

(Key and Solutions for AIMCAT1714)

Key

SECTION – I
SUB-SECTION: RC

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

SUB-SECTION: VA

- | | | | | |
|----------|----------|----------|------|-------|
| 1. 24153 | 3. 15243 | 5. 51423 | 7. 5 | 9. A |
| 2. 35124 | 4. 45132 | 6. 14 | 8. B | 10. D |

SECTION – II
SUB-SECTION: DI

- | | | | |
|--------|-------|-------|-------|
| 1. 36 | 5. 76 | 9. 10 | 13. B |
| 2. B | 6. C | 10. A | 14. C |
| 3. 592 | 7. C | 11. D | 15. A |
| 4. D | 8. A | 12. B | 16. C |

SUB-SECTION: LR

- | | | | |
|------|------|-------|-------|
| 1. 3 | 5. A | 9. C | 13. A |
| 2. 3 | 6. D | 10. 3 | 14. C |
| 3. 2 | 7. B | 11. B | 15. B |
| 4. D | 8. B | 12. D | 16. B |

SECTION – III: QA

- | | | | | |
|---------|---------|-------|--------|---------|
| 1. 900 | 8. C | 15. D | 22. A | 29. D |
| 2. C | 9. D | 16. A | 23. 5 | 30. 12 |
| 3. 30 | 10. 31 | 17. C | 24. B | 31. 27 |
| 4. C | 11. 60 | 18. D | 25. A | 32. D |
| 5. 1440 | 12. 2 | 19. C | 26. D | 33. 290 |
| 6. B | 13. 150 | 20. C | 27. 35 | 34. 7 |
| 7. 7 | 14. B | 21. B | 28. A | |

Solutions

SECTION – I
SUB-SECTION: RC

Solutions for questions 1 to 6:

Number of words and Explanatory notes for RC:

Number of words : 601

1. The passage presents differences between the terms "post industrial age", "industrial age" and/or "agricultural age".
Option A: The passage mentions that "Post industrialism" is a curious term and that it lacks a central concept. However, this does not imply that the age of post industrialism itself lacks a central concept. Hence, this option is incorrect.

Option B: According to the passage, "If there is a single concept that is the thrust of post industrial society, it is, no doubt, the explosion of information". However, the passage does not talk about the "explosion of agricultural and industrial techniques". Hence, this option is also incorrect.

Option C: The passage states that there is no central concept in the term "post industrialism". However, we cannot state that the term itself carries no meaning. Hence, this option is not the correct answer.

Option D: This option correctly captures what is mentioned in the passage regarding the term "post industrialism". The third para mentions that "post industrialism" lacks a central concept such as agriculture or industry to define its character.

Therefore, the correct answer is option D.

Choice (D)

2. The first paragraph of the passage describes the society in the industrial age. We can infer this from the second paragraph where it mentions that "Perhaps we shall walk back down the other side of the industrial peak and return to a scale of human organization and communication more natural to participatory democracy".

Option A: Industrialization has facilitated the expansion of society. But the level of civic participation is not high in industrialized societies. This is evident from the passage as it mentions that communication in the industrial age is not natural to participatory democracy. Further, the passage also states that "post industrial society that would self-consciously use technology to return to smaller-scale institutions and a renewed commitment to the traditional norms of civic participation". Hence, we cannot infer from this that civic participation is high in industrial society. Therefore, this option is incorrect.

Option B: In the passage, Masuda mentions that a post industrial society "would allow the individual to return to the self-reliance and individualism of the small town and villages of the eighteenth century". However, this does not imply that small towns and villages would re-emerge. Hence, this option is also incorrect.

Option C: We can infer from the passage that industrialization was not conducive to participatory democracy. Post industrial society "would self-consciously use technology to return to smaller-scale institutions and a renewed commitment to the traditional norms of civic participation". In post industrial society, the author feels that communication will be "more natural to participatory democracy." Hence we can say that involvement of individuals could be harmonious. Hence, this option is the correct answer.

Option D: The passage does not talk about post industrialism reducing the production output. In discussing civic participation the author uses the terms 'scale...more natural to participatory democracy' and 'traditional norms of civic participation'. Neither of these can be taken to mean 'a high level' – there isn't enough to support that. At best, they point to an 'appropriate' level/composition/arrangement of participation in a democratic environment. Hence, this option is incorrect.

Therefore, the correct answer is option C.

Choice (C)

3. According to Huntington, "the politics of post industrial society may strain the capacities of the political institutions that evolved in earlier times".

Option A: Huntington worries that "the mass media make it possible for 'magnetic and attractive personalities' to command the attention and mobilize the support of 'millions of unorganized citizens'". However, this does not imply that people without magnetic and attractive personalities cannot lead people. Hence, this option is not correct.

Option B: According to Huntington, the political institutions that "evolved in earlier times" may be strained. Further, "as in the case of the transition from agricultural life to industrial society, he posits that the changes may occur too fast and in too disconnected a manner for political institutions to adjust". We can infer from this that the political institutions that "evolved in earlier times", i.e., in industrial age, might become obsolete in post industrial age. Hence, this is the correct answer.

Option C: Huntington does not talk about democratic political institutions in specific. Rather, he made a prediction about all political institutions in general. Hence, this option is incorrect.

Option D: While Huntington does state that extremist movements may occur in the post industrial society, we cannot infer that they will be frequent. Hence, this option is also incorrect.

Therefore, the correct answer is option B.

Choice (B)

4. Masuda's vision is called by the author as an "intriguing utopian vision". According to Masuda, post industrialism "would allow the individual to return to the self-reliance and individualism of the small town and villages of the

eighteenth century, but with all the technical trappings and material wealth of the twentieth century".

Option A: Masuda does not state that small towns and villages will flourish. He only predicts that the individuals will become self-reliant and individualistic similar to the small towns and villages. Hence, this option is incorrect.

Option B: Masuda does not state that small towns and villages will have abundance of technology. Hence, this option is also incorrect.

Option C: According to Masuda, post industrial age will allow the individual to return to "the self-reliance and individualism of the small town and villages of the eighteenth century". Hence, this option is the correct answer.

Option D: While Masuda does state that citizens will be able to "control their own environments and to find information and education on issues of specialized interest conveniently and inexpensively". But, he does not state that individuals will be able to modify the information. Hence, this option is also incorrect.

Therefore, the correct answer is option C.

Choice (C)

5. Huntington mentions that "social strata that are in decline and are not integral to the new information economy may, as did the middle class of shopkeepers and small businessmen during the preceding transition, support extremist movements in a desperate attempt to reverse the economic changes"

Option A: Huntington does not imply that shopkeepers and small businessmen are not integral to the information economy. He only implies that they were not integral "during the preceding transition". Hence, we cannot imply that shopkeepers and small businessmen may support the extremist movements. The main reason that (a class of) people might support the extremist movements is that their relevance has diminished in the information age. Refer to the seventh para: Social strata that are in decline and are not integral to the new information economy may support extremist movements. Also "desperate attempt to reverse the economic changes" is a method to deal with their unhappiness that they experience after their relevance has been diminished. So the primary reason that extremist movements are supported is not that people want to reverse the economic changes but because their relevance has diminished in the information age and they would want to regain that relevance. Therefore, this is not the correct answer.

Option B: Huntington does not state that extremist movements can stem from any group. He mentions that it may stem only from those who are not integral to the information age. Hence, this option is also incorrect.

Option C: According to Huntington, extremist movements will be supported by social strata that are in decline and are not integral to the new information economy. Hence, this is the correct answer.

Option D: Huntington mentions that there might be a standoff between executive bureaucracy and media. But he does not mention that either of them may support extremist movements. Hence, this option is also incorrect.

Therefore, the correct answer is option C.

Choice (C)

6. The author mentions the statement given in the question in the second paragraph.

Option A: The author presents an illustration immediately after he makes the statement - "That would be something new indeed, a post industrial society that would self-consciously use technology to return to smaller-scale institutions and a renewed commitment to the traditional norms of civic participation". From this we can infer that, the institutions in post industrial society could resemble the institutions present prior to the industrial age. Therefore we can say that earlier societal forms and traditions could enjoy a resurgence. Hence, this is the correct answer.

Option B: If the size of the societies were larger in the post industrial age, it does not support the author's claim that

social effects are sometimes cyclical. 'Sometimes' can't be applied to all institutions and can't be taken to mean 'most likely'. Hence, this option is incorrect.

Option C: The author makes this statement to emphasize that the "a post industrial society that would self-consciously use technology to return to smaller-scale institutions". This is constrained only for mass media. Hence, this option is also incorrect.

Option D: The author states the exact opposite in the passage. Hence, this option is also incorrect.

Therefore, the correct answer is option A.

Choice (A)

Solutions for questions 7 to 12:

Number of words and Explanatory notes for RC:

Number of words : 607

7. The passage mentions that the art of war in the Middle ages has received "such unfortunate treatment at the hands of historians". The passage also mentions that this arises from "several causes". However, it specifically points out one cause for the unfortunate treatment.

Option A: The main reason that the passage mentions is that it is difficult to be well versed in two subjects at the same time: "the military problems of the period" and "knowledge of medieval historical writing". However, it does not mention that not a lot of people are acquainted with medieval military problems. Hence, this option is incorrect.

Option B: The passage does mention that the army officers' profession "has given them no preparation in historical method". But it does not state that they do not have time to study art of war. Further, the example cited in the passage mentions that "Delpech amassed an enormous amount of material, for he studied accounts of the battles of the eleventh, twelfth, thirteenth and early fourteenth centuries". Hence, this option is also incorrect.

Option C: We cannot infer from the passage that exaggeration in historical records was a reason why the subject was not properly studied.

Option D: The passage mentions that "it is not easy to be deeply versed in the military problems of the period and at the same time to possess considerable knowledge of medieval historical writing, with its peculiar problems of historical criticism". Hence, this is the correct answer.

Choice (D)

8. The passage talks about army officers trying to tackle the subject of art of medieval warfare. It also provides an example of an author, i.e., Delpech.

Option A: The passage mentions that the military officers do not get time for "preparation in historical method". However, it does not mention that they do not have time to study the available information. Hence, this option is incorrect.

Option B: The passage mentions that most of the officers "have not penetrated to the root of the specialized problem which arises". Further, the passage also mentions that Delpech "lacked that historical background and critical faculty which are indispensable to study the art of medieval warfare". Hence, we can conclude that most military writers often unable to critically analyse in depth the available historical writings on medieval warfare. Hence, this option is correct.

Option C: While Delpech "accepted all estimates of the number of troops at their face value", we cannot generalize this for most of the military writers. Hence, this option is not the correct answer.

Option D: The passage does not talk about military writers having less time to write comprehensive volumes. Also, the author described Delpech' work as "voluminous". Hence, this option is also incorrect.

Therefore, the correct answer is option B.

Choice (B)

9. The passage talks about various shortcomings of Delpech in his work.

Option A: The passage mentions that Delpech lacked the "historical background and critical faculty". Hence, this shortcoming is mentioned in the passage.

Option B: The passage also mentions that "texts from the period itself were often neglected in favour of later versions". Hence, this is also mentioned in the passage.

Option C: According to the passage, Delpech "accepted all estimates of the number of troops at their face value". Further, he "described battles without carefully sifting accounts of them". Hence, this is also mentioned in the passage.

Option D: The passage talks about how Delpech "tried to show that the armies of the thirteenth century based their operations on carefully thought-out tactics". However, the passage does not mention that he started his work with this hypothesis. Hence, this option is neither mentioned in the passage nor can we infer from the passage.

Therefore, option D is the correct answer.

Choice (D)

10. The passage talks about Delpech's work in the first paragraph and Delbrück's work in the last paragraph.

Option A: The passage mentions that "medieval knights of the twelfth and thirteenth centuries did not form tactical units". The individual fighters were the basis of tactics. In the first paragraph, Delpech tries to show that the tactics of warfare "were quite logical and compatible with the means of warfare then available". Hence, this is the correct answer.

Option B: The passage mentions that Oman, not Delpech, studied the English military affairs. Hence, this option is incorrect.

Option C: While the passage mentions that Delpech was misled by exaggerated accounts, it does not state that Delbrück was also misled. Hence, this option is also incorrect.

Option D: Delbrück did not discuss the compatibility of war tactics and means of warfare. Hence, this option is also incorrect.

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

11. Delbrück talks about the two different bases of warfare: tactical unit and individual fighters. In the last line of the passage, he states that the theory of "any real 'art of war'" was excluded" when individual fighter was considered as the basis of tactics.

Option A: We can infer from the passage that theory of any real art of war should not consider individual fighters. Hence, this option is incorrect.

Option B: Delbrück mentioned two bases for tactics in warfare. When individual fighters are considered the bases for war tactics, "the theory of any real 'art of war'" was excluded". He also states that in such a case "combat formations were of less importance and by no means essential". He also defines tactical unit as "a battle formation in which such discipline prevails that the individuals obey the orders of their commander as one". From this we can infer that real art of war involves battle formations and tactical units. Hence, this option is the correct answer.

Option C: From the passage, we can infer that individuals are not important in war tactics for "real art of war". Hence, this option is also incorrect.

Option D: We cannot infer from the passage that the commanders of tactical units put personal honour, fame and reputation above all else. Hence, this cannot be the correct answer.

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

12. The passage mentions Sir Charles Oman, Hans Delbrück, Wilhelm Erben and Ferdinand Lot as trained historians. Carl von Clausewitz is called the "best theoretician on the conduct of war". However, he may or may not have been a historian. Hence, the correct answer is option C.

Choice (C)

Solutions for questions 13 to 15:

Number of words and Explanatory notes for RC:

Number of words : 424

13. The author states that "empirical data show that when rigid cultural property laws are put in place, major archaeological excavations and discoveries slow markedly". He presents the survey that he conducted to corroborate his claim.

Option A: If the laws were present only in the developed countries, the claim would lie there, and would not necessarily weaken because of this. This option, therefore, does not necessarily weaken the author's claim.

Option B: The survey that the author presented says that "When you look into the history of the sites, you see that all but 21 were discovered before the passage of cultural property laws". If the laws were introduced only recently in most of the countries, this would explain why very few archaeological sites were discovered after the passage of these laws. Hence, if this statement is true, it would weaken the author's claim.

Option C: If the cultural property laws are beneficial to local archaeologists, it does not necessarily weaken the author's claim. Hence, this option is also incorrect.

Option D: This statement, if true, would strengthen the author's claim because foreigners will have little incentive to conduct archaeological surveys. Hence, this option is also incorrect.

Therefore, the correct answer is option B.

Choice (B)

14. According to the passage, "the drop in World Heritage Site discoveries after passage of cultural property laws suggests that external sources aren't as active as they were and domestic funding isn't offsetting the loss".

Option A: The passage does not mention that most of the archaeological sites were already discovered. Hence, this option is incorrect.

Option B: The passage states that "To the extent that source countries can fund their own archaeological projects, artifacts and sites may still be discovered" but "domestic funding isn't offsetting the loss". Hence, we understand that the source countries are not able to finance their own archaeological projects.

Option C: The passage does not talk about how piracy is affected due to these laws. Hence, this option is also incorrect.

Option D: This option cannot be inferred from the passage. Further, even if this were true, this cannot be a reason for the decline in archaeological discoveries.

Hence, the correct answer is option B.

Choice (B)

15. The passage talks about the purpose of cultural patrimony laws in the first and second paragraphs. It states that "Patrimony laws were intended to protect future archaeological discoveries against Western imperialist designs". We can infer from this that the primary purpose was to prevent prospective archaeological discoveries from leaving the country. Hence, the correct answer is option C.

Choice (C)

Solutions for questions 16 to 18:

Number of words and Explanatory notes for RC:

Number of words : 420

16. The answer to this question is available in the second paragraph.

Option A: Israel is the only country with a consistently growing Jewish population due to natural population increase. But 'natural factors' is not the main reason for an increase in the Jewish population in Europe and North America. So choice A is incorrect.

Option B: 'Better living conditions' has not been mentioned as a factor. So choice B can be eliminated.

Option C: The Jewish populations of other countries in Europe and North America have recently increased due to

immigration. Hence choice C is correct.

Option D: The third para of the passage mentions that there is less chance of intermarriage. Choice D is not specific to the question. Hence choice D is not true.

Choice (C)

17. The answer to this question is available in the third paragraph.

Option A: Many Jewish groups have tried to reach out to the assimilated Jewish communities of the diaspora in order to increase the number of Jews. Additionally, while in principle Reform Judaism favours seeking new members for the faith, this position has not translated into active proselytism, instead taking the form of an effort to reach out to non-Jewish spouses of intermarried couples. Hence choice A is correct.

Choices B and C have not been mentioned in the passage.

Choice (A)

18. Option A: Choice A is not true. Traditional Jews are against the idea of birth control because of religious reasons. (..... Orthodox and Haredi Jewish communities, whose members often shun birth control for religious reasons)

Option B: There is a trend of Orthodox movements pursuing secular Jews in order to give them a stronger Jewish identity so there is less chance of intermarriage. Hence choice B is correct.

Option C: "Make themselves strict observants of their religion" is more a consequence than a cause of Orthodox Jews wanting secular Jews to gain a stronger identity. Hence choice C is not the answer.

Option D: The word 'assimilated' in the context of the passage can be replaced by 'absorbed' or 'incorporated'. Choice D is not correct.

Choice (B)

Solutions for questions 19 to 24:

Number of words and Explanatory notes for RC:

Number of words : 732

19. By targeting drugs at that single step (that determines whether cells become cancerous), physicians would be able to stop a cell from becoming cancerous just as a **switchman stops a train from going down the wrong track**. It turns out that a gene called p53 may be that switch.

Option A: From a careful reading of the third para (p53 acts as the cell's director of damage control. A healthy cell sets it on the path to cancer, the cell switches into high alert the tumour-to-be is stopped dead) **and** the fourth para (Except when it doesn't the p53 gene goes bad by undergoing a mutation protein with a wrong molecule not able to suppress tumours), we can say that choice A is the correct description of how p53 can serve as a switch in keeping a cell normal or taking it down the cancerous path. So choice A is the answer.

Option B: Choice B is out of scope and is not an implication. We only know from the passage that until 1989 biologists thought that p53 caused cancer but in 1989 biologists discovered that p53 was a tumour killer. Hence choice B is incorrect.

Option C: Choice C is not the answer. The passage clearly explains the role of p53 in suppressing tumours. We cannot say that treating cancer depends on pure luck. "p53 is the gene whose useless mutant form, luckless families passed from parent to child" may seem misleading as far as the 'luck' factor is concerned.

Option D: Option D is the converse of what is stated in the passage. Actually, the normal (form of) p53 keeps cancer away while the mutant p53 could result in a cell becoming cancerous. Therefore choice D is not correct.

Choice (A)

20. It was not until 1989 that biologists separately discovered p53's true colours: it was a tumour killer. Some 2000 biologists dropped the date they brought to the dance **and latched onto the new area of research**. One can infer that the term "date" refers to the previous research subject.

Option A: The term "date" does not refer to the year 1989 The year 1989 cannot be dropped if one considers the given context. Hence choice A is not correct.

Option B: One of the previous research subjects of the biologists (before 1989) was the seeming ability of p53 to cause cancer. (Few researchers were interested in yet another one of those oncogenes). (We do not know if all the 2000 biologists were interested only in the subject of p53's ability to cause cancer). Ability of p53 to kill tumours is the new research area of cancer biologists from 1989 onwards. So choice B is not true.

Option C: The contemporary research subject of the biologists cannot be the "date" that was dropped. The "date" that was dropped has to be the "older" or "previous" research subject of cancer biologists. Hence choice C is fundamentally wrong. Also the current research subject of the biologists is to address the ability of p53 to kill tumours and not primarily the ability of rogue molecules to prevent p53 from suppressing cancer (though the latter can also be a related area of research). Hence choice C is not the answer.

Option D: Choice D is the answer. "erstwhile" means "in the past". The term "date" refers to the previous research subject wrt p53 for biologists.

Choice (D)

21. The answer to this question lies in para 3. The molecular biologist Carol Pives of Columbia University likens the p53 gene to an office clerk. The p53 supply builds up, p53 starts acting like an office clerk who, discovering a typo in an original document that is about to be copied, turns off the copier until he can fix the typo

Option A: p53 turns off the cell's copying machinery and stops the progression of cell cycle until the cell can repair its damaged DNA. So choice A is true and is not the answer.

Option B: The penultimate sentence of para 3 states that p53 may activate the transcription of proteins involved in DNA repair. Hence choice B is true and is not the answer.

Option C: The passage does not say that an office clerk is prone to committing typing errors. The fact that the p53 gene can make a garbled protein if there is a spelling mistake in one of its chemical letters (A, T, G and C) has been discussed in para 4. But this statement is not related to the question and therefore choice C is the answer.

Option D: The last sentence of para 3 also likens p53 to an office clerk. Sometimes p53 acts more like a clerk so disgusted with the many typos that he just trashes the document: p53 activates the cell's suicide software, resulting in apoptosis or programmed cell death. So, choice D is not the answer. (*Apoptosis is the "last resort" to avoid proliferation of cells containing abnormal DNA.*)

Choice (C)

22. The passage describes the role of p53 in suppressing cancer. It also describes reasons when p53 may fail in its role in keeping tumours at bay. The author uses simile/ metaphor/ analogy in describing the role of p53 in an attempt to make the passage vivid (..... as a switchman stops a train from going down the wrong track, biologists dropped the date they brought to the dance and latched onto the new area of research, p53 starts acting like an office clerk). Hence we can say that the style of the passage is descriptive. So choice B is correct. Option A: The passage does not present an argument or debate. There are no merits and demerits discussed. The author also does not take a stand in the passage. He dispassionately discusses the role of p53 in a neutral tone. The style is not argumentative. Hence choice A is incorrect. Option C: Analysis involves examining aspects of a situation in its pluses and minuses, and making an evaluation at the end of it. In this passage, the author is not analysing the role of p53.

Option D: The passage is not difficult to comprehend. It does not have difficult vocabulary and it is not abstruse. Hence choice D is also wrong.

Choice (B)

23. Option A: Para 6 only tells us that a single p53 mutant gene is enough to leave a cell with no healthy tumour-quashing

p53. But the passage does not say that the bad p53 gene could destroy the good p53 gene. Hence choice A is not the answer. The last para also states that if the mutant gene is churning out mutant proteins, then each four-ribbon tangle likely has a mutant among its strands. That is enough to keep the p53 ribbon from binding to DNA and halting tumour growth.

Option B: The second sentence of para 5 tells us that if the sperm or the egg from which a baby grew held a mutant p53, then every single cell of the 30 trillion in her body will also harbour a mutant copy. So choice B is unlikely.

Option C: The healthy copy should make enough p53 to keep tumours at bay. But p53 doesn't work that way. Each cell with one bad p53 gene is only one mutation away from completely lacking the function of this critical gene. That mutation can occur when the cell makes a spelling mistake as it copies its gene before dividing into two cells. Hence choice C is correct.

Option D: Choice D has been contradicted by para 5 and para 7 and is not the answer. A mistake in one copy of a p53 gene cannot be "cancelled out" when there is no mistake in the other copy of the same gene.

Choice (C)

24. It can be inferred on a careful reading of paras 5, 6 and 7 that choices A, B and C are true with reference to the 'spelling mistake' or 'mutant p53 gene' as discussed in the passage. Choice D is incorrect and is the answer.

Choice (D)

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

SUB-SECTION: VA

Solutions for questions 1 to 5:

1. On a careful reading of the sentences, it can be observed that sentence 2 is a general sentence that introduces the paragraph. There are two types of immunity: innate and acquired. Sentence 4 which highlights features of innate immunity follows sentence 2. Sentence 1 which details additional features of innate immunity (Innate immunity **also** causes) continues after sentence 4. Sentence 5 tells us what happens when the innate response fails and that the second line of defence (acquired immunity) comes into play. So sentence 5 follows sentence 1. "invaders are handled by adaptive immunity" (sentence 5) and "innate immunity rapidly responds to invaders entering the body" (sentence 4) talk about "adaptive immunity" and "acquired immunity" respectively. Sentence 3 concludes the paragraph with one distinguishing feature between "adaptive" and "innate" immunity, that the adaptive response requires time unlike the innate response which is rapid (mentioned in sentence 4). Hence 24153.

Ans: (24153)

2. On a careful reading of the sentences, it can be inferred that sentence 3 is general sentence that begins the paragraph. It provides the context (Boston Tea Party) and has the proper nouns "Sons of Liberty" alongwith the name of the place (Boston) and the date (December 16, 1773). Sentences 3 and 5 form a mandatory pair. "political protest" in sentence 3 links with "demonstrators" in sentence 5. Sentence 1 follows sentence 5. The pronoun 'they' in sentence 1 refers to 'demonstrators' in sentence 5. "boarded the ships and threw the chests of tea into Boston Harbor" in sentence 1 links with "destroyed an entire shipment of tea sent by the East India Company" in sentence 5. So, 351. Sentence 2 follows sentence 1 as it tells us that the British government responded to the protest of the demonstrators. Sentence 2 is followed by

sentence 4. "the episode escalated into the American Revolution" in sentence 2 links with "iconic event of American history" in sentence 4. Sentence 4 concludes the paragraph. Sentence 4 is given in the present tense while the other sentences have been mentioned in the past tense. Hence, 35124.

Ans: (35124)

3. On a careful reading of the sentences, it can be observed that sentence 1 is a general sentence that can begin the paragraph. It introduces "Inuit art" to us. Sentence 5 follows sentence 1. The pronoun "their" in sentence 5 refers to the "Inuits". Sentence 2 with the contrast conjunction "but" follows sentence 5. "that" in sentence 2 refers to "their preferred medium of artwork" in sentence 5. The establishment of southern markets for Inuit art in 1945 changed the preferred medium of artwork of the Inuits which earlier was walrus ivory. Sentence 4 tells us the preferred medium of artwork of the Inuits post 1945. Hence sentence 4 follows sentence 2. Sentence 3 is a claim of the Southern markets and is best left at the end of the paragraph. Sentence 3 concludes by telling us about the largest collection of contemporary Inuit art in the world. Hence 15243.

Ans: (15243)

4. On a careful reading of the sentences, it can be observed that sentence 4 is a general sentence that begins the paragraph. Music is considered a pastime. Sentences 4 and 5 form a mandatory pair. The pronoun 'it' in sentence 5 refers to 'music'. "To regard music as central might seem alien" in sentence 5 links with "music is considered a pastime" in sentence 4. Sentence 1 with the conjunctive adverb 'however' follows after sentence 5. "However deeply and widely music permeates our lives think differently" in sentence 1 contrasts "To regard it as 'central' rather than 'peripheral' might seem alien" in sentence 5. Hence 451. Sentences 1 and 3 form another mandatory pair. "when we actually look closely" in sentence 1 links with "And when we consider exactly" in sentence 3. "music is not merely constructed in keys but it may well hold the key to our existence" in sentence 3 links with " how deeply and widely it permeates our lives" in sentence 1 and "We need to regard it as "central" and not "peripheral"" (viewpoint expressed previously in sentence 5). Sentence 2 (**Even** the) concludes with a connotation of the word "entertainment" which is similar to that of "music". "something (entertainment) which is integral (entertain = hold together) to our being" in sentence 2 links with "it (music) may well hold the key to our existence" in sentence 3. Hence 45132.

Ans: (45132)

5. On a careful reading of the sentences, it can be observed that sentence 5 is a general sentence that begins the paragraph. Sentences 5 and 1 form a mandatory pair. "this 'fearful' rule" in sentence 1 links with "ruled Cambodia by fear" in sentence 5. "population of Cambodia" in sentence 1 points to "Cambodia" in sentence 5. Sentence 4 which lists more hallmarks of the organization continues after sentence 1 which primarily talked about 'deaths'. So, 514. It can be inferred that sentences 5, 1 and 4 are factual in nature. Sentence 2 (Despite controversy there is ample evidence) and sentence 3 (Our thesis is that) are opinionated statements. Sentences 4 and 2 form a mandatory pair. "scale of the lethal violence due to the policies of the organization" and "..... mass murder, terror and ethnic purity....." in sentence 2 links with "Terror, autarky, collectivisation, ethnic purity, and deliberate isolation" in sentence 4. Democratic Kampuchea (the full name has been mentioned) is implicated in the mass murders observed in Cambodia. Sentence 3 concludes by opining that DK (only abbreviations have been mentioned) set about complete decivilization of Cambodia through 'Angkar'. Sentence 3 throws more light on "Angkar" which had been introduced as the 'organization' in sentence 1. Hence, 51423.

Ans: (51423)

Solutions for questions 6 and 7:

6. Part 1 is correct. The phrases "nudges into life" and "nudges to life" are both used in contemporary contexts. Part 2 needs the correlative conjunction "not just but also". So the part should read "not just but also." Part 3 needs the phrasal verb "set against" and not "set in". The correct phrase would be "Set against the stunning back-drop". Part 4 is error-free. Part 5 needs the superlative adjective 'most' and not 'more'. So, the answer would be 14.

Ans: (14)

7. Part 1 needs the possessive noun "society's" and not the plural noun "societies". In part 2, the comparative degree "lesser" can be replaced with the positive degree "less". Also "than it was once" is improper construction. The part should read: than it once was. Part 2 should read: Yet work is a **less** generous, and (a) **less** certain, provider of these benefits than it **once was**. Sentence 3 has an error related to subject-verb agreement. The subject "economic growth" is singular and needs a singular verb 'has'. So the plural verb 'have' is incorrect. In part 4, there is an error related to the use of articles. "a world of work" is incorrect. The part should read "the world of work". Part 5 is error free.

Ans: (5)

Solutions for questions 8 to 10:

8. Choice A is incomplete as a summary. It does not mention that we find it difficult to consider writing to be a technology, just as printing and computers. Also "they all require tools and specialized equipment" in choice A is out of scope. Choice C is incomplete as it does not take into account the last sentence of the paragraph. Choice C again says that we fail to realize that writing is the most drastic of the three technologies. The para says that we fail to realize that writing is a technology in the first place. Choice D distorts facts. It says that writing initiated a drastic new technology whereas the para tells us that we find it difficult to consider writing to be a technology. Choice D goes on to say that we normally do not realize (*some other points not mentioned as such in the paragraph, viz.*) that writing initiated a drastic new technology, whose process printing and modern computers only continue. Choice B correctly summarizes the paragraph.

Choice (B)

9. Option B does not state the problem as mentioned in the first few sentences of the given paragraph. It does not spell out the solution mentioned at the end of the paragraph. The second sentence in choice B sounds extreme. Option C does not tell us what 'balance' or the middle path is and instead focuses more on the conflict. Choice C though incomplete is unnecessarily wordy. Option D is limited to the solution or the course of action provided by the author but does not detail what the problem is. Option A best summarizes the paragraph.

Choice (A)

10. Choice A is totally wrong because nowhere in the paragraph is it mentioned that time travel was considered impossible by Newton. In choice B, the second part is wrong because it is not the opinion of Einstein. Choice C is a complete distortion of fact. Only choice D summarizes the differences correctly.

Choice (D)

Difficulty level wise summary - Section I	
Sub Section: VA	
Level of Difficulty	Questions
Very Easy	-
Easy	-
Medium	2, 3, 8, 9, 10
Difficult	1, 4, 5, 6, 7
Very Difficult	-

SECTION – II
SUB-SECTION: DI

Solutions for questions 1 to 4:

Let $n_1, n_2, n_3 \dots$ represent the number of people who visited the restaurant on March 1st, 2nd, 3rd ... respectively.

From March 5th data,

$$n_1 + n_2 + n_3 + n_4 + n_5 = 160 \text{ and } n_5 = 31$$

$$\text{Hence, } n_1 + n_2 + n_3 + n_4 = 129$$

From March 6th data,

$$n_2 + n_3 + n_4 + n_5 + n_6 = 155$$

$$\Rightarrow n_2 + n_3 + n_4 = 104 \text{ and } n_1 = 25$$

Similarly, from March 8th data,

$$n_4 + n_7 = 62$$

From March 10th data,

$$n_7 + n_9 = 54$$

From the given condition, $n_7 = 18$ and $n_9 = 36$.

$$\text{Hence, } n_4 = 44 \text{ and } n_2 + n_3 = 60$$

From March 13th data, $n_{11} + n_{12} = 26$

$$\text{From March 15}^{\text{th}} \text{ data, } n_{15} + n_{14} + n_{13} + n_{12} + n_{11} = 94$$

$$\Rightarrow n_{14} = 94 - 36 - 18 - 26 = 14$$

$$\text{From March 18}^{\text{th}} \text{ data, } n_{16} + n_{17} = 89$$

$$\text{From March 20}^{\text{th}} \text{ data, } n_{19} = 15 \text{ and } n_{20} = 44.$$

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Number of people	25	60	44	31	20	18	44	36	30	26	18	14	36	89	42	15	44			

1. 36 people visited the restaurant on March 9th.

Ans: (36)

H by F. But in message 1 this is not the case. Hence, 47 must be the TID of D.

2. On March 14th, 14 people visited the restaurant. If the number of people who visited the restaurant on March 11th is less than 14, then the number of people who visited the restaurant on March 12th has to be at least 13 and at most 26. From the options, the answer is 25.

Choice (B)

3. Total number of people who visited the restaurant = 592

Ans: (592)

Message 5 would have been relayed through 31-F-D-64-G. By observing the network, we can see that 64 must be the TID of E. 31 cannot be the TID of D or J or K. Therefore, 31 must be the TID of H.

4. The number of people who visited the restaurant on March 4th = 44

But the number of people who visited the restaurant on March 16 and 17th combined is 89. Hence, one of these values will definitely be greater than 44. Therefore, the statement given in option D is definitely false.

Choice (D)

Message 3 would have been relayed through 53-G-F-K. 53 must be the TID of I or E. Since the TID of E is already known, the TID of I must be 53.

Message 6 would have been relayed through 61-59-E-G-F-J-K. 61 and 59 can only be A and C respectively (since B cannot relay a message to E through one other tower).

From Message 1, 19 must be the TID of tower B.

The following table gives the towers through which each message was relayed:

Message Number	Unique TID String
1	B D F K
2	D F J K
3	I G F K
4	K F G
5	H F D E G
6	A C E G F J K

Solutions for questions 5 to 8:

The message to tower L must be relayed through K or G. From the messages, the last relay tower in all the cases has an TID of 12 or 28. Therefore, 12 and 28 must be the IDs of K and G, in any order.

For Messages 3 and 4, K and G received the message from the same tower. The only tower which connects both K and G is F. Hence, the TID of F must be 76.

Message 2 was relayed from 76 (F) to 84 to 12(G/K). Any message from F to G cannot be relayed through just one tower. But a message from F can be relayed to K through just one tower (J). Hence, J will have an TID of 84, K will have an TID of 12 and G will have an TID of 28.

Message 1 and Message 2 both passed through F. Only four towers can relay a message to F – D, J, K and H. The TID of J and K are already known. 47 must be the TID of either D or H. H cannot relay a message to F unless the message was relayed to

5. The TID of tower F is 76. Ans: (76)
6. Tower G relayed the maximum number of messages (4) among the given options. Choice (C)
7. ID 59 represents tower C and TID 76 represents tower F. A message from tower C must be relayed through at least

two towers (E and G or E and D) to reach tower F.
Choice (C)

8. Message number 1 originated at tower B.
Choice (A)

Solutions for questions 9 to 12:

9. By observing the graph and the table, we can see that the routes that Ravi took on Day 3 must be different from the route that he took on Day 4. This is because even though the average speed has increased from Day 3 to Day 4 (implying a reduction in trip duration if he took the same route), the total fare increased. This implies that Ravi must have taken a longer route. Similarly, by comparing Day 3 and Day 5 we come to the same conclusion. Hence, Ravi must have used three different routes on Day 3, Day 4 and Day 5. Comparing the average speed and fare of Day 7 to Day 3, 4 and 5, we can see that Ravi must have used the same route on Day 3 as he used on Day 7 (this is because on Day 4 and Day 5, the average speed increased but the cost did not decrease).

Let the distance that Ravi travelled on Day 3 and Day 7 be a and let the per kilometre charge be k .

On Day 3, the total fare that Ravi paid will be equal to

$$k \times a + \frac{a}{25} \times 2 \times 60.$$

$$\therefore ka + \frac{120a}{25} = 183.52$$

$$\Rightarrow 25ka + 120a = 25 \times 183.52$$

From Day 7, $19ka + 120a = 19 \times 202.32$

Solving for ka and a , we get

$$ka = \frac{25 \times 183.52 - 19 \times 202.32}{6} \approx 124$$

$$\text{And } a = \frac{25 \times 183.52 - 25 \times 124}{120} = 12.4$$

Hence, $k = ₹10/\text{km}$.

Ans: (10)

10. Let t be the duration of Ravi's trip on Day 5.

$$10 \times 30 \times t + t \times 2 \times 60 = 203$$

$$\Rightarrow t = 0.4833 \text{ hours} = 29 \text{ minutes}$$

Choice (A)

11. Duration of Ravi's trip on

$$\text{Day 1: } t = \frac{223.2}{150 + 120} = \frac{223.2}{270}$$

$$\text{Day 2: } t = \frac{232}{200 + 120} = \frac{232}{320}$$

$$\text{Day 7: } t = \frac{202.32}{190 + 120} = \frac{202.32}{310}$$

$$\text{Day 8: } t = \frac{269.5}{160 + 120} = \frac{269.5}{280}$$

By observation, we can see that duration for Day 1 is greater than both Day 2 and Day 7. However, between Day 8 and Day 1, the duration on Day 8 is the highest.

Choice (D)

12. Ravi travelled along the longest route on Day 4 (from the previous question). He could not have travelled along the longest route on Day 3 and Day 7.

$$\text{Distance travelled on Day 2} = \frac{20 \times 232}{20 \times 10 + 2 \times 60} = 14.5$$

$$\text{Distance travelled on Day 4} = \frac{30 \times 215.6}{30 \times 10 + 2 \times 60} = 15.4$$

Distance travelled on Day 5 will not be the same as the distance travelled on Day 4 (the longest route).

$$\text{Distance travelled on Day 6} = \frac{36 \times 193.33}{36 \times 10 + 2 \times 60} = 14.5$$

$$\text{Distance travelled on Day 8} = \frac{16 \times 269.5}{16 \times 10 + 2 \times 60} = 15.4$$

Hence, Ravi travelled on the longest route on two days, Day 4 and Day 8.
Choice (B)

Solutions for questions 13 to 16:

13. The highest price of Silver during the eight days was on Day 6 in City D.

The profit that he would have made in this = $37000 \times 0.9 \times 10 - 320000 = 13000$

If he sold it for ₹36000 in City A, profit = $36000 \times 0.9 \times 10 - 320000 = 4000$

Hence, the maximum profit = ₹13,000
Choice (B)

14. If the profit percentage is to be the highest, he has to buy it at the cheapest price and sell it at the highest price. He cannot do both together because the price of silver reaches its lowest only after it reaches its highest. He can buy it at either City A or City E. But if he buys it at City E, he will be able to sell it at a higher price (in City D)

If he buys it at the cheapest price (i.e., ₹25,000), he can sell it at a price of $₹34500 \times 0.9 = 31050$

Profit percentage

$$= \frac{310500 - 250000}{250000} \times 100 = 24.2\%$$

If he sells it at the highest price (at $₹37000 \times 0.9 = 33300$), he can buy it at E for ₹27000.

Profit if he buys in E

$$= \frac{333000 - 270000}{270000} \times 100 = 23.33\%$$

By finishing his transaction before Day 6, he cannot make a higher profit. But we should also consider one more option which is buying it at 24000 on Day 7 in City E and sell it at 33000 on Day 8 at City D.

Profit percentage in this case

$$= \frac{330000 \times 0.9 - 240000}{240000} \times 100 = 23.75\%$$

Hence, the highest profit percentage = 24.2%.

Choice (C)

15. The time taken for Ravi to travel along ACDEB is 5 days, i.e., he can reach B earliest on Day 6. Hence, Ravi can spend an additional two days in any of the five cities.

He can stay in City A until Day 3. But the price of silver in City C on Day 2 is more than the price of silver in City A on Day 3. Hence, Ravi should travel to City C. It takes one day to travel between A and C. Even if he stays for two days in City A or City C, he cannot match this profit. Hence, Ravi travels to City C on Day 2.

Ravi buys 10 kg of silver at ₹28,000 and sells the silver in City C at $₹36,000 \times 0.9 \times 10 = ₹3,24,000$

The total profit in this transaction = ₹342,000 - ₹280,000 = ₹44,000

Even if Ravi stays in City C for two days, the price of silver will not decrease as compared to the price in City D. Hence, Ravi need not buy any silver in City C and travels to City D immediately.

He has two options from City D:

- He can buy the silver in City D at ₹28,000 and stay in City D for two days and sell the silver for $₹37000 \times 0.9 = ₹3,33,000$. This will result in a profit of ₹5,300 per kg. After this, he can travel to City E, buy silver at ₹24,000 and sell silver in City B at $₹27,000 \times 0.9$ making a total profit of ₹300 per kg.
- Or from City D, he can immediately travel to City E (where the silver is cheaper than in City D), purchase

silver at 27000 and sell this in City B at 34000×0.9. This will result in a total profit of 36000. Since the profit in the first case is higher, Ravi should take the first option.

Hence, the maximum profit in selling silver = 44000 + 53000 + 3000 = 100000
Choice (A)

16. We first need to find out in how many ways Ravi can visit all the five cities in eight days.

Starting from A, he can reach B on Day 4. He has to reach other three cities within 4 days. From B, he cannot travel to C or D (since it exceeds 8 days). Hence, he travels to E from B. From E, he can travel to C and D or D and C in that order. But if he travels to C and D, he will reach D on the 9th day. Hence, only one route is possible in this case, which is ABEDC.

If he travels to C from A, he will reach C on Day 2. From C, if he travels to E, he will reach E on Day 4. To travel between B and D takes 4 days. Hence, from E, after reaching either B or D, he cannot visit all the cities in 8 days. From C, if he travels to B, he reaches B on Day 7. It is not possible to visit the 5 cities using this route. From C, if he travels to D, he reached City D on Day 4. From D, he goes to E and B. Hence, ACDEB is one possible route.

If Ravi travels to D from A, he reaches D on Day 4. He cannot travel to B (since it takes 4 days). Also, he cannot travel from B to C (since it takes 5 days). Hence, the only possibility is ADCEB. However, this also exceeds 8 days.

If Ravi travels to E from A, he reaches E on Day 5. From here, he has to travel to each city on consecutive days which is not possible.

Therefore, only two routes are possible – ABEDC and ACDEB.

From the previous question, the maximum profit that he can make using ACDEB is ₹100000.

Using the route ABEDC, Ravi will travel for 8 days. Hence, he cannot stay in any city for more than a day.

Price of Silver in City A on Day 1 = 28000
Price of Silver in City B on Day 4 = 36000
Price of Silver in City E on Day 5 = 27000
Price of Silver in City D on Day 6 = 37000
Price of Silver in City C on Day 8 = 31000

Ravi will make the maximum profit if he purchases 10 kg silver in City A, sells it in City B, buys 10 kg silver in City E and sells it in City D.

Hence, the total profit (excluding transport costs)
 $= 36,000 \times 0.9 \times 10 - 2,80,000 + 37,000 \times 0.9 \times 10 - 2,70,000 = 1,07,000$
Choice (C)

Difficulty level wise summary - Section II	
Sub Section: DI	
Level of Difficulty	Questions
Very Easy	-
Easy	-
Medium	1, 2, 3, 5, 13, 14
Difficult	4, 6, 7, 8, 15
Very Difficult	9, 10, 11, 12, 16

SUB-SECTION: LR

Solutions for questions 1 to 4:

Given that Tarun selected 5 students from College B and two of them were from Computer Science.

Also, he selected 2 students from A. From C, D and E he must have selected 8 students. Since he has to select at least two students from each college, and from (v), Tarun must have selected 4 students from College C and 2 students from College D and College E.

Since Tarun selected 4 Computer Science students from the same college, he must have selected all the 4 from College C. Also from (iii), the two branches for which he selected all the students from a single branch cannot be Mechanical, Civil (from (vi)), Computer Science (from (ii)). Hence, the branches are Electronics and Electrical. Since he has to select 3 students from the same college in Electronics, he must have selected 3 from College B. The 2 students from Electrical must have been from College A.

The following table gives the distribution:

Subject	College A	College B	College C	College D	College E	Total
Electronics	0	3	0	0	0	3
Electrical	2	0	0	0	0	2
Computer Science	0	2	4	0	0	6
Mechanical	0	0	0	1	1	2
Civil	0	0	0	1	1	2
TOTAL	2	5	4	2	2	15

1. Tarun selected exactly two students in three Colleges, A, D and E.
Ans: (3)
2. Tarun selected three Electronics students from College B.
Ans: (3)
3. Tarun selected all the students from a single branch in two colleges.
Ans: (2)
4. Tarun selected the second highest number of students from College C.
Choice (D)

Solutions for questions 5 to 8:

From (ii), we know one aspect about each of the five photographers. From this we can say that the photographer who covered the Birthday did not visit on Monday or Tuesday. From (v), Harsh visited after the photographer who covered the Birthday. Hence, the photographer who covered the Birthday

would have visited on Wednesday or Thursday and Harsh would have visited on Thursday or Friday. Among the five photographers mentioned in (ii), Harsh can only be the person who printed 20 photos. From (vi), Harsh could not have visited on Thursday (since he printed 20 photos). Hence, Harsh must have visited on Friday.

From (i), Tarun could have visited the studio on Wednesday or Thursday or Friday. By comparing this with the five photographers in (ii), Tarun must be the photographer who covered the Birthday. From (vi), Pranav did not visit the studio on Monday. Hence, Pranav must have visited on Tuesday and Ratan on Monday.

From (iv), Ratan must have printed 10 photos more than Harsh (who visited on Friday). Hence, Ratan must have printed 30 photos. From (iii), Tarun must have printed 40 photos. From (vi), Tarun must have visited on Thursday. Pavan must have printed 50 photos and visited the studio on Wednesday.

Since Tarun visited on Thursday, the person who visited on Tuesday (Pranav) must have covered the wedding (from (i)). From (iv), Ratan did not cover the Inauguration. Hence, Pavan must have covered the Inauguration and Ratan must have covered the Conference.

The following table presents this information:

Name	Day	Event	Photos
Pavan	Wednesday	Inauguration	50
Ratan	Monday	Conference	30
Tarun	Thursday	Birthday	40
Harsh	Friday	Convocation	20
Pranav	Tuesday	Wedding	10

5. Pranav visited the studio on Tuesday.
Choice (A)
6. Pavan, who covered the Inauguration, printed 50 photos.
Choice (D)
7. The photographer who printed the minimum number of photos, Pranav, visited the studio on Tuesday.
Choice (B)
8. Only statements given in options B is correct.
Choice (B)

Solutions for questions 9 to 12:

Given that there is exactly one truth teller.

Let Ankur be the truth teller.

From his second statement, either of Piyush or Manish should have even number of marbles. Since the number of marbles that each person has is a prime number, one of them should have 2 marbles. But this will contradict his third statement. Hence, Ankur cannot be a truth teller.

Let Jai be the truth teller.

Piyush will have 3 marbles. Each person has less than 20 marbles. Ankur's third statement will be false. From Ankur's second statement, Manish must have 14 marbles. Hence, his second statement will also be false. Therefore, Ankur must be a liar. Hence, Ankur's first statement is also false and Ankur has 19 marbles.

Since each person has less than 20 marbles, Ankur will have the highest number of marbles. Hence, Manish's third statement is true. Since there is only one truth teller, Manish has to be an alternator. This implies that Manish's first statement will also be true. The total number of marbles with them will be 53. Since Ankur has 19 and Piyush has 3, Manish, Jai and Naveen combined should have 31 marbles.

The number of marbles that they have should be a number among 5, 7, 11, 13 and 17 (they cannot have 2 since the sum is odd).

If one of them has 17, then it is not possible for the other two to have 14 marbles from the list of numbers.

If one of them has 13, then the other two can have 11 and 7 marbles. By observation we can conclude that this is the only possibility.

Since Manish is an alternator, his second statement will be false (as his third statement is true). Naveen can have 13 or 7 marbles. From Jai's second statement, Jai should have either 15 or 9 marbles. Both these cases will result in Jai having non-prime number of marbles. Therefore, this case is also not possible.

Let Manish be the truth teller.

Naveen will have 11 marbles. If Ankur's second statement is true, one of them will have 2 marbles. But in this case, the sum of the marbles cannot be an odd number (53). Hence, Ankur's second statement is false. Ankur's third statement is also false because Naveen has 11 marbles. Therefore, Ankur is a liar and Ankur has 19 marbles.

Jai, Manish and Piyush should have 23 marbles between them. Jai's third statement must be true since Ankur, who has the highest number of marbles, has only 19 marbles. Hence, Jai must be an alternator and his first statement must also be true. Therefore, Piyush has 3 marbles. Hence, Jai and Manish together must have 20 marbles. This is possible only if they have 13 and 7 marbles. Since Naveen has 11 marbles, Jai cannot have 13 marbles (from Jai's second statement). Hence, Jai has 7 marbles and Manish has 13 marbles.

The following table presents the distribution:

Person	Number of Marbles	TT/L/A
Ankur	19	Liar
Jai	7	Alternator
Manish	13	Truth teller
Naveen	11	-
Piyush	3	-

9. Manish is the truth teller.
Choice (C)
10. Piyush has three marbles.
Ans: (3)
11. Two persons have less than ten marbles.
Choice (B)
12. Naveen has the third highest number of marbles.
Choice (D)

Solutions for questions 13 to 16:

From the information given in the question, the Premier has 24 days to meet the nine delegates and return to Xanadu. He will have to spend minimum of 5 days travelling and 12 days meeting the 9 delegates. This implies he has 7 days without any meetings (free days) and plans to spend the maximum number of days among the 7 days in Cambodia. Therefore, the Premier has to minimize the number of free days spent in the other two countries.

From condition (iv), (v), and (vi), the Premier must travel to either Bulgaria or Cambodia first (If he travels to Abyssinia first, he can leave Abyssinia only after March 14th spending 8 free days in Abyssinia which will not give him enough time to meet the other delegates)

If he travels to Cambodia first, he can only spend a maximum of 6 days in Cambodia which includes only 2 free days since he has to be in Bulgaria by March 9th to meet the Prime Minister (from iv).

In this case, the Premier will spend maximum of **6 days** in Cambodia. Hence, this is not possible.

Hence, the Premier will travel to Bulgaria on March 1st, meet the Prime Minister on March 2nd, meet the President on March 3rd, and meet the Foreign Minister on March 4th. Since he meets the President on March 3rd, it should either be a Tuesday, Wednesday, or a Saturday.

From condition i, 4 Sundays are present between March 1st and March 24th. Therefore, March 1st can only be a Friday, Saturday or a Sunday. Only one combination of March 1st and March 3rd are possible i.e., March 1st is a Sunday and March 3rd is Tuesday.

The Premier can travel either to Abyssinia or to Cambodia from Bulgaria.

Case 1.1: Travel to Cambodia from Bulgaria

In this case, the Premier will travel from Bulgaria to Cambodia on March 5th. He has to meet the President on two consecutive days. From condition (i), he can only meet him on Tuesday and Wednesday. March 10th and March 11th are the nearest Tuesday and Wednesday. But if he meets the President of Cambodia on these days, he cannot meet the Foreign Minister of Abyssinia for 3 days before March 16th (the Premier will travel on March 12th and 13th, but since March 15th is a Sunday, he cannot meet the Foreign Minister of Abyssinia on March 14th, 15th, and 16th). Therefore this case is **not possible**.

Case 1.2: Travel to Abyssinia from Bulgaria

In this case, the Premier will travel to Abyssinia on March 5th and March 6th. Since March 7th is a Saturday he cannot meet the Foreign Minister (because the Premier must meet him for 3 consecutive days) and he cannot meet the President as well (from vi). Therefore, he can meet the Prime Minister of Abyssinia on March 7th so as to not spend a free day in Abyssinia. He can meet the President the earliest on March 14th (which is a Saturday). Hence, he can meet the Foreign Minister on any three days between March 9th and March 13th.

On March 15th and March 16th, the Premier can travel to Cambodia. He has to meet the President on March 17th and 18th, because he can only meet the President on Tuesday and Wednesday and these days are the only available Tuesday and Wednesday. From March 19th to March 23rd, he has to spend any 2 days meeting the Prime Minister and the Foreign Minister (except for March 22nd which is a Sunday) and leave for Xanadu on March 24th. The Premier will **spend 7 days** in Cambodia.

Since the Premier has to spend at least 7 days in Cambodia, he will schedule his trip as given in Case 1.2.

The final schedule of the Premier's trip is given below.

March 1st: Travel to Bulgaria

March 2nd, 3rd, 4th (Mon, Tue, Wed): Meet Bulgaria's Prime Minister, President, and Foreign Minister.

March 5th – 6th: Travel to Abyssinia

March 7th (Sat): Meet Abyssinia's Prime Minister

March 9th – 13th: Meet Abyssinia's Foreign Minister for 3 consecutive days and 2 days without meetings

March 14th (Sat): Meet Abyssinia's President

March 15th – 16th: Travel to Cambodia

March 17th – 18th (Tue, Wed): Meet Cambodia's President

March 19th – 23rd: Meet Cambodia's Prime Minister and Foreign Minister on 2 days (except on March 22nd – Sunday) and 3 days without meetings

13. The Premier will definitely be travelling on March 5th.
Choice (A)

14. The Premier will meet Cambodia's President on Wednesday.
Choice (C)

15. The Premier has to meet the Foreign Minister of Abyssinia for 3 days between March 9th and March 13th. The possible combinations are: March 9th, 10th, 11th OR March 10th, 11th, 12th OR March 11th, 12th, 13th. In all three cases he will meet the Foreign Minister on March 11th.
Choice (B)

16. Only in Cambodia, the Premier will meet the Prime Minister after meeting the President.
Choice (B)

SECTION – III: QA

Solutions for questions 1 to 34:

- It is given that,
The distance covered, (d) $\propto t^2$.
 $\therefore d = kt^2$.
Distance covered in first 10 seconds = $k(10)^2 = 300$
 $\Rightarrow k = 3$.
Distance covered in the first 20 seconds = $k(20)^2 = 1200$
Therefore, the body covers $1200 - 1300 = 900$ m in the next 10 seconds.
Ans: (900)

- Let $8^a = 12^b = 18^c = K$
 $\therefore 8 = K^{1/a}$, $12 = K^{1/b}$ and $18 = K^{1/c}$
Now $(8)(18) = 12^2$
 $K^{1/a} K^{1/c} = K^{2/b}$
 $\therefore \frac{1}{a} + \frac{1}{c} = \frac{2}{b}$
 $\Rightarrow b = \frac{2}{\left(\frac{1}{a} + \frac{1}{c}\right)}$, i.e, b is the harmonic mean of a and c .

Choice (C)

- After 12 litres of milk is replaced by water, the quantity of milk remaining = $\frac{V-12}{V}(V)$

After the process is repeated two more times, the quantity of milk remaining in the beaker

$$= \left(\frac{V-12}{V}\right)^3 V$$

Ratio of the quantity milk to the total volume

$$= \frac{\left(\frac{V-12}{V}\right)^3 V}{V}$$

$$\text{Now } \left(\frac{V-12}{V}\right)^3 V = \frac{27}{27+98}$$

$$\Rightarrow \left(\frac{V-12}{V}\right)^3 = \frac{27}{125}$$

$$\Rightarrow \left(\frac{V-12}{V}\right)^3 = \left(\frac{3}{5}\right)^3$$

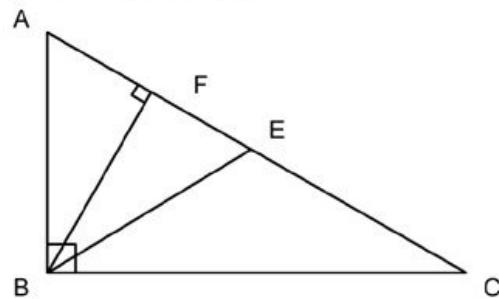
$$\therefore \frac{V-12}{V} = \frac{3}{5}$$

$$5V - 60 = 3V$$

$$\Rightarrow V = 30$$

Ans: (30)

- Consider the figure below.



$$AC = 2(AE)$$

$$\text{Now, } AB^2 + BC^2 = 4AE^2$$

$$\text{Area of } \triangle ABC = \frac{1}{2} (AB)(BC) = \frac{1}{2} (2AE)(BF)$$

$$\begin{aligned} \therefore \frac{AB}{BC} + \frac{BC}{AB} &= \frac{AB^2 + BC^2}{(AB)(BC)} \\ &= \frac{4AE^2}{(2AE)(BF)} \\ &= 2 \frac{BF}{AF} = 2 \times \frac{25}{24} = 2 \frac{1}{12} \end{aligned}$$

Choice (C)

5. The word LUCIFER consists of 4 consonants and 3 vowels. First we arrange the consonant in $4!$, or 24 , ways. Say, one of these arrangements is

— L — C — F — R —

Now, we can arrange the 3 vowels in the blank spaces shown above in $5C_3 \times 3!$ ways

Therefore, the total number of arrangements is

$$24 \times 5C_3 \times 3! = 1440 \quad \text{Ans: (1440)}$$

6. As $0 < x < \pi$, $\sin x$ is positive.

$\therefore x \sin x$ is a positive real number.

Let $x \sin x = t$

$$\begin{aligned} \text{We have } \frac{16x^2 \sin^2 x + 9}{x \sin x} &= (16x \sin x) + \left(\frac{9}{x \sin x}\right) \\ &= 16t + \frac{9}{t} \end{aligned}$$

Now, the product of the above two numbers is a constant (equal to 144). Hence, their sum will be minimum when they are equal.

$$\therefore (16x \sin x) = \left(\frac{9}{x \sin x}\right) = \sqrt{144} = 12$$

\therefore the required sum attains a minimum value of $12 + 12 = 24$. Choice (B)

7. $a = (26 - 15\sqrt{3})^{\frac{1}{3}} \Rightarrow a^3 = 26 - 15\sqrt{3}$

$$\therefore \frac{1}{a} = \frac{1}{(26 - 15\sqrt{3})^{\frac{1}{3}}} \cdot \frac{(26 - 15\sqrt{3})^{\frac{1}{3}}}{(26 - 15\sqrt{3})^{\frac{1}{3}}}$$

$$= (26 + 15\sqrt{3})^{\frac{1}{3}}$$

$$\Rightarrow \frac{1}{a^3} = 26 + 15\sqrt{3}$$

$$a^3 + \frac{1}{a^3} = 52$$

$$\left(a + \frac{1}{a}\right)\left(a^2 + \frac{1}{a^2} - 1\right) = 52$$

$$\left(a + \frac{1}{a}\right)\left[\left(a + \frac{1}{a}\right)^2 - 3\right] = 52$$

[It can be observed that $4(4^2 - 3) = 52$]

$$\text{Alternately, let } a + \frac{1}{a} = t$$

$$t(t^2 - 3) = 52$$

$$t^3 - 3t - 52 = 0$$

$$\Rightarrow (t-4)(t^2 + 4t + 13) = 0$$

$\therefore t^2 + 4t + 13 = 0$ gives imaginary roots

$$\therefore t = 4$$

$$\begin{aligned} \Rightarrow a + \frac{1}{a} &= 4 \\ a^2 - 4a + 1 &= 0 \\ \Rightarrow a &= \frac{4 \pm \sqrt{4^2 - 4}}{2} = 2 \pm \sqrt{3} \end{aligned}$$

Now, $2 + \sqrt{3}$ is not admissible, since $(26 - 15\sqrt{3}) < 1$

(and $(26 - 15\sqrt{3})^{\frac{1}{3}}$ is also < 1).

$$\therefore a = 2 - \sqrt{3}$$

$$\text{and } a^2 = 7 - 4\sqrt{3}$$

$$\Rightarrow a^2 - 6a = (7 - 4\sqrt{3}) - 6(2 - \sqrt{3})$$

$$= -5 + 2\sqrt{3}$$

$$= -5 + \sqrt{12}$$

Comparing the rational and irrational parts, $A = -5$ and $B = 12$.

$$\therefore A + B = 7.$$

Alternative Solution:

$$\text{Let } (26 - 15\sqrt{3}) = (p - \sqrt{q})^3$$

$$\Rightarrow p^3 - q\sqrt{q} - 3p^2\sqrt{q} + 3pq = 26 - 15\sqrt{3}$$

Comparing the rational and irrational terms

$$26 = p^3 + 3pq \quad \text{and } -\sqrt{q}(q + 3p^2) = -15\sqrt{3}$$

Now, by observation, trying $q = 3$, gives $p = 2$, which satisfies both equations

$$\Rightarrow a = (p - \sqrt{q}) = (2 - \sqrt{3})$$

$$\therefore a^2 - 6a = (2 - \sqrt{3})^3 - 6(2 - \sqrt{3}) = -5 + \sqrt{12}$$

$$\therefore A = -5 \text{ and } B = 12.$$

$$\Rightarrow A + B = 7.$$

Ans: (7)

8. The lowest number divisible by 112 and 180
 $= \text{LCM} (112, 180) = \text{LCM} (2^4 \times 7, 2^2 \times 3^2 \times 5)$
 $= 2^4 \times 3^2 \times 5 \times 7 = 5040.$ Choice (C)

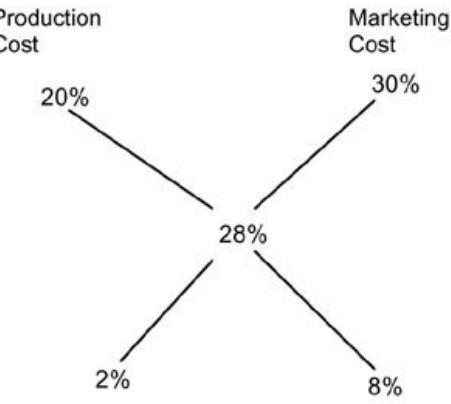
9. Let the initial cost of production and marketing be denoted by P and M respectively.
Initial total cost = $P + M$
Final total cost = $1.2P + 1.3M = 1.28(P + M)$
 $\Rightarrow 0.02M = 0.08P$

$$\frac{M}{P} = \frac{0.08}{0.02} = \frac{4}{1}$$

$$\therefore M = 4P$$

Alternative Solution:

Using approach of alligations



$$\frac{\text{ProductionCost}}{\text{MarketingCost}} = \frac{2}{8} = \frac{1}{4}$$

Therefore the marketing cost is 4 times the production cost.
Choice (D)

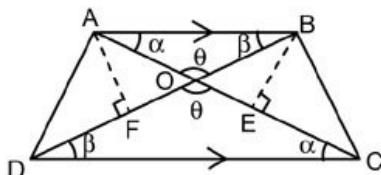
10. $x^2 - 3x + 2 = (x-1)(x-2)$, is a factor of the given expression.
Now, since $(x-1)$ is a factor of $f(x)$, $f(1) = 0$
 $f(1) = 1 + a - b + 26 = 0$
 $\Rightarrow b - a = 27$ _____ (1)
Similarly, $f(2) = 0$.
 $16 + 8a - 2b + 26 = 0$
 $\Rightarrow b - 4a = 21$ _____ (2)
Solving equations (1) and (2), we get $a = 2$ and $b = 29$
Thus $a + b = 31$. Ans: (31)

11. Let the speed at which the escalator is descending be e steps per second.
Let the time taken by A be t seconds.
 $30 + te$ = Total number of steps in the escalator.
In the time A covers 30 steps, B would cover 60 steps.
As B has covered 120 steps so the time taken must be $2t$.
 $120 - 2te$ = Total number of steps in the escalator
 $\therefore 30 + te = 120 - 2te$
 $3te = 90$
 $\Rightarrow te = 30$.
Thus the total number of steps in the escalator
 $= 30 + te = 60$ Ans: (60)

12. $(123)_5 = 1(5^2) + 2(5) + 3 = 38$
Factors of 38 are 1, 19 and 38.
It is given that, $(a3)_8$ is a factor of 38 as 38 is divisible by $(a3)_8$.
Since $(a3)_8 > 2$ and $(a3)_8$ is odd, it cannot be equal to either 2 or 38.
 $\therefore (a3)_8 = 8a + 3 = 19$, for $a = 2$. Ans: (2)

13. In the figure given below $\triangle AOB$ is similar to $\triangle COD$, since all three angles are equal.

$$\therefore \frac{AO}{CO} = \frac{BO}{DO} = \frac{2}{3}$$



Considering $\triangle ABC$, the ratio of the area of $\triangle ABO$ to the area of $\triangle BOC$ will be same as $AO : OC$ (since both triangles have same altitude, i.e., BE). Similarly, the ratio of

$$\text{Area of } \frac{\Delta ABO}{\Delta AOD} = \frac{BO}{OD}.$$

Also, in any trapezium, the areas of $\triangle BOC = \triangle AOD$ (since area of $\triangle ABC = \triangle ABD$)

$$\text{Hence, area of } \triangle AOB = \frac{2}{3} \times 36 = 24.$$

$$\text{Area of } \triangle AOD = \frac{3^2}{2^2} = \frac{9}{4}$$

$$\Rightarrow \text{Area of } \triangle COD = \frac{9}{4} \times 24 = 54.$$

$$\therefore \text{Area of trapezium ABCD} = 36 + 36 + 24 + 54 = 150.$$

Ans: (150)

14. $f(x) = 3x^2 - \tan x$
 $f(-x) = 3x^2 - \tan(-x) = 3x^2 + \tan x$
- $$\therefore \frac{f(-x) - f(x)}{4} = \frac{(3x^2 + \tan x) - (3x^2 - \tan x)}{4}$$

$$= \frac{\tan x}{2}.$$

Now, $\frac{\tan x}{2}$ is an odd function

Choice (B)

$$15. {}^{240}C_{120} = \frac{240!}{120! 120!}$$

P is a two-digit prime number, so P is present twice in the denominator. P will be a factor of ${}^{240}C_{120}$, if P is present (atleast) thrice in the numerator.

$$\therefore 3P \leq 240$$

$$P \leq 80.$$

Thus the maximum value of P is 79 (the greatest prime under 80). Choice (D)

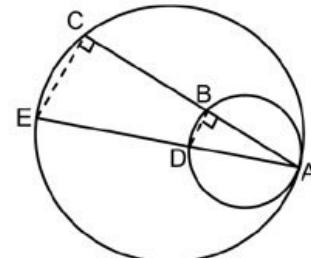
$$16. a \Psi b = (a - b)(a^3 + b^3)$$

$$(11) \Psi (-11) (11 - (-11)) (11^3 + (-11)^3) = 0,$$

since $(-11)^3 = -11^3$.

Choice (A)

17.



We construct a line AE passing through the centres of both the circles.

$$\angle ABD = \angle ACE = 90^\circ \text{ [Angle in a semi circle]}$$

Now $\triangle ABD \approx \triangle ACE$

$$\therefore \frac{AB}{AC} = \frac{AD}{AE} = \frac{1}{3}$$

\therefore Diameter of the smaller circle is one-third the diameter of the bigger circle.

Therefore fraction of the area of the outer circle that is not

$$\text{included in the inner circle} = 1 - \left(\frac{1}{3}\right)^2 = \frac{8}{9}$$

Note: In this question, the information about the area of the larger segment being three times of the smaller segment is redundant.

Choice (C)

18. Let the number of flowers of each variety picked by her be denoted by a, b, c, d and e respectively. As she needs to pick 12 flowers, we have $a + b + c + d + e = 12$, where $a, b, c, d, e \geq 0$

Now, the number of non-negative integral solution to the above equation is ${}^{(12+5-1)}C_{(5-1)} = {}^{16}C_4 = 1820$

Choice (D)

$$19. P + 8P \cdot \frac{r}{100} = 3P$$

$$\Rightarrow \frac{r}{100} = \frac{1}{4}$$

Let the sum become 30 times after N years

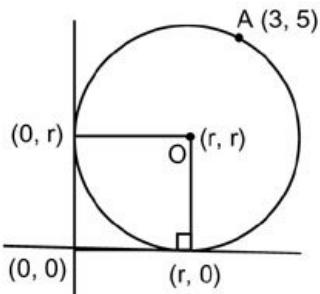
$$P + N \cdot \frac{Pr}{100} = 30P$$

$$N \cdot \frac{r}{100} = 29$$

$$N = 116$$

Choice (C)

20. Let the centres of the circle in the 1st and the 3rd quadrants be O (r, r) and P ($-R, -R$).



The distance between point O and point A is the radius of the circle in the 1st quadrant.

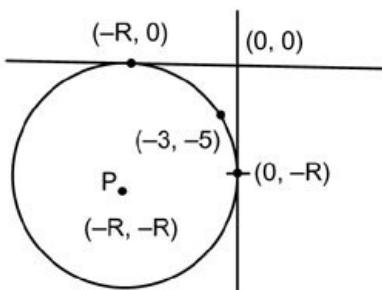
$$(5-r)^2 + (3-r)^2 = r^2$$

$$r^2 - 16r + 34 = 0$$

$$r = \frac{16 \pm \sqrt{120}}{2}$$

$$r = 8 \pm \sqrt{30}$$

Since, the distance between (0, 0) and (3, 5) is $\sqrt{34}$ (which, as per the figure, is more than the radius of the circle), the value of $r = 8 - \sqrt{30}$.



The distance between point P and point B is the radius of the circle in the third quadrant.

OR

$$(5-R)^2 + (3-R)^2 = R^2$$

$$R^2 - 16R + 34 = 0$$

$$R = 8 \pm \sqrt{30}$$

Now since the distance from (0, 0) to (-3, -5) is $\sqrt{34}$, R must be more than that (from the figure).

$$\therefore R = 8 + \sqrt{30}$$

$$\therefore R + r = 16 = 16 + \sqrt{0}, \text{ i.e., } a + b = 16.$$

Alternative Solution:

The radius (r) of any circle touching the co-ordinate axis and passing through (3, 5) will satisfy the equation $(r-3)^2 + (r-5)^2 = r^2$. This quadratic will have two roots, corresponding to the two circles shown in the figure.

Note that (-3, -5) is simply the reflection of (3, 5) about the origin and the values of the radius obtained will be the same as for (3, 5).

Hence, the required sum of radii is simply the sum of the roots of the above quadratic equation. i.e., $(r-3)^2 + (r-5)^2 = r^2$

$$\Rightarrow r^2 - 16r + 34 = 0, \text{ i.e., Sum of roots} = 16.$$

Choice (C)

21. Let the roots of the quadratic equation be $2k$ and $2k+2$

\therefore The quadratic equation is

$$x^2 - (4k+2)x + 2k(2k+2) = 0$$

$$\text{The discriminant} = (4k+2)^2 - 4(1)(2k)(2k+2)$$

$$= 16k^2 + 16k + 4 - 16k^2 - 16k = 4$$

$$= 4$$

Alternative Solution 1:

If the roots of $x^2 + bx + c = 0$ are consecutive even integers, the difference of the roots = 2.

$$\text{Hence } \left[\left(\frac{-b + \sqrt{b^2 - 4c}}{2} \right) - \left(\frac{-b - \sqrt{b^2 - 4c}}{2} \right) \right],$$

$$\therefore \sqrt{b^2 - 4c} = 2$$

$$\Rightarrow b^2 - 4c (\text{i.e., discriminant}) = 4.$$

Alternative Solution 2:

Trying a few examples like $(x-2)(x-4) = 0$; $(x-4)(x-6) = 0$; $(x-8)(x-10) = 0$ etc., will show that the discriminant is always equal to 4.

Choice (B)

22. Let the three angles in $\triangle ABC$ be denoted by a , b and c such that $\frac{a}{b} = \frac{4}{7}$

Let us consider $a = 4k$ and $b = 7k$.

$$\therefore c = 180 - (a+b) = 180 - 11k.$$

Now, each of a , b , c must be less than 90° .

Hence, possible values of k and the angles of $\triangle ABC$ are listed below:

Cases	K	$a = 4K$	$b = 7K$	$c = 180 - 11K$
I	9	36	63	81
II	10	40	70	70
III	11	44	77	59
IV	12	48	84	48

The difference between any two angles is at most $81^\circ - 36^\circ = 45^\circ$, in case I.

Choice (A)

23. $f(x) = |x-1| + |x-2| + |x-6| + |x-24|$

Now $|x-1| + |x-24|$ will be minimum when $1 \leq x \leq 24$

Again $|x-2| + |x-6|$ will be minimum when $2 \leq x \leq 6$

For $|x-1| + |x-2| + |x-6| + |x-24|$ to be minimum x must lie in the interval [2, 6].

$\therefore f(x)$ takes a minimum value of 27 for $x = 2, 3, 4, 5$ or 6

There are 5 integral values of x .

Ans: (5)

24. Let the present age of Sumanta and Tamal be $6x$ and $2y$ respectively.

	Sumanta	Tamal
Past	y	x
Present	$6x$	$2y$

$$\text{Now } y - x = 6x - 2y$$

$$3y = 7x$$

$$y = \frac{7}{3}x$$

It is given that $y - x = 8$

$$\frac{7}{3}x - x = 8$$

$$\frac{4x}{3} = 8$$

$$\Rightarrow x = 6$$

$$\therefore 6x = 36 \text{ and } 2y = 2 \times \frac{7}{3}x = 2 \times \frac{7}{3} \times 6 = 28$$

Hence, the sum of their present ages is 64 years.

Choice (B)

25. Let the cost of a pencil and an eraser be ₹P and ₹E respectively.

$$11P + 11E = 99$$

$$\therefore P + E = 9 \quad \dots (1)$$

$$3P + 5E = 33 \quad \dots (2)$$

Solving (1) and (2), we get $P = 6$ and $E = 3$

Now, he needed extra amount of $(5P + 3E) - (3P + 5E) = 2(P - E) = 2(6 - 3) = \text{₹}6$.

Choice (A)

26. Let the initial consumption per day per person be x kg.

Quantity of provision left after 40 days.

$$= 240(80)(x) \text{ kg}$$

Let the remaining quantity of food last for d days

$$(300)(d)(x - \frac{20}{100}x) = 240(80)x$$

$$300d(0.8x) = 240(80)x$$

$$\Rightarrow d = 80$$

∴ The provisions will get over as per the scheduled time.
Choice (D)

27. Let the marked price and the cost price of the article be denoted by M and C respectively.

We know that,

$$M\left(1 - \frac{P}{200}\right) = C\left(1 + \frac{P}{200}\right) \Rightarrow \frac{M}{C} = \frac{200+P}{200-P}$$

$$M\left(1 - \frac{P}{100}\right) = C\left(1 - \frac{P}{400}\right) \Rightarrow \frac{M}{C} = \frac{400-P}{400+P}$$

$$\therefore \frac{200+P}{200-P} = \frac{400-P}{400-4P}$$

$$\Rightarrow 5P^2 - 200P = 0$$

$$5P(P-40) = 40$$

$$\because P \neq 0, P = 40$$

$$\therefore \frac{M}{C} = \frac{200+40}{200-40} = \frac{3}{2}$$

Now, let the marked price and the cost price of the article be 300 and 200 respectively.

$$\therefore 300\left(1 - \frac{40}{400}\right) = 270$$

CP	SP	Profit	Profit %
200	270	70	$\left(\frac{70}{200} \times 100\right) = 35\%$

Ans: (35)

28. Let the series be a, ar, ar^2, \dots

$$S = \frac{a}{1-r}$$

The sum of the squares of all the terms i.e., $a^2 + (ar)^2 +$

$$(ar^2)^2 + \dots = \frac{a^2}{1-r^2}$$

$$\text{It is given that } 2\left(\frac{a}{1-r}\right)^2 = \frac{a^2}{1-r^2}$$

$$\frac{2a^2}{(1-r)^2} = \frac{a^2}{(1-r)(1+r)}$$

$$2(1+r) = (1-r)$$

$$3r = -1$$

$$r = -\frac{1}{3}$$

Choice (A)

29. It is given that $2a + 3b + 6c = 66$.

$a^6 b^2 c^3$ will be maximum when

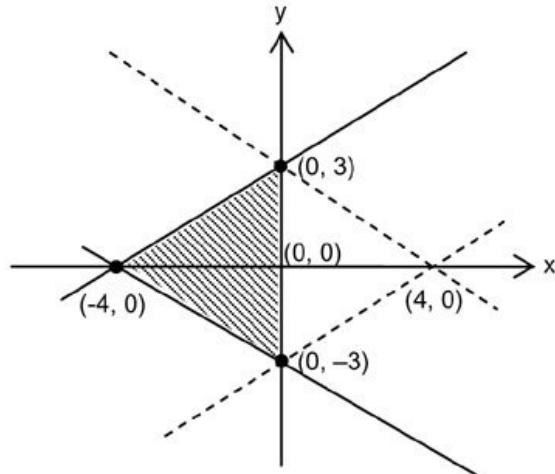
$$\frac{2a}{6} = \frac{3b}{2} = \frac{6c}{3} = \frac{2a+3b+6c}{6+2+3} = \frac{66}{11} = 6$$

$$\Rightarrow a = 18, b = 4 \text{ and } c = 3.$$

$$\text{Therefore, the maximum value of } a^6 b^2 c^3 = (18)^6 (4)^2 (3)^3 = 2^{10} \times 3^{15}$$

Choice (D)

30. The graph of $|3x| + |4y| \leq 12$ and $x \leq 0$, is given by the shaded region.

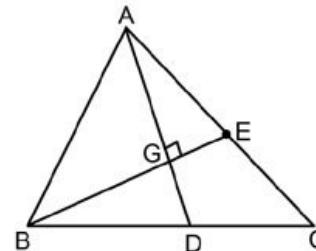


The area of the enclosed region is

$$\frac{1}{2}(6)(4) = 12 \text{ sq.units.}$$

Ans: (12)

31.



Let G be the centroid of the triangle.

$$\text{As } AD = 8, AG = \frac{16}{3} \text{ and } GD = \frac{8}{3}$$

$$\left[\because \frac{AG}{GD} = \frac{2}{1} \right]$$

Let the length of BE be k

$$\text{Area of } \Delta ABE = \frac{1}{2} (BE)(AG) = \frac{1}{2} (BE) \left(\frac{16}{3}\right)$$

We know that any median divides the area of a triangle into two equal parts.

$$\therefore \frac{1}{2} (k) \left(\frac{16}{3}\right) = \frac{144}{2}$$

Therefore $k = 27$

Ans: (27)

32. Let $\frac{x+2}{(x+1)(x+3)} = y$

$$\therefore x+2 = (x^2 + 4x + 3)y$$

$$x^2y + 4xy - x + 3y - 2 = 0$$

$$yx^2 + x(4y-1) + 3y - 2 = 0$$

as x is real, the discriminant ≥ 0

$$(4y-1)^2 - 4y(3y-2) \geq 0$$

$$16y^2 - 8y + 1 - 12y^2 + 8y \geq 0$$

$$4y^2 + 1 \geq 0$$

Now $4y^2 + 1$ will be positive for any real value of y

Hence, range of $y = (-\infty, \infty)$.

Choice (D)

33. $f(x) + f(3-x) = 20$

$$\text{Putting } x = \frac{1}{10}, \text{ we get } f\left(\frac{1}{10}\right) + f\left(\frac{29}{10}\right) = 20$$

$$\text{Putting } x = \frac{2}{10}, \text{ we get } f\left(\frac{2}{10}\right) + f\left(\frac{28}{10}\right) = 20$$

Putting $x = \frac{14}{10}$, we get $f\left(\frac{14}{10}\right) + f\left(\frac{16}{10}\right) = 20$

Putting $x = \frac{15}{10}$, we get $f\left(\frac{15}{10}\right) + f\left(\frac{15}{10}\right) = 20$

$$\Rightarrow f\left(\frac{15}{10}\right) = 10$$

Therefore the sum of the above terms
 $= 14(20) + 10$
 $= 290$

Ans: (290)

By observation, $3^{a+1} = 81$, for $5^b = 625$ works (since 5's powers end in 5, 3^{a+1} must end in 1).

$\Rightarrow a = 3$ and $b = 4$.

We check that $3^{b+2} - 5^a = 604$ is also satisfied by the above values of a and b .

Therefore $a + b = 3 + 4 = 7$

Ans: (7)

Difficulty level wise summary - Section III: QA	
Level of Difficulty	Questions
Very Easy	8, 16
Easy	1, 5, 9, 12, 14, 19, 25, 34
Medium	2, 3, 4, 6, 10, 17, 21, 24, 26, 28, 32, 33
Difficult	11, 15, 18, 22, 23, 27, 29, 30, 31
Very Difficult	7, 13, 20

34. $3^{a+1} + 5^b = 706$

5^b can take only the values 1, 5, 25, 125 or 625, depending on b being 0, 1, 2, 3 or 4.