacks.
- C A comparative case study of metrics- and non-metrics-based evaluation, and its impact on the main goals of an organisation.
- D More real-life illustrations of the consequences of employees and professionals gaming metrics-based performance measurement systems.

Answer: D

Explanation:

In the passage, the author has discussed the ill-effects of metric fixation. He has discussed gaming of the metrics-based performance system in detail. By providing more real-life illustrations of the same, the author would not have added any value to the main argument. Options A, B and C are relevant to the discussion and will surely add weight to the main idea of the passage. Hence, option D is the correct answer.

Question 10

What is the main idea that the author is trying to highlight in the passage?

- A Performance measurement needs to be precise and cost-effective to be useful for evaluating organisational performance.
- B Evaluating performance by using measurable performance metrics may misguide organisational goal achievement.
- C Long-term organisational goals should not be ignored for short-term measures of organisational success.
- D All kinds of organisations are now relying on metrics to measure performance and to give rewards and punishments.

Answer: B

Explanation:

The author has criticized the method of metric fixation in the passage. He has stated that metric fixation will lead professionals to adhere to practices that are at odds with the larger purpose of the organization. He has also explained that metric fixation will lead to goal displacement. In this light, option B is the most relevant.

Option A is incorrect because it is against the author's view.

Option C is narrow as it focuses on short-termism only which is one of the ill-effects of metric fixation as mentioned in the passage.

Option D does not state that the author is criticizing the metric fixation method to measure the performance.

Hence, option B is the correct answer.

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Instructions

Read the passage carefully and answer the questions given

Will a day come when India's poor can access government services as easily as drawing cash from an ATM? . . . [N]o country in the world has made accessing education or health or policing or dispute resolution as easy as an ATM, because the nature of these activities requires individuals to use their discretion in a positive way. Technology can certainly facilitate this in a variety of ways if it is seen as one part of an overall approach, but the evidence so far in education, for instance, is that just adding computers alone doesn't make education any better. . . .

The dangerous illusion of technology is that it can create stronger, top down accountability of service providers in implementation-intensive services within existing public sector organisations. One notion is that electronic management information systems (EMIS) keep better track of inputs and those aspects of personnel that are 'EMIS visible' can lead to better services. A recent study examined attempts to increase attendance of Auxiliary Nurse Midwife (ANMs) at clinics in Rajasthan, which involved high-tech time clocks to monitor attendance. The study's title says it all: Band-Aids on a Corpse . . . e-governance can be just as bad as any other governance when the real issue is people and their motivation.

For services to improve, the people providing the services have to want to do a better job with the skills they have. A study of medical care in Delhi found that even though providers, in the public sector had much better skills than private sector providers their provision of care in actual practice was much worse.

In implementation-intensive services the key to success is face-to-face interactions between a teacher, a nurse, a policeman, an extension agent and a citizen. This relationship is about power. Amartya Sen's . . . report on education in West Bengal had a supremely telling anecdote in which the villagers forced the teacher to attend school, but then, when the parents went off to work, the teacher did not teach, but forced the children to massage his feet. . . . As long as the system empowers providers over citizens, technology is irrelevant.

The answer to successfully providing basic services is to create systems that provide both autonomy and accountability. In basic education for instance, the answer to poor teaching is not controlling teachers more . . . The key . . . is to hire teachers who want to teach and let them teach, expressing their professionalism and vocation as a teacher through autonomy in the classroom. This autonomy has to be matched with accountability for results—not just narrowly measured through test scores, but broadly for the quality of the education they provide.

A recent study in Uttar Pradesh showed that if, somehow, all civil service teachers could be replaced with contract teachers, the state could save a billion dollars a year in revenue and double student learning. Just the additional autonomy and accountability of contracts

through local groups—even without complementary system changes in information and empowerment—led to that much improvement. The first step to being part of the solution is to create performance information accessible to those outside of the government. . . .

Question 11

According to the author, service delivery in Indian education can be improved in all of the following ways EXCEPT through:

- A access to information on the quality of teaching.
- B elimination of government involvement.
- C recruitment of motivated teachers.
- D use of technology.

Answer: B

Explanation:

In the last line of the passage, the author mentions about the availability of information which should be the first step towards solving the service delivery in the Indian education system.

In the penultimate paragraph, the author says that the key is to hire those teachers who want to teach. In other words, the author supports the recruitment of motivated teachers.

In the first paragraph, the author states that technology can facilitate better service delivery in Indian education.

The author has nowhere talked about the elimination of government involvement. He wants that the autonomy and accountability of the teachers should be increased.

Hence, option B is the correct answer.

Question 12

In the context of the passage, we can infer that the title "Band Aids on a Corpse" (in paragraph 2) suggests that:

- A the nurses attended the clinics, but the clinics were ill-equipped.
- B the clinics were better funded, but performance monitoring did not result in any improvement.
- C the nurses who attended the clinics were too poorly trained to provide appropriate medical care.
- D the electronic monitoring system was a superficial solution to a serious problem.

Answer: D

Explanation:

The author has explained the phrase "Band Aids on a Corpse" by stating that "e-governance can be just as bad as any other governance when the real issue is people and their motivation." From this, we can infer that the solution was not intended to tackle the real cause of the problem which was the motivation of the people. If people are not motivated, forcing them to come on time will act only as a specious way to deal with the issue.

Hence, option D is the correct answer.

Question 13

The author questions the use of monitoring systems in services that involve face-to-face interaction between service providers and clients because such systems:

- A do not improve services that need committed service providers.
- B are ineffective because they are managed by the government.
- C improve the skills but do not increase the motivation of service providers.
- D are not as effective in the public sector as they are in the private sector.

Answer: A

Explanation:

In the third paragraph, the author has given the example of a school where the villagers forced the teachers to come to school, but the teacher instead of teaching indulged in various other non-productive activities. Further, the author also mentions that as long as the

system empowers providers over citizens, technology is irrelevant.

So, the author wants to convey that commitment and motivation are the primary requirements in systems which involve face-to-face interaction between service providers and clients. Therefore, using technology to monitor in such scenarios will be ineffective. Hence, option A is the correct answer.

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Question 14

The main purpose of the passage is to:

- A argue that some types of services can be improved by providing independence and requiring accountability.
- B analyse the shortcomings of government-appointed nurses and their management through technology.
- C critique the government's involvement in educational activities and other implementation-intensive services.
- D find a solution to the problem of poor service delivery in education by examining different strategies.

Answer: A

Explanation:

The author has explained in the passage that without increasing the autonomy and accountability of the person involved in a job, monitoring systems will be ineffective in improving the services. So, the author has advocated for making the persons more responsible and give them more independence. Option A is the most relevant in this context.

Option B is narrow in the sense that the passage does not only focus on the case of nurses.

Option C is irrelevant as the author does not criticize the involvement of government.

Option D is incorrect because the author is not trying to find a solution, but he has proposed a solution to deal with the problem.

Hence, option A is the correct answer.

Question 15

Which of the following, IF TRUE, would undermine the passage's main argument?

- A If it were proven that increase in autonomy of service providers leads to an exponential increase in their work ethic and sense of responsibility.
- B If it were proven that service providers in the private sector have better skills than those in the public sector.
- C Empowerment of service providers leads to increased complacency and rigged performance results.
- D If absolute instead of moderate technological surveillance is exercised over the performance of service providers.

Answer: C

Explanation:

The author has argued in the passage and proposed some ways to increase productivity and to make the systems more effective. Option C which states "Empowerment of service providers leads to increased complacency and rigged performance results." will undermine the author's main argument because if empowerment of the service providers leads to rigged performance results, the whole purpose will be defeated.

Option A supports the passage's main idea.

Option B is irrelevant.

Option D does not talk about the effect of implementing absolute surveillance on the performance of service providers.

Hence, option C is the correct answer.

Instructions

Read the passage carefully and answer the questions given

Grove snails as a whole are distributed all over Europe, but a specific variety of the snail, with a distinctive white-lipped shell, is found exclusively in Ireland and in the Pyrenees mountains that lie on the border between France and Spain. The researchers sampled a total of 423 snail specimens from 36 sites distributed across Europe, with an emphasis on gathering large numbers of the white-lipped variety. When they sequenced genes from the mitochondrial DNA of each of these snails and used algorithms to analyze the genetic diversity between them, they found that... a distinct lineage (the snails with the white-lipped shells) was indeed endemic to the two very specific and distant places in question.

Explaining this is tricky. Previously, some had speculated that the strange distributions of creatures such as the white-lipped grove snails could be explained by convergent evolution—in which two populations evolve the same trait by coincidence—but the underlying genetic similarities between the two groups rules that out. Alternately, some scientists had suggested that the white-lipped variety had simply spread over the whole continent, then been wiped out everywhere besides Ireland and the Pyrenees, but the researchers say their sampling and subsequent DNA analysis eliminate that possibility too. “If the snails naturally colonized Ireland, you would expect to find some of the same genetic type in other areas of Europe, especially Britain. We just don’t find them,” Davidson, the lead author, said in a press statement.

Moreover, if they’d gradually spread across the continent, there would be some genetic variation within the white-lipped type, because evolution would introduce variety over the thousands of years it would have taken them to spread from the Pyrenees to Ireland. That variation doesn’t exist, at least in the genes sampled. This means that rather than the organism gradually expanding its range, large populations instead were somehow moved en masse to the other location within the space of a few dozen generations, ensuring a lack of genetic variety.

“There is a very clear pattern, which is difficult to explain except by involving humans,” Davidson said. Humans, after all, colonized Ireland roughly 9,000 years ago, and the oldest fossil evidence of grove snails in Ireland dates to roughly the same era. Additionally, there is archaeological evidence of early sea trade between the ancient peoples of Spain and Ireland via the Atlantic and even evidence that humans routinely ate these types of snails before the advent of agriculture, as their burnt shells have been found in Stone Age trash heaps.

The simplest explanation, then? Boats. These snails may have inadvertently traveled on the floor of the small, coast-hugging skiffs these early humans used for travel, or they may have been intentionally carried to Ireland by the seafarers as a food source. “The highways of the past were rivers and the ocean—as the river that flanks the Pyrenees was an ancient trade route to the Atlantic, what we’re actually seeing might be the long lasting legacy of snails that hitched a ride...as humans travelled from the South of France to Ireland 8,000 years ago,” Davidson said.

Question 16

The passage outlines several hypotheses and evidence related to white-lipped grove snails to arrive at the most convincing explanation for:

- A why the white-lipped variety of grove snails are found only in Ireland and the Pyrenees.
- B why the white-lipped variety of grove snails were wiped out everywhere except in Ireland and the Pyrenees.
- C how the white-lipped variety of grove snails might have migrated from the Pyrenees to Ireland.
- D how the white-lipped variety of grove snails independently evolved in Ireland and the Pyrenees.

Answer: A

Explanation:

Throughout the passage, the author has contemplated the reasons why the white-lipped variety of grove snails are found only in Ireland and the Pyrenees. This is also evident from the last line of the first paragraph, the first line of the second paragraph and the first line of the fourth paragraph.

The author has not discussed the reasons why the snails were wiped out from the other parts of the world. Option B is incorrect.

The author has focused neither on migration nor on the evolution of the snails. Option C and D are irrelevant.

Hence, option A is the correct answer.

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Question 17

In paragraph 4, the evidence that “humans routinely ate these types of snails before the advent of agriculture” can be used to conclude that:

- A white-lipped grove snails may have inadvertently traveled from the Pyrenees to Ireland on the floor of the small, coast-hugging skiffs that early seafarers used for travel.
- B 9,000 years ago, during the Stone Age, humans traveled from the South of France to Ireland via the Atlantic Ocean.
- C rivers and oceans in the Stone Age facilitated trade in white-lipped grove snails.
- D the seafarers who traveled from the Pyrenees to Ireland might have carried white-lipped grove snails with them as edibles.

Answer: D

Explanation:

In the fourth paragraph, the author states that the appearance of grove snails and the arrival of humans in Ireland coincided. Further, the author proves his point by mentioning about the evidence that humans routinely ate these types of snails before the advent of agriculture. From this, we can infer that people who came to colonize Ireland must have brought snails with them as edibles. Option D is the most relevant in this context.

Options B and C are out of context.

Option A might be factually true, but it cannot be concluded from the given sentence.

Hence, option D is the correct answer.

Question 18

Which one of the following makes the author eliminate convergent evolution as a probable explanation for why white-lipped grove snails are found in Ireland and the Pyrenees?

- A The coincidental evolution of similar traits (white-lipped shell) in the grove snails of Ireland and the Pyrenees.
- B The absence of genetic variation between white-lipped grove snails of Ireland and the Pyrenees.
- C The absence of genetic similarities between white-lipped grove snails of Ireland and snails from other parts of Europe, especially Britain.
- D The distinct lineage of white-lipped grove snails found specifically in Ireland and the Pyrenees.

Answer: B

Explanation:

In the second paragraph, the author mentions convergent evolution in which two populations evolve the same trait by coincidence. In that case, if the traits are similar by mere coincidence, the genetic structure must be different as they are part of two distinct populations. However, in the study, it was found that the two groups of snails have genetic similarities and thus, it cannot be a case of convergent evolution. Option B states the same.

Hence, option B is the correct answer.

Question 19

All of the following evidence supports the passage's explanation of sea travel/trade EXCEPT:

- A the oldest fossil evidence of white-lipped grove snails in Ireland dates back to roughly 9,000 years ago, the time when humans colonised Ireland.
- B archaeological evidence of early sea trade between the ancient peoples of Spain and Ireland via the Atlantic Ocean.
- C absence of genetic variation within the white-lipped grove snails of Ireland and the Pyrenees, whose genes were sampled.
- D the coincidental existence of similar traits in the white-lipped grove snails of Ireland and the Pyrenees because of convergent evolution.

Answer: D

Explanation:

In the second paragraph, the author mentions convergent evolution in which two populations evolve the same trait by coincidence. In that case, if the traits are similar by mere coincidence, the genetic structure must be different as they are part of two distinct populations. However, in the study, it was found that the two groups of snails have genetic similarities and thus, it cannot be a case of convergent evolution. Thus, the author refutes the claim that convergent evolution can explain the similarity in characteristics. Therefore, option C supports the passage's explanation of sea travel/trade while option D rejects.

Hence, option D is the correct answer.

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Instructions

Read the passage carefully and answer the given questions

The complexity of modern problems often precludes any one person from fully understanding them. Factors contributing to rising obesity

levels, for example, include transportation systems and infrastructure, media, convenience foods, changing social norms, human biology and psychological factors. . . . The multidimensional or layered character of complex problems also undermines the principle of meritocracy: the idea that the 'best person' should be hired. There is no best person. When putting together an oncological research team, a biotech company such as Gilead or Genentech would not construct a multiple-choice test and hire the top scorers, or hire people whose resumes score highest according to some performance criteria. Instead, they would seek diversity. They would build a team of people who bring diverse knowledge bases, tools and analytic skills. . . .

Believers in a meritocracy might grant that teams ought to be diverse but then argue that meritocratic principles should apply within each category. Thus the team should consist of the 'best' mathematicians, the 'best' oncologists, and the 'best' biostatisticians from within the pool. That position suffers from a similar flaw. Even with a knowledge domain, no test or criteria applied to individuals will produce the best team. Each of these domains possesses such depth and breadth, that no test can exist. Consider the field of neuroscience. Upwards of 50,000 papers were published last year covering various techniques, domains of enquiry and levels of analysis, ranging from molecules and synapses up through networks of neurons. Given that complexity, any attempt to rank a collection of neuroscientists from best to worst, as if they were competitors in the 50-metre butterfly, must fail. What could be true is that given a specific task and the composition of a particular team, one scientist would be more likely to contribute than another. Optimal hiring depends on context. Optimal teams will be diverse.

Evidence for this claim can be seen in the way that papers and patents that combine diverse ideas tend to rank as high-impact. It can also be found in the structure of the so-called random decision forest, a state-of-the-art machine-learning algorithm. Random forests consist of ensembles of decision trees. If classifying pictures, each tree makes a vote: is that a picture of a fox or a dog? A weighted majority rules. Random forests can serve many ends. They can identify bank fraud and diseases, recommend ceiling fans and predict online dating behaviour. When building a forest, you do not select the best trees as they tend to make similar classifications. You want diversity. Programmers achieve that diversity by training each tree on different data, a technique known as bagging. They also boost the forest 'cognitively' by training trees on the hardest cases - those that the current forest gets wrong. This ensures even more diversity and accurate forests.

Yet the fallacy of meritocracy persists. Corporations, non-profits, governments, universities and even preschools test, score and hire the 'best'. This all but guarantees not creating the best team. Ranking people by common criteria produces homogeneity. . . . That's not likely to lead to breakthroughs.

Question 20

Which of the following conditions, if true, would invalidate the passage's main argument?

- A If it were proven that teams characterised by diversity end up being conflicted about problems and take a long time to arrive at a solution.
- B If a new machine-learning algorithm were developed that proved to be more effective than the random decision forest.
- C If top-scorers possessed multidisciplinary knowledge that enabled them to look at a problem from several perspectives.
- D If assessment tests were made more extensive and rigorous.

Answer: C

Explanation:

Throughout the passage, the author has argued that each field of study has become so vast that diversity in knowledge and skills is required to sail through. Meritocracy is not enough to bring the required variety. This is the main idea presented by the author. Option A is distorted because the author is not concerned about the negative consequences of his proposition and how to deal with them.

Option B is too narrow in its scope as it focuses on random decision trees which is not the main idea.

Option C addresses the primary concerns which the author has and thus, weakens the main idea of the passage.

Option D is irrelevant as the author has no problem with the assessment tests.

Hence, option C is the correct answer.

Question 21

Which of the following best describes the purpose of the example of neuroscience?

- A In narrow fields of knowledge, a meaningful assessment of expertise has always been possible.
- B Unlike other fields of knowledge, neuroscience is an exceptionally complex field, making a meaningful assessment of neuroscientists impossible.
- C In the modern age, every field of knowledge is so vast that a meaningful assessment of merit is impossible.

- D Neuroscience is an advanced field of science because of its connections with other branches of science like oncology and biostatistics.

Answer: C

Explanation:

Just before giving the example of neuroscience, the author has mentioned that each of these domains possesses such depth and breadth, that no test can exist. From this we can infer that the purpose behind mentioning neuroscience as an example by the author is to show that each field is so complex now that a meaningful assessment of merit is impossible. Option C is the most relevant in this case.

Hence, option C is the correct answer.

Question 22

The author critiques meritocracy for all the following reasons EXCEPT that:

- A an ideal team comprises of best individuals from diverse fields of knowledge.
- B diversity and context-specificity are important for making major advances in any field.
- C modern problems are multifaceted and require varied skill-sets to be solved.
- D criteria designed to assess merit are insufficient to test expertise in any field of knowledge.

Answer: A

Explanation:

Option B is the main idea that the author wants to express through the passage. So, it is one of the main reasons why the author criticizes meritocracy.

Option C is also one of the reasons as conveyed by the author through the example of neuroscientists in the second paragraph. The author mentions in the second paragraph "each of these domains possesses such depth and breadth, that no test can exist." From this, we can infer option D to be a valid reason.

Option A : The idea/term of 'ideal team' is not mentioned in the passage. Best team implies a team which gives the best possible outcome, however an ideal team can be understood as the model/perfect team. In order to critique ideal team, one needs to introduce such an idea. Hence, Option A is not a reason why the author criticizes meritocracy.

Hence, option A is the correct answer.

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Question 23

Which of the following conditions would weaken the efficacy of a random decision forest?

- A If the types of decision trees in each ensemble of the forest were doubled.
- B If a large number of decision trees in the ensemble were trained on data derived from easy cases.
- C If the types of ensembles of decision trees in the forest were doubled.
- D If a large number of decision trees in the ensemble were trained on data derived from easy and hard cases.

Answer: B

Explanation:

In the last two lines of the third paragraph, it has been given that forest is cognitively boosted by training the trees on the hardest cases. So, if a large number of decision trees in the ensemble were trained on data derived from easy cases, the forest will not get a cognitive boost and thus weaken the efficacy of a random decision forest.

Hence, option B is the correct answer.

Question 24

On the basis of the passage, which of the following teams is likely to be most effective in solving the problem of rising obesity levels?

- A A specialised team of nutritionists from various countries, who are also trained in the machine-learning algorithm of random decision forest.
- B A team comprised of nutritionists, psychologists, urban planners and media personnel, who have each scored a distinction in their respective subject tests.
- C A specialised team of top nutritionists from various countries, who also possess some knowledge of psychology.
- D A team comprised of nutritionists, psychologists, urban planners and media personnel, who have each performed well in their respective subject tests.

Answer: D

Explanation:

According to the author's main idea, the problem should be tackled by a diverse group of members from different fields. On the basis of this, we can eliminate options A and C because, in these options, the expert team consists of only nutritionists.

Out of options B and D, option D is better because it mentions a team of members who have performed well in their respective field. In option B, the members are selected on the parameter of meritocracy, which is not concurrent with the author's viewpoint. Hence, option D is the correct answer.

Instructions

For the following questions answer them individually

Question 25

The four sentences (labelled 1,2,3,4) given in this question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper sequence of order of the sentences and key in this sequence of four numbers as your answer:

1. In the era of smart world, however, 'Universal Basic Income' is an ineffective instrument which cannot address the potential breakdown of the social contract when large swathes of the population would effectively be unemployed.
2. In the era of industrial revolution, the abolition of child labour, poor laws and the growth of trade unions helped families cope with the pressures of mechanised work.
3. Growing inequality could be matched by a creeping authoritarianism that is bolstered by technology that is increasingly able to peer into the deepest vestiges of our lives.
4. New institutions emerge which recognise ways in which workers could contribute to and benefit by economic growth when, rather than if, their jobs are automated.

Answer:4213

Explanation:

4 should be the opening sentence since it states that new institutions recognize ways in which workers can contribute to the economy. The other 3 sentences provide examples and elaborate on the same and hence, sentence 4, which introduces the topic of discussion, should be the opening sentence.

2 talks about the period of industrial revolution. 1 talks about the smart world. Chronologically, 1 should follow 2. Moreover, 2 talks about an example that conformed to the point mentioned in sentence 4. On the other hand, 1 talks about an inadequacy. Therefore, 2 should have preceded 1. 3 should be the last sentence of the paragraph.

Sentences 4213 form a coherent paragraph and hence, 4213 is the correct answer.

CAT Syllabus (Download PDF)

Question 26

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

The early optimism about sport's deterrent effects on delinquency was premature as researchers failed to find any consistent relationships between sports participation and deviance. As the initial studies were based upon cross-sectional data and the effects captured were short-term, it was problematic to test and verify the temporal sequencing of events suggested by the deterrence theory. The correlation between sport and delinquency could not be disentangled from class and cultural variables known. Choosing individuals to play sports in the first place was problematic, which became more acute in the subsequent decades as researchers began to document just how closely sports participation was linked to social class indicators.

- A There is a direct relationship between sport participation and delinquency but it needs more empirical evidence.
- B Statistical and empirical weaknesses stand in the way of inferring any relationship between sports participation and deviance.
- C Sports participation is linked to class and cultural variables such as education, income, and social capital.
- D Contradicting the previous optimism, latter researchers have proved that there is no consistent relationship between sports participation and deviance.

Answer: B

Explanation:

The main points of the passage are that the relation between sports participation and deviation have not been established and that there is not sufficient evidence to prove the relationship.

Option A is distorted because it states that the relationship is already established.

Option B mentions all the relevant points.

Option C does not talk about the relationship and hence, ruled out.

Option D distorts what is given in the paragraph by saying that latter researchers have "proved" there is no consistent relationship. Thus, it is can be eliminated.

Hence, option B is the correct answer.

Question 27

The four sentences (labelled 1, 2, 3, and 4) given in this question, when properly sequenced, form a coherent paragraph. Decide on the proper order for the sentences and key in this sequence of four numbers as your answer.

1. Self-management is thus defined as the 'individual's ability to manage the symptoms, treatment, physical and psychosocial consequences and lifestyle changes inherent in living with a chronic condition'.
2. Most people with progressive diseases like dementia prefer to have control over their own lives and health-care for as long as possible.
3. Having control means, among other things, that patients themselves perform self-management activities.
4. Supporting people in decisions and actions that promote self-management is called self-management support requiring a cooperative relationship between the patient, the family, and the professionals.

Answer:2314

Explanation:

1 states that 'self management is 'thus' defined as the individual's ability to manage...'. Therefore, some details about self management should have been provided before sentence 1.

Sentence 2 states that people with dementia prefer to have 'control' in their lives. Sentence 3 states what 'having control means'. Therefore, sentences 2 and 3 form a mandatory pair.

Sentence 1 should follow sentence 3 since sentence 3 states that 'having control means to perform self management activities' and sentence 1 defined self management activities. Sentence 4 should be the last sentence since it states what self management support is. Self management support can be defined only after defining what self management is.

Sentences 2314 form a coherent paragraph. Therefore, 2314 is the correct answer.

Question 28

A Japanese government panel announced that it recommends regulating only genetically modified organisms that have had foreign genes permanently introduced into their genomes and not those whose endogenous genes have been edited. The only stipulation is that researchers and businesses will have to register their modifications to plants or animals with the government, with the exception of microbes cultured in contained environments. Reactions to the decision are mixed. While lauding the potential benefits of genome editing, an editorial opposes across-the-board permission. Unforeseen risks in gene editing cannot be ruled out. All genetically modified products must go through the same safety and labeling processes regardless of method.

- A Excepting microbes cultured in contained environments from the regulations of genome editing is premature.
- B Creating categories within genetically modified products in terms of transgenic modification and genome editing advances science but defies laws.

- C Exempting from regulations the editing of endogenous genes is not desirable as this procedure might be risk-prone.
- D A government panel in Japan says transgenic modification and genome editing are not the same.

Answer: C

Explanation:

Let us note down the important points:

The Japanese government recommends regulating GM organisms in which foreign genes are introduced, not those in which the endogenous genes have been edited. The step has drawn mixed reactions since there are some risks involved in gene editing.

Option A shifts the focus on exempting microbes. The central theme of the passage is that endogenous gene editing is not totally risk free. Therefore, we can eliminate option A.

Option B states that categorizing GM products advances science but defies laws. No such comparison has been made in the paragraph. The legality of the issue has not been discussed and hence, we can eliminate option B.

Option D fails to capture the fact that endogenous gene editing is not devoid of risks.

Only option C captures the fact that exempting endogenous gene editing is not desirable due to the risks involved. Therefore, option C is the right answer.

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Question 29

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

1. Much has been recently discovered about the development of songs in birds.
2. Some species are restricted to a single song learned by all individuals, others have a range of songs.
3. The most important auditory stimuli for the birds are the sounds of other birds.
4. For all bird species there is a prescribed path to development of the final song,
5. A bird begins with the subsong, passes through plastic song, until it achieves the species song.

Answer:3

Explanation:

On reading the sentences, we can infer that the paragraph talks about the development of songs in birds.

1 should be the opening sentence since it introduces the topic of discussion, the development of songs in birds. 1 provides a proper introduction to the paragraph by stating that much has been discovered about the development of songs in birds.

4 should be the sentence that follows 1 since it states that the development of songs in birds follow a template process.

5 explains the mechanism in which the song is developed. Therefore, sentence 5 should follow sentence 4.

2 should be the last sentence since it states that some species restrict themselves to one song while other species have more than one song.

Sentences 1452 form a coherent paragraph. Sentence 3 talks about the sounds of birds while the other sentences are about how a species develops a song. Therefore, sentence 3 is the one out of context and hence, 3 is the right answer.

Question 30

The four sentences (labelled 1, 2, 3, and 4) given in this question, when properly sequenced, form a coherent paragraph. Decide on the proper order for the sentences and key in this sequence of four numbers as your answer.

1. It was his taxpayers who had to shell out as much as \$1.6bn over 10 years to employees of failed companies.
2. Companies in many countries routinely engage in such activities which means that the employees are left with unpaid entitlements
3. Deliberate and systematic liquidation of a company to avoid liabilities and then restarting the business is called phoenixing.
4. The Australian Minister for Revenue and Services discovered in an audit that phoenixing had cost the Australian economy between \$2.9bn and \$5.1bn last year.

Answer:3241

Explanation:

3 should be the opening sentence since it introduces the concept of phoenixing. Sentence 2 logically continues sentence 1 by stating that companies in many countries engage in such activities (Phoenixing). Sentence 2 should be followed by sentence 4 since it moves to a specific instance (Australian minister's discovery) from general statements. Sentence 1 should follow sentence 4 since it states that it was 'his' taxpayers (Australian Minister's taxpayers or Australian citizens) who had to foot the bill.

Sentences 3241 form a coherent paragraph. Therefore, 3241 is the correct answer.

Question 31

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

1. Our smartphones can now track our diets, our biological cycles, even our digestive systems and sleep-patterns.
2. Researchers have even coined a new term, "orthosomnia", to describe the insomnia brought on by paying too much attention to smartphones and sleep-tracking apps.
3. Sleep, nature's soft nurse, is a blissful, untroubled state all too easily disturbed by earthly worries or a guilty conscience.
4. The existence of a market for such apps is unsurprising: shift work, a long-hours culture and blue light from screens have conspired to rob many of us of sufficient rest.
5. A new threat to a good night's rest has emerged - smart-phones, with sleep-tracking apps.

Answer:3

Explanation:

The use of the word "such apps" in 4 indicates that 4 must be preceded by a line that mentions a type of app. We find this in 5 and 2. So the pairs could be 5-4 or 2-4. If we see the sentences 5 and 1 they introduce the topic under discussion and provide context for the details provided in 2 and 4. Hence, 1 and 5 should come at the start of the paragraph and 2-4 should be the end of the paragraph. Between 5 and 1, 5 provides a better opening line as it introduces the main topic of discussion. Hence, the order of the paragraph should be 5-1-2-4.

Sentence 3 which talks of "guilty conscience" is out of context with the rest of the paragraph.

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Question 32

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

1. As India looks to increase the number of cities, our urban planning must factor in potential natural disasters and work out contingencies in advance.
2. Authorities must revise data and upgrade infrastructure and mitigation plans even if their local area hasn't been visited by a natural calamity yet.
3. Extreme temperatures, droughts, and forest fires have more than doubled since 1980.
4. There is no denying the fact that our baseline normal weather is changing.
5. It is no longer a question of whether we will be hit by nature's fury but rather when.

Answer:3

Explanation:

If we read all the sentences together, we see that the author is arguing for India preparing itself in advance for future natural disasters. Sentence 4, which introduces the broader context makes for a good opening line. Sentences 1 and 2 together make the main point that the author is trying to make through the paragraph - that India should prepare itself for future natural disasters. Sentence 5 emphasizes the main point by adding that natural disasters will occur in the future and thus makes for a good concluding line.

Sentence 3, that talks about extreme temperatures does not lead off to any of the other sentences nor does it add to any of the other sentences. Hence, it is the odd one.

Additional Explanation:

1-2 is a block, both are talking about things that authorities should do 45 are rhetorical opinions of the author on the weather. 3 is a fact. We use facts to draw reasonable conclusions. This standalone fact cannot be used to draw any conclusion. The style of the author's writing in 4 and 5 are more opinionated than factual. So 3 is a misfit. Moreover, we cannot make a connection between 1-4, 1 says we need contingencies for natural disaster(suggestive) whereas, 4 says whether is changing(rhetorical).

Question 33

The four sentences (labelled 1,2,3,4) given in this question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper sequence of order of the sentences and key in this sequence of four numbers as your answer:

1. They would rather do virtuous side projects assiduously as long as these would not compel them into doing their day jobs more honourably or reduce the profit margins.
2. They would fund a million of the buzzwordy programs rather than fundamentally question the rules of their game or alter their own behavior to reduce the harm of the existing distorted, inefficient and unfair rules.
3. Like the dieter who would rather do anything to lose weight than actually eat less, the business elite would save the world through social-impact-investing and philanthro-capitalism.
4. Doing the right thing – and moving away from their win-win mentality – would involve real sacrifice; instead, it's easier to focus on their pet projects and initiatives.

Answer:3241

Explanation:

After reading all the sentences, we know that the paragraph is about the businessmen who, instead of tackling the root causes, focus on superficial solutions. Statement 3 is the opening sentence as it introduces the topic by comparing businessmen with a dieter who is ready to do everything except eating less. Statement 2 mentions the examples of some of the specious solutions mentioned in statement 3. Statement 4 provides the reason why businessmen are hesitant to execute the genuine solutions which will bring real change. Statement 4 mentions the alternative taken by businessmen. The word 'rather' in statement 1 connects it with statement 4. Thus, the correct order is 3 - 2 - 4 - 1.

Hence, 3241 is the correct answer.

Question 34

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

Should the moral obligation to rescue and aid persons in grave peril, felt by a few, be enforced by the criminal law? Should we follow the lead of a number of European countries and enact bad Samaritan laws? Proponents of bad Samaritan laws must overcome at least three different sorts of obstacles. First, they must show the laws are morally legitimate in principle, that is, that the duty to aid others is a proper candidate for legal enforcement. Second, they must show that this duty to aid can be defined in a way that can be fairly enforced by the courts. Third, they must show that the benefits of the laws are worth their problems, risks and costs.

- A A number of European countries that have successfully enacted bad Samaritan laws may serve as model statutes.
- B Everyone agrees that people ought to aid others, the only debate is whether to have a law on it.
- C If bad Samaritan laws are found to be legally sound and enforceable they must be enacted.
- D Bad Samaritan laws may be desirable but they need to be tested for legal soundness.

Answer: D

Explanation:

In the given paragraph, the author has discussed about Bad Samaritan laws and whether it is enforceable by law. While answering the question, the author puts forward three points which she deems necessary for the implementation of Bad Samaritan law. Only after crossing the three obstacles mentioned by the author, the law should be enacted. Option D is the most relevant in this context.

Option A is about implementing the law without any conditions, which is not what the author wants to convey.

Option B does not mention anything about the three obstacles.

Option C is stated with a firmness which is not the tone of the author. The author says that the law may be enacted, not must be enacted.

Hence, option D is the correct answer.

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LRDI

Instructions

The base exchange rate of a currency X with respect to a currency Y is the number of units of currency Y which is equivalent in value to one unit of currency X. Currency exchange outlets buy currency at buying exchange rates that are lower than base exchange rates, and sell currency at selling exchange rates that are higher than base exchange rates.

A currency exchange outlet uses the local currency L to buy and sell three international currencies A, B, and C, but does not exchange one international currency directly with another. The base exchange rates of A, B and C with respect to L are in the ratio 100:120:1. The buying exchange rates of each of A, B, and C with respect to L are 5% below the corresponding base exchange rates, and their selling exchange rates are 10% above their corresponding base exchange rates. The following facts are known about the outlet on a particular day:

1. The amount of L used by the outlet to buy C equals the amount of L it received by selling C.
2. The amounts of L used by the outlet to buy A and B are in the ratio 5:3.
3. The amounts of L the outlet received from the sales of A and B are in the ratio 5:9.
4. The outlet received 88000 units of L by selling A during the day.
5. The outlet started the day with some amount of L, 2500 units of A, 4800 units of B, and 48000 units of C.
6. The outlet ended the day with some amount of L, 3300 units of A, 4800 units of B, and 51000 units of C.

Question 35

How many units of currency A did the outlet buy on that day?

Answer:1200

Explanation:

It is given that the base exchange rates of A, B and C with respect to L are in the ratio 100:120:1. Let us assume that base exchange rates are '100a', '120a' and 'a' in that order.

It is given that the buying exchange rates of each of A, B, and C with respect to L are 5% below the corresponding base exchange rates. Therefore, we can say that the buying exchange rates are 95a, 114a, 0.95a.

It is given that the selling exchange rates of each of A, B, and C with respect to L are 10% above their corresponding base exchange rates. Therefore, we can say that the selling exchange rates are 110a, 132a, 1.1a.

We know about the opening and closing units in stock for each currency. Let us draw the table accordingly.

Currency	Buying rate	Base rate	Selling rate	No. of units			
				Opening stock	Buy	Sell	Closing stock
A	95a	100a	110a	2500			3300
B	114a	120a	132a	4800			4800
C	0.95a	a	1.1a	48000			51000

Let 'p', 'q' and 'r' be the number of units of currency A, B and C bought by the outlet on that day.

Then, we can say that the outlet sold 'p - 800', 'q' and 'r-3000' units of currency A, B and C respectively.

Currency	Buying rate	Base rate	Selling rate	No. of units			
				Opening stock	Buy	Sell	Closing stock
A	95a	100a	110a	2500	p	p - 800	3300
B	114a	120a	132a	4800	q	q	4800
C	0.95a	a	1.1a	48000	r	r - 3000	51000

It is given that the amount of L used by the outlet to buy C equals the amount of L it received by selling C.

$$\Rightarrow 0.95a \cdot r = 1.1a \cdot (r - 3000)$$

$$\Rightarrow 0.15r = 3300$$

$$\Rightarrow r = 22000$$

It is also given that the amounts of L used by the outlet to buy A and B are in the ratio 5:3.

$$\begin{aligned} p * 95a &= 5 \\ \Rightarrow q * 114a &= 3 \end{aligned}$$

$$\Rightarrow p = 2q$$

Also, the amounts of L the outlet received from the sales of A and B are in the ratio 5:9.

$$\begin{aligned} (p - 800) * 110a &= 5 \\ \Rightarrow q * 132a &= 9 \end{aligned}$$

$$\begin{aligned} (2q - 800) * 110a &= 5 \\ \Rightarrow q * 132a &= 9 \end{aligned}$$

$$\Rightarrow q = 600$$

Therefore, $p = 2q = 2 * 600 = 1200$.

It is given that the outlet received 88000 units of L by selling A during the day.

$$\Rightarrow (p - 800) * 110a = 88000$$

$$\Rightarrow (1200 - 800) * 110a = 88000$$

$$\Rightarrow 44000a = 88000$$

$$\Rightarrow a = 2$$

We can fill the entire table and answer all the questions.

Currency	Buying rate	Base rate	Selling rate	No. of units			
				Opening stock	Buy	Sell	Closing stock
A	190	200	220	2500	1200	400	3300
B	228	240	264	4800	600	600	4800
C	1.9	2	2.2	48000	22000	19000	51000

From the table we can see that the currency outlet bought 1200 units of A.

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Question 36

How many units of currency C did the outlet sell on that day?

- A 22000
- B 19000
- C 6000
- D 3000

Answer: B

Explanation:

It is given that the base exchange rates of A, B and C with respect to L are in the ratio 100:120:1. Let us assume that base exchange rates are '100a', '120a' and 'a' in that order.

It is given that the buying exchange rates of each of A, B, and C with respect to L are 5% below the corresponding base exchange rates. Therefore, we can say that the buying exchange rates are 95a, 114a, 0.95a.

It is given that the selling exchange rates of each of A, B, and C with respect to L are 10% above their corresponding base exchange rates. Therefore, we can say that the selling exchange rates are 110a, 132a, 1.1a.

We know about the opening and closing units in stock for each currency. Let us draw the table accordingly.

Currency	Buying rate	Base rate	Selling rate	No. of units			
				Opening stock	Buy	Sell	Closing stock
A	95a	100a	110a	2500			3300
B	114a	120a	132a	4800			4800
C	0.95a	a	1.1a	48000			51000

Let 'p', 'q' and 'r' be the number of units of currency A, B and C bought by the outlet on that day.

Then, we can say that the outlet sold 'p - 800', 'q' and 'r-3000' units of currency A, B and C respectively.

Currency	Buying rate	Base rate	Selling rate	No. of units			
				Opening stock	Buy	Sell	Closing stock
A	95a	100a	110a	2500	p	p - 800	3300
B	114a	120a	132a	4800	q	q	4800
C	0.95a	a	1.1a	48000	r	r - 3000	51000

It is given that the amount of L used by the outlet to buy C equals the amount of L it received by selling C.

$$\Rightarrow 0.95a * r = 1.1a * (r - 3000)$$

$$\Rightarrow 0.15r = 3300$$

$$\Rightarrow r = 22000$$

It is also given that the amounts of L used by the outlet to buy A and B are in the ratio 5:3.

$$\begin{aligned} p * 95a &= 5 \\ \Rightarrow q * 114a &= 3 \end{aligned}$$

$$\Rightarrow p = 2q$$

Also, the amounts of L the outlet received from the sales of A and B are in the ratio 5:9.

$$\begin{aligned} (p - 800) * 110a &= 5 \\ \Rightarrow q * 132a &= 9 \end{aligned}$$

$$\begin{aligned} (2q - 800) * 110a &= 5 \\ \Rightarrow q * 132a &= 9 \end{aligned}$$

$$\Rightarrow q = 600$$

$$\text{Therefore, } p = 2q = 2 * 600 = 1200.$$

It is given that the outlet received 88000 units of L by selling A during the day.

$$\Rightarrow (p - 800) * 110a = 88000$$

$$\Rightarrow (1200 - 800) * 110a = 88000$$

$$\Rightarrow 44000a = 88000$$

$$\Rightarrow a = 2$$

We can fill the entire table and answer all the questions.

Currency	Buying rate	Base rate	Selling rate	No. of units			
				Opening stock	Buy	Sell	Closing stock
A	190	200	220	2500	1200	400	3300
B	228	240	264	4800	600	600	4800
C	1.9	2	2.2	48000	22000	19000	51000

From the table we can see that the currency outlet sold 19000 units of currency C. Hence, option B is the correct answer.

Question 37

What was the base exchange rate of currency B with respect to currency L on that day ?

Answer:240

Explanation:

It is given that the base exchange rates of A, B and C with respect to L are in the ratio 100:120:1. Let us assume that base exchange rates are '100a', '120a' and 'a' in that order.

It is given that the buying exchange rates of each of A, B, and C with respect to L are 5% below the corresponding base exchange rates. Therefore, we can say that the buying exchange rates are 95a, 114a, 0.95a.

It is given that the selling exchange rates of each of A, B, and C with respect to L are 10% above their corresponding base exchange rates. Therefore, we can say that the selling exchange rates are 110a, 132a, 1.1a.

We know about the opening and closing units in stock for each currency. Let us draw the table accordingly.

Currency	Buying rate	Base rate	Selling rate	No. of units			
				Opening stock	Buy	Sell	Closing stock
A	95a	100a	110a	2500			3300
B	114a	120a	132a	4800			4800
C	0.95a	a	1.1a	48000			51000

Let 'p', 'q' and 'r' be the number of units of currency A, B and C bought by the outlet on that day.

Then, we can say that the outlet sold 'p - 800', 'q' and 'r-3000' units of currency A, B and C respectively.

Currency	Buying rate	Base rate	Selling rate	No. of units			
				Opening stock	Buy	Sell	Closing stock
A	95a	100a	110a	2500	p	p - 800	3300
B	114a	120a	132a	4800	q	q	4800
C	0.95a	a	1.1a	48000	r	r - 3000	51000

It is given that the amount of L used by the outlet to buy C equals the amount of L it received by selling C.

$$\Rightarrow 0.95a \cdot r = 1.1a \cdot (r - 3000)$$

$$\Rightarrow 0.15r = 3300$$

$$\Rightarrow r = 22000$$

It is also given that the amounts of L used by the outlet to buy A and B are in the ratio 5:3.

$$\begin{aligned} p \cdot 95a &= 5 \\ \Rightarrow q \cdot 114a &= 3 \end{aligned}$$

$$\Rightarrow p = 2q$$

Also, the amounts of L the outlet received from the sales of A and B are in the ratio 5:9.

$$\begin{aligned} (p - 800) \cdot 110a &= 5 \\ \Rightarrow q \cdot 132a &= 9 \end{aligned}$$

$$\begin{aligned} (2q - 800) \cdot 110a &= 5 \\ \Rightarrow q \cdot 132a &= 9 \end{aligned}$$

$$\Rightarrow q = 600$$

Therefore, $p = 2q = 2 \cdot 600 = 1200$.

It is given that the outlet received 88000 units of L by selling A during the day.

$$\Rightarrow (p - 800) \cdot 110a = 88000$$

$$\Rightarrow (1200 - 800) \cdot 110a = 88000$$

$$\Rightarrow 44000a = 88000$$

$$\Rightarrow a = 2$$

We can fill the entire table and answer all the questions.

Currency	Buying rate	Base rate	Selling rate	No. of units			
				Opening stock	Buy	Sell	Closing stock
A	190	200	220	2500	1200	400	3300
B	228	240	264	4800	600	600	4800
C	1.9	2	2.2	48000	22000	19000	51000

From the table we can see that the base exchange rate of currency B with respect to currency L was 240.

Question 38

What was the buying exchange rate of currency C with respect to currency L on that day?

- A 1.10
- B 0.95
- C 2.20
- D 1.90

Answer: D

Explanation:

It is given that the base exchange rates of A, B and C with respect to L are in the ratio 100:120:1. Let us assume that base exchange rates are '100a', '120a' and 'a' in that order.

It is given that the buying exchange rates of each of A, B, and C with respect to L are 5% below the corresponding base exchange rates. Therefore, we can say that the buying exchange rates are 95a, 114a, 0.95a.

It is given that the selling exchange rates of each of A, B, and C with respect to L are 10% above their corresponding base exchange rates. Therefore, we can say that the selling exchange rates are 110a, 132a, 1.1a.

We know about the opening and closing units in stock for each currency. Let us draw the table accordingly.

Currency	Buying rate	Base rate	Selling rate	No. of units			
				Opening stock	Buy	Sell	Closing stock
A	95a	100a	110a	2500			3300
B	114a	120a	132a	4800			4800
C	0.95a	a	1.1a	48000			51000

Let 'p', 'q' and 'r' be the number of units of currency A, B and C bought by the outlet on that day.

Then, we can say that the outlet sold 'p - 800', 'q' and 'r-3000' units of currency A, B and C respectively.

Currency	Buying rate	Base rate	Selling rate	No. of units			
				Opening stock	Buy	Sell	Closing stock
A	95a	100a	110a	2500	p	p - 800	3300
B	114a	120a	132a	4800	q	q	4800
C	0.95a	a	1.1a	48000	r	r - 3000	51000

It is given that the amount of L used by the outlet to buy C equals the amount of L it received by selling C.

$$\Rightarrow 0.95a \cdot r = 1.1a \cdot (r - 3000)$$

$$\Rightarrow 0.15r = 3300$$

$$\Rightarrow r = 22000$$

It is also given that the amounts of L used by the outlet to buy A and B are in the ratio 5:3.

$$p \cdot 95a = 5$$

$$\Rightarrow q \cdot 114a = 3$$

$$\Rightarrow p = 2q$$

Also, the amounts of L the outlet received from the sales of A and B are in the ratio 5:9.

$$(p - 800) * 110a = 5$$

$$\Rightarrow q * 132a = 9$$

$$(2q - 800) * 110a = 5$$

$$\Rightarrow q * 132a = 9$$

$$\Rightarrow q = 600$$

Therefore, $p = 2q = 2 * 600 = 1200$.

It is given that the outlet received 88000 units of L by selling A during the day.

$$\Rightarrow (p - 800) * 110a = 88000$$

$$\Rightarrow (1200 - 800) * 110a = 88000$$

$$\Rightarrow 44000a = 88000$$

$$\Rightarrow a = 2$$

We can fill the entire table and answer all the questions.

Currency	Buying rate	Base rate	Selling rate	No. of units			
				Opening stock	Buy	Sell	Closing stock
A	190	200	220	2500	1200	400	3300
B	228	240	264	4800	600	600	4800
C	1.9	2	2.2	48000	22000	19000	51000

From the table we can see that the buying exchange rate of currency C with respect to currency L was 1.9. Hence, we can say that option D is the correct answer.

CAT Percentile Predictor

Instructions

Each visitor to an amusement park needs to buy a ticket. Tickets can be Platinum, Gold, or Economy. Visitors are classified as Old, Middle-aged, or Young. The following facts are known about visitors and ticket sales on a particular day:

- 140 tickets were sold.
- The number of Middle-aged visitors was twice the number of Old visitors, while the number of Young visitors was twice the number of Middle-aged visitors.
- Young visitors bought 38 of the 55 Economy tickets that were sold, and they bought half the total number of Platinum tickets that were sold.
- The number of Gold tickets bought by Old visitors was equal to the number of Economy tickets bought by Old visitors.

Question 39

If the number of Old visitors buying Platinum tickets was equal to the number of Middle-aged visitors buying Platinum tickets, then which among the following could be the total number of Platinum tickets sold?

A 34

B 36

C 38

D 32

Answer: D

Explanation:

Let 'x' be the the number of Old visitors. Then, the number of middle-aged visitors = 2x.

Also, the number of Young visitors = 2*2x = 4x

$$\Rightarrow x + 2x + 4x = 140$$

$$\Rightarrow x = 20$$

It is given that total of 55 Economy tickets were sold out.

It is given that Young visitors half the total number of Platinum tickets that were sold.

Let 'Y' be the number of Platinum tickets bought by the Young visitors.

Then, the number of Platinum tickets sold = 2Y.

Consequently, we can say that the number of Gold tickets sold = $140 - 55 - 2Y = 85 - 2Y$.

	Platinum	Gold	Economy	Total
Old				20
Middle-aged				40
Young	Y		38	80
Total	2Y	85-2Y	55	140

Let us assume that 'Z' is the number of Economy tickets bought by the Old visitors. It is given that the number of Gold tickets bought by Old visitors was equal to the number of Economy tickets bought by Old visitors.

	Platinum	Gold	Economy	Total
Old	20 - 2Z	Z	Z	20
Middle-aged	(Y+2Z) - 20	43 - (Y+Z)	17 - Z	40
Young	Y	42 - Y	38	80
Total	2Y	85-2Y	55	140

It is given that the number of Old visitors buying Platinum tickets was equal to the number of Middle-aged visitors buying Platinum tickets.

$$20 - 2Z = (Y+2Z) - 20$$

$$Y + 4Z = 40$$

$$2Y + 8Z = 80$$

$$2Y = 80 - 8Z$$

We can see that Z can take only integer values. Therefore, we can say that the total number of Platinum tickets sold will be a multiple of 8. Hence, option D is the correct answer.

Question 40

If the number of Old visitors buying Platinum tickets was equal to the number of Middle-aged visitors buying Economy tickets, then the number of Old visitors buying Gold tickets was

Answer:3

Explanation:

Let 'x' be the the number of Old visitors. Then, the number of middle-aged visitors = 2x.

Also, the number of Young visitors = $2 \cdot 2x = 4x$

$$\Rightarrow x + 2x + 4x = 140$$

$$\Rightarrow x = 20$$

It is given that total of 55 Economy tickets were sold out.

It is given that Young visitors half the total number of Platinum tickets that were sold.

Let 'Y' be the number of Platinum tickets bought by the Young visitors.

Then, the number of Platinum tickets sold = 2Y.

Consequently, we can say that the number of Gold tickets sold = $140 - 55 - 2Y = 85 - 2Y$.

	Platinum	Gold	Economy	Total
Old				20
Middle-aged				40
Young	Y		38	80
Total	2Y	85-2Y	55	140

Let us assume that 'Z' is the number of Economy tickets bought by the Old visitors. It is given that the number of Gold tickets bought by Old visitors was equal to the number of Economy tickets bought by Old visitors.

	Platinum	Gold	Economy	Total
Old	20 - 2Z	Z	Z	20
Middle-aged	(Y+2Z) - 20	43 - (Y+Z)	17 - Z	40
Young	Y	42 - Y	38	80
Total	2Y	85-2Y	55	140

It is given that the number of Old visitors buying Platinum tickets was equal to the number of Middle-aged visitors buying Economy tickets.

$$20 - 2Z = 17 - Z$$

$$\Rightarrow Z = 3$$

Therefore, we can say that the number of Old visitors buying Gold tickets = 3

Question 41

If the number of Old visitors buying Gold tickets was strictly greater than the number of Young visitors buying Gold tickets, then the number of Middle-aged visitors buying Gold tickets was

Answer:0

Explanation:

Let 'x' be the the number of Old visitors. Then, the number of middle-aged visitors = 2x.

Also, the number of Young visitors = 2*2x = 4x

$$\Rightarrow x+2x+4x = 140$$

$$\Rightarrow x = 20$$

It is given that total of 55 Economy tickets were sold out.

It is given that Young visitors half the total number of Platinum tickets that were sold.

Let 'Y' be the number of Platinum tickets bought by the Young visitors.

Then,the number of Platinum tickets sold = 2Y.

Consequently, we can say that the number of Gold tickets sold = 140 - 55 - 2Y = 85 - 2Y.

	Platinum	Gold	Economy	Total
Old				20
Middle-aged				40
Young	Y		38	80
Total	2Y	85-2Y	55	140

Let us assume that 'Z' is the number of Economy tickets bought by the Old visitors. It is given that the number of Gold tickets bought by Old visitors was equal to the number of Economy tickets bought by Old visitors.

	Platinum	Gold	Economy	Total
Old	20 - 2Z	Z	Z	20
Middle-aged	(Y+2Z) - 20	43 - (Y+Z)	17 - Z	40
Young	Y	42 - Y	38	80
Total	2Y	85-2Y	55	140

It is given that the number of Old visitors buying Gold tickets was strictly greater than the number of Young visitors buying Gold tickets.

$$Z > 42 - Y$$

$$\Rightarrow Z + Y > 42 \dots (1)$$

The number of Middle-aged visitors buying Gold tickets = 43 - (Y+Z)

Since (Y+Z) > 42, then We can say that (Y+Z)_{min} = 43.

Hence, the number of Middle-aged visitors buying Gold tickets = 43 - 43 = 0

About CAT exam

Question 42

Which of the following statements MUST be FALSE?

- A The numbers of Gold and Platinum tickets bought by Young visitors were equal
- B The numbers of Middle-aged and Young visitors buying Gold tickets were equal
- C The numbers of Old and Middle-aged visitors buying Platinum tickets were equal
- D The numbers of Old and Middle-aged visitors buying Economy tickets were equal

Answer: D

Explanation:

Let 'x' be the the number of Old visitors. Then, the number of middle-aged visitors = 2x.

Also, the number of Young visitors = $2 \cdot 2x = 4x$

$$\Rightarrow x + 2x + 4x = 140$$

$$\Rightarrow x = 20$$

It is given that total of 55 Economy tickets were sold out.

It is given that Young visitors half the total number of Platinum tickets that were sold.

Let 'Y' be the number of Platinum tickets bought by the Young visitors.

Then, the number of Platinum tickets sold = 2Y.

Consequently, we can say that the number of Gold tickets sold = $140 - 55 - 2Y = 85 - 2Y$.

	Platinum	Gold	Economy	Total
Old				20
Middle-aged				40
Young	Y		38	80
Total	2Y	85-2Y	55	140

Let us assume that 'Z' is the number of Economy tickets bought by the Old visitors. It is given that the number of Gold tickets bought by Old visitors was equal to the number of Economy tickets bought by Old visitors.

	Platinum	Gold	Economy	Total
Old	20 - 2Z	Z	Z	20
Middle-aged	(Y+2Z) - 20	43 - (Y+Z)	17 - Z	40
Young	Y	42 - Y	38	80
Total	2Y	85-2Y	55	140

Let us check with the help of options.

Option (A): The numbers of Gold and Platinum tickets bought by Young visitors were equal.

$$Y = 42 - Y$$

$$\Rightarrow Y = 21. \text{ Hence, this statement can be true.}$$

Option (B): The numbers of Middle-aged and Young visitors buying Gold tickets were equal

$$43 - (Y+Z) = 42 - Y$$

$$\Rightarrow Z = 1. \text{ Hence, this statement can be true.}$$

Option (C): The numbers of Old and Middle-aged visitors buying Platinum tickets were equal

$$20 - 2Z = (Y+2Z) - 20$$

$$\Rightarrow Y+4Z = 40. \text{ Hence, this statement can be true.}$$

Option (D): The numbers of Old and Middle-aged visitors buying Economy tickets were equal

$$Z = 17 - Z$$

$\Rightarrow Z = 8.5$. This is not possible as Z has to be an integer. Hence, we can say that this statement is false.

Instructions

An agency entrusted to accredit colleges looks at four parameters: faculty quality (F), reputation (R), placement quality (P), and infrastructure (I). The four parameters are used to arrive at an overall score, which the agency uses to give an accreditation to the colleges. In each parameter, there are five possible letter grades given, each carrying certain points: A (50 points), B (40 points), C (30 points), D (20 points), and F (0 points). The overall score for a college is the weighted sum of the points scored in the four parameters. The weights of the parameters are 0.1, 0.2, 0.3 and 0.4 in some order, but the order is not disclosed. Accreditation is awarded based on the following scheme:

Range	Accreditation
Overall score ≥ 45	AAA
$35 \leq \text{Overall score} < 45$	BAA
$25 \leq \text{Overall score} < 35$	BBA
$15 \leq \text{Overall score} < 25$	BBB
Overall score < 15	Junk

Eight colleges apply for accreditation, and receive the following grades in the four parameters (F, R, P, and I):

	F	R	P	I
A-one	A	A	A	B
Best Ed	B	C	D	D
Cosmopolitan	B	D	D	C
Dominance	D	D	B	C
Education Aid	A	A	B	A
Fancy	A	A	B	B
Global	C	F	D	D
High Q	C	D	D	B

It is further known that in terms of overall scores:

1. High Q is better than Best Ed;
2. Best Ed is better than Cosmopolitan; and
3. Education Aid is better than A-one.

Question 43

What is the weight of the faculty quality parameter?

- A 0.2
- B 0.3
- C 0.4
- D 0.1

Answer: D

Explanation:

It is given that: High Q > Best Ed > Cosmopolitan and Education Aid > A-one

We can say that High Q > Cosmopolitan

We can see that both High Q and Cosmopolitan got same points in reputation (R) and placement quality (P). High Q received more points in infrastructure (I) than Cosmopolitan whereas Cosmopolitan received more points in faculty Quality (F) than High Q.

Hence, we can say that Infrastructure's weight should be greater than Faculty quality. i.e. $I > F$

Similarly, We can see that both Best Ed and Cosmopolitan got same points in faculty Quality (F) and placement quality (P). Best Ed received more points in reputation (R) than Cosmopolitan whereas Cosmopolitan received more points in infrastructure (I) than Best Ed.

Hence, we can say that reputation's weight should be greater than infrastructure. i.e. $R > I$

Similarly, We can see that both Education Aid and A-one got same points in faculty Quality (F) and reputation (R). Education Aid received more points in infrastructure (I) than A-one whereas A-one received more points in placement quality (P) than Education Aid.

Hence, we can say that reputation's weight should be greater than infrastructure. i.e. $I > P$

So basically there are two possible cases: $R > I > P > F$ or $R > I > F > P$

Case 1: Order of weights assigned = $R > I > P > F$

$R = 0.4, I = 0.3, P = 0.2, F = 0.1$

In this case overall score received by Best Ed = $0.1*40+0.4*30+0.2*20+0.3*20 = 26$

In this case overall score received by High Q = $0.1*30+0.4*20+0.2*20+0.3*40 = 27$

We can see that High Q's overall score is higher than Best Ed. Hence, this is a possible case.

Case 2: Order of weights assigned = $R > I > F > P$

$R = 0.4, I = 0.3, P = 0.1, F = 0.2$

In this case overall score received by Best Ed = $0.2*40+0.4*30+0.1*20+0.3*20 = 28$

In this case overall score received by High Q = $0.2*30+0.4*20+0.1*20+0.3*40 = 28$

We can see that High Q's overall score is not greater than the overall score received Best Ed. Hence, this case is not possible.

Now that we know the weight of each parameter, we can calculate the overall score and accreditation received by each college.

	F (0.1)	R (0.4)	P (0.2)	I (0.3)	Overall score	Accreditation
A-one	50	50	50	40	47	AAA
Best Ed	40	30	20	20	26	BBA
Cosmopolitan	40	20	20	30	25	BBA
Dominance	20	20	40	30	27	BBA
Education Aid	50	50	40	50	48	AAA
Fancy	50	50	40	40	45	AAA
Global	30	0	20	20	13	Junk
High Q	30	20	20	40	27	BBA

We can see that weight of the faculty quality parameter = 0.1. Hence, option D is the correct answer.

Question 44

How many colleges receive the accreditation of AAA?

Answer:3

Explanation:

It is given that: High Q > Best Ed > Cosmopolitan and Education Aid > A-one

We can say that High Q > Cosmopolitan

We can see that both High Q and Cosmopolitan got same points in reputation (R) and placement quality (P). High Q received more points in infrastructure (I) than Cosmopolitan whereas Cosmopolitan received more points in faculty Quality (F) than High Q.

Hence, we can say that Infrastructure's weight should be greater than Faculty quality. i.e. $I > F$

Similarly, We can see that both Best Ed and Cosmopolitan got same points in faculty Quality (F) and placement quality (P). Best Ed received more points in reputation (R) than Cosmopolitan whereas Cosmopolitan received more points in infrastructure (I) than Best Ed.

Hence, we can say that reputation's weight should be greater than infrastructure. i.e. $R > I$

Similarly, We can see that both Education Aid and A-one got same points in faculty Quality (F) and reputation (R). Education Aid received more points in Infrastructure (I) than A-one whereas A-one received more points in placement quality (P) than Education Aid.

Hence, we can say that reputation's weight should be greater than infrastructure. i.e. $I > P$

So basically there are two possible cases: $R > I > P > F$ or $R > I > F > P$

Case 1: Order of weights assigned = $R > I > P > F$

$R = 0.4, I = 0.3, P = 0.2, F = 0.1$

In this case overall score received by Best Ed = $0.1*40+0.4*30+0.2*20+0.3*20 = 26$

In this case overall score received by High Q = $0.1*30+0.4*20+0.2*20+0.3*40 = 27$

We can see that High Q's overall score is higher than Best Ed. Hence, this is a possible case.

Case 2: Order of weights assigned = $R > I > F > P$

$R = 0.4, I = 0.3, P = 0.1, F = 0.2$

In this case overall score received by Best Ed = $0.2*40+0.4*30+0.1*20+0.3*20 = 28$

In this case overall score received by High Q = $0.2*30+0.4*20+0.1*20+0.3*40 = 28$

We can see that High Q's overall score is not greater than the overall score received Best Ed. Hence, this case is not possible.

Now that we know the weight of each parameter, we can calculate the overall score and accreditation received by each college.

	F (0.1)	R (0.4)	P (0.2)	I (0.3)	Overall score	Accreditation
A-one	50	50	50	40	47	AAA
Best Ed	40	30	20	20	26	BBA
Cosmopolitan	40	20	20	30	25	BBA
Dominance	20	20	40	30	27	BBA
Education Aid	50	50	40	50	48	AAA
Fancy	50	50	40	40	45	AAA
Global	30	0	20	20	13	Junk
High Q	30	20	20	40	27	BBA

From the table, we can see that three received the accreditation of AAA.

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Question 45

What is the highest overall score among the eight colleges ?

Answer:48

Explanation:

It is given that: High Q > Best Ed > Cosmopolitan and Education Aid > A-one

We can say that High Q > Cosmopolitan

We can see that both High Q and Cosmopolitan got same points in reputation (R) and placement quality (P). High Q received more points in infrastructure (I) than Cosmopolitan whereas Cosmopolitan received more points in faculty Quality (F) than High Q.

Hence, we can say that Infrastructure's weight should be greater than Faculty quality. i.e. $I > F$

Similarly, We can see that both Best Ed and Cosmopolitan got same points in faculty Quality (F) and placement quality (P). Best Ed received more points in reputation (R) than Cosmopolitan whereas Cosmopolitan received more points in infrastructure (I) than Best Ed.

Hence, we can say that reputation's weight should be greater than infrastructure. i.e. $R > I$

Similarly, We can see that both Education Aid and A-one got same points in faculty Quality (F) and reputation (R). Education Aid received more points in infrastructure (I) than A-one whereas A-one received more points in placement quality (P) than Education Aid.

Hence, we can say that reputation's weight should be greater than infrastructure. i.e. $I > P$

So basically there are two possible cases: $R > I > P > F$ or $R > I > F > P$

Case 1: Order of weights assigned = $R > I > P > F$

$R = 0.4, I = 0.3, P = 0.2, F = 0.1$

In this case overall score received by Best Ed = $0.1*40+0.4*30+0.2*20+0.3*20 = 26$

In this case overall score received by High Q = $0.1*30+0.4*20+0.2*20+0.3*40 = 27$

We can see that High Q's overall score is higher than Best Ed. Hence, this is a possible case.

Case 2: Order of weights assigned = $R > I > F > P$

$R = 0.4, I = 0.3, P = 0.1, F = 0.2$

In this case overall score received by Best Ed = $0.2*40+0.4*30+0.1*20+0.3*20 = 28$

In this case overall score received by High Q = $0.2*30+0.4*20+0.1*20+0.3*40 = 28$

We can see that High Q's overall score is not greater than the overall score received Best Ed. Hence, this case is not possible.

Now that we know the weight of each parameter, we can calculate the overall score and accreditation received by each college.

	F (0.1)	R (0.4)	P (0.2)	I (0.3)	Overall score	Accreditation
A-one	50	50	50	40	47	AAA
Best Ed	40	30	20	20	26	BBA
Cosmopolitan	40	20	20	30	25	BBA
Dominance	20	20	40	30	27	BBA
Education Aid	50	50	40	50	48	AAA
Fancy	50	50	40	40	45	AAA
Global	30	0	20	20	13	Junk
High Q	30	20	20	40	27	BBA

From the table we can see that Education Aid scored the highest overall score = 48.

Question 46

How many colleges have overall scores between 31 and 40, both inclusive?

- A 0
- B 2
- C 1
- D 3

Answer: A

Explanation:

It is given that: High Q > Best Ed > Cosmopolitan and Education Aid > A-one

We can say that High Q > Cosmopolitan

We can see that both High Q and Cosmopolitan got same points in reputation (R) and placement quality (P). High Q received more points in infrastructure (I) than Cosmopolitan whereas Cosmopolitan received more points in faculty Quality (F) than High Q.

Hence, we can say that Infrastructure's weight should be greater than Faculty quality. i.e. $I > F$

Similarly, We can see that both Best Ed and Cosmopolitan got same points in faculty Quality (F) and placement quality (P). Best Ed received more points in reputation (R) than Cosmopolitan whereas Cosmopolitan received more points in infrastructure (I) than Best Ed.

Hence, we can say that reputation's weight should be greater than infrastructure. i.e. $R > I$

Similarly, We can see that both Education Aid and A-one got same points in faculty Quality (F) and reputation (R). Education Aid received more points in infrastructure (I) than A-one whereas A-one received more points in placement quality (P) than Education Aid.

Hence, we can say that reputation's weight should be greater than infrastructure. i.e. $I > P$

So basically there are two possible cases: $R > I > P > F$ or $R > I > F > P$

Case 1: Order of weights assigned = $R > I > P > F$

$$R = 0.4, I = 0.3, P = 0.2, F = 0.1$$

$$\text{In this case overall score received by Best Ed} = 0.1 \times 40 + 0.4 \times 30 + 0.2 \times 20 + 0.3 \times 20 = 26$$

$$\text{In this case overall score received by High Q} = 0.1 \times 30 + 0.4 \times 20 + 0.2 \times 20 + 0.3 \times 40 = 27$$

We can see that High Q's overall score is higher than Best Ed. Hence, this is a possible case.

Case 2: Order of weights assigned = $R > I > F > P$

$$R = 0.4, I = 0.3, P = 0.1, F = 0.2$$

$$\text{In this case overall score received by Best Ed} = 0.2 \times 40 + 0.4 \times 30 + 0.1 \times 20 + 0.3 \times 20 = 28$$

$$\text{In this case overall score received by High Q} = 0.2 \times 30 + 0.4 \times 20 + 0.1 \times 20 + 0.3 \times 40 = 28$$

We can see that High Q's overall score is not greater than the overall score received Best Ed. Hence, this case is not possible.

Now that we know the weight of each parameter, we can calculate the overall score and accreditation received by each college.

	F (0.1)	R (0.4)	P (0.2)	I (0.3)	Overall score	Accreditation
A-one	50	50	50	40	47	AAA
Best Ed	40	30	20	20	26	BBA
Cosmopolitan	40	20	20	30	25	BBA
Dominance	20	20	40	30	27	BBA
Education Aid	50	50	40	50	48	AAA
Fancy	50	50	40	40	45	AAA
Global	30	0	20	20	13	Junk
High Q	30	20	20	40	27	BBA

From the table we can see that none of the mentioned college received an overall scores between 31 and 40, both inclusive. Hence, option A is the correct answer.

Instructions

Fun Sports (FS) provides training in three sports - Gilli-danda (G), Kho-Kho (K), and Ludo (L). Currently it has an enrollment of 39 students each of whom is enrolled in at least one of the three sports. The following details are known:

1. The number of students enrolled only in L is double the number of students enrolled in all the three sports.
2. There are a total of 17 students enrolled in G.
3. The number of students enrolled only in G is one less than the number of students enrolled only in L.
4. The number of students enrolled only in K is equal to the number of students who are enrolled in both K and L.
5. The maximum student enrollment is in L.
6. Ten students enrolled in G are also enrolled in at least one more sport.

Question 47

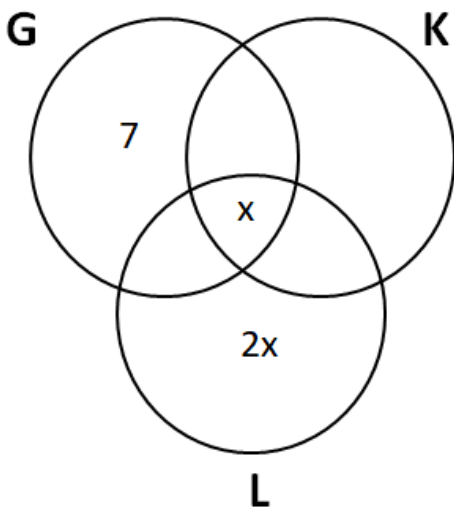
What is the minimum number of students enrolled in both G and L but not in K?

Answer:4

Explanation:

Let 'x' be the number of students enrolled in all three sports. Then the number of students enrolled only in L = 2x

It is given that there are a total of 17 students enrolled in G. Also, ten students enrolled in G are also enrolled in at least one more sport. Hence, the number of students enrolled in only G = 17 - 10 = 7



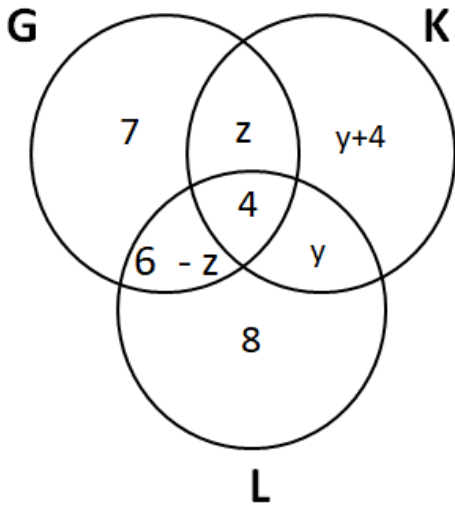
The number of students enrolled only in G is one less than the number of students enrolled only in L. Hence, the number of students enrolled only in L = 7+1

$$\Rightarrow 2x = 8$$

$$\Rightarrow x = 4$$

Let us assume that 'y' students are enrolled in K and L but not G. Then, the number of students enrolled only in K = y + 4

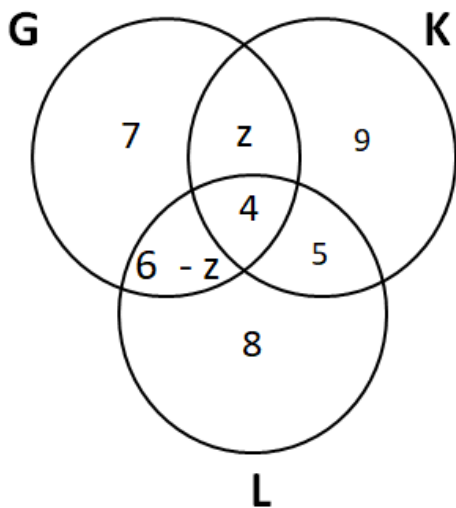
Let us assume that 'z' be the the number of students enrolled in G and K but not L. Then, the number of students enrolled G and L bot not K = 10 - 4 - z = 6 - z



It is given that a total of 39 students in the sports.

$$7 + z + 4 + 6 - z + 8 + y + y + 4 = 39$$

$$\Rightarrow y = 5$$



Number of students enrolled in G = 17

Number of students enrolled in K = $9 + 4 + 5 + z = 18 + z$

Number of students enrolled in L = $6 - z + 4 + 5 + 8 = 23 - z$

It is given that the maximum student enrollment is in L.

$$\Rightarrow 23 - z > 18 + z$$

$$\Rightarrow 2z < 5$$

$$\Rightarrow z < 2.5$$

Therefore, we can say that z can take three values = {0, 1, 2}

The number of students enrolled in both G and L but not in K = $6 - z$. This number will be minimum when 'z' is maximum. $z_{\max} = 2$

Therefore, the minimum number of students enrolled in both G and L but not in K = $6 - 2 = 4$

Know the CAT Percentile Required for IIM Calls

Question 48

If the numbers of students enrolled in K and L are in the ratio 19:22, then what is the number of students enrolled in L?

A 18

B 17

C 22

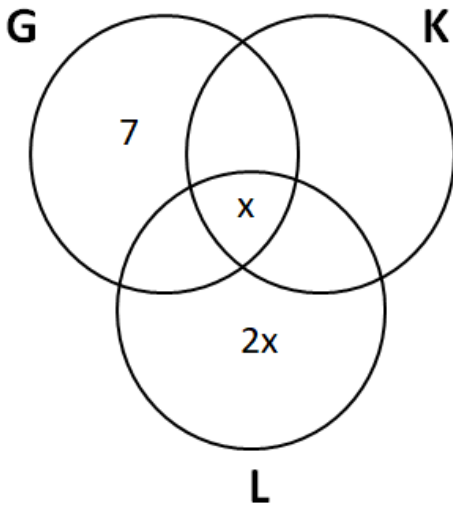
D 19

Answer: C

Explanation:

Let 'x' be the number of students enrolled in all three sports. Then the number of students enrolled only in L = 2x

It is given that there are a total of 17 students enrolled in G. Also, ten students enrolled in G are also enrolled in at least one more sport. Hence, the number of students enrolled in only G = 17 - 10 = 7



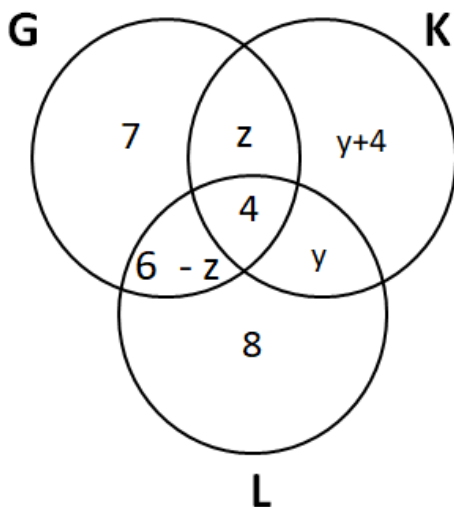
The number of students enrolled only in G is one less than the number of students enrolled only in L. Hence, the number of students enrolled only in L = 7+1

$$\Rightarrow 2x = 8$$

$$\Rightarrow x = 4$$

Let us assume that 'y' students are enrolled in K and L but not G. Then, the number of students enrolled only in K = y + 4

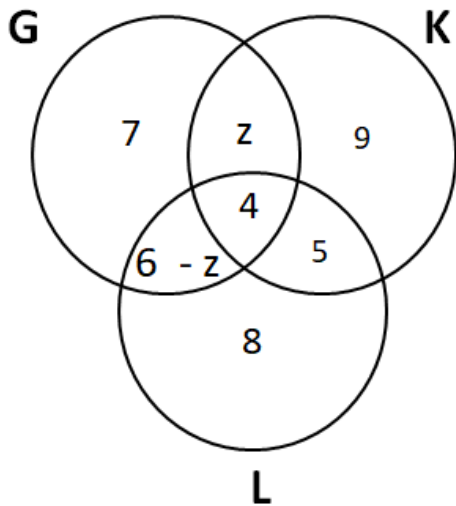
Let us assume that 'z' be the the number of students enrolled in G and K but not L. Then, the number of students enrolled G and L bot not K = 10 - 4 - z = 6 - z



It is given that a total of 39 students in the sports.

$$7 + z + 4 + 6 - z + 8 + y + y + 4 = 39$$

$$\Rightarrow y = 5$$



Number of students enrolled in G = 17

Number of students enrolled in K = $9 + 4 + 5 + z = 18 + z$

Number of students enrolled in L = $6 - z + 4 + 5 + 8 = 23 - z$

It is given that the maximum student enrollment is in L.

$$\Rightarrow 23 - z > 18 + z$$

$$\Rightarrow 2z < 5$$

$$\Rightarrow z < 2.5$$

Therefore, we can say that z can take three values = $\{0, 1, 2\}$

It is given that the numbers of students enrolled in K and L are in the ratio 19:22.

$$18 + z = 19$$

$$23 - z = 22$$

$z = 1$ which is a possible solution as well.

In this case the number of students enrolled in L = $23 - z = 23 - 1 = 22$. Hence, option C is the correct answer.

Question 49

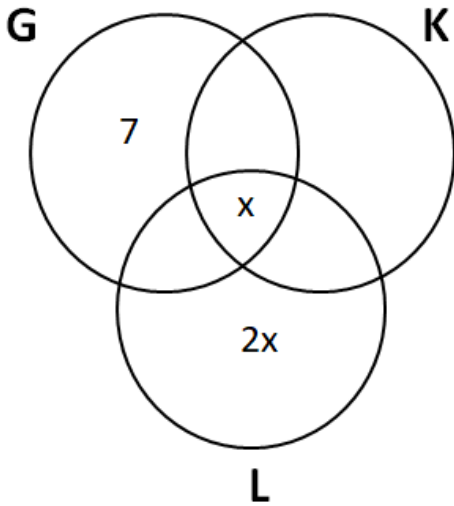
Due to academic pressure, students who were enrolled in all three sports were asked to withdraw from one of the three sports. After the withdrawal, the number of students enrolled in G was six less than the number of students enrolled in L, while the number of students enrolled in K went down by one. After the withdrawal, how many students were enrolled in both G and K?

Answer:2

Explanation:

Let 'x' be the number of students enrolled in all three sports. Then the number of students enrolled only in L = $2x$

It is given that there are a total of 17 students enrolled in G. Also, ten students enrolled in G are also enrolled in at least one more sport. Hence, the number of students enrolled in only G = $17 - 10 = 7$



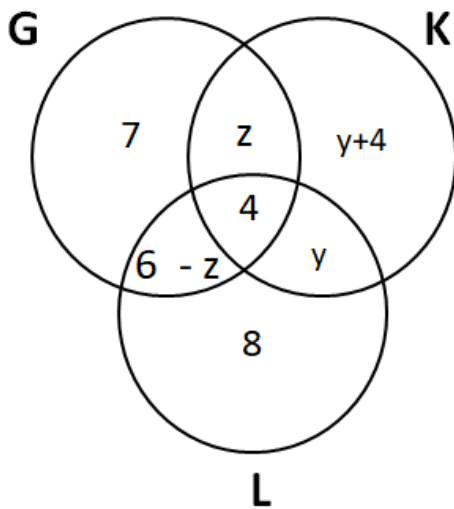
The number of students enrolled only in G is one less than the number of students enrolled only in L. Hence, the number of students enrolled only in L = $7+1$

$$\Rightarrow 2x = 8$$

$$\Rightarrow x = 4$$

Let us assume that 'y' students are enrolled in K and L but not G. Then, the number of students enrolled only in K = $y + 4$

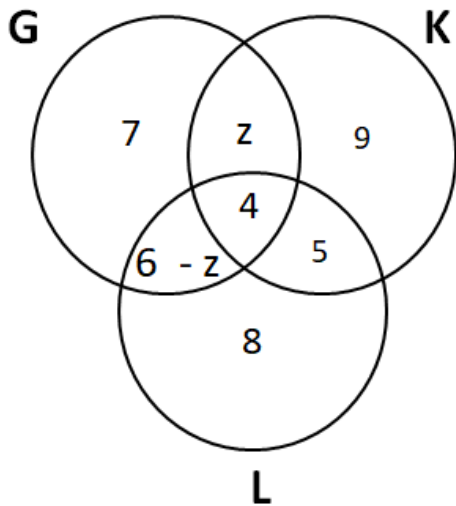
Let us assume that 'z' be the the number of students enrolled in G and K but not L. Then, the number of students enrolled G and L bot not K = $10 - 4 - z = 6 - z$



It is given that a total of 39 students in the sports.

$$7 + z + 4 + 6 - z + 8 + y + y + 4 = 39$$

$$\Rightarrow y = 5$$



Number of students enrolled in G = 17

Number of students enrolled in K = $9 + 4 + 5 + z = 18 + z$

Number of students enrolled in L = $6 - z + 4 + 5 + 8 = 23 - z$

It is given that the maximum student enrollment is in L.

$$\Rightarrow 23 - z > 18 + z$$

$$\Rightarrow 2z < 5$$

$$\Rightarrow z < 2.5$$

Therefore, we can say that z can take three values = $\{0, 1, 2\}$

Hence, the number of students enrolled in K = $18 + z = \{18, 19, 20\}$

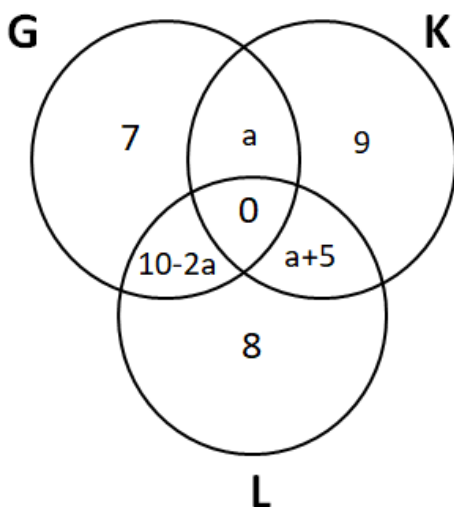
It is given that after withdrawal the number of students enrolled in K went down by one. This one student must have left sports K. Hence we can say that the remaining 3 students must have left either G or L.

Before withdraw there were a total of 24 students were enrolled in exactly 1 sports, 11 students were enrolled in exactly 2 courses and 4 students were enrolled in all three courses.

The students which were enrolled in all three sports, withdrew from one of the sports. Hence, we can say that now the number of students who were enrolled in exactly 2 courses = $11 + 4 = 15$.

It is given that the number of students enrolled in G was six less than the number of students enrolled in L. Let 'a' be the number of students who were enrolled in G and K but not L. Then, the number of students who were enrolled in L and K but not G = $a + 5$

Consequently, we can say that the number of students enrolled in G and L but not K = $15 - (2a + 5) = 10 - 2a$



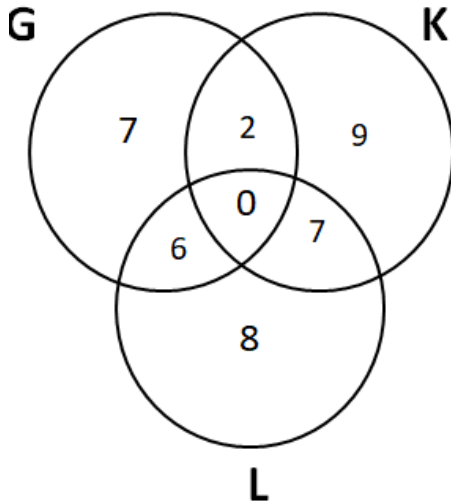
Number of students enrolled in this case = $a + a + 5 + 9 = 14 + 2a$. We can see that ' $14 + 2a$ ' is an even number. It is given that the number of students enrolled in K went down by one. Therefore, we can say that the number of students enrolled in K earlier was an odd number.

Hence, the number of students enrolled in K = $18 + z = \{18, 19, 20\}$

We can see that only '19' is an odd number. Hence, we can say that the number of students enrolled in K after withdrawal = 18

$$\Rightarrow 14 + 2a = 18$$

$$\Rightarrow a = 2$$



From the diagram we can see that the number of students enrolled in both G and K = 2.

Question 50

Due to academic pressure, students who were enrolled in all three sports were asked to withdraw from one of the three sports. After the withdrawal, the number of students enrolled in G was six less than the number of students enrolled in L, while the number of students enrolled in K went down by one. After the withdrawal, how many students were enrolled in both G and L?

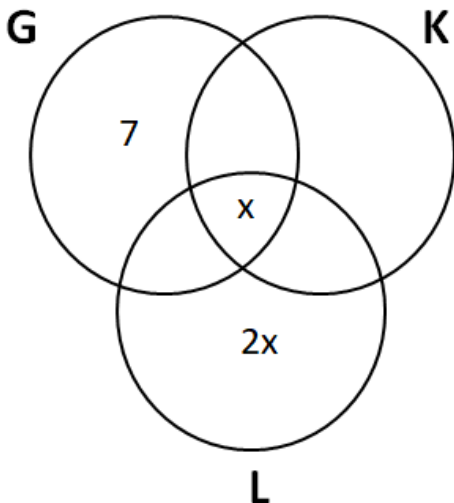
- A 6
- B 5
- C 7
- D 8

Answer: A

Explanation:

Let 'x' be the number of students enrolled in all three sports. Then the number of students enrolled only in L = 2x

It is given that there are a total of 17 students enrolled in G. Also, ten students enrolled in G are also enrolled in at least one more sport. Hence, the number of students enrolled in only G = 17 - 10 = 7



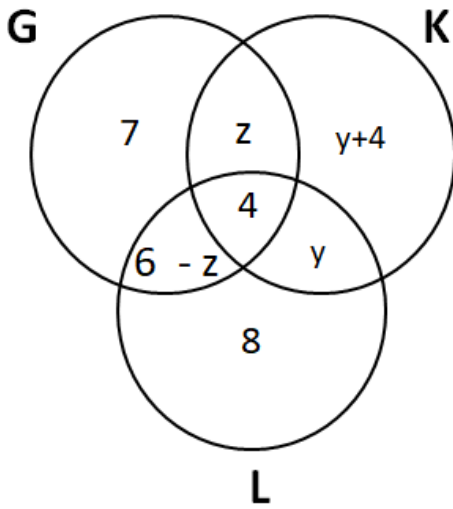
The number of students enrolled only in G is one less than the number of students enrolled only in L. Hence, the number of students enrolled only in L = 7 + 1 = 8

$$\Rightarrow 2x = 8$$

$$\Rightarrow x = 4$$

Let us assume that 'y' students are enrolled in K and L but not G. Then, the number of students enrolled only in K = $y + 4$

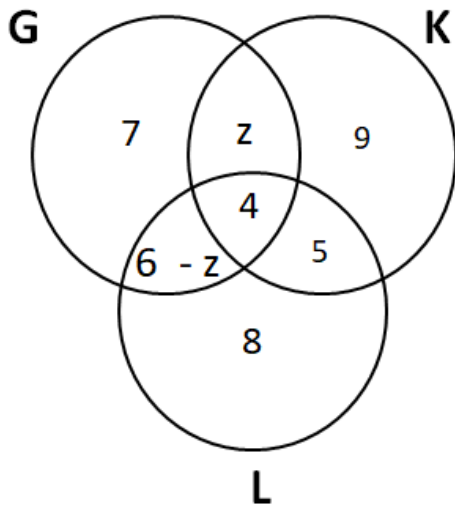
Let us assume that 'z' be the number of students enrolled in G and K but not L. Then, the number of students enrolled G and L but not K = $10 - 4 - z = 6 - z$



It is given that a total of 39 students in the sports.

$$7 + z + 4 + 6 - z + 8 + y + y + 4 = 39$$

$$\Rightarrow y = 5$$



Number of students enrolled in G = 17

Number of students enrolled in K = $9 + 4 + 5 + z = 18 + z$

Number of students enrolled in L = $6 - z + 4 + 5 + 8 = 23 - z$

It is given that the maximum student enrollment is in L.

$$\Rightarrow 23 - z > 18 + z$$

$$\Rightarrow 2z < 5$$

$$\Rightarrow z < 2.5$$

Therefore, we can say that z can take three values = $\{0, 1, 2\}$

Hence, the number of students enrolled in K = $18 + z = \{18, 19, 20\}$

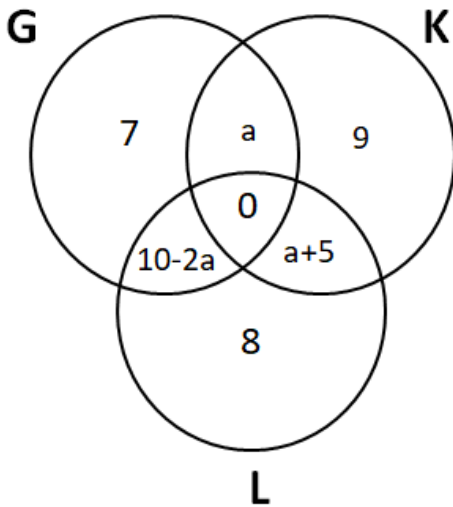
It is given that after withdrawal the number of students enrolled in K went down by one. This one student must have left sports K. Hence we can say that the remaining 3 students must have left either G or L.

Before withdraw there were a total of 24 students were enrolled in exactly 1 sports, 11 students were enrolled in exactly 2 courses and 4 students were enrolled in all three courses.

The students which were enrolled in all three sports, withdrew from one of the sports. Hence, we can say that now the number of students who were enrolled in exactly 2 courses = $11 + 4 = 15$.

It is given that the number of students enrolled in G was six less than the number of students enrolled in L. Let 'a' be the number of students who were enrolled in G and K but not L. Then, the number of students who were enrolled in L and K but not G = $a + 5$

Consequently, we can say that the number of students enrolled in G and L but not K = $15 - (2a + 5) = 10 - 2a$



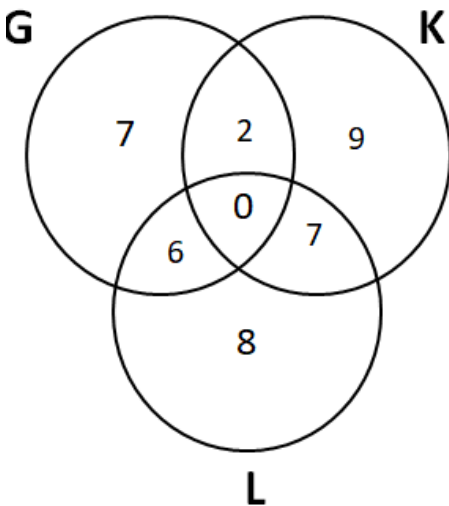
Number of students enrolled in this case = $a + a + 5 + 9 = 14 + 2a$. We can see that ' $14 + 2a$ ' is an even number. It is given that the number of students enrolled in K went down by one. Therefore, we can say that the number of students enrolled in K earlier was an odd number.

Hence, the number of students enrolled in K = $18 + z = \{18, 19, 20\}$

We can see that only '19' is an odd number. Hence, we can say that the number of students enrolled in K after withdrawal = 18

$$\Rightarrow 14 + 2a = 18$$

$$\Rightarrow a = 2$$



From the diagram we can see that the number of students enrolled in both G and L = 6. Hence, option A is the correct answer.

How to prepare for Verbal Ability for CAT

Instructions

According to a coding scheme the sentence:

"Peacock is designated as the national bird of India" is coded as 5688999 35 1135556678 56 458 13666689 1334 79 13366

This coding scheme has the following rules:

- a: The scheme is case-insensitive (does not distinguish between upper case and lower case letters).
- b: Each letter has a unique code which is a single digit from among 1,2,3, ...,9.

- c: The digit 9 codes two letters, and every other digit codes three letters.
 d: The code for a word is constructed by arranging the digits corresponding to its letters in a non-decreasing sequence.

Answer these questions on the basis of this information.

Question 51

What best can be concluded about the code for the letter L?

- A 1
- B 8
- C 1 or 8
- D 6

Answer: A

Explanation:

Peacock	is	designated	as	the	national	bird	of	India
5688999	35	1135556678	56	458	13666689	1334	79	13366

We can see that India's code is 13366 therefore we can say that I's code is either 3 or 6.

Also, we can see that code for word "is" is 35 therefore we can say that I's code is 3. Consequently, we can say that S's code is 5.

Also, we can see that code of word 'as' is 56 therefore we can say that A's code is 6. Consequently, we can say that S's code is 5.

There is only one letter 'O' common in words 'of' and 'national'. In code word as well only digit '9' is common in both. Hence, we can say that letter 'O' is assigned numerical '9'. Consequently, we can say that F is assigned number 7.

	1	2	3	4	5	6	7	8	9
Letters			I		S	A	F		O

It is given that '9' is assigned to only two alphabets one of them is 'O'. We can see that there are three 9's in Peacock's code. One of the digit '9' is used for 'O'. Remaining two 9's must represent same letter. We can see that only letter 'C' has appeared twice in Peacock. Therefore, we can say that 'C' is assigned number '9'.

In word national 'N' has appeared twice. In code only digit '6' has appeared more than once. Hence, we can say that code of letter N is '6'. Consequently, we can say that code for letter 'D' is '1' because in India rest of the numerals are already taken.

	1	2	3	4	5	6	7	8	9
Letters	D		I		S	N, A	F		C, O

In words, 'the' and 'national' only letter 't' is common. In code as well only digit '8' is common in two codes. Hence, we can say that letter code for letter 't' is 8.

In words, 'the' and 'peacock' only letter 'e' is common. In code as well only digit '5' is common in two codes. Hence, we can say that letter code for letter 'e' is 5. Consequently, we can say that leftover letter, in word "the", 'H's code is 4.

	1	2	3	4	5	6	7	8	9
Letters	D		I	H	S, E	N, A	F	T	C, O

We can see that code for word "NATIONAL" is 13666689. Hence, we can say that code for the letter L is '1'. Hence, option A is the correct answer.

Question 52

What best can be concluded about the code for the letter B?

- A 3 or 4
- B 1 or 3 or 4
- C 1
- D 3

Answer: A

Explanation:

Peacock	is	designated	as	the	national	bird	of	India
5688999	35	1135556678	56	458	13666689	1334	79	13366

We can see that India's code is 13366 therefore we can say that I's code is either 3 or 6.

Also, we can see that code for word "is" is 35 therefore we can say that I's code is 3. Consequently, we can say that S's code is 5.

Also, we can see that code of word 'as' is 56 therefore we can say that A's code is 6. Consequently, we can say that S's code is 5.

There is only one letter 'O' common in words 'of' and 'national'. In code word as well only digit '9' is common in both. Hence, we can say that letter 'O' is assigned numerical '9'. Consequently, we can say that F is assigned number 7.

	1	2	3	4	5	6	7	8	9
Letters			I		S	A	F		O

It is given that '9' is assigned to only two alphabets one of them is 'O'. We can see that there are three 9's in Peacock's code. One of the digit '9' is used for 'O'. Remaining two 9's must represent same letter. We can see that only letter 'C' has appeared twice in Peacock. Therefore, we can say that 'C' is assigned number '9'.

In word national 'N' has appeared twice. In code only digit '6' has appeared more than once. Hence, we can say that code of letter N is '6'. Consequently, we can say that code for letter 'D' is '1' because in India rest of the numerals are already taken.

	1	2	3	4	5	6	7	8	9
Letters	D		I		S	N, A	F		C, O

In words, 'the' and 'national' only letter 't' is common. In code as well only digit '8' is common in two codes. Hence, we can say that letter code for letter 't' is 8.

In words, 'the' and 'peacock' only letter 'e' is common. In code as well only digit '5' is common in two codes. Hence, we can say that letter code for letter 'e' is 5. Consequently, we can say that leftover letter, in word 'the', 'H's code is 4.

	1	2	3	4	5	6	7	8	9
Letters	D		I	H	S, E	N, A	F	T	C, O

We can see that code for word "NATIONAL" is 13666689. Hence, we can say that code for the letter L is '1'.

	1	2	3	4	5	6	7	8	9
Letters	L, D		I	H	S, E	N, A	F	T	C, O

We can see that code for word "BIRD" is 1334. 1 corresponds to D and one 3 corresponds to I. Hence, we can say that code for letters 'R' and 'B' are '3' and '4' in any order.

Therefore, we can say that for letter 'B' there are two possible numbers: 3 or 4

Hence, option A is the correct answer.

Question 53

For how many digits can the complete list of letters associated with that digit be identified?

- A 1
- B 2
- C 0
- D 3

Answer: B

Explanation:

Peacock	is	designated	as	the	national	bird	of	India
5688999	35	1135556678	56	458	13666689	1334	79	13366

We can see that India's code is 13366 therefore we can say that I's code is either 3 or 6.

Also, we can see that code for word "is" is 35 therefore we can say that I's code is 3. Consequently, we can say that S's code is 5.

Also, we can see that code of word 'as' is 56 therefore we can say that A's code is 6. Consequently, we can say that S's code is 5.

There is only one letter 'O' common in words 'of' and 'national'. In code word as well only digit '9' is common in both. Hence, we can say that letter 'O' is assigned numerical '9'. Consequently, we can say that F is assigned number 7.

	1	2	3	4	5	6	7	8	9
Letters			I		S	A	F		O

It is given that '9' is assigned to only two alphabets one of them is 'O'. We can see that there are three 9's in Peacock's code. One of the

digit '9' is used for 'O'. Remaining two 9's must represent same letter. We can see that only letter 'C' has appeared twice in Peacock. Therefore, we can say that 'C' is assigned number '9'.

In word national 'N' has appeared twice. In code only digit '6' has appeared more than once. Hence, we can say that code of letter N is '6'. Consequently, we can say that code for letter 'D' is '1' because in India rest of the numerals are already taken.

	1	2	3	4	5	6	7	8	9
Letters	D		I		S	N, A	F		C, O

In words, 'the' and 'national' only letter 't' is common. In code as well only digit '8' is common in two codes. Hence, we can say that letter code for letter 't' is 8.

In words, 'the' and 'peacock' only letter 'e' is common. In code as well only digit '5' is common in two codes. Hence, we can say that letter code for letter 'e' is 5. Consequently, we can say that leftover letter, in word "the", 'H's code is 4.

	1	2	3	4	5	6	7	8	9
Letters	D		I	H	S, E	N, A	F	T	C, O

We can see that code for word "NATIONAL" is 13666689. Hence, we can say that code for the letter L is '1'.

	1	2	3	4	5	6	7	8	9
Letters	L, D		I	H	S, E	N, A	F	T	C, O

We can see that code for word "DESIGNATED" is 1135556678. Hence, we can say that code for the letter 'G' is '7'.

	1	2	3	4	5	6	7	8	9
Letters	L, D		I	H	S, E	N, A	G, F	T	C, O

We can see that code for word "PEACOCK" is 56889999. Hence, we can say that code for the letters 'P' and 'K' is '8'.

	1	2	3	4	5	6	7	8	9
Letters	L, D		I	H	S, E	N, A	G, F	T, P, K	C, O

Digit '1' is used for L and D only. We can not figure out the third letter for which digit 1 is used.

Digit '2' is not used for any letter. Hence, we can not figure out all the letters for which digit 2 is correct code.

Digit '3' is used for letter 'I' only. Hence, we can not figure out all the letters for which digit 3 is correct code.

Digit '4' is used for letters 'H' and one of 'B' and 'R'. Hence, we can not figure out all the letters for which digit 4 is correct code.

Digit '5' is used for letters 'S' and 'E'. We can not figure out the third letter for which digit 5 is used.

Digit '6' is used for letters 'A' and 'N'. We can not figure out the third letter for which digit 6 is used.

Digit '7' is used for letters 'G' and 'F'. We can not figure out the third letter for which digit 7 is used.

Digit '8' is used for letters 'T', 'P' and K. Hence, we can say that this is one of the digit for which the complete list of letters associated is known.

Digit '9' is used for letters 'C' and 'O'. Hence, we can say that this is one of the digit for which the complete list of letters associated is known.

Therefore, we can say that for only two digits (8 and 9), the complete list of letters associated is known. Hence, option B is the correct answer.

How to prepare for Data Interpretation for CAT

Question 54

Which set of letters CANNOT be coded with the same digit?

- A S,E,Z
- B I,B,M
- C S,U,V
- D X,Y,Z

Answer: C

Explanation:



Peacock	is	designated	as	the	national	bird	of	India
5688999	35	1135556678	56	458	13666689	1334	79	13366

We can see that India's code is 13366 therefore we can say that I's code is either 3 or 6.

Also, we can see that code for word "is" is 35 therefore we can say that I's code is 3. Consequently, we can say that S's code is 5.

Also, we can see that code of word 'as' is 56 therefore we can say that A's code is 6. Consequently, we can say that S's code is 5.

There is only one letter 'O' common in words 'of' and 'national'. In code word as well only digit '9' is common in both. Hence, we can say that letter 'O' is assigned numerical '9'. Consequently, we can say that F is assigned number 7.

	1	2	3	4	5	6	7	8	9
Letters			I		S	A	F		O

It is given that '9' is assigned to only two alphabets one of them is 'O'. We can see that there are three 9's in Peacock's code. One of the digit '9' is used for 'O'. Remaining two 9's must represent same letter. We can see that only letter 'C' has appeared twice in Peacock. Therefore, we can say that 'C' is assigned number '9'.

In word national 'N' has appeared twice. In code only digit '6' has appeared more than once. Hence, we can say that code of letter N is '6'. Consequently, we can say that code for letter 'D' is '1' because in India rest of the numerals are already taken.

	1	2	3	4	5	6	7	8	9
Letters	D		I		S	N, A	F		C, O

In words, 'the' and 'national' only letter 't' is common. In code as well only digit '8' is common in two codes. Hence, we can say that letter code for letter 't' is 8.

In words, 'the' and 'peacock' only letter 'e' is common. In code as well only digit '5' is common in two codes. Hence, we can say that letter code for letter 'e' is 5. Consequently, we can say that leftover letter, in word "the", 'H's code is 4.

	1	2	3	4	5	6	7	8	9
Letters	D		I	H	S, E	N, A	F	T	C, O

We can see that code for word "NATIONAL" is 13666689. Hence, we can say that code for the letter L is '1'.

	1	2	3	4	5	6	7	8	9
Letters	L, D		I	H	S, E	N, A	F	T	C, O

We can see that code for word "DESIGNATED" is 1135556678. Hence, we can say that code for the letter 'G' is '7'.

	1	2	3	4	5	6	7	8	9
Letters	L, D		I	H	S, E	N, A	G, F	T	C, O

We can see that code for word "PEACOCK" is 5688999. Hence, we can say that code for the letters 'P' and 'K' is '8'.

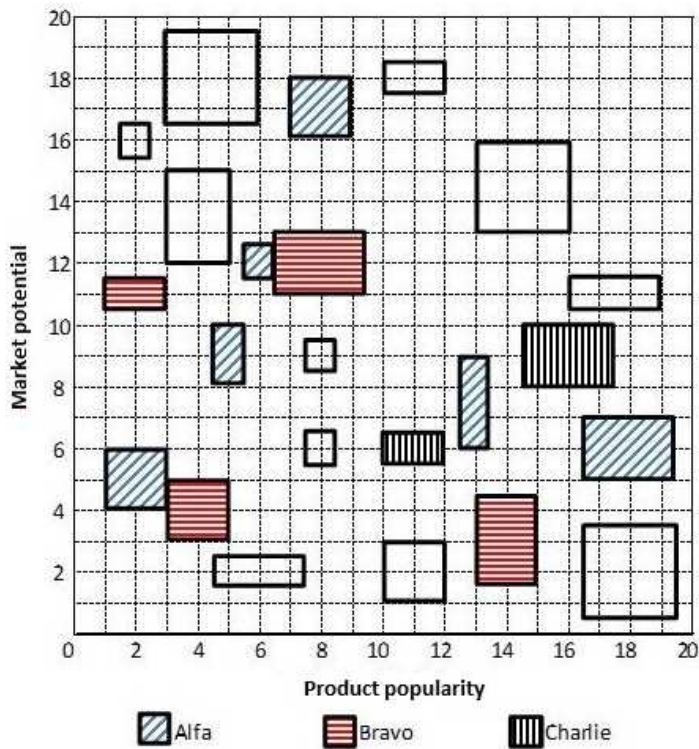
	1	2	3	4	5	6	7	8	9
Letters	L, D		I	H	S, E	N, A	G, F	T, P, K	C, O

Let us check this by options:

- (A) S,E,Z: If letter 'Z' is assigned code '5' then this case is possible.
- (B) I,B,M: If letters 'B' and 'M' are assigned code '3' then this case is possible.
- (C) S,U,V: If letters 'U' and 'V' are assigned code '5' then this case is possible. But in that case digit 5 will have 4 letters associated with it which is not possible. Hence, this is the answer.
- (D) X,Y,Z: If letters 'X', 'Y' and 'Z' are assigned code '2' then this case is possible.

Instructions

Each of the 23 boxes in the picture below represents a product manufactured by one of the following three companies: Alfa, Bravo and Charlie. The area of a box is proportional to the revenue from the corresponding product, while its centre represents the Product popularity and Market potential scores of the product (out of 20). The shadings of some of the boxes have got erased.



The companies classified their products into four categories based on a combination of scores (out of 20) on the two parameters - Product popularity and Market potential as given below:

	Promising	Blockbuster	Doubtful	No-hope
Product popularity score	>10	>10	≤10	≤10
Market potential score	>10	≤10	>10	≤10

The following facts are known:

1. Alfa and Bravo had the same number of products in the Blockbuster category.
2. Charlie had more products than Bravo but fewer products than Alfa in the No-hope category.
3. Each company had an equal number of products in the Promising category.
4. Charlie did not have any product in the Doubtful category, while Alfa had one product more than Bravo in this category.
5. Bravo had a higher revenue than Alfa from products in the Doubtful category.
6. Charlie had a higher revenue than Bravo from products in the Blockbuster category.
7. Bravo and Charlie had the same revenue from products in the No-hope category.
8. Alfa and Charlie had the same total revenue considering all products.

Question 55

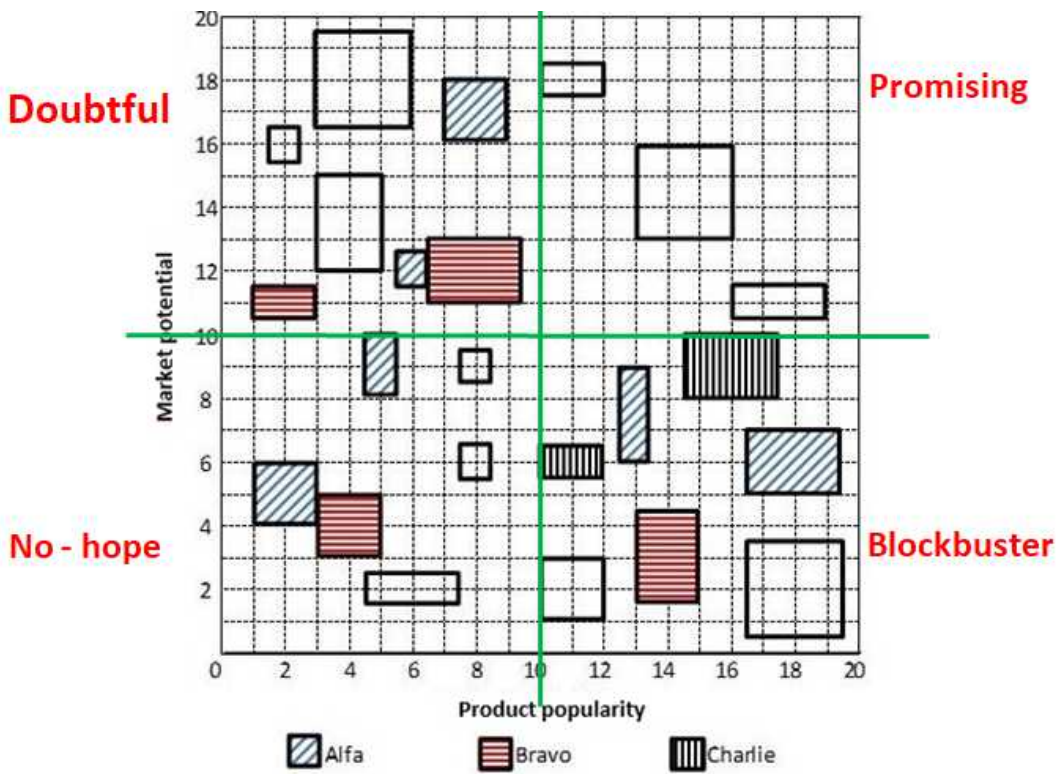
Considering all companies' products, which product category had the highest revenue?

- A No-hope
- B Blockbuster
- C Doubtful
- D Promising

Answer: B

Explanation:

Let us divide the given figure in four quadrants (Q1, Q2, Q3, Q4).



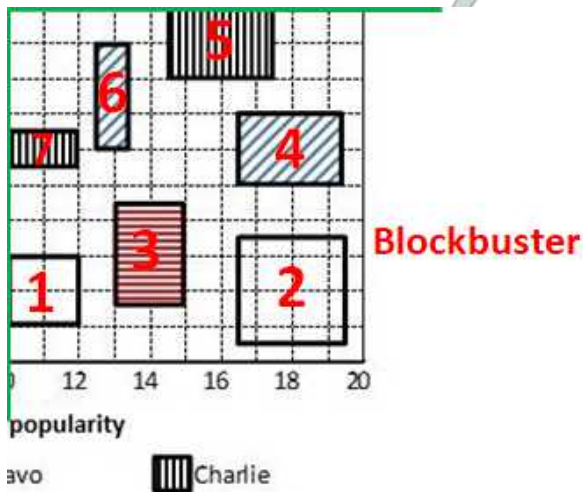
Let us solve this problem by considering only one category at a time.

(A) Blockbuster category: We have two information regarding Blockbuster category.

1. Alfa and Bravo had the same number of products in the Blockbuster category.

There are a total of 7 products in Blockbuster category. Alfa already has two products in blockbuster category. If Alfa has 3 products in blockbuster category then Bravo will also have 3 products in Blockbuster category which is not possible as there are 2 products of Charlie. Hence, we can say that Alfa and Bravo have 2 products each in Blockbuster category whereas Charlie has 3 products in Blockbuster category.

2. It is also given that Charlie had a higher revenue than Bravo from products in the Blockbuster category.



We know that one of the product 1 and 2 is from Charlie and the other is from Bravo.

If product 1 is from Charlie, then we can say that products 1, 7 and 5 are from Charlie. Therefore, revenue generated by products in Charlie category = $2 + 4 + 6 = 12$ units. (Assuming area of a square to be 1 unit)

In this case product 2 and product n are from Bravo. Therefore, revenue generated by products in Bravo category = $6 + 9 = 15$ units.

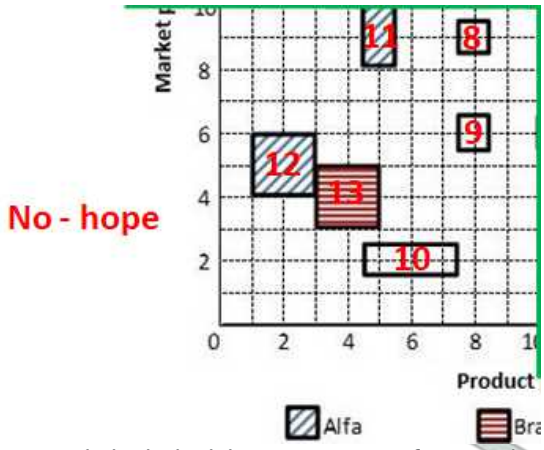
We can see that products from Charlie have a higher revenue than Bravo. Hence, this case is not possible.

Therefore, we can say that Product 1 is from Bravo and Product 2 is from Charlie. We have determined each product's company name in Blockbuster category.

(B) No-hope category: We have two information regarding No-hope category.

(1) Charlie had more products than Bravo but fewer products than Alfa in the No-hope category. Bravo and Charlie had the same revenue from products in the No-hope category. There are a total of 6 products in no-hope category.

Therefore, we can say that Alfa, Charlie and Bravo have 3, 2 and 1 products in No-hope category in that order.



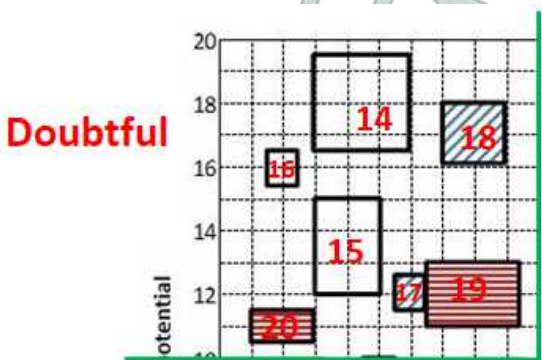
Bravo and Charlie had the same revenue from products in the No-hope category.

Revenue generated for Bravo in the No-hope category = 4 units. We need same revenue for Charlie which has 2 products in this category. Hence, we can say that Product 10 and one of product 8 and 9 is from Charlie and other is from Alfa. Let's assume that product 8 is from Charlie and product 9 is from Alfa.

(C) Doubtful category: We have two information regarding Doubtful category.

- Charlie did not have any product in the Doubtful category, while Alfa had one product more than Bravo in this category .
- Bravo had a higher revenue than Alfa from products in the Doubtful category.

We can see that there are a total of 7 products in this category. Hence, we can say that 4 products are from Alfa and 3 products are from Bravo.



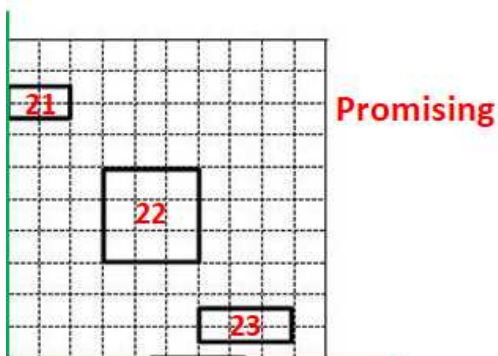
We can see that one of product 14, 15 and 16 is from Bravo company and others are from Alfa company. Bravo will have higher revenue than Alfa only when product no. 14 is from Bravo and others (15 and 16) are from Alfa category.

In this case total revenue by Bravo = Product 14 + Product 19 + Product 20 = 9 + 6 + 2 = 17

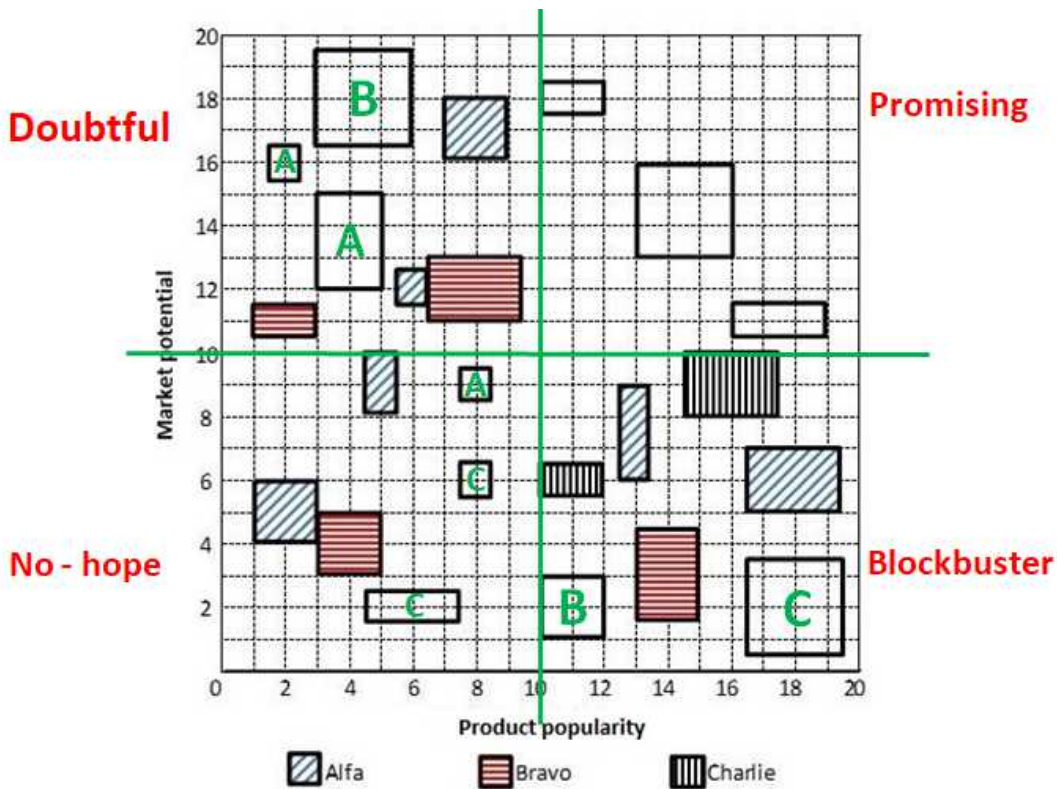
Similarly, total revenue by Charlie = Product 15 + Product 16 + Product 17 + Product 18 = 6 + 1 + 1 + 4 = 12

(D) Promising category: We have only 1 direct information regarding Promising category.

- Each company had an equal number of products in the Promising category.



There are a total of 3 products in promising category with different revenue. Therefore, we can say that each company had 1 product in promising category. We are given that Alfa and Charlie had the same total revenue considering all products. We can calculate the revenue generated by Alfa and Charlie from the products in categories.



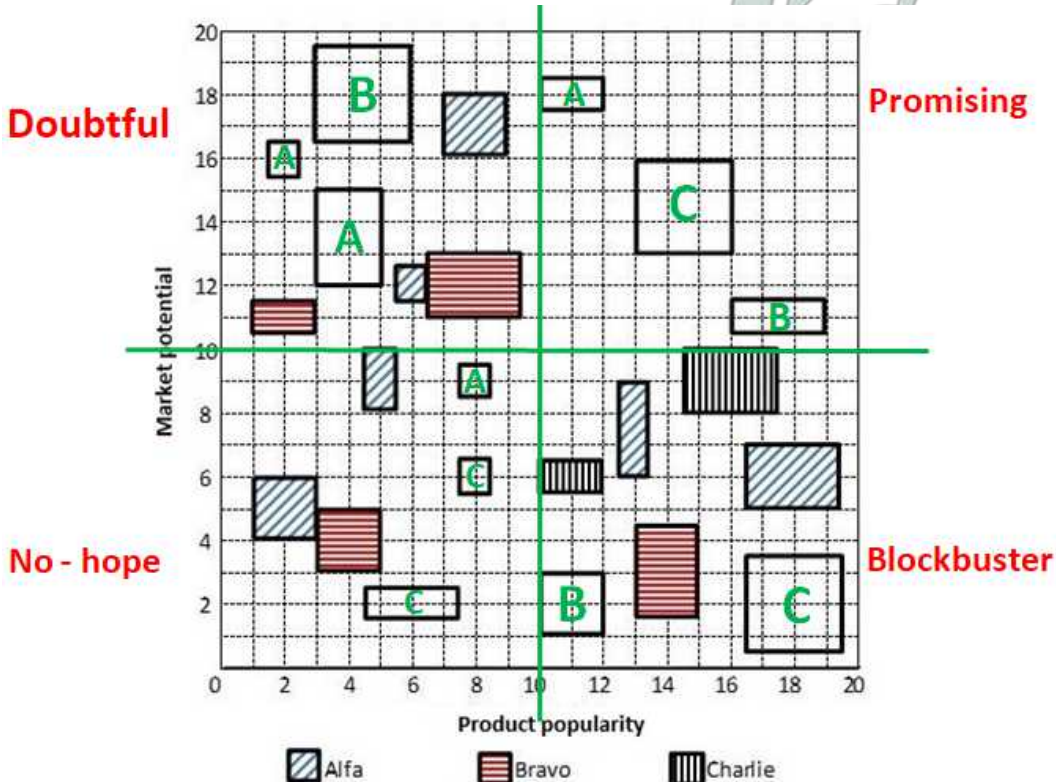
Revenue generated by Charlie from all categories except Promising = From Blockbuster + From No-hope + From Doubtful

$$\Rightarrow (9+6+2) + (3+1) + (0) = 21 \text{ units}$$

Revenue generated by Alfa from all categories except Promising = From Blockbuster + From No-hope + From Doubtful

$$\Rightarrow (6+3) + (4+2+1) + (1+6+4+1) = 28 \text{ units}$$

We can see the difference between revenue generated by Charlie and Alfa from remaining categories is 7 units. Hence, we can say that Charlie's product's revenue should be 7 units more than Alfa's product's revenue in Promising category. That is possible only in one case where product 22 is from Charlie and product 21 is from Alfa. Consequently, we can say that product 23 is from Bravo. Now we have identified each product's company name we can answer all the questions.



Revenue generated by the products in Promising category = $2 + 9 + 3 = 14$ units.

Revenue generated by the products in Doubtful category = $1 + 9 + 4 + 6 + 2 + 1 + 6 = 29$ units.

Revenue generated by the products in No-hope category = $4 + 4 + 3 + 2 + 1 + 1 = 15$ units.

Revenue generated by the products in Blockbuster category = $6 + 3 + 6 + 2 + 4 + 6 + 9 = 36$ units.

We can see that the revenue generated is the highest for Blockbuster category. Hence, option B is the correct answer.

Question 56

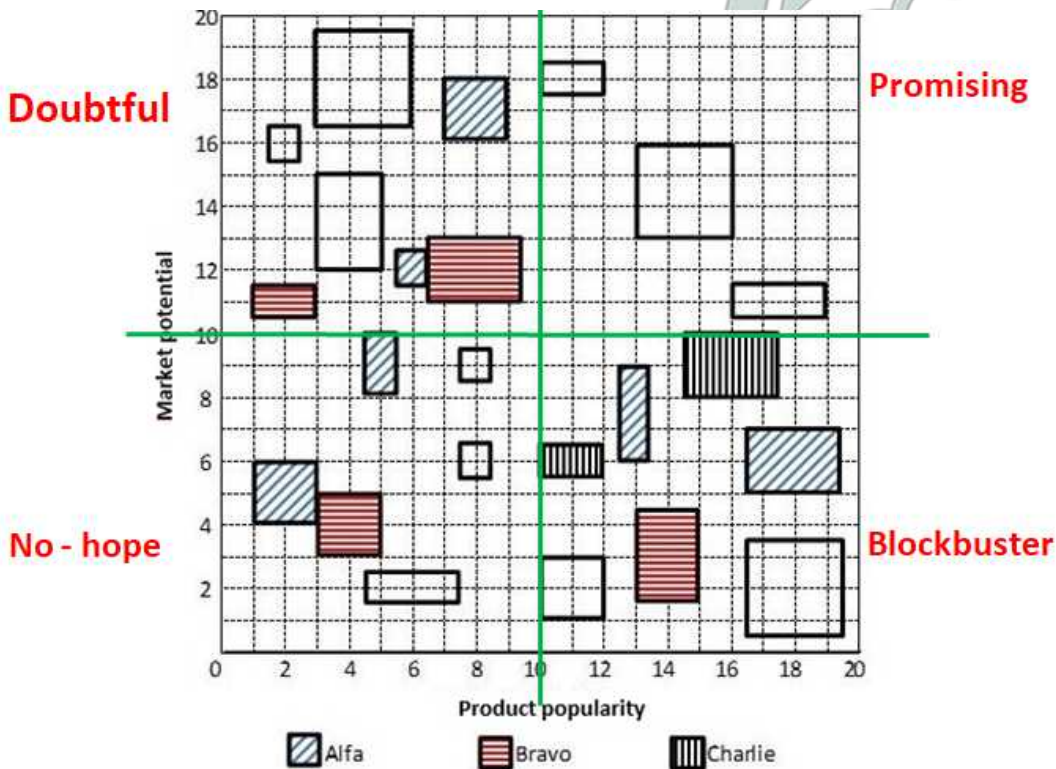
Which of the following is the correct sequence of numbers of products Bravo had in No-hope, Doubtful, Promising and Blockbuster categories respectively?

- A 1,3,1,2
- B 1,3,1,3
- C 3,3,1,2
- D 2,3,1,2

Answer: A

Explanation:

Let us divide the given figure in four quadrants (Q1, Q2, Q3, Q4).



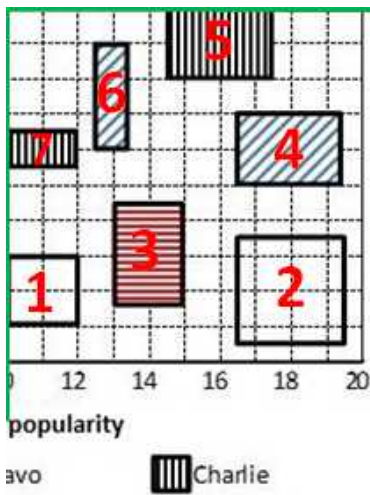
Let us solve this problem by considering only one category at a time.

(A) **Blockbuster category:** We have two information regarding Blockbuster category.

1. Alfa and Bravo had the same number of products in the Blockbuster category.

There are a total of 7 products in Blockbuster category. Alfa already has two products in blockbuster category. If Alfa has 3 products in blockbuster category then Bravo will also have 3 products in Blockbuster category which is not possible as there are 2 products of Charlie. Hence, we can say that Alfa and Bravo have 2 products each in Blockbuster category whereas Charlie has 3 products in Blockbuster category.

2. It is also given that Charlie had a higher revenue than Bravo from products in the Blockbuster category.



Blockbuster

We know that one of the product 1 and 2 is from Charlie and the other is from Bravo.

If product 1 is from Charlie, then we can say that products 1, 7 and 5 are from Charlie. Therefore, revenue generated by products in Charlie category = $2 + 4 + 6 = 12$ units. (Assuming area of a square to be 1 unit)

In this case product 2 and product n are from Bravo. Therefore, revenue generated by products in Bravo category = $6 + 9 = 15$ units.

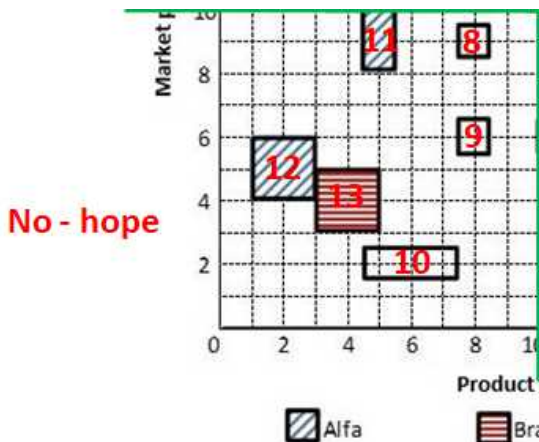
We can see that products from Charlie have a higher revenue than Bravo. Hence, this case is not possible.

Therefore, we can say that Product 1 is from Bravo and Product 2 is from Charlie. We have determined each product's company name in Blockbuster category.

(B) No-hope category: We have two information regarding No-hope category.

(1) Charlie had more products than Bravo but fewer products than Alfa in the No-hope category. Bravo and Charlie had the same revenue from products in the No-hope category. There are a total of 6 products in no-hope category.

Therefore, we can say that Alfa, Charlie and Bravo have 3, 2 and 1 products in No-hope category in that order.



No - hope

Bravo and Charlie had the same revenue from products in the No-hope category.

Revenue generated for Bravo in the No-hope category = 4 units. We need same revenue for Charlie which has 2 products in this category. Hence, we can say that Product 10 and one of product 8 and 9 is from Charlie and other is from Alfa. Let's assume that product 8 is from Charlie and product 9 is from Alfa.

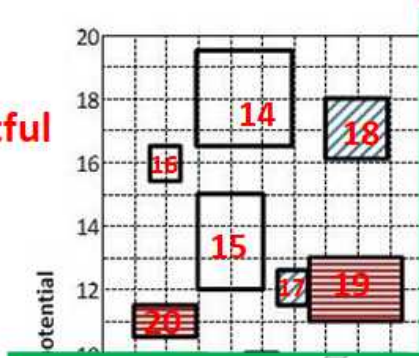
(C) Doubtful category: We have two information regarding Doubtful category.

(1). Charlie did not have any product in the Doubtful category, while Alfa had one product more than Bravo in this category.

(2). Bravo had a higher revenue than Alfa from products in the Doubtful category.

We can see that there are a total of 7 products in this category. Hence, we can say that 4 products are from Alfa and 3 products are from Bravo.

Doubtful



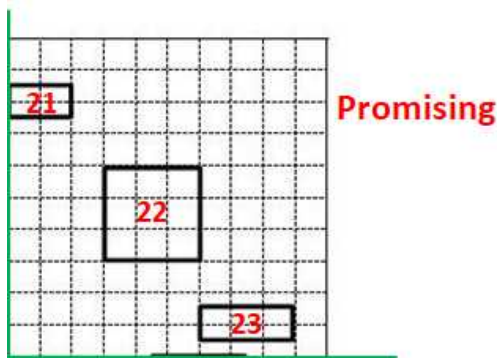
We can see that one of product 14, 15 and 16 is from Bravo company and others are from Alfa company. Bravo will have higher revenue than Alfa only when product no. 14 is from Bravo and others (15 and 16) are from Alfa category.

In this case total revenue by Bravo = Product 14 + Product 19 + Product 20 = 9 + 6 + 2 = 17

Similarly, total revenue by Charlie = Product 15 + Product 16 + Product 17 + Product 18 = 6 + 1 + 1 + 4 = 12

(D) Promising category: We have only 1 direct information regarding Promising category.

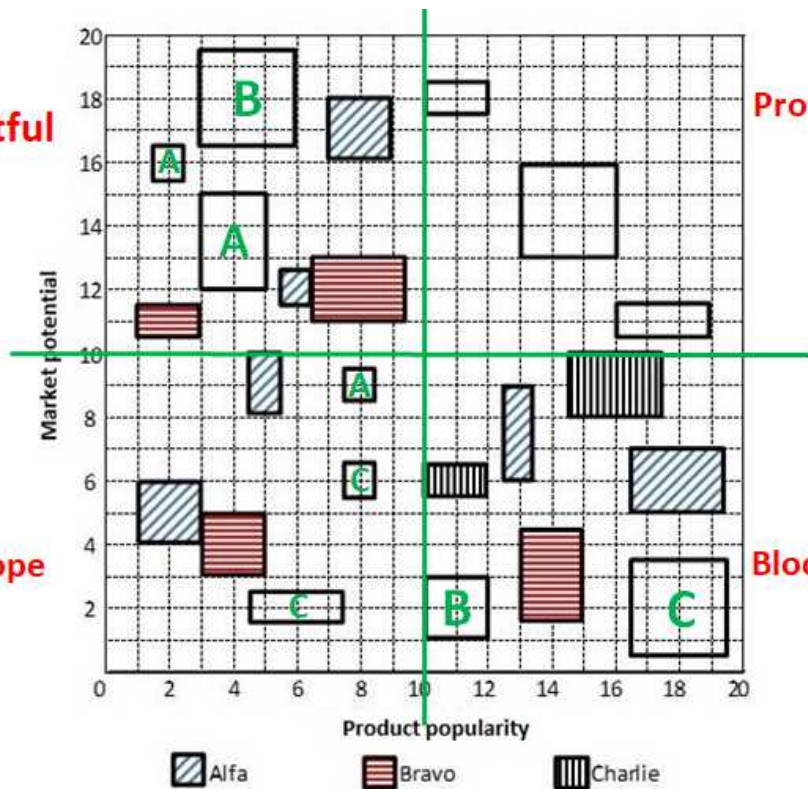
1. Each company had an equal number of products in the Promising category.



There are a total of 3 products in promising category with different revenue. Therefore, we can say that each company had 1 product in promising category. We are given that Alfa and Charlie had the same total revenue considering all products. We can calculate the revenue generated by Alfa and Charlie from the products in categories.

Doubtful

No - hope



Promising

Blockbuster

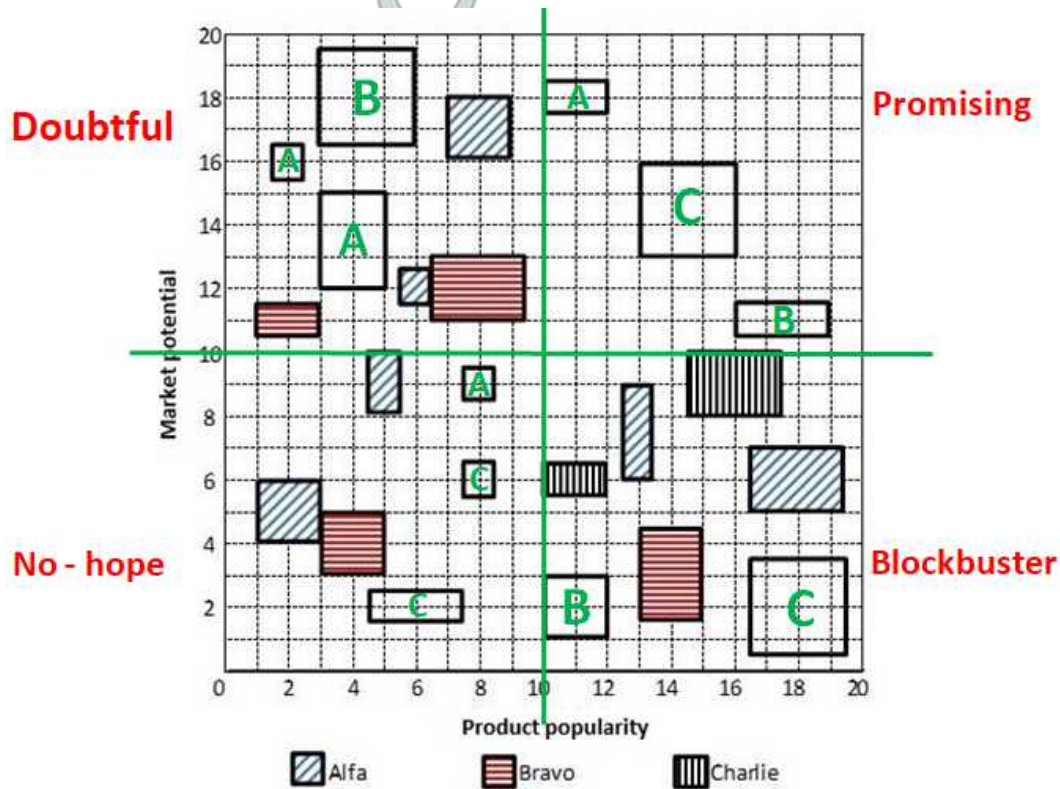
Revenue generated by Charlie from all categories except Promising = From Blockbuster + From No-hope + From Doubtful

$$\Rightarrow (9+6+2) + (3+1) + (0) = 21 \text{ units}$$

Revenue generated by Alfa from all categories except Promising = From Blockbuster + From No-hope + From Doubtful

$$\Rightarrow (6+3) + (4+2+1) + (1+6+4+1) = 28 \text{ units}$$

We can see the difference between revenue generated by Charlie and Alfa from remaining categories is 7 units. Hence, we can say that Charlie's product's revenue should be 7 units more than Alfa's product's revenue in Promising category. That is possible only in one case where product 22 is from Charlie and product 21 is from Alfa. Consequently, we can say that product 23 is from Bravo. Now we have identified each product's company name we can answer all the questions.



Bravo had in No-hope, Doubtful, Promising and Blockbuster categories respectively = 1, 3, 1, 2. Hence, option A is the correct answer.

How to prepare for Logical Reasoning for CAT

Question 57

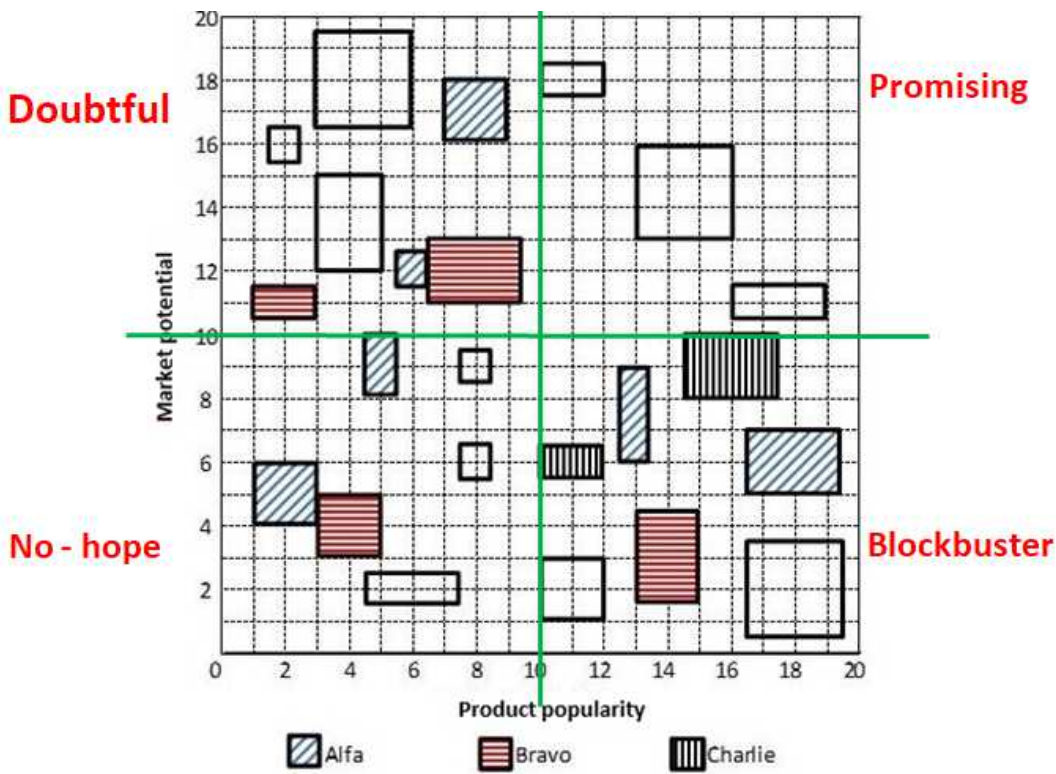
Which of the following statements is NOT correct?

- A Alfa's revenue from Blockbuster products was the same as Charlie's revenue from Promising products
- B Bravo's revenue from Blockbuster products was greater than Alfa's revenue from Doubtful products
- C Bravo and Charlie had the same revenues from No-hope products
- D The total revenue from No-hope products was less than the total revenue from Doubtful products

Answer: B

Explanation:

Let us divide the given figure in four quadrants (Q1, Q2, Q3, Q4).



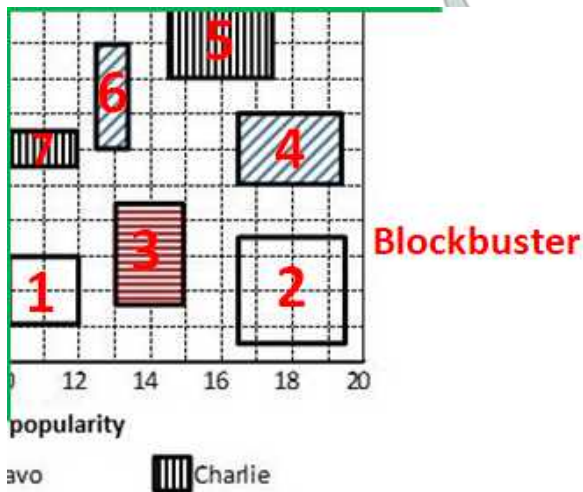
Let us solve this problem by considering only one category at a time.

(A) Blockbuster category: We have two information regarding Blockbuster category.

1. Alfa and Bravo had the same number of products in the Blockbuster category.

There are a total of 7 products in Blockbuster category. Alfa already has two products in blockbuster category. If Alfa has 3 products in blockbuster category then Bravo will also have 3 products in Blockbuster category which is not possible as there are 2 products of Charlie. Hence, we can say that Alfa and Bravo have 2 products each in Blockbuster category whereas Charlie has 3 products in Blockbuster category.

2. It is also given that Charlie had a higher revenue than Bravo from products in the Blockbuster category.



We know that one of the product 1 and 2 is from Charlie and the other is from Bravo.

If product 1 is from Charlie, then we can say that products 1, 7 and 5 are from Charlie. Therefore, revenue generated by products in Charlie category = $2 + 4 + 6 = 12$ units. (Assuming area of a square to be 1 unit)

In this case product 2 and product n are from Bravo. Therefore, revenue generated by products in Bravo category = $6 + 9 = 15$ units.

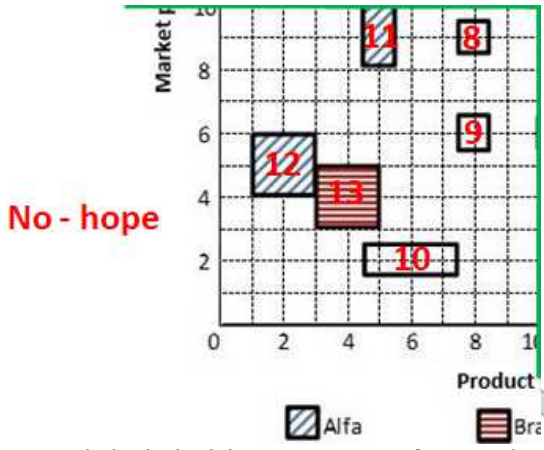
We can see that products from Charlie have a higher revenue than Bravo. Hence, this case is not possible.

Therefore, we can say that Product 1 is from Bravo and Product 2 is from Charlie. We have determined each product's company name in Blockbuster category.

(B) No-hope category: We have two information regarding No-hope category.

(1) Charlie had more products than Bravo but fewer products than Alfa in the No-hope category. Bravo and Charlie had the same revenue from products in the No-hope category. There are a total of 6 products in no-hope category.

Therefore, we can say that Alfa, Charlie and Bravo have 3, 2 and 1 products in No-hope category in that order.



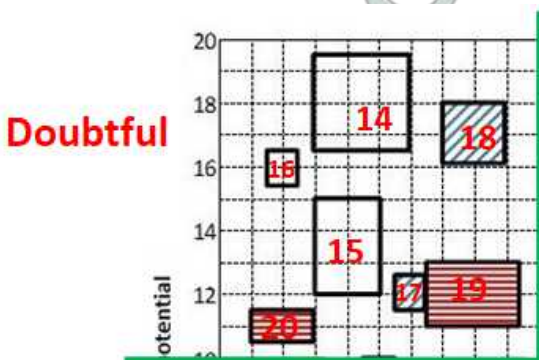
Bravo and Charlie had the same revenue from products in the No-hope category.

Revenue generated for Bravo in the No-hope category = 4 units. We need same revenue for Charlie which has 2 products in this category. Hence, we can say that Product 10 and one of product 8 and 9 is from Charlie and other is from Alfa. Let's assume that product 8 is from Charlie and product 9 is from Alfa.

(C) Doubtful category: We have two information regarding Doubtful category.

- (1). Charlie did not have any product in the Doubtful category, while Alfa had one product more than Bravo in this category .
- (2). Bravo had a higher revenue than Alfa from products in the Doubtful category.

We can see that there are a total of 7 products in this category. Hence, we can say that 4 products are from Alfa and 3 products are from Bravo.



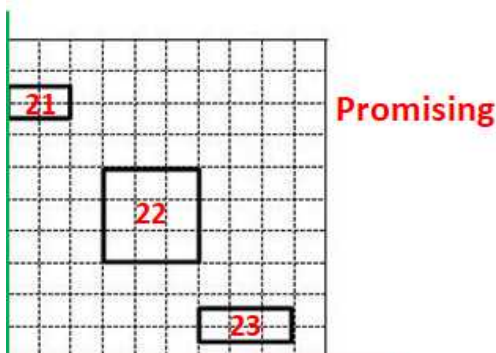
We can see that one of product 14, 15 and 16 is from Bravo company and others are from Alfa company. Bravo will have higher revenue than Alfa only when product no. 14 is from Bravo and others (15 and 16) are from Alfa category.

In this case total revenue by Bravo = Product 14 + Product 19 + Product 20 = 9 + 6 + 2 = 17

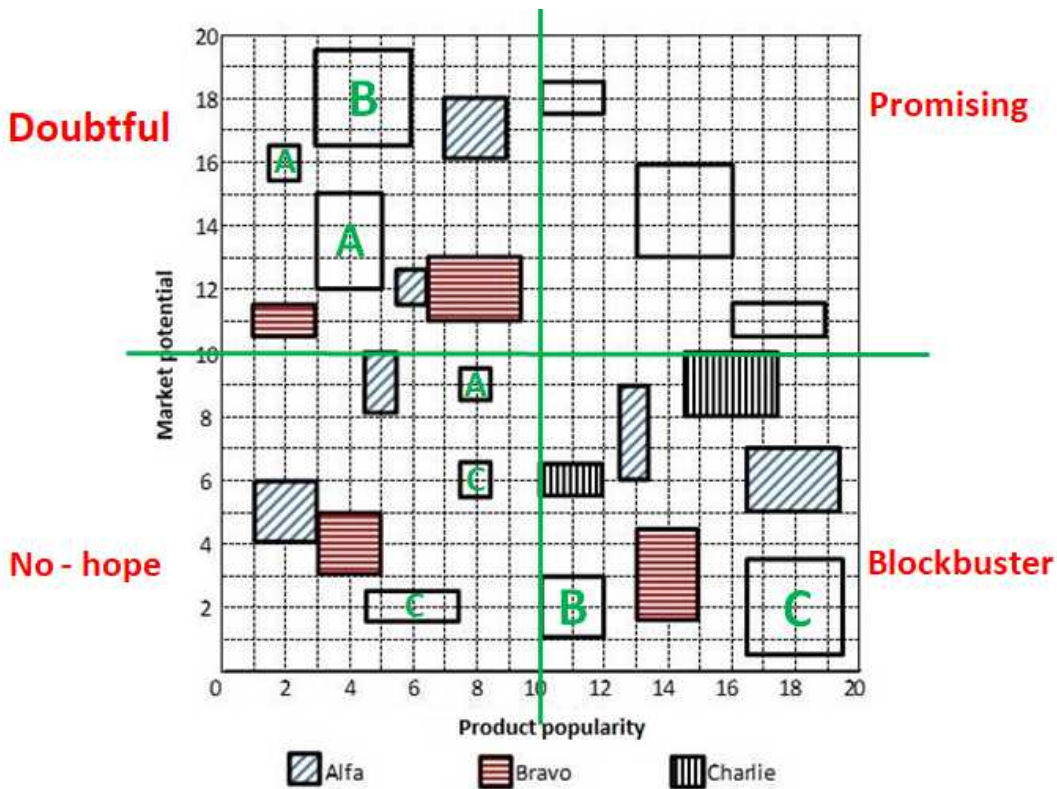
Similarly, total revenue by Charlie = Product 15 + Product 16 + Product 17 + Product 18 = 6 + 1 + 1 + 4 = 12

(D) Promising category: We have only 1 direct information regarding Promising category.

1. Each company had an equal number of products in the Promising category.



There are a total of 3 products in promising category with different revenue. Therefore, we can say that each company had 1 product in promising category. We are given that Alfa and Charlie had the same total revenue considering all products. We can calculate the revenue generated by Alfa and Charlie from the products in categories.



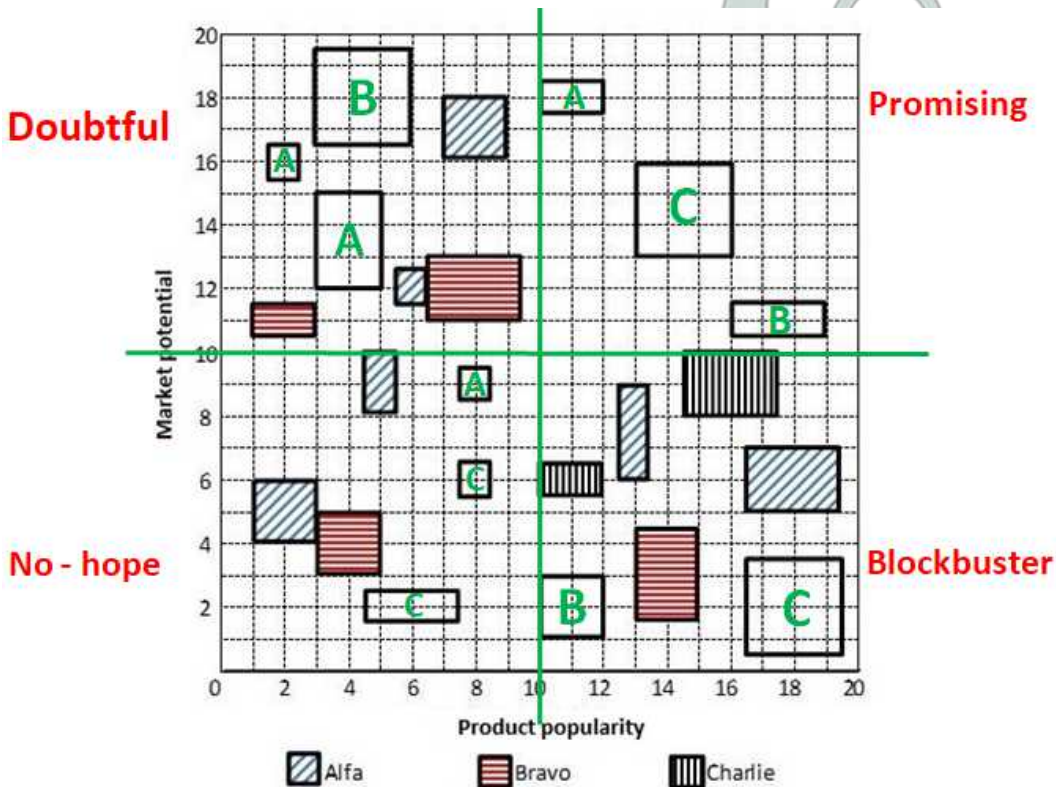
Revenue generated by Charlie from all categories except Promising = From Blockbuster + From No-hope + From Doubtful

$$\Rightarrow (9+6+2) + (3+1) + (0) = 21 \text{ units}$$

Revenue generated by Alfa from all categories except Promising = From Blockbuster + From No-hope + From Doubtful

$$\Rightarrow (6+3) + (4+2+1) + (1+6+4+1) = 28 \text{ units}$$

We can see the difference between revenue generated by Charlie and Alfa from remaining categories is 7 units. Hence, we can say that Charlie's product's revenue should be 7 units more than Alfa's product's revenue in Promising category. That is possible only in one case where product 22 is from Charlie and product 21 is from Alfa. Consequently, we can say that product 23 is from Bravo. Now we have identified each product's company name we can answer all the questions.



Let us check all options.

Option (A): Alfa's revenue from Blockbuster products was the same as Charlie's revenue from Promising products

$$\text{Alfa's revenue from Blockbuster products} = 6 + 3 = 9 \text{ units.}$$

Charlie's revenue from Promising products = 9 units. Hence, this statement is **true**.

Option (B): Bravo's revenue from Blockbuster products was greater than Alfa's revenue from Doubtful products.

Bravo's revenue from Blockbuster products = $6 + 4 = 10$ units.

Alfa's revenue from Doubtful products = $6 + 4 + 1 + 1 = 12$ units. Hence, this statement is **false**.

Option (C): Bravo and Charlie had the same revenues from No-hope products.

Bravo's revenue from No-hope products = 4 units.

Charlie's revenue from No-hope products = $3 + 1 = 4$ units. Hence, this statement is **true**.

Option (D): The total revenue from No-hope products was less than the total revenue from Doubtful products

Revenue generated by the products in Doubtful category = $1 + 9 + 4 + 6 + 2 + 1 + 6 = 29$ units.

Revenue generated by the products in No-hope category = $4 + 4 + 3 + 2 + 1 + 1 = 15$ units. Hence, this statement is **true**.

We can see that statement mentioned in option B is false. Therefore, option B is the correct answer.

Question 58

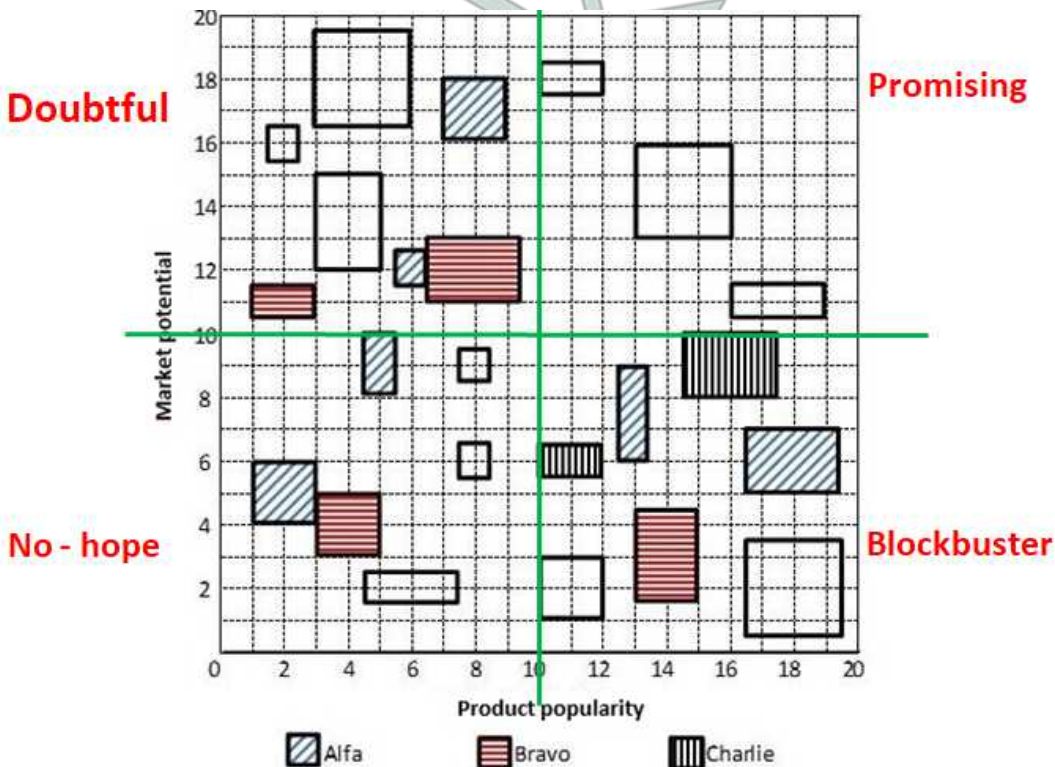
If the smallest box on the grid is equivalent to revenue of Rs.1 crore, then what approximately was the total revenue of Bravo in Rs. crore?

- A 40
- B 24
- C 34
- D 30

Answer: C

Explanation:

Let us divide the given figure in four quadrants (Q1, Q2, Q3, Q4).



Let us solve this problem by considering only one category at a time.

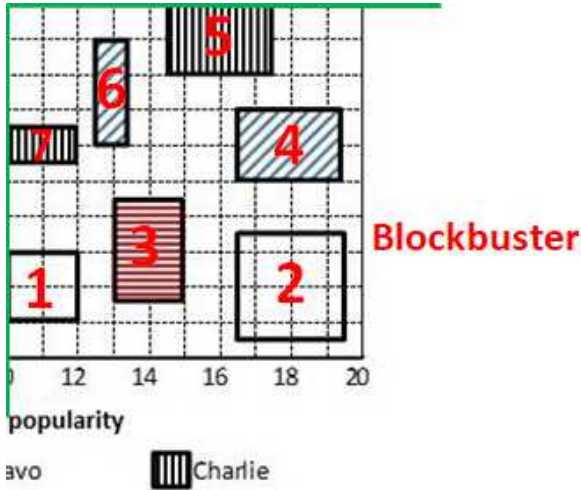
(A) **Blockbuster category:** We have two information regarding Blockbuster category.

1. Alfa and Bravo had the same number of products in the Blockbuster category.

There are a total of 7 products in Blockbuster category. Alfa already has two products in blockbuster category. If Alfa has 3 products in blockbuster category then Bravo will also have 3 products in Blockbuster category which is not possible as there are 2 products of

Charlie. Hence, we can say that Alfa and Bravo have 2 products each in Blockbuster category whereas Charlie has 3 products in Blockbuster category.

2. It is also given that Charlie had a higher revenue than Bravo from products in the Blockbuster category.



We know that one of the product 1 and 2 is from Charlie and the other is from Bravo.

If product 1 is from Charlie, then we can say that products 1, 7 and 5 are from Charlie. Therefore, revenue generated by products in Charlie category = $2 + 4 + 6 = 12$ units. (Assuming area of a square to be 1 unit)

In this case product 2 and product n are from Bravo. Therefore, revenue generated by products in Bravo category = $6 + 9 = 15$ units.

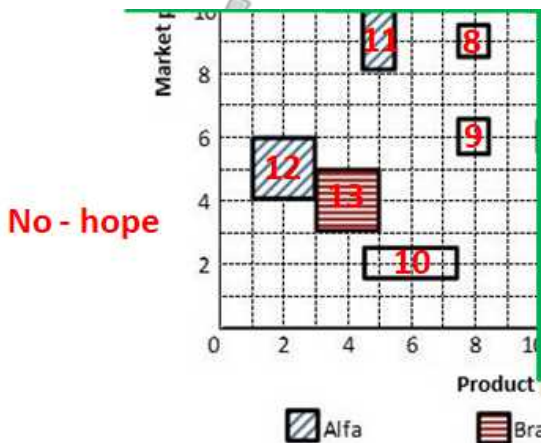
We can see that products from Charlie have a higher revenue than Bravo. Hence, this case is not possible.

Therefore, we can say that Product 1 is from Bravo and Product 2 is from Charlie. We have determined each product's company name in Blockbuster category.

(B) No-hope category: We have two information regarding No-hope category.

(1) Charlie had more products than Bravo but fewer products than Alfa in the No-hope category. Bravo and Charlie had the same revenue from products in the No-hope category. There are a total of 6 products in no-hope category.

Therefore, we can say that Alfa, Charlie and Bravo have 3, 2 and 1 products in No-hope category in that order.



Bravo and Charlie had the same revenue from products in the No-hope category.

Revenue generated for Bravo in the No-hope category = 4 units. We need same revenue for Charlie which has 2 products in this category. Hence, we can say that Product 10 and one of product 8 and 9 is from Charlie and other is from Alfa. Let's assume that product 8 is from Charlie and product 9 is from Alfa.

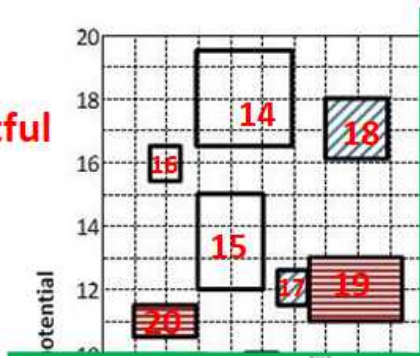
(C) Doubtful category: We have two information regarding Doubtful category.

(1). Charlie did not have any product in the Doubtful category, while Alfa had one product more than Bravo in this category.

(2). Bravo had a higher revenue than Alfa from products in the Doubtful category.

We can see that there are a total of 7 products in this category. Hence, we can say that 4 products are from Alfa and 3 products are from Bravo.

Doubtful



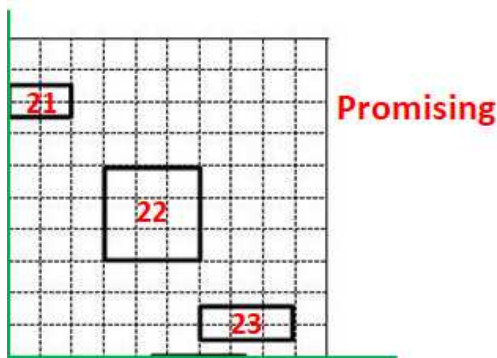
We can see that one of product 14, 15 and 16 is from Bravo company and others are from Alfa company. Bravo will have higher revenue than Alfa only when product no. 14 is from Bravo and others (15 and 16) are from Alfa category.

In this case total revenue by Bravo = Product 14 + Product 19 + Product 20 = 9 + 6 + 2 = 17

Similarly, total revenue by Charlie = Product 15 + Product 16 + Product 17 + Product 18 = 6 + 1 + 1 + 4 = 12

(D) Promising category: We have only 1 direct information regarding Promising category.

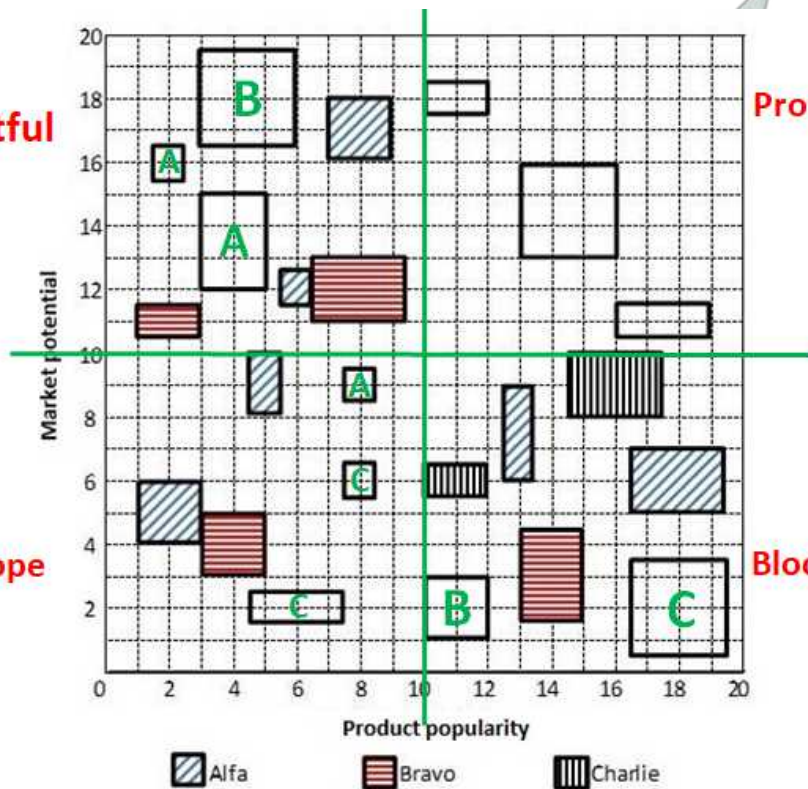
1. Each company had an equal number of products in the Promising category.



There are a total of 3 products in promising category with different revenue. Therefore, we can say that each company had 1 product in promising category. We are given that Alfa and Charlie had the same total revenue considering all products. We can calculate the revenue generated by Alfa and Charlie from the products in categories.

Doubtful

No - hope



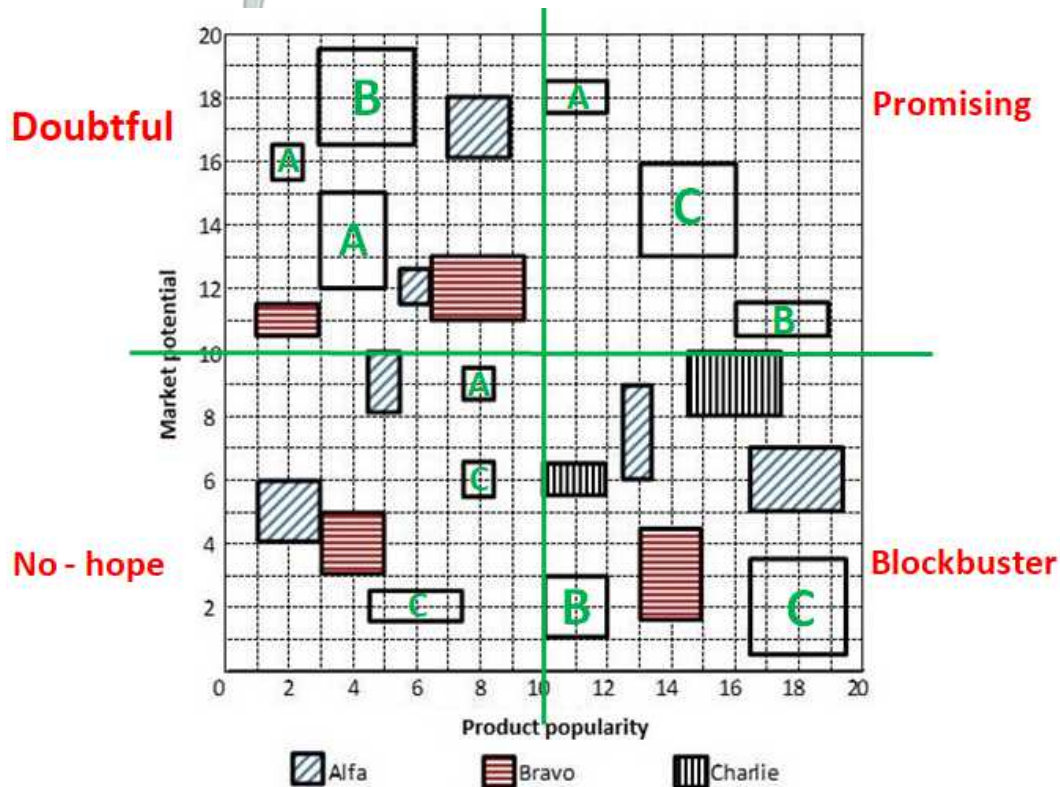
Revenue generated by Charlie from all categories except Promising = From Blockbuster + From No-hope + From Doubtful

$$\Rightarrow (9+6+2) + (3+1) + (0) = 21 \text{ units}$$

Revenue generated by Alfa from all categories except Promising = From Blockbuster + From No-hope + From Doubtful

$$\Rightarrow (6+3) + (4+2+1) + (1+6+4+1) = 28 \text{ units}$$

We can see the difference between revenue generated by Charlie and Alfa from remaining categories is 7 units. Hence, we can say that Charlie's product's revenue should be 7 units more than Alfa's product's revenue in Promising category. That is possible only in one case where product 22 is from Charlie and product 21 is from Alfa. Consequently, we can say that product 23 is from Bravo. Now we have identified each product's company name we can answer all the questions.



Total revenue generated by Bravo products alone = From Blockbuster + From No-hope + From Doubtful + From Promising

$$\Rightarrow (6+4) + (4) + (9+6+2) + (3) = 34 \text{ units}$$

One box is equivalent to Rs. 1 crore therefore, we can say that total revenue generated by Bravo = Rs. 34 crores. Hence, option C is the correct answer.

Instructions

Seven candidates, Akil, Balaram, Chitra, Divya, Erina, Fatima, and Ganeshan, were invited to interview for a position. Candidates were required to reach the venue before 8 am. Immediately upon arrival, they were sent to one of three interview rooms: 101, 102, and 103. The following venue log shows the arrival times for these candidates. Some of the names have not been recorded in the log and have been marked as '?'.

Time	7:10 AM	7:15 AM	7:25 AM	7:30 AM	7:40 AM	7:45 AM
Person	Akil, ?	?	?	Chitra	Fatima	?

Additionally here are some statements from the candidates:

Balaram: I was the third person to enter Room 101.

Chitra: I was the last person to enter the room I was allotted to.

Erina: I was the only person in the room I was allotted to.

Fatima: Three people including Akhil were already in the room that I was allotted to when I entered it.

Ganeshan : I was one among the two candidates allotted to Room 102.

Question 59

What best can be said about the room to which Divya was allotted?

- A Definitely Room 101
- B Definitely Room 103
- C Definitely Room 102

D Either Room 101 or Room 102

Answer: A

Explanation:

It is given that there were a total of 3 rooms and seven candidates. Ganeshan said that he was one among the two candidates allotted to Room 102 whereas Erina said that she is the only person in the room she was allotted to. Therefore, we can say that there were 1 and 4 candidates in either 101 or 103 room. But it is given that Balaram was the third person to enter in the Room 101 therefore we can say that there were 4 candidates in Room 101 and only 1 candidate in room 103.

Room no.	Candidates	Name
101	4	
102	2	
103	1	

Fatima said that three people including Akhil were already in the room that I was allotted to when I entered it. Hence, we can say that Fatima was the last person to enter in 101 and Akhil is the first person who entered in room 101.

Chitra said that she was the last person to enter the room she was allotted to. Hence, we can say that Chitra was allotted room no 102 and she entered after Ganeshan.

Erina was the only person in room no 103.

Room no.	Candidates	Name (In sequential order)
101	4	Akhil, _____, _____, Fatima
102	2	Ganeshan, Chitra
103	1	Erina

Balaram said he was third to enter room no 101. Hence, we can say that Divya was second person who entered in room 101.

Since Chitra and Fatima were already in by 7:40 AM we can say that the candidate who entered at 7:45 am is Erina.

Room no.	Candidates	Name (In sequential order)
101	4	Akhil(7:10), Divya, Balaram, Fatima(7:40)
102	2	Ganeshan, Chitra(7:30)
103	1	Erina(7:45)

From the table we can see that Divya was allotted room no 101. Hence, option A is the correct answer.

How to prepare for Quantitative aptitude for CAT

Question 60

Who else was in Room 102 when Ganeshan entered?

- A Akil
- B Divya
- C Chitra
- D No one

Answer: D

Explanation:

It is given that there were a total of 3 rooms and seven candidates. Ganeshan said that he was one among the two candidates allotted to Room 102 whereas Erina said that she is the only person in the room she was allotted to. Therefore, we can say that there were 1 and 4 candidates in either 101 or 103 room. But it is given that Balaram was the third person to enter in the Room 101 therefore we can say that there were 4 candidates in Room 101 and only 1 candidate in room 103.

Room no.	Candidates	Name
101	4	
102	2	
103	1	

Fatima said that three people including Akhil were already in the room that I was allotted to when I entered it. Hence, we can say that

Fatima was the last person to enter in 101 and Akhil is the first person who entered in room 101.

Chitra said that she was the last person to enter the room she was allotted to. Hence, we can say that Chitra was allotted room no 102 and she entered after Ganeshan.

Erina was the only person in room no 103.

Room no.	Candidates	Name (In sequential order)
101	4	Akhil, _____, _____, Fatima
102	2	Ganeshan, Chitra
103	1	Erina

Balaram said he was third to enter room no 101. Hence, we can say that Divya was second person who entered in room 101.

Since Chitra and Fatima were already in by 7:40 AM we can say that the candidate who entered at 7:45 am is Erina.

Room no.	Candidates	Name (In sequential order)
101	4	Akhil(7:10), Divya, Balaram, Fatima(7:40)
102	2	Ganeshan, Chitra(7:30)
103	1	Erina(7:45)

From the table we can see that Ganeshan is the first person to enter in room 102. Hence, option D is the correct answer.

Question 61

When did Erina reach the venue?

A 7:45 am

B 7:25 am

C 7:15 am

D 7:10 am

Answer: A

Explanation:

It is given that there were a total of 3 rooms and seven candidates. Ganeshan said that he was one among the two candidates allotted to Room 102 whereas Erina said that she is the only person in the room she was allotted to. Therefore, we can say that there were 1 and 4 candidates in either 101 or 103 room. But it is given that Balaram was the third person to enter in the Room 101 therefore we can say that there were 4 candidates in Room 101 and only 1 candidate in room 103.

Room no.	Candidates	Name
101	4	
102	2	
103	1	

Fatima said that three people including Akhil were already in the room that I was allotted to when I entered it. Hence, we can say that Fatima was the last person to enter in 101 and Akhil is the first person who entered in room 101.

Chitra said that she was the last person to enter the room she was allotted to. Hence, we can say that Chitra was allotted room no 102 and she entered after Ganeshan.

Erina was the only person in room no 103.

Room no.	Candidates	Name (In sequential order)
101	4	Akhil, _____, _____, Fatima
102	2	Ganeshan, Chitra
103	1	Erina

Balaram said he was third to enter room no 101. Hence, we can say that Divya was second person who entered in room 101.

Since Chitra and Fatima were already in by 7:40 AM we can say that the candidate who entered at 7:45 am is Erina.

Room no.	Candidates	Name (In sequential order)
101	4	Akhil(7:10), Divya, Balaram, Fatima(7:40)
102	2	Ganeshan, Chitra(7:30)
103	1	Erina(7:45)

From the table we can see that Erina reached the venue at 7:45 am. Hence, option A is the correct answer.

Question 62

If Ganeshan entered the venue before Divya, when did Balaram enter the venue?

- A 7:25 am
- B 7:10 am
- C 7:15 am
- D 7:45 am

Answer: A

Explanation:

It is given that there were a total of 3 rooms and seven candidates. Ganeshan said that he was one among the two candidates allotted to Room 102 whereas Erina said that she is the only person in the room she was allotted to. Therefore, we can say that there were 1 and 4 candidates in either 101 or 103 room. But it is given that Balaram was the third person to enter in the Room 101 therefore we can say that there were 4 candidates in Room 101 and only 1 candidate in room 103.

Room no.	Candidates	Name
101	4	
102	2	
103	1	

Fatima said that three people including Akhil were already in the room that I was allotted to when I entered it. Hence, we can say that Fatima was the last person to enter in 101 and Akhil is the first person who entered in room 101.

Chitra said that she was the last person to enter the room she was allotted to. Hence, we can say that Chitra was allotted room no 102 and she entered after Ganeshan.

Erina was the only person in room no 103.

Room no.	Candidates	Name (In sequential order)
101	4	Akhil, _____, _____, Fatima
102	2	Ganeshan, Chitra
103	1	Erina

Balaram said he was third to enter room no 101. Hence, we can say that Divya was second person who entered in room 101.

Since Chitra and Fatima were already in by 7:40 AM we can say that the candidate who entered at 7:45 am is Erina.

Room no.	Candidates	Name (In sequential order)
101	4	Akhil(7:10), Divya, Balaram, Fatima(7:40)
102	2	Ganeshan, Chitra(7:30)
103	1	Erina(7:45)

In the question it is given that Ganeshan entered the venue before Divya. Therefore, we can say that Ganesh must have entered with Akhil at 7:10 am. In that case, Divya and Balaram must have entered at 7:15 am and 7:25 am respectively. Hence, option A is the correct answer.

How to prepare for Logical Reasoning for CAT

Instructions

There are only four brands of entry level smartphones called Azra, Bysi, Cxqi, and Dipq in a country.

Details about their market share, unit selling price, and profitability (defined as the profit as a percentage of the revenue) for the year 2016 are given in the table below:

Brand	Market Share (%)	Unit Selling Price (Rs.)	Profitability (%)
Azra	40	15,000	10
Bysi	25	20,000	30
Cxqi	15	30,000	40
Dipq	20	25,000	30

In 2017, sales volume of entry level smartphones grew by 40% as compared to that in 2016. Cxqi offered a 40% discount on its unit selling price in 2017, which resulted in a 15% increase in its market share. Each of the other three brands lost 5% market share. However, the profitability of Cxqi came down to half of its value in 2016. The unit selling prices of the other three brands and their profitability values remained the same in 2017 as they were in 2016.

Question 63

The brand that had the highest revenue in 2016 is:

- A Cxqi
- B Bysi
- C Azra
- D Dipq

Answer: C

Explanation:

Let '100x' be the number of smartphones sold in year 2016.

Total revenue generated by Azra = $40x \times 15000 = \text{Rs. } 600000x$

Total revenue generated by Bysi = $25x \times 20000 = \text{Rs. } 500000x$

Total revenue generated by Cxqi = $15x \times 30000 = \text{Rs. } 450000x$

Total revenue generated by Dipq = $20x \times 25000 = \text{Rs. } 500000x$

We can see that revenue generated by Azra is the highest among all four brands. Hence, option C is the correct answer.

Question 64

The brand that had the highest profit in 2016 is:

- A Bysi
- B Dipq
- C Cxqi
- D Azra

Answer: C

Explanation:

Let '100x' be the number of smartphones sold in year 2016.

Total revenue generated by Azra = $40x \times 15000 = \text{Rs. } 600000x$

10

Profitability is defined as the profit as a percentage of the revenue. Therefore, profit generated by Azra = $100 \times 600000x = \text{Rs. } 600000x$

Total revenue generated by Bysi = $25x \times 20000 = \text{Rs. } 500000x$

30

Profit generated by Bysi = $100 \times 500000x = \text{Rs. } 150000x$

Total revenue generated by Cxqi = $15x \times 30000 = \text{Rs. } 450000x$

40

Profit generated by Cxqi = $100 \times 450000x = \text{Rs. } 180000x$

Total revenue generated by Dipq = $20x \times 25000 = \text{Rs. } 500000x$

30

Profit generated by Dipq = $100 \times 500000x = \text{Rs. } 150000x$

We can see that profit generated by Cxqi is the highest among all four brands. Hence, option C is the correct answer.

Question 65

The brand that had the highest profit in 2017 is:

- A Bysi
- B Azra
- C Cxqi
- D Dipq

Answer: A

Explanation:

Let '100x' be the number of smartphones in year 2016. Then the number of smartphones sold in 2017 = $1.4 \times 100x = 140x$

It is given that Cxqi offered a 40% discount on its unit selling price in 2017 i.e. selling price in 2017 = $0.6 \times 30000 = \text{Rs. } 18000$

Also Cxqi's market share increased by 15% whereas the other three brands lost 5% market share.

Brand	Market Share (%)	No of units	Unit Selling Price (Rs.)	Profitability(%)
Azra	35	49x	15,000	10
Bysi	20	28x	20,000	30
Cxqi	30	42x	18,000	20
Dipq	15	21x	25,000	30

Amount of profit generated by Azra = $100 \times 15000 \times 49x = 735000x$

30

Amount of profit generated by Bysi = $100 \times 20000 \times 28x = 1680000x$

20

Amount of profit generated by Cxqi = $100 \times 18000 \times 42x = 1512000x$

30

Amount of profit generated by Dipq = $100 \times 25000 \times 21x = 1575000x$

We can see that brand Bysi generated maximum profit in year 2017. Hence, option A is the correct answer.

Data Interpretation for CAT Questions (download pdf)

Question 66

The complete list of brands whose profits went up in 2017 from 2016 is:

- A Azra, Bysi, Dipq
- B Cxqi, Azra, Dipq
- C Azra, Bysi, Cxqi
- D Bysi, Cxqi, Dipq

Answer: A

Explanation:

Let '100x' be the number of smartphones sold in year 2016.

Total revenue generated by Azra = $40x \times 15000 = \text{Rs. } 600000x$

Profitability is defined as the profit as a percentage of the revenue. Therefore, profit generated by Azra = $100 * 600000x = \text{Rs. } 600000x$

Total revenue generated by Bysi = $25x * 20000 = \text{Rs. } 500000x$
30

Profit generated by Bysi = $100 * 500000x = \text{Rs. } 1500000x$

Total revenue generated by Cxqi = $15x * 30000 = \text{Rs. } 450000x$
40

Profit generated by Cxqi = $100 * 450000x = \text{Rs. } 1800000x$

Total revenue generated by Dipq = $20x * 25000 = \text{Rs. } 500000x$
30

Profit generated by Dipq = $100 * 500000x = \text{Rs. } 1500000x$

It is given that the market sales increased by 40%. Therefore, the number of smartphones sold in 2017 = $1.4 * 100x = 140x$

It is given that Cxqi offered a 40% discount on its unit selling price in 2017 i.e. selling price in 2017 = $0.6 * 30000 = \text{Rs. } 18000$

Also Cxqi's market share increased by 15% whereas the other three brands lost 5% market share.

Brand	Market Share (%)	No of units	Unit Selling Price (Rs.)	Profitability(%)
Azra	35	49x	15,000	10
Bysi	20	28x	20,000	30
Cxqi	30	42x	18,000	20
Dipq	15	21x	25,000	30

Amount of profit generated by Azra = $100 * 15000 * 49x = 735000x$

Amount of profit generated by Bysi = $100 * 20000 * 28x = 1680000x$

Amount of profit generated by Cxqi = $100 * 18000 * 42x = 1512000x$

Amount of profit generated by Dipq = $100 * 25000 * 21x = 1575000x$

We can see that profit of brands Azra, Bysi and Dipq increased in the year 2017 as compared to 2016. Hence, option A is the correct answer.

Logical Reasoning for CAT Questions (download pdf)

Quantitative Aptitude

Instructions

For the following questions answer them individually

Question 67

A water tank has inlets of two types A and B. All inlets of type A when open, bring in water at the same rate. All inlets of type B, when open, bring in water at the same rate. The empty tank is completely filled in 30 minutes if 10 inlets of type A and 45 inlets of type B are open, and in 1 hour if 8 inlets of type A and 18 inlets of type B are open. In how many minutes will the empty tank get completely filled if 7 inlets of type A and 27 inlets of type B are open?

Answer:48

Explanation:

Let the efficiency of type A pipe be 'a' and the efficiency of type B be 'b'.
In the first case, 10 type A and 45 type B pipes fill the tank in 30 mins.

So, the capacity of the tank = $2(10a + 45b) \dots \dots (i)$

In the second case, 8 type A and 18 type B pipes fill the tank in 1 hour.

So, the capacity of the tank = $(8a + 18b) \dots \dots (ii)$

Equating (i) and (ii), we get

$$10a + 45b = 16a + 36b$$

$$\Rightarrow 6a = 9b$$

From (ii), capacity of the tank = $(8a + 18b) = (8a + 12a) = 20a$

In the third case, 7 type A and 27 type B pipes fill the tank.

$$\text{Net efficiency} = \frac{(7a + 27b)}{20a} = \frac{(7a + 18a)}{20a} = 25a$$

Time taken = $\frac{20a}{25a}$ hour = 48 minutes.

Hence, 48 is the correct answer.

Quantitative Aptitude for CAT Questions (download pdf)

Question 68

Let $f(x) = \max(5x, 52 - 2x^2)$, where x is any positive real number. Then the minimum possible value of $f(x)$

Answer: 20

Explanation:

The minimum value of the function will occur when the expressions inside the function are equal.

$$\text{So, } 5x = 52 - 2x^2$$

$$\text{or, } 2x^2 + 5x - 52 = 0$$

$$13$$

On solving, we get $x = 4$ or -2

But, it is given that x is a positive number.

$$\text{So, } x = 4$$

$$\text{And the minimum value} = 5 \cdot 4 = 20$$

Hence, 20 is the correct answer.

Question 69

Points A, P, Q and B lie on the same line such that P, Q and B are, respectively, 100 km, 200 km and 300 km away from A. Cars 1 and 2 leave A at the same time and move towards B. Simultaneously, car 3 leaves B and moves towards A. Car 3 meets car 1 at Q, and car 2 at P. If each car is moving in uniform speed then the ratio of the speed of car 2 to that of car 1 is

A 2 : 7

B 2 : 9

C 1 : 2

D 1 : 4

Answer: D

Explanation:

Car 3 meets car 1 at Q, which is 200 km from A.

Therefore, at the time of their meeting car 1 must have travelled 200 km and car 3 must have travelled 100 km.

As the time is same, ratio of speed of car 1 to speed of car 3 = 2 : 1.

Car 3 meets car 2 at P, which is 100 km from A.

Therefore, at the time of their meeting car 2 must have travelled 100 km and car 3 must have travelled 200 km.

As the time is same, ratio of speed of car 2 to speed of car 3 = 1 : 2.

$$\text{Speed of car 1 : speed of car 3} = 2 : 1$$

$$\text{And speed of car 2 : speed of car 3} = 1 : 2$$

$$\text{So, speed of car 1 : speed of car 2 : speed of car 3} = 4 : 1 : 2$$

Hence, option D is the correct answer.

Question 70

The smallest integer n such that $n^3 - 11n^2 + 32n - 28 > 0$ is

Answer:8

Explanation:

We can see that at $n = 2$, $n^3 - 11n^2 + 32n - 28 = 0$ i.e. $(n-2)$ is a factor of $n^3 - 11n^2 + 32n - 28$

$$\begin{aligned} n^3 - 11n^2 + 32n - 28 \\ n - 2 &= n^2 - 9n + 14 \end{aligned}$$

We can further factorize $n^2 - 9n + 14$ as $(n-2)(n-7)$.

$$n^3 - 11n^2 + 32n - 28 = (n - 2)^2(n - 7)$$

$$\Rightarrow n^3 - 11n^2 + 32n - 28 > 0$$

$$\Rightarrow (n - 2)^2(n - 7) > 0$$

Therefore, we can say that $n-7 > 0$

Hence, $n_{min} = 8$

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Question 71

The scores of Amal and Bimal in an examination are in the ratio 11 : 14. After an appeal, their scores increase by the same amount and their new scores are in the ratio 47 : 56. The ratio of Bimal's new score to that of his original score is

A 4 : 3

B 8 : 5

C 5 : 4

D 3 : 2

Answer: A

Explanation:

Let the score of Amal and Bimal be $11k$ and $14k$

Let the scores be increased by x

So, after increment, Amal's score = $11k + x$ and Bimal's score = $14k + x$

According to the question,

$$11k + x = 47$$

$$14k + x = 56$$

$$42$$

On solving, we get $x = 9k$

Ratio of Bimal's new score to his original score

$$\begin{aligned} &= \frac{14k + x}{14k} \end{aligned}$$

$$= \frac{14k + 9k}{14k}$$

$$= \frac{23k}{14k}$$

$$= \frac{23}{14}$$

$$= 1\frac{9}{14}$$

$$= 1\frac{9}{14}$$

$$= 1\frac{9}{14}$$

Hence, option A is the correct answer.

Question 72

How many two-digit numbers, with a non-zero digit in the units place, are there which are more than thrice the number formed by interchanging the positions of its digits?

Answer:6

Explanation:

Let 'ab' be the two digit number. Where $b \neq 0$.

We will get number 'ba' after interchanging its digit.

It is given that $10a+b > 3*(10b + a)$

$$7a > 29b$$

If $b = 1$, then $a = \{5, 6, 7, 8, 9\}$

If $b = 2$, then $a = \{9\}$

If $b = 3$, then no value of 'a' is possible. Hence, we can say that there are a total of 6 such numbers.

Question 73

For two sets A and B, let $A\Delta B$ denote the set of elements which belong to A or B but not both. If $P = \{1,2,3,4\}$, $Q = \{2,3,5,6\}$, $R = \{1,3,7,8,9\}$, $S = \{2,4,9,10\}$, then the number of elements in $(P\Delta Q)\Delta(R\Delta S)$ is

Answer:7

Explanation:

$P = \{1,2,3,4\}$ and $Q = \{2,3,5,6\}$

$P\Delta Q = \{1, 4, 5, 6\}$

$R = \{1,3,7,8,9\}$ and $S = \{2,4,9,10\}$

$R\Delta S = \{1, 2, 3, 4, 7, 8, 10\}$

$(P\Delta Q)\Delta(R\Delta S) = \{2, 3, 5, 6, 7, 8, 10\}$

Thus, there are 7 elements in $(P\Delta Q)\Delta(R\Delta S)$.

hence, 7 is the correct answer.

IIFT previous papers (download pdf)

Question 74

A parallelogram ABCD has area 48 sqcm. If the length of CD is 8 cm and that of AD is s cm, then which one of the following is necessarily true?

A $s \neq 6$

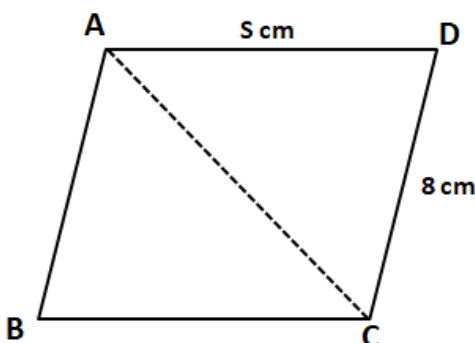
B $s \geq 6$

C $5 \leq s \leq 7$

D $s \leq 6$

Answer: B

Explanation:



We can see that area of parallelogram ABCD = 2*Area of triangle ACD

$$48 = 2*\text{Area of triangle ACD}$$

Area of triangle ACD = 24

$$(1/2) * CD * DA * \sin ADC = 24$$

$$AD * \sin ADC = 6$$

We know that $\sin \theta \leq 1$, Hence, we can say that $AD \geq 6$

$$\Rightarrow s \geq 6$$

Question 75

A 20% ethanol solution is mixed with another ethanol solution, say, S of unknown concentration in the proportion 1:3 by volume. This mixture is then mixed with an equal volume of 20% ethanol solution. If the resultant mixture is a 31.25% ethanol solution, then the unknown concentration of S is

A 30%

B 40%

C 50%

D 60%

Answer: C

Explanation:

Let the volume of the first and the second solution be 100 and 300.

When they are mixed, quantity of ethanol in the mixture

$$= (20 + 300S)$$

Let this solution be mixed with equal volume i.e. 400 of third solution in which the strength of ethanol is 20%.

So, the quantity of ethanol in the final solution

$$= (20 + 300S + 80) = (300S + 100)$$

It is given that, 31.25% of 800 = (300S + 100)

$$\text{or, } 300S + 100 = 250$$

$$\text{or } S = \frac{1}{2} = 50\%$$

Hence, 50 is the correct answer.

Question 76

In a tournament, there are 43 junior level and 51 senior level participants. Each pair of juniors play one match. Each pair of seniors play one match. There is no junior versus senior match. The number of girl versus girl matches in junior level is 153, while the number of boy versus boy matches in senior level is 276. The number of matches a boy plays against a girl is

Answer: 1098

Explanation:

In a tournament, there are 43 junior level and 51 senior level participants.

Let 'n' be the number of girls on junior level. It is given that the number of girl versus girl matches in junior level is 153.

$$\Rightarrow nC_2 = 153$$

$$\Rightarrow \frac{n(n-1)}{2} = 153$$

$$\Rightarrow n(n-1) = 306$$

$$\Rightarrow n^2 - n - 306 = 0$$

$$\Rightarrow (n+17)(n-18) = 0$$

$$\Rightarrow n = 18 \text{ (rejecting } n = -17)$$

Therefore, number of boys on junior level = 43 - 18 = 25.

Let 'm' be the number of boys on senior level. It is given that the number of boy versus boy matches in senior level is 276.

$$\Rightarrow mC_2 = 276$$

$$\Rightarrow m = 24$$

Therefore, number of girls on senior level = $51 - 24 = 27$.

Hence, the number of matches a boy plays against a girl = $18 \cdot 25 + 24 \cdot 27 = 1098$

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Question 77

A chord of length 5 cm subtends an angle of 60° at the centre of a circle. The length, in cm, of a chord that subtends an angle of 120° at the centre of the same circle is

A $5\sqrt{3}$

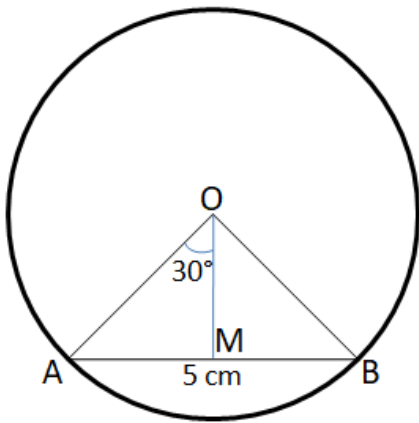
B 2π

C 8

D $6\sqrt{2}$

Answer: A

Explanation:



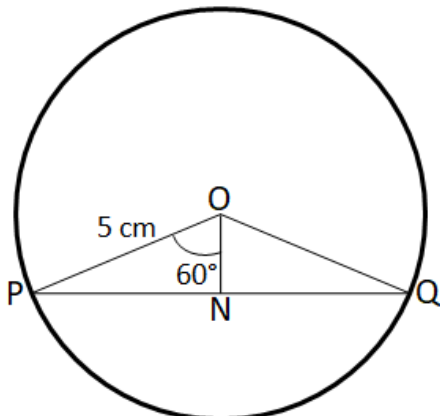
We are given that $AB = 5$ cm and $\angle AOB = 60^\circ$

Let us draw OM such that $OM \perp AB$.

In right angle triangle AMO ,

$$\sin 30^\circ = \frac{AM}{AO}$$

$\Rightarrow AO = 2 \cdot AM = 2 \cdot 2.5 = 5$ cm. Therefore, we can say that the radius of the circle = 5 cm.



In right angle triangle PNO ,

$$\sin 60^\circ = \frac{PN}{PO}$$

$$\Rightarrow PN = \frac{\sqrt{3}}{2} \cdot PO = \frac{\sqrt{3}}{2} \cdot 2 = \sqrt{3}$$

$$\text{Therefore, } PQ = 2 \cdot PN = 2\sqrt{3} \text{ cm}$$

Question 78

Let a_1, a_2, \dots, a_{52} be positive integers such that $a_1 < a_2 < \dots < a_{52}$. Suppose, their arithmetic mean is one less than arithmetic mean of a_2, a_3, \dots, a_{52} . If $a_{52} = 100$, then the largest possible value of a_1 is

- A 48
- B 20
- C 23
- D 45

Answer: C

Explanation:

Let 'x' be the average of all 52 positive integers a_1, a_2, \dots, a_{52} .

$$a_1 + a_2 + a_3 + \dots + a_{52} = 52x \quad (1)$$

Therefore, average of $a_2, a_3, \dots, a_{52} = x+1$

$$a_2 + a_3 + a_4 + \dots + a_{52} = 51(x+1) \quad (2)$$

From equation (1) and (2), we can say that

$$a_1 + 51(x+1) = 52x$$

$$a_1 = x - 51.$$

We have to find out the largest possible value of a_1 . a_1 will be maximum when 'x' is maximum.

$(x+1)$ is the average of terms a_2, a_3, \dots, a_{52} . We know that $a_2 < a_3 < \dots < a_{52}$ and $a_{52} = 100$.

Therefore, $(x+1)$ will be maximum when each term is maximum possible. If $a_{52} = 100$, then $a_{51} = 99, a_{50} = 98$ ends so on.

$$a_2 = 100 + (51-1) \cdot (-1) = 50.$$

$$\text{Hence, } a_2 + a_3 + a_4 + \dots + a_{52} = 50 + 51 + \dots + 99 + 100 = 51(x+1)$$

$$\Rightarrow \frac{51 \cdot (50 + 100)}{2} = 51(x+1)$$

$$\Rightarrow x = 74$$

Therefore, the largest possible value of $a_1 = x - 51 = 74 - 51 = 23$.

Question 79

The value of the sum $7 \times 11 + 11 \times 15 + 15 \times 19 + \dots + 95 \times 99$ is

Answer: 80707

Explanation:

$$S = 7 \times 11 + 11 \times 15 + 15 \times 19 + \dots + 95 \times 99$$

Nth term of the series can be written as $T_n = (4n + 3) \cdot (4n + 7)$

Last term, $(4n+3) = 95$ i.e. $n = 23$

$$\sum_{n=1}^{n=23} (4n + 3) \cdot (4n + 7)$$

$$\Rightarrow \sum_{n=1}^{n=23} 16n^2 + 40n + 21$$

$$\Rightarrow 16 * \frac{23 * 24 * 47}{6} + 40 * \frac{23 * 24}{2} + 21 * 23$$

$$\Rightarrow 80707$$

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Question 80

If N and x are positive integers such that $N^N = 2^{160}$ and $N^2 + 2^N$ is an integral multiple of 2^x , then the largest possible x is

Answer:10

Explanation:

It is given that $N^N = 2^{160}$

We can rewrite the equation as $N^N = (2^5)^{160/5} = 32^{32}$

$$\Rightarrow N = 32$$

$$N^2 + 2^N = 32^2 + 2^{32} = 2^{10} + 2^{32} = 2^{10} * (1 + 2^{22})$$

Hence, we can say that $N^2 + 2^N$ can be divided by 2^{10}

Therefore, $x_{max} = 10$

Question 81

A tank is emptied everyday at a fixed time point. Immediately thereafter, either pump A or pump B or both start working until the tank is full. On Monday, A alone completed filling the tank at 8 pm. On Tuesday, B alone completed filling the tank at 6 pm. On Wednesday, A alone worked till 5 pm, and then B worked alone from 5 pm to 7 pm, to fill the tank. At what time was the tank filled on Thursday if both pumps were used simultaneously all along?

A 4:48 pm

B 4:12 pm

C 4:24 pm

D 4:36 pm

Answer: C

Explanation:

Let 't' pm be the time when the tank is emptied everyday. Let 'a' and 'b' be the liters/hr filled by pump A and pump B respectively.

On Monday, A alone completed filling the tank at 8 pm. Therefore, we can say that pump A worked for (8 - t) hours. Hence, the volume of the tank = a*(8 - t) liters.

Similarly, on Tuesday, B alone completed filling the tank at 6 pm. Therefore, we can say that pump B worked for (6 - t) hours. Hence, the volume of the tank = b*(6 - t) liters.

On Wednesday, A alone worked till 5 pm, and then B worked alone from 5 pm to 7 pm, to fill the tank. Therefore, we can say that pump A worked for (5 - t) hours and pump B worked for 2 hours. Hence, the volume of the tank = a*(5 - t) + 2b liters.

We can say that $a*(8 - t) = b*(6 - t) = a*(5 - t) + 2b$

$$a*(8 - t) = a*(5 - t) + 2b$$

$$\Rightarrow 3a = 2b \dots (1)$$

$$a*(8 - t) = b*(6 - t)$$

Using equation (1), we can say that

$$a * (8 - t) = \frac{3a}{2} * (6 - t)$$

$$t = 2$$

Therefore, we can say that the tank gets emptied at 2 pm daily. We can see that A takes 6 hours and pump B takes 4 hours alone.

Hence, working together both can fill the tank in $= \frac{6 \times 4}{6+4} = 2.4$ hours or 2 hours and 24 minutes.

The pumps started filling the tank at 2:00 pm. Hence, the tank will be filled by 4:24 pm.

Question 82

The arithmetic mean of x, y and z is 80, and that of x, y, z, u and v is 75, where $u = (x+y)/2$ and $v = (y+z)/2$. If $x \geq z$, then the minimum possible value of x is

Answer: 105

Explanation:

Given that the arithmetic mean of x, y and z is 80.

$$\frac{x + y + z}{3} = 80$$

$$\Rightarrow x + y + z = 240 \dots (1)$$

$$\text{Also, } \frac{x + y + z + v + u}{5} = 75$$

$$\Rightarrow \frac{x + y + z + v + u}{5} = 75$$

$$\Rightarrow x + y + z + v + u = 375$$

Substituting values from equation (1),

$$\Rightarrow v + u = 135$$

It is given that $u = (x+y)/2$ and $v = (y+z)/2$.

$$\Rightarrow \frac{(x+y)}{2} + \frac{(y+z)}{2} = 135$$

$$\Rightarrow x + 2y + z = 270$$

$$\Rightarrow y = 30 \text{ (Since } x + y + z = 240)$$

Therefore, we can say that $x + z = 240 - y = 210$. We are also given that $x \geq z$,

Hence, $x_{min} = 210/2 = 105$.

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Question 83

Points A and B are 150 km apart. Cars 1 and 2 travel from A to B, but car 2 starts from A when car 1 is already 20 km away from A. Each car travels at a speed of 100 kmph for the first 50 km, at 50 kmph for the next 50 km, and at 25 kmph for the last 50 km. The distance, in km, between car 2 and B when car 1 reaches B is

Answer: 5

Explanation:

Time taken to cover first 50 km at 100 km/hr = $\frac{1}{2}$ hr.

Time taken to cover second 50 km at 50 km/hr = 1 hr.

Time taken to cover last 50 km at 25 km/hr = 2 hr.

When car 2 starts, car 1 has already covered 20 km.

So, time taken by car 1 to reach B after car 1 starts = total time - time required to travel first 20 km

$$= 3 \text{ hr } 30 \text{ min} - 12 \text{ min} = 3 \text{ hr } 18 \text{ min}$$

Distance travelled by car 2 = $(50 + 50 + 45) = 145$ km

Distance from B = $(150 - 145)$ km = 5 km

Hence, 5 is the correct answer.

Question 84

If the sum of squares of two numbers is 97, then which one of the following cannot be their product?

- A -32
- B 16
- C 48
- D 64

Answer: D

Explanation:

Let 'a' and 'b' are those two numbers.

$$\Rightarrow a^2 + b^2 = 97$$

$$\Rightarrow a^2 + b^2 - 2ab = 97 - 2ab$$

$$\Rightarrow (a - b)^2 = 97 - 2ab$$

We know that $(a - b)^2 \geq 0$

$$\Rightarrow 97 - 2ab \geq 0$$

$$\Rightarrow ab \leq 48.5$$

Hence, $ab \neq 64$. Therefore, option D is the correct answer.

Question 85

The area of a rectangle and the square of its perimeter are in the ratio 1 : 25. Then the lengths of the shorter and longer sides of the rectangle are in the ratio

- A 1:4
- B 2:9
- C 1:3
- D 3:8

Answer: A

Explanation:

Let 'a' and 'b' be the length of sides of the rectangle. ($a > b$)

Area of the rectangle = $a \cdot b$

Perimeter of the rectangle = $2 \cdot (a + b)$

$$\Rightarrow \frac{a \cdot b}{(2 \cdot (a + b))^2} = \frac{1}{25}$$

$$\Rightarrow 25ab = 4(a + b)^2$$

$$\Rightarrow 4a^2 - 17ab + 4b^2 = 0$$

$$\Rightarrow (4a - b)(a - 4b) = 0$$

$$\Rightarrow a = 4b \text{ or } a = \frac{b}{4}$$

We initially assumed that $a > b$, therefore $a \neq \frac{b}{4}$.

Hence, $a = 4b$

$$\Rightarrow b : a = 1 : 4$$

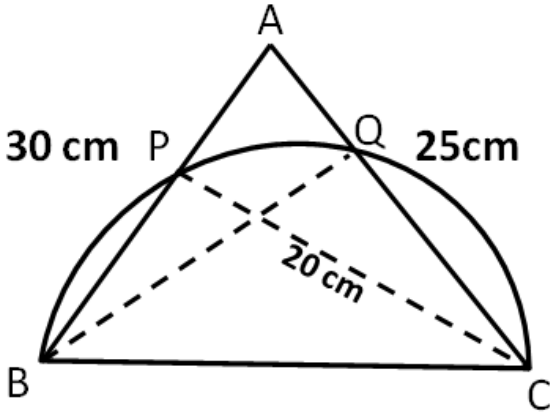
Question 86

On a triangle ABC, a circle with diameter BC is drawn, intersecting AB and AC at points P and Q, respectively. If the lengths of AB, AC, and CP are 30 cm, 25 cm, and 20 cm respectively, then the length of BQ, in cm, is

Answer:24

Explanation:

Let us draw the diagram according to the available information.



We can see that triangle BPC and BQC are inscribed inside a semicircle. Hence, we can say that

$$\angle BPC = \angle BQC = 90^\circ$$

Therefore, we can say that $BQ \perp AC$ and $CP \perp AB$.

In triangle ABC,

$$\text{Area of triangle} = \frac{1}{2} \times \text{Base} \times \text{Height} = \frac{1}{2} \times AB \times CP = \frac{1}{2} \times AC \times BQ$$

$$\Rightarrow BQ = \frac{AB \times CP}{AC} = \frac{30 \times 20}{25} = 24 \text{ cm.}$$

Question 87

A triangle ABC has area 32 sq units and its side BC, of length 8 units, lies on the line $x = 4$. Then the shortest possible distance between A and the point (0,0) is

- A 8 units
- B 4 units
- C $2\sqrt{2}$ units
- D $4\sqrt{2}$ units

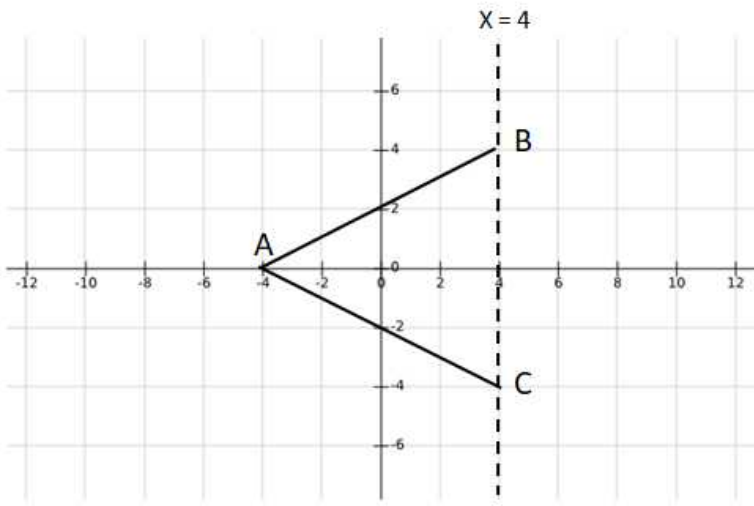
Answer: B

Explanation:

We know that area of the triangle = 32 sq. units, BC = 8 units

Therefore, the height of the perpendicular drawn from point A to BC = $2 \times 32 / 8 = 8$ units.

Let us draw a possible diagram of the given triangle.



We can see that if A coincide with $(-4, 0)$ then the distance between A and $(0, 0) = 4$ units.

If we move the triangle up or down keeping the base BC on $x = 4$, then point A will move away from origin as vertical distance will come into factor whereas horizontal distance will remain as 4 units.

Hence, we can say that minimum distance between A and origin $(0, 0) = 4$ units.

Question 88

From a rectangle ABCD of area 768 sq cm , a semicircular part with diameter AB and area $72\pi \text{ sq cm}$ is removed. The perimeter of the leftover portion, in cm, is

- A $80 + 16\pi$
- B $86 + 8\pi$
- C $88 + 12\pi$
- D $82 + 24\pi$

Answer: C

Explanation:

$$\text{Area of the semicircle with AB as a diameter} = \frac{1}{2} * \pi * \left(\frac{AB}{2}\right)^2$$

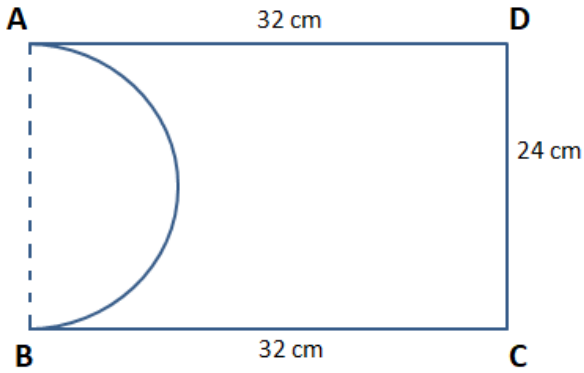
$$\Rightarrow \frac{1}{2} * \pi * \left(\frac{AB}{2}\right)^2 = 72 * \pi$$

$$\Rightarrow AB = 24 \text{ cm}$$

Given that area of the rectangle ABCD = 768 sq.cm

$$\Rightarrow AB * BC = 768$$

$$\Rightarrow BC = 32 \text{ cm}$$



We can see that the perimeter of the remaining shape = AD + DC + BC + Arc(AB)

$$\Rightarrow 32+24+32+\pi * 24/2$$

$$\Rightarrow 88 + 12\pi$$

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Question 89

If $A = \{6^{2n} - 35n - 1\}$, where $n = 1, 2, 3, \dots$ and $B = \{35(n-1)\}$, where $n = 1, 2, 3, \dots$ then which of the following is true?

- A Every member of A is in B and at least one member of B is not in A
- B Neither every member of A is in B nor every member of B is in A
- C Every member of B is in A.
- D At least one member of A is not in B

Answer: A

Explanation:

If we carefully observe set A, then we find that $6^{2n} - 35n - 1$ is divisible by 35. So, set A contains multiples of 35. However, not all the multiples of 35 are there in set A, for different values of n .

For $n = 1$, the value is 0, for $n = 2$, the value is 1225 which is the 35th multiple of 3.

If we observe set B, it consists of all the multiples of 35 including 0.

So, we can say that every member of set A will be in B while every member of set B will not necessarily be in set A.

Hence, option A is the correct answer.

Question 90

The smallest integer n for which $4^n > 17^{19}$ holds, is closest to

- A 37
- B 35
- C 33
- D 39

Answer: D

Explanation:

$$4^n > 17^{19}$$

$$\Rightarrow 16^{n/2} > 17^{19}$$

Therefore, we can say that $n/2 > 19$

$n > 38$

Hence, option D is the correct answer.

Question 91

A jar contains a mixture of 175 ml water and 700 ml alcohol. Gopal takes out 10% of the mixture and substitutes it by water of the same amount. The process is repeated once again. The percentage of water in the mixture is now

A 30.3

B 35.2

C 25.4

D 20.5

Answer: B

Explanation:

Final quantity of alcohol in the mixture = $700 + 175 \times \frac{90}{100} = 875$ ml

Therefore, final quantity of water in the mixture = $875 - 567 = 308$ ml

Hence, we can say that the percentage of water in the mixture = $\frac{308}{875} \times 100 = 35.2\%$

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Question 92

If a and b are integers such that $2x^2 - ax + 2 > 0$ and $x^2 - bx + 8 \geq 0$ for all real numbers x , then the largest possible value of $2a - 6b$ is

Answer: 36

Explanation:

Let $f(x) = 2x^2 - ax + 2$. We can see that $f(x)$ is a quadratic function.

For, $f(x) > 0$, Discriminant (D) < 0

$$\Rightarrow (-a)^2 - 4 * 2 * 2 < 0$$

$$\Rightarrow (a-4)(a+4) < 0$$

$$\Rightarrow a \in (-4, 4)$$

Therefore, integer values that 'a' can take = $\{-3, -2, -1, 0, 1, 2, 3\}$

Let $g(x) = x^2 - bx + 8$. We can see that $g(x)$ is also a quadratic function.

For, $g(x) \geq 0$, Discriminant (D) ≤ 0

$$\Rightarrow (-b)^2 - 4 * 8 * 1 < 0$$

$$\Rightarrow (b - \sqrt{32})(b + \sqrt{32}) < 0$$

$$\Rightarrow b \in (-\sqrt{32}, \sqrt{32})$$

Therefore, integer values that 'b' can take = $\{-5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5\}$

We have to find out the largest possible value of $2a - 6b$. The largest possible value will occur when 'a' is maximum and 'b' is minimum.

$$a_{max} = 3, b_{min} = -5$$

Therefore, the largest possible value of $2a - 6b = 2*3 - 6*(-5) = 36$.

Question 93

$$\log_2 100 - \log_4 100 + \log_5 100 - \log_{10} 100 + \log_{20} 100 - \log_{25} 100 + \log_{50} 100 = ?$$

- A $\frac{1}{2}$
- B 10
- C 0
- D -4

Answer: A

Explanation:

We know that $\log_a b = \frac{1}{\log_x a} \log_x b$

Therefore, we can say that $\log_2 100 = \frac{1}{\log_{10} 2} \log_{10} 100$

$$\begin{aligned} \Rightarrow & \frac{1}{\log_2 100} - \frac{1}{\log_4 100} + \frac{1}{\log_5 100} - \frac{1}{\log_{10} 100} + \frac{1}{\log_{20} 100} - \frac{1}{\log_{25} 100} + \frac{1}{\log_{50} 100} \\ \Rightarrow & \log_{10} 2 - \log_{10} 4 + \log_{10} 5 - \log_{10} 10 + \log_{10} 20 - \log_{10} 25 + \log_{10} 50 \\ \Rightarrow & \log_{10} 100 - \log_{10} 100 + \log_{10} 100 - \log_{10} 100 + \log_{10} 100 - \log_{10} 100 + \log_{10} 100 \end{aligned}$$

We know that $\log_{10} 100 = 2$

$$\begin{aligned} \Rightarrow & 2 * [\log_{10} 2 - \log_{10} 4 + \log_{10} 5 - \log_{10} 10 + \log_{10} 20 - \log_{10} 25 + \log_{10} 50] \\ \Rightarrow & 2 * [\log_{10} 2 * 5 * 20 * 50] \\ \Rightarrow & 2 * [\log_{10} 10] \\ \Rightarrow & 2 \end{aligned}$$

Question 94

If $p^3 = q^4 = r^5 = s^6$, then the value of $\log_s(pqr)$ is equal to

- A $\frac{47}{10}$
- B $\frac{24}{5}$
- C $\frac{16}{5}$
- D 1

Answer: A

Explanation:

Given that, $p^3 = q^4 = r^5 = s^6$

$$p^3 = s^6$$

$$p = s^{\frac{6}{3}} = s^2 \dots(1)$$

$$\text{Similarly, } q = s^{\frac{6}{4}} = s^{\frac{3}{2}} \dots(2)$$

$$\text{Similarly, } r = s^{\frac{6}{5}} \dots(3)$$

$$\Rightarrow \log_s(pqr)$$

By substituting value of p, q, and r from equation (1), (2) and (3)

$$\Rightarrow \log_s(s^2 * s^3 * s^6)$$

$$\Rightarrow \log_s(s^{11})$$

$$47$$

$$\Rightarrow 10$$

Hence, option A is the correct answer.

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Question 95

There are two drums, each containing a mixture of paints A and B. In drum 1, A and B are in the ratio 18 : 7. The mixtures from drums 1 and 2 are mixed in the ratio 3 : 4 and in this final mixture, A and B are in the ratio 13 : 7. In drum 2, then A and B were in the ratio

A 251 : 163

B 239 : 161

C 220 : 149

D 229 : 141

Answer: B

Explanation:

It is given that in drum 1, A and B are in the ratio 18 : 7.

Let us assume that in drum 2, A and B are in the ratio $x : 1$.

It is given that drums 1 and 2 are mixed in the ratio 3 : 4 and in this final mixture, A and B are in the ratio 13 : 7.

By equating concentration of A

$$\frac{3 * 18 + 4 * x}{3 + 4} = \frac{13 * 7}{13 + 7}$$

$$\Rightarrow \frac{54 + 4x}{7} = \frac{91}{20}$$

$$\Rightarrow 20(54 + 4x) = 91 * 7$$

$$\Rightarrow 1080 + 80x = 637$$

$$80x = 637 - 1080$$

Therefore, we can say that in drum 2, A and B are in the ratio 161 : 1 or 239 : 161.

Question 96

Ramesh and Ganesh can together complete a work in 16 days. After seven days of working together, Ramesh got sick and his efficiency fell by 30%. As a result, they completed the work in 17 days instead of 16 days. If Ganesh had worked alone after Ramesh got sick, in how many days would he have completed the remaining work?

A 14.5

B 11

C 13.5

D 12

Answer: C

Explanation:

Let 'R' and 'G' be the amount of work that Ramesh and Ganesh can complete in a day.

It is given that they can together complete a work in 16 days. Hence, total amount of work = $16(R+G)$... (1)

For first 7 days both of them worked together. From 8th day, Ramesh worked at 70% of his original efficiency whereas Ganesh worked at his original efficiency. It took them 17 days to finish the same work. i.e. Ramesh worked at 70% of his original efficiency for 10 days.

$$\Rightarrow 16(R+G) = 7(R+G) + 10(0.7R+G)$$

$$\Rightarrow 16(R+G) = 14R + 17G$$

$$\Rightarrow R = 0.5G \dots (2)$$

Total amount of work left when Ramesh got sick = $16(R+G) - 7(R+G) = 9(R+G) = 9(0.5G+G) = 13.5G$

Therefore, time taken by Ganesh to complete the remaining work = $\frac{13.5G}{G} = 13.5$ days.

Question 97

Gopal borrows Rs. X from Ankit at 8% annual interest. He then adds Rs. Y of his own money and lends Rs. X+Y to Ishan at 10% annual interest. At the end of the year, after returning Ankit's dues, the net interest retained by Gopal is the same as that accrued to Ankit. On the other hand, had Gopal lent Rs. X+2Y to Ishan at 10%, then the net interest retained by him would have increased by Rs. 150. If all interests are compounded annually, then find the value of X + Y.

Answer: 4000

Explanation:

Amount of interest paid by Ishan to Gopal if the borrowed amount is Rs. (X+Y) = $100 * \frac{10}{100} * (X + Y) = 0.1(X+Y)$

Gopal also borrowed Rs. X from Ankit at 8% per annum. Therefore, he has to return Ankit Rs. 0.08X as the interest amount on borrowed sum.

$$\text{Hence, the interest retained by gopal} = 0.1(X+Y) - 0.08X = 0.02X + 0.1Y \dots (1)$$

It is given that the net interest retained by Gopal is the same as that accrued to Ankit.

$$\text{Therefore, } 0.08X = 0.02X + 0.1Y$$

$$\Rightarrow X = (5/3)Y \dots (2)$$

Amount of interest paid by Ishan to Gopal if the borrowed amount is Rs. (X+2Y) = $100 * \frac{10}{100} * (X + 2Y) = 0.1X + 0.2Y$

$$\text{In this case the amount of interest retained by Gopal} = 0.1X + 0.2Y - 0.08X = 0.02X + 0.2Y \dots (3)$$

It is given that the interest retained by Gopal increased by Rs. 150 in the second case.

$$\Rightarrow (0.02X + 0.2Y) - (0.02X + 0.1Y) = 150$$

$$\Rightarrow Y = \text{Rs. } 1500$$

By substituting value of Y in equation (2), we can say that X = Rs. 2500

Therefore, (X+Y) = Rs. 4000.

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Question 98

The strength of a salt solution is p% if 100 ml of the solution contains p grams of salt. If three salt solutions A, B, C are mixed in the proportion 1 : 2 : 3, then the resulting solution has strength 20%. If instead the proportion is 3 : 2 : 1, then the resulting solution has strength 30%. A fourth solution, D, is produced by mixing B and C in the ratio 2 : 7. The ratio of the strength of D to that of A is

A 3 : 10

B 1 : 3

C 1 : 4

D 2 : 5

Answer: B

Explanation:

Let 'a', 'b' and 'c' be the concentration of salt in solutions A, B and C respectively.

It is given that three salt solutions A, B, C are mixed in the proportion 1 : 2 : 3, then the resulting solution has strength 20%.

$$\frac{a + 2b + 3c}{1 + 2 + 3} = 20$$

$$\Rightarrow a + 2b + 3c = 120 \dots (1)$$

If instead the proportion is 3 : 2 : 1, then the resulting solution has strength 30%.

$$\frac{3a + 2b + c}{1 + 2 + 3} = 30$$

$$\Rightarrow 3a + 2b + c = 180 \dots (2)$$

From equation (1) and (2), we can say that

$$\Rightarrow b + 2c = 45$$

$$\Rightarrow b = 45 - 2c$$

Also, on subtracting (1) from (2), we get

$$a - c = 30$$

$$\Rightarrow a = 30 + c$$

In solution D, B and C are mixed in the ratio 2 : 7

$$\text{So, the concentration of salt in D} = \frac{2b + 7c}{9} = \frac{90 - 4c + 7c}{9} = \frac{90 + 3c}{9}$$

$$\text{Required ratio} = \frac{90 + 3c}{9a} = \frac{90 + 3c}{9(30 + c)} = 1 : 3$$

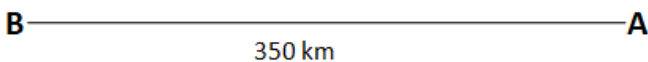
Hence, option B is the correct answer.

Question 99

On a long stretch of east-west road, A and B are two points such that B is 350 km west of A. One car starts from A and another from B at the same time. If they move towards each other, then they meet after 1 hour. If they both move towards east, then they meet in 7 hrs. The difference between their speeds, in km per hour, is

Answer: 50

Explanation:



Let 'a' and 'b' be the speed (in km/hr) of cars starting from both A and B respectively.

If they both move in east direction, then B will catch A if and only if $b > a$.

Relative speed of both the cars when they move in east direction = $(b - a)$ km/hr

It takes them 7 hours to meet. i.e. they travel 350 km in 7 hours with a relative speed of $(b - a)$ km/hr.

Hence, $(b - a) = 7 = 50 \text{ km/hr.}$

Question 100

Let t_1, t_2, \dots be real numbers such that $t_1 + t_2 + \dots + t_n = 2n^2 + 9n + 13$, for every positive integer $n \geq 2$. If $t_k = 103$, then k equals

Answer:24

Explanation:

It is given that $t_1 + t_2 + \dots + t_n = 2n^2 + 9n + 13$, for every positive integer $n \geq 2$.

We can say that $t_1 + t_2 + \dots + t_k = 2k^2 + 9k + 13 \dots (1)$

Replacing k by $(k-1)$ we can say that

$t_1 + t_2 + \dots + t_{k-1} = 2(k-1)^2 + 9(k-1) + 13 \dots (2)$

On subtracting equation (2) from equation (1)

$\Rightarrow t_k = 2k^2 + 9k + 13 - 2(k-1)^2 + 9(k-1) + 13$

$\Rightarrow 103 = 4k + 7$

$\Rightarrow k = 24$

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