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Aimcat 2005

Varc

DIRECTIONS *for questions 1 to 5:* The passage given below is accompanied by a set of five questions. Choose the best answer to each question.

...Financial systems generate credit booms and busts: this is the chief reason for the instability of market economies. Hyman Minsky described the broad features of such booms and busts in his Financial Instability Hypothesis (FIH). Minsky started with an explanation of investment. It is, in essence, an exchange of money today for money tomorrow. A firm pays now for the construction of a factory; profits from running the facility will, all going well, translate into money for it in coming years. Put crudely, money today can come from one of two sources: the firm's own cash or that of others (for example, if the firm borrows from a bank). The balance between the two is the key question for the financial system.

Minsky distinguished between three kinds of financing. The first, which he called "hedge financing", is the safest: firms rely on their future cash flow to repay all their borrowings. For this to work, they need to have very limited borrowings and healthy profits. The second, speculative financing, is a bit riskier: firms rely on their cash flow to repay the interest on their borrowings but must roll over their debt, wherein the borrower pays the lender an additional fee in order to extend the loan's due date, to repay the principal. This should be manageable as long as the economy functions smoothly, but a downturn could cause distress. The third, Ponzi financing, is the most dangerous. Cashflow covers neither principal nor interest; firms are betting only that the underlying asset will appreciate by enough to cover their liabilities. If that fails to happen, they will be left exposed.

...Minsky identified five stages in a bubble: 'displacement' - a trigger event, such as falling interest rates; 'boom' - when asset prices start rising; 'euphoria' - when investors throw caution to the wind;

'profit-taking' - when intelligent investors start taking profits; and 'panic' - a period of collapsing asset prices and mass bankruptcy. Displacement is an event that raises optimism, such as an innovation, access to new economic resources, or maybe a decline in the cost of funds. As the cycle unfolds, credit expands relative to the economy. This allows more people to borrow, normally against collateral and often against property collateral. The borrowing is used to buy assets and spend on investment and consumption. The former raises asset prices. The latter stimulates the economy. Both effects encourage people to borrow and spend even more. Borrowing and spending create more borrowing and spending...

Ultimately, the bubble will expand no longer. When new buyers can no longer borrow, prices stop rising. From ceasing to rise to starting to fall takes but a moment: nobody wants to hold assets that nobody wants to buy. This is the 'Minsky moment', a term coined by Paul McCulley, formerly of the Pacific Investment Management Company. If left unchecked, the Minsky moment can become a "Minsky meltdown", a spreading decline in asset values capable of producing a recession. Once the supply of 'greater fools' has dried up, those who have borrowed in the expectation of further price rises will be forced to sell, the institutions who have lent to such institutions will also want their money back. That triggers the panic, the systemic crisis and the recession. The financial sector and the economy crash. The Minsky cycle is complete.

Q1. Which of the following is least likely to trigger the displacement stage of a bubble?

- a) A sudden drop in the interest rates for lending.
- b) A breakthrough technological advancement that can spawn a new industry.
- c) An announcement by the government to ease lending norms.
- d) **Sharp profits registered by owners of assets which register steep appreciation.**

Number of words and Explanatory notes for RC:

Number of words: 553

This can be understood from the following lines: '*Displacement is an event that raises optimism, such as an innovation, access to new economic resources, or maybe a decline in the cost of funds.*'

Option A: This will reduce the cost of funds (as borrowers/investors) have to pay less for the debt they raise from lenders, and hence, can be considered as a possible trigger for 'displacement'. It could also open up new economic resources. Option A is not the answer.

Option B: An innovation that spawns a new industry likely raises optimism and brings in investments, a characteristic starting point for a bubble. Hence, Option B is not the answer.

Option C: This encourages spending as the cost of borrowing is brought down by easing lending norm. Anything that encourages spending is a good trigger for the displacement stage of a bubble. Hence, Option C is not the answer.

Option D: The appreciation of the asset could be a trigger event here. However, profits are generally witnessed in the third stage where smart investors cash in on their early investments. Hence, Option D is the answer.

Choice (D)

Q2. All the following can be inferred from the hypothesis of Minsky EXCEPT

- a) Hedge financing is not drastically impacted by sudden market swings.
- b) Recession can be triggered by a drastic and sudden fall in asset prices.
- c) Asset prices stop climbing when borrowing becomes difficult.
- d) **Excessive borrowing and spending eventually crashes the economy.**

Number of words and Explanatory notes for RC:

Number of words: 553

Option A: Consider this: '*The first, which he called "hedge financing", is the safest: firms rely on their future cash flow to repay all their borrowings. For this to work, they need to have very limited borrowings and healthy profits.*' This is the safest according to the author as firms rely on their future cash flow to repay borrowings. Hence, market swings may not have a drastic impact here, compared to the other two types of financing. Option A is not the answer.

Option B: This can be understood from the following sentences: '*If left unchecked, the Minsky moment can become a "Minsky meltdown", a spreading decline in asset values capable of producing a recession.* Once the supply of 'greater fools' has dried up, those who have borrowed in the expectation of further price rises will be forced to sell, the institutions who have lent to such institutions will also want their money back. *That triggers the panic, the systemic crisis and the recession.*' The panic triggered by the crisis spreads decline in asset values which leads to a recession. Hence, Option B is consistent with Minsky's theories. Option B is not the answer.

Option C: This can be understood from '*Ultimately, the bubble will expand no longer. When new buyers can no longer borrow, prices stop rising.* From ceasing to rise to starting to fall takes but a moment.' Asset prices stop climbing (prices stop rising) when new buyers can no longer borrow. Hence, Option C is true and not the answer.

Option D: Consider the sentences: '*The borrowing is used to buy assets and spend on investment and consumption. The former raises asset prices. The latter stimulates the economy. Both effects encourage people to borrow and spend even more. Borrowing and spending create more borrowing and spending...*' It cannot be inferred from here that the excessive borrowing and spending is what leads to the crash. In fact, it cannot be understood at what time one could use the term 'excessive borrowing'. Hence, Option D is not consistent with Minsky's theories. Option D is the answer.

Choice (D)

Q3. The Minsky moment is characterised by which of the following?

- a) The absence of speculation that the prices will stabilize.
- b) The absence of greater fools who will hold assets.
- c) **The absence of people willing to buy assets.**
- d) **The absence of expectation that the asset prices will drop.**

Number of words and Explanatory notes for RC:

Number of words: 553

Consider the sentences: 'When new buyers can no longer borrow, prices stop rising. From ceasing to rise to starting to fall takes but a moment: nobody wants to hold assets that nobody wants to buy. This is the 'Minsky moment'...Once the supply of 'greater fools' has dried up, those who have borrowed in the expectation of further price rises will be forced to sell, the institutions who have lent to such institutions will also want their money back...'

Option A: The absence of speculation that the prices will stabilize doesn't tell us whether the prices will rise or fall (Only the absence of speculation that the prices will rise will lead to the Minsky moment). Therefore, this doesn't indicate the Minsky moment. Option A is not the answer.

Option B: Greater fools is a pejorative term used for those who buy assets in the expectation of a price rise. They are not those who hold assets. Hence, Option B is not the answer.

Option C: The absence of people to buy assets is what leads to the fall, the decline of asset price as nobody wants to hold assets that nobody wants to buy. This is the Minsky moment. Option C is the answer.

Option D: The absence of expectation that the asset prices will drop represents a positive/optimistic sentiment and is far removed from the panic that causes the Minsky moment. Hence, Option D is easy to eliminate.

Choice (C)

Q4. A 'downturn could cause distress' in case of speculative financing because

- a) cash flow of a firm covers neither principal nor interest.
- b) it may not be possible to roll over debt or repay interest with the cash flows.
- c) the underlying assets will not appreciate enough to cover the liabilities of a firm.
- d) future cash flows may not yield profits.

Number of words and Explanatory notes for RC:

Number of words: 553

Consider the sentences: '*The second, speculative financing, is a bit riskier: firms rely on their cash flow to repay the interest on their borrowings but must roll over their debt, wherein the borrower pays the lender an additional fee in order to extend the loan's due date, to repay the principal. This should be manageable as long as the economy functions smoothly, but a downturn could cause distress.* The third, *Ponzi financing, is the most dangerous. Cashflow covers neither principal nor interest; firms are betting only that the underlying asset will appreciate by enough to cover their liabilities. If that fails to happen, they will be left exposed.*'

Option A: Cash flow covers neither principal nor interest in the Ponzi financing rather than in speculative financing, where cash flow covers the interests on the borrowings. Hence, Option A is not the answer.

Option B: Speculative financing relies on using cash flow to pay off interests on the borrowings while rolling over the debt to repay the principal at a later stage. So, a downturn could cause distress because a downturn will make rolling over the debt difficult (or adversely affect cash flows). Hence, Option B is the answer.

Option C: The expectation of the appreciation of underlying assets to cover liabilities is more a characteristic of the Ponzi financing. It is not associated with speculative financing. Option C is not the answer.

Option D: The nature of speculative financing involves using cash flows to pay interest and roll over the principal to be paid later. Now, from this we cannot really infer anything about future profits. The distress will be more because paying back the principal later will become a problem. We cannot extrapolate the info beyond it to guess about whether there will be profits (or assume that principal is paid back from the profits, etc.). Hence, Option D is not the answer.

Choice (B)

Q5. Which of the following can be most reasonably inferred based on Minsky's description of the five stages of a bubble?

- a) Smart investors sell their assets during the fourth stage of a bubble.
- b) Greater fools buy assets during the fifth stage of a bubble.
- c) Investors take greater risk in the 'boom' period rather than in the 'euphoria' period.
- d) Bubbles are triggered by a rise in asset prices.

Number of words and Explanatory notes for RC:

Number of words: 553

Option A: Smart investors make profits in the 'profit-taking' stage of a bubble, which is the fourth stage. They can only make profits if they sell their assets given that in the fifth stage the asset values will decline sharply. Hence, this can be inferred. Option A is the answer.

Option B: Greater fools are those who buy assets from those who want to sell them. The author mentions that panic sets in when there aren't any more 'greater fools' to buy the assets no one wants to keep. We cannot quite infer whether the people who buy assets during the fifth stage alone are the greater fools. Hence, Option B is not the answer.

Option C: It is in the 'euphoria' stage when the investors throw caution to the wind (act a little more recklessly/adventurously). Hence, it cannot be inferred clearly that the investors take greater risks in the boom period rather than in the euphoria period. Option C is not the answer.

Option D: The rise in asset prices is generally a characteristic of the second stage of the bubble called the 'boom'. This is, however, not the trigger event. The trigger event is the displacement which is any event that induces optimism. Hence, Option D is not the answer.

Choice (A)

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

...[P]ublic culture can be quick to attack, castigate and condemn. In her Class Day remarks at Harvard's 2018 graduation, the Nigerian novelist Chimamanda Ngozi Adichie addressed the problem of this rush to judgment. In the face of what she called 'a culture of "calling out", a culture of outrage', she asked students to 'always remember context, and never disregard intent'. She could have been speaking as a historian.

History, as a discipline, turns away from two of the main ways of reading that have dominated the humanities for the past half-century. These methods have been productive, but perhaps they also bear some responsibility for today's corrosive lack of generosity. The two approaches have different genealogies, but share a significant feature: at heart, they are adversarial.

One mode of reading ... known as 'the hermeneutics of suspicion', aims to uncover the hidden meaning or agenda of a text. Whether inspired by Karl Marx, Friedrich Nietzsche or Sigmund Freud, the reader interprets what happens on the surface as a symptom of something deeper and more

dubious, from economic inequality to sexual anxiety. The reader's task is to reject the face value of a work, and to plumb for a submerged truth.

A second form of interpretation, known as 'deconstruction'...aims to identify and reveal a text's hidden contradictions – ambiguities and even aporias (unthinkable contradictions) that eluded the author...

The reader's goal becomes to uncover meanings or problems that the work does not explicitly express. In both cases, intelligence and moral probity are displayed at the expense of what's been written ...They do, however, foster a prosecutorial attitude among academics and public intellectuals... One error is taken as the symptom of problematic thinking; it can spoil not just a whole book, but perhaps even the author's entire oeuvre...

Yet, the study of history is different... Historians deal with difference: with what is unlike the present, and with what rarely meets today's moral standards...The virtue of reading like a historian, then, is that critique or disavowal is not the primary goal. On the contrary, reading historically provides something more destabilising: it requires the historian to put her own values in parentheses.

...[H]istorical empathy involves reaching out across the chasm of time to understand people whose values and motivations are often utterly unlike our own. It means affording these people the gift of intellectual charity – that is, the best possible interpretation of what they said or believed. ... [Historians] invoke intentions not from a desire to attack, nor because they seek reasons to restrain a text's range of meanings. Their questions about intentions stem, instead, from respect for the people whose actions and thoughts they're trying to understand...

Certainly, reading isn't a zero-sum game. One can and should cultivate multiple modes of interpretation. Yet the nostrum that the humanities teach 'critical thinking and reading skills' obscures the profound differences in how adversarial and empathetic disciplines engage with written works – and how they teach us to respond to other human beings. If the empathetic humanities can make us more compassionate and more charitable – if they can encourage us to 'always remember context, and never disregard intent' – they afford something uniquely useful today.

Q6. Which of the following is the author most likely to recommend to a reader?

- a) **Pick up study of history as an exercise in empathy.**

- b) Interpret text objectively without being influenced by subtext.
- c) Avoid focusing on the best possible interpretation of a given text.
- d) Focus on improving critical thinking and reading skills.

Number of words and Explanatory notes for RC:

Number of words: 525

Option A: This is the author's primary motive in suggesting us to pick up study of empathetic humanities – so we can be more compassionate and more charitable, something that is uniquely useful in the present situation. So, the author is likely to recommend picking up history as an exercise in developing empathy. Option A is the answer.

Option B: The author wants empathetic humanities to '*encourage us to always remember context, and never disregard intent*'. So, interpreting text objectively without being influenced by subtext (nuances and implications) goes against the grain of such an advice. Hence, Option B is not the answer.

Option C: The author recommends an empathetic style of engaging which is all about focusing on the best possible interpretation of what the subjects of the written works said or believed. So, this option contradicts the passage. Option C is not the answer.

Option D: Consider: '*Yet the nostrum that the humanities teach 'critical thinking and reading skills' obscures the profound differences in how adversarial and empathetic disciplines engage with written works.*' The author isn't asking the reader to focus on critical thinking and reading. Rather, the author bemoans how the idea that humanities teach those skills takes away attention from the differences in different ways of engaging with written works. Hence, Option D is not the answer.

Choice (A)

Q7. The study of history differs from the main ways of reading that have dominated the humanities for the past half-century in the way:

- a) it allows room for intellectual charity towards the authors.
- b) it advocates an unbiased and constructive critiquing of the text.
- c) it avoids adopting a prosecutorial attitude towards problematic thinking.
- d) it adopts a sympathetic attitude towards the constraints of a different era.

Number of words and Explanatory notes for RC:

Number of words: 525

Consider the following sentences: 'Yet, the study of history is different... Historians deal with difference: with what is unlike the present, and with what rarely meets today's moral standards...The virtue of reading like a historian, then, is that critique or disavowal is not the primary goal. On the contrary, reading historically provides something more destabilising: it requires the historian to put her own values in parentheses'

Option A: Consider: '...[H]istorical empathy involves reaching out across the chasm of time to understand people whose values and motivations are often utterly unlike our own. It means affording these people the gift of intellectual charity – that is, the best possible interpretation of what they said or believed. ... [Historians] invoke intentions not from a desire to attack, nor because they seek reasons to restrain a text's range of meanings. Their questions about intentions stem, instead, from respect for the people whose actions and thoughts they're trying to understand...' So, historians read not with an attitude to judge but to try and understand the writers by trying to adopt the best interpretation of what they said (since those times are unlike ours). This is what the author means by 'intellectual charity'. Option A is the answer.

Option B: From '*The virtue of reading like a historian, then, is that critique or disavowal is not the primary goal*' we can understand that critiquing, constructive or otherwise is not the primary goal as mentioned by the author. Hence, Option B is not the answer.

Option C: While studying history the author does expect readers to avoid prosecutorial attitude. However, this option is incorrect in that the author suggests avoiding prosecutorial attitude towards the writing and writers, and not towards 'problematic thinking' alone. Problematic thinking in the passage is mentioned as an implication (Errors in the writing are taken as a sign of problematic thinking, the passage says.) Hence, Option C is not the answer.

Option D: A study of history is about empathy and attempting to understand the situation in the past, of the time, we are reading about, and respecting the people whose actions we are trying to understand. However, sympathy for the constraints doesn't reflect the same emotion, since 'constraints' suggests we are judging them and justifying why they did what they did. Hence, Option D is not the answer.

Choice (A)

Q8. The author mentions that reading isn't a zero-sum game to highlight that

- a) adversarial and empathetic styles of reading aren't the only styles of interpretation.
- b) a reader need not be hostile and prosecutorial towards the written text.
- c) a reader doesn't have to side only with one style of reading.

- d) readers need not attribute every error to problematic thinking.

Number of words and Explanatory notes for RC:

Number of words: 525

Option A: The author doesn't delve into other styles of reading. All the author is trying to convey is that one need not limit one's reading to just one mode of interpretation. Hence, Option A is not the answer.

Option B: The prosecutorial attitude is adopted in the adversarial style of reading (deconstruction and hermeneutics of suspicion). However, the author doesn't mention zero-sum game in that context to argue against the adversarial style of reading. In fact, the author is accommodative by saying one should adopt multiple styles of interpretation. Option B is not the answer.

Option C: This can be understood from '*Certainly, reading isn't a zero-sum game. One can and should cultivate multiple modes of interpretation.*' The author mentions the zero-sum game to highlight that there isn't necessarily one mode of interpretation. One can try out both adversarial as well as the empathetic style of reading and such activities need not be mutually exclusive. (The author follows this up with how the differences between the two styles of reading is not comprehended well). Option C is the answer.

Option D: This is, yet again, related purely to the adversarial style of reading where readers consider one error as a sign of problematic thinking. However, zero-sum game was mentioned in an entirely different context. Hence, Option D is not the answer.

Choice (C)

Q9. The author will agree with all of the following as similarities between 'deconstruction' and 'the hermeneutics of suspicion' EXCEPT:

- a) readers critique the written text to demonstrate their own intelligence and moral integrity.
- b) dissecting the written text to reveal what is hidden is the agenda of a reader.
- c) there is an absence of empathy for the writers or the context and conditions in which the written text was composed.
- d) they taint the writer's entire body of work by uncovering flaws in the writer's thinking.

Number of words and Explanatory notes for RC:

Number of words: 525

Consider the sentences: '*The reader's goal becomes to uncover meanings or problems that the work does not explicitly express. In both cases, intelligence and moral probity are displayed at the expense of what's been written ... They do, however, foster a prosecutorial attitude among academics and public intellectuals... One error is taken as the symptom of problematic thinking; it can spoil not just a whole book, but perhaps even the author's entire oeuvre...*'

Option A: This option (or rather similarity between deconstruction and hermeneutics of suspicion) can be understood from *intelligence and moral probity are displayed at the expense of what's been written*. According to this line, a reader displays intelligence and moral probity at the expense of (by being condescending upon/or be devaluing) the written text. Option A is not the answer.

Option B: This can be understood from: *The reader's goal becomes to uncover meanings or problems that the work does not explicitly express*. So, the agenda of the reader is to spot errors/contradictions which the work doesn't express (unintentionally). Also, 'the hermeneutics of suspicion' involves reading for subtext assuming that there is more to the writing than what is obvious, because writers have a hidden agenda. Hence, Option B is a similarity and not the answer.

Option C: In talking about the empathetic style of reading the author highlights that *the virtue of reading like a historian, then, is that critique or disavowal is not the primary goal* implying what the adversarial style (deconstruction and hermeneutics of suspicion) of reading lacks. Also, *They (deconstruction and hermeneutics of suspicion) do, however, foster a prosecutorial attitude among academics and public intellectuals* showing that there is no empathy for the writers of the written text. Hence, Option C is not the answer.

Option D: This is not always the case. The oeuvre of the writer is tainted only when readers spot errors in the writing and extrapolate it to infer problematic thinking on the part of the writer. Since, that may not always happen, Option D is something the author may not agree with as a similarity.

Choice (D)

Q10. The difference between 'deconstruction' and 'the hermeneutics of suspicion' is that

- a) The former tries to identify errors while the latter tries to identify the root cause behind the errors.
- b) The former tries to identify hidden contradictions while the latter tries to discover hidden implications.
- c) The former focuses on intentional ambiguities while the latter focuses on unintended implications.

d) The former focuses on the subtext while the latter focuses on the surface of the text.

Number of words and Explanatory notes for RC:

Number of words: 525

Option A: While the former can be said to identify errors (contradictions and ambiguities), the latter (hermeneutics of suspicion) tries to uncover hidden agenda (which cannot be equated to identifying errors, which may or may not be there). In other words, hermeneutics of suspicion doesn't really assume that there are errors in the text. It assumes there is an underlying meaning. Option A is not the answer.

Option B: The former (deconstruction) aims to identify and reveal a text's hidden contradictions while the latter tries to discover the hidden meaning or agenda of a text (hidden implications). Hence, Option B is the answer.

Option C: The former (deconstruction) focuses on contradictions and ambiguities (which are unintentional). Hence, Option C is not the answer.

Option D: The former focuses on the text (subtext is the nuance) while it is the latter which focuses on subtext (the inner meaning/agenda) of the text. Option D is not the answer.

Choice (B)

DIRECTIONS for questions 11 to 14: The passage given below is accompanied by a set of four questions. Choose the best answer to each question.

"The Net interprets censorship as damage and routes around it," said Internet pioneer John Gilmore in a 1993 *Time* magazine article about a then-ungoverned place called "cyberspace." How times have changed...In April, Sri Lankan authorities blocked its citizens' access to social media sites like Facebook and YouTube following a major terrorist attack. Such censorship, once considered all but inconceivable, is now commonplace in a growing number of countries. Russia, for instance, approved an "Internet sovereignty" law in May that gives the government broad power to dictate what its citizens can see online. And China is not just perfecting its "Great Firewall," which blocks such things as searches for "Tiananmen Square" and the *New York Times*, but is seeking to export its top-down version of the web to countries throughout Southeast Asia.

This phenomenon, colloquially called "splinternet," whereby governments seek to fence off the World Wide Web into a series of national Internets, isn't new. The term, also known as cyberbalkanization, has been around since the 1990s. But lately the rupturing has accelerated, as companies censor their sites to comply with national rules and governments blot out some sites entirely.

Technology is one reason for the change. The sort of censorship tools deployed by China were enormously expensive and labour-intensive. But now, as the tools become cheaper and more efficient, other countries are willing to try them too. Meanwhile, there is a new political will among governments to try to control websites—especially following events like the Arab Spring, during which Facebook and Twitter helped fuel political uprisings.

It's not just authoritarian countries trying to bend the global web to national values... [S]ocial media companies [...] have come under fire for allowing their services to be used to promote hatred and terrorism. England and Australia have recently passed laws demanding tech firms provide easier access to web users' communications.

When it comes to censorship, the process is more complicated in democratic countries than in dictatorships. In places like Iran and Venezuela, autocrats can order the Internet service provider [...] to block sites that displease them... Democracies require the force of law, upheld by a judge, before governments can tamper with a website. Nonetheless, more countries are doing just that—often with worldwide effects.

...The splintering of the Internet is likely to accelerate, as many countries tighten their grip on power and as nations struggle to contain extremism... For Ed Black, who heads the Computer and Communications Industry Association in Washington, D.C., the current state of the web is troubling—and one policymakers might have mitigated had they acted sooner. He believes the U.S. should have done more to promote a “digital bill of rights” and other measures to preserve free speech online. Black also worries that each step by governments to restrict the web will normalize censorship and move the world further away from unfettered cyberspace. Says Black: “It’s death by a thousand cuts. We now face a situation where we have Chinese and authoritarian models being aggressively proselytized around the world, and we haven’t done enough to counter that.”

Q11. The author uses the expression ‘death by a thousand cuts’ to refer to how

- a) government censorship is slowly curtailing free speech online.
- b) authoritarian governments are aggressively proselytizing censorship.
- c) censorship is used by governments to squeeze the life out of online extremism.

- d) countries are censoring online space to prevent political uprisings.

Number of words and Explanatory notes for RC:

Number of words: 509

Option A: 'Death by a thousand cuts' is a metaphor the author uses in order to describe how governments are slowly bleeding the rights of free speech by curtailing online expression through censorship. This can be understood by Black's general tone against the censorship taken up by the government, followed by the Chinese example. Hence, Option A is the answer.

Option B: While the line following the metaphor talks about proselytizing (promoting) authoritarian models, it doesn't mention authoritarian governments preaching censorships. These two mean (proselytizing authoritarian models and proselytizing censorship) different things. Hence, Option B is not the answer.

Option C: Black isn't talking just about extremism; he is referring to all forms of online censorship as understood from his remarks. Hence, Option C is not the answer.

Option D: Once again, Black's comments are with regard to general online censorship and while one of the reasons mentioned is the government's eagerness to stamp out political uprisings, it is not the only one. Hence, Option D is not the answer.

Choice (A)

Q12. Cyberbalkanization is more complicated when

- a) the countries are run by autocratic governments.
- b) the countries have a democratic process in place.
- c) freedom of speech isn't actively safeguarded by the government.
- d) when companies have to adhere to strict national regulations.

Number of words and Explanatory notes for RC:

Number of words: 509

Consider the following sentences: '*When it comes to censorship, the process is more complicated in democratic countries than in dictatorships. In places like Iran and Venezuela, autocrats can order the Internet service provider [...] to block sites that displease them... Democracies require the force of law, upheld by a judge, before governments can tamper with a website.*'

Option A: It is less complicated when the countries are run by autocratic governments (Iran and Venezuela), where autocrats can just order the service provider to block sites. Hence, Option A is not the answer.

Option B: From the underlined portion above, it can be understood that countries with a democratic process in place have more complications when it comes to governments applying online censorship. This is because the force of law, upheld by a judge has to support the government if it wants to tamper with a website. Hence, Option B is the answer.

Option C: If it isn't, then the democratic processes can easily be subverted as in autocratic governments. Then censorship isn't too complicated. Option C is not the answer.

Option D: The complication in censorship that the author mentions is more from the point of view of the government rather than from that of the companies. So, companies adhering to national regulations isn't really a factor to consider here. Hence, Option D is not the answer.

Choice (B)

Q13. The 'digital bill of rights', suggested by Ed Black, will probably

- a) **normalize government censorship.**
- b) **safeguard websites from government censorship.**
- c) **help nations frame better policies to mitigate extremism.**
- d) **aid governments in restricting unfettered cyberspace.**

Number of words and Explanatory notes for RC:

Number of words: 509

Option A: The tone of this option is negative, whereas Ed Black suggests this measure as a way of safeguarding the free speech online. Normalizing government censorship is actually the government making censorship a norm rather than an exception. Hence, Option A is not the answer.

Option B: Consider this: '*He believes the U.S. should have done more to promote a "digital bill of rights" and other measures to preserve free speech online.*' It can be understood that such a bill is a measure to preserve free speech online. Hence, Option B is the answer.

Option C: The bill itself is a policy in favour of free speech for citizens. It has no special relevance as far as mitigating extremism is concerned. This is the easiest option to eliminate.

Option D: The bill of rights is to safeguard the free speech of citizens online. Therefore, it will not aid governments in restricting unfettered cyberspace, rather discourage the government to do so. Hence, Option D is not the answer.

Choice (B)

Q14. Which of the following has not been mentioned by the author as an instance of the acceleration of Splinternet?

- a) The technology backing the censorship tools has become expensive and labour-intensive.
- b) Some countries have passed stringent laws allowing them better regulation of social media.
- c) Some countries are using their laws to dictate what their citizens see online.
- d) Governments are showing greater resolve in dealing with platforms that help foment rebellions.

Number of words and Explanatory notes for RC:

Number of words: 509

Option A: When this is the case, the government is less likely to participate in active censorship. If anything, the fact that such tools have become cheaper and the technology more accessible, which according to the author, have empowered governments to go about fragmenting the internet more actively. This is not an instance of acceleration of Splinternet. Hence, Option A is the answer.

Option B: Consider this: '*Social media companies [...] have come under fire for allowing their services to be used to promote hatred and terrorism. England and Australia have recently passed laws demanding tech firms provide easier access to web users' communications.*' This is an instance of governments accelerating Splinternet, as governments use laws to force tech firms to hand over user data (as such service providers have helped promote hatred and terrorism through their platforms). Hence, Option B is not the answer.

Option C: This is particularly the case with countries like Russia and China that censor specific content to determine what is available to the citizens. Even companies are complying with such regulations to blot out certain sites. This is an example of acceleration of Splinternet. Hence, Option C is not the answer.

Option D: Consider this: '*Meanwhile, there is a new political will among governments to try to control websites—especially following events like the Arab Spring, during which Facebook and Twitter helped fuel political uprisings.*' So, the governments showing greater political will (resolve) in discouraging platforms that help foment rebellions. This is one of the reasons Splinternet is being witnessed.

Hence, Option D is not the answer.

Choice (A)

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

The notion of “intelligent design” arose after opponents of evolution repeatedly failed on First Amendment grounds to get Bible-based creationism taught in the public schools. Their solution: Take God out of the mix and replace him with an “intelligent designer”, add some irrelevant mathematics and fancy biochemical jargon, and lo, you have “intelligent design”, which scientists have dubbed “creationism in a cheap tuxedo.”

But the tuxedo is fraying, for intelligent design has been rejected by biologists and judges who recognize it as poorly disguised religion. Nevertheless, its advocates (such as the biologist Michael Behe) persist. Behe admits, (like Darwin), that evolution occurs by natural selection sifting new mutations and that all species are related via common ancestors. However, he claims that the important mutations aren’t random but are installed by an intelligent designer. These designed mutations solve natural selection’s problem: the origin of complex biochemical features. Such

features appear to defy Darwinian explanation because, claims Behe, they can't function until all parts are in place. These "irreducibly complex" systems must have been forged by a designer who made simultaneous changes in several genes.

Scientists, however, quickly spotted the errors in this argument. They pointed out numerous scenarios and then adduced evidence for systems fitting Behe's definition of "irreducible complexity" that could evolve in a step-by-step manner, without the intervention of an engineer.

Further, Behe claims that biochemical pathways are designed rather than evolved because they're based on the "purposeful arrangement of parts." But which arrangements are those designed with a purpose? They're simply the pathways that Behe sees as too complex to have evolved. This is a classic example of begging the question: assuming what you're supposed to prove (purposefulness).

...

Perhaps Behe's most ludicrous claim is this: Evolution within the lowest levels of biological classification (genera and species) might be purely Darwinian, but the origin of higher-level groups (families, orders) requires designed mutations. Yet, as every biologist knows, groupings above the level of species are purely subjective. That is, whether you call a group a family or a genus is arbitrary, depending on the tastes of the scientists who work on that group. ...

Behe's third attack on evolution is that, even at lower levels, it's "self-limiting." Evolution's reliance on random mutations and natural selection make the process wind down, preventing further change and requiring the designer to step in. These claims are wrong. Environments change and current functions become outmoded, prompting new evolution. New adaptations can create new niches.

Mutation supposedly acts as a brake on evolution because, argues Behe, most genes that fuel adaptation have been irreparably broken and inactivated by mutations. ...Evolution must eventually grind to a halt. But Behe selectively ignores the large number of adaptive mutations that do not inactivate genes. These include duplications, in which a gene is accidentally copied twice, with the copies diverging in useful ways (different forms of haemoglobin in primates); changes not in gene function but in how and when a gene is turned on and off (mutations producing lactose tolerance in milk-drinking human populations); "chimeric genes" cobbled together from odd bits of DNA (antifreeze genes in fish blood). ...

And what is an example of a designed mutation? (Behe is silent here.) ... Humans are placed in the same family as other great apes (Hominidae) and Behe asserts that there are “excellent reasons to suspect those differences [between humans and other apes] are well beyond Darwinian processes.” Sadly, he doesn’t give these reasons.

Q15. In para 2, the phrase “the tuxedo is fraying” is

- a) an exaggeration aimed at bolstering Behe’s claim.
- b) an accurate description of the criticism levelled against creationism today.
- c) a metaphor to exemplify that intelligent design has been discredited as science.
- d) an analogy that compares intelligent design to masked religion.

Number of words and Explanatory notes for RC:

Number of words: 575

Refer to the first para. The phrase "tuxedo is fraying" includes two components:

- (a) Tuxedo – Take God out of the mix and replace him with an "intelligent designer", add some irrelevant mathematics and fancy biochemical jargon, and lo, you have "intelligent design", which scientists have dubbed "creationism in a cheap tuxedo."
- (b) is fraying – when something becomes worn or unravelled, especially cloth, to become or cause the threads in cloth or rope to become slightly separated, forming loose threads at the edge or end.

Option A: But the tuxedo is fraying, for intelligent design has been rejected by biologists and judges who recognize it as poorly disguised religion. **Nevertheless**, its advocates (such as Michael J. Behe) persist. The use of the conjunctive adverb 'nevertheless' here implies that the phrase "the tuxedo is fraying" cannot strengthen or bolster Behe's claim. Hence option A is not the answer.

Option B: It is intelligent design that is attacked in the passage and not creationism. So option B would have been correct if it said: an accurate description of the criticism levelled against intelligent design today. So option B is not the answer.

Option C: Take God out and replace him with an "intelligent designer", add some irrelevant mathematics and fancy biochemical jargon, and lo, you have "intelligent design", which scientists have dubbed "creationism in a cheap tuxedo." But the tuxedo is fraying. **Intelligent design has been rejected by biologists and judges who recognize it as poorly disguised religion.** Hence option C correctly captures the implication of the phrase "the tuxedo is fraying". Option C is the correct answer.

Option D: Option D is incomplete. It only mentions what the tuxedo symbolises. It does not include the implication of the second half of the phrase "is fraying". Hence option D is not the answer.

Choice (C)

Q16. Which of the following claims made by Behe does the author consider most preposterous?

- a) **Mutations at the lowest levels of biological classification are natural while those at higher levels are designed.**
- b) **Evolution is self-limiting.**
- c) **An intelligent designer who has forged the irreducibly complex biochemical systems of life is responsible for the simultaneous tinkering of several genes.**
- d) **Many adaptive mutations inactivate or degrade genes, putting a brake on evolution.**

Number of words and Explanatory notes for RC:

Number of words: 575

Option A: Behe admits, like Darwin, that evolution occurs by natural selection sifting new mutations and that all species are related via common ancestors. Perhaps Behe's most ludicrous claim is this: Evolution within the lowest levels of biological classification (genera and species) might be purely Darwinian, but the origin of higher-level groups (families, orders) requires designed mutations. Yet, as every biologist knowsSo option A is closest to what the author terms as the most preposterous claim of Behe. Option A is the correct answer.

Option B: Behe's third attack on evolution is that, even at lower levels, it's "self-limiting." Evolution's reliance on random mutations and natural selection make the process wind down, preventing further change and requiring the designer to step in. These claims are wrong. Option B has been attacked for being a wrong claim. But it is not the most preposterous claim of Behe. Hence option B is not the answer.

Option C: Early on in the passage, we are told how Behe differs from other biologists. He claims that the important mutations are not random accidents but are installed by an intelligent designer. These designed mutations solve natural selection's problem: the origin of complex biochemical features. Such features appear to defy Darwinian explanation because, claims Behe, they can't function until all the parts are in place. These "irreducibly complex" systems must have been forged by a designer who made simultaneous changes in several genes. So, option C forms the preface of the passage as it introduces the role of an intelligent designer. The passage, however, does not state this as the most ludicrous claim of Behe. Hence option C is not the answer.

Option D: Mutation supposedly acts as a brake on evolution because, argues Behe, most genes that fuel adaptation have been irreparably broken and inactivated by mutations. Option D is another claim of Behe but it is not his most ludicrous or preposterous claim. So option D is not the answer.

Choice (A)

Q17. Which of the following statements best expresses the main point of this passage?

- a) Even court judges have dubbed intelligent design as poorly disguised religion.
- b) Behe's case against Darwinism isn't very compelling.
- c) Biologists constantly keep in mind that what they see was not designed but rather evolved.
- d) Evolution should eventually grind to a halt without intervention from an intelligent designer.

Number of words and Explanatory notes for RC:

Number of words: 575

Option A: Intelligent design has been rejected by biologists and judges who recognize it as poorly disguised religion. Option A is true but the passage goes on to discuss Behe's claim and the opposition to those claims by the scientific community. Hence option A is incomplete and cannot be the main point of the passage.

Option B: Behe admits, (like Darwin), that evolution occurs by natural selection sifting new mutations and that all species are related via common ancestors. However, he claims that the important mutations aren't random but are installed by an intelligent designer. Such features appear to defy Darwinian explanation because, claims Behe, they can't function until all parts are in place. Scientists, however, quickly spotted the errors in this argument. From para 4 onwards, we see that a number of Behe's claims have been disproved.

- Behe claims that biochemical pathways are designed rather than evolved
- Perhaps Behe's most ludicrous claim is this: **Evolution** within the lowest levels of biological classification (genera and species) **might be purely Darwinian**, but the origin of higher-level groups (families, orders) requires designed mutations.
- Behe claims that biochemical pathways are designed rather than evolved...
- Mutation supposedly acts as a brake on evolution because, argues Behe, most genes that fuel adaptation have been irreparably broken and inactivated by mutations.

And finally the concluding para states: Behe asserts that there are "excellent reasons to suspect those differences [between humans and other apes] are well beyond Darwinian processes." **Sadly, he doesn't give these reasons.** This means that Behe makes a number of claims against Darwin's explanation of evolution. However, these claims are insufficient and have been countered in the passage. So we can infer that option B best captures the essence of the passage.

Option C: Behe claims that biochemical pathways are designed rather than evolved because they're based on the "purposeful arrangement of parts." But which arrangements are those designed with a purpose? **They're simply the pathways that Behe sees as too complex to have evolved.** ...begging the question. Now, other biologists including evolutionary biologists would focus on "things evolved" and not "things designed". So option C can be inferred to be viewpoint shared by some biologists but it does not form the crux of the passage. Option C ignores the discussion of Behe's claims in the passage and the opposition to the same. So option C is not the answer.

Option D: Option D is what Behe would subscribe to. Mutation supposedly acts as a brake on evolution because, argues Behe, most genes that fuel adaptation have been irreparably broken and inactivated by mutations. ... Evolution must eventually grind to a halt. Behe's claims have been disproved in the passage. Intelligent design has been rejected by biologists and judges. So option D is not the answer. Choice (B)

Q18. The sentence given in boldface in the passage exemplifies which of the following logical flaws?

- a) **"After this therefore because of this"** – Assigning causation without any evidence other than the temporal sequence of events.
- b) **"Attack on the Arguer rather than the Argument"**.

c) “Sweeping generalization” – A large conclusion based on very scanty evidence or premises.

d) “Circular argument” – The argument uses the conclusion to prove itself.

Number of words and Explanatory notes for RC:

Number of words: 575

The boldface sentence in the passage that we need to refer to is: They're simply the pathways that Behe sees as too complex to have evolved.

Option A: {**After this therefore because of this (Post Ergo Propter Hoc)** – This fallacy lies in concluding that since Y happened after X, X has caused Y. Assigning causation without any evidence other than the temporal sequence of events.}

The sentence given in boldface does not represent any temporal sequence of events. So option A is not the answer.

Option B: {**Attack on the Arguer rather than the Argument** – Rather than debate the original argument on its merits, the opponent makes an attack upon some irrelevant fact about the person presenting the theory or claim. Eg. His demands for raising the taxes do not make any economic sense, anyways he himself lives in a luxury house.}

Now this passage attacks the claims of Michael Behe. The highlighted sentence points to a logical flaw in the argument of Behe. It is not an attack on Behe himself. The theory of intelligent design has been rejected by biologists and judges. So option B is not the answer.

Option C: {**Hasty Generalizations without adequate basis (also known as sweeping statements)** – where a large conclusion is based on very scanty evidence or data. Eg. My father smoked all his life and never suffered from a single stroke or lung disease, so smoking is not as injurious as it is made out to be.}

They're simply the pathways that Behe sees as too complex to have evolved. This is a classic example of begging the question: assuming what you're supposed to prove (purposefulness). Now “begging the question” is not the same as “based on very scanty evidence or premises”. So option C is not the correct answer.

Option D: {**Circular arguments or “Begging the question”**– Where a premise presented is nothing but the writer's viewpoint (conclusion) restated in different words. This is a common strategy when the person making the claim has no real evidence to support his case beyond “this is true because it can't be false.”}.

Further, Behe claims that biochemical pathways are designed rather than evolved because they're based on the “purposeful arrangement of parts.” But which arrangements are those designed with a purpose? They're simply the pathways that Behe sees as too complex to have evolved. This is a classic example of begging the question: assuming what you're supposed to prove (purposefulness). ... We can say that Behe's rationale for designed mutations is circular. Option D is the correct answer.

Choice (D)

Q19. The passage suggests that scientists would most likely categorize mutations producing lactose tolerance in milk-drinking humans under ...?

a) gain-of-function mutations arising out of duplications and yielding beneficial traits.

- b) mutations of interest to proponents of evolutionary biology but not to those of intelligent design.
- c) mutations arising out of gene regulation, of how and when genes are expressed or repressed.
- d) changes arising when genes are cobbled together from DNA bits.

Number of words and Explanatory notes for RC:

Number of words: 575

Option A: Behe selectively ignores the large number of adaptive mutations that do not inactivate genes. These include **duplications, in which a gene is accidentally copied twice**, with the copies diverging in useful ways (different forms of haemoglobin in primates). Mutations producing lactose tolerance in milk-drinking humans are not duplications. Also, in the case of mutations producing lactose tolerance in milk-drinking humans, there are changes **not in gene function** but in how and when a gene is turned on and off. So we cannot term the mutation as a gain-of-function mutation. So option A is distorted and is not the answer.

Option B: Option B is very general. The passage does not categorize genes or mutations of interest to proponents of intelligent design and genes or mutations of interest to evolutionary biologists. So option B, even if it seems true from the discussion in the seventh para (Behe selectively ignores the large number of adaptive mutations that do not inactivate genes..... fish blood) is not the answer.

Option C: Behe selectively ignores the large number of adaptive mutations that do not inactivate genes. These include ... changes not in gene function but in **how and when a gene is turned on and off** (mutations producing lactose tolerance in milk-drinking human populations). Hence option C is the correct answer.

Option D: "chimeric genes" are cobbled together from odd bits of DNA (eg. antifreeze genes in fish blood). ... Mutations producing lactose tolerance in milk-drinking humans have not been classified as "chimeric genes". Hence option D is not the answer.

Choice (C)

DIRECTIONS *for questions 20 to 24*: The passage given below is accompanied by a set of five questions. Choose the best answer to each question.

For decades, behavioral decision researchers have suggested that human beings have two modes of making decisions. The first, System 1 thinking, is automatic, instinctive and emotional and relies

on mental shortcuts that generate intuitive answers to problems. The second, System 2, is slow, logical, and deliberate.

These thinking modes have distinct advantages and disadvantages. System 1 takes in information and reaches conclusions effortlessly using intuition and rules of thumb, but these shortcuts can lead us astray. So, we rely on methodical System 2 thinking to tell us when our intuition is wrong or our emotions have clouded our judgment, and to correct poor judgments. Too often, though, we allow our intuitions to go unchecked by analysis, resulting in poor decisions especially in the business world.

Overreliance on System 1 thinking leads to poor follow-through on plans: it focuses on concrete, immediate payoffs, distracting us from abstract, long-term consequences of our decisions. For instance, employees know they should save for retirement, yet they rarely get around to setting up a retirement account.

This does not mean that System 1 should be suppressed to promote sound decisions. But System 2 should also be used and the emotional response should be weighed against factors underappreciated by System 1, say, the long-term strategic value of an investment. ...

Because poor decision-making often occurs when System 2 thinking fails to kick in, the next step is to ascertain which aspect of the situation caused System 1 to weigh the trade-offs among available options incorrectly and what prevented System 2 from engaging and correcting the mistake. Common sense can go a long way in diagnosing underlying causes of poor business decisions...

Once the underlying source of a problem has been diagnosed, companies can begin to design a solution. The emotions and cognitive biases that accompany System 1 thinking often wreak havoc, but they can be tapped for productive purposes. Executives can trigger System 1 in several ways. ...In a bid to reduce the high turnover at its call centers, Wipro BPO conducted an experiment aimed at strengthening employees' emotional connection with the organization. Employees were asked on the first day of orientation to think about their strengths and how they could apply them in their new jobs. This arousal of emotions helped new employees to forge emotional bonds with the organization leading to lower employee turnover and higher performance. Executives can also use cognitive biases to their advantage. Research shows that people feel twice as bad about incurring a loss as they feel good about receiving a gain of the same amount (loss aversion bias) but pay extra attention to vivid information and overlook less flashy data (vividness bias). Lastly, organizational processes

involve unnecessary steps that lower motivation or increase the potential for cognitive biases. By streamlining processes, executives can reduce such problems.

Executives need to engage System 2 as well. Evaluating decision alternatives simultaneously, rather than sequentially, reduces bias. A manager evaluating job candidates can avoid making biased assessments of their likely future performance by comparing them against one another rather than evaluating them separately... Taking time out of our busy days to just reflect may sound costly, but it is an effective way to engage System 2. Thirdly, people often resolve to act in a particular way but fail to follow through, so simple planning prompts can help employees stick to the plan. Lastly, holding individuals accountable for their judgments increases the likelihood that executives will be vigilant about eliminating bias.

Q20. Which of the following interventions would the author of the passage support?

- a) **Trigger System 1 thinking to improve decision making.**
- b) **Engage in System 2 thinking to design an apt solution after diagnosing the cause of poor decision making.**
- c) **Engage in a judicious combination of System 1 and System 2 thinking for making decisions.**
- d) **Bypass both System 1 and System 2 thinking by setting defaults and building in automatic adjustments.**

Number of words and Explanatory notes for RC:

Number of words: 577

Option A: This does not mean that System 1 should be suppressed to promote sound decisions. But System 2 should also be used, and the emotional response should be weighed against other factors that may be underappreciated by System 1 – such as the long-term strategic value of the investment. So, option A alone is insufficient.

Option B: This does not mean that System 1 should be suppressed to promote sound decisions. But System 2 should also be used and the emotional response should be weighed against other factors that may be underappreciated by System 1 – such as the long-term strategic value of the investment. ...So, option B alone is insufficient as both system 1 and system 2 thinking need to be used.

Option C: This does not mean that System 1 should be suppressed to promote sound decisions. But System 2 should also be used and the emotional response should be weighed against other factors that may be underappreciated by System 1 – such as the long-term strategic value of the investment. ... Once they've diagnosed the underlying source of a problem, companies can begin to design a solution. The emotions and biases that accompany System 1 thinking often wreak havoc, but they can be tapped for productive purposes. Executives can trigger System 1 in several ways. Executives need to engage system 2 as well to reduce bias and increase motivation. Hence option C is the correct answer.

Option D: Option D is out of scope and cannot be understood from the passage.

Choice (C)

Q21. Which of the following best describes the function of the example provided in the last sentence of the third paragraph?

- a) To give an example of a particular kind of decision that people make.
- b) To cast doubt on the assertion made in the previous sentence.
- c) To introduce an idea that will be countered in the following paragraph.
- d) To support the view that a mode of thinking has a limitation.

Number of words and Explanatory notes for RC:

Number of words: 577

Option A: For instance, employees know they should save for retirement, yet they rarely get around to setting up a retirement account. The purpose of the last sentence of the third para is not merely to exemplify a kind of decision that people make. It serves to highlight the limitation of System 1 thinking. Hence option A is insufficient as an answer.

Option B: The last sentence of the third para reads thus: For instance, employees know they should save for retirement, yet they rarely get around to setting up a retirement account. The sentence prior to the last sentence of the third para is: System 1 focuses on concrete, immediate payoffs, distracting us from the abstract, long-term consequences of our decisions. So the example provided in the last sentence of the third para supports the previous sentence. It does not cast doubt on the premise given in the previous sentence. So option B is not the correct answer.

Option C: The last sentence of the third para does not provide any new idea as such. It only exemplifies the disadvantage of System 1 thinking mentioned in the previous sentences. So even though the following para (para 4) begins by saying: This does not mean that System 1 should be suppressed to promote sound decisions, we cannot say that the idea of the last sentence of para 3 has been contradicted in the fourth para. So option C is incorrect.

Option D: These modes of thinking have distinct advantages and disadvantages. System 1 takes in information and reaches correct conclusions effortlessly using intuition and rules of thumb. ... System 1 focuses on concrete, immediate payoffs, distracting us from the abstract, long-term consequences of our decisions. For instance, employees know they should save for retirement, yet they rarely get around to setting up a retirement account. the emotional response should be weighed against other factors that may be underappreciated by System 1 – such as the long-term strategic value of the investment. ...This makes option D the correct answer.

Choice (D)

Q22. The passage argues that the lever of System 2 thinking can be triggered by executives by ...

- a) introducing changes that arouse emotions, increasing accountability, introducing planning prompts and using reminders
- b) increasing accountability, introducing reminders, using simultaneous evaluation of alternatives, creating opportunities for reflection
- c) introducing reminders, using simultaneous evaluation of alternatives, simplifying processes, using planning prompts

- d) using simultaneous evaluation of alternatives, creating opportunities for reflection, harnessing biases, increasing accountability**

Number of words and Explanatory notes for RC:

Number of words: 577

One needs to refer to the last two paras of the passage to answer the question. We look at the keywords given in the choices and then categorize them under the two categories of System 1 and System 2 thinking.

Executives can trigger System 1 in several ways:

- (a) Arousal of emotions: In a bid to reduce the high turnover at its call centers, Wipro BPO conducted an experiment aimed at strengthening employees' emotional connection with the organization. Employees were asked on the first day of orientation to think about their strengths and how they could apply them in their new jobs. This arousal of emotions helped new employees to forge emotional bonds with the organization leading to lower employee turnover and higher performance.
- (b) Harnessing biases: Executives can also use cognitive biases to their advantage. Research shows that people feel twice as bad about incurring a loss as they feel good about receiving a gain of the same amount (loss aversion bias) but pay extra attention to vivid information and overlook less flashy data (vividness bias).
- (c) Simplifying processes: Lastly, organizational processes involve unnecessary steps that lower motivation or increase the potential for cognitive biases. By streamlining processes, executives can reduce such problems.

Executives can engage System 2 thinking in the following ways:

- (a) Using simultaneous evaluations of alternatives: Evaluating decision alternatives simultaneously, rather than sequentially, reduces bias. For instance, a manager who is evaluating job candidates can avoid making biased assessments of their likely future performance by comparing them against one another rather than evaluating them separately.
- (b) Creating opportunities for reflection: Taking time out of our busy days to just reflect may sound costly, but it is an effective way to engage System 2.
- (c) Increasing accountability: Lastly, holding individuals accountable for their judgments increases the likelihood that executives will be vigilant about eliminating bias.
- (d) Introducing reminders: Thirdly, people often resolve to act in a particular way but fail to follow through, so simple planning prompts can help employees stick to the plan.

So option B correctly represents the triggers for engaging System 2 thinking. The remaining options have one or more triggers for System 1 thinking, viz. introducing changes that arouse emotions (option A), simplifying processes (option C) and harnessing biases (option D). So options A, C and D are incorrect. Option B is the correct answer.

Choice (B)

Q23. Which of the following best describes the primary purpose of the passage?

- a) **To distinguish between two systems of thinking.**

- b) To provide anecdotal evidence of situations involving poor decision making.
- c) To highlight the importance of the two systems of thinking in designing the solution to a problem.
- d) To understand the cognitive biases linked with two systems of thinking that affect business decisions.

Number of words and Explanatory notes for RC:

Number of words: 577

Option A: Option A is limited to the first four paragraphs of the passage only. It does not highlight the problem of business decisions nor does it elaborate on the diagnosis and the solutions for the same. Hence option A is not the answer.

Option B: Option B is also incomplete. The main focus of the passage is not to provide anecdotal evidence of situations involving poor decision-making. The passage discusses two systems of thinking and in doing so, provides anecdotal evidence. The passage then states that poor decision-making results from insufficient motivation and cognitive biases. The passage also goes on to discuss a solution for the problem. ...Once they've diagnosed the underlying source of a problem, companies can begin to design a solution. So option B cannot be the answer.

Option C: Poor decision making results from insufficient motivation and cognitive biases. These categories are not mutually exclusive, but one must first recognize the distinction between them...Common sense can go a long way in diagnosing underlying causes...Once they've diagnosed the underlying source of a problem, companies can begin to design a solution. ... Executives can trigger System 1 in several ways. ...Executives need to engage system 2 as well. Hence option C is correct and is the answer.

Option D: The passage does not enumerate the common biases that affect business decisions. It only mentions that cognitive bias is a problem that affects decision making. So option D is not the correct answer.

Choice (C)

Q24. Which of the following points to the correct difference between System 1 thinking and System 2 thinking, as can be inferred from the passage?

- a) In a typical business environment, System 1 thinking is engaged more frequently than System 2 thinking.
- b) The long-term consequences of our decisions may be undermined by System 1 thinking.

- c) System 2 thinking continuously generates suggestions for System 1 thinking: impressions, intuitions, intentions, and feelings.
- d) System 2 thinking is unfairly underestimated in business circles.

Number of words and Explanatory notes for RC:

Number of words: 577

Option A: Option A finds no mention in the passage. It is out of scope and is not the answer.

Option B: System 1 takes in information and reaches conclusions effortlessly using intuition and rules of thumb but these shortcuts can lead us astray. So we rely on methodical System 2 thinking to tell us when our intuition is wrong or our emotions have clouded our judgment, and to correct poor judgments. System 1 thinking leads to poor follow-through on plans: it focuses on concrete, immediate payoffs, distracting us from abstract, long-term consequences of our decisions. For instance, employees know they should save for retirement, yet they rarely get around to setting up a retirement account. A factor undermined by System 1 thinking is the long-term strategic value of an investment. So option B is correct and is the answer.

Option C: Option C is inverted. It is System 1 thinking that continuously generates suggestions for System 2: impressions, intuitions, intentions, and feelings. Hence option C is negated. {The first, System 1 thinking, is automatic, instinctive and emotional and relies on mental shortcuts that generate intuitive answers to problems. The second, System 2, is slow, logical, and deliberate. System 1 takes in information and reaches conclusions effortlessly using intuition and rules of thumb but these shortcuts can lead us astray. So we rely on methodical System 2 thinking to tell us when our intuition is wrong or our emotions have clouded our judgment, and to correct poor judgments.}

Option D: Overreliance on System 1 thinking leads to poor follow-through on plans: it focuses on concrete, immediate payoffs, distracting us from abstract, long-term consequences of our decisions. This does not mean that System 1 should be suppressed to promote sound decisions. But System 2 should also be used and the emotional response should be weighed against factors underappreciated by System 1. There is no information in the passage to suggest that System 2 thinking is unfairly underestimated in business circles. The passage only tells us that System 2 thinking is also important and should be engaged along with System 1 thinking. Hence option D is not the answer.

Choice (B)

Q25. DIRECTIONS for question 25: The sentences given in the following question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper order for the four sentences and key in the sequence of four numbers as your answer, in the input box given below the question.

1. That is the source of the complaint.

2. To some extent, the significance of rationality stems from its very effectiveness in uplifting men from primitive conditions.
3. One can see how both the informal and formal processes of hypothesis, experiment, conclusion, century after century, repeated with new material, have built up the hierarchies of thought which have eliminated most of the enemies of primitive man.
4. It's such a powerful, all-dominating agent of civilised man [that] it [has] all but shut out everything else and now dominates man himself.

Sentence 1: Sentence 1 has the demonstrative pronoun 'that' and the clue 'complaint'. Sentence 1 sounds negative.

Sentence 2: Sentence 2 has the clues 'significance of rationality'. Sentence 2 is again positive in tone.

Sentence 3: Sentence 3 sounds like a general sentence that can begin the paragraph. It has the topic of discussion: hierarchies of thought eliminating enemies of primitive man. Sentence 3 is positive in tone.

Sentence 4: Sentence 4 has the pronoun 'It's'. The first half of sentence 4 is positive in tone while the second half is slightly negative in tone.

On a careful reading of the sentences, it can be observed that sentence 3 is a general sentence that can begin the paragraph. It has the general words 'one can see'. It talks about how hierarchies of thought have been built up by the processes of hypothesis, experiment, conclusion, century after century. And this has yielded the result: the enemies of primitive man have been eliminated.

Sentences 3 and 2 form a logical block. "eliminated most of the enemies of primitive man" in sentence 3 links with "effectiveness in uplifting men from primitive conditions" in sentence 2. So sentence 2 follows sentence 3.

Sentence 2 is followed by sentence 4. "It's such a powerful, all-dominating agent" in sentence 4 points to "rationality" in sentence 2. "civilised man" in sentence 4 contrasts "primitive man" in sentence 3 and "primitive conditions" in sentence 2. "It's such a powerful, all-dominating agent of civilised man" in sentence 4 links with "effectiveness in uplifting men from primitive conditions" in sentence 2. So, 324.

Sentence 1 which is negative in tone links with the half-negative sentence 4. Sentence 1 concludes the para. The pronoun 'that' in sentence 1 links with "it [has] all but shut out everything else and now dominates man himself" in sentence 4. Hence, 3241.

Ans: (3241)

Q26. DIRECTIONS for question 26: The paragraph given below is followed by four summaries. Choose the option that best represents the author's primary position in the paragraph.

There are lessons to be learnt from our collective historical experience but what we are witnessing at the moment, in our febrile political atmosphere, is the reckless conscription of narratives to ideological purposes. This is not at all uncommon in many countries where history and politics remain unsettled and narratives are fiercely contested. But in Britain we have become used – some might say to the point of complacency – to a gentler politics and more settled history. The politics of

the past few years has clearly unsettled us, and we yearn for explanations from our history. But such has been the shock to the system that in our anxiety we have responded with narratives that are both politically pointed and historically pointless.

- a) While narratives are designed to fit an ideology in many countries, Britain, where politics and history have been static for far too long, is unable to deal with the political pointlessness.
- b) Britain, used to a conservative brand of history and politics, is suddenly awakening to the chaos of ideologies formed to explain narratives.
- c) The present political atmosphere in Britain, used to milder politics and a placid history, is undergoing an uncommon turmoil and the response has been historically irrelevant narratives to meet ideological ends.
- d) Britain, for long boasting of gentle politics and a settled history, is walking the path of other politically turbulent countries whose narratives seldom disagree with their political ideologies.

There are three ideas in the para. The first is that the old Britain had gentle politics and settled history. Secondly, in countries with turbulent politics narratives are chosen to fit ideological purposes (subsidiary/elaboration idea). Thirdly, Britain is also taking that route now, albeit with narratives that seem out of place(contrast idea).

Option A: The author doesn't conclude that Britain is unable to deal with the situation. Secondly, the situation cannot be equated to 'political pointlessness'. The author had simply called the narratives pointless. Hence, Option A is not the answer.

Option B: The option equates gentle politics and settled history with 'conservative'. Secondly, narratives are being designed to fit ideologies and not the other way around. Hence, Option B is easy to eliminate.

Option C: This reflects the central idea that Britain's settled political atmosphere (milder politics and placid history – gentle politics and settled history) is undergoing a sea change (turmoil) and the narratives built to fit that atmosphere are shallow and superficial

(historically pointless). Hence, Option C is the answer.

Option D:Firstly, Britain walking the path of other politically turbulent countries is an extreme extrapolation, since the para only compares the similarity of the situations. Secondly, narratives are being conjured to fit ideological purposes. This is different from saying narratives seldom disagree with ideologies.

Choice (C)

Q27. DIRECTIONS for question 27: Five sentences related to a topic are given in the question below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out. Choose its number as your answer and key it in.

1. Unlike print text, hypertext provides multiple paths between text segments, now often called "lexias" in a borrowing from the pre-hypertextual but prescient Roland Barthes.
2. Hypertext reader and writer are said to become co-learners or co-writers, as it were, fellow-travelers in the mapping and remapping of textual (and visual, kinetic and aural) components, not all of which are provided by what used to be called the author.
3. With its webs of linked lexias, its networks of alternate routes (as opposed to print's fixed unidirectional page-turning) hypertext presents a radically divergent technology, interactive and polyvocal, favoring a plurality of discourses over definitive utterance and freeing the reader from domination by the author.
4. With a hypertextual diskette books are supposed to become obsolete.
5. "Hypertext" is not a system but a generic term, coined a quarter of a century ago by a computer populist named Ted Nelson to describe the writing done in the nonlinear or nonsequential space made possible by the computer.

Sentence 1: Sentence 1 contrasts "hypertexts" with "print text" and introduces the word "lexias".

Sentence 2: Sentence 2 focuses on hypertext reader and writer.

Sentence 3: Sentence 3 talks about network and linked lexias and can only succeed sentence 1. It also says that hypertext is a divergent technology.

Sentence 4: Sentence 4 talks about books becoming redundant because of hypertexts.

Sentence 5: Sentence 5 sounds like a general sentence that can begin the paragraph. It introduces the term "hypertext".

Among all the five sentences, only sentence 5 can begin the paragraph. It is a general standalone sentence that introduces "Hypertext" to the reader. Sentence 5 is followed by sentence 1. It distinguishes "hypertext" from a print text. "describe the writing done in the nonlinear or nonsequential space made possible by the computer" in sentence 5 links with "Unlike print text" in sentence 1.

Sentences 1 and 3 form a mandatory pair or logical block. "now often called "lexias"" in sentence 1 links with "With its webs of linked lexias" in sentence 3. Also "its networks of alternate routes (as opposed to print's fixed unidirectional page-turning)" in sentence 3 links with "its networks of alternate routes (as opposed to print's fixed unidirectional page-turning)" in sentence 1. So sentence 3 follows sentence 1.

Sentence 3 is followed by sentence 2. "favoring a plurality of discourses over definitive utterance and freeing the reader from domination by the author" in sentence 3 links with "mapping and remapping of textual (and visual, kinetic and aural) components, not all of which are provided by what used to be called the author" in sentence 2. Sentence 2 concludes the paragraph. So, 5132.

Sentence 4 is the odd sentence out. It runs tangent to the paragraph and is not connected with the other sentences. It can be a part of another para as it introduces a new point of view which needs to be substantiated.

Ans: (4)

Q28. DIRECTIONS for question 28: The paragraph given below is followed by four summaries. Choose the option that best represents the author's primary position in the paragraph.

Macroprudential policy has two, mirror-image functions: to protect the financial system from the economy and the economy from the financial system. In its former guise, macroprudential policy recognises that a monetary policy designed to achieve price stability can encourage destabilizing developments in the financial system. The aim, then, is to prevent or at least reduce the undesirable consequences of such a development. In this guise, then, macroprudential policy is concerned with financial stability. It works, by, for example, raising equity requirements of lenders or borrowers in a boom. In its latter guise, macroprudential policy is aimed at protecting the economy from the excesses of the financial system, in both boom and bust. It works by actions that curb lending.

- a) Macroprudential policy plays a dual role – protecting the financial system from turbulence in the economy and protecting the economy when the financial system is turbulent.
- b) Macroprudential policy protects the financial system and the economy from adversely affecting each other.
- c) The role of macroprudential policy is to ensure the financial system and the economy are stable in both boom and bust.
- d) A good macroprudential policy has to walk the tightrope between financial stability and price stability as they affect each other.

Option A: The function of the macroprudential policy is not just to protect the financial system from 'turbulence' in the economy, and not just to protect the economy when the financial system is turbulent. It is more about keeping both stable and from affecting each other adversely. Hence, Option A is close but not the answer.

Option B: This option highlights the essence of the para: macroprudential policy protecting the financial system and the economy from adversely affecting each other, through various ways (examples of which are given but which are not the main ideas of the para). Hence, Option B is the answer.

Option C: This option seems to apply the term 'boom and bust' for something outside economy and financial system, by mentioning that they are kept stable in both boom and bust. That is not how the para uses 'boom and bust' and that is not the author's main idea in the para. Option C is not the answer.

Option D: This option, instead of explaining the function of macroprudential policy, explains what a good policy is. Also, such a policy doesn't walk a tightrope (a term used when something is hanging in between two sides or two ends - financial system and economy aren't two different sides here). Option D is not the answer.

Choice (B)

Q29. DIRECTIONS for question 29: The sentences given in the following question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper order for the four sentences and key in the sequence of four numbers as your answer, in the input box given below the question.

1. They exquisitely design every sub-system of the landing craft so as to withstand the shock of arrival.
2. In the quickening race to put men and machines on other planets, tremendous resources are devoted to making possible a "soft landing".

- 3. Failure of any sub-system to function after touch-down could destroy human lives, not to mention billions of dollars worth of apparatus and tens of thousands of man-years of labour.
- 4. Armies of engineers, geologists, physicists, metallurgists and other specialists concentrate years of work on the problem of landing impact

Sentence 1: Sentence 1 has the pronoun 'they'.

Sentence 2: Sentence 2 sounds like a general sentence that can begin the paragraph. It mentions the topic of discussion: resources devoted to ensure a smooth landing of the aircraft on another planet.

Sentence 3: Sentence 3 mentions some consequences of a bad landing of the aircraft.

Sentence 4: Sentence 4 mentions the resource specialists who work hard on the problem of landing impact.

So sentence 2 is a general sentence that can begin the paragraph. It has some introductory words "In the quickening race" and it mentions the contextual background: resources devoted for a soft landing.

Sentences 2 and 4 form a logical block. "tremendous resources are devoted to making possible a "soft landing"" in sentence 2 is exemplified by "Armies of engineers, geologists, physicists, metallurgists and other specialists" in sentence 4. Sentence 2 is followed by sentence 4.

Sentence 4 is followed by sentence 1. The pronoun 'they' in sentence 1 points to "Armies of engineers, geologists, physicists, metallurgists and other specialists" in sentence 4. "exquisitely designedwithstand the shock of arrival" in sentence 1 links with "concentrate years of work on the problem of landing impact" in sentence 4 and "tremendous resources are devoted to making possible a "soft landing"" in sentence 2. So sentence 1 follows sentence 2.

Sentence 1 is followed by sentence 3. "Failure of any sub-system to function after touch-down" in sentence 3 contrasts "exquisitely design every sub-system of the landing craft" in sentence 1. Sentence 3 concludes the para by mentioning the consequences of a bad landing of the aircraft. So, 2413.

Ans: (2413)

Q30. DIRECTIONS for question 30: The sentences given in the following question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper order for the four sentences and key in the sequence of four numbers as your answer, in the input box given below the question.

- 1. The fact that some black women may be more privileged in relation to class may not take away from their experience of racism.
- 2. By doing so they address the ways that different aspects of one's identity, such as race, gender, class, sexuality and so forth, intersect to create multiple and distinct forms of oppression so that no one aspect can be privileged over another in understanding oppression.

3. Instead, various identities must all be understood as intersecting in producing one's experience of oppression.
4. For this reason and others, feminist scholars call for more attention to the intersections of race and/or ethnicity, nationality, class and gender.

Sentence 1 talks about black women from privileged classes still facing racism. It is a grammatically and logically independent sentence.

Sentence 2 connects with some action by using 'so', and with a personal pronoun 'they' referring to a plural noun.

Sentence 3 starts with a contrast by using 'instead' and talks about culmination of various identities, probably following a sentence that talks about segregation/separation/uniqueness of an identity etc.

Sentence 4 points to some reason that spurs feminist scholars into action. This obviously has to point to something negative since it spurs feminist scholars into action. So, 4 is downstream to 1 (not necessarily immediately after).

2 follows 4 since 'they' pairs up with 'feminist scholars'. Similarly, 3 follows 1 since, with a contrast word 'instead' it explains what constitutes oppression. 4 and 2 talk about reaction/response to the event explained in 1 and 3.

So, 1342.

Ans: (1342)

Q31. DIRECTIONS for question 31: Five sentences related to a topic are given in the question below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out. Choose its number as your answer and key it in.

1. As with decaf coffee, which is treated in similar ways, many people argue that it also spoils the flavour.
2. Sipping decaffeinated tea can help prevent anxiety and insomnia – the downside of caffeine – but there are drawbacks to this, too.
3. What would be agreeable is a tea plant that provides all the taste and goodness but with little or none of the caffeine.
4. Although this will get rid of most of the caffeine, it can cause collateral damage to some of the fragile compounds that give tea its benefits – cholesterol reduction, reduction of the risk of cardiovascular disease and improvement of mental alertness.
5. Stripping away caffeine from tea involves either immersing the leaves in carbon dioxide at extremely high pressure or treating the leaves with searing hot water.

Sentence 1: Sentence 1 brings in a comparison “As with decaf coffee”.

Sentence 2: Sentence 2 contrasts the effects of the presence and absence of caffeine in tea.

Sentence 3: Sentence 3 mentions the features of a tea plant that would be agreeable.

Sentence 4: Sentence 4 highlights a contrast conjunction ‘although’. It mentions the pronouns ‘this’, ‘it’ and “its”. The key word here is “collateral damage”, the examples of which are mentioned in this sentence.

Sentence 5: Sentence 5 mentions a method for stripping away caffeine from tea.

So sentence 2 is a general sentence that can begin the para. The remaining sentences need a precedent. Though sentence 2 praises some benefits of decaffeinated tea (vis-à-vis those of caffeine), it also highlights its drawbacks.

Sentences 2 and 5 form a logical block. “Stripping away caffeine from tea” in sentence 5 points to “sipping decaffeinated tea” in sentence 2. So sentence 5 follows sentence 2.

Sentences 5 and 4 form another logical block. “this will get rid of most of the caffeine” in sentence 4 links with “immersing the leaves in carbon dioxide at extremely high pressure or treating the leaves with searing hot water” in sentence 5. “collateral damage” in sentence 4 points to “there are drawbacks to this, too” mentioned earlier in sentence 2. So, 245.

Sentence 1 concludes the para. “which is treated in similar ways” in sentence 1 points to the treatment mentioned in sentence 5. “also spoils the flavour” in sentence 1 links with “cause collateral damage to some of the fragile compounds that give tea its benefits” in sentence 4.

Sentence 3 can be the beginning sentence of another para, in fact, it can be the introduction sentence of the very next para. “tea plant that provides all the taste and goodness but with little or none of the caffeine” would need further substantiation.

Ans: (3)

Q32. DIRECTIONS for question 32: The sentences given in the following question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper order for the four sentences and key in the sequence of four numbers as your answer, in the input box given below the question.

1. But the challenge was not simply that great buildings and art required post-war rehabilitation.
2. What began with war-ravaged Europe soon set its sights on the developing world, and it would remain a one-way flow: from the West to the rest.
3. Forged in the twilight of empire and led by the victors of the recently concluded war and major colonial powers, UNESCO's founders sought global influence with a programme of reconstruction.
4. UNESCO sought to regulate the past itself, managing it for the future.

Sentence 1 starts with a contrast marker 'but' followed by a logically incomplete statement about what the challenge is not. That means it should be followed by some real challenge and preceded by something that matches the tone.

Sentence 2 talks about the beginning of something and how it proceeded.

Sentence 3 is an independent sentence about the origin of UNESCO, definitely upstream to all the sentences and hence, the start of the para (origin sentence comes before any other issue-sentences).

Sentence 4 is also about UNESCO, and the role it plays.

Since, Sentence 3 talks about 'reconstruction' it is the one that precedes 1 to match the tone of 'but'. So, the founders sought global influence with a program of reconstruction BUT the challenge didn't just stop at rehabilitation that great buildings needed. The greater task was 'regulation of past itself'. So, 4 follows 1. Sentence 2 gives us specifics - the initial project and how UNESCO became bigger, to follow the mission described in 1 and 4. So, 3142. Ans: (3142)

Q33. DIRECTIONS for question 33: Five sentences related to a topic are given in the question below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out. Choose its number as your answer and key it in.

1. One is to remove them entirely.
2. Nations and communities have various options for dealing with controversial monuments.
3. Rather, they advocate removing controversial statues while retaining their pedestals as a reminder of the events that they invoke.
4. But is viewing a statue actually an effective way of learning about history?
5. Some who oppose particular monuments do not wish to take them down entirely, however, asserting that simply removing a statue is tantamount to pretending a traumatic event in the past never happened.

Sentence 1 logically demands the question 'one' of what?

Sentence 2 is a logically independent sentence that discusses the various options available to nations and communities when it comes to dealing with controversial monument. This also offers a context to Sentence 1 which represents one such option – removing them.

Sentence 3 uses a contrast marker 'Rather' to advocate an alternative way of dealing with controversial statues – removing them while retaining their pedestals as a reminder.

Sentence 4 introduces a contrast questioning the futility of viewing a statue in learning about history. This sentence will fit alongside a sentence that discusses using statues as a way to learn about history.

Sentence 5 questions another way of dealing with controversial monuments – removing them, since removing them is like denying whatever event they represent. This connects to 3 since 3 proposes the alternative to remember the event (since 5 mentions that remembering is important).

2 is the most upstream of all statements and provides context to the remaining four sentences. 1 gives one solutions/3 and 5 together propose another. 4 merely questions the importance of viewing statues as a way of learning history. So, the order will be 2153 and 4 will be left out because its preceding sentence is missing.

Ans: (4)

Q34. DIRECTIONS for question 34: The paragraph given below is followed by four summaries. Choose the option that best represents the author's primary position in the paragraph.

Fascism, in Italy, undermined Italian linguistically, to the extent of enforcing a "pure Italian" free from foreign words and expressions. Under Fascism a croissant became a cornetto, a bar became a quisibeve, and football, invented by the English, became calcio. Even the pronoun *lei* (as opposed to *voi*) was prohibited as a second-person pronoun because it was claimed to be a Spanish grammatical import, and also because it sounded "feminine." The regime sought to standardize and flatten the language, to weed out dialect and other anomalies, above all, to turn it inward. And it was in that very moment that Italy's writers, at least a considerable number of them, turned defiantly outward. The entire twentieth century can be read as a battle of wills between the wall Fascism sought to erect around Italy and Italian culture, and those determined, despite running grave risks, to break it down.

- a) Fascism in Italy rooted out impurities from Italian, a change that didn't please many rebellious writers.
- b) Fascism in Italy weeded out foreign words like 'croissant', 'football' and 'bar' in their determined battle to purify Italian.
- c) 20th century writers of Italy clashed against its fascist regime's iron-fisted endeavour to rid Italian of its anomalies and foreign imports.
- d) Many Italian writers rebelled against Italy's fascist regime which single-mindedly sought to eliminate the influences of other languages on Italian.

Option A: The word 'impurities' cannot be attributed to the author's position, since the author may not really agree to calling foreign expressions and dialect as impurities. It was the quest of the Fascist regime. Also, 'that didn't please' is a very vague representation of the response of the writers of Italy as depicted in the para. Hence, Option A is not the answer.

Option B: This option is easy to eliminate because more than the author's position it focuses on the examples, which do not contribute to the idea of the para. Option B is not the answer.

Option C: This option depicts both the ideas in the para – the clashing of 20th century writers of Italy with the fascist regime, the latter's efforts to rid the language of anomalies and foreign – imports – accurately. Hence, Option C is the answer.

Option D: The Fascist regime removed foreign language expressions and words from Italian. This is not the same as influences of foreign languages. Influences can exist without the foreign word or expression being present. Influence is subjective too. Also, we cannot infer that the fascist regime was "single-minded" (single purpose driving their actions) in its efforts. Hence, Option D is not the answer. Choice (C)

DILR

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

In a hotel, there are exactly 10 rooms, R1 through R10, each of which can be opened using a different key. Hari, a concierge in the hotel, has a rectangular box in which he keeps the ten keys

that open these ten rooms. In the box, there are ten slots, S_1 through S_{10} , for holding the keys. Hari places the ten keys in the ten slots such that, for any n , the key in S_n opens the room R_n .

On a particular day, Hari took this box home and his daughter, while playing with the keys in the box, removed all the keys and ended up placing them back in the ten slots, but in a random manner.

Hari realized that his daughter had jumbled the keys. Therefore, on returning to the hotel the next day, he tried to arrange the keys in their correct slots using the process described below. He followed the process for each room, one at a time, starting from R_1 through R_9 (but not R_{10}).

- For any room R_n , Hari tried each key from the key in S_n through the key in S_{10} , until the room opened.
- He then placed the key that opened R_n in S_n and the key initially in S_n in the now empty slot, i.e., the slot from which the key that opened R_n was removed.
- If the key that opened R_n was initially in S_n , he did not interchange any keys.

Each time Hari tries to open a room (either successfully or unsuccessfully) using a key and places the key back in the box is counted as one trial.

Q1. DIRECTIONS for questions 1 to 4: Type in your answer in the input box provided below the question.

The keys in S_1 , S_2 , S_3 ... S_{10} open the rooms R_{10} , R_7 , R_6 , R_8 , R_2 , R_3 , R_1 , R_5 , R_4 and R_9 , respectively.

What is the number of trials that Hari needs to ensure that all the keys are placed in their correct slots?

For R₁, Hari will try till S₇. Hence, he will need 7 trials.
For R₂, Hari will try till S₅. Hence, Hari will need 4 trials.
For R₃, Hari will try till S₆. Hence, Hari will need 4 trials.
For R₄, Hari will try till S₉. Hence, Hari will need 6 trials.
For R₅, Hari will try till S₈. Hence, Hari will need 4 trials.
For R₆, S₆ has the key to open R₆. Hence, Hari will need only 1 trial.
For R₇, Hari will try till S₈. Hence, Hari will need 2 trials.
For R₈, Hari will try till S₉. Hence, Hari will need 2 trials.
For R₉, Hari will try till S₁₀. Hence, Hari will need 2 trials.
After this, all the keys will be in the correct slots.

Hence, the number of trials required = $7 + 4 + 4 + 6 + 4 + 1 + 2 + 2 + 2 = 32$

Ans: (32)

Q2. DIRECTIONS for questions 1 to 4: Type in your answer in the input box provided below the question.

If it is known that exactly 4 keys were initially not in their correct slots and Hari arranged all the keys in their correct slots after exactly n trials, what is the maximum possible value of n ?

Given that 4 keys are not in their correct slots. Hence, we can consider two pairs of keys to not be in their correct slots.

If the keys to R₁ and R₁₀ are not in their correct slots and are interchanged, Hari will need 10 trials to place them in their correct slots.

Similarly, for R₂, he can use a maximum of 9 trials. This is possible if the keys to the rooms are in the following manner from S₁ through S₁₀:

R₂ R₉ R₃ R₄ R₅ R₆ R₇ R₈ R₁₀ R₁

For R₁, he will need 10 trials.

For R₂, he will need 9 trials (since R₂ will now be in S₁₀).

For each of R₃ through R₈, he will need a total of 6 trials.

For R₉, he will need 2 trials.

∴ The maximum possible value of $n = 10 + 9 + 6 + 2 = 27$.

Ans: (27)

Q3. DIRECTIONS for questions 1 to 4: Type in your answer in the input box provided below the question.

If no key was initially in its correct slot and Hari arranged all the keys in their correct slots after exactly n trials, what is the minimum possible value of n ?

If the keys for R1 and R2 are in S1 and S2 respectively, Hari will need 3 trials to place the keys for R1 and R2 in the correct slots.

If the keys for R3 and R4, R5 and R6, R7 and R8 are interchanged, Hari will need 3 trials each for each pair. Hence, he will require a total of $4 \times 3 = 12$ trials for R1 through R8.

For R9 and R10, if the keys are interchanged, then Hari will need two trials for finding the key to R9 and does not need any more trials for R10. Hence, he will need only two trials for this pair of keys.

∴ Hari requires a total of $12 + 2 = 14$ trials.

Ans: (14)

Q4. DIRECTIONS for questions 1 to 4: Type in your answer in the input box provided below the question.

If Hari ended up placing all the keys in their correct slots after exactly x trials, what is the maximum possible value of x ?

For the first key, the maximum number of trials required is 10.

For the second key, the maximum number of trials required is 9.

In a similar manner, the maximum number of trials for R3 through R9 is 8, 7, 6... 2.

The maximum number of trials required is $10 + 9 + \dots + 2 = 54$

Note that this is possible if the keys initially in S1 through S10 open the following rooms (in that order): R2, R3, R4, R5, R6, R7, R8, R9, R10 and R1. Ans: (54)

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

In a country, exactly five different brands of smartphones, P, Q, R, S and T, are sold. Kiran tracked the market shares (by volume) of these five brands, over four years, from 2015 to 2018.

The following area chart provides the market share of each of the five brands for each year:



It is also known that,

- during one year, among 2016, 2017 and 2018, the total number of units of the five brands sold decreased by 50,000 as compared to the previous year but in this year, the number of units sold by P increased as compared to the previous year.
- during another year, among 2016, 2017 and 2018, the total number of units of the five brands sold decreased by 30,000 as compared to the previous year but in this year, the number of units sold by R increased as compared to the previous year.
- during another year, among 2016, 2017 and 2018, the total number of units of the five brands sold increased by 40,000 as compared to the previous year but in this year, the number of units sold by Q decreased as compared to the previous year.

Q5. DIRECTIONS for questions 5 to 8: Select the correct alternative from the given choices.

What is the difference between the number of units of R sold in 2017 and the number of units of Q sold in 2016?

- a) **10000**
- b) **8000**
- c) **6000**
- d) **Cannot be determined**

In the year that condition (i) refers to, the overall size of the market decreased and the number of units of P sold increased. Hence, the market share of P must have definitely increased in this year. By observation, we can see that, from 2016 to 2018, the market share of P increased in two years, 2016 and 2018.

In the year that condition (ii) refers to, the overall size of the market decreased and the number of units of R sold increased. Hence, the market share of the R must have increased in this year. By observation, we can see that, from 2016 to 2018, the market share of R increased in two years, 2017 and 2018.

In the year that condition (iii) refers to, the overall size of the market increased and the number of units of Q sold decreased. Hence, the market share of Q must have decreased in this year. By observation, we can see that, from 2016 to 2018, the market share of Q decreased only in 2017. Hence, the year that this condition refers to must be 2017.

The year that condition (ii) refers to must be 2018 and the year that condition (i) refers to must be 2016.

Let the total number of mobile phones sold in the year 2015 be x .

From (i), (ii) and (iii), the number of mobile phones sold in the years 2016, 2017 and 2018 will be $x - 50000$, $x - 10000$ and $x - 40000$ respectively.

Hence, we can calculate the number of units of each brand sold in each year. This is given in the following table:

	2015	2016	2017	2018
P	$0.25x$	$0.35x - 17500$	$0.15x - 1500$	$0.25x - 10000$
Q	$0.15x$	$0.2x - 10000$	$0.15x - 1500$	$0.2x - 8000$
R	$0.1x$	$0.1x - 5000$	$0.2x - 2000$	$0.25x - 10000$
S	$0.05x$	$0.15x - 7500$	$0.25x - 2500$	$0.15x - 6000$
T	$0.45x$	$0.2x - 10000$	$0.25x - 2500$	$0.15x - 6000$
Total	x	$x - 50000$	$x - 10000$	$x - 40000$

The number of units of R sold in 2017 = $0.2x - 2000$

The number of units of Q sold in 2016 = $0.2x - 10000$

Required difference = 8000

Choice (B)

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

If the difference between the number of units of T sold in 2017 and that of Q sold in 2015 is 47,500, how many units of S were sold in 2018?

a) 60,000

b) 63,000

c) 66,000

d) 69,000

In the year that condition (i) refers to, the overall size of the market decreased and the number of units of P sold increased. Hence, the market share of P must have definitely increased in this year. By observation, we can see that, from 2016 to 2018, the market share of P increased in two years, 2016 and 2018.

In the year that condition (ii) refers to, the overall size of the market decreased and the number of units of R sold increased. Hence, the market share of the R must have increased in this year. By observation, we can see that, from 2016 to 2018, the market share of R increased in two years, 2017 and 2018.

In the year that condition (iii) refers to, the overall size of the market increased and the number of units of Q sold decreased. Hence, the market share of Q must have decreased in this year. By observation, we can see that, from 2016 to 2018, the market share of Q decreased only in 2017. Hence, the year that this condition refers to must be 2017.

The year that condition (ii) refers to must be 2018 and the year that condition (i) refers to must be 2016.

Let the total number of mobile phones sold in the year 2015 be x .

From (i), (ii) and (iii), the number of mobile phones sold in the years 2016, 2017 and 2018 will be $x - 50000$, $x - 10000$ and $x - 40000$ respectively.

Hence, we can calculate the number of units of each brand sold in each year. This is given in the following table:

	2015	2016	2017	2018
P	$0.25x$	$0.35x - 17500$	$0.15x - 1500$	$0.25x - 10000$
Q	$0.15x$	$0.2x - 10000$	$0.15x - 1500$	$0.2x - 8000$
R	$0.1x$	$0.1x - 5000$	$0.2x - 2000$	$0.25x - 10000$
S	$0.05x$	$0.15x - 7500$	$0.25x - 2500$	$0.15x - 6000$
T	$0.45x$	$0.2x - 10000$	$0.25x - 2500$	$0.15x - 6000$
Total	x	$x - 50000$	$x - 10000$	$x - 40000$

The number of units of T sold in 2017 = $0.25x - 2500$

The number of units of Q sold in 2015 = $0.15x$

Given that $0.1x - 2500 = 47,500 \Rightarrow x = 500,000$

Number of units of S sold in 2018 = $0.15x - 6000 = 69,000$

Choice (D)

Q7. DIRECTIONS for questions 5 to 8: Select the correct alternative from the given choices.

The number of units of R sold in 2017 is definitely greater than

a) the number of units of R sold in 2015.

b) the number of units of P sold in 2018.

c) the number of units of P sold in 2016.

d) None of the above

In the year that condition (i) refers to, the overall size of the market decreased and the number of units of P sold increased. Hence, the market share of P must have definitely increased in this year. By observation, we can see that, from 2016 to 2018, the market share of P increased in two years, 2016 and 2018.

In the year that condition (ii) refers to, the overall size of the market decreased and the number of units of R sold increased. Hence, the market share of the R must have increased in this year. By observation, we can see that, from 2016 to 2018, the market share of R increased in two years, 2017 and 2018.

In the year that condition (iii) refers to, the overall size of the market increased and the number of units of Q sold decreased. Hence, the market share of Q must have decreased in this year. By observation, we can see that, from 2016 to 2018, the market share of Q decreased only in 2017. Hence, the year that this condition refers to must be 2017.

The year that condition (ii) refers to must be 2018 and the year that condition (i) refers to must be 2016.

Let the total number of mobile phones sold in the year 2015 be x .

From (i), (ii) and (iii), the number of mobile phones sold in the years 2016, 2017 and 2018 will be $x - 50000$, $x - 10000$ and $x - 40000$ respectively.

Hence, we can calculate the number of units of each brand sold in each year. This is given in the following table:

	2015	2016	2017	2018
P	$0.25x$	$0.35x - 17500$	$0.15x - 1500$	$0.25x - 10000$
Q	$0.15x$	$0.2x - 10000$	$0.15x - 1500$	$0.2x - 8000$
R	$0.1x$	$0.1x - 5000$	$0.2x - 2000$	$0.25x - 10000$
S	$0.05x$	$0.15x - 7500$	$0.25x - 2500$	$0.15x - 6000$
T	$0.45x$	$0.2x - 10000$	$0.25x - 2500$	$0.15x - 6000$
Total	x	$x - 50000$	$x - 10000$	$x - 40000$

The number of units of R sold in 2017 = $0.2x - 2000$

Option A: Number of units of R sold in 2015 = $0.1x$

$$0.2x - 2000 < 0.1x \Rightarrow x < 20,000$$

However, the value of x must be greater than 50,000 (since $x - 50000$ units were sold in 2016). Hence, the number of units of R sold in 2017 must definitely be greater than the number of units of R sold in 2015.

Option B: The number of units of P sold in 2018

$$= 0.25x - 10000$$

$$0.2x - 2000 < 0.25x - 10000 \Rightarrow x > 240,000$$

Hence, this is possible and the number of units of R sold in 2017 can be less than that of P sold in 2018.

Option C: The number of units of P sold in 2016

$$= 0.35x - 17500$$

$$0.2x - 2000 < 0.35x - 17500 \Rightarrow x > 103,333.33$$

Hence, this is also possible.

∴ Only option A satisfies the condition.

Choice (A)

Q8. DIRECTIONS for questions 5 to 8: Select the correct alternative from the given choices.

If the total number of units of T sold across the four years is the same as the total number of units of the five brands sold in the year 2015, how many units of P were sold in the year 2016?

a) 1,07,000

b) 1,12,000

c) 1,05,000

d) 1,00,000

In the year that condition (i) refers to, the overall size of the market decreased and the number of units of P sold increased. Hence, the market share of P must have definitely increased in this year. By observation, we can see that, from 2016 to 2018, the market share of P increased in two years, 2016 and 2018.

In the year that condition (ii) refers to, the overall size of the market decreased and the number of units of R sold increased. Hence, the market share of the R must have increased in this year. By observation, we can see that, from 2016 to 2018, the market share of R increased in two years, 2017 and 2018.

In the year that condition (iii) refers to, the overall size of the market increased and the number of units of Q sold decreased. Hence, the market share of Q must have decreased in this year. By observation, we can see that, from 2016 to 2018, the market share of Q decreased only in 2017. Hence, the year that this condition refers to must be 2017.

The year that condition (ii) refers to must be 2018 and the year that condition (i) refers to must be 2016.

Let the total number of mobile phones sold in the year 2015 be x .

From (i), (ii) and (iii), the number of mobile phones sold in the years 2016, 2017 and 2018 will be $x - 50000$, $x - 10000$ and $x - 40000$ respectively.

Hence, we can calculate the number of units of each brand sold in each year. This is given in the following table:

	2015	2016	2017	2018
P	$0.25x$	$0.35x - 17500$	$0.15x - 1500$	$0.25x - 10000$
Q	$0.15x$	$0.2x - 10000$	$0.15x - 1500$	$0.2x - 8000$
R	$0.1x$	$0.1x - 5000$	$0.2x - 2000$	$0.25x - 10000$
S	$0.05x$	$0.15x - 7500$	$0.25x - 2500$	$0.15x - 6000$
T	$0.45x$	$0.2x - 10000$	$0.25x - 2500$	$0.15x - 6000$
Total	x	$x - 50000$	$x - 10000$	$x - 40000$

The total number of units of T sold across the four years = $1.05x - 18500$

The total number of units of any brand sold in the year 2015 = x

Given that $1.05x - 18500 = x \Rightarrow x = 370,000$

The number of units of P sold in the year 2016 = $0.35x - 17500 = 112,000$.

Choice (B)

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

Kiran had 64 small unpainted cubes, of which he took exactly m cubes and painted exactly n faces of each of these m cubes. He then used all the 64 small cubes to form a large cube. However, he formed the large cube before the paint on the small cubes completely dried. Because of this, any unpainted face of any small cube that touched a painted face of a small cube also became a painted face.

Q9. DIRECTIONS *for questions 9 to 12*: Select the correct alternative from the given choices.

If $n = 2$, what is the minimum possible value of m such that, after forming the large cube, every small cube has at least one painted face?

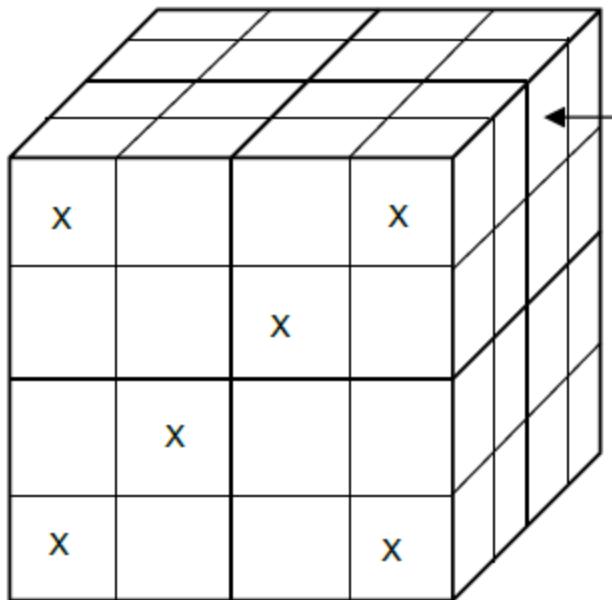
a) 22

b) 24

c) 36

d) 28

Given that $n = 2$. Hence, for each of the m small cubes, two faces are painted. Since 2 faces are painted, each painted cube can result in 2 other smaller cubes having one painted face. Hence, for every painted cube, there must be 2 initially unpainted cubes which will end up with one painted face, i.e., in the ratio 1:2. Since there are a total of 64 cubes, the theoretical minimum number of cubes required $= 64/3 = 21.33$. Hence, there must be at least 22 cubes which have all faces painted. We should now confirm whether this is possible in any way.



Let the adjacent diagram represent the large cube.

We can divide the cube into four vertical layers.

Assume that all the 16 cubes in the third layer (indicated by the arrow in the diagram) are painted. Because of this, all the cubes in the second and fourth layers will also be painted.

In the first layer, we need to paint 6 cubes or less to achieve the theoretical minimum. This can be achieved in multiple ways, one of which is provided in the figure.

Hence, it is possible to paint two faces of 22 cubes and end up with at least one painted face in each small cube after the large cube is formed. Choice (A)

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

What is the minimum possible value of m such that, after forming the large cube, every small cube has all its six faces painted?

a) 56

- b) 60
- c) 62
- d) 64

Given that every small cube must have all faces painted. Also, the value of n is not given. To minimize the value of m , we can take $n = 6$.

All the small cubes which have at least one exposed face must be painted before forming the cube.

Hence, all the 56 cubes (which have at least one exposed face) must have been painted before forming the large cube.

We are left with the $2 \times 2 \times 2$ cube in the centre.

All the exposed faces of this $2 \times 2 \times 2$ cube will have painted face because they will be in contact with the 56 cubes mentioned above.

In this $2 \times 2 \times 2$ cube, we can have 4 previously painted cubes and 4 unpainted cubes. These 4 painted cubes should have no common faces. This is possible if we consider the four cubes to be along one of the diagonals in the first layer and along opposite diagonal in the second layer.

Hence, a total of $56 + 4 = 60$ cubes must have been painted.

Choice (B)

Q11. DIRECTIONS for questions 9 to 12: Select the correct alternative from the given choices.

If $m = 32$ and $n = 5$, what is the maximum number of small cubes that have no face painted?

- a) 8
- b) 16
- c) 32
- d) 24

Given that there are 32 small cubes that were painted on exactly 5 faces.

To maximize the number of small cubes with no painted faces, we can arrange 16 cubes to be in the first layer such that all the faces that come into contact with the second layer are not painted.

Similarly, we can consider all the 16 cubes in the fourth layer to be painted such that all the faces that are in contact with the third layer are not painted.

In this case, all the cubes that are in the second and third layer will remain completely unpainted.

Hence, a total of 32 cubes will not have any painted face.

Choice (C)

Q12. DIRECTIONS for questions 9 to 12: Select the correct alternative from the given choices.

If, in the larger cube, $m = 64$ and no visible face is painted, what is the maximum possible value of n ?

- a) 3
- b) 4
- c) 2
- d) **None of the above**

In the larger cube, no visible face is painted. Since there are a maximum of three exposed faces for the cube at the corner, there will be a minimum of three faces that are hidden. Hence, a maximum of three faces can be painted and no paint will be visible in the larger cube.

\therefore The maximum value of n is 3.

Choice (A)

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

At the beginning of 2018, exactly nine persons joined a gym, which began its operations only at the beginning of 2018. When the nine persons joined the gym, Kiran, a trainer at the gym, noted the heights of these nine persons and he found the mode of the heights of all these nine persons.

Over the course of 2018, other persons also joined the gym, on different days. On each day that any other person(s) joined, Kiran updated the mode of the heights of all the persons who had joined the gym till that day. No person who joined the gym in 2018 left the gym during the year and the height of any person who joined the gym in 2018 remained constant during the year.

The following table provides all the modes recorded by Kiran, the respective dates on which he recorded the modes and the cumulative number of persons who had joined the gym till then (if there is more than one mode, then all the modes are given in the corresponding column, separated by commas):

Date	Mode(s) (in cm)	Cumulative Number of persons
January 1 st	160	9
February 15 th	158	12
March 17 th	160, 170	16
April 21 st	175	20
June 2 nd	158, 180	28
July 18 th	170, 172	38
October 15 th	164	44

Note: *The mode of a set of numbers is defined as the value which appears most often in the set. If more than one number appears the maximum number of times in a set, then all the numbers that appear the maximum number of times are said to be the modes of the set.*

Q13. DIRECTIONS for questions 13 to 16: Select the correct alternative from the given choices.

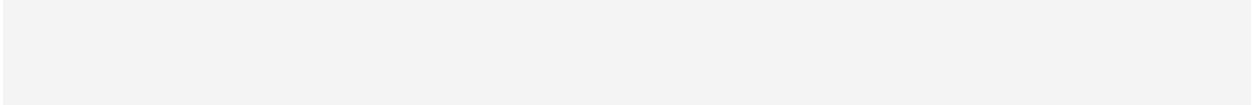
What is the average height of all the persons who joined the gym on July 18th?

a) 171.8 cm

b) 170.6 cm

c) 170.8 cm

d) Cannot be determined



Given that the mode of the heights of the 9 persons who joined on January 1st is 160 cm.

Let the number of persons who joined on January 1st whose height is 160 be n. Since the mode is 160 cm, the value of n must be at least 2.

In February 15th, three persons joined the gym (12 - 9 = 3). Because of them joining the mode changed to 158 cm. Hence, on February 15th, the number of persons whose height was 158 cm must have become at least n + 1.

Among the persons who joined the gym on January 1st, the number of persons whose height is 158 cm can be n - 1 or n - 2 (it cannot be n, as 158 was not the mode on January 1st and it cannot be less than n - 2 as adding three to any number less than n - 2 will not make it higher than n + 1).

On March 17th, when 4 persons joined, the mode became 160 and 170. For these two values to become modes, the number of persons with each of the two heights must be n + 2.

Since, on January 1st, there are n persons whose height is 160 cm, at least 2 more persons whose height is 160 cm must have joined on March 17th.

Also, on January 1st, the number of persons whose height is 170 cm can be at most n - 1. For this to become n + 2, at least 3 persons whose height is 170 cm must have joined by March 17th. However, on March 17th, only 4 persons joined, and at least two of them must have a height of 160 cm. Hence, among the persons who joined on March 17th, at most two persons can have a height of 170 cm.

The only possibility to have one more person with a height of 170 cm joining the gym is if this person joined the gym on February 15th. Hence, among the three persons who joined on February 15th, two must have a height of 158 cm and one must have a height of 170 cm.

Also, among the persons who joined on January 1st, n - 1 persons must have a height of 158 cm and n - 1 persons must have a height of 170 cm.

On April 21st, 4 persons joined the gym and the mode became 175 cm. Since the mode was not 175 cm on any of the previous days, there could have been at most n - 1 persons on January 1st with a height of 175 cm. For 175 cm to become the mode on April 21st, there must be at least n + 3 persons with a height of 175 cm for this to become the mode (since there are n + 2 persons with heights of 160 cm and 170 cm). Hence, there must have been n - 1 persons on January 1st with a height of 175 cm and 4 persons who joined on April 21st must all have a height of 175 cm.

On June 2nd, 8 persons joined and the modes were 158 cm and 180 cm. There must be at least n + 4 persons of each of the two heights.

Since there are n + 1 persons whose height is 158 cm (after 2 persons of height 158 cm joined on February 15th), there must be at least 3 more persons among the ones who joined on June 2nd, whose height is 158 cm.

Also, if there were n - 1 persons of height 180 cm on January 1st, there must have been at least 5 persons, among the ones who joined on June 2nd, whose height is 180 cm. Since, among the 8 persons who joined on June 2nd, 3 persons have a height of 158 cm, the other 5 persons must have a height of 180 cm.

Hence, there must have been n - 1 persons whose height is 180 cm on January 1st.

On July 18th, 10 persons joined and the modes became 170 and 172. For these numbers to become the mode, there must be at least n + 5 persons each, whose heights are 170 and 172. There are n + 2 persons whose height is 170 cm after March 17th. Hence, among the 10 persons who joined on July 18th, at least 3 persons must have height of 170 cm.

The number of persons whose height is 172 cm after July 18th must also be at least n + 5. There can be at most n - 1 persons whose height is 172 cm on January 1st. Hence, at least 6 persons who joined on July 18th must have a height of 172 cm.

∴ On January 1st, there can be n - 1 or n - 2 persons whose height is 172 cm and 6 or 7 persons who joined on July 18th must have a height of 172 cm. If 6 persons who joined on July 18th have a height of 172 cm, then we cannot determine the height of the 10th person who joined on July 18th.

On October 15th, 6 persons joined and the mode became 164. The number of persons whose height is 164 cm after October 15th must be n + 6. If there were n - 1 persons on January 1st whose height is 164 cm, then at least 7 persons must have joined. However, only 6 persons joined on October 15th. For this to become 7, the only option is if we consider that one of the persons who joined on July 18th to have a height of 164 cm.

Hence, there must have been n - 1 persons on January 1st whose height is 164 cm and n - 1 persons whose height is 172 cm.

We know that, on January 1st, there are n persons whose height is 160 cm, n - 1 persons whose height is 158 cm, n - 1 persons whose height is 170 cm, n - 1 persons whose height is 175 cm, n - 1 persons whose height is 180 cm, n - 1 persons whose height is 172 cm and n - 1 persons whose height is 164 cm.

The value of n cannot be more than 2, since only 9 persons joined in January. Since n must be at least 2 for the mode to be 160 cm, n = 2.

The following table provides the heights of the persons who joined on each day (we do not know the height of one person who joined on January 1st, which is represented by an X in the table):

Date	Heights
January 1 st	160, 160, 158, 170, 175, 180, 172, 164, X
February 15 th	158, 158, 170
March 17 th	160, 160, 170, 170
April 21 st	175, 175, 175, 175
June 2 nd	158, 158, 158, 180, 180, 180, 180
July 18 th	170, 170, 170, 172, 172, 172, 172, 172, 172, 164
October 15 th	164, 164, 164, 164, 164, 164

The average height of the persons who joined on July 18th

$$= \frac{170 \times 3 + 172 \times 6 + 164}{10} = 170.6 \text{ cm}$$

Choice (B)

Q14. DIRECTIONS for questions 13 to 16: Select the correct alternative from the given choices.
If after October 15th, exactly n persons joined, because of which the mode of the heights became 196 cm, what is the minimum value of n ?

a) 9

b) 10

c) 8

d) 7

Given that the mode of the heights of the 9 persons who joined on January 1st is 160 cm.

Let the number of persons who joined on January 1st whose height is 160 be n. Since the mode is 160 cm, the value of n must be at least 2.

In February 15th, three persons joined the gym ($12 - 9 = 3$). Because of them joining the mode changed to 158 cm. Hence, on February 15th, the number of persons whose height was 158 cm must have become at least $n + 1$.

Among the persons who joined the gym on January 1st, the number of persons whose height is 158 cm can be $n - 1$ or $n - 2$ (it cannot be n, as 158 was not the mode on January 1st and it cannot be less than $n - 2$ as adding three to any number less than $n - 2$ will not make it higher than $n + 1$).

On March 17th, when 4 persons joined, the mode became 160 and 170. For these two values to become modes, the number of persons with each of the two heights must be $n + 2$.

Since, on January 1st, there are n persons whose height is 160 cm, at least 2 more persons whose height is 160 cm must have joined on March 17th.

Also, on January 1st, the number of persons whose height is 170 cm can be at most $n - 1$. For this to become $n + 2$, at least 3 persons whose height is 170 cm must have joined by March 17th. However, on March 17th, only 4 persons joined, and at least two of them must have a height of 160 cm. Hence, among the persons who joined on March 17th, at most two persons can have a height of 170 cm.

The only possibility to have one more person with a height of 170 cm joining the gym is if this person joined the gym on February 15th. Hence, among the three persons who joined on February 15th, two must have a height of 158 cm and one must have a height of 170 cm.

Also, among the persons who joined on January 1st, $n - 1$ persons must have a height of 158 cm and $n - 1$ persons must have a height of 170 cm.

On April 21st, 4 persons joined the gym and the mode became 175 cm. Since the mode was not 175 cm on any of the previous days, there could have been at most $n - 1$ persons on January 1st with a height of 175 cm. For 175 cm to become the mode on April 21st, there must be at least $n + 3$ persons with a height of 175 cm for this to become the mode (since there are $n + 2$ persons with heights of 160 cm and 170 cm). Hence, there must have been $n - 1$ persons on January 1st with a height of 175 cm and 4 persons who joined on April 21st must all have a height of 175 cm.

On June 2nd, 8 persons joined and the modes were 158 cm and 180 cm. There must be at least $n + 4$ persons of each of the two heights.

Since there are $n + 1$ persons whose height is 158 cm (after 2 persons of height 158 cm joined on February 15th), there must be at least 3 more persons among the ones who joined on June 2nd, whose height is 158 cm.

Also, if there were $n - 1$ persons of height 180 cm on January 1st, there must have been at least 5 persons, among the ones who joined on June 2nd, whose height is 180 cm. Since, among the 8 persons who joined on June 2nd, 3 persons have a height of 158 cm, the other 5 persons must have a height of 180 cm.

Hence, there must have been $n - 1$ persons whose height is 180 cm on January 1st.

On July 18th, 10 persons joined and the modes became 170 and 172. For these numbers to become the mode, there must be at least $n + 5$ persons each, whose heights are 170 and 172. There are $n + 2$ persons whose height is 170 cm after March 17th. Hence, among the 10 persons who joined on July 18th, at least 3 persons must have height of 170 cm.

The number of persons whose height is 172 cm after July 18th must also be at least $n + 5$. There can be at most $n - 1$ persons whose height is 172 cm on January 1st. Hence, at least 6 persons who joined on July 18th must have a height of 172 cm.

- On January 1st, there can be $n - 1$ or $n - 2$ persons whose height is 172 cm and 6 or 7 persons who joined on July 18th must have a height of 172 cm. If 6 persons who joined on July 18th have a height of 172 cm, then we cannot determine the height of the 10th person who joined on July 18th.

On October 15th, 6 persons joined and the mode became 164. The number of persons whose height is 164 cm after October 15th must be $n + 6$. If there were $n - 1$ persons on January 1st whose height is 164 cm, then at least 7 persons must have joined. However, only 6 persons joined on October 15th. For this to become 7, the only option is if we consider that one of the persons who joined on July 18th to have a height of 164 cm.

Hence, there must have been $n - 1$ persons on January 1st whose height is 164 cm and $n - 1$ persons whose height is 172 cm.

We know that, on January 1st, there are n persons whose height is 160 cm, $n - 1$ persons whose height is 158 cm, $n - 1$ persons whose height is 170 cm, $n - 1$ persons whose height is 175 cm, $n - 1$ persons whose height is 180 cm, $n - 1$ persons whose height is 172 cm and $n - 1$ persons whose height is 164 cm.

The value of n cannot be more than 2, since only 9 persons joined in January. Since n must be at least 2 for the mode to be 160 cm, $n = 2$.

The following table provides the heights of the persons who joined on each day (we do not know the height of one person who joined on January 1st, which is represented by an X in the table):

Date	Heights
January 1 st	160, 160, 158, 170, 175, 180, 172, 164, X
February 15 th	158, 158, 170
March 17 th	160, 160, 170, 170
April 21 st	175, 175, 175, 175
June 2 nd	158, 158, 158, 180, 180, 180, 180, 180
July 18 th	170, 170, 170, 172, 172, 172, 172, 172, 164, 164
October 15 th	164, 164, 164, 164, 164, 164

To minimize the value of n, we can consider that X = 196 cm. For this to become the mode, 8 persons must have joined with a height of 196 cm. Hence, the minimum possible value of n = 8.

Choice (C)

Q15. DIRECTIONS for questions 13 to 16: Select the correct alternative from the given choices.
On which of the following days is the average height of all the persons who joined on that day the lowest?

- a) **March 17th**
- b) **June 2nd**
- c) **February 15th**
- d) **October 15th**

Given that the mode of the heights of the 9 persons who joined on January 1st is 160 cm.

Let the number of persons who joined on January 1st whose height is 160 be n. Since the mode is 160 cm, the value of n must be at least 2.

In February 15th, three persons joined the gym ($12 - 9 = 3$). Because of them joining the mode changed to 158 cm. Hence, on February 15th, the number of persons whose height was 158 cm must have become at least $n + 1$.

Among the persons who joined the gym on January 1st, the number of persons whose height is 158 cm can be $n - 1$ or $n - 2$ (it cannot be n, as 158 was not the mode on January 1st and it cannot be less than $n - 2$ as adding three to any number less than $n - 2$ will not make it higher than $n + 1$).

On March 17th, when 4 persons joined, the mode became 160 and 170. For these two values to become modes, the number of persons with each of the two heights must be $n + 2$.

Since, on January 1st, there are n persons whose height is 160 cm, at least 2 more persons whose height is 160 cm must have joined on March 17th.

Also, on January 1st, the number of persons whose height is 170 cm can be at most $n - 1$. For this to become $n + 2$, at least 3 persons whose height is 170 cm must have joined by March 17th. However, on March 17th, only 4 persons joined, and at least two of them must have a height of 160 cm. Hence, among the persons who joined on March 17th, at most two persons can have a height of 170 cm.

The only possibility to have one more person with a height of 170 cm joining the gym is if this person joined the gym on February 15th. Hence, among the three persons who joined on February 15th, two must have a height of 158 cm and one must have a height of 170 cm.

Also, among the persons who joined on January 1st, $n - 1$ persons must have a height of 158 cm and $n - 1$ persons must have a height of 170 cm.

On April 21st, 4 persons joined the gym and the mode became 175 cm. Since the mode was not 175 cm on any of the previous days, there could have been at most $n - 1$ persons on January 1st with a height of 175 cm. For 175 cm to become the mode on April 21st, there must be at least $n + 3$ persons with a height of 175 cm for this to become the mode (since there are $n + 2$ persons with heights of 160 cm and 170 cm). Hence, there must have been $n - 1$ persons on January 1st with a height of 175 cm and 4 persons who joined on April 21st must all have a height of 175 cm.

On June 2nd, 8 persons joined and the modes were 158 cm and 180 cm. There must be at least $n + 4$ persons of each of the two heights.

Since there are $n + 1$ persons whose height is 158 cm (after 2 persons of height 158 cm joined on February 15th), there must be at least 3 more persons among the ones who joined on June 2nd, whose height is 158 cm.

Also, if there were $n - 1$ persons of height 180 cm on January 1st, there must have been at least 5 persons, among the ones who joined on June 2nd, whose height is 180 cm. Since, among the 8 persons who joined on June 2nd, 3 persons have a height of 158 cm, the other 5 persons must have a height of 180 cm.

Hence, there must have been $n - 1$ persons whose height is 180 cm on January 1st.

On July 18th, 10 persons joined and the modes became 170 and 172. For these numbers to become the mode, there must be at least $n + 5$ persons each, whose heights are 170 and 172. There are $n + 2$ persons whose height is 170 cm after March 17th. Hence, among the 10 persons who joined on July 18th, at least 3 persons must have height of 170 cm.

The number of persons whose height is 172 cm after July 18th must also be at least $n + 5$. There can be at most $n - 1$ persons whose height is 172 cm on January 1st. Hence, at least 6 persons who joined on July 18th must have a height of 172 cm.

∴ On January 1st, there can be $n - 1$ or $n - 2$ persons whose height is 172 cm and 6 or 7 persons who joined on July 18th must have a height of 172 cm. If 6 persons who joined on July 18th have a height of 172 cm, then we cannot determine the height of the 10th person who joined on July 18th.

On October 15th, 6 persons joined and the mode became 164. The number of persons whose height is 164 cm after October 15th must be $n + 6$. If there were $n - 1$ persons on January 1st whose height is 164 cm, then at least 7 persons must have joined. However, only 6 persons joined on October 15th. For this to become 7, the only option is if we consider that one of the persons who joined on July 18th to have a height of 164 cm.

Hence, there must have been $n - 1$ persons on January 1st whose height is 164 cm and $n - 1$ persons whose height is 172 cm.

We know that, on January 1st, there are n persons whose height is 160 cm, $n - 1$ persons whose height is 158 cm, $n - 1$ persons whose height is 170 cm, $n - 1$ persons whose height is 175 cm, $n - 1$ persons whose height is 180 cm, $n - 1$ persons whose height is 172 cm and $n - 1$ persons whose height is 164 cm.

The value of n cannot be more than 2, since only 9 persons joined in January. Since n must be at least 2 for the mode to be 160 cm, $n = 2$.

The following table provides the heights of the persons who joined on each day (we do not know the height of one person who joined on January 1st, which is represented by an X in the table):

Date	Heights
January 1 st	160, 160, 158, 170, 175, 180, 172, 164, X
February 15 th	158, 158, 170
March 17 th	160, 160, 170, 170
April 21 st	175, 175, 175, 175
June 2 nd	158, 158, 158, 180, 180, 180, 180, 180
July 18 th	170, 170, 170, 172, 172, 172, 172, 172, 172, 164
October 15 th	164, 164, 164, 164, 164, 164

The average height of all the persons who joined on March 17th

$$= \frac{160 \times 2 + 170 \times 2}{4} = 165 \text{ cm}$$

The average height of all the persons who joined on June 2nd

$$= \frac{158 \times 3 + 180 \times 5}{8} = 171.75 \text{ cm}$$

The average height of all the persons who joined on February 15th

$$= \frac{158 \times 2 + 170}{3} = 162 \text{ cm}$$

The average height of all the persons who joined on October 15th is 164 cm.

Hence, the average height is the lowest for the persons who joined on February 15th.

Choice (C)

Q16. DIRECTIONS for questions 13 to 16: Select the correct alternative from the given choices.
Considering only the persons who joined the gym before June 4th, what is the difference between
the number of persons whose height is 180 cm and that whose height is 170 cm?

a) 2

b) 3

c) 4

d) 5

Given that the mode of the heights of the 9 persons who joined on January 1st is 160 cm.

Let the number of persons who joined on January 1st whose height is 160 be n. Since the mode is 160 cm, the value of n must be at least 2.

In February 15th, three persons joined the gym ($12 - 9 = 3$). Because of them joining the mode changed to 158 cm. Hence, on February 15th, the number of persons whose height was 158 cm must have become at least $n + 1$.

Among the persons who joined the gym on January 1st, the number of persons whose height is 158 cm can be $n - 1$ or $n - 2$ (it cannot be n, as 158 was not the mode on January 1st and it cannot be less than $n - 2$ as adding three to any number less than $n - 2$ will not make it higher than $n + 1$).

On March 17th, when 4 persons joined, the mode became 160 and 170. For these two values to become modes, the number of persons with each of the two heights must be $n + 2$.

Since, on January 1st, there are n persons whose height is 160 cm, at least 2 more persons whose height is 160 cm must have joined on March 17th.

Also, on January 1st, the number of persons whose height is 170 cm can be at most $n - 1$. For this to become $n + 2$, at least 3 persons whose height is 170 cm must have joined by March 17th. However, on March 17th, only 4 persons joined, and at least two of them must have a height of 160 cm. Hence, among the persons who joined on March 17th, at most two persons can have a height of 170 cm.

The only possibility to have one more person with a height of 170 cm joining the gym is if this person joined the gym on February 15th. Hence, among the three persons who joined on February 15th, two must have a height of 158 cm and one must have a height of 170 cm.

Also, among the persons who joined on January 1st, $n - 1$ persons must have a height of 158 cm and $n - 1$ persons must have a height of 170 cm.

On April 21st, 4 persons joined the gym and the mode became 175 cm. Since the mode was not 175 cm on any of the previous days, there could have been at most $n - 1$ persons on January 1st with a height of 175 cm. For 175 cm to become the mode on April 21st, there must be at least $n + 3$ persons with a height of 175 cm for this to become the mode (since there are $n + 2$ persons with heights of 160 cm and 170 cm). Hence, there must have been $n - 1$ persons on January 1st with a height of 175 cm and 4 persons who joined on April 21st must all have a height of 175 cm.

On June 2nd, 8 persons joined and the modes were 158 cm and 180 cm. There must be at least $n + 4$ persons of each of the two heights.

Since there are $n + 1$ persons whose height is 158 cm (after 2 persons of height 158 cm joined on February 15th), there must be at least 3 more persons among the ones who joined on June 2nd, whose height is 158 cm.

Also, if there were $n - 1$ persons of height 180 cm on January 1st, there must have been at least 5 persons, among the ones who joined on June 2nd, whose height is 180 cm. Since, among the 8 persons who joined on June 2nd, 3 persons have a height of 158 cm, the other 5 persons must have a height of 180 cm.

Hence, there must have been $n - 1$ persons whose height is 180 cm on January 1st.

On July 18th, 10 persons joined and the modes became 170 and 172. For these numbers to become the mode, there must be at least $n + 5$ persons each, whose heights are 170 and 172. There are $n + 2$ persons whose height is 170 cm after March 17th. Hence, among the 10 persons who joined on July 18th, at least 3 persons must have height of 170 cm.

The number of persons whose height is 172 cm after July 18th must also be at least $n + 5$. There can be at most $n - 1$ persons whose height is 172 cm on January 1st. Hence, at least 6 persons who joined on July 18th must have a height of 172 cm.

∴ On January 1st, there can be $n - 1$ or $n - 2$ persons whose height is 172 cm and 6 or 7 persons who joined on July 18th must have a height of 172 cm. If 6 persons who joined on July 18th have a height of 172 cm, then we cannot determine the height of the 10th person who joined on July 18th.

On October 15th, 6 persons joined and the mode became 164. The number of persons whose height is 164 cm after October 15th must be $n + 6$. If there were $n - 1$ persons on January 1st whose height is 164 cm, then at least 7 persons must have joined. However, only 6 persons joined on October 15th. For this to become 7, the only option is if we consider that one of the persons who joined on July 18th to have a height of 164 cm.

Hence, there must have been $n - 1$ persons on January 1st whose height is 164 cm and $n - 1$ persons whose height is 172 cm.

We know that, on January 1st, there are n persons whose height is 160 cm, $n - 1$ persons whose height is 158 cm, $n - 1$ persons whose height is 170 cm, $n - 1$ persons whose height is 175 cm, $n - 1$ persons whose height is 180 cm, $n - 1$ persons whose height is 172 cm and $n - 1$ persons whose height is 164 cm.

The value of n cannot be more than 2, since only 9 persons joined in January. Since n must be at least 2 for the mode to be 160 cm, $n = 2$.

The following table provides the heights of the persons who joined on each day (we do not know the height of one person who joined on January 1st, which is represented by an X in the table):

Date	Heights
January 1 st	160, 160, 158, 170, 175, 180, 172, 164, X
February 15 th	158, 158, 170
March 17 th	160, 160, 170, 170
April 21 st	175, 175, 175, 175
June 2 nd	158, 158, 158, 180, 180, 180, 180, 180
July 18 th	170, 170, 170, 172, 172, 172, 172, 172, 164
October 15 th	164, 164, 164, 164, 164, 164

By June 4th, the number of persons who joined the gym whose height was 180 cm = 6
The number of persons who joined the gym whose height was 170 cm = 4

Required difference = $6 - 4 = 2$.

Choice (A)

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

Four companies, Crookle, Fearbook, Malsoft and Wickedpedia, manufacture and sell computer monitors. In any year, the total cost incurred by each company comprises a fixed component, which is independent of the number of units manufactured, and a variable component, which is proportional to the number of units manufactured during that year.

The first table below provides the number of units sold (in '000), the revenue (in USD '000) and the profit (in USD '000) of each of the four companies, for each year from 2013 to 2015. For each company, its fixed cost and its variable cost per unit remained constant during the given three years. Further, none of the four companies had any inventory either at the beginning of 2013 or at the end of 2015.

The second table provides the number of units manufactured (in '000) by each company in each year but the information about the company and the year has been intentionally omitted.

Company	2013			2014			2015		
	Units Sold	Revenue	Profit	Units Sold	Revenue	Profit	Units Sold	Revenue	Profit
Crookle	50	1250	-250	65	1950	600	120	5400	3945
Fearbook	35	1575	175	60	2700	1000	90	3600	1500
Malsoft	75	2250	450	85	3400	1500	80	4000	2300
Wickedpedia	50	1500	-225	105	2625	800	75	2625	975

Number of Units Manufactured (in '000)											
45	50	60	60	70	75	80	80	85	90	95	100

Q17. DIRECTIONS for question 17: Select the correct alternative from the given choices.
What is the number of units (in '000) in the inventory for the four companies combined at the end of 2014?

- a) 50
- b) 55
- c) 60

d) **70**

The following table presents the total cost incurred by each of the companies in each year:

Company	2013	2014	2015
Crookle	1500	1350	1455
Fearbook	1400	1700	2100
Malsoft	1800	1900	1700
Wickedpedia	1725	1825	1650

Since no company had any inventory at the beginning of 2013 and at the end of 2015, the number of units manufactured by Crookle, Fearbook, Malsoft and Wickedpedia across the three years are 235, 185, 240 and 230 respectively.

Since we have to distribute the given number of units manufactured for these four companies, it will be easier to consider the highest or the lowest totals first. Since Fearbook has manufactured the lowest number of units, let us start with Fearbook first.

Let Fearbook manufacture x units in 2013, y units in 2014 and z units in 2015. Let v be the variable cost per unit and f be the fixed cost for Fearbook.

In 2013, 2014 and 2015, the total costs will be $vx + f$, $vy + f$ and $vz + f$.

$$\therefore vx + f = 1400$$

$$vy + f = 1700 \text{ and}$$

$$vz + f = 2100$$

$$y - x = \frac{300}{v} \Rightarrow v = \frac{300}{y-x} \text{ and } z - y = \frac{400}{v} \Rightarrow v = \frac{400}{z-y}$$

In both the cases, the value of v must remain the same.

$$\therefore \frac{300}{y-x} = \frac{400}{z-y} \Rightarrow \frac{y-x}{z-y} = \frac{3}{4}$$

The difference between pairs of values for Fearbook must be in the ratio 3 : 4. However, we can see that the values give are all multiples of 5. Hence, the differences must also be multiples of 15. Hence, the differences can be (15, 20), (30, 40) and so on. However, (30, 40) and higher values are not possible because the maximum difference for the given values = $100 - 45 = 55$. For the difference between the pairs of values to be 30 and 40, the minimum and maximum must differ by at least $30 + 40 = 70$.

Hence, the difference between x and y ($y - x$) must be 15 and the difference between y and z ($z - y$) must be 20.

Checking for various values of y , we can see that y cannot be 45 (as no number is less than this); y cannot be 50 (as x must be 35, which is not possible); **y can be 60 (where $x = 45$ and $z = 80$)**; y cannot be 70 (as x cannot be 55); **y can be 75 (where $x = 60$ and $z = 90$)**; y cannot be 80 (as x cannot be 65); **y can be 85 (where $x = 15$ and $z = 100$)**; y cannot be more than 85 as z has to be more than 100, which is not possible.

We also know that the $x + y + z = 185$. Of the three cases which are possible (highlighted in bold above), the only possible values of x , y and z which add up to 185 are $x = 45$, $y = 60$ and $z = 80$.

Hence, $z = 80$, $x = 45$ and $y = 60$ for Fearbook.

Now, let x , y and z represent the number of units manufactured by Crookle in 2013, 2014 and 2015.

$$\therefore vx + f = 1500$$

$$vy + f = 1350 \text{ and}$$

$$vz + f = 1455$$

$$x - z = \frac{45}{v} \Rightarrow v = \frac{45}{x-z} \text{ and } z - y = \frac{105}{v} \Rightarrow v = \frac{105}{z-y}$$

$$\therefore \frac{45}{x-z} = \frac{105}{z-y} \Rightarrow \frac{x-z}{z-y} = \frac{3}{7}$$

Since the difference must all be multiples of 5, the only possible values for $x - z$ and $z - y$ are 15 and 35 (higher multiples of this difference will result in the difference exceeding the maximum possible difference, i.e., $100 - 45 = 55$).

Checking the given values, the possible values of x , y and z are (95, 45, 80), (100, 50, 85). The first set of values is not possible as 45 is the cost of Fearbook.

Hence, for Crookle, $x = 100$, $y = 50$ and $z = 85$.

The remaining values for the number of units are 60, 70, 75, 80, 90, 95.

By observing the manufacturing cost of Malsoft, (1800, 1900 and 1700), the difference in the number of units manufactured in 2013 and 2014 must be the same as that in 2015 and 2013 (since the manufacturing cost increased by the same amount). Hence, the number of units manufactured by Malsoft in the three years must be in Arithmetic Progression and must add up to 240.

From the remaining values, the only possible combination of values which are in AP and add up to 240 is (70, 80, 90). Hence, Malsoft would have manufactured 80 units in 2013, 90 units in 2014 and 70 units in 2015.

Also, Wickedpedia would have manufactured 75, 95 and 60 units in 2013, 2014 and 2015 respectively.

The following table gives the number of units manufactured, the fixed cost and the variable cost of the four companies:

Company	Fixed Cost	Variable Cost per unit	Number of Units Manufactured		
			2013	2014	2015
Crookle	1200	3	100	50	85
Fearbook	500	20	45	60	80
Malsoft	1000	10	80	90	70
Wickedpedia	1350	5	75	95	60

There were 35, 10, 10 and 15 units in the inventory for Crookle, Fearbook, Malsoft and Wickedpedia respectively. Hence, the total number of units in inventory = 70.

Choice (D)

Q18. DIRECTIONS for questions 18 and 19: Type in your answer in the input box provided below the question.

What was the variable cost (in USD) incurred by Fearbook for manufacturing one computer monitor in 2014?

The following table presents the total cost incurred by each of the companies in each year:

Company	2013	2014	2015
Crookle	1500	1350	1455
Fearbook	1400	1700	2100
Malsoft	1800	1900	1700
Wickedpedia	1725	1825	1650

Since no company had any inventory at the beginning of 2013 and at the end of 2015, the number of units manufactured by Crookle, Fearbook, Malsoft and Wickedpedia across the three years are 235, 185, 240 and 230 respectively.

Since we have to distribute the given number of units manufactured for these four companies, it will be easier to consider the highest or the lowest totals first. Since Fearbook has manufactured the lowest number of units, let us start with Fearbook first.

Let Fearbook manufacture x units in 2013, y units in 2014 and z units in 2015. Let v be the variable cost per unit and f be the fixed cost for Fearbook.

In 2013, 2014 and 2015, the total costs will be $vx + f$, $vy + f$ and $vz + f$.

$$\therefore vx + f = 1400$$

$$vy + f = 1700 \text{ and}$$

$$vz + f = 2100$$

$$y - x = \frac{300}{v} \Rightarrow v = \frac{300}{y-x} \text{ and } z - y = \frac{400}{v} \Rightarrow v = \frac{400}{z-y}$$

In both the cases, the value of v must remain the same.

$$\therefore \frac{300}{y-x} = \frac{400}{z-y} \Rightarrow \frac{y-x}{z-y} = \frac{3}{4}$$

The difference between pairs of values for Fearbook must be in the ratio 3 : 4. However, we can see that the values give are all multiples of 5. Hence, the differences must also be multiples of 15. Hence, the differences can be (15, 20), (30, 40) and so on. However, (30, 40) and higher values are not possible because the maximum difference for the given values = $100 - 45 = 55$. For the difference between the pairs of values to be 30 and 40, the minimum and maximum must differ by at least $30 + 40 = 70$.

Hence, the difference between x and y ($y - x$) must be 15 and the difference between y and z ($z - y$) must be 20.

Checking for various values of y , we can see that y cannot be 45 (as no number is less than this); y cannot be 50 (as x must be 35, which is not possible); **y can be 60 (where $x = 45$ and $z = 80$)**; y cannot be 70 (as x cannot be 55); **y can be 75 (where $x = 60$ and $z = 90$)**; y cannot be 80 (as x cannot be 65); **y can be 85 (where $x = 15$ and $z = 100$)**; y cannot be more than 85 as z has to be more than 100, which is not possible.

We also know that the $x + y + z = 185$. Of the three cases which are possible (highlighted in bold above), the only possible values of x , y and z which add up to 185 are $x = 45$, $y = 60$ and $z = 80$.

Hence, $z = 80$, $x = 45$ and $y = 60$ for Fearbook.

Now, let x , y and z represent the number of units manufactured by Crookle in 2013, 2014 and 2015.

$$\therefore vx + f = 1500$$

$$vy + f = 1350 \text{ and}$$

$$vz + f = 1455$$

$$x - z = \frac{45}{v} \Rightarrow v = \frac{45}{x-z} \text{ and } z - y = \frac{105}{v} \Rightarrow v = \frac{105}{z-y}$$

$$\therefore \frac{45}{x-z} = \frac{105}{z-y} \Rightarrow \frac{x-z}{z-y} = \frac{3}{7}$$

Since the difference must all be multiples of 5, the only possible values for $x - z$ and $z - y$ are 15 and 35 (higher multiples of this difference will result in the difference exceeding the maximum possible difference, i.e., $100 - 45 = 55$).

Checking the given values, the possible values of x , y and z are (95, 45, 80), (100, 50, 85). The first set of values is not possible as 45 is the cost of Fearbook.

Hence, for Crookle, $x = 100$, $y = 50$ and $z = 85$.

The remaining values for the number of units are 60, 70, 75, 80, 90, 95.

By observing the manufacturing cost of Malsoft, (1800, 1900 and 1700), the difference in the number of units manufactured in 2013 and 2014 must be the same as that in 2015 and 2013 (since the manufacturing cost increased by the same amount). Hence, the number of units manufactured by Malsoft in the three years must be in Arithmetic Progression and must add up to 240.

From the remaining values, the only possible combination of values which are in AP and add up to 240 is (70, 80, 90). Hence, Malsoft would have manufactured 80 units in 2013, 90 units in 2014 and 70 units in 2015.

Also, Wickedpedia would have manufactured 75, 95 and 60 units in 2013, 2014 and 2015 respectively.

The following table gives the number of units manufactured, the fixed cost and the variable cost of the four companies:

Company	Fixed Cost	Variable Cost per unit	Number of Units Manufactured		
			2013	2014	2015
Crookle	1200	3	100	50	85
Fearbook	500	20	45	60	80
Malsoft	1000	10	80	90	70
Wickedpedia	1350	5	75	95	60

Variable Cost per unit for Fearbook was \$20.

Ans: (20)

Q19. DIRECTIONS for questions 18 and 19: Type in your answer in the input box provided below the question.

What is the highest Fixed Cost (in USD '000) for any of the given companies?

The following table presents the total cost incurred by each of the companies in each year:

Company	2013	2014	2015
Crookle	1500	1350	1455
Fearbook	1400	1700	2100
Malsoft	1800	1900	1700
Wickedpedia	1725	1825	1650

Since no company had any inventory at the beginning of 2013 and at the end of 2015, the number of units manufactured by Crookle, Fearbook, Malsoft and Wickedpedia across the three years are 235, 185, 240 and 230 respectively.

Since we have to distribute the given number of units manufactured for these four companies, it will be easier to consider the highest or the lowest totals first. Since Fearbook has manufactured the lowest number of units, let us start with Fearbook first.

Let Fearbook manufacture x units in 2013, y units in 2014 and z units in 2015. Let v be the variable cost per unit and f be the fixed cost for Fearbook.

In 2013, 2014 and 2015, the total costs will be $vx + f$, $vy + f$ and $vz + f$.

$$\therefore vx + f = 1400$$

$$vy + f = 1700 \text{ and}$$

$$vz + f = 2100$$

$$y - x = \frac{300}{v} \Rightarrow v = \frac{300}{y-x} \text{ and } z - y = \frac{400}{v} \Rightarrow v = \frac{400}{z-y}$$

In both the cases, the value of v must remain the same.

$$\therefore \frac{300}{y-x} = \frac{400}{z-y} \Rightarrow \frac{y-x}{z-y} = \frac{3}{4}$$

The difference between pairs of values for Fearbook must be in the ratio 3 : 4. However, we can see that the values give are all multiples of 5. Hence, the differences must also be multiples of 15. Hence, the differences can be (15, 20), (30, 40) and so on. However, (30, 40) and higher values are not possible because the maximum difference for the given values = $100 - 45 = 55$. For the difference between the pairs of values to be 30 and 40, the minimum and maximum must differ by at least $30 + 40 = 70$.

Hence, the difference between x and y ($y - x$) must be 15 and the difference between y and z ($z - y$) must be 20.

Checking for various values of y , we can see that y cannot be 45 (as no number is less than this); y cannot be 50 (as x must be 35, which is not possible); y can be 60 (where $x = 45$ and $z = 80$); y cannot be 70 (as x cannot be 55); y can be 75 (where $x = 60$ and $z = 90$); y cannot be 80 (as x cannot be 65); y can be 85 (where $x = 15$ and $z = 100$); y cannot be more than 85 as z has to be more than 100, which is not possible.

We also know that the $x + y + z = 185$. Of the three cases which are possible (highlighted in bold above), the only possible values of x , y and z which add up to 185 are $x = 45$, $y = 60$ and $z = 80$.

Hence, $z = 80$, $x = 45$ and $y = 60$ for Fearbook.

Now, let x , y and z represent the number of units manufactured by Crookle in 2013, 2014 and 2015.

$$\therefore vx + f = 1500$$

$$vy + f = 1350 \text{ and}$$

$$vz + f = 1455$$

$$x - z = \frac{45}{v} \Rightarrow v = \frac{45}{x-z} \text{ and } z - y = \frac{105}{v} \Rightarrow v = \frac{105}{z-y}$$

$$\therefore \frac{45}{x-z} = \frac{105}{z-y} \Rightarrow \frac{x-z}{z-y} = \frac{3}{7}$$

Since the difference must all be multiples of 5, the only possible values for $x - z$ and $z - y$ are 15 and 35 (higher multiples of this difference will result in the difference exceeding the maximum possible difference, i.e., $100 - 45 = 55$).

Checking the given values, the possible values of x , y and z are (95, 45, 80), (100, 50, 85). The first set of values is not possible as 45 is the cost of Fearbook.

Hence, for Crookle, $x = 100$, $y = 50$ and $z = 85$.

The remaining values for the number of units are 60, 70, 75, 80, 90, 95.

By observing the manufacturing cost of Malsoft, (1800, 1900 and 1700), the difference in the number of units manufactured in 2013 and 2014 must be the same as that in 2015 and 2013 (since the manufacturing cost increased by the same amount). Hence, the number of units manufactured by Malsoft in the three years must be in Arithmetic Progression and must add up to 240.

From the remaining values, the only possible combination of values which are in AP and add up to 240 is (70, 80, 90). Hence, Malsoft would have manufactured 80 units in 2013, 90 units in 2014 and 70 units in 2015.

Also, Wickedpedia would have manufactured 75, 95 and 60 units in 2013, 2014 and 2015 respectively.

The following table gives the number of units manufactured, the fixed cost and the variable cost of the four companies:

Company	Fixed Cost	Variable Cost per unit	Number of Units Manufactured		
			2013	2014	2015
Crookle	1200	3	100	50	85
Fearbook	500	20	45	60	80
Malsoft	1000	10	80	90	70
Wickedpedia	1350	5	75	95	60

The highest Fixed Cost is for Wickedpedia which is \$1350.

Ans: (1350)

Q20. DIRECTIONS for question 20: Select the correct alternative from the given choices.
How many companies had at least one unit in the inventory at the end of both 2013 and 2014?

a) 1

b) 2

c) 3

d) 4

The following table presents the total cost incurred by each of the companies in each year:

Company	2013	2014	2015
Crookle	1500	1350	1455
Fearbook	1400	1700	2100
Malsoft	1800	1900	1700
Wickedpedia	1725	1825	1650

Since no company had any inventory at the beginning of 2013 and at the end of 2015, the number of units manufactured by Crookle, Fearbook, Malsoft and Wickedpedia across the three years are 235, 185, 240 and 230 respectively.

Since we have to distribute the given number of units manufactured for these four companies, it will be easier to consider the highest or the lowest totals first. Since Fearbook has manufactured the lowest number of units, let us start with Fearbook first.

Let Fearbook manufacture x units in 2013, y units in 2014 and z units in 2015. Let v be the variable cost per unit and f be the fixed cost for Fearbook.

In 2013, 2014 and 2015, the total costs will be $vx + f$, $vy + f$ and $vz + f$.

$$\therefore vx + f = 1400$$

$$vy + f = 1700 \text{ and}$$

$$vz + f = 2100$$

$$y - x = \frac{300}{v} \Rightarrow v = \frac{300}{y-x} \text{ and } z - y = \frac{400}{v} \Rightarrow v = \frac{400}{z-y}$$

In both the cases, the value of v must remain the same.

$$\therefore \frac{300}{y-x} = \frac{400}{z-y} \Rightarrow \frac{y-x}{z-y} = \frac{3}{4}$$

The difference between pairs of values for Fearbook must be in the ratio 3 : 4. However, we can see that the values give are all multiples of 5. Hence, the differences must also be multiples of 15. Hence, the differences can be (15, 20), (30, 40) and so on. However, (30, 40) and higher values are not possible because the maximum difference for the given values = $100 - 45 = 55$. For the difference between the pairs of values to be 30 and 40, the minimum and maximum must differ by at least $30 + 40 = 70$.

Hence, the difference between x and y ($y - x$) must be 15 and the difference between y and z ($z - y$) must be 20.

Checking for various values of y , we can see that y cannot be 45 (as no number is less than this); y cannot be 50 (as x must be 35, which is not possible); **y can be 60 (where $x = 45$ and $z = 80$)**; y cannot be 70 (as x cannot be 55); **y can be 75 (where $x = 60$ and $z = 90$)**; y cannot be 80 (as x cannot be 65); **y can be 85 (where $x = 15$ and $z = 100$)**; y cannot be more than 85 as z has to be more than 100, which is not possible.

We also know that the $x + y + z = 185$. Of the three cases which are possible (highlighted in bold above), the only possible values of x , y and z which add up to 185 are $x = 45$, $y = 60$ and $z = 80$.

Hence, $z = 80$, $x = 45$ and $y = 60$ for Fearbook.

Now, let x , y and z represent the number of units manufactured by Crookle in 2013, 2014 and 2014.

$$\therefore vx + f = 1500$$

$$vy + f = 1350 \text{ and}$$

$$vz + f = 1455$$

$$x - z = \frac{45}{v} \Rightarrow v = \frac{45}{x-z} \text{ and } z - y = \frac{105}{v} \Rightarrow v = \frac{105}{z-y}$$

$$\therefore \frac{45}{x-z} = \frac{105}{z-y} \Rightarrow \frac{x-z}{z-y} = \frac{3}{7}$$

Since the difference must all be multiples of 5, the only possible values for $x - z$ and $z - y$ are 15 and 35 (higher multiples of this difference will result in the difference exceeding the maximum possible difference, i.e., $100 - 45 = 55$).

Checking the given values, the possible values of x , y and z are (95, 45, 80), (100, 50, 85). The first set of values is not possible as 45 is the cost of Fearbook.

Hence, for Crookle, $x = 100$, $y = 50$ and $z = 85$.

The remaining values for the number of units are 60, 70, 75, 80, 90, 95.

By observing the manufacturing cost of Malsoft, (1800, 1900 and 1700), the difference in the number of units manufactured in 2013 and 2014 must be the same as that in 2015 and 2013 (since the manufacturing cost increased by the same amount). Hence, the number of units manufactured by Malsoft in the three years must be in Arithmetic Progression and must add up to 240.

From the remaining values, the only possible combination of values which are in AP and add up to 240 is (70, 80, 90). Hence, Malsoft would have manufactured 80 units in 2013, 90 units in 2014 and 70 units in 2015.

Also, Wickedpedia would have manufactured 75, 95 and 60 units in 2013, 2014 and 2015 respectively.

The following table gives the number of units manufactured, the fixed cost and the variable cost of the four companies:

Company	Fixed Cost	Variable Cost per unit	Number of Units Manufactured		
			2013	2014	2015
Crookle	1200	3	100	50	85
Fearbook	500	20	45	60	80
Malsoft	1000	10	80	90	70
Wickedpedia	1350	5	75	95	60

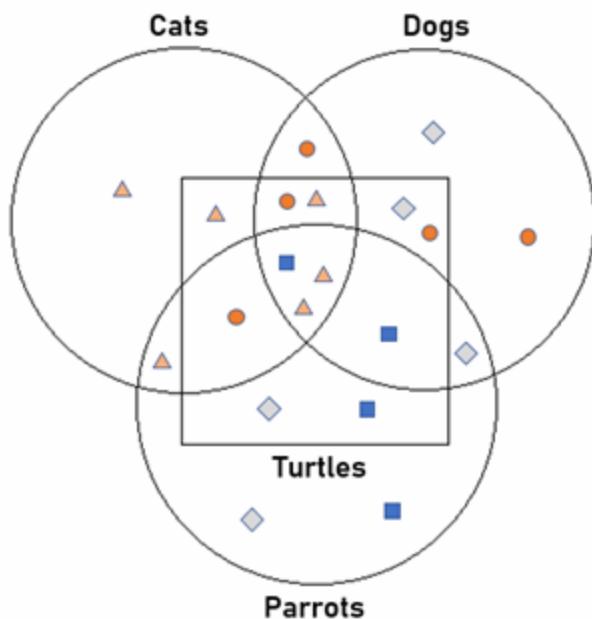
All the four companies had some number of units in the inventory at the end of 2013 and 2014.

Choice (D)

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

There were twenty persons in a colony, who owned only four types of animals – Cats, Dogs, Turtles and Parrots – as pets. A survey was conducted in the colony among the twenty persons, each of who owned one or more types of animals as pets. Each person owns at least two pets and at most five pets. Further, it is known that the total number of pets in the colony is 69.

In the Venn diagram given below, there are twenty markers, comprising four different shapes – circle, triangle, square and diamond – each marker representing one of the twenty persons surveyed. The shape of each marker denotes the number of pets that the respective person owns. The number of pets denoted by each shape is distinct but unknown. Also, the location of the marker in the Venn diagram indicates the different types of animals that the person owns as pets.



Q21. DIRECTIONS for questions 21 and 22: Select the correct alternative from the given choices.
How many pets have owners who own all four types of pets?

- a) 13

b) 14

c) 15

d) Cannot be determined

There are three persons who owned all four types of pets. Since the maximum number of pets anyone owned is 5, they could have had either 4 pets or 5 pets. Therefore, a triangle and a square denote that the person has 4 pets and 5 pets, not necessarily in the same order.

Now the circle can denote 2 or 3. But there is a circle in the region common to Cats, Dogs and Turtles. Since there is at least one cat, one dog and one turtle, the circle cannot denote 2. Therefore, the circle denotes that the person has 3 pets. The diamond cannot denote 4 or 5 because 4 and 5 are the numbers denoted by the square and the triangle, not necessarily in that order. Therefore, the diamond denotes that the person has 2 pets.

It is given that the total number of pets in the colony is 69.

In the figure, there are 6 triangles, 5 circles, 5 diamonds and 4 squares.

If a triangle denotes that the person has 5 pets and a square denotes that the person has 4 pets, then the total number of pets in the colony = $6 \times 5 + 5 \times 3 + 5 \times 2 + 4 \times 4 = 71$. This is not valid because the total number of pets in the colony is 69.

Therefore, a triangle denotes that the person has 4 pets and a square denotes that the person has 5 pets.

From the figure, we can say that the number of persons owning only cats, only dogs, only turtles and only parrots is 4, 5, 0 and 7 respectively.

For any region, there is at least one type of each pet that is represented by the region. Therefore, the number of cats, dogs, turtles and parrots, is at least 13, at least 15, at least 12 and at least 16 respectively.

The number of pets that have owners who own all four types of pets = $4 + 4 + 5 = 13$.

Choice (A)

Q22. DIRECTIONS for questions 21 and 22: Select the correct alternative from the given choices.

If the number of cats is the minimum, possible, how many persons definitely own more than one dog?

a) 2

b) 3

c) 4

d) 5

There are three persons who owned all four types of pets. Since the maximum number of pets anyone owned is 5, they could have had either 4 pets or 5 pets. Therefore, a triangle and a square denote that the person has 4 pets and 5 pets, not necessarily in the same order.

Now the circle can denote 2 or 3. But there is a circle in the region common to Cats, Dogs and Turtles. Since there is at least one cat, one dog and one turtle, the circle cannot denote 2. Therefore, the circle denotes that the person has 3 pets. The diamond cannot denote 4 or 5 because 4 and 5 are the numbers denoted by the square and the triangle, not necessarily in that order. Therefore, the diamond denotes that the person has 2 pets.

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Therefore, a triangle denotes that the person has 4 pets and a square denotes that the person has 5 pets.

From the figure, we can say that the number of persons owning only cats, only dogs, only turtles and only parrots is 4, 5, 0 and 7 respectively.

For any region, there is at least one type of each pet that is represented by the region. Therefore, the number of cats, dogs, turtles and parrots, is at least 13, at least 15, at least 12 and at least 16 respectively.

The minimum number of cats is 13. This means that except the persons owning only cats, every person owning a cat and at least one pet of a different type owns exactly one cat.

There are two persons who own only dogs and each of them has at least two dogs.

In the region that represents only cats and dogs, there is one person who has one cat and two dogs.

Among the other persons owning dogs, we cannot determine how many persons have exactly two dogs. Therefore, the number of persons who definitely own more than one dog is 3.

Choice (B)

Q23. DIRECTIONS for questions 23 and 24: Type in your answer in the input box provided below the question.

If the total number of parrots is 24, what is the maximum total number of turtles owned by the twenty persons?

There are three persons who owned all four types of pets. Since the maximum number of pets anyone owned is 5, they could have had either 4 pets or 5 pets. Therefore, a triangle and a square denote that the person has 4 pets and 5 pets, not necessarily in the same order.

Now the circle can denote 2 or 3. But there is a circle in the region common to Cats, Dogs and Turtles. Since there is at least one cat, one dog and one turtle, the circle cannot denote 2. Therefore, the circle denotes that the person has 3 pets. The diamond cannot denote 4 or 5 because 4 and 5 are the numbers denoted by the square and the triangle, not necessarily in that order. Therefore, the diamond denotes that the person has 2 pets.

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Therefore, a triangle denotes that the person has 4 pets and a square denotes that the person has 5 pets.

From the figure, we can say that the number of persons owning only cats, only dogs, only turtles and only parrots is 4, 5, 0 and 7 respectively.

For any region, there is at least one type of each pet that is represented by the region. Therefore, the number of cats, dogs, turtles and parrots, is at least 13, at least 15, at least 12 and at least 16 respectively.

24 is the maximum number of parrots in the colony. This is possible when, in the region that represents parrots, all the extra pets are parrots. Therefore, in the region common to both turtles and parrots, every person has exactly one turtle. Therefore, there are a total of 7 turtles in the common region. Since we are trying to maximize the number of turtles, in the regions that represent persons who own turtles but not parrots, every extra pet has to be a turtle.

There will be one person with one cat and three turtles; one person with one cat, one dog and one turtle; one person with one cat, one dog and two turtles; one person with one dog and one turtle and one person with one dog and two turtles. Therefore, the maximum number of turtles will be $7 + 3 + 1 + 2 + 1 + 2 = 16$. Ans: (16)

Q24. DIRECTIONS for questions 23 and 24: Type in your answer in the input box provided below the question.

If the total number of parrots is 24, what is the minimum number of persons who own at most one cat?

There are three persons who owned all four types of pets. Since the maximum number of pets anyone owned is 5, they could have had either 4 pets or 5 pets. Therefore, a triangle and a square denote that the person has 4 pets and 5 pets, not necessarily in the same order.

Now the circle can denote 2 or 3. But there is a circle in the region common to Cats, Dogs and Turtles. Since there is at least one cat, one dog and one turtle, the circle cannot denote 2. Therefore, the circle denotes that the person has 3 pets. The diamond cannot denote 4 or 5 because 4 and 5 are the numbers denoted by the square and the triangle, not necessarily in that order. Therefore, the diamond denotes that the person has 2 pets.

It is given that the total number of pets in the colony is 69.

In the figure, there are 6 triangles, 5 circles, 5 diamonds and 4 squares.

If a triangle denotes that the person has 5 pets and a square denotes that the person has 4 pets, then the total number of pets in the colony = $6 \times 5 + 5 \times 3 + 5 \times 2 + 4 \times 4 = 71$. This is not valid because the total number of pets in the colony is 69.

Therefore, a triangle denotes that the person has 4 pets and a square denotes that the person has 5 pets.

From the figure, we can say that the number of persons owning only cats, only dogs, only turtles and only parrots is 4, 5, 0 and 7 respectively.

For any region, there is at least one type of each pet that is represented by the region. Therefore, the number of cats, dogs, turtles and parrots, is at least 13, at least 15, at least 12 and at least 16 respectively.

24 is the maximum number of parrots in the colony. This is possible when, in the region that represents parrots, all the extra pets are parrots. Then, in the region common to both cats and parrots, one person owns one cat and three parrots; one person owns one cat, one turtle and one parrot; two persons own one cat, one dog, one turtle and one parrot, and one person owns one cat, one dog, one turtle and two parrots. So in this region, there are 5 persons who own exactly one cat.

In the region representing cats but not parrots, one person owns one cat, one dog and one turtle. Therefore, the total number of persons who definitely own exactly one cat in this region is 1. The remaining persons in this region may or may not own more than one cat and that cannot be determined unless additional information is given.

Besides this, there are ten persons who do not own any cats. Therefore, the number of persons who definitely do not own more than one cat is 16. Ans: (16)

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

Six cities – P, Q, R, S, T and U – are distinctly ranked from 1 to 6 in each of the six parameters – security, health, education, recreation, wildlife and finance. No city got the same rank in any two parameters. Further, the following information is known regarding the ranks:

- i. The city which got the 2nd rank in health got the 1st rank in security.
- ii. Either R or T got the 3rd rank in security. Either R or S got the 1st rank in wildlife.
- iii. P got the 6th rank in security; U got the 2nd rank in wildlife; R got the 4th rank in finance; and T got the 3rd rank in health.

- iv. If T got the 4th rank in wildlife, then P got the 6th rank in wildlife. T got the 6th rank in finance; S got the 3rd rank in wildlife and R got the 5th rank in education.
- v. Q got the 3rd rank in education and S got the 1st rank in education, while U got the 4th rank in health.

Q25. DIRECTIONS *for questions 25 to 28:* Select the correct alternative from the given choices.
Which city got the 1st rank in recreation?

- a) Q
- b) S
- c) T
- d) P

The data given in conditions (iii), (iv) and (v) is tabulated as follows.

	Security	Health	Education	Recreation	Wildlife	Finance
P	6					
Q			3			
R			5			4
S			1		3	
T		3				6
U		4			2	

From (ii), either R or T got the 3rd rank in security. As T got the 3rd rank in health, R got the 3rd rank in security.

From (ii), either R or S got the 1st rank in wildlife. From the above table it is clear that R got the 1st rank in wildlife.

From (i), the city with 2nd rank in health should have the 1st rank in security. Only city Q can satisfy the condition.

Now the grid appears as below.

	Security	Health	Education	Recreation	Wildlife	Finance
P	6					
Q	1	2	3			
R	3		5		1	4
S			1		3	
T		3				6
U		4			2	

City R's rank in health can be 1, 5 or 6 but since it already has ranks 1 and 5, it can only be 6 \Rightarrow R's rank in recreation is 2. \Rightarrow Rank of city S in health is 5 and that of P in health is 1. Rank of S in finance has to be either 2, 4 or 6 but it cannot be 4 or 6 \Rightarrow It is 2. Now, the remaining cells in the grid can be easily filled and completed to obtain the grid below.

	Security	Health	Education	Recreation	Wildlife	Finance
P	6	1	2	5	4	3
Q	1	2	3	4	6	5
R	3	6	5	2	1	4
S	4	5	1	6	3	2
T	2	3	4	1	5	6
U	5	4	6	3	2	1

- . City T got the 1st rank in recreation. Choice (C)

Q26. DIRECTIONS for questions 25 to 28: Select the correct alternative from the given choices.
Which of the following statements is false?

a) The city that got the 5th rank in wildlife got the 3rd rank in health.

b) The city that got the 2nd rank in recreation got the 3rd rank in security.

c) The city that got the 4th rank in wildlife got the 2nd rank in health.

d) The city that got the 5th rank in recreation got the 1st rank in health

The data given in conditions (iii), (iv) and (v) is tabulated as follows.

	Security	Health	Education	Recreation	Wildlife	Finance
P	6					
Q			3			
R			5			4
S			1		3	
T		3				6
U		4			2	

From (ii), either R or T got the 3rd rank in security. As T got the 3rd rank in health, R got the 3rd rank in security.

From (ii), either R or S got the 1st rank in wildlife. From the above table it is clear that R got the 1st rank in wildlife.

From (i), the city with 2nd rank in health should have the 1st rank in security. Only city Q can satisfy the condition.

Now the grid appears as below.

	Security	Health	Education	Recreation	Wildlife	Finance
P	6					
Q	1	2	3			
R	3		5		1	4
S			1		3	
T		3				6
U		4			2	

City R's rank in health can be 1, 5 or 6 but since it already has ranks 1 and 5, it can only be 6 \Rightarrow R's rank in recreation is 2. \Rightarrow Rank of city S in health is 5 and that of P in health is 1. Rank of S in finance has to be either 2, 4 or 6 but it cannot be 4 or 6 \Rightarrow It is 2. Now, the remaining cells in the grid can be easily filled and completed to obtain the grid below.

	Security	Health	Education	Recreation	Wildlife	Finance
P	6	1	2	5	4	3
Q	1	2	3	4	6	5
R	3	6	5	2	1	4
S	4	5	1	6	3	2
T	2	3	4	1	5	6
U	5	4	6	3	2	1

The statement given in the third choice is false.

Choice (C)

Q27. DIRECTIONS for questions 25 to 28: Select the correct alternative from the given choices.

Which of the following is the correct order of the cities that got the 5th rank in the respective parameters of health, security, education, recreation, wildlife and finance?

a) **S, R, P, U, T, Q**

b) **P, Q, S, R, T, U**

c) **Q, S, U, R, T, P**

d) **S, U, R, P, T, Q**

The data given in conditions (iii), (iv) and (v) is tabulated as follows.

	Security	Health	Education	Recreation	Wildlife	Finance
P	6					
Q			3			
R			5			4
S			1		3	
T		3				6
U		4			2	

From (ii), either R or T got the 3rd rank in security. As T got the 3rd rank in health, R got the 3rd rank in security.

From (ii), either R or S got the 1st rank in wildlife. From the above table it is clear that R got the 1st rank in wildlife.

From (i), the city with 2nd rank in health should have the 1st rank in security. Only city Q can satisfy the condition.

Now the grid appears as below.

	Security	Health	Education	Recreation	Wildlife	Finance
P	6					
Q	1	2	3			
R	3		5		1	4
S			1		3	
T		3				6
U		4			2	

City R's rank in health can be 1, 5 or 6 but since it already has ranks 1 and 5, it can only be 6 \Rightarrow R's rank in recreation is 2. \Rightarrow Rank of city S in health is 5 and that of P in health is 1. Rank of S in finance has to be either 2, 4 or 6 but it cannot be 4 or 6 \Rightarrow It is 2. Now, the remaining cells in the grid can be easily filled and completed to obtain the grid below.

	Security	Health	Education	Recreation	Wildlife	Finance
P	6	1	2	5	4	3
Q	1	2	3	4	6	5
R	3	6	5	2	1	4
S	4	5	1	6	3	2
T	2	3	4	1	5	6
U	5	4	6	3	2	1

S, U, R, P, T and Q is the proper order.

Choice (D)

Q28. DIRECTIONS for questions 25 to 28: Select the correct alternative from the given choices.
Which among the following statements is true?

- a) The city that got the 1st rank in finance got the 6th rank in health.

- b) The city that got the 3rd rank in finance got the 2nd rank in education.
- c) The city that got the 4th rank in education got the 6th rank in wildlife.
- d) The city that got the 6th rank in recreation got the 5th rank in security.

The data given in conditions (iii), (iv) and (v) is tabulated as follows.

	Security	Health	Education	Recreation	Wildlife	Finance
P	6					
Q			3			
R			5			4
S			1		3	
T		3				6
U		4			2	

From (ii), either R or T got the 3rd rank in security. As T got the 3rd rank in health, R got the 3rd rank in security.

From (ii), either R or S got the 1st rank in wildlife. From the above table it is clear that R got the 1st rank in wildlife.

From (i), the city with 2nd rank in health should have the 1st rank in security. Only city Q can satisfy the condition.

Now the grid appears as below.

	Security	Health	Education	Recreation	Wildlife	Finance
P	6					
Q	1	2	3			
R	3		5		1	4
S			1		3	
T		3				6
U		4			2	

City R's rank in health can be 1, 5 or 6 but since it already has ranks 1 and 5, it can only be 6 \Rightarrow R's rank in recreation is 2. \Rightarrow Rank of city S in health is 5 and that of P in health is 1. Rank of S in finance has to be either 2, 4 or 6 but it cannot be 4 or 6 \Rightarrow It is 2. Now, the remaining cells in the grid can be easily filled and completed to obtain the grid below.

	Security	Health	Education	Recreation	Wildlife	Finance
P	6	1	2	5	4	3
Q	1	2	3	4	6	5
R	3	6	5	2	1	4
S	4	5	1	6	3	2
T	2	3	4	1	5	6
U	5	4	6	3	2	1

The statement given in the second choice is true.

Choice (B)

QA

Q1. DIRECTIONS for questions 1 and 2: Type in your answer in the input box provided below the question.

If $\frac{7}{b} + \frac{8}{a} = -1$, where a and b are non-zero integers, for how many values of (a, b) , is $(a + b)$ positive?

$$\frac{7}{b} + \frac{8}{a} = -1$$

$$\Rightarrow 7a + 8b = -ab \Rightarrow 7a + 8b + ab = 0$$

$$\Rightarrow (a+8)(b+7) - 56 = 0 \Rightarrow (a+8)(b+7) = 56 = 2^3(7)$$

So 56 has 4(2) or 8 positive factors and it can be expressed as the product of 2 factors in 4 ways. We need not consider negative factors as we want $a + b$ to be positive. Of these 4 ways, we need to look at the cases where $(a+8) + (b+7)$ is greater than 15.

$$56 = 1(56) = 2(28) = 4(14) = 7(8)$$

We ignore the last case and accept only the first 3 cases. This would correspond to 6 solutions (Eg. $a+8=1$, $b+7$

= 56 and vice versa).

Ans: (6)

Q2. DIRECTIONS for questions 1 and 2: Type in your answer in the input box provided below the question.

If the minimum value of $\frac{x^2 + 6x + 7}{x^2 + 6x + 16}$ is L , find the value of $126L$.

$$\text{Let } E = \frac{x^2 + 6x + 7}{x^2 + 6x + 16} = \frac{(x^2 + 6x + 16) - 9}{x^2 + 6x + 16}$$

$$= 1 - \frac{9}{x^2 + 6x + 16}$$

$$\therefore E = 1 - \frac{9}{(x+3)^2 + 7}$$

For E to be minimum $\frac{9}{(x+3)^2 + 7}$ must be maximum, which is the case when $(x+3)^2$

+ 7 is minimum.

\therefore When $x = -3$

$$E = 1 - \frac{9}{0+7} = 1 - \frac{9}{7} = \frac{-2}{7}$$

$$\therefore L = \frac{-2}{7} \text{ and } 126L = -36$$

Ans: (-36)

Q3. DIRECTIONS for questions 3 and 4: Select the correct alternative from the given choices.

Consider 20 infinite geometric progressions, whose first terms are 2, 3, 4,21 respectively, and

common ratios are $\frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \dots, \frac{1}{22}$ respectively. If $S_1, S_2, S_3, \dots, S_{20}$ respectively denote the sums of these 20 geometric progressions, find $S_1 + S_2 + S_3 + \dots + S_{20}$.

a) 230

b) 320

c) 160

d) 250

From the given information it is clear that for the n^{th} G.P the first term is $n + 1$ and the

common ratio is $\frac{1}{n+2}$

$$\therefore S_n = \frac{n+1}{1 - \frac{1}{n+2}} = n+2$$

Therefore, $S_1 + S_2 + \dots + S_{20} = \sum (n+2)$

$$\therefore \sum_{n=1}^{20} (n+2) = [3 + 4 + 5 + \dots + 22] = \frac{(3+22)}{2} \times 20 = 250$$

Choice (D)

Q4. DIRECTIONS for questions 3 and 4: Select the correct alternative from the given choices.

$$\sqrt{28 - 16\sqrt{3}} + \sqrt{28 + 16\sqrt{3}} =$$

a) 8

b) 16

c) 32

d) 4

Let $\sqrt{28 - 16\sqrt{3}} = \sqrt{a} - \sqrt{b}$ and hence

$$\sqrt{28 + 16\sqrt{3}} = \sqrt{a} + \sqrt{b}$$

$$\therefore \left(\sqrt{28 - 16\sqrt{3}} \right)^2 = (\sqrt{a} - \sqrt{b})^2$$

$$28 - 16\sqrt{3} = a + b - 2\sqrt{ab}$$

$$\therefore a + b = 28 \quad \rightarrow \quad (1)$$

$$\sqrt{ab} = 8\sqrt{3} = \sqrt{192}$$

$$\Rightarrow ab = 192 \quad \rightarrow \quad (2)$$

$$\text{Substituting (2) in (1)} \Rightarrow a + \frac{192}{a} = 28$$

$$\Rightarrow a^2 - 28a + 192 = 0$$

$$\Rightarrow a^2 - 16a - 12a + 192 = 0$$

$$\Rightarrow (a - 16)(a - 12) = 0$$

$$\Rightarrow a = 16 \text{ or } 12.$$

From (1),

When $a = 16$, $b = 12$ and

When $a = 12$, $b = 16$

\therefore For $\sqrt{a} - \sqrt{b}$ to be positive $a = 16$ and $b = 12$

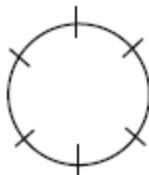
$$\sqrt{28 - 16\sqrt{3}} + \sqrt{28 + 16\sqrt{3}} = \sqrt{a} - \sqrt{b} + \sqrt{a} + \sqrt{b}$$

$$= 2\sqrt{a} = 2\sqrt{16} = 8$$

Choice (A)

Q5. DIRECTIONS for question 5: Type in your answer in the input box provided below the question.
In how many ways can three couples sit around a circular table such that no pair of wife and husband are opposite each other?

Let (A, B), (C, D) and (E, F) be the pairs of wives and husbands. As we need a circular arrangement, we first fix the places of one among the six persons.



As there are five places to be taken by 5 people, the total number of ways in which 6 people can sit around a circular table = $5! = 120$ ways.

Now, let us subtract the cases in which at least one pair of wife and husband are opposite each other

- (i) The number of ways in which exactly one pair are opposite each other:

If B is opposite A, then C can take any one of the remaining 4 places and D can take any of the 2 remaining places (As D is not allowed to sit opposite C) and C and F can sit in the remaining two places in any order.

Thus the number of ways = $4 \times 2 \times 2 = 16$ ways.

Similarly, there will be 16 ways in which C and D are opposite each other and 16 ways in which E and F are opposite each other.

Thus the total number of ways in which exactly one pair are opposite each other are $16 + 16 + 16 = 48$ ways.

- (ii) The number of ways in which exactly two pairs are opposite each other

As there are three pairs, if two pairs are opposite each other, then the third pair will also be opposite each other.

Thus it will be zero.

- (iii) The number of ways in which exactly three pairs are opposite each other:

If B is opposite A, then C, can take any of the four places and D can take only one place, i.e., the place opposite C. E and F can occupy the remaining two places in any order.

Thus the total number of ways = $4 \times 2 = 8$ ways.

The number of ways in which no pair of wife and husband are opposite to each other = $120 - (48 + 8) = 64$ ways.

Ans: (64)

Q6. DIRECTIONS for questions 6 to 10: Select the correct alternative from the given choices.

If $f(x)$ is defined as the greatest integer less than or equal to $\frac{x}{2}$, how many of the following statements are true?

- I. $f(x)$ is half the least even integer greater than or equal to x .
- II. $f(x)$ is the least integer greater than or equal to $\frac{x}{2} - 1$.
- III. $f(x)$ is one less than half the least even integer greater than x .

a) 0

- b) 1
- c) 2
- d) 3

The values of the given function and the functions given in the choices are tabulated below for $2 \leq x < 4$

	$x = 2$	$2 < x < 4$
$f(x)$	1	1
Statement I	1	2
Statement II	0	1
Statement III	1	1

We see that only statement III is true.

Choice (B)

Q7. DIRECTIONS for questions 6 to 10: Select the correct alternative from the given choices.
If the total simple interest earned on Rs.60,000, at a rate of interest of 7.5% per annum, for n years is Rs.36,000, find n .

- a) 6
- b) 10
- c) 9
- d) 8

The total simple interest on ₹60000 at 7.5% rate of interest in n years is given by
$$\frac{60000 \times 7.5 \times n}{100}$$

$$\text{Now, } \frac{60000 \times 7.5 \times n}{100} = 36000$$
$$\Rightarrow n = 8.$$

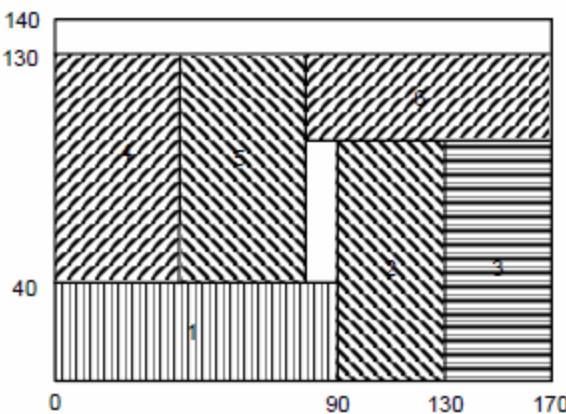
Choice (D)

Q8. DIRECTIONS for questions 6 to 10: Select the correct alternative from the given choices.

A rectangular floor of dimensions 170 cm by 140 cm is to be covered (not necessarily completely) by rectangular tiles of size 90 cm by 40 cm. While the tiles may be placed in any direction, their edges have to be parallel to the edges of the floor. No tile should either overlap another tile or overshoot any edge of the floor. What is the maximum number of tiles that can be accommodated on the floor?

- a) 5
- b) 7
- c) 6
- d) 4

Six tiles of 90 cm \times 40 cm can be placed on the floor of dimensions 170 cm \times 140 cm in the following way



Choice (C)

Q9. DIRECTIONS for questions 6 to 10: Select the correct alternative from the given choices.
The standard deviation of the observations 4086, 4090, 4082, 4094, 4078, 4102, 4098 is

- a) $\sqrt{8}$.
- b) 8.
- c) 8.25.

d) 7.25.

Arranging the given observations in an increasing order, we get 4078, 4082, 4086, 4090, 4094, 4098, 4102, the observations are in an arithmetic progression.

$$\therefore \text{S.D } (\sigma) = |d| \sqrt{\frac{n^2 - 1}{12}} ; d \text{ is the common difference}$$

$$= 4 \cdot \sqrt{\frac{7^2 - 1}{12}} = 8$$

Choice (B)

Q10. DIRECTIONS for questions 6 to 10: Select the correct alternative from the given choices.

If $\theta \in [0, 2\pi]$, for which of the following ranges of θ is $|\sin\theta + \cos\theta| < \frac{1}{\sqrt{2}}$?

a) $\left(\frac{\pi}{4}, \frac{5\pi}{12}\right)$

b) $\left(\frac{2\pi}{3}, \frac{11\pi}{12}\right)$

c) $\left(0, \frac{\pi}{6}\right)$

d) $\left(\frac{7\pi}{6}, \frac{3\pi}{2}\right)$

$$\begin{aligned} |\sin\theta + \cos\theta| &= \sqrt{2} \left| \frac{1}{\sqrt{2}} \sin\theta + \frac{1}{\sqrt{2}} \cos\theta \right| \\ &= \sqrt{2} \left| \sin\left(\theta + \frac{\pi}{4}\right) \right| < \frac{1}{\sqrt{2}} \Rightarrow \left| \sin\left(\theta + \frac{\pi}{4}\right) \right| < \frac{1}{2} \\ &\Rightarrow -\frac{1}{2} < \sin\left(\theta + \frac{\pi}{4}\right) < \frac{1}{2} \end{aligned}$$

Given $0 \leq \theta \leq 2\pi \Rightarrow \frac{\pi}{4} \leq \theta + \frac{\pi}{4} \leq 2\pi + \frac{\pi}{4}$

Let $\alpha = \theta + \frac{\pi}{4} \Rightarrow \frac{\pi}{4} \leq \alpha \leq \frac{9\pi}{4}$ and $-\frac{1}{2} < \sin\alpha < \frac{1}{2}$

$$\Rightarrow \alpha \in \left(\frac{5\pi}{6}, \frac{7\pi}{6} \right) \cup \left(\frac{11\pi}{6}, \frac{13\pi}{6} \right)$$

$$\Rightarrow \theta \in \left(\frac{5\pi}{6} - \frac{\pi}{4}, \frac{7\pi}{6} - \frac{\pi}{4} \right) \cup \left(\frac{11\pi}{6} - \frac{\pi}{4}, \frac{13\pi}{6} - \frac{\pi}{4} \right)$$

$$\Rightarrow \theta \in \left(\frac{7\pi}{12}, \frac{11\pi}{12} \right) \cup \left(\frac{19\pi}{12}, \frac{23\pi}{12} \right)$$

Of the given options only B satisfies.

Choice (B)

Q11. DIRECTIONS for question 11: Type in your answer in the input box provided below the question.

A group of men can complete a work in a certain number of days. The entire group starts the work. However, exactly 16 days after the start, one-third of the group left. To complete the remaining work, the rest of the group took as many days as the entire group would have taken to complete the entire work. Find the total time (in days) that would have been taken to complete the entire work, if instead, one-fourth of the group had left after working for exactly 21 days from the start.

Let us suppose that x men can do the work in y days. It is given that for the first 16 days all the x men worked. After this only $\frac{2}{3}x$ men worked for y days and thus the work is completed

$$\Rightarrow \therefore \frac{16}{y} + \frac{\frac{2}{3}x}{\frac{2}{3}y} = 1$$

$$\therefore y = 48 \text{ days}$$

Now if one-fourth of the group left after 21 days, the remaining group is $3/4$ of the original. Hence remaining time taken = $4/3 \times (48 - 21) = 36$ days. Hence total time = $21 + 36 = 57$ days.

Alternative solution

$$xy = 16x + \frac{2}{3}x.y$$

$$\Rightarrow y = 48$$

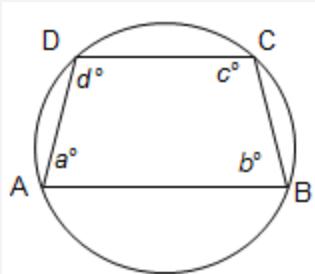
$$xy = 21x + \frac{3}{4}x.y^1$$

$$\Rightarrow y^1 = 36$$

$$\therefore \text{Total time} = 21 + 36 = 57 \text{ days.}$$

Ans: (57)

Q12. DIRECTIONS for questions 12 and 13: Select the correct alternative from the given choices.



In the above figure, a circle circumscribes a trapezium ABCD. If a, b, c and d are integers, what is the number of possible values that $(a + b - c - d)$ can assume?

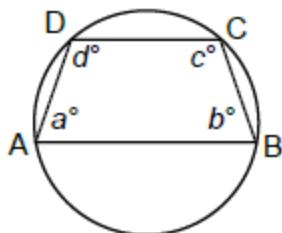
a) 179

b) 89

c) 357

d) 358

If a pair of sides of a cyclic quadrilateral are parallel, it becomes an isosceles trapezium.



a, b, c, d are integers.

Here $a + c = b + d = 180$ (cyclic quadrilateral)

$a = b$ and $c = d$ (isosceles trapezium)

Consider, the expression $a + b - c - d$

$$= (a + b + c + d) - 2(c + d)$$

$$= 360^\circ - 4c \quad (\because c = d)$$

Since no angle of ABCD is reflex (or $\geq 180^\circ$), C can take any value from 1 to 179.

$\therefore a + b - c - d$ can take one value for each value of c, i.e. 179 values.

Choice (A)

Q13. DIRECTIONS for questions 12 and 13: Select the correct alternative from the given choices.

If $-8 \leq x \leq -7$ and $-6 \leq y \leq 6$, where x and y are non-zero integers, which of the following must be true?

a) $-13 \leq (x + y) \leq 2$

b) $-42 \leq xy \leq 48$

c) $-8 \leq \frac{x}{y} \leq 8$

d) More than one of the above

If $x = -8$ and $y = -6$, $x + y = -14$

Hence, choice (A) is false.

If $x = -8$ and $y = 6$, $xy = -48$.

Hence, Choice (B) is also false

If $x = -7$ and $y = -6$, $x - y = -1$

Hence, Choice (C) is also false.

For $\frac{x}{y}$, the minimum value can be realised when $x = -8$ and $y = 1$, while the maximum value can be realised when $x = -8$ and $y = -1$.

$-8 \leq \frac{x}{y} \leq 8$. Hence, Choice (C) is true.

Choice (C)

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

Akhil has a board, similar to a chessboard, except that it has only 6×6 squares. He calculated the number of rectangles (including squares) on the board. How many distinct values can the area of these rectangles assume?

Any natural number, A, which lies in the interval.

$1 \leq A \leq 36$ is capable of being the area of the rectangle formed by considering one or more of the playing squares vertically or horizontally provided it satisfies the following condition.

$A = m \times n$, where $m, n \in N$ and $1 \leq (m, n) \leq 6$

\therefore The value that A can take are 1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 15, 16, 18, 20, 24, 25, 30 and 36. A can take 18 distinct values.

Alternative Solution:

Area of a rectangle is $l \times b$ where l and b are from 1 to 6.

Number of such rectangles which are not squares is ${}^6C_2 = 15$.

Number of squares = 6

\therefore Total number of possible rectangles = $15 + 6 = 21$.

But of these, $1 \times 6 = 2 \times 3$

$$2 \times 6 = 3 \times 4$$

$$1 \times 4 = 2 \times 2$$

\therefore There are 3 possible areas, each of which can be obtained from two distinct rectangles.

\therefore Number of distinct areas possible = $21 - 3 = 18$.

Ans: (18)

Q15. DIRECTIONS for question 15: Select the correct alternative from the given choices.

Let x, y, z be three positive numbers, such that $x + y + z = 1$. The minimum possible value of

$$\left(x + \frac{1}{x}\right)^2 + \left(y + \frac{1}{y}\right)^2 + \left(z + \frac{1}{z}\right)^2 \text{ is}$$

a) 27.

b) 18.

c) $33\frac{1}{3}$.

d) 40.

The minimum value will be realised when

$$x = y = z = \frac{1}{3} \text{ and will be } \left(\frac{1}{3} + 3\right)^2 (3)$$
$$= \left(\frac{10}{3}\right)^2 (3) = \frac{100}{9} = 33\frac{1}{3}.$$

If x, y, z are not taken as equal, say $x = 0.3, y = 0.3, z = 0.4$ the value of the expression is

$$2\left(\frac{3}{10} + \frac{10}{3}\right)^2 + \left(\frac{2}{5} + \frac{5}{2}\right)^2 \approx 34.5$$

\therefore The minimum value is $33\frac{1}{3}$.

Choice (C)

Q16. DIRECTIONS for question 16: Type in your answer in the input box provided below the question.

The decimal equivalent of $(123.21)_4$ is

$$123.01 = (1 \times 4^2 + 2 \times 4 + 3 \times 4^0) + \left(2 \cdot \frac{1}{4} + 1 \cdot \frac{1}{4^2}\right)$$

$$= (16 + 8 + 3) + \left(\frac{1}{2} + \frac{1}{16}\right) = 27 + (0.5 + 0.0625)$$

$$= 27 + 0.5625 = 27.5625$$

Ans: (27.5625)

Q17. DIRECTIONS for question 17: Select the correct alternative from the given choices.

Amar, Bhavan and Chetan have a total of 40 marbles among them. First, Amar tripled the number of marbles with each of the other two by giving them some marbles. Next, Bhavan similarly triples the

number of marbles with each of the other two. If Bhavan finally has 10 marbles, find the number of marbles he had initially.

a) 11

b) 10

c) 9

d) 12

Let the number of marbles with Amar at the end of the process be $3a$. Now, the total number of marbles with Amar and Chetan = $40 - 10 = 30$.

We tabulate the number of marbles with Amar, Bhavan and Chetan at different stages. We fill up the table from the bottom and see immediately that, initially the number of marbles with B is 10.

	A	B	C
Initial		10	
After A triples	a	30	$10 - a$
After B triples	3a(say)	10	$30 - 3a$

\therefore Initial marbles with Bhavan = 10.

Choice (B)

Q18. DIRECTIONS for question 18: Type in your answer in the input box provided below the question.

Two non-zero real numbers, x and y , satisfy the equations given below:

$$x + y + x^2 + 10y^2 = 0$$

$$\frac{x}{y} + \frac{y}{x} = 9$$

If $x + y \neq 0$, find the value of $27y$.

$$x + y + x^2 + 10y^2 = 0 \dots\dots (1)$$

$$\frac{x}{y} + \frac{y}{x} = 9$$

$$\Rightarrow x^2 + y^2 = 9xy \dots\dots (2)$$

$$\therefore (1) \text{ becomes } x + y + 9xy + 9y^2 = 0$$

$$(x + y)(1 + 9y) = 0$$

$$\text{As } x + y \neq 0, y = -\frac{1}{9}$$

$$\therefore 27y = -3.$$

Ans: (-3)

Q19. DIRECTIONS for questions 19 to 24: Select the correct alternative from the given choices.

A cloth merchant, raised the price of cloth in June by $p\%$ over the prices in the previous month. The next month, he announced a discount of $p\%$ over the prices of the previous month. The price of a piece of cloth thus goes down by Rs.16, when compared to its price in May. He repeats the same procedure, i.e., in August, he again increases the price of cloth by $p\%$ over the price in July, and in September, he again decreases it by $p\%$ over the previous month. If the price of the same piece of cloth in September is Rs.368.64, what was the price of that piece of cloth in the month of May?

- a) Rs.400
- b) Rs.360
- c) Rs.384
- d) Rs.420

Whenever the price of an item, which has initially ₹x, is increased by p% and then decreased by p%, the final price of the item would be

$x\left(1 - \frac{p^2}{100}\right)$ and the net reduction in price after consecutive increase and decrease is

equal to $\frac{xp^2}{100}$

Given,

$$\therefore \frac{xp^2}{100} = 16 \Rightarrow \frac{p^2}{100} = \frac{16}{x} \quad \text{--- (1)}$$

If the same operation is performed once again the final price would be

$$x\left(1 - \frac{p^2}{100}\right)\left(1 - \frac{p^2}{100}\right) = 368.64$$

$$\Rightarrow x\left(1 - \frac{16}{x}\right)\left(1 - \frac{16}{x}\right) = 368.64$$

Substituting the given choices we can say that

$$x = ₹400$$

Choice (A)

Q20. DIRECTIONS for questions 19 to 24: Select the correct alternative from the given choices.
A and B are playing a game, where A throws a die and B pays him the amount (in rupees) equal to the number (from 1 to 6) that turns up on the die. If for every throw A has to pay Rs.3 to B, what is the expected net amount earned by A in 300 throws?

- a) Rs.50
- b) Rs.100
- c) Rs.150
- d) Rs.300

The probabilities for 1, 2, 3, 4, 5 and 6 turning up are all equal. Hence for every six throws, the expected amount earned by $A = 1 + 2 + 3 + 4 + 5 + 6 = 21$

$$\Rightarrow \text{Average expected amount per throw} = \frac{21}{6} = 3.5$$

\therefore Expected net earnings of $A = 3.5 - 3 = 0.5$

For 300, throws expected net earnings = $300 \times 0.5 = ₹150$.

Choice (C)

Q21. DIRECTIONS for questions 19 to 24: Select the correct alternative from the given choices.

The number of real roots of the equation $\frac{A}{x-1} + \frac{B}{x+2} = 1$, where A and B are both negative real numbers, is

- a) 0.
- b) 1.
- c) 2.
- d) Cannot be determined

$$\frac{A}{x-1} + \frac{B}{x+2} = 1$$

$$\Rightarrow Ax + 2A + Bx - B = x^2 + x - 2$$

$\Rightarrow x^2 + (1 - A - B)x - 2A + B - 2 = 0$, which is a quadratic equation

$$\text{Discriminant} = (1 - A - B)^2 - 4(-2A + B - 2)$$

$$= 1 + A^2 + B^2 - 2A - 2B + 2AB + 8A - 4B + 8$$

$$= A^2 + B^2 + 2AB + 6A - 6B + 9$$

$$= (A - B)^2 + 4AB + 6(A - B) + 9$$

$$= (A - B + 3)^2 + 4AB.$$

As $A, B < 0 \quad AB > 0$

\therefore Discriminant > 0

\therefore Two real roots are possible.

Choice (C)

Q22. DIRECTIONS for questions 19 to 24: Select the correct alternative from the given choices.

An instruction was sent to all the railway stations across the country that, workers above the age of 47 years must retire. Five workers with different ages at the Kazipet railway station managed to

tamper their records. However, the station master knew that the sums of the ages (in years) of all the possible pairs of workers (from out of the five) are 102, 105, 107, 107, 109, 109, 111, 112, 114, 116. Find the age of the oldest of the five workers.

- a) 60 years
- b) 58 years
- c) 59 years
- d) Cannot be determined

Let the ages of the five workers be a, b, c, d and e in the increasing order.

$$d + e = 116 \rightarrow (1)$$

$$c + e = 114 \rightarrow (2)$$

$$a + b = 102 \rightarrow (3)$$

$$a + c = 105 \rightarrow (4)$$

By adding the equations (1) and (3)

$$a + b + d + e = 218 \rightarrow (5)$$

By adding all the 10 ages given in the problems (as each person's age occurs in four of the sums), $4(a + b + c + d + e) = 1092$

$$a + b + c + d + e = 273 \rightarrow (6)$$

subtracting (5) from (6), $c = 55$

putting c in (2), $e = 114 - c = 59$

Alternative solution:

As we have five equations and five unknowns, the problem is solvable. Hence Choice (D) is eliminated.

If $e = 58$, then $d = 58$. As the men have distinct ages, Choice (B) is eliminated.

If $e = 60$, $d = 116 - 60 = 56$

Now $c = 54$ and $c + e = 110$

But 110 is not present in the given values.

Hence, 59 is the only possible choice.

Choice (C)

Q23. DIRECTIONS for questions 19 to 24: Select the correct alternative from the given choices.

Let S denote the infinite sum $3 + 7x + 12x^2 + 18x^3 + 25x^4 + \dots$, where $|x| < 1$ and the coefficient of x^{n-1} is $\frac{1}{2}n(n+5)$, ($n = 1, 2, \dots$). Then S equals

a) $\frac{3+2x}{(1+x)^3}$

b) $\frac{3-2x}{(1-x)^3}$

c) $\frac{3+2x}{(1-x)^3}$

d) $\frac{3-2x}{(1+x)^3}$

$$S = 3 + 7x + 12x^2 + 18x^3 + 25x^4 + \dots \quad (1)$$

$$Sx = 3x + 7x^2 + 12x^3 + 18x^4 + \dots \quad (2)$$

$$(1) - (2) \Rightarrow$$

$$\begin{aligned} S(1-x) &= 3 + 4x + 5x^2 + 6x^3 + 7x^4 + \dots \\ &= 3(1+x+x^2+x^3+x^4+\dots) + (x+2x^2+3x^3+4x^4+\dots) \end{aligned}$$

$$= 3\left[\frac{1}{1-x}\right] + x[1+2x+3x^2+4x^3+\dots]$$

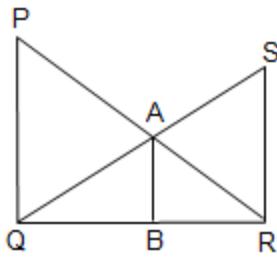
$$= \frac{3}{1-x} + x(1-x)^{-2} \Rightarrow S = \frac{3}{(1-x)^2} + \frac{x}{(1-x)^3}$$

$$= \frac{3-3x+x}{(1-x)^3} = \frac{3-2x}{(1-x)^3}$$

Choice (B)

Q24. DIRECTIONS for questions 19 to 24: Select the correct alternative from the given choices.

In the given figure, $\angle PQR = \angle SRQ = 90^\circ$ and $AB \perp QR$. If $SR = i$, $PQ = j$ and $QR = k$, find the length of AB .

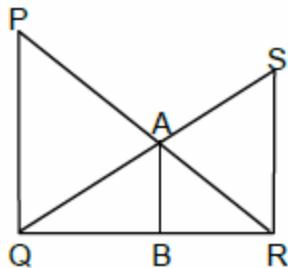


a) $\frac{i^2 + j^2 + k^2}{i+j+k}$

b) $\frac{ik}{i+k}$

c) $\frac{ij}{i+j}$

d) $\frac{(j+jk+ki)}{k}$



As $\triangle PQR$ and $\triangle ABR$ are similar, $\frac{AB}{PQ} = \frac{RB}{RQ}$ --- (1)

As $\triangle SRQ$ and $\triangle ABQ$ are similar, $\frac{AB}{SR} = \frac{BQ}{RQ}$ --- (2)

Adding (1) and (2), $AB \left(\frac{1}{PQ} + \frac{1}{SR} \right) = \frac{RQ}{RQ}$

$$AB = \frac{PQ \times SR}{PQ + SR} = \frac{ij}{i+j}$$

Alternative Solution:

If $PQ = RS$, i.e., $i = j = 1$ (say), then AB should be $\frac{1}{2}$, irrespective of the value of k (from symmetry). Plugging in $i = j = 1$ in the choices, only choice (C) gives $AB = \frac{1}{2}$,

Choice (C)

Q25. DIRECTIONS for questions 25 to 28: Type in your answer in the input box provided below the question.

A triathlon is an athletic event in which each participant has to perform three activities, swimming, running and cycling. Shiva wanted to participate in a triathlon. He prepared himself for it by going for workouts every morning and evening. The ratio of his speeds of cycling, running and swimming is 10 : 4 : 1 respectively. One day, in the morning workout, he covered equal distances while performing each activity and in the evening workout, on the same day, he covered a total distance which was five times that he covered in the morning workout, spending equal times on each of the three activities. If the total time he spent on his workouts that day was 348 minutes, find the total time (in minutes) he spent on cycling that day.

Let the distance that he totally covered in his morning workout be d km. Distance he covered in each of swimming, running and cycling will be $\frac{d}{3}$ km. Let his speed of cycling be $10x$ kmph. His speeds of running and swimming are $4x$ kmph and x kmph respectively.

His total workout time in the morning

$$= \frac{\left(\frac{d}{3}\right)}{10x} + \frac{\left(\frac{d}{3}\right)}{4x} + \frac{\left(\frac{d}{3}\right)}{x} = \frac{9d}{20x} \text{ hours}$$

His total distance covered in the evening workout = $5d$ km. Let his time spent for each activity then be t hours.

$$(10x + 4x + x)t = 5d$$

$$t = \frac{d}{3x}$$

$$\therefore \text{Total time spent} = \frac{9d}{20x} + 3t = \frac{9d}{20x} + 3\left(\frac{d}{3x}\right) = \frac{29d}{20x}$$

= 348 min (given).

Now, the total time spent on cycling

$$= \frac{d}{30x} + \frac{d}{3x} = \frac{11d}{30x}$$

$$= 348 \times \frac{20}{29} \times \frac{11}{30} = 88 \text{ minutes}$$

Alternative Solution:

Let the distance be the LCM of the speeds, i.e., $20k$.

Since the speeds are in the ratio $10 : 4 : 1$, the time taken is in the ratio $2k : 5k : 20k$ in the morning for cycling, running and swimming respectively.

Total distance covered in the morning = $3 \times 20k = 60k$.

\therefore Total distance covered in the evening = $5 \times 60k = 300k$.

Since the time spent in evening on each of the three activities is the same, distance covered in cycling, running and swimming is in the ratio of speeds, i.e., $10 : 4 : 1$.

$$\therefore \text{Distance covered in evening in cycling} = \frac{10}{15} \times 300k = 200k.$$

Time taken to cover $20k$ in cycling is $2k$ units.

\therefore Time taken to cover $200k$ in cycling = $20k$ units.

\therefore Total time spent in evening = $3 \times 20k = 60k$ units.

Total time spent in morning and evening

$$= 2k + 5k + 60k = 87k$$

$$\text{Given } 87k = 348 \Rightarrow k = 4$$

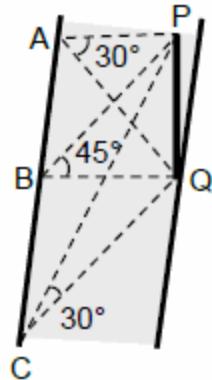
$$\therefore \text{Total time spent in cycling} = 2k + 20k = 22k = 88 \text{ minutes}$$

Ans: (88)

Q26. DIRECTIONS for questions 25 to 28: Type in your answer in the input box provided below the question.

Anita was walking along the edge of a wide road. As she walked along, she observed that the angle of elevation of the top of a pole, standing exactly on the other edge of the road, was 30° at two

distinct points and was 45° at exactly one point. If Anita covered a distance of exactly $20\sqrt{2}$ m between the two points from where the angle was 30° , find the height of the pole (in m).



Let the pole be PQ.

The angle of elevation (θ) of P, the top of the pole is 30° at A and C and 45° at B. If the point on AB, where θ is 45° is anywhere other than B, the point directly across the road from Q, there would be two instances when the angle is 45° . As there is only one, that point (where $\theta = 45^\circ$) has to be B.

Let $PQ = h$ be the height of the pole

As $\angle PBQ = 45^\circ$, $BQ = h$

As $\angle A = \angle C = 30^\circ$

$AQ = CQ = h\sqrt{3}$ m

In $\triangle ABQ$, $AB^2 = AQ^2 - BQ^2 = 3h^2 - h^2 = 2h^2$

$$\therefore AB = \sqrt{2}h = 10\sqrt{2} \text{ m} \Rightarrow h = 10 \text{ m}$$

Ans: (10)

Q27. DIRECTIONS for questions 25 to 28: Type in your answer in the input box provided below the question.

The remainder obtained when 12345678987654321 is divided by 1001 is

$$12,345,678,987,654,321 = N$$

$$= 12 \times 10^{15} + 345 \times 10^{12} + 678 \times 10^9 + 987 \times 10^6 + 654 \times 10^3 + 321$$

$$\frac{1000}{1001}$$
 leaves a remainder of 1000 or -1.

\therefore The given number is expressed in the above form.

$$\text{Rem}\left(\frac{10^3}{1001}\right) = -1 \quad \text{Rem}\left(\frac{10^6}{1001}\right) = 1$$

$$\therefore \text{Rem}\left(\frac{12 \times 10^{15} + 345 \times 10^{12} + 678 \times 10^9 + 987 \times 10^6 + 654 \times 10^3 + 321}{1001}\right)$$

$$= 12(-1) + 345(1) + 678(-1) + 987(1) + 654(-1) + 321$$

$$= -12 + 345 - 678 + 987 - 654 + 321 = 333 + 309 - 333$$

$$= 309.$$

Alternative Solution 1:

$$1001 = 7 \times 11 \times 13$$

Checking for divisibility by 11 is easier than checking for divisibility by 7 and 13.

Sum of digits in odd places

$$= 1 + 3 + 5 + 7 + 9 + 7 + 5 + 3 + 1 = 41$$

Sum of digits in even places

$$= 2 + 4 + 6 + 8 + 8 + 6 + 4 + 2 = 40$$

$$\therefore \text{Difference in sums} = 41 - 40 = 1$$

\therefore N divided by 11 leaves a remainder 1.

$\Rightarrow N - 1$ is exactly divisible by 11.

Let $N = 1001q + r$

If $N - 1$ is divisible by 11, then $r - 1$ should also be divisible by 11.

$$\Rightarrow r = 11k + 1$$

Of the given choices, only $309 = 11 \times 28 + 1$.

Alternative Solution 2:

Though time consuming, it is possible to directly approach the question using the long division method to arrive at the remainder when the given number is divided by 1001.

Ans: (309)

Q28. DIRECTIONS for questions 25 to 28: Type in your answer in the input box provided below the question.

Let S_m denote the sum of the first m natural numbers. For how many values of m less than or equal to 100, is S_m divisible by 15?

Since $S_m = \frac{m(m+1)}{2}$ must be a multiple of 15.

We need $m(m + 1) =$ multiple of $2 \times 15 = 2 \times 3 \times 5$
i.e., $m(m + 1)$ must contain a factor of 2, 3 and 5.

Now, $m(m + 1)$ is always even.

$\Rightarrow 2$ is always a factor of $m(m + 1)$.

Now, consider all multiples of 5 less than or equal to 100 (i.e., a total of 20 multiples). Since among every three consecutive numbers there is always one multiple of three, for all multiples of 5, it will be possible to find at least one value of m (or $m + 1$) such that $m(m + 1)$ contains a factor of 3 (i.e., apart from containing a factor of 5). Hence at least 20 values of m are there.

However, in the above approach, if in any of the cases, the multiple of 5 itself is also a multiple of 3 then one more value of m will possible.

Hence, for all the multiples of 15 we get an extra possible value of m , i.e., 6 multiples of 15 below 100

\Rightarrow another six values of m are possible.

Hence, a total of 26 values are possible.

Ans: (26)

Q29. DIRECTIONS for question 29: Select the correct alternative from the given choices.
If one of the sides of a right-angled triangle with integer sides is 15 cm, find the maximum possible area of the triangle (in sq.cm).

a) 54

b) 187.5

c) 720

d) 840

When 15 is the hypotenuse it limits the other two perpendicular sides to values less than 15. Thereby limiting the area. Hence, we should take 15 as a non-hypotenuse side.

If 15 is one of the perpendicular sides

$$15^2 = c^2 - b^2$$

c is the hypotenuse

$$= (c + b)(c - b)$$

= product of two distinct numbers

$$c + b = 225$$

$$c - b = 1 \text{ so, } b = 112$$

$$\text{largest possible area} = \frac{1}{2} \times 15 \times 112 = 840 \text{ cm}^2$$

Choice (D)

Q30. DIRECTIONS for questions 30 and 31: Type in your answer in the input box provided below the question.

How many eight-digit numbers are there for which the sum of the digits is 4?

The number can begin with

1 st digit	Remaining digits	No. of possibilities
4	0s → Seven	1
3	0s → Six 1s → One	$\frac{7!}{6!} = 7$
2	(i) 0s → Six 2s → One	$\frac{7!}{6!} = 7$
	(ii) 0s → Five 1s → Two	$\frac{7!}{5! 2!} = 21$
1	(i) 0s → Six 3s → One	$\frac{7!}{6!} = 7$
	(ii) 0s → Five 1s → One	$\frac{7!}{5!} = 42$
	(iii) 0s → Four 1s → Three	$\frac{7!}{4! 3!} = 35$

$$\therefore \text{Total number of numbers} = 1 + 7 + 7 + 21 + 7 + 42 + 35 = 120$$

Ans: (120)

Q31. DIRECTIONS for questions 30 and 31: Type in your answer in the input box provided below the question.

If K is a non-negative integer less than 200, such that there exists at least one natural number P, for which $P!$ ends with K zeros, then how many distinct values can K assume?

If we consider $P = 1, 2, 3, or } 4$, then $P!$ ends in zero 0's. Hence K can be 0.

Similarly for $P = 5, 6, 7, 8, or } 9$, $P!$ ends in one 0.

Hence K can be 1.

Similarly K can be 2, 3 or 4, but K cannot be 5, as the number of 0's at the end of $24! = 4$ and the number of 0's at the end of $25! = 6$. Hence, there is no value of P, for which K can be 5.

In this manner K cannot assume one value for every value of P that is a multiple of $5^2 = 25$.

Similarly K cannot assume one (additional) value for every P which is a multiple of $5^3 = 125$, and one (additional) value for every P which is a multiple of $5^4 = 625$.

Now, number of zeros at the end of $800!$ (we arrive at $P = 800$ by trial and error), will give 199 zero's (i.e., $K < 200$).

Hence, from 0 to 199, K cannot assume $\left[\frac{800}{25}\right] + \left[\frac{800}{125}\right] + \left[\frac{800}{625}\right]$ values, where $[x]$

stands for the greatest integer less than or equal to x.

Hence, from among the 200 values possible (from 0 to 199), K can assume only $200 - (32 + 6 + 1) = 161$ distinct values.

Ans: (161)

Q32. DIRECTIONS for questions 32 to 34: Select the correct alternative from the given choices.

ABCD is a rhombus with the diagonals AC and BD intersecting at the origin on the x-y plane. If the equation of the line AB is $x - y = 1$, then the equation of the line CD is

a) $x - y = 0$.

b) $x + y - 1 = 0$.

c) $x - y + 1 = 0$.

d) None of the above

One side of the rhombus lies on the line $\ell : y = x - 1$

The centre (point where the diagonals intersect each other) is the origin.

\therefore The other side lies on the line which is as far from (0, 0) as ℓ .

This line has also got to be parallel to ℓ .

\therefore The line has to be $m : y = x + 1$.

Choice (C)

Q33. DIRECTIONS for questions 32 to 34: Select the correct alternative from the given choices.

If the 11th and the 8th terms of an arithmetic progression are in the ratio 2 : 5, which of the following statements is definitely false?

- a) The sum of no two consecutive terms is zero.
- b) The sum of no three consecutive terms is zero.
- c) At least one of the terms is zero.
- d) None of the above

$$\text{Given } \frac{a+10d}{a+7d} = \frac{2}{5}$$

$$\Rightarrow 5a + 50d = 2a + 14d$$

$$\Rightarrow 3a + 36d = 0 \rightarrow (1)$$

$$\Rightarrow a + 12d = 0$$

\Rightarrow 13th term is zero.

\Rightarrow choice (C) is true.

$$3a + 36d = (a + 11d) + (a + 12d) + (a + 13d)$$

0 = sum of three consecutive terms.

\therefore choice (B) is definitely false.

The series can be written as $-12d, -11d, -10d, \dots, d, 0, d, 2d, \dots$

\therefore The sum of no two consecutive terms is zero unless $d = 0$

\therefore Choice (A) is definitely not false.

Choice (B)

Q34. DIRECTIONS for questions 32 to 34: Select the correct alternative from the given choices.

The number of girls in a class is 60% of the number of boys in the class. In an exam, a total of 80 students of the class failed, of which 30% are girls. If 35% of the boys failed in the exam, find the percentage of girls who passed the exam.

a) 25%

b) 58%

c) 42%

d) 75%

$$\text{Number of girls who failed in the exam} = \frac{30}{100} \times 80 = 24.$$

$$\text{Number of boys who failed in the exam} = 80 - 24 = 56$$

$$\text{Total number of boys in the class} = 56 \times \frac{100}{35} = 160$$

$$\text{Total number of girls in the class} = \frac{60}{100} \times 160 = 96$$

$$\text{Number of girls who passed in the exam} = 96 - 24 = 72$$

$$\text{Percentage of girls who passed the exam} = \frac{72}{96} \times 100 = 75\%.$$

Choice (D)

Q35.

DIRECTIONS for question 35: Type in your answer in the input box provided below the question.

There are 32 teams participating in a tournament, where each team plays exactly one match against every other team. For a win, a team is awarded two points; for a draw, each of the two teams gets one point; for a loss, no points are awarded. If the team that scored more number of points in the tournament than any other team was declared the winner of the tournament, the winner must have scored at least

The sum of the scores of the two teams playing a match is 2, irrespective of the outcome of the match.

The total number of matches played in the tournament is ${}^{32}C_2 = \frac{32 \times 31}{2} = 496$

The total number of points = 496(2) [Each match involves two points]

The points scored by the team scoring the highest number of points will be minimum when these points are equally divided among all the teams participating, such that

every team ends up with $\frac{496(2)}{32} = 31$ points

Therefore, the score of the team that scores the highest number of points must be at least one more than 31, i.e., 32 points.

Alternately, if we consider all the matches ending in draws, each team will end up with 31 points (the number of matches played by each team). Now, the team scoring the highest number of points must have won atleast one of its matches, i.e., it's score must be one more than 31, i.e., 32

Ans: (32)

Q36.

DIRECTIONS for question 36: Select the correct alternative from the given choices.

The graph of a quadratic expression, $ax^2 + bx + c$, attains a maximum value of 10 at $x = 2$. If the graph intersects the x-axis at two points, one positive and the other negative, then which of a , b and c is/are positive?

a)

Only c

b)

Only b

c)

Both b and c

d)

Both a and c

As the quadratic expression attains a maximum value at $x = 2$ the graph of the given expression is a parabola pointing downwards and a is negative.

Again, the maximum value of the expression is at $x = \frac{-b}{2a} = 2 \Rightarrow b = -4a$

$\therefore b$ is positive [$\because a$ is negative]

Again, the product of the two roots, $\left(\frac{c}{a}\right)$, is negative, implying c is positive.

Therefore, a is negative, whereas both b and c are positive.

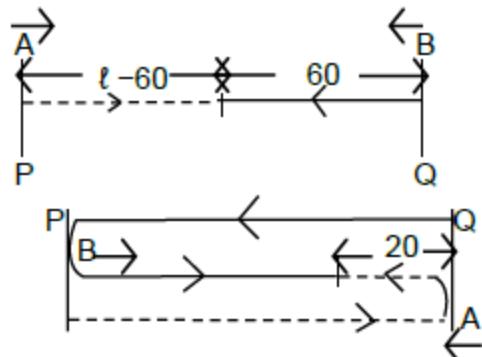
Choice (C)

Q37.

DIRECTIONS for questions 37 and 38: Type in your answer in the input box provided below the question.

A and B started swimming simultaneously from opposite ends of a swimming pool, PQ, and met each other for the first time after B had covered 60 m. Thereafter, they continued swimming and after both had completed a lap, they met for the second time, at a distance of 20 m from the end that B had started from. Find the length (in m) of the swimming pool.

Let the length of the swimming pool be ℓ m.



They met for the first time after time ' t ' (say),
when they together covered ℓ .

They met for the second time after they together covered 3ℓ . So the second meeting took place after time $3t$.

Meeting	time	distance covered	
		A	B
1	t	$\ell - 60$	60
2	$3t$	$\ell + 20$	$2\ell - 20$

$$\therefore 2\ell - 20 = 3(60)$$

$$\Rightarrow \ell = 100 \text{ m}$$

Ans: (100)

Q38.

DIRECTIONS for questions 37 and 38: Type in your answer in the input box provided below the question.

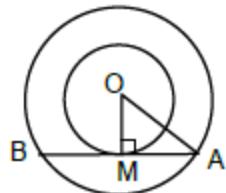
There are two concentric circles, whose radii (in cm) are positive integers, such that a chord of length 26 cm drawn in the outer circle is tangent to the inner circle. If the difference (in cm) in the circumference of the inner circle and that of the outer circle is $k\pi$ cm, find k .

Let the radii of the inner and the outer circles be denoted by r_1 and r_2 respectively.

Now, $AB = 26$, $OA = r_1$ and $OM = r_2$

$$r_1^2 - r_2^2 = AM^2 = 13^2$$

$$(r_1 - r_2)(r_1 + r_2) = 169$$



Now 169 can be expressed as a product of two natural numbers in 2 ways: (1×169) and (13×13)

$$\begin{array}{ll} r_1 - r_2 = 1 & \text{OR} & r_1 - r_2 = 13 \\ r_1 + r_2 = 169 & \text{OR} & r_1 + r_2 = 13 \end{array}$$

Solving, we get $r_1 = 85$ and $r_2 = 84$ Solving, we get $r_1 = 13$ and $r_2 = 0$
which is not possible

\therefore The required difference in circumference of the inner circle and outer circle
which is not possible = $2\pi(85 - 84) = 2\pi$

$$\therefore k = 2$$

Ans: (2)