

(Key and Solutions for AIMCAT1706)

Key

SECTION – I SUB-SECTION: RC

1. C	7. D	13. D	19. B
2. C	8. C	14. B	20. C
3. B	9. B	15. D	21. A
4. D	10. A	16. C	22. B
5. D	11. A	17. B	23. A
6. B	12. C	18. 14	24. C

SUB-SECTION: VA

1. 4	5. 5	9. D	13. 34	17. 21331
2. 25	6. 3	10. C	14. 15	18. 13333
3. 4	7. 1	11. C	15. 234	19. 11213
4. 134	8. 4	12. A	16. 13	20. 31123

SECTION – II SUB-SECTION: DI

1. 29	5. B	9. D	13. 4
2. 13	6. B	10. C	14. D
3. B	7. B	11. A	
4. D	8. A	12. 3	

SUB-SECTION: LR

1. B	5. B	9. B	13. 8
2. A	6. C	10. A	14. B
3. D	7. C	11. 1	
4. A	8. D	12. 2	

SECTION – III: QA

1. B	7. B	13. 13	19. B	24. D
2. A	8. 36	14. 444	20. C	25. 131
3. D	9. 2	15. C	21. A	26. C
4. A	10. B	16. C	22. B	27. 905
5. B	11. B	17. -144	23. C	28. D
6. B	12. A	18. B		

Solutions

SECTION – I SUB-SECTION: RC

Solutions for questions 1 to 6:

Number of words and Explanatory notes for RC:

Number of words : 690

- According to the passage, the scientific mode of study describes architecture "scientifically as a thing existing, without any reference to the manner in which it was invented".

Option A: The passage does not mention that the scientific mode of the study of Architecture deals only with facts. Hence, this option is incorrect.

Option B: The historic mode of study, not the scientific mode, involves studying "the influence one style has had

upon another in the progress of time". Hence, this option is also incorrect.

Option C: The passage mentions that in the scientific mode of study, there will be no "reference to the manner in which it was invented". Hence, it will not involve the study of the origin of Architecture.

Option D: Architecture, when studied with a **historical perspective**, "becomes one of the most important adjuncts of history". This is not said with reference to the scientific perspective. Hence, this option is also incorrect.

Therefore, the correct answer is option C.

Choice (C)

- The author presents various benefits of the historical mode of studying architecture over the scientific mode in the second and the third paragraphs.

Option A: The author mentions that the historical mode of study is "more popular and easily followed" as compared to

the scientific mode of study. However, the author mentions other advantages which are superior and more important subsequently. Hence, even though this is one of the advantages, it cannot be called the most important advantage.

Option B: The author mentions that "The great superiority... of the historical mode of study arises from the fact that... Architecture ceases to be a mere art... but becomes one of the most important adjuncts of history, filling up many gaps in the written record". Therefore, this is an important advantage. However, the third paragraph provides details about "A still more important use of Architecture". According to the author, the use of architecture provided in the third paragraph is more important than the ones presented in the preceding paragraph. Hence, this option also cannot be considered as the most important advantage of the historical mode of study.

Option C: The passage mentions that "A still more important use of architecture, when followed as a history, is found in its ethnographic value.". The author talks about the ability of Architecture to act as a means of "discriminating between the different races of mankind". Hence, this can be called the most important advantage of the historical mode of studying architecture.

Option D: This advantage is also mentioned in the second paragraph (advantage of separating the objects of study relation to one another). However, the author moves on to discuss more important advantages and hence, this cannot be the most important advantage.

Therefore, the answer is option C. Choice (C)

3. According to the passage, "a great deal of the confusion of ideas existing on the subject of Architecture arises from the fact that writers have been in the habit of speaking of Painting, Sculpture, and Architecture as three similar fine arts, practised on the same principles".

Option A: The author mentions that in the 16th century "painters and sculptors undertook also the practice of architecture, and builders ceased to be architects". This is how the "confusion of ideas" originated. However, the "confusion of ideas" that the author mentions does not refer to this. Hence, this is not the correct answer.

Option B: The confusion of ideas is considering Painting, Sculpture and Architecture to be "three similar fine arts, practised on the same principles." The author believes that this is not the case. This is the "confusion of ideas" mentioned by the author and is the correct answer.

Option C: According to the author, "much of the degraded position of the art at this day is owing to the mistake then made". The "mistake" here refers to applying same principles for the three fine arts. However, this is a consequence of the "confusion of ideas" and is not the correct answer.

Option D: This is mentioned in the passage as a reason for the origin of the confusion of ideas. Hence, this option is also incorrect.

Therefore, the correct answer is option B. Choice (B)

4. According to the passage, Phonetic Arts "express by colour or form ideas that could be – generally have been – expressed by words".

Option A: The passage does not state that Phonetic arts use only words for expressing ideas. The author talks about Poetry, Painting and Sculpture which are all Phonetic arts among which Painting and Sculpture do not use words. Hence, this option is incorrect.

Option B: Phonetic arts deal "with the same class of images and appealing to the same class of feelings". But it does not include all the arts which gratify our senses. The author mentions Aesthetic arts in the last paragraph which also gratify our senses. Hence, this option is also incorrect.

Option C: Phonetic arts do not all use images for conveying ideas. Poetry, which is also a Phonetic art, uses words to convey ideas. Hence, this option is incorrect.

Option D: Phonetic arts appeal to the "same class of feelings" and convey ideas that could generally have been expressed by words. Hence, this is the correct answer.

Choice (D)

5. The author categorizes various arts into three different types – Technic Arts, Aesthetic Arts and Phonetic Arts.

Option A: The ability to convey ideas using words is limited only to Phonetic arts and is not applicable to Technic and Aesthetic Arts. Hence, this is a criterion for differentiating between Phonetic arts and the other two categories of arts.

Option B: Technic arts provide basic needs and "minister to the primary wants of mankind". Aesthetic arts provide gratification of senses by refining the arts that provide the basic needs. Phonetic Arts is at the other extreme which does not provide any functional benefits but "appeal to the same class of feelings". The three categories form "one homogeneous mass". Hence, the extent of functional benefits is also a criterion for differentiating between the three categories.

Option C: Aesthetic arts and Phonetic arts gratify our senses but Technic arts do not. Technic Arts provide only the "primary wants". Hence, this is also a criterion for differentiation.

Option D: The author does not talk about the type of senses that are gratified by an art. He does not make a differentiation between Painting and Poetry just because they appeal to different senses. Hence, this is not a criteria used by the author. Therefore, this is the correct answer.

Choice (D)

6. Statement I: According to the passage, music is "the most typical of the Aesthetic arts". When "married to immortal verse," steps upwards into the region of the Phonetic arts". Hence, an opera with exquisite lyrics becomes a Phonetic art rather than an Aesthetic art.

Statement II: A makeshift hut which caters to the primary want of shelter can be categorized as a Technic Art.

Statement III: According to the passage, agriculture is a Technic art as it is capable of providing food. The refinement of cooking makes it an Aesthetic art. Hence, a simple dish made by boiling vegetables can be categorized as an Aesthetic art.

Statement IV: A building "when used for ornament, is raised out of the domain of the Technic arts" and becomes an Aesthetic Art. Throughout the passage, the author argues that architecture should not be considered the same as painting and sculpture, which are Phonetic arts. Hence, this should be categorized as an Aesthetic art rather than Phonetic art.

Hence, only two statements, II and III, are accurately categorized.

Choice (B)

Solutions for questions 7 to 12:

Number of words and Explanatory notes for RC:

Number of words : 768

7. According to the passage, even the best artists do not get the running pose right. The reason for this is explained in the sixth paragraph which talks about proprioception.

Option A: The author does not mention that the running pose varied from person to person. He describes the way that people run in the second paragraph. Hence, this is not the correct answer.

Option B: The passage mentions that thinking about a running posture is not the same as running and "This is a common mistake when it comes to thinking about how we think about movement". However, the passage does not talk about our brains not being able to draw and think of a running posture at the same time. Hence, this option is incorrect.

Option C: According to the passage, in Egyptian art, "artists followed strict rules about the position of the head and body". However, the author mentions that "as art evolved, and as accuracy of form become more and more important, it's hard to imagine why someone like Da Vinci or Donatello would intentionally draw a person running in such an inaccurate pose". Hence, we can conclude that the improper posture has not always been an artist's choice.

Option D: According to Wilson, the way we think about movement is different from the way we actually move. This is one of the reasons why people tend to draw an improper posture of running. Hence, this is the correct answer.

Choice (D)

8. The last paragraph of the passage talks about the contralateral pose and the homolateral pose. Even though the passage does not describe what these poses are, we can infer from the passage that homolateral pose refers to the way people pose when asked to strike a running pose. This is because Wilson says that "it's possible that when standing, the homolateral pose is just more stable". Contralateral pose refers to placing the opposite arm and leg forward which is how people actually run.

Option A: The passage does not differentiate between the pose when walking and running. In both cases, people use the contralateral pose. Hence, this is not the correct answer.

Option B: We can infer from the passage that contralateral pose involves moving forward an arm and a leg on opposite sides of the body at the same time and homolateral pose involves moving an arm and a leg on the same side of the body. This option states the opposite and is not the correct answer.

Option C: When we run, we move opposite limbs forwards (as described in the second paragraph of the passage). But while drawing, we tend to draw people in a homolateral pose. Hence, this option is the correct answer.

Option D: According to the passage, Egyptians drew the running posture inaccurately, i.e., using the homolateral pose. Da Vinci also drew inaccurately. Hence, this option is incorrect.

Therefore, the correct answer is option C.

Choice (C)

9. The fifth and sixth paragraphs talk about proprioception. Option A: According to the passage, "Proprioception happens on multiple levels". It takes information from our "internal map" and "our sensory input". The "internal map" refers to the "information that the brain has built in about where arms and legs are". Therefore, this feature is mentioned in the passage.

Option B: According to the passage, the "information that the brain has built in" is responsible for the "phantom pains", i.e., a pain that emanates from amputated limbs. The information in the brain is involved in proprioception and phantom pains. But we cannot infer the relation between proprioception and phantom pains. Therefore, this cannot be inferred from the passage.

Option C: The passage mentions that "information coming in from the extremities" also plays a part in proprioception. Tactile feedback is one form of sensory input and hence, will play a part in proprioception. Therefore, this can be inferred to be a feature of proprioception.

Option D: Proprioception is defined as "the way we perceive the existence and placement of our body". Hence, this feature is also mentioned in the passage.

Therefore, the answer is option B.

Choice (B)

10. Wilson presents a possible reason why people strike a running pose incorrectly in the last paragraph of the passage.

Option A: According to Wilson, running requires "dynamic balance" and this is why we run in a contralateral pose. Running pose required "static balance" which is why we pose in a homolateral pose. Hence, the position of limbs needs to be different to achieve balance while running and while striking a running pose. Therefore, this is the correct answer.

Option B: Wilson mentions that "the contralateral pose is far more like a yoga-balancing act". However, he does not say that this is impossible. Therefore, this option is incorrect.

Option C: According to the passage, proprioception is a sense which enables us to know the position of our limbs. We cannot infer from the passage that while posing

proprioception switches off. Hence, this option is also incorrect.

Option D: The passage does not talk about the influence of the improper postures drawn by artists. Hence, this option is also incorrect.

Therefore, the correct answer is option A.

Choice (A)

11. The passage mentions the standard way of learning. This is when we "assemble a collection of pieces of information about a thing that builds to an internal representation of that thing". However, according to Wilson, "that's not actually how learning happens".

Option A: The approach presented in this option is the standard way of learning. But this is not how learning happens. This is not the way people learn to run. Hence, this is the correct answer.

Option B: Running without building a model can be one way to learn running. The passage does not mention this way to be correct or incorrect. Hence, this cannot be the answer.

Option C: Mimicking other peoples' movements can also be a way to learn which the passage does not contest. Hence, this cannot be the answer.

Option D: This is also not mentioned in the passage and cannot be the correct answer.

Therefore, the correct answer is option A.

Choice (A)

12. In the last paragraph, Wilson talks about the different poses required for running and striking a running pose. These are the "different tasks" that Wilson refers to. Hence, the correct answer is option C.

Choice (C)

Solutions for questions 13 to 18:

Number of words and Explanatory notes for RC:

Number of words: 649

13. "Across the span car crash" is a startling statistic provided by the U.K.-based nonprofit Global Challenges Foundation. Refer to the second and third paragraphs. According to a new report from the U.K.-based Global Challenges Foundation, the most viable threats to globally organized civilizations are much more likely than we might think.

Option A: In para 4, it has been mentioned that the average person will probably not die in an automobile accident. Every year, one in 9,395 people die in a crash; that translates to about a 0.01 percent chance per year. But that chance compounds over the course of a lifetime. From this we cannot say that Americans are very careful drivers. Also the author only mentions a statistic from the report submitted by the UK Based Global Challenges Foundation – he does not applaud its work. So choice A is incorrect.

Option B: The author does not suggest that human extinction can happen **any time soon**. Hence choice B is out of scope.

Option C: Choice C is not the reason for the question. The author only says that the average person will probably not die in an automobile accident. But there is still a chance (however small that chance may be) that a person will die in a car crash, and that chance compounds over the course of a lifetime.

Option D: The author begins the passage with: Nuclear war. Climate change. Pandemics that kill tens of millions. In its annual report on "*global catastrophic risk*," the nonprofit debuted a startling (alarming or surprising) statistic: Across the span of their lives, the average American is more than five times likelier to die during a human-extinction event than in a car crash. A human-extinction event is a viable threat to "globally organized civilization". Hence choice D is correct and is the answer.

Choice (D)

14. Option A: The most viable threats to globally organized civilization are real and part of the calculus that political

leaders consider everyday. From this we cannot say that politicians are **constantly** worried about the occurrence of natural calamities. Hence choice A is not correct.

Option B: Refer to para 2. The most viable threats to globally organized civilization....(are)....much more likely than we might think. Also refer to various sentences in paras 4, 5 and 6. At life-long scales, one in 120 Americans dies in an accident. The risk of human extinction due to climate change – or an accidental nuclear war – is much higher than that. The Global Challenges Foundation estimates a 9.5 percent chance of human extinction within the next hundred years. And that number probably underestimates the risk of dying in any global cataclysm. Hence choice B is correct and is the answer.

Option C: The most viable threats to globally organized civilization are the stuff of nightmares and blockbusters – but unlike sea monsters or zombie viruses, they're real. From this we cannot say that the author considers sea monsters or zombie viruses as threats. So choice C is not true.

Option D: Nuclear war. Climate change. Pandemics that kill tens of millions. Choice D is out of scope. From this, we cannot say that nuclear war and climate change are the only two global catastrophes that humans should be worried about. Hence choice D is not true.

Choice (B)

15. Nuclear war. Climate change. Pandemics that kill tens of millions. These are the most viable threats to globally organized civilization. They're the stuff of nightmares and blockbusters – but unlike sea monsters or zombie viruses, they're real and more likely than we might think.

Option A: From the third and fourth paras, we can say that a car crash or automobile accident is not a human extinction event and does not qualify as the "most viable threats". Hence choice A is not the answer.

Option B: A tsunami would be a natural disaster but it cannot be classified as a "global catastrophic risk". So choice B is not the answer. From the fifth para onwards, it is clear that the passage highlights the negative aspects of nuclear war, climate change and pandemics only. A tsunami does not come under any of these categories. So choice B does not answer the question, it is not according to the passage.

Option C: A pogrom is a violent event or series of events aimed at the massacre or persecution of an ethnic or religious group. People of a specific group are targeted and killed in a pogrom. But since choice C only mentions the word 'pogrom' without expanding on the impact it can have on civilization, we rule out choice C as the answer.

Option D: A deadly virus that spreads around countries would result in a pandemic and would qualify as an example of the "most viable threat" to globally organized civilization. So choice D is the answer.

Choice (D)

16. Option A: Partly that's because the average person will probably not die in an automobile accident. Every year, one in 9,395 people die in a crash. The risk of human extinction due to climate change or nuclear warfare is much higher than that. Hence choice A is true and is not the answer.

Option B: The Stern Review, the U.K. government's premier report on the economics of climate change, estimated a 0.1 percent risk of human extinction every year. That may sound low, but it also adds up when extrapolated to century-scale. So choice B is true and is not the answer.

Option C: Choice C cannot be deduced from the passage. Hence it is the answer.

Option D: Every year, one in 9,395 people die in a crash; that translates to about a 0.01 percent chance per year. But that chance compounds over the course of a lifetime. At life-long scales, one in 120 Americans dies in an accident. Hence choice D is correct and is not the answer.

Choice (C)

17. Option A: "lot of discrepancy between the two reports" and "more erroneous" in choice A is out of scope. Choice A cannot be inferred from the passage.

Option B: Choice B is true. The Stern Review, whose math suggests the 0.1-percent number, only calculated the danger of species-wide extinction. The Global Challenges Foundation's report is concerned with all events that would wipe out more than 10 percent of Earth's human population.

Option C: "more reliable" in Choice C cannot be inferred. The time period (whole century vs one year) is not an important point of differentiation between the two reports. Para 6 of the passage throws more light on the two reports and choice C does not capture the important points.

Option D: Choice D is not correct. The Global Challenges Foundation's report is concerned with **all events** that would wipe out **more than 10 percent** of Earth's human population. "We don't expect any of the events that we describe to happen in any 10-year period. They might – but, on balance, they probably won't," Sebastian Farquhar, the director of the Global Priorities Project, said. So the second part of choice D is not related to the Global Challenges Foundation's report.

Choice (B)

18. "We don't expect any of the events that we describe to happen in any 10-year period. They might – but, on balance, they probably won't," Sebastian Farquhar, the director of the Global Priorities Project, told me. "But there's lots of events that we think are unlikely that we still prepare for."

Statement 1: A simple exam is unlikely to be difficult or require intensive preparation. Statement 1 does not qualify as an example for preparation of an "unlikely event" and is hence the answer to the question.

Statement 2: Most people demand working airbags in their cars and they strap in their seat-belts whenever they go for a drive. We may know that the risk of an accident on any individual car ride is low, but we still believe that it makes sense to reduce possible harm – i.e. we still prepare for an unlikely event. Statement 2 is not the answer to the question.

Statement 3: We may know that the risk of an accident on any individual car ride is low, but we still believe that it makes sense to reduce possible harm – i.e. we still prepare for an unlikely event. Statement 3 is not the answer to the question.

Statement 4: If the disease is likely to spread in the area of residence, then one is at risk of getting the disease. Taking vaccination is then prudent. So statement 4 highlights preparation for a likely event. The disease is fatal and one is taking precaution in the form of vaccination. So statement 4 is not an example of preparation for an "unlikely event" and is hence an answer to the question.

So statements 1 and 4 apply.

Ans: (14)

Solutions for questions 19 to 21:

Number of words and Explanatory notes for RC:

Number of words : 490

19. The passage talks about various groups of people who are affected, directly or indirectly, due to incarceration.

Option A: The third paragraph of the passage mentions that "According to an important study, as of 2010 there were roughly twenty million living Americans that were ex-felons or ex-prisoners... impacted by incarceration". Hence, ex-felons and ex-prisoners are directly impacted by incarceration.

Option B: The passage questions "Add the number of people in criminal enterprise who are not yet felons and who knows how many people are affected?" We can infer from this, that the people who are not yet felons are also affected. However, it does not mention anything about the families of these people. Hence, this is not mentioned in the passage and is the correct answer.

Option C: The author asks the reader to "Factor in the families of living ex-prisoners and you have a lot of people directly impacted by incarceration". Hence, this group of people is also mentioned in the passage.

Option D: The passage also mentions the victims of crime in the same paragraph.

Hence, the answer is option B.

Choice (B)

20. The author mentions various reasons because of which "it is likely they would return to a life of crime to support themselves and their families".

Option A: The passage mentions that "most employers still discriminate against anyone with a criminal record". Hence, this is one of the reasons which makes it difficult for ex-convicts to find jobs because of which it becomes likely that they will return to a life of crime.

Option B: The passage also states that "Many criminals and ex-cons don't have formal education or training". Hence, this is also one of the reasons mentioned in the passage.

Option C: The passage does not talk about the inability of the prisoners to master business skills. Hence, this option is not one of the reasons and is the correct answer.

Option D: The passage also states that "In jail it's not always possible to get education or training beyond a G.E.D. which doesn't help prepare you to get a well-paying career". Hence, this option is also one of the reasons.

Therefore, the correct answer is option C.

Choice (C)

21. The passage talks about the difficulties involved in ex-felons getting a job after serving their time in prison.

Option A: The passage presents various reasons why ex-felons are not able to get jobs and explains why it is likely that they turn to a life of crime. Hence, this is the purpose of the passage.

Option B: While the first two paragraphs of the passage mentions drug dealers, the author also states that "When I use "drug dealer," it also applies to any illegal business". Hence, the passage does not concentrate only on drug dealers. Therefore, this is not the correct answer.

Option C: The passage does not mention that legal system does not favour ex-criminals. In fact, it mentions the U.S. Equal Employment Opportunity Commission which advocates against any discrimination towards people with criminal background. Hence, this is not the correct answer.

Option D: The passage only talks about the employment opportunities of ex-felons and does not discuss any other social aspects of their life after prison. Hence, this option is also incorrect.

Therefore, the correct answer is option A.

Choice (A)

Solutions for questions 22 to 24:

Number of words and Explanatory notes for RC:

Number of words : 346

22. The author proposes that we might not be in the midst of a leadership corruption epidemic but the leaders could have been always corrupt.

Option A: The passage mentions that "so many of our historical heroic figures would not have likely stood up well under today's intense scrutiny". Hence, we cannot say that the current leaders are more corrupt than the historical leaders.

Option B: According to the author, the historical leaders could also have been as corrupt as the current leaders. Technology allows continuous scrutiny of our leaders because of which the public gets to know about the corruption of their leaders. Hence, this option is correct.

Option C: We cannot infer from the passage that the current leaders are less corrupt than historical leaders. Hence, this option is incorrect.

Option D: We cannot conclude that the leaders of the current age and the leaders of the past are equally corrupt. The author says that the leaders of the past "would not have **likely** stood up well" to intense scrutiny and does not categorically say that they are as corrupt as today's leaders. Hence, this option is also incorrect. Therefore, the correct answer is option B.

Choice (B)

23. The first sentence of the paragraph talks about the fragility of public confidence in leaders. It provides Panama papers as an example.

Option A: Sigmundur Davíð Gunnlaugsson "was sent packing after 3% of the country's population marched on the Parliament" after his perceived misconduct. Hence, this is an example of the fragility of public confidence in their leader.

Option B: The passage mentions that David Cameron's name appeared in the Panama papers. However, this was met with "little public outcry". Hence, this option is incorrect.

Option C: The public apathy regarding Mauricio Macri making it into Panama print cannot be considered as an example of the fragility of public confidence as the public did not do anything even after learning that their leader features in the Panama papers. Hence, this option is incorrect.

Option D: The passage does not state that 10 million Americans marched into the Parliament. It only compares the 3% population of Iceland with 3% population in the U.S. Hence, this option is incorrect.

Therefore, the correct answer is option A.

Choice (A)

24. The author mentions that it is a time of "inspiring possibilities and sobering realities" in the last paragraph of the passage.

Option A: The paragraph starts with saying that "regardless of the reason for diminished trust in our leaders and institutions, the stakes are enormous". Hence, we cannot conclude that the author thinks that public mistrust in its leaders is the reason for sobering realities.

Option B: The passage mentions that "individuals and the institutions they lead are increasingly less "enabled" to conjure up and execute the decisions needed to help transform our society to meet the critical demands of the future". It does not imply that they are not critical about the demands of the future. Hence, this option is incorrect.

Option C: The author states that the individuals and the institutions are less enabled to meet the critical demands of the future. Hence, this option is correct.

Option D: The author does not talk about the corruption among the leaders in the last paragraph of the passage. Hence, this option is incorrect.

Therefore, the correct answer is option C.

Choice (C)

Difficulty level wise summary - Section I	
Sub Section: RC	
Level of Difficulty	Questions
Very Easy	-
Easy	-
Medium	1, 8, 12, 13, 14, 15, 20, 21, 23
Difficult	2, 4, 5, 10, 11, 16, 18, 19, 22, 24
Very Difficult	3, 6, 7, 9, 17

SUB-SECTION: VA

Solutions for questions 1 to 4:

1. Part (1) has an error of tense. Since the present perfect tense (has shown) is used, we need to say 'has terrified' and not 'terrified'. The part should read: in its vast territorial grab in the South China Sea has terrified In part (2), "set it in" is incorrect. The part should read: set it **on** In part (3), the adverb 'thoroughly' is misplaced. It modifies the verb 'demolished' and should be placed before it. Part (4) is error-free. In part (5), the preposition 'on' is incorrect and needs to be replaced with 'over'. The part should read: it will be elevating brute force **over** international law Ans: (4)

2. Part (1) has an error of punctuation. Commas have to be placed in appropriate locations. The part should read: In a clean room at the Airbus Defence & Space (ADS) factory, north of London, scientists are working on *LISA Pathfinder*,

..... Part (2) is error-free. In part (3), 'predicted around' needs to be replaced with 'predicted by'. In part (4), 'farther' needs to be replaced with 'further'. Part (5) is error-free.

Ans: (25)

3. In part (1), 'mysteries' is a countable noun. Hence 'less' is inappropriate. 'less' needs to be replaced with 'a few'. In part (2), the adjective 'precise' needs to be replaced with the adverb 'precisely'. In part (3), 'scattered view' is incorrect. One must use the plural: scattered views. (Note: 'Views from the fringes' would be either (i) views collected from those at the fringes or (ii) views of those looking inward from the fringes. 'views of the fringes' would be views of those looking outwards, towards the fringes. Both are correct.) Part (4) is error-free. Note that "like" is used for comparison and means "similar to". Suppose 'particles being in multiple places at once' was an oddity predicted by another branch of knowledge, not quantum mechanics, and quantum mechanics was in the business of predicting similar oddities, then, in that context, "like" would be correct. ("such as" in place of "like" would have a different meaning. "such as" means "for example" i.e. "one of the things that quantum mechanics predicts"). In part (5) 'insuparable' is a wrong spelling. The correct spelling should be: insuperable.

Ans: (4)

4. Part (1) is error-free. In part (2), there is an error of subject-verb agreement. The plural verb 'serve' is required for the plural subject 'roads and bridges'. Hence 'serves' needs to be replaced with 'serve'. Part (3) is not necessarily wrong. "would outstrip dedicated transport revenues of \$5 billion a year" means that expenses could exceed existing revenues, which are \$5 billion. [Note: If the phrase was replaced with "would outstrip dedicated transport revenues by \$5 billion a year", it would mean that expenses could exceed existing revenues, by a sum of \$5 billion. Both would be grammatically correct. It's just that they'd have different meanings.] Part (4) is error-free. In part (5), "steer off towards" does not indicate the correct meaning, which is that funds are being utilised for.... . The part should read: "..... steer \$1.7 billion of oil- and gas-production taxes towards the highway fund."

Ans: (134)

Solutions for questions 5 to 8:

5. On a careful reading of the sentences, it can be observed that sentence 2 is a general sentence that begins the paragraph. It mentions the three zones of the deep sea. Sentences 2 and 4 form a mandatory pair. "those terms" in sentence 4 links with "the bathyal, the abyssal and the hadal" in sentence 2. The thought "each more profound than the last" in sentence 4 links with "The farther down we go" in sentence 1. Hence, sentence 1 follows 4. Sentence 1 is followed by sentence 3. "The farther down we go the floor of the Marianas Trench" in sentence 1 is linked with "those remote depths of the sea" in sentence 3. "the less we know less studied" in sentence 1 is linked with "we can scarcely conjecture" in sentence 3. So, 2413. Sentence 5 is the odd sentence out as Verne's book needs mentioning. The opinion about the book does not gel with the remaining sentences.

Ans: (5)

6. On a careful reading of the sentences, it can be observed that sentence 5 is a general sentence that begins the paragraph. The terms "spectacular" and "mixed success" are further explained in sentences 1 and 4 respectively. The pronoun "it" in sentence 5 is further explained in sentence 1. Philae, a robotic probe, had landed on its target, a comet. Sentence 4 with the contrast conjunction 'but' follows sentence 1. "Things had not gone entirely to plan" in sentence 4 hints at "mixed success" mentioned earlier in sentence 5. Sentence 2 (Philae was down in the wrong place) further elaborates on the point mentioned in sentence 4 (Things had not gone entirely to plan). So, 5142. Sentence 3 is the odd sentence out as it needs a precedent and more substantiation.

Ans: (3)

7. On a careful reading of the sentences, it can be observed that sentence 4 is a general sentence that begins the paragraph. Sentences 4 and 3 form a mandatory pair. "agriculture permitted the human population to expand its size" in sentence 4 links with "That it permitted the population to expand its range as well" in sentence 3. Also "obvious" in sentence 4 links with "a more subtle point" in sentence 3. Sentence 3 is followed by sentence 2. "shows a fascinating example of just that" in sentence 2 links with "is a more subtle point" in sentence 3. Sentence 2 is followed by sentence 5. "new crop not only allowed people to colonize the highest reaches of Tibet when the weather was actually getting colder" in sentence 5 substantiates "agriculture permitted the population to expand its range as well" mentioned earlier in sentence 3. So, 4325. Sentence 1 is the odd sentence out as it needs a precedent and more substantiation.

Ans: (1)

8. On a careful reading of the sentences, it can be observed that sentence 3 is a general sentence that begins the paragraph. It establishes the background of the story: the most important guinea worm in history has already found its home. Sentences 3 and 1 form a mandatory pair. "this long white parasite" in sentence 1 links with "most important guinea worm in history" in sentence 3. "has already found its home" in sentence 3 links with "Its host does not know it yet, but inside his or her body" In sentence 1. Sentence 1 is followed by sentence 5. "she will feed and strengthen in the host's body" in sentence 5 follows "reproducing and growing" mentioned in sentence 1. "she will feed and strengthen in the host's body" in sentence 5 is followed by "Then slowly, excruciatingly, she will break through the skin release her larvae" (sentence 2). So, 3152. Sentence 4 is the odd sentence out as "this vicious cycle" needs a precedent and further elaboration.

Ans: (4)

Solutions for questions 9 to 12:

9. On a careful reading of the sentences, it can be observed that sentence 4 is a general sentence that begins the paragraph. It introduces the background of the para: most important date in the history of the personal computer revolution Sentences 4 and 2 form a mandatory pair. "most important date" in sentence 4 links with "that date" in sentence 2. The pronoun 'they' in sentence 2 points to "veterans of Silicon Valley" in sentence 4. Sentence 2 is followed by sentence 1. "That was when" in sentence 1 links with "January 1975" in sentence 2. The Altair 8800 is also introduced in sentence 1. Sentence 5 throws additional light on the Altair 8800 and follows sentence 1. Sentence 3 concludes the para. "World's First Minicomputer Kit to rival Commercial Models" in sentence 3 links with "do-it-yourself contraption that you could assemble at home" in sentence 5. "story" in sentence 3 points to "cover story" mentioned earlier in sentence 1. So, 42153. Sentence 5 will occupy the fourth position in the coherent paragraph.

Choice (D)

10. On a careful reading of the sentences, it can be observed that sentence 5 is a general sentence that begins the paragraph. It introduces Eragon as a fifteen-year-old farmboy and tells us about a polished blue stone that he encountered in the Spine. Sentence 5 is followed by sentence 3. "polished blue stone appears before him" in sentence 5 links with "takes the stone to the farm" in sentence 3. Also "lives with his uncle, Garrow, and his cousin, Roran" in sentence 3 links with "Garrow and his late wife, Marian, have raised Eragon" in sentence 2. Hence sentence 2 follows sentence 3. Sentence 2 is followed by sentence 1. Later, a baby dragon emerges from the stone. Sentence 1 is followed by sentence 4. "When Eragon touches her" in sentence 4 links with "a baby dragon emerges" in sentence 1. Sentence 4 concludes the paragraph. So, 53214. Sentence 1 will be placed in the fourth position.

Choice (C)

11. On a careful reading of the sentences, it can be observed that sentence 2 is a general sentence that begins the paragraph. It introduces the background: the life of a rice farmer and mentions the location: in the Pearl River Delta. Sentence 2 is followed by sentence 1. "Think for a moment life of a rice farmer must have been like" in sentence 2 links with "3000 hours a year is a staggering amount of time for a rice farmer to spend working planting and weeding in a rice paddy" in sentence 1. Sentence 1 is followed by sentence 5. "However" in sentence 5 (redeemed nature of that work) contrasts the point made in sentence 1 (staggering amount of time involve being bent over in the hot sun, planting and weeding in a rice paddy). Sentences 4 and 3 in that order expand on the point made in sentence 5. Hence sentence 5 is followed by sentence 4 which in turn is followed by sentence 3. So, 21543. Sentence 3 will conclude the coherent paragraph.

Choice (C)

12. On a careful reading of the sentences, it can be observed that sentence 3 is a general sentence that begins the paragraph. It introduces the background: Building a "Great Green Wall" (*mentioned in quotes*) and mentions the name of the place: Africa. Sentence 3 which highlights a major challenge or tall order (Building a "Great Green Wall" of trees) is then followed by two major problems (land degradation and desertification) in sentence 5. Hence sentence 3 (**tall order**) is followed by sentence 5 (**twin problems pose a greater challenge still**). Sentence 2 follows sentence 5 with the contrast conjunction 'but'. "60 years after it was first proposed, just such a project is underway at the edge of the Sahara" in sentence 2 points to "Building a "Great Green Wall" of trees across the width of Africa" mentioned earlier in sentence 3. Sentence 2 is followed by sentence 1. In the segment, "thrust it into the limelight" in sentence 1, the pronoun "it" refers to "such a project" mentioned earlier in sentence 2. "footage of its progress" in sentence 1 links with "such a project is underway" in sentence 2. Sentence 4 compares the completed "Great Green Wall" of trees in Africa to the largest living structure in the world and mentions that its size would be three times the size of the Great Barrier Reef. So, 35214.

Hence three sentences are placed between sentences 3 and 4 in the coherent paragraph.

Choice (A)

Solutions for questions 13 to 16:

13. The usage of the word 'flush' is incorrect in sentences (3) and (4). In sentence (3), it should read 'flush with the ground'. Here 'flush' means 'of a surface exactly even with an adjoining one'; being level, straight or regular without variation. In sentence (4), the usage should be 'In a flush of patriotism' or 'Flushed with patriotism'. This means a rush of strong feeling or emotion.

The other statements have the correct usage of the word 'flush'. In sentence (1), "flushed out" means "driven out or dislodged", "to drive or force into the open." Another example can be: The rabbits were flushed out from the wooded area before the logging began.

With respect to sentence (2), for a person to "flush" is to become markedly red in the face and often other areas of the skin, from various physiological conditions like embarrassment.

In sentence (5), 'flush times' means 'plentiful, marked by abundance'.

Ans: (34)

14. "Buckle" is inappropriately used in sentences (1) and (5). In sentence (1), the correct usage should be: The prime minister was accused of buckling under to right-wing religious groups. This means give in, yield, concede, submit, surrender, succumb. Sentence (5) is also incorrect. The colt can break into a trot or a gallop. It may buck or it may even break into somebody's garden, but not "into a buckle".

The other sentences have the correct usage of the word 'buckle'. In sentence (2), "buckled" indicates that the old

man's knees were ready to collapse or that he was extremely tired. The phrasal verb 'buckled down' means exert oneself or get busy. In sentence (3), 'buckled' means "bend" or "collapse" or "distort" or "contort", or even "break". "fix a buckle" means to "fix a kink, bulge, or other distortion." In sentence (4), "buckled" means "to collapse".

Ans: (15)

15. The usage of the word 'rule' is incorrect in sentences (2), (3) and (4). Sentence (2) should have "thumb rule" and not "thumbs rule". In sentence (2), 'As a thumb rule' refers to a principle with broad application that is not intended to be strictly accurate or reliable for every situation; a way of calculating something which is not exact but which will help you to be correct enough.

Sentence (3) should read 'The judge gave his ruling...' or 'The judge ruled in favour of....'.

In sentence (4) 'rule rather than the exception' means the customary or normal circumstance, occurrence, practice, quality. 'rule your temper' means keep in check. But "rule your temper in" is **incorrect**. The part should read: you need to rule your temper if you wish to climb the corporate ladder.

The other sentences have the correct usage of the word 'rule'. The phrasal verb 'ruled out' in sentence (1) means 'excluded' or 'not considered'. In sentence (5), the idiom "bend the rules" means to do something or to allow someone to do something which is not usually allowed.

Ans: (234)

16. The usage of the word 'try' is incorrect in sentences (1) and (3).

Sentence (1) should read: "I need to try my hand at surfing." This means 'To attempt to do something for the first time.' Sentence (3) should read: My uncle allowed me to try **out** the car on the weekend. "try something out" means to test, experiment with, appraise, evaluate, check out, inspect, put into practice.

In sentence (2), 'tried' means 'to subject to great strain or hardship; tax.' In sentence (4), 'tried' refers to 'to conduct the trial of (a legal claim).' Sentence (5) suggests "to put to a severe test; subject to strain, as of endurance".

Ans: (13)

Solutions for questions 17 to 20:

17. Statement (i) is an inference. The second part of statement (i) i.e. the omission of veganism in Bill McKibben's approach to reducing greenhouse gas emissions might not seem a problem" is more a conclusion than an opinion and it is based on the first part "Given the nature of our current discourse on climate change". Statement (i) follows the definition of an inference: conclusion drawn about the unknown, on the basis of the known.

Statement (ii) is given as a reported statement, which can be verified. Vegans are **still considered** This makes statement (ii) a fact. If statement (ii) was changed to read: Vegans are a sort of "out there," a fringe group of animal rights activists with pasty skin and protein issues, then it would be an opinionated statement, a judgement. As it is, statement (ii) is a fact.

Statement (iii) offers an opinion through an example comparison. 'However' is a contrast conjunction and provides a continuation with the previous sentence. It provides a view contrary to the view that various people hold. Hence statement (iii) overall is a judgement.

Statement (iv) is a judgement. It provides an opinion about the reduced relevance or the unimportance of ending dirty coal or natural gas pipelines.

Statement (v) is a fact since it presents a reported statement. It might seem as a judgement at first (... veganism offers the single most effective path....). A closer look shows that the author himself is not presenting an opinion about veganism but is simply reporting the WPF's views regarding the same. The word 'shows' refers to an observation.

Since the five sentences can be classified as IFJJF, we represent the answer as 21331.

Ans: (21331)

Learner's Notes on Facts, Inferences and Judgments

- Information and ideas used, by an author, as Premises in an argument **are the author's Facts**. (The author presents these as statements of information that one has seen, heard or read and which are open to discovery and verification).

eg. 1) The sky is heavily overcast today. (**Fact**)

eg. 2) It can't get closer than this – A desperate farm worker, standing on the track and waving his towel frantically, managed to help avoid a major disaster this morning when, thanks to his signals, the GT express screeched to a halt a mere 6 feet from a spot where the rails had been removed from the tracks. (**Fact**)

- All Inferences (incl. Conclusions) i.e. what the author understands will follow, or can be expected to follow, from the Premises in an argument **are the author's Inferences**. However, such statements present understanding (logical derivation) only, and do not indicate opinion. The conclusions drawn about the unknown on the basis of the known.

eg. 1) It's likely to rain. (**Inference** – Understanding or belief based on prior knowledge)

eg. 2) There's a sudden cool and moist breeze, cloud over soon. (**Inference** – Understanding drawn from the knowledge that a cool and moist breeze is usually followed by the gathering of clouds)

eg. 3) The rain should bring the smiles back to the faces of our drought stricken farmers. (**Inference** – Expected rain would ease the suffering farmers who face drought.)

- When an author makes statements that go beyond presentation of understanding, and offer opinions, these **are the author's Judgments**. Statements indicating opinions, decisions, plans, strategies, recommendations, approval/disapproval, proverbs and so on would fall in this category.

eg. 1) You would do well to carry your raincoat (**Judgment** – Recommendation made)

eg. 2) Our nation is yet to develop in certain social aspects but, as even rural folk can sometimes demonstrate, sincere concern on the part of the common man is not one of them. (**Judgment** – While the words used may not seem to convey strong opinion, it is clear that the author is expressing approval of the outlook of the common man – a personal opinion.)

18. Statement (i) is a fact as it provides information about *The Golden Compass* and other relevant details.

Statement (ii) is overall a judgement. While facts like "production design and Computer Generated Imagery effects" are mentioned, adjectives like "fussed-over" and "relentless" offer opinions. Even the comparative analysis "more of its virtues are tied up in those than should be" is subjective and opinionated. Hence statement (ii) is a judgement.

Statement (iii) is a judgement. That the film is fast-paced is an assessment. In fact, the verb 'rushes' is an opinion, in this context.

Statement (iv) is the author's personal assessment of the film and hence can be labelled as a judgement.

Statement (v) offers opinion. It is once again a judgement, as it is the author's view on how the film compares to the book (..... without committing to the skeptical humanism and challenges to religion that define Pullman's series).

Since the five sentences can be classified as FJJJJ, we represent the answer as 13333. Ans: (13333)

19. Statements (i) and (ii) provide information which is encyclopaedic in nature, and can be easily verified.

Statement (iii) is inferential in nature: the author speculates about the motivation for using fragile glass tesserae. ".... were likely used...." is an understanding about the unknown, on the basis of the known (..... provide pure blues, reds, and greens that could not be found in the more durable natural stone.)

Statement (iv) provides facts which can be verified.

While the second part of statement (v) is factual in content, the use of a judgemental adjective such as 'plagiaristic' and the adverb-adjective combination "inherently illusionistic" in statement (v) give us a clue that this is the author's personal opinion. Hence statement (v) is a judgement.

Since the five sentences can be classified as FFIFJ, we represent the answer as 11213. Ans: (11213)

20. Statement (i) is the author's personal opinion about the new Firefox, so it is a Judgement. Words like "I think that" and "no longer a lumbering beast" make the statement an opinionated statement.

Statement (ii) is a fact which can be verified.

Statement (iii) is a fact. The main clause here is "... I'd been sticking with Firefox but not any more", telling you what the author did, not how he/she felt (that's incidental). This would be F.

In statement (iv), the author is making a prediction about the future impact of Firefox 3.5 based on its current features, so it is an Inference. The segment (The new release is sure to prompt Web designers to create pages tailored to the Web's new language) is a logical conclusion or understanding based on the first factual part of the sentence (Firefox 3.5 offers the best implementation of the standard – and because it's the second-most-popular Web browser in the world).

Statement (v) is a judgement as it presents a comparative opinion. The main clause here is "..... it isn't just (this)", followed by the comparison "..... it could well be (that)". This would be a judgement.

Since the five sentences can be classified as JFFIJ, we represent the answer as 31123. Ans: (31123)

Difficulty level wise summary - Section I	
Sub Section: VA	
Level of Difficulty	Questions
Very Easy	–
Easy	–
Medium	2, 6, 10
Difficult	1, 3, 4, 7, 8, 11, 13, 15, 16, 19
Very Difficult	5, 9, 12, 14, 17, 18, 20

SECTION – II

SUB-SECTION: DI

Solutions for questions 1 to 3:

1. Number of children younger than a child whose age is 11 years = 28
Rank of a child whose age is 11 years = $28 + 1 = 29$
Ans: (29)
2. Any child who is 13 years of age will have 34 children younger than him. Hence, for a child to be ranked 35, his age must be 13.
Ans: (13)
3. The total number of children at the summer camp = 51
The median age will be the age of the child who is 26th in ascending order of their ages. This will be 10 years.
Choice (B)

Solutions for questions 4 to 6:

Let Raw Material Cost, Utility Cost and Salary Cost in 2010 be 50x, 20x and 30x respectively.

4. The following table presents the Raw Material Cost, Utility Cost and Salary Cost (in terms of x) for the four years:

Cost	2011	2012	2013	2014
Raw Material Cost	56.5x	54.2x	58.6x	64.4x
Utility Cost	21.8x	24.4x	22.2x	23.3x
Salary Cost	30.9x	34.3x	30.2x	32x
Total Cost	109.2x	112.9x	111x	119.7x

- The Total Cost is the highest in 2014. Choice (D)
5. Utility Cost in 2014 = $20x \times 1.09 \times 1.12 \times 0.91 \times 1.05$
Utility Cost in 2012 = $20x \times 1.09 \times 1.12$
Required Percentage =
$$\frac{1.09 \times 1.12 \times 0.91 \times 1.05 - 1.09 \times 1.12}{1.09 \times 1.12} \times 100$$

 $= 0.91 \times 1.05 - 1 = -4.45\%$ Choice (B)
 6. From the table given in the above question, required percentage = $\frac{64.4}{119.7} = 53.8\%$ Choice (B)

Solutions for questions 7 to 10:

For Segment A, the distance as measured by Instrument I can be between 23.5 and 24.4999 (we can consider this to be 24.5 for the purpose of this calculation). Only then will Instrument I round off the distance to 24 SKM.

In Nautical Miles, the distance will be between $23.5 \times 0.5 = 11.75$ NM and $24.5 \times 0.5 = 12.25$ NM

From the reading of Instrument II, we can see that the distance can be between 13.5 SM and 14.5 SM.

In Nautical Miles, the distance will be between $13.5 \times 0.9 = 12.15$ NM and $14.5 \times 0.9 = 13.05$ NM.

From Instrument III, we can say that the distance of Segment A will be between 11.5 and 12.5 NM.

Hence, Instrument IV would have measured the distance of Segment A (in NM) as **12.2 NM**.

Solutions for questions 11 to 14:

The total number of movies directed by each of the directors can be obtained from the total number of hits and flops they had.

	Action	Sci-Fi	Comedy	Drama	TOTAL
Spielberg	6	D	G	I	14
Cameron	A	E	2	J	13
Allen	B	1	3	K	10
Kubrick	C	F	H	4	10
TOTAL	12	16	8	11	47

For Segment B, from Instrument I, we can see that the distance has to be between 11.25 and 11.75 NM.

From Instrument II, the distance has to be between 11.25 and 12.15 NM.

From Instrument III, the distance has to be between 10.5 and 11.5 NM.

Hence, the distance of Segment B can be **11.3 or 11.4 or 11.5 NM**.

For Segment C, from Instrument I, the distance has to be between 18.25 and 18.75 NM.

From Instrument II, the distance has to be between 17.55 and 18.45 NM.

From Instrument III, the distance has to be between 17.5 and 18.5 NM.

The distance of Segment C can only be **18.3 or 18.4 NM**.

For Segment D, from Instrument I, the distance has to be between 10.25 and 10.75 NM.

From Instrument II, the distance has to be between 9.45 and 10.35 NM.

From Instrument III, the distance has to be between 9.5 and 10.5 NM.

Hence, Segment D can only be **10.3 NM**.

For Segment E, from Instrument I, the distance has to be between 16.25 and 16.75 NM.

From Instrument II, the distance has to be between 16.65 and 17.55 NM.

From Instrument III, the distance has to be between 16.5 and 17.5 NM.

Hence, Segment E can only be **16.7 NM**.

For Segment F, from Instrument I, the distance has to be between 14.75 and 15.25 NM.

From Instrument II, the distance has to be between 13.95 and 14.85 NM.

For Instrument III, the distance has to be between 14.5 and 15.5 NM.

Hence, Segment F can only be **14.8 NM**.

The following table gives the distances as measured by Instrument IV:

Segment	Instrument IV
A	12.2
B	11.3/11.4/11.5
C	18.3/18.4
D	10.3
E	16.7
F	14.8

7. The length of Road Segment E as measured by Instrument IV is 16.7 NM. Choice (B)

8. The sum of the lengths of six Road Segments A, D, E and F is 83.6 NM. Hence, the length of Road Segments B and C must be 29.6 NM. This is possible only if B is 11.3 NM and C is 18.3 NM. The longest Road Segment, C, as measured by Instrument IV will be 18.3 NM.

Choice (A)

9. The least difference is for Road Segment F (0.2 NM). Choice (D)

10. The actual length of Road Segment A can be 12.21 NM. Choice (C)

A, B, C should add up to 6. Therefore, A, B, C can be 1/2/3 or 1/1/4. (not necessarily in the same order)

But B cannot be 1/3. Therefore, B can only be 2/4. A can only be 1/3 (Since Cameron directed 2 comedies). With these possibilities of A and B, C cannot take the value of 2. (No possibility exists for C to be 2). Hence C also can only be 1/3.
H,G should add up to 3. Therefore, H, G should be 1/2.

C,F,H should add up to 6. Therefore, C can be 1/3, F can be 1/2/3, H can be 1/2. All three should add up to 6.
The possible values of (C,F,H) are (3,2,1) or (1,3,2).

Case 1: (C,F,H) = (3,2,1)

A+B must be 3 and B cannot be 1. Therefore, B=2 and A=1.

The values are populated in the table below.

	Action	Sci-Fi	Comedy	Drama	TOTAL
Spielberg	6	D	2	I	14
Cameron	1	E	2	J	13
Allen	2	1	3	4	10
Kubrick	3	2	1	4	10
TOTAL	12	16	8	11	47

The values of I and J should 1 and 2. But neither can be 2 (Since Spielberg and Cameron both directed 2 comedy movies). Therefore (C,F,H) cannot be (3,2,1)

Case 2: (C,F,H) = (1,3,2)

There exists two possible values for (A,B), (1,4) and (3,2) (Since B cannot be 1 or 3).

Case 2a: (A,B) = (1,4)

K=2, G=1. I and J should add up to 5. I and J cannot take the value of 1 because A and G are 1. Therefore 1,4 is not possible. J cannot be 2. Therefore J can only be 3. Hence I can be 2.

	Action	Sci-Fi	Comedy	Drama	TOTAL
Spielberg	6	5	1	2	14
Cameron	1	7	2	3	13
Allen	4	1	3	2	10
Kubrick	1	3	2	4	10
TOTAL	12	16	8	11	47

Case 2b: (A,B) = (3,2)

K = 4 and G=1. (I,J) = (2,1)

	Action	Sci-Fi	Comedy	Drama	TOTAL
Spielberg	6	5	1	2	14
Cameron	3	7	2	1	13
Allen	2	1	3	4	10
Kubrick	1	3	2	4	10
TOTAL	12	16	8	11	47

The following table summarizes the above two cases (2a and 2b):

	Action	Sci-Fi	Comedy	Drama	TOTAL
Spielberg	6	5	1	2	14
Cameron	3/1	7	2	1/3	13
Allen	2/4	1	3	4/2	10
Kubrick	1	3	2	4	10
TOTAL	12	16	8	11	47

11. Spielberg directed 5 Sci-fi movies.

Choice (A)

13. The condition given in the question refers to Case 2b.
For Sci-Fi hits to be minimum, the hits from other genres should be maximum.
Total number of hits = 26

12. The given information refers to Case 2b. Cameron would have directed 3 Action movies.

Ans: (3)

Number of Action hits = 4

Maximum possible hits of Comedy and Drama combined
= $8+11 = 19$

However, Allen has 7 movies across Comedy and Drama genres and 6 Hits in total. Hence, there has to be at least one flop in any of these two genres (since they can't all be hits). Hence, the maximum possible number of hits in Comedy and Drama combined can only be $19 - 1 = 18$.

Total number of hits in these three genres = $18 + 4 = 22$
Therefore, the minimum number of hits in Sci-Fi genre is
 $26 - 22 = 4$.
Ans: (4)

14. The number of Drama movies directed by Cameron can be 1 or 3. Hence, the answer cannot be determined.

Choice (D)

Difficulty level wise summary - Section II	
Sub Section: DI	
Level of Difficulty	Questions
Very Easy	-
Easy	1, 2, 4, 5, 6
Medium	3, 11
Difficult	7, 8, 9, 10, 12, 14
Very Difficult	13

SUB-SECTION: LR

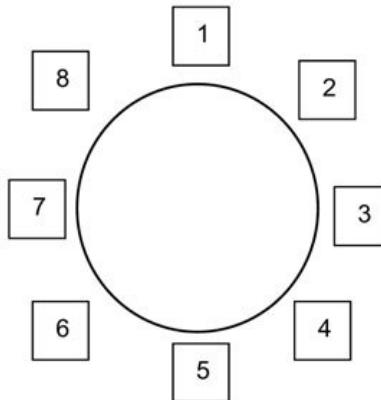
Solutions for questions 1 to 3:

Given that D is a Doctor (from (iii)), B is a female (form (iii)) and E is a male (from (i)). E is not a Plumber (from (i)), he is not a Teacher (since the teacher is a female), he is not a Doctor (since D is the doctor), he is not a Lawyer (since the lawyer is a female), he is not an Author (from (iv)). Hence, he must be a Nurse.

B cannot be the lawyer (from (v)), the doctor (from (iii)), the author (from (iv)), or Nurse (since E is the nurse). Hence, B must be either a Plumber or a Teacher.

Solutions for questions 4 to 6:

Let the adjacent diagram represent the table with numbered chairs.



Let Pavan be at 1. Raj will be at 8 from (v). Since Vikas is adjacent to Pavan, Vikas must be at 2. The chair at 3 must be empty.

If Utsav and Naveen are at 7 and 6 respectively, the other empty chair has to be at 5 (it cannot be at 4 since they should not be adjacent to each other). Tarun will then be at 4. But this will violate (iv). Hence, this case is not possible.

If Utsav and Naveen are at 6 and 5 in any order, the empty chair cannot be at 7 or at 4. This case is also not possible because the empty chair cannot be any place.

Hence, Utsav and Naveen must be at 4 and 5 in any order. Since the empty chair cannot be at 7, it has to be at 6 and Tarun will be at 7.

4. Vikas is sitting opposite an empty chair.

Choice (A)

5. Naveen must be sitting at 4. Utsav must be at 5 and opposite Pavan.
Choice (B)

From (iv), C and F bot can be males or both can be females. If they are both males, one of them will be an author. The other person cannot be plumber (from (iv)), a teacher (since teacher is female), lawyer (since lawyer is also a female). He cannot be a doctor or a nurse (since D and E are doctor and nurse respectively). Hence, they are not males.

Therefore, C and F are females. One of them is the author. Between the three females, B, C and F, one must be a lawyer. B and C cannot be the lawyer. Hence, F must be the lawyer and C must be the Author.

Since A cannot be a teacher, he has to be a plumber and B will be the teacher.

The following table presents the distribution:

Person	Gender	Profession
A	Male	Plumber
B	Female	Teacher
C	Female	Author
D	Male	Doctor
E	Male	Nurse
F	Female	Lawyer

1. B is a Teacher. Choice (B)
2. The Author is a female. Choice (A)
3. Only the statement given in option D is true. Choice (D)

Solutions for questions 7 to 10:

Given that Amar overtook only Himesh and there was one runner who started his race between Amar and Himesh. The runner between Amar and Himesh must have overtaken Himesh (since Amar overtook only Himesh). Chintu cannot be the runner between Amar and Himesh since he started the race immediately after David. Similarly, David also cannot be this runner. Since Chintu is not the runner who started the race between Amar and Himesh, the three runners who overtook other runners were Chintu, Amar and the runner between Amar and Himesh. Of these three, Chintu overtook two runners and the other two overtook one runner each. Since the runner between Amar and Himesh cannot be David, we can say that David did not overtake any runner. Hence, Chintu must have overtaken David and Gautam (since he started the race immediately after David).

If Gautam was the runner between Amar and Himesh, he must have overtaken only Himesh (since this runner would have overtaken only one runner). In this case, Chintu cannot overtake Gautam (since there will be more than one runner between Chintu and Gautam or Gautam will be behind Chintu throughout the race). Hence, the runner between Amar and Himesh cannot be Gautam. Hence, Gautam, David and Chintu would have started their race in this order.

The runner between Amar and Himesh has to be Balu. Himesh, Balu and Amar would have started the race in this order. However, Himesh, Balu and Amar could not have started their race after Gautam, David and Chintu as Amar will become the last person to start the race in this case. Hence, Himesh, Balu

and Amar started the race first followed by Gautam, David and Chintu.

Further, Balu would have overtaken Himesh first. Only then would Amar be able to overtake only Himesh. Chintu would have overtaken David and Gautam in that order during any point of the race.

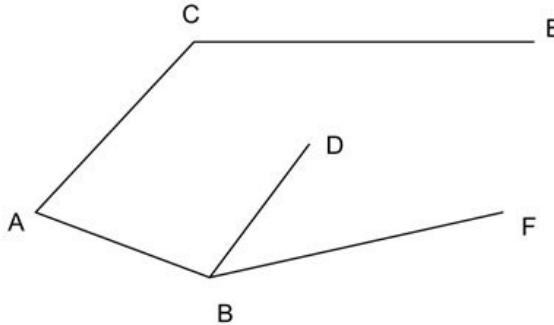
The following table gives the order in which each person started the race and the order in which each person finished the race:

Order	Start	Finish
1	Himesh	Balu
2	Balu	Amar
3	Amar	Himesh
4	Gautam	Chintu
5	David	Gautam
6	Chintu	David

7. Balu was the first to finish the race. Choice (C)
8. Balu overtook at least one other runner. Choice (D)
9. Himesh was overtaken by Amar and Balu. Choice (B)
10. David was the last person to finish the race. Choice (A)

Solutions for questions 11 to 14:

The following diagrams present the roads present during 2011 and 2012:



11. In 2011, a person can travel from city A to city F in only one way (ABF). Ans: (1)

12. In 2012, to travel from city D to city E, a person must pass through two cities (A and C OR B and F). Ans: (2)

13. In 2012, number of ways that a person can travel from city A to city F = 3 (ACEF, ADBF, ABF)

In 2013, possible routes are ABF, ABEF, ABDCEF, ADBF, ADBEF, ADCEF, ADCEBF, ACEBF, ACEF, ACDBF, ACDBEF = 11 ways

Required difference = 11 – 3 = 8 Ans: (8)

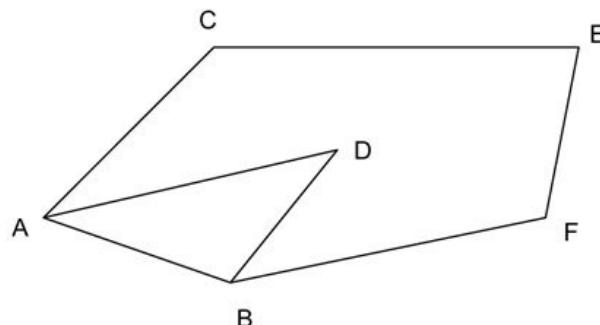
14. Option A: In 2012, a person will take the route BFE and in 2013, a person will take the route BE.

Option B: In 2012, a person will take the route DBF and in 2013, a person will take the same route.

Option C: In 2012, a person will take the route DBFE/DACE and in 2013, a person will take the route DBE/DCE.

Option D: In 2012, a person will take the route CAD and in 2013, a person will take the route CD.

Hence, the route remains unchanged only in option B. Choice (B)



SECTION – III: QA

Solutions for questions 1 to 25:

1. Given, $f(x) = \bar{x}$
 $g(x) = \cos[x]\pi$
 $\therefore gof(x) = g[f(x)] = g(\bar{x})$
 $= \cos[\bar{x}]\pi$
 $= \cos 0 = 1 \quad [\because 0 \leq \bar{x} < 1]$
 $\therefore \text{the range of } f(x) \text{ is } \{1\}$ Choice (B)
2. Let $5 \$ (3 \$ 2) = a$. Now, $\{1 \$ a\} = 1^a = 1$ (as $a = 5 \$ (3 \$ 2)$ is positive) and $\{10^{1.6} \# \log_{10}(0.1)\} = \{10^{1.6} \# -1\} = (-1)^{-1} = -1$, as $10^{1.6}$ is positive and $\log_{10}(0.1) = -1$, negative.
 $\therefore \{1 \$ [5 \$ (3 \$ 2)]\} \# \{10^{1.6} \# \log_{10}(0.1)\}$
 $= 1 \# -1 = (-1)^{-1} = -1$.

Alternative Solution:

Since all the numbers in $1 \$ [5 \$ (3 \$ 2)]$ are positive, the expression will give a positive number.

$$\{10^{1.6} \# \log_{10}(0.1)\} = \{10^{1.6} \# -1\} = (-1)^{-1} = -1$$

The first part (say x) of the given expression is positive & the second part = -1

Hence, $x \times -1$ will be negative & $x \# -1$ will be equal to $(-1)^{-1} = -1$ Choice (A)

3. The effect on the average ages of X and Y for different values of a are tabulated below.

Difficulty level wise summary - Section II	
Sub Section: LR	
Level of Difficulty	Questions
Very Easy	–
Easy	1, 3, 4, 5, 6, 11, 12
Medium	2, 7, 8, 9, 10, 13, 14
Difficult	–
Very Difficult	–

	X	Y
$a > 28$	decrease	increase
$a = 28$	decrease	no change
$24 < a < 28$	decrease	decrease
$a = 24$	no change	decrease
$a < 24$	increase	decrease

Given: Average age of only one class would not increase,
If $a < 24$ or $a > 28$, the given condition would be satisfied.
 $\therefore a < 24$ or $a > 28$. Neither (A) nor (B) specify all these
values
Choice (D)

4. The data is tabulated below:

		m	n
A	a_1	$a_m = 6x$	$a_n = 8x$
B	b_1	$b_m = a_1 = 5x$	$b_n = 7x$
C			$c_n = b_1$

As the common difference is the same for the 3 APs $a_i - b_i$ (as also $a_i - c_i$) is constant for all $i \in \mathbb{N}$.

Also $\frac{a_m}{b_m} = \frac{6}{5}$, we can assume that $a_m = 6x$ and hence $b_m = 5x$ i.e., the difference is x , which is constant for all i .

As $\frac{a_n}{b_n} = \frac{8}{7}$ and $a_n - b_n = x$

It follows that $a_n = 8x$ and $b_n = 7x$

As $a_1 = b_m$, $a_1 = 5x$ (i.e., $8x - 3x$)

And $b_1 = 4x$ i.e., $(7x - 3x)$ and $c_1 = c_n - 3x = b_1 - 3x = 4x - 3x = x$

$$\therefore \frac{a_1}{c_1} = \frac{5}{1}$$

Alternative Solution 1:

Assume $m = 2$ and $a_2 = 6$ and $b_2 = 5$.

Then $a_1 = b_2 = 5$ and also $a_2 - a_1 = d = 1$ and hence $b_1 = 4$.

Now, since $\frac{a_n}{b_n} = \frac{8}{7}$, $n = 4$.

Also given $b_1 = c_n$

$$\Rightarrow c_4 = b_1 = 4$$

$$\Rightarrow c_1 = 1$$

$$\therefore \frac{a_1}{c_1} = \frac{5}{1}.$$

Alternative Solution 2:

$$\frac{a_m}{b_m} = \frac{a_1 + (m-1)d}{a_1} = \frac{6}{5} \therefore (m-1)d = \frac{a_1}{5}$$

$$\because b_m = b_1 + (m-1)d = a_1 \Rightarrow b_1 = \frac{4}{5} a_1$$

$$\frac{a_n}{b_n} = \frac{a_1 + (n-1)d}{\frac{4a_1}{5} + (n-1)d} = \frac{8}{7} \Rightarrow (n-1)d = \frac{3a_1}{5}$$

$$\text{Now, } c_n = c_1 + (n-1)d = c_1 + \frac{3a_1}{5} = b_1 = \frac{4a_1}{5}$$

$$\therefore c_1 = \frac{a_1}{5} \quad \text{Choice (A)}$$

5. We can work out the total cost (C) of storage (S) and transportation (T) for the given options.

(A) Truck operates on days, 2, 4, 7.
Stock is stored on days, 1, 3, 5, 6.

Day	Stock stored
1	120
3	170
5	160
6	$160 + 150 = 310$

$$S = 5(120 + 170 + 160 + 310) = 3800 \\ T = 3(1000) = 3000. \quad \therefore C = 6800.$$

Similarly, we work out the C for the other 4 options.

(B)	(C)	(D)
1 120	1 120	1 120
3 170	3 170	2 300
5 160	4 410	4 240
450	6 150	6 150
	850	810
S 2250	4250	4050
T 4000	3000	3000
C 6250	7250	7050

We see that choice (B) results in the minimum value of C.
Choice (B)

6. The first tree grows (at a constant rate) by $\frac{1}{8}$ th of its initial height every year. The second tree grows by a rate which at any instant is proportional to its height at that instant.

Let us imagine the period of 1 year to be divided into n (where n is a large number) small intervals. Given that the first tree grows by h meters in 1 year, in the first interval,

i.e., $\frac{1}{n}$ th of a year, the first tree and also the second tree

will both grow by $\frac{h}{n}$ meters each i.e., their initial rates of growth are same. After one interval, the height of the second tree will be $8h + \frac{h}{n}$, i.e., $8h \left(1 + \frac{1}{8n}\right)$. In the

second interval, this will be the initial height of the tree and this height will further grow at a proportional rate, so that height at the end of the second interval will be

$$\left[8h \left(1 + \frac{1}{8n}\right)\right] \times \left(1 + \frac{1}{8n}\right), \text{i.e., } 8h \left(1 + \frac{1}{8n}\right)^2.$$

After n intervals (i.e., one year), it would be $8h \left(1 + \frac{1}{8n}\right)^n$.

This is similar to the formula for continuous compounding of an initial amount (Principal).

After 8 years, it would be $8h \left(1 + \frac{1}{8n}\right)^{8n}$. For continuous compounding, we take larger and larger value of n (smaller and smaller values of $\frac{1}{8n}$). The limit of this expression as n tends to infinity is $8he$. Hence, by the end of eight years, the height of the second tree would increase to $8he$ or by $8h(e - 1)$, where $e = 2.7183$, which is a growth of 171.8%.

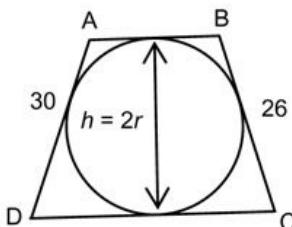
Alternative Solution:

The first tree grows from a height of $8h$ to $9h$ in one year, i.e., at the rate of 12.5% p.a. or $\frac{1}{8}$ of its initial height every year. For the second tree, the growth is (effectively equivalent to being) continuously compounded. At the end

of 1 year its height is $8h \left(e^{\frac{1}{8}}\right)$ and at the end of 8 years it

is $8h(e)$ or $8h(2.718)$. At the end of 8 years its height increases by $8h(1.718)$ or by 171.8%. Choice (B)

7. The size of the plot will be the minimum when all the four sides of the plot (i.e. trapezium) touch the pool.



Let the oblique sides be AD and BC. Since the circle is inscribed in ABCD, the sum of the lengths of opposite sides will be equal.

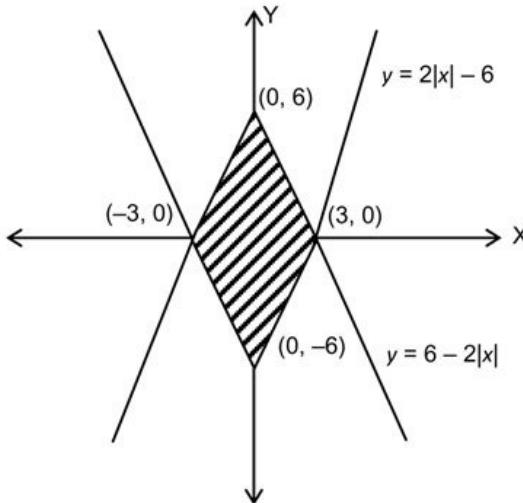
$$\text{Hence, } AB + DC = AD + BC = 30 + 26 = 56 \text{ cm}$$

$$\text{Also, height of the trapezium} = h = 2r = \text{diameter of circle} = 12 \times 2 = 24 \text{ m}$$

$$\text{Hence area of trapezium} = \frac{1}{2} (AB + DC) \times h = \frac{1}{2} \times 56 \times 24 = 672 \text{ sq.m}$$

Choice (B)

8. The following figure shows the two graphs.



The area enclosed is a rhombus of area

$$= \frac{1}{2} (3 + 3)(6 + 6) = 36 \text{ sq.units.}$$

Ans: (36)

9. $675 = 3^3 5^2$. There are 12 factors and 6 ways of expressing 675 as a product of 2 factors. One of the factors is not a multiple of 3, i.e., it is $3^0 5^x$.

One of the factors is not a multiple of 5. There are 2 cases. The non-multiple of 5 is the same as the non-multiple of 3, i.e., the factor is $3^0 5^0$ (The other factor would be $3^3 5^2$). Alternately, the non-multiple of 5 can be different from the non-multiple of 3, i.e., the factors are 5^2 (the non-multiple of 3) and 3^3 (the non-multiple of 5). Thus, there are only two rectangles which satisfy the given conditions.

Ans: (2)

10. Given $t_n = (t_{n-1} - 1)^2 + 1$

$$t_1 = 3 = 2^1 + 1$$

$$t_2 = 2^2 + 1$$

$$t_3 = 2^4 + 1$$

$$t_4 = 2^8 + 1$$

$$t_5 = 2^{16} + 1$$

.

.

.

The exponents of the 2's powers in the terms are
1, 2^1 , 2^2 , 2^3 , 2^4 ,

$$\therefore t_n = 2^{2^{n-1}} + 1$$

So let P be the required product of the first ten terms.

$$P = (2^1 + 1)(2^2 + 1)(2^4 + 1) \dots (2^{512} + 1)$$

By multiplying both sides by $(2^1 - 1)$, we get

$$(2^1 - 1)P = (2^1 - 1)(2^1 + 1)(2^2 + 1)(2^4 + 1) \dots (2^{512} + 1)$$

$$\Rightarrow P = (2^2 - 1)(2^2 + 1)(2^4 + 1) \dots (2^{512} + 1)$$

$$= (2^4 - 1)(2^4 + 1) \dots (2^{512} + 1)$$

$$= (2^{512} - 1)(2^{512} + 1) = 2^{1024} - 1$$

\therefore The required product is $2^{1024} - 1$.

Alternative Solution:

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

Now, the product

$$\text{of first term} = 3 = 2^2 - 1$$

$$\text{of the first two terms} = 3 \cdot 5 = 2^4 - 1$$

$$\text{of the first three terms} = 17 \cdot 15 = 2^8 - 1$$

Hence, a pattern is established as product of first n terms

$$= (2) \left(2^n \right) - 1$$

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

11. Let the product be p .

$$10^9 < 134125XY06 < 10^{10} \text{ and}$$

$$10^5 < 85AB22 < 10^6$$

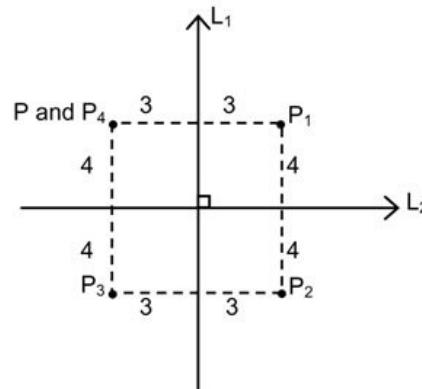
$$10^{15} < p < 10^{16} \text{ as } (1.34 \times 8.5 > 10)$$

Hence, p has 16 digits.

So, option A cannot be the answer.

Further, 134125XY06 and 85AB22 are both multiples of 2 but not of 4. The product of these two numbers must be a multiple of 4, but not of any other higher power of 2. Checking the last three digits of each option, we can see that option B is divisible by 4 but not by 8 whereas option C and option D are both divisible by 8. Hence, the product can be the number in only option B. Choice (B)

12. The given pair of lines can be observed to be mutually perpendicular. Hence the reflections will be as below.



Thus, P_4 coincides with P and $P_1P_2P_3P_4$ is a rectangle of area $= (3 + 3) \times (4 + 4) = 48$ sq.units. Choice (A)

13. $N = 210 = 2(3)(5)(7)$

We can partition these 4 prime numbers into 3 groups

Let us denote the 3 groups as g_1 , g_2 , and g_3 .

We get the following possibilities:

I $g_1 = 1$, g_2 is one of the 4 primes and g_3 is the product of the remaining 3

II. $g_1 = 1$, g_2 is the product of 2 of the 4 primes and g_3 is the product of the remaining 2

III. g_1 is one of these primes, g_2 is one of the remaining 3 primes and g_3 is the product of the remaining 2 prime numbers.

\therefore Required number of ways

$$= \frac{4!}{1!3!} + \frac{4!}{(2!)(2!)} \left(\frac{1}{2!} \right) + \frac{4!}{(1!)(1!)(2!)} \left(\frac{1}{2!} \right)$$

\therefore Required number of ways

$$= \frac{24}{6} + \frac{24}{4} \cdot \left(\frac{1}{2} \right) + \frac{24}{2} \cdot \left(\frac{1}{2} \right) = 4 + 3 + 6 = 13.$$

Ans: (13)

14. Total number of positive integral solutions of

$$x_1 + x_2 + x_3 + x_4 = 20 \quad \text{--- (1)}$$

$$\text{is } {}^{20-1}C_{4-1} = {}^{19}C_3 = \frac{19(18)(17)}{6} = 969$$

Let the number of positive integral solutions of (1), in which $x_1 > x_2$ be m

Then, the number of positive integral solutions of (1) in which $x_1 < x_2$ would also be m (by symmetry)

Let the number of positive integral solutions of (1) in which $x_1 = x_2$ be n then $2m + n =$ Total number of positive integral solutions of (1)

$$\therefore 2m + n = 969$$

If $x_1 = x_2 = \alpha$, then equations (1) reduces to $2\alpha + x_3 + x_4 = 20$

\therefore As α varies from 1 to 9, we get the 9 equations $x_3 + x_4 = 18$, $x_3 + x_4 = 16, \dots, x_3 + x_4 = 2$

The number of solutions is

$${}^{17}C_1 + {}^{15}C_1 + \dots + {}^1C_1 = 1 + 3 + \dots + 17 = 81$$

$$\text{now, } 2m + 81 = 969 \Rightarrow 2m = 888 \Rightarrow m = 444$$

Alternate Solution:

Since, $x_1 > x_2$, the least possible value of $x_1 + x_2$ is 3, when $x_1 = 2$ and $x_2 = 1$, i.e., x_1 and x_2 can be chosen in only one way. Hence, in this case x_3 and x_4 can be chosen in $({}^{(20-3)-1}C_{2-1}) = 16C_1 = 16$ ways. Now, if $x_1 + x_2$ increases

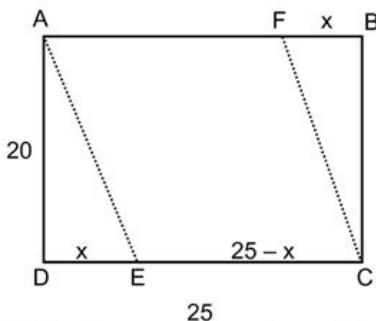
to 4, then also x_1 and x_2 can be chosen in only one way, while x_3 and x_4 can be chosen in ${}^{15}C_1 = 15$ ways. When $x_1 + x_2 = 5$, x_1 and x_2 can be chosen in 2 ways and x_3 and x_4 can be chosen in 14 ways; when $x_1 + x_2 = 6 \rightarrow$ 2 ways and x_3 and x_4 can be chosen in 13 ways.

Similarly, for $x_1 + x_2 = 7 \rightarrow$ 3 ways and x_3, x_4 in 12 ways, and so on.

In this manner, we get $(1 \times 16) + (1 \times 15) + (2 \times 14) + (2 \times 13) + (3 \times 12) + (3 \times 11) \dots + (8 \times 2) + (8 \times 1) = 444$.

Ans: (444)

15.



Let ABCD be the rectangular piece of land and let the AECF be the largest possible rhombus that can be cut from the plot.

Let $DE = x$

$$\text{Then } AE = EC = \sqrt{20^2 + x^2} = 25 - x$$

$$\Rightarrow 20^2 + x^2 = (25 - x)^2$$

$$\Rightarrow x = \frac{625 - 400}{50} = 4.5$$

\therefore Length of each side of the rhombus
= $25 - 4.5 = 20.5$ yards

\therefore Its perimeter = 4×20.5 or 82 yards. Choice (C)

16. Given, $\sin^{-1}x + \sin^{-1}(1-x) = \cos^{-1}x$

$$\text{Let } \sin^{-1}x = \theta_1 \Rightarrow \sin\theta_1 = x \Rightarrow \cos\theta_1 = \sqrt{1-x^2}$$

$$\text{Similarly, Let } \sin^{-1}(1-x) = \theta_2 \Rightarrow \cos\theta_2 = \sqrt{1-(1-x)^2}$$

$$\text{and Let } \cos^{-1}x = \theta_3 \Rightarrow \sin\theta_3 = \sqrt{1-x^2}$$

Given equation is now simply $\theta_1 + \theta_2 = \theta_3 \rightarrow$ (1)

Taking sine value on both sides of (1)

$$\sin(\theta_1 + \theta_2) = \sin\theta_3$$

$$\Rightarrow \sin\theta_1 \cos\theta_2 + \cos\theta_1 \sin\theta_2 = \sin\theta_3$$

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

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

$$x\left(\sqrt{1-(1-x)^2} - \sqrt{1-x^2}\right) = 0$$

$$\Rightarrow x = 0 \text{ or } \sqrt{1-(1-x)^2} = \sqrt{1-x^2}$$

$$\text{i.e., } x = 0 \text{ or } x = \frac{1}{2}$$

$$\text{When } x = 0, 2x^2 - x + 1 = 1$$

$$\text{When } x = \frac{1}{2}, 2x^2 - x + 1 = 2\left(\frac{1}{4}\right) - \frac{1}{2} + 1 = 1$$

Alternative Solution 1:

Using options, if choice (A), is correct we get $2x^2 - x + 1 = 0$, for which x cannot be real, since the discriminant is negative. Similarly, for choice (B) also, x cannot be real. Given the other two choices, the correct answer must be choice (C).

Alternative Solution 2:

$$\text{Let } \sin^{-1}x = \alpha \text{ and } \sin^{-1}(1-x) = \beta$$

$$\Rightarrow \cos^{-1}x = 90 - \alpha$$

$$\text{Given equation implies } \alpha + \beta = 90 - \alpha$$

$$\Rightarrow \beta = 90 - 2\alpha. \text{ Also, since } x + (x-1) = 1, \text{ we get}$$

$$\sin\alpha + \sin\beta = 1 \Rightarrow \sin\alpha + \sin(90 - 2\alpha) = 1$$

$$\Rightarrow \sin\alpha + \cos 2\alpha = 1 \Rightarrow \sin\alpha + (1 - 2\sin^2\alpha) = 1$$

$$\Rightarrow x + 1 - 2x^2 = 1 \Rightarrow 2x^2 - x + 1 = 1$$

Hence Choice (C). Choice (C)

17. Given $(x-1)(x-3)(x-5) \dots (x-23)$ has 12 factors.

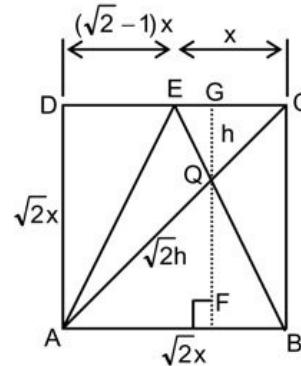
In the expansion, the first term is x^{12} and the second term is C_1x^{11} , where $C_1 = -(1+3+5+\dots+23) = -144$.

Ans: (-144)

18. After 256 years the number of toffees in each box will be 2^t times the number of toffees initially present. (where t is the number of seconds in a period of 256 years). Now, this is a constant, and the same for all the four boxes.

\Rightarrow The pair boxes which have the closest number of toffees presently will be the pair having the closest number of toffees after 256 years also. Choice (B)

19.



As AC is the diagonal, area of triangle ACD = Area of triangle ABC.

Further area of triangle AEB = Area of triangle ABC (As both are of same height and are on the same base)

As ΔAQB is common to both ΔAEB and ΔACB , area of triangle AEQ = Area of triangle CQB _____ (1)

In triangles ABC and ACD as $\Delta AEQ = \Delta CQB$

Area of triangle AQB = Area of triangle AED + Area of triangle CEQ

$$\Rightarrow 10 \text{ cm}^2 = \text{Area of triangle AED} + 5 \text{ cm}^2$$

$$\Rightarrow \text{Area of triangle AED} = 5 \text{ cm}^2$$

Alternative Solution:

ΔAQB and ΔQEC are similar as all their three angles are correspondingly equal.

$$\text{Also, since ratio of their areas} = \frac{10}{5} = 2,$$

$$AB = \sqrt{2} EC \text{ and } QF = \sqrt{2} GQ \text{ (where } GQ \text{ and } QF \text{ are altitudes)}$$

Let EC = x, and GQ = h, where $h(\sqrt{2}+1) = \sqrt{2}x$,

$$\Rightarrow h = \frac{\sqrt{2}}{\sqrt{2}+1}x$$

Now, since area of $\triangle AQB = 10$ sq.cm.,

$$\frac{1}{2} \times \sqrt{2}(x) \times \sqrt{2}(h) = 10$$

$$\Rightarrow \frac{1}{2} \times \sqrt{2}(x) \times \sqrt{2}\left(\frac{\sqrt{2}}{\sqrt{2}+1}(x)\right) = 10$$

$$\Rightarrow x^2 = \left(\frac{\sqrt{2}+1}{\sqrt{2}}\right) \times 10$$

$$\text{Now, Area of } \triangle AED = \frac{1}{2} \times DE \times AD$$

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

$$= \frac{1}{\sqrt{2}} \sqrt{2}(\sqrt{2}-1) \frac{(\sqrt{2}+1)}{\sqrt{2}} \times 10 = \frac{1}{2} \times 10 = 5 \text{ sq.cm.}$$

Choice (B)

20. If a number N written in base 8 has 6 digits, then $8^5 \leq N < 8^6$
That is $2^{15} \leq N \leq 2^{18} \rightarrow (1)$

Similarly, the number N, when written to base 16 has 4 digits.
 $\therefore 16^3 \leq N < 16^4$

That is $2^{12} \leq N < 2^{16} \rightarrow (2)$

From (1) and (2) $2^{15} \leq N < 2^{16}$

Hence, when written to the base 2, N will have 16 digits.

Choice (C)

21. As (11 men + 16 boys) take 2 days

\Rightarrow (22 men + 32 boys) take 1 day $\rightarrow (1)$

Also, as (5 men + 11 boys) take 4 days

\Rightarrow (20 men + 44 boys) take 1 day $\rightarrow (2)$

$\therefore 22 \text{ men} + 32 \text{ boys} = 20 \text{ men} + 44 \text{ boys} \Rightarrow 1m = 6b$.

Hence, 11 men and 16 boys work = 82 boys work and
1 man and 4 boys work = 10 boys work.

\therefore Time taken by 1 man and 4 boys to complete the work

$$= \frac{82 \times 2}{10} = 16 \frac{2}{5}$$

Choice (A)

22. A person doesn't win a prize if all the 5 tickets that he picked are not prized. The probability that the person wins no prize is

$$\frac{6c_5}{12c_5} = \frac{1}{132}$$

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

$$= 1 - \frac{1}{132} = \frac{131}{132}$$

Choice (B)

23. From the figure $f(x) = mx$ (where m is the slope)

$g(x) = mx - 2$ and $h(x) = 2$

\therefore clearly $g(x) + h(x) = f(x)$

Choice (C)

24. $x = \sqrt{2} - 1$.

We have $(x+1)^4 = x^4 + 4x^3 + 6x^2 + 4x + 1$

Hence, $(x+1)^4 = (\sqrt{2})^4$.

$(x+1)^4 = 4$

Hence, the given expression $= (x+1)^4 + 6 = 4 + 6 = 10$

Alternative Solution:

Using the on-screen calculator, we find $x \approx 0.414$

We can use the calculator to find the approximate value of the expression $x^4 + 4x^3 + 6x^2 + 4x + 7$ which will be close to 10.

Choice (D)

25. The total number of five-digit numbers that can be formed using only the digits 4, 5 and 6 is $3^5 = 243$

(Each of the 5 places can be filled by 4, 5 or 6, i.e., in 3 ways.)

The number of five-digit numbers having only one 5

$$= {}^5C_1 (2^4) = 5(16) = 80$$

The number of 5 – digit numbers having no 5's = $2^5 = 32$

\therefore The number of ways in which 5 occurs

at least twice = $243 - (80 + 32) = 131$. Ans: (131)

Solutions for questions 26 and 27:

In the algorithm, for each value of $k = 1$ to 967, each a_i ($i = 1$ to 967) for which i is perfectly divisible by k (i.e., k is a factor of i) is identified and multiplied by (-1) .

Hence, each a_i is multiplied by (-1) exactly as many times as the number of factors that i has.

Now, the number of factors of any i ($i = 1$ to 967) is either odd or even.

Hence all a_i , for which the number of factors of i is even (i.e., i is not a perfect square), will be multiplied by $(-1)^{(2m)} = 1$. For all perfect square values of i , a_i will be multiplied by $(-1)^{(2nH)} = -1$.

Thus all the a_i , ($i = 1$ to 967), for which i is a perfect square, will become -1 , while all other a_i will remain as 1.

26. Since $i = 671$ is not a perfect square, $a_{671} = 1$.

Choice (C)

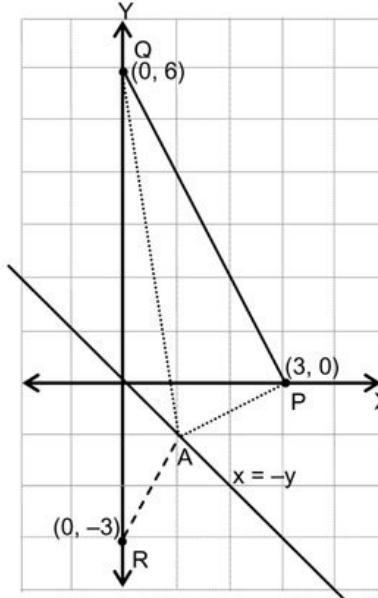
27. There are 31 perfect squares upto 967. Hence, there are $967 - 31 = 936$ (1)'s and 31 (-1)'s.

$$\therefore a_1 + a_2 + a_3 + \dots + a_{967} = 936 - 31 = 905.$$

Ans: (905)

Solutions for question 28:

28. Consider the following diagram, where R is the image of P in the line $x = -y$.



The image of $P(3, 0)$ in the line $y = -x$ is $R(0, -3)$.

Let A be an arbitrary point on the line $x = -y$.

$PA + AQ = RA + AQ$ and this would be the least when A lies on QR itself, i.e., when A coincides with the origin.

\therefore Perimeter of $\triangle PAB$ would be the least when $A = (0, 0)$

Choice (D)

Difficulty level wise summary - Section III: QA

Level of Difficulty	Questions
Very Easy	
Easy	2, 18, 21, 23, 24
Medium	1, 3, 7, 8, 10, 11, 12, 17, 19, 20, 22, 25, 26
Difficult	4, 5, 9, 13, 14, 15, 27
Very Difficult	6, 16, 28