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AIMCAT 2020

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.

...Researchers...prefer to describe [some children] as having “callous and unemotional traits,” shorthand for a cluster of characteristics and behaviours, including a lack of empathy, remorse, or guilt; shallow emotions; aggression and even cruelty; and a seeming indifference to punishment... They opine that nearly 1 percent of children exhibit these traits...More than 50 studies have found that kids with callous and unemotional traits are more likely than other kids to become criminals or display aggressive, psychopathic traits later in life...

Researchers believe that two paths can lead to psychopathy: one dominated by nature, the other by nurture. For some children, their environment – growing up in poverty, living with abusive parents, fending for themselves in dangerous neighbourhoods – can turn them violent and cold-hearted. These kids aren’t born callous and unemotional; many experts suggest that if they’re given a reprieve from their environment, they can be pulled back from psychopathy’s edge.

But other children display callous and unemotional traits even though they are raised by loving parents in safe neighbourhoods. Large studies...have found that this early-onset condition is highly hereditary, hardwired in the brain – and especially difficult to treat...

... A trained eye can spot a callous and unemotional child by age 3 or 4. Whereas normally developing children at that age grow agitated when they see other children cry – and either try to comfort them or bolt the scene – these kids show a chilly detachment...

As a child gets older, more obvious warning signs appear. Kent Kiehl, a psychologist at the University of New Mexico, says that one scary harbinger occurs when a kid 8-10 years old commits a transgression while alone, without the pressure of peers. This reflects an interior impulse toward harm. Criminal versatility – committing different types of crimes in different settings – can also hint at future psychopathy. But the biggest red flag is early violence. “Most of the psychopaths I meet in prison had been in fights with teachers in elementary school or junior high,” Kiehl says...

...Kiehl and others believe that the psychopathic brain has neural abnormalities – and that these same differences likely also occur in the brains of callous children.

One of the abnormalities appears in the limbic system, the set of brain structures involved in, among other things, processing emotions. In a psychopath’s brain, this area contains less grey matter. “It’s like a weaker muscle,” Kiehl says. A psychopath may understand, intellectually, that what he is doing is wrong, but he doesn’t feel it. “Psychopaths know the words but not the music” is how Kiehl describes it...

In particular, experts point to the amygdala – a part of the limbic system – as a physiological culprit for cold-hearted or violent behaviour. Someone with an undersized or underactive amygdala may not be able to feel empathy or refrain from violence. Why does this neural quirk matter? [D]istress cues, such as fearful or sad expressions, [are] designed to prevent attacks by raising the white flag; those not sensitive to these cues are more likely to attack somebody whom other people would refrain from attacking.

...The best physiological indicator of which young people will become violent criminals as adults is a low resting heart rate. Adrian Raine of the University of Pennsylvania says, “We think that low heart rate reflects a lack of fear, and a lack of fear could predispose someone to committing fearless criminal-violence acts.”

Q1. The author mentions the example of children with callous and unemotional traits, despite being raised by loving parents, to demonstrate that:

- a) poverty and abusive parents affect child behaviour.
- b) hardwired psychopathic traits are always hereditary.
- c) environment has an effect on the nature of children.
- d) callous and unemotional traits are not always because of the environment children grow up in.

Number of words and Explanatory notes for RC:

Number of words: 556

Researchers believe that two paths can lead to psychopathy: one dominated by nature, the other by nurture. For some children, their environment—growing up in poverty, living with abusive parents, fending for themselves in dangerous neighbourhoods—can turn them violent and cold-hearted. These kids aren't born callous and unemotional; many experts suggest that if they're given a reprieve from their environment, they can be pulled back from psychopathy's edge. But other children display callous and unemotional traits even though they are raised by loving parents in safe neighbourhoods. Large studies...have found that this early-onset condition is highly hereditary, hardwired in the brain—and especially difficult to treat...

Option A: The example isn't about abusive parents but loving ones. There are two different cases. One in which the children are brought up in bad environments and second, when the environment is good, but the child is naturally wired to be callous. Hence, Option A is not the answer.

Option B: Early-onset condition of callousness is hereditary and is hardwired in the brain, as mentioned in the passage. This option is just a circular argument, where it is understood hereditary traits are hardwired. That doesn't explain the purpose of an example that mentions loving and caring parents. They were mentioned to show that their parenting cannot affect the hardwiring. Option B is not the answer.

Option C: While this may be true, it is not so in this case, as the example clearly talks about a good environment, where the parents are loving and caring. Hence, this is not the purpose of the example mentioned. Option C is not the answer.

Option D: The example was given to show that sometimes psychopathic traits are hardwired and aren't necessarily a result of a bad and abusive environment (which includes parenting). Hence, Option D is the answer.

Choice (D)

Q2. All of the following characteristics indicate that a child is callous and unemotional EXCEPT:

- a) When the child exhibits detachment in the presence of other crying children.

- b) When the child commits a crime without others' help and influence.
- c) When the child repeats their transgressions.
- d) When the child shows a proclivity towards violence.

Number of words and Explanatory notes for RC:

Number of words: 556

Option A: *A trained eye can spot a callous and unemotional child by age 3 or 4. Whereas normally developing children at that age grow agitated when they see other children cry—and either try to comfort them or bolt the scene—these kids show a chilly detachment...* These lines indicate that detachment in the presence of crying children is a sign of a callous and unemotional child. Hence, Option A is not the answer.

Option B: Consider the sentence: *one scary harbinger occurs when a kid 8-10 years old commits a transgression while alone, without the pressure of peers. This reflects an interior impulse toward harm.* From the underlined portions we can understand that kids committing crimes without peer influence, all by themselves, is a troubling sign of callousness. Option B is not the answer.

Option C: From '*Criminal versatility—committing different types of crimes in different settings—can also hint at future psychopathy*', it can clearly be understood that committing crimes (transgressions) across various settings is a sign of criminal versatility that hints at psychopathic behaviour. However, mere repetition of transgressions doesn't quite tell us if it is the same setting or a different one. We cannot quite infer from this option whether psychopathic behaviour is indicated or not. Hence, Option C is the answer.

Option D: '*But the biggest red flag is early violence. "Most of the psychopaths I meet in prison had been in fights with teachers in elementary school or junior high," Kiehl says...*' It is clearly indicated that there is a connection between early violence (proclivity – inclination) and psychopathic behaviour. Hence, Option D is not the answer.

Choice (C)

Q3. The expression 'Psychopaths know the words but not the music' is:

- a) a metaphor to describe the lack of emotions in a psychopath.
- b) a way of describing the antipathy of psychopaths towards music.
- c) a comparison to highlight the difference between a psychopath's intellectual and emotional comprehension of his actions.

- d) an analogy to explain the difference in the manner in which a psychopath understands the lyrics and feels the music.

Number of words and Explanatory notes for RC:

Number of words: 556

The first abnormality appears in the limbic system, the set of brain structures involved in, among other things, processing emotions. In a psychopath's brain, this area contains less gray matter. "It's like a weaker muscle," Kiehl says. A psychopath may understand, intellectually, that what he is doing is wrong, but he doesn't feel it. "Psychopaths know the words but not the music" is how Kiehl describes it... The author gives another example to explain the problem. It is an analogy, a similar event to elaborate another situation. Just like one may know the song but may not be able to sing it for lack of understanding of the music, psychopaths, intellectually, know what they are doing wrong, but lack an emotional connection with those actions/the remorse someone usually might feel.

Option A: A metaphor is a comparison between two entities, not between two events. One entity is spoken about as if it is another in a metaphor. Here, the author compares two different entities. Hence, Option A is not the answer.

Option B: The emotions of psychopaths towards music has not been discussed here. Rather, any person who understands the words but not music has been mentioned as an example for anyone who knows the act is wrong but doesn't feel it. Hence, Option B is not the answer.

Option C: The example helps us understand the situation with psychopaths – they understand their actions intellectually but do not feel it emotionally. Hence, Option C is the right answer.

Option D: While it is an analogy, the passage doesn't talk about music per se, or the difference between understanding lyrics and understanding music. It is just an example to help understand the mindset of psychopaths. Not understanding music has been equated to not emotionally feeling the remorse/pinch of a wrong action, otherwise intellectually understood. Hence, Option D is not the answer.

Choice (C)

Q4. All of the following are physiological indicators for predicting psychopathic behaviour, according to the passage, EXCEPT:

- a) An undersized or underactive amygdala.
- b) Distress cues such as fearful or sad expressions.
- c) Less grey matter in the limbic system.

- d) A low resting heart rate.

Number of words and Explanatory notes for RC:

Number of words: 556

Option A: Consider the sentences: '*In particular, experts point to the amygdala—a part of the limbic system—as a physiological culprit for cold-hearted or violent behaviour. Someone with an undersized or underactive amygdala may not be able to feel empathy or refrain from violence.*' It can be understood from the underlined portion that the size of the amygdala is indeed a physiological indicator to direct us towards psychopathic behaviour. Hence, Option A is not the answer.

Option B: Consider the sentences: '*Why does this neural quirk matter? [D]istress cues, such as fearful or sad expressions, [are] designed to prevent attacks by raising the white flag; those not sensitive to these cues are more likely to attack somebody whom other people would refrain from attacking.*' These sentences indicate that distress cues are designed to evoke sympathy in others, so they don't continue their attack. So, there is no connection between distress cues and psychopathic behaviour per se. Hence, Option B is the answer.

Option C: Consider the sentences: '*One of the abnormalities appears in the limbic system, the set of brain structures involved in, among other things, processing emotions. In a psychopath's brain, this area contains less gray matter.*' The underlined portion clearly indicates that there is a connection between psychopathic behaviour and less gray matter. Hence, Option C is not the answer.

Option D: Consider the sentence: '*The best physiological indicator of which young people will become violent criminals as adults is a low resting heart rate...*' It clearly mentions that psychopathic behaviour and a low resting heart rate are connected.

Option D is not the answer.

Choice (B)

Q5. The author is least likely to agree with which of the following statements?

- a) Not all children exhibiting callous and unemotional traits exhibit psychopathic or criminal behaviour as they grow up.
- b) No child exhibiting psychopathic behaviour can really be rehabilitated through nurture.
- c) Despite the best upbringing, some children have been found to demonstrate psychopathic behaviour growing up.
- d) Children with perfectly fine heart rate and limbic systems have developed psychopathic behaviour growing up.

Number of words and Explanatory notes for RC:

Number of words: 556

Option A: 'More than 50 studies have found that kids with callous and unemotional traits are more likely than other kids to become criminals or display aggressive, psychopathic traits later in life...' It clearly mentions that such kids are more likely to become criminals. So, not all of them necessarily exhibit psychopathic behaviour, even according to what the author mentions. Option A is not the answer, because the author may agree with it.

Option B: Consider the sentence: 'These kids aren't born callous and unemotional; many experts suggest that if they're given a reprieve from their environment, they can be pulled back from psychopathy's edge.' This clearly shows that some of those who display psychopathic behaviour can be rehabilitated through careful nurture and care. This option undermines the author's stance in the passage. Option B is the answer.

Option C: This is the case of 'nature' as mentioned in the passage where callousness and being unemotional are hereditary traits hardwired into the brain. This, in fact, strengthens the author's argument, rather than undermines it. Option B is not the answer.

Option D: Low resting heart rate and less gray matter in the limbic system indicate psychopathic behaviour. However, those who have perfectly fine heart rates or limbic systems turning into psychopaths have not been discussed in the passage. So, we cannot quite be sure if the reverse is equally true. Option D is not the answer.

Choice (B)

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.

In his book, "Capital", Piketty had argued that inequality [on the wane from the 1930s until the 1970s], had risen sharply back toward the high levels of the Industrial Revolution. Now Milanovic, in his book "Global Inequality", reinforces how little is known about economic forces of long duration. Over the past 30 years, the incomes of workers in the middle of the global income distribution have soared, as has pay for the richest 1%. At the same time, incomes of the working class in advanced economies have stagnated. This dynamic helped create a global middle class and caused global economic inequality to plateau and decline, for the first time since industrialisation began.

At the dawn of industrialisation, Milanovic muses, inequality within countries (class-based) was responsible for the largest gaps between rich and poor. After industrialisation, inequality across

countries (location-based) became more important. But as gaps between countries narrow in the near future, class-based inequality will become more important.

Milanovic offers “Kuznets waves” as an alternative to two theories. Kuznets argued that inequality is low at low levels of development, rises during industrialisation and falls as countries reach economic maturity. Piketty offered an alternative explanation: that high levels of inequality are the natural state of modern economies. Unusual events such as world wars and the Great Depression disrupt that normal equilibrium by destroying capital and bringing higher taxes in the US and Europe.

Milanovic suggests that both are mistaken: across history, inequality has tended to flow in cycles (Kuznets waves). In the pre-industrial period, these waves were governed by Malthusian dynamics: inequality would rise as countries enjoyed a spell of high incomes, then fall as war or famine dragged average income back to subsistence level.

With industrialisation, the forces creating Kuznets waves changed. In the 19th century, technological advance, globalization and policy shifts worked together in mutually reinforcing ways to produce economic change. Workers were reallocated from farms to factories, average incomes and inequality soared and the world became interconnected. Malign forces such as war and political upheaval, and benign forces such as increased education squeezed inequality to the lows of the 1970s....

Since then, the rich world has been riding a new Kuznets wave, propelled by another era of economic change. Technological progress and trade work together to squeeze workers: cheap technology made in foreign economies undermines the bargaining power of rich-world workers directly, and makes it easier for firms to replace people with machines.

This diagnosis carries with it a predictive element. Milanovic expects rich-world inequality to keep rising before eventually declining. Importantly, he argues that the downswing in inequality that occurs on the backside of a Kuznets wave is an inevitable result of the preceding rise. Where Piketty sees the inequality-compressing historical events of the early 20th century as an accident, Milanovic believes them to be the direct result of soaring inequality. The search for foreign investment opportunities engendered imperialism and set the stage for war. There are parallels, if imperfect ones, to the modern economy; rich economies seem to be stagnating as the very rich struggle to find places to earn good returns on their piles of wealth. Emerging economies will probably continue on

their path toward rich-world incomes though that is not guaranteed and could be threatened by political crisis in China and other markets....

The conclusion of Milanovic's book is unsatisfying. A theory in which rising inequality triggers countervailing social dislocations feels intuitively right, but it leaves important questions unanswered. Milanovic's contributions – which broadly connate with those of Piketty – offer a clearer picture of great economic puzzles and his bold theorising chips away at tired economic orthodoxies. But the grand theory does as much to reveal the scale of contemporary ignorance as to illuminate the mechanics of the global economy.

Q6. Which of the following is consistent with the information presented in the passage?

- a) Milanovic's and Piketty's theories together completely explain inequality.
- b) Kuznets' theory complements Piketty's theory of inequality but Piketty's theory is unfairly underestimated in explaining inequality.
- c) Milanovic's theory of inequality is superior to either Piketty's or Kuznets' theory.
- d) Milanovic's contributions in explaining inequality are approximately similar to those made by Piketty.

Number of words and Explanatory notes for RC:

Number of words: 623

Option A: Milanovic offers "Kuznets waves" as an alternative to two theories (of inequality). Kuznets argued that Piketty offered an alternative explanation.... disrupt that normal equilibrium. But Milanovic suggests that both (Kuznets and Piketty) are mistaken. Across history, he says, inequality has tended to flow in cycles: Kuznets waves. Though the passage (from para 4 onwards) goes on to explain Milanovic's contributions, the passage ends on a negative tone: The book's conclusion is unsatisfying. It also leaves many important questions unanswered. **But the grand theory does as much to reveal the scale of contemporary ignorance as to illuminate the mechanics of the global economy.** Hence, we cannot say that (the cause of) inequality has been completely explained. Neither can we infer that the combination of Milanovic's and Piketty's theories together completely explain inequality. (Milanovic, in his book "Global Inequality", reinforces how little is known about economic forces of long duration). Hence choice A is not the answer.

Option B: Kuznets argued that inequality is low at low levels of development, rises during industrialisation and falls as countries reach economic maturity. Piketty offered an alternative explanation: that high levels of inequality are the natural state of modern economies. Unusual events – World wars and the Great Depression [which destroyed lots of capital and brought higher taxes in the US and Europe] – disrupt that normal equilibrium. **Milanovic suggests that both are mistaken.** Across history, he says, inequality has tended to flow in cycles: Kuznets waves. Milanovic explains "Kuznets waves" as an alternative to the prevailing theories of inequality put forward by Kuznet and Piketty. So, "Kuznets' theory complements Piketty's theory of inequality" is incorrect. Kuznets' views are corrected by Milanovic. Also, there is no basis for the approval of Piketty's theory as mentioned in the line "Piketty's theory is unfairly underestimated in explaining inequality". Hence choice B is incorrect.

Option C: Though the passage deals with Milanovic's contribution to a large extent, we cannot infer with certainty that his theory is superior to either Piketty's or Kuznets' theory. Therefore, choice C is not appropriate.

Option D: Where Piketty sees the inequality-compressing historical events of the early 20th century as an accident, Milanovic believes them to be the direct result of soaring inequality. **Milanovic's contributions, which are broadly connate (similar) with those of Piketty, offer a clearer picture of great economic puzzles** We can say that choice D is the correct answer.

Choice (D)

Q7. According to Milanovic, which of the following combination of factors was responsible for the steep decline in inequality in the 1970s?

- a) Malthusian forces, technological progress, trade, workers' declining economic power
- b) Technological prowess, globalization, policy shifts, war and famine, workers' declining economic power
- c) Wars, political unrest, increased education
- d) Technological advances, openness, policy shifts, social dislocations, war, political uprising, improved education

Number of words and Explanatory notes for RC:

Number of words: 623

With industrialisation, the forces creating Kuznets waves changed. In the 19th century, technological advance, globalization and policy shifts worked together in mutually reinforcing ways to produce economic change.

Option A: Choice A is incorrect because the factors mentioned in this choice influenced the changes in inequality across other time periods and not specifically in the 1970s, when inequality fell to great lows. *In the pre-industrial period, the Kuznets waves were governed by Malthusian dynamics. After the 1970s, the rich world has been riding a new Kuznets wave, propelled by another era of economic change. Technological progress and trade work together to squeeze workers, workers' declining economic power can be gathered from "makes it easier for firms to replace people with machines."*

Option B: In choice B, only 'war (and perhaps) famine' can be said to be the correct factors that were responsible for the steep decline in inequality in the 20th century. The remaining factors are incorrect. *In the 19th century, technological advance, globalization and policy shifts worked together in mutually reinforcing ways to produce dramatic economic change. After the 1970s, technological progress and trade work together to squeeze workers: cheap technology made in foreign economies undermines the bargaining power of rich-world workers directly, and makes it easier for firms to replace people with machines (workers' declining economic power).* So, choice B is not the correct answer.

Option C: *Malign (war and political upheaval) and benign (increased education) forces squeezed inequality to the lows of the 1970s.* This makes choice C the correct answer.

Option D: In choice D, the last three factors (*war, political upheaval, increased education*) correctly answer the question. The first three factors are not related to the time period: 1970s. *In the 19th century, technological advance, globalization and policy shifts worked together in mutually reinforcing ways to produce dramatic economic change. "social dislocations" mentioned as the fourth factor in choice D is a likely consequence of high inequality and not its cause. (A theory in which rising inequality eventually triggers countervailing social dislocations feels intuitively right....).* Hence choice D is not the answer.

Choice (C)

Q8. Which of the following is the central idea that the author is trying to highlight in the passage?

- a) Piketty and Milanovic, in their books, point to the historical events of the 20th century as the causes and consequences of inequality respectively.
- b) The economist Milanovic proposes a theory of inequality in his book but does not comprehensively explain the nature of inequality.
- c) In the U.S. and Britain, the income of a select few has been rising since the 1970s, reversing a large part of the income levelling achieved earlier in this century.
- d) In his book, Milanovic reckons that while global inequality is still very high, we are now living in a period of falling inequality and this is truly a golden age for studying inequality.

Number of words and Explanatory notes for RC:

Number of words: 623

Option A: Where Piketty sees the inequality-compressing historical events of the early 20th century as an accident, Milanovic believes them to be the direct result of soaring inequality. This is a viewpoint difference between the two. It does not form the central idea of the passage. Hence choice A is not the answer.

Option B: Now Milanovic, in his book "Global Inequality", reinforces how little is known about economic forces of long duration. *Milanovic offers "Kuznets waves" as an alternative to two prevailing theories of inequality: the theory of Kuznets and that of Piketty. The book's conclusion is unsatisfying. A theory in which rising inequality triggers countervailing social dislocations feels intuitively right, but it also leaves important questions unanswered. Milanovic's contributions offer a clearer picture of great economic puzzles and his bold theorising chips away at tired economic orthodoxies. But the grand theory does as much to reveal the scale of contemporary ignorance as to illuminate the mechanics of the global economy.* Hence choice B is the correct answer.

Option C: *Over the past 30 years, the incomes of workers in the middle of the global income distribution have soared, as has pay for the richest 1%. At the same time, incomes of the working class in advanced economies have stagnated.* So choice C, which mentions that the income of people in the U.S. and Britain has clearly been rising since the 1970s, is incorrect.

Option D: *In his book, "Capital", Piketty argued that inequality [on the wane from the 1930s until the 1970s], had risen sharply back toward the high levels of the Industrial Revolution. Now Milanovic, in his book "Global Inequality", reinforces how little is known about economic forces of long duration. Hence the emphasis on studying inequality can be ascertained. From the first para, we can also infer that we are now living in a period of falling inequality. However, choice D, like choice B, leaves out the more important discussion about Milanovic's views and contributions.* It also ignores the author's viewpoint mentioned in the last para of the passage: But the grand theory does as much to reveal the scale of contemporary ignorance as to illuminate the mechanics of the global economy. So, choice D is not the answer. Choice (B)

Q9. Which of the following correctly states the difference in the views of Kuznets and Piketty as can be inferred from the passage?

- a) The former believed that high inequality is the norm in modern economies, while the latter thought that high inequality is a temporary side-effect of the developmental process.
- b) The former believed that inequality is low at low levels of development, while the latter believed that inequality is low at high levels of development.
- c) The former believed that Kuznets waves can be governed by Malthusian dynamics, while the latter considered technology, openness and policy to be factors creating Kuznets waves.
- d) The former believed that a rise in inequality is a temporary outcome of the developmental process, while the latter thought that high inequality is the norm in modern economies.

Number of words and Explanatory notes for RC:

Number of words: 623

Option A: Kuznets argued that inequality is low at low levels of development, rises during industrialisation and falls as countries reach economic maturity. Piketty offered an alternative explanation: that high levels of inequality are the natural state of modern economies. Unusual events – World wars and the Great Depression [which destroyed capital and brought higher taxes in the US and Europe] – disrupt that normal equilibrium. So, the converse of choice A is true. Piketty believed that high inequality is the norm in modern economies. Kuznets thought that inequality is an outcome of the developmental process. Choice A is incorrect.

Option B: Choice B does not capture the difference in the views of Kuznets and Piketty mentioned in the third para of the passage.

Option C: Choice C is not related to the views of Kuznets and Piketty at all. The governing factors mentioned in this choice are those which are used by Milanovic to explain his theory. {In the pre-industrial period, these Kuznets waves were governed by Malthusian dynamics. In the 19th century, technological advance, globalization and policy shifts worked together in mutually reinforcing ways to produce dramatic economic change}. Choice C is not the answer.

Option D: As mentioned in the explanation for choice A, choice D correctly depicts the difference in the views of Kuznets (Inequality is low at low levels of development, rises during industrialisation and falls as countries reach economic maturity) and Piketty (High levels of inequality are the natural state of modern economies. Unusual events – World wars and the Great Depression – disrupt that normal equilibrium). Choice D is the right answer.

Choice (D)

Q10. Which of the following is the author least likely to agree with?

- a) In the near future, most of the differences in incomes between the rich and the poor may once again be due to inequality gaps within countries, according to Milanovic.
- b) Piketty opines that a reduction in economic inequality after the world wars was a result of imposition of taxes and reduction of capital.
- c) A study which throws light on how governments can address inequality crises may add more depth to Milanovic's book.
- d) Emerging economies will certainly continue on their path toward rich-world incomes.

Number of words and Explanatory notes for RC:

Number of words: 623

Option A: Milanovic muses that at the dawn of industrialisation, inequality within countries (class-based) was responsible for the largest gaps between rich and poor. After industrialisation, inequality across countries (location-based) became more important. But as gaps between countries narrow in the near future, class-based inequality will become more important. Hence choice A is correct and is not the answer.

Option B: Unusual events such as World wars and the Great Depression disrupt that normal equilibrium by destroying capital and bringing higher taxes in the US and Europe, according to Piketty. So choice B is true and is not the answer.

Option C: Milanovic offers "Kuznets waves" as an alternative to two prevailing theories (of inequality). Across history, he says, inequality has tended to flow in cycles: Kuznets waves. He talks about how the forces creating Kuznets waves have changed. He argues that the downswing in inequality that occurs on the backside of a Kuznets wave is an inevitable result of the preceding rise. ... The author goes on to conclude that Milanovic's theory leaves important questions unanswered. It does as much to reveal the scale of contemporary ignorance as to illuminate the mechanics of the global economy. ... Choice C can add more weight to what Milanovic has to offer. The first para tells us that global economic inequality has plateaued and declined, for the first time since industrialisation began. There is a need to avoid crises of high inequality. Hence choice C is also correct and is not the answer.

Option D: Emerging economies will probably continue on their path toward rich-world incomes though that is not guaranteed and could be threatened by political crisis in China and other markets. Hence choice D is false and is the answer.

Choice (D)

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

How can the law account for the value of complex, nonhuman entities such as rivers, lakes, forests and ecosystems? At a time of runaway climate change, when the Earth's biosphere is on the brink of collapse and species extinctions are accelerating, this has become a vital question.

... Perhaps we should take the idea of 'the human' as a rights-bearer and extend it to the complex, nonhuman systems that we wish to protect, that we know are deserving of care and concern.

Tempting as it is, this move must be resisted. For one thing, human rights have proven to be exclusionary – even within our own species. Its emergence as a set of legal and moral norms betrays the fact that the white, European, male property-owner is the paradigm case of 'the human': others, historically, have had to fight even to be seen as fully capable of bearing rights. International treaties have been required to address the rights of women, children, workers, LGBT people, indigenous communities and others, precisely because such 'minorities' were marginalised by the abstract idea of 'the human' of the Universal Declaration of Human Rights. Critics have also suggested that human rights norms are a Trojan horse for neo-imperialism, providing ideological cover for dubious 'humanitarian' interventions and capitalist plundering. In theory, human rights are for all humans, but it turns out that some people are more human than others...

Certain dangers lurk in using human rights to capture the interests of the nonhuman. First, its language and conceptual framing risk blunting attention to the distinctiveness and particularities of such dynamic beings. We risk only having respect for things insofar as they resemble human experience and characteristics.

Secondly, and just as important, is the related danger of diminishing our awareness of the human itself as a variegated mode of being in the world. This danger is already starkly present in the advent of corporate human rights, a development that has distorted the entire international human rights paradigm ... So, if we resist the idea of 'human rights' for nonhumans, and we carefully distinguish between 'humanity' and legal personhood, what is left standing?

... In a seminal paper from 1972, the legal scholar Christopher Stone asked if trees should have 'standing' – that is, if they could claim the necessary status to mount claims at law.

...[I]t's important to move beyond Stone's suggestion, and inch closer to acknowledging the complexity and liveliness of the nonhuman by admitting the porousness of our own boundaries. Perhaps we should not extend outwards from ourselves, so much as question humanity's entitlement to act as a model. After all, it is a hubristic belief in our own singularity and exceptionalism that's partly responsible for destroying the planet. One thing seems certain: if the law is to respond to the multiple crises afflicting the Earth, and if rights are to be deployed, we need to get rid of the notion of a rights-bearer who is an active, wilful human subject, set against a passive, acted-upon, nonhuman object ...

...Given all that is at stake, nothing less than a radical re-storying will do; and laws and rights – for too long tools of human privilege and exceptionalism – need to be re-imagined if they are to play a full role in human-nonhuman struggles for a future worth living.

Q11. Which of the following best expresses the overall argument of the passage?

- a) Human laws need a paradigm facelift to make them more inclusive for all people.
- b) Human laws must be extended to complex, non-human systems.
- c) Human laws should be altered to get rid of the inherent anthropocentric prejudice in them.
- d) Human laws should focus less on humans and more on saving the planet.

Number of words and Explanatory notes for RC:

Number of words: 548

Option A: The overall passage deals with taking care of non-human systems. It isn't about inclusivity towards other humans. This option leaves out the central point of discussion in the passage. Option A is not the answer.

Option B: The author is more in favour of redefining the laws. Simply extending the existing laws to non-humans has its own downside as understood from these lines: '*Perhaps we should take the idea of 'the human' as a rights-bearer and extend it to the complex, nonhuman systems that we wish to protect, that we know are deserving of care and concern. Tempting as it is, this move must be resisted. For one thing, human rights have proven to be exclusionary – even within our own species.*' Hence, Option B is not the answer.

Option C: From '*for too long tools of human privilege and exceptionalism*' we can understand how human laws have been biased towards some. From '*if rights are to be deployed, we need to get rid of the notion of a rights-bearer who is an active, wilful human subject, set against a passive, acted-upon, nonhuman object ...*' we can understand how the author believes the anthropocentric prejudice (humans being the central focus) must go out of the laws. Hence, Option C is the answer.

Option D: Saving the planet is not so much the theme of the passage as it is about including nonhuman systems – plants and animals – under the ambit of conservation. Yes, human hubris has been held responsible for the partial destruction of the planet.

Choice (C)

Q12. All of the following explain the dangers lurking in using human rights to capture the interests of the nonhuman EXCEPT that:

- a) respect may be lost for characteristics and experiences alien to humans.
- b) the distinctiveness of nonhuman beings may not be highlighted by the language used to frame human rights.
- c) the appreciation of the inherent heterogeneity amongst human beings may reduce.
- d) these laws will reduce the empathy humans have for nonhuman systems.

Number of words and Explanatory notes for RC:

Number of words: 548

Option A: Consider the sentences: '*We risk only having respect for things insofar as they resemble human experience and characteristics.*' From this, it can be understood that one of the dangers lurking in using human rights to capture nonhuman interests is that we will start respecting only those aspects which are comprehensible from a human lens. Hence, Option A is not the answer.

Option B: Consider the sentence: '*First, its language and conceptual framing risk blunting attention to the distinctiveness and particularities of such dynamic beings.* We risk only having respect for things insofar as they resemble human experience and characteristics.' From this we can understand that losing respect for non-human distinctiveness is a risk we run if we look at rights from a human perspective. Hence, Option B is not the answer.

Option C: Consider the sentences: '*Secondly, and just as important, is the related danger of diminishing our awareness of the human itself as a variegated mode of being in the world.* This danger is already starkly present in the advent of corporate human rights, a development that has distorted the entire international human rights paradigm.' From this it can be understood that one of the dangers of talking about 'human' rights for non-human interests is how it ends up diminishing awareness of human as a variegated mode. In short, we forget how heterogeneous humanity is and rather tend to club humanity as a homogenous group (leading to absence of appreciation for the diversity). Hence, Option C is not the answer.

Option D: Since the passage doesn't discuss existing empathy towards non-humans, the point of it getting reduced further doesn't really come about. Hence, Option D is the answer.

Choice (D)

Q13. Critics have suggested that the human rights norms are a Trojan Horse:

- a) as a way of describing the current state of minorities marginalised by the Universal Declaration of Human Rights.
- b) as a metaphor for neo-imperialism and capitalist plundering.
- c) to prove that legal and moral norms only create more divides.
- d) to highlight how they provide an ideological veil for debatable humanitarian interventions.

Number of words and Explanatory notes for RC:

Number of words: 548

Consider the sentences: 'Critics have also suggested that human rights norms are a Trojan horse for neo-imperialism, providing ideological cover for dubious 'humanitarian' interventions and capitalist plundering. In theory, human rights are for all humans, but it turns out that some people are more human than others'. The Trojan Horse depicts something that seems useful and benign in the beginning but causes harm later.

Option A: The concern was against human rights in general and not just about minorities marginalised by Human Rights. Hence, Option A doesn't clearly explain what the Trojan Horse is.

Option B: Here the Human Rights are the Trojan Horse. The harm they cause is giving way to neo-imperialism. This option incorrectly depicts the said metaphor. Option B is not the answer.

Option C: The concern the author has is not about other divides that could get created by super-imposing human rights over nonhumans. Such an interpretation doesn't really fit with the idiomatic expression of Trojan Horse. Hence, Option C is not the answer.

Option D: An ideological veil (something posing as good) for something sinister (debatable humanitarian interventions, capitalistic plundering etc.) is what the Trojan Horse stands for. Hence, Option D is the answer.

Choice (D)

Q14. The author persuades us to resist which of the following, according to the third para of the passage?

- a) Attributing the role of a rights-bearer to humans.
- b) Assigning equal rights to humans and nonhuman systems.
- c) Modifying existing laws after evaluating complex non-human entities.
- d) Extending the framework of human rights to include non-human entities.

Number of words and Explanatory notes for RC:

Number of words: 548

Consider the sentences: ... Perhaps we should take the idea of 'the human' as a rights-bearer and extend it to the complex, nonhuman systems that we wish to protect, that we know are deserving of care and concern. Tempting as it is, this move must be resisted.

Option A: The author clearly denounces the idea of extending the idea of the 'human' as a rights bearer to the non-human systems. The author doesn't denounce the idea of taking the human as a rights bearer. It is the extension to non-humans that the author thinks must be resisted. Hence, Option A is not the answer.

Option B: The author doesn't speak about equality or equal rights. If anything, the author talks about how each system is distinct in its own way. Hence, Option B is not the answer.

Option C: The author is in favour of modifying the framework, rather than individual laws. Also, that is not necessarily based on evaluating complex non-human entities. Such a thing has not been discussed in the para mentioned above. Hence, Option C is not the answer.

Option D: The author asks us to resist the idea of extending the human rights to nonhuman systems. The author wants a fundamental rejig and not just merely extending the human framework. So, Option D is something the author has asked us to resist. Option D is the answer.

Choice (D)

Q15. The author's views mentioned in the passage would not be weakened by which of the following statements?

- a) Human rights have succeeded in making the world a more just place.
- b) Human rights serve the needs of an exclusive set of people.
- c) The present framework of human laws will suffice to protect nonhuman entities, if they are implemented better.
- d) Any law that does not place humanity as the rightful custodian of nonhuman entities is bound to be chaotic and futile.

Number of words and Explanatory notes for RC:

Number of words: 548

The author's primary view is that the laws need to be reimagined/modified instead of trying to simply extend the present framework to nonhumans. The author also believes human rights have largely been prejudiced against some segments of humanity.

Option A: This is contradictory to what the author has mentioned in the passage, about how the laws have been biased against certain communities (including LGBT). This option weakens the author's arguments. Hence, Option A is not the answer.

Option B: This strengthens the author's argument as the current set of laws only serve the needs of some, as the author clearly points out there has been bias and some communities have been left out or mistreated. Therefore, Option B doesn't weaken the author's argument. Option B is the answer.

Option C: This statement suggests that no fundamental rewriting needs to be done to the current framework. However, that is not true according to the author, who believes there are several flaws in extending human rights to nonhumans, as it is, or even considering that they are doing a perfect job even within the scope of humanity. Hence, Option C weakens the argument.

Option D: This weakens the author's argument because it fundamentally places humans at the centre of the rights framework which is exactly what the author has denounced. Hence, Option D is not the answer.

Choice (B)

DIRECTIONS for questions 16 to 20: The passage given below is accompanied by a set of five questions. Choose the best answer to each question.

... How to teach world history today is a question that is going to grow only more and more important. Last summer in the United States, a debate flared when the influential testing agency Advanced Placement (AP) announced a change to its attendant courses, a change in which 'world history' would begin in 1450. In practice, beginning world history in 1450 becomes a story about how Europeans came to dominate not one but all the continents, and excludes the origins of alphabets, agriculture, cities and civilisation. Before the 1400s, it was others who did the empire-building, drove sciences, medicine and philosophy, and sought to capitalise on and extend the trading networks that facilitated the flow and exchange of goods, ideas, faiths and people.

Under pressure, the AP College Board retreated. 'We've received thoughtful, principled feedback from AP teachers, students and college faculty,' said a statement. As a result, the start date for the course has been nudged back 250 years to 1200...

Where that leaves Plato and Aristotle, or ancient Greece and Rome, is unclear – but presumably none are ‘foundational to the modern era’. That in itself is strange given that ... Mark Zuckerberg, a poster-boy for new technologies and the 21st century, admits to the Emperor Augustus as his role model.

Gone too is China of the Han dynasty (206 BCE-220 CE) and the networks that linked the Pacific with the Indian Ocean and the Mediterranean 2,000 years ago, and that allow us to understand that Asia, Africa and Europe were connected many centuries prior in a world that was effectively ‘globalised’... And too bad for climate change and the changes in global temperatures 1,500 years ago that led to the collapse of cities, the dispersal of populations and the spread of pandemics.

History is at its most exciting and stimulating for students and teachers alike when there is scope to look at connectivity, to identify and work through deep rhythms and trends, and to explore the past by challenging assumptions that the story of the world can be charted through a linear progression – as the AP College Board seems to think with its statement linking 1200 with the ‘modern era’.

If you really want to see how foolish this view is, then take a look at the front pages in just about any country in the world today. In China, news is dominated by the Belt and Road Initiative, the Chinese-led plan to re-galvanise the ancient networks of the past into the modern-day Silk Roads... This is far and away the single most important geopolitical development in the modern world today. Understanding why Beijing is trying to return to the glory years of the Silk Roads (which date back 2,000 years) would seem to be both interesting, and important – and largely to be bypassed by the new World History scope...

Students taking world history courses that begin in 1200 will not learn about any of these topics, even though their peers in colleges and schools around the world will. Education should expand horizons and open minds... [W]hat a shame too that this is happening at a time of such profound global change – when understanding the depth of our interconnected world is more important than ever. That, for me anyway, is the most valuable conclusion that is ‘foundational to the modern era’.

Q16. The criticism levied against the AP for beginning 'world history' from a specific date is that:

- a) history is less linear and more an interconnected web of events.
- b) advances in science, medicine and philosophy haven't been represented fairly.
- c) very little has been included about Plato, Aristotle, ancient Greece and Rome.
- d) we cannot study the period dominated by the Europeans while ignoring the others who did the empire-building prior to it.

Number of words and Explanatory notes for RC:

Number of words: 553

Consider the sentences: *In practice, beginning world history in 1450 becomes a story about how Europeans came to dominate not one but all the continents, and excludes the origins of alphabets, agriculture, cities and civilisation. Before the 1400s, it was others who did the empire-building, drove sciences, medicine and philosophy, and sought to capitalise on and extend the trading networks that facilitated the flow and exchange of goods, ideas, faiths and people.*

Option A: The crux of the passage has been highlighted in the following statements: '*History is at its most exciting and stimulating for students and teachers alike when there is scope to look at connectivity, to identify and work through deep rhythms and trends, and to explore the past by challenging assumptions that the story of the world can be charted through a linear progression.*' The author states here that history is not linear thereby making it difficult to pick a start date and studying it from there. Rather, one should look at a scope that helps connect events. Hence, Option A is the answer.

Option B: The author mentions these fields to explain that pre-1400, there were others who drove advancements. However, that is not the only, or sufficient reason to explain the concerns around putting a date to what should be studied and what should be left out. Hence, Option B is not the answer.

Option C: Plato, Aristotle, Greece and Rome have indeed been mentioned. But, that is not the only reason why the author has a problem with representing 1450 as the starting date for studying history. The above names were mentioned more as an example of all the influential subjects students will miss out on if they study history starting from 1200. Hence, Option C is not the answer.

Option D: While this is true, it doesn't provide the complete picture on the author's concerns, which are not just about who ruled, but also about influential people from centuries ago who may still have an influence. Also, this reason was more specific to pre-1450 and post-1450. Hence, Option D is not the answer.

Choice (A)

Q17. The author mentions Mark Zuckerberg in the passage to demonstrate that:

- a) it is Emperor Augustus and not Plato and Aristotle who are foundational to the modern era.
- b) the histories of Greece and Rome are important to understand the history of the modern era.
- c) history is more stimulating when there is scope to look at connectivity.
- d) the modern era is influenced by people and events from much earlier than 1200.

Number of words and Explanatory notes for RC:

Number of words: 553

Consider the sentences: '*Where that leaves Plato and Aristotle, or ancient Greece and Rome, is unclear – but presumably none are 'foundational to the modern era'. That in itself is strange given that ... Mark Zuckerberg, a poster-boy for new technologies and the 21st century, admits to the Emperor Augustus as his role model.'*'

Option A: The author didn't mention Zuckerberg in order to compare the greats. If anything, the author puts all of them in the same category, expressing surprise that none of them have been considered important enough to be present in the history books. Hence, Option A is not the answer.

Option B: Zuckerberg hasn't been mentioned just to highlight Greece or Rome, one particular kingdom or era. Hence, Option B is not the answer.

Option C: We haven't really discussed connectivity here. The author simply mentions that history and some of its great personalities like Emperor Augustus are hailed by influential people in the world of technology. Hence, Option C is not the answer.

Option D: By mentioning that even someone like Zuckerberg, one of the most influential tech pioneers of the modern world, learnt from the likes of Augustus, the author is highlighting that people and events from much before 1200 (since the AP College Board set the relevant timeline to 1200). Hence, Option D is the answer.

Choice (D)

Q18. Which of the following doesn't corroborate the crux of the author's argument in the passage?

- a) The Belt and Road Initiative is the single most important geopolitical development in the modern world today.
- b) Mark Zuckerberg, a poster-boy for new technologies and the 21st century, admits to the Emperor Augustus as his role model.
- c) The networks that linked the Pacific with the Indian Ocean and the Mediterranean 2,000 years ago allow us to understand the connectivity between Asia, Africa and Europe.
- d) The start date for the AP College Board 'world history' course has been nudged back 250 years to 1200.

Number of words and Explanatory notes for RC:

Number of words: 553

The crux of the passage is that there are a lot of connections in history and it can't be studied as a linear progression starting from a particular date.

Option A: Consider the sentences: 'If you really want to see how foolish this view is, then take a look at the front pages in just about any country in the world today. In China, news is dominated by the Belt and Road Initiative, the Chinese-led plan to re-galvanise the ancient networks of the past into the modern-day Silk Roads... This is far and away the single most important geopolitical development in the modern world today.' The author takes this example to explain that what is happening in the present, is connected to history. Hence, this corroborates the crux of the main argument. Option A is not the answer.

Option B: The author uses this example to explain that the poster-boy of technology derives lessons from someone from way back in history, thus proving the interconnectivity of things in history. Therefore, Option B is not the answer.

Option C: This represents the same theme as has been discussed above. The connectivity corroborates the author's central argument about how history is studded with examples of interconnected events, exactly why history shouldn't be something that could be studied with fixed timelines, say from 1450 or from 1200. Option C is not the answer.

Option D: The nudging back of the dates from 1450 to 1200 didn't find favour with the author either. As far as the author is concerned, that isn't a remedy for the criticism against fixing the date at 1450. 1200 as the starting date still leaves out the Han dynasty, and Greece and Rome, something the author laments about. Hence, this option doesn't corroborate the author's central argument. Option D is the answer.

Choice (D)

Q19. According to the author, which of the following is a difference between world history before and after the 1400s?

- a) the former excludes the origins of alphabets, cities and civilisation.
- b) the latter charts the tale of European domination.
- c) the latter is more about the empire-building activities of non-Europeans.
- d) the former excludes the contribution of the Europeans to world history.

Number of words and Explanatory notes for RC:

Number of words: 553

In practice, beginning world history in 1450 becomes a story about how Europeans came to dominate not one but all the continents, and excludes the origins of alphabets, agriculture, cities and civilisation. Before the 1400s, it was others who did the empire-building, drove sciences, medicine and philosophy, and sought to capitalise on and extend the trading networks that facilitated the flow and exchange of goods, ideas, faiths and people.

Option A: The former (world history before 1400s) doesn't exclude, but rather includes the origins of alphabets, cities and civilisation. Hence, Option A is the answer.

Option B: History after 1450s becomes a story about how Europeans came to dominate, not one but all the continents according to the author, unlike the case before 1400s. Hence, this option represents the difference as mentioned in the passage.

Option C: This is untrue, since it is the former when others (and not Europeans) did the empire-building. Hence, Option C is not the answer.

Option D: The author doesn't mention about the contribution of Europeans to world history before 1400s. The author laments about the selection of 1400s for missing out on contributions made by non-Europeans to the world before that period. Hence, Option D is not the answer.

Choice (B)

Q20. The author wants readers to “take a look at the front pages in just about any country in the world today” to help them understand that:

- a) linking 1200 to the start of the modern era is flawed.
- b) China’s plan to re-galvanise ancient networks is an important geopolitical event.
- c) the story of the world cannot be charted through a linear progression.
- d) education should expand horizons and open minds.

Number of words and Explanatory notes for RC:

Number of words: 553

Consider the sentences: *History is at its most exciting and stimulating for students and teachers alike when there is scope to look at connectivity, to identify and work through deep rhythms and trends, and to explore the past by challenging assumptions that the story of the world can be charted through a linear progression – as the AP College Board seems to think with its statement linking 1200 with the ‘modern era’.* If you really want to see how foolish this view is, then take a look at the front pages in just about any country in the world today.

Also consider the sentences: ‘Education should expand horizons and open minds... [W]hat a shame too that this is happening at a time of such profound global change – when understanding the depth of our interconnected world is more important than ever. That, for me anyway, is the most valuable conclusion that is ‘foundational to the modern era’.

Option A: While the author would agree with this, it is not the reason why the author wants us to open the front pages. The author wants us to understand how the front pages show that important events in the present world are connected to the past. Hence, Option A is not the answer.

Option B: While this may be true, this is what the author says one will find on the front pages in China. It is an important geopolitical event that proves that the past and present are interconnected. The reason the author wants us to look at the front pages is something much deeper than just one example. Hence, Option B is not the answer.

Option C: Consider the sentence: ‘*If you really want to see how foolish this view is, then take a look at the front pages in just about any country in the world today.*’ What that foolish view is can be seen from: ‘...and to explore the past by challenging assumptions that the story of the world can be charted through a linear progression – as the AP College Board seems to think with its statement linking 1200 with the ‘modern era’’. What the author calls foolish as seen above is the view/assumption that ‘*that the story of the world can be charted through a linear progression*’. It cannot be linear because events in the past across centuries and across different places are interconnected. Hence, Option C is the answer.

Option D: This is indeed the author’s conclusion, while pointing to the flaw in the thinking of the AP board. However, it is not the reason why the author wants us to take a look at the front pages, as the newspapers won’t suggest anything about education and its importance.

Choice (C)

DIRECTIONS *for questions 21 to 24:* The passage given below is accompanied by a set of four questions. Choose the best answer to each question.

“Data is the new oil” is one of those deceptively simple mantras for the modern world. ...The wildcatting nature of oil exploration, plus the extractive exploitation of a trapped asset, seems like an apt metaphor for the boom in monetized data.

The metaphor has even assumed political implications. Newly installed California governor Gavin Newsom recently proposed an ambitious “data dividend” plan, whereby companies like Facebook or Google would pay their users a fraction of the revenue derived from the users’ data. Facebook cofounder Chris Hughes laid out a similar idea, and compared it to the Alaskan Permanent Fund, which doles out annual payments to Alaskans based on the state’s petroleum revenue. As in Alaska, the average Google or Facebook user is conceived as standing on a vast substratum of personal data whose extraction they’re entitled to profit from.

But data isn’t the new oil, in almost any metaphorical sense, and it’s supremely unhelpful to perpetuate the analogy. Oil is literally a liquid, fungible, and transportable commodity. The global market is designed to take a barrel of oil from the Ghawar oil field in Saudi Arabia and, as frictionless as possible, turn it into a heated apartment in Boston or a moving commuter bus in New York. With data, by contrast, the abstract bits are functionally static.

...Accounting rules don’t call for tech companies to specify their data as a separate asset on the balance sheet, but by any reasonable valuation, Amazon’s purchase data is worth an immense fortune ... to Amazon...because Amazon has built an expansive ecommerce presence, a ruthlessly efficient recommendation and advertising engine, and a mind-bogglingly complex warehouse and fulfilment operation around the data on those hard drives. Ditto Google, Uber, Airbnb, and every other company you’d identify as an “oil field” in this tired metaphor.

...[T]here are companies that would love to know Amazon’s sales data, Google’s search queries, or Uber’s routing and pricing history. But here’s the key thing: Those interested outside parties are competitors, and the owners of the data would never in a million years sell it.

Where does this leave proposals around a “data dividend”? Beyond being implausible, they are problematic for several reasons.

For starters, the dividend will likely be paltry, and nowhere near the \$1,600-per-person Alaska oil dividend...[M]ore foundationally, why would Facebook or Google owe you anything? ... You wilfully used a service and generated data that wouldn't otherwise exist. What you get in return is Facebook itself, for which you've not paid a nickel... Google likewise uses your searches and resulting clicks as a training set for its search algorithm. None of these modern marvels is cheap to maintain. You're not contributing to some limited pool of data on whose resulting revenue you can stake a claim; you're an infinitesimally small part of a data cooperative whose benefits accrue to the very users that generated it.

...Ultimately, the majors like Google and Facebook will raise the castle walls around their data (and users) ... It'll be first-party data all around: Publishers, apps, and ecommerce all huddling around their data and user piles, projecting that data externally in data-safe ways if absolutely necessary, but not otherwise.

No, data isn't the new oil. And it never will be, because the biggest data repositories don't want it to be.

Q21. That data is the new oil

- a) is a metaphor to describe the possible exploitation of valuable data.
- b) is an analogy to explain how data hasn't been monetized as oil has been.
- c) is a misleading notion about the hidden value of a trapped asset like oil.
- d) is an accurate depiction of the unexplored value of hoarded data.

Number of words and Explanatory notes for RC:

Number of words: 546

Consider the sentences: “*Data is the new oil*” is one of those deceptively simple mantras for the modern world. ...The wildcatting nature of oil exploration, plus the extractive exploitation of a trapped asset, seems like an apt metaphor for the boom in monetized data. The metaphor has even assumed political implications.’ The comparison of data with oil represents a metaphor.

Option A: Comparing data to oil represents a metaphor. Further, data can be exploited or monetized just like oil is extracted. The author clearly mentions above that this is an apt metaphor for monetized data. Hence, Option A is the answer.

Option B: Firstly, an analogy is a situation of example used to explain another case. An analogy compares events where a metaphor compares entities. Also, the above underlined line clearly says it is an apt metaphor for the boom in monetized data, whereas this choice says that data hasn't been monetized. Hence, Option B is not the answer.

Option C: The metaphor is about data and not about oil. Data has been compared to oil to talk about its hidden value and how it can be monetized. Although the author does discuss ‘misleading notion’, that is about monetization of data and not that of oil. Hence, Option C is not the answer.

Option D: While data has value, the author doesn't really lament about the ‘unexplored value’, and that too of ‘hoarded’ data. Hoard is to deliberately save something beyond what is required. According to the author, all data is valuable. Hence, Option D is not the answer.

Choice (A)

Q22. According to the author, the flaw in comparing oil and data held by companies is that:

- a) accounting rules don't call for tech companies to specify their data as a separate asset.
- b) owners of data would not sell it away for anything less than a fortune.
- c) the data is worthless for anyone other than the companies that hold it.
- d) the data is useful only in a specific ecosystem built by the owners of the data.

Number of words and Explanatory notes for RC:

Number of words: 546

Consider the sentences: 'But data isn't the new oil, in almost any metaphorical sense, and it's supremely unhelpful to perpetuate the analogy. Oil is literally a liquid, fungible, and transportable commodity. The global market is designed to take a barrel of oil from the Ghawar oil field in Saudi Arabia and, as frictionless as possible, turn it into a heated apartment in Boston or a moving commuter bus in New York. With data, by contrast, the abstract bits are functionally static.'

Option A: While the author does mention that data isn't considered an asset as per the rules of accounting, that is more a passing remark than a fundamental rule that makes the comparison faulty. It is more an example to explain why data is not the new oil. It is because data cannot be as readily monetized as oil can be. Hence, Option A is the answer.

Option B: The author's opinion that comparing oil and data is flawed doesn't have anything to do with whether companies like Amazon, sitting on large piles of data, are willing to sell it or not. Irrespective of whether they would want to monetize data or not, the fact stays that data is not as easily transformable into its monetary value as oil is. Hence, Option B is not the answer.

Option C: The author does mention that those who are most keen to get their hands on the data held by some companies are likely to be competitors. Also, it is not asserted that the data is absolutely trash or sans value for anyone else other than the competitors. The analogy is faulty because data is valuable under a very specific set of circumstances and cannot easily be monetized, compared to oil, not because it is valuable only to the companies holding it. If that were the case, competitors wouldn't be so desperate to get their hands around it. Hence, Option C is not the answer.

Option D: The author feels data cannot be monetized the same way and with the same ease as oil can be. Data is useful but for some companies and their competitors above all. Hence, this option explains why the author feels the analogy is flawed. Option D is the answer.

Choice (D)

Q23. Which of the following statements best expresses the overall argument of the passage?

- a) Drawing comparisons between monetization of data and that of oil is not apt.
- b) While oil is globally valuable, the same is not true for data.
- c) Oil can be directly encashed, but data needs to be processed to extract its true value.
- d) Oil's fungibility makes it valuable, unlike data hoarded in its repositories.

Number of words and Explanatory notes for RC:

Number of words: 546

The overall argument of the passage has been well-summarized by the author as: 'No, data isn't the new oil. And it never will be, because the biggest data repositories don't want it to be.' There are two aspects to it. 1. The author doesn't think data and oil are the same (as some people think them to be). 2. The author believes even if there is potential in the data to be tapped, companies that hold it wouldn't want to monetize it.

Option A: This is true, as the author explains clearly that 'Oil is literally a liquid, fungible, and transportable commodity. The global market is designed to take a barrel of oil from the Ghawar oil field in Saudi Arabia and, as frictionless as possible, turn it into a heated apartment in Boston or a moving commuter bus in New York.' Data on the other hand has value for some, in a very niche way. So, it is difficult to compare the monetization of oil and data, leave alone calling data the new oil. Hence, Option A is the answer.

Option B: The locational possibilities of data or oil have not been explored anywhere in the passage. In other words, the author doesn't really discuss where oil is valuable and where data is valuable. The entire discussion simply hinges on whether data is as valuable as oil is, anywhere in the world. Hence, Option B can be eliminated.

Option C: The wealth oil represents has been taken too literally in this option. The ease with which oil can be 'cashed' wasn't a subject of speculation in the passage. This definitely is not the central point of the passage.

Option D: The author established that oil is valuable whereas data may not be valuable in the same way as oil is. One of the reasons why oil differs from data in terms of why it is valuable is because oil is fungible whereas data isn't. (Fungibility means that two different parts of an entity are interchangeable. A barrel of oil from anywhere in the world is pretty much the same. Data on the other hand is contextual and useful only to certain entities.) So, while this option offers insights into why data and oil are not the same, it is not the pivotal argument in the passage (which is not why data is not as valuable as oil but rather about why data is not the new oil).

Choice (A)

Q24. Which of the following strengthens the author's stance on whether service providers like Facebook or Google 'owe you anything'?

- a) User data is collected by the service provider without explicitly stating so.
- b) No amount of data is insignificant enough, if a service provider wants to monetize it.
- c) Individual user information isn't as useful as collective user information.
- d) Users will shift to a different service provider if companies such as Facebook and Google start charging for their services.

Number of words and Explanatory notes for RC:

Number of words: 546

These are the author's arguments about the issue of service providers owing users anything at all. '*[M]ore foundationally, why would Facebook or Google owe you anything? ... You wilfully used a service and generated data that wouldn't otherwise exist. What you get in return is Facebook itself, for which you've not paid a nickel... Google likewise uses your searches and resulting clicks as a training set for its search algorithm. None of these modern marvels is cheap to maintain. You're not contributing to some limited pool of data on whose resulting revenue you can stake a claim; you're an infinitesimally small part of a data cooperative whose benefits accrue to the very users that generated it.*'

Option A: The author's arguments are largely based on how users use a service they don't pay for. The para doesn't really discuss consent. Hence, whether the service providers explicitly state that they are collecting the data or not, will not help resolve the question of service providers owing users for their data. Hence, Option A is not the answer.

Option B: While this may or may not be true, it doesn't really help us resolve whether service providers owe the users anything. Even if the data is useful and service providers make use of that data, the author argues that they don't owe the users anything as the users wilfully generated the data that otherwise doesn't exist. So, we will still have the question unresolved. Hence, Option B is not the answer.

Option C: This will resolve the question for sure, since this would allow us to conclude that service providers do not owe anything to individual users and it is only the collective data that they have accrued which is useful. Hence, Option C is the answer.

Option D: Whether the users will switch loyalties or not, based on charges levied by service providers, the result doesn't influence the author's stance – which is that data dividend paid out to users might not be a feasible plan. Users could switch to any other company, but it still doesn't tell you whether or not that will influence the chances of their getting paid for the data they've generated. Hence, Option D is not the answer.

Choice (C)

Q25. DIRECTIONS for question 25: Five sentences related to a topic are given in the question below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out. Choose its number as your answer and key it in.

1. As the ice melts at the end of the summer melting season, polar bears rely more and more on the fat stores they built up during the previous winter.
2. These large bears of the Arctic region aren't endangered but are considered a vulnerable species.
3. Polar bears have large hunting ranges and their role as an alpha predator in the Arctic is a crucial part of the natural balance in their unique ecosystem; if the sea ice disappears, the bears may soon follow.
4. Shake off those late winter doldrums and join us in observing International Polar Bear Day.
5. As Arctic sea ice coverage continues to shrink due to warming ocean temperatures, the polar bear population faces a rapidly shrinking habitat.

Sentence 1: Sentence 1 talks about the response of the polar bears towards the ice melting at the end of the summer melting season.

Sentence 2: Sentence 2 has the demonstrative adjective 'these bears'. It mentions that bears are a vulnerable species.

Sentence 3: Sentence 3 has a mention of the role of the polar bears in their ecosystem. It also explains that bears will disappear if the sea ice disappears.

Sentence 4: Sentence 4 has the clue 'International Polar Bear Day' (*global event that draws attention to the challenges polar bears face in a warming Arctic*). "Shake off those late winter doldrums" is an exhortation. Here "doldrums" means inertia, malaise, low spirits.

Sentence 5: Sentence 5 has a cause-effect relation. It brings in the idea of the shrinking of both, the arctic sea ice and the habitat of the polar bears.

On a careful reading of the sentences, it can be observed that only sentence 4 and sentence 5 can serve as 'introductory sentences'. The remaining sentences need a precedent and more substantiation. But sentence 4 is a standalone sentence that is better placed at the beginning of the paragraph. It does not really mention the problems that polar bears face and can serve as an appropriate starting point from where the remaining sentences (which highlight the risks faced by polar bears) flow.

Sentence 4 is followed by sentence 2. "join us in observing International Polar Bear Day" in sentence 4 is linked with "These large bears of the Arctic region aren't endangered but are vulnerable" in sentence 2. Sentences 2 and 5 form a logical block. Sentence 5 gives reasons for the point made in sentence 2 – that polar bears aren't endangered but are considered a vulnerable species. Sentence 5 follows sentence 2. Sentence 5 is followed by sentence 3. "the polar bear population faces a rapidly shrinking habitat" in sentence 5 links with "polar bears have large hunting ranges" and "crucial part of the natural balance in their unique ecosystem" in sentence 3. Sentence 3 concludes the para. So, 4253. Sentence 1 is the odd sentence out. "ice melts at the end of the summer melting season" in sentence 1 is a normal event and is not to be confused with "as Arctic sea ice coverage continues to shrink due to warming ocean temperatures" in sentence 3. "polar bears rely more and more on the fat stores they built up during the previous winter" in sentence 3 is a normal occurrence and is not related to the problem discussed in the remaining sentences – if the sea ice disappears, the (vulnerable) bears may soon follow. In other words, (1) doesn't have the negative tone of the vulnerability of polar bears. It is about how polar bears survive when ice melts at the end of summer.

Ans: (1)

Q26. DIRECTIONS for question 26: 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. A BATNA may involve walking away, prolonging a stalemate, approaching another potential buyer, making something in-house rather than procuring it externally, going to court rather than settling the matter, forming a different alliance, or going on strike.

2. BATNAs – the acronym for “best alternative to a negotiated agreement” – reflect the course of action a party would take if the proposed deal were not possible.

3. Both parties doing better than their BATNAs is a necessary condition for an agreement; in that sense, BATNAs define a zone of possible agreement and determine its location.

4. BATNAs set the threshold – in terms of the full set of interests – that any acceptable agreement must exceed.

Sentence 1: Sentence 1 exemplifies some courses of action related to BATNAs.

Sentence 2: Sentence 2 explains the term BATNA. It gives us the full form of BATNA.

Sentence 3: Sentence 3 mentions the necessary condition for an agreement.

Sentence 4: Sentence 4 has the clue 'threshold for a BATNA'.

On a careful reading of the sentences, it can be observed that sentence 2 is a general sentence that can begin the para. It mentions the full form "best alternative to a negotiated agreement". Sentences 2 and 1 form a mandatory pair. "course of action a party would take" in sentence 2 links with the examples "A BATNA may involve walking away going on strike" in sentence 1.

It can also be seen that sentences 4 and 3 form a logical block. "Both parties doing better than their BATNAs is a necessary condition for an agreement" in sentence 3 links with "BATNAs set the threshold that any acceptable agreement must exceed" in sentence 4. So, sentence 3 follows sentence 4. It can also be observed that sentence 3 concludes the para.

So, 2 and 1 form a logical block. 4 and 3 form another logical block. Sentence 1 is connected to sentence 4. The correct answer is 2143.

Ans: (2143)

Q27. DIRECTIONS for question 27: The following question has a paragraph from which the last sentence has been left incomplete. From the given options, choose the one that completes the paragraph in the most appropriate way.

People are different in fundamental ways. They want different things, they have different motives, purposes, aims, values, needs, drives, impulses, urges. They believe differently: they think, perceive, cognize, conceptualize, discern, and reflect differently. And of course, manners of acting and emoting, governed by wants and beliefs, differ radically among people. Seeing others around us differing from us, we conclude that these differences in individual behaviour are but temporary manifestations of madness, badness, stupidity, or sickness.

a)

In other words, we should expect other people to behave like we do because our way of doing things is better than that of the other person.

b)

The Myers-Briggs Type Indicator (MBTI) is one such attempt that has been proven as very useful in understanding and predicting differences.

c)

In other words, we rather naturally account for variations in the behaviour of others in terms of flaws and afflictions.

d)

Differences in behaviour are a result of preferences related to the basic functions, such as perceiving and decision-making, performed by individuals.

The para highlights the differences between people in terms of their wants, motives, beliefs, behaviour, thoughts and other wide-ranging parameters. The penultimate sentence of the para mentions the underlying cause of the differences in people's behaviour: manifestations of madness, badness, stupidity or sickness (negative points). Choice C best completes and concludes this viewpoint. "we rather naturally account for variations in the behavior of others" in choice C links with "we conclude that these differences in individual behavior" in the penultimate sentence of the para. Also, " in terms of flaws and afflictions" in choice C links with "temporary manifestations of madness, badness, stupidity, or sickness" in the penultimate sentence of the para. Hence, choice C mirrors the introduction and connects with the penultimate sentence, thereby, effectively bringing the para to a close.

Option A: Choice A seems to gel with "temporary manifestations of madness, badness, stupidity, or sickness" given in the penultimate sentence of the para. It suggests that we wish we could change the people we closely interact with. This choice runs tangent to the para. Choice A is not negative in tone. And the author is not prescriptive i.e. he does not recommend that we **should** expect uniform behaviour. So, choice A is not the correct answer.

Option B: Choice B sounds abrupt. It assumes that one has cited the need for understanding and predicting differences. But this point has not been covered in the para. Choice B (one **such** attempt) jumps the gun and cannot complete the para.

Option D: Choice D is out of scope. It brings in a new term 'preferences' which needs further clarification or substantiation.

Choice (C)

Q28. DIRECTIONS for question 28: 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. Fine vodka is the antithesis of this.
2. It has three distinct notes, brioche, flavours of green chestnuts and almonds, and rich chocolate and coffee, and you cannot down it in a single shot.
3. You must savour it slowly at room temperature, appreciating the complexities as the notes appear at various stages of drinking it.
4. Most vodka in the past was made as a rough spirit that necessitated downing it as shots at freezing temperature.

Sentence 1: This talks about fine vodka, but 'this' indicates there is some other theory opposite to the experience provided by fine vodka. We need to look for a theory sentence.

Sentence 2: This is an independent sentence about fine vodka, giving its contents.

Sentence 3: This sentence has the clue "complexities as the notes". It also has the pronoun "it".

Sentence 4: The important word here is 'rough spirit' which contrasts 'fine vodka'. 'downing it as shots at freezing temperature' in sentence 4 contrasts 'savour it slowly at room temperature' in sentence 3.

Sentence 4, which talks about 'rough spirit', needs to precede sentence 1. 'this' in sentence 1 refers to "most vodka in the past was made as a rough spirit" given in sentence 4. The narrator makes a reference to the past – Most vodka in the past. The remaining sentences appear to refer to fine vodka. So, sentence 4 which is the only sentence referring to 'most vodka in the past' is a standalone sentence that is best placed at the very beginning of the para.

Sentences 4 and 1 form a logical block. "most vodka in the past" in sentence 4 contrasts 'fine vodka' in sentence 1. "this" in sentence 1 refers to the feature(s) of 'most vodka in the past' mentioned in sentence 4. So 4 is followed by 1. Also, "rough spirit that necessitated downing it as shots at freezing temperature" in sentence 4 contrasts (*is the antithesis*) of "fine vodka" in sentence 1.

Sentence 2 tells us how fine vodka is an antithesis of 'most vodka in the past'. 'you cannot down it in a single shot' in sentence 2 contrasts 'necessitated downing it as shots at freezing temperature' in sentence 4. Also 'rough spirit (vodka of the past)' in 4 contrasts 'three distinct notes, brioche, flavours of green chestnuts and almonds, and rich chocolate and coffee (of fine vodka)' in sentence 2.

23 is a logical block because one says you can't do this and the next says, 'you have to savour it'. The 'it' in sentences 2 and 3 has to be 'fine vodka'. "as the notes appear at various stages of drinking it" in sentence 3 explains "you cannot down it in a single shot" in sentence 2. Also, 3 has 'the notes' which lends credibility to 2 being mentioned earlier since 2 has 'three distinct notes'. Sentence 3 concludes the para. So, 4123.

Ans: (4123)

Q29. DIRECTIONS for question 29: 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. I will constantly try to protect and insure my assets, properties, securities, position, or reputation.
2. My sense of self-worth will constantly fluctuate and I won't have any sense of constancy or anchorage or persistent selfhood.
3. If I'm in the presence of someone of greater net worth or fame or status, I will feel inferior; if I'm in the presence of someone of lesser net worth or fame or status, I will feel superior.

4. A driving force for many people is possessions: material possessions such as fashionable clothes, homes, cars and jewelry, and the intangible possessions of fame, glory or social prominence.

5. If my sense of security lies in my reputation or in the things I have, my life will be in a constant state of threat and jeopardy that these possessions may be lost or stolen or devalued.

Sentence 1: Sentence 1 is a consequence of some other factor(s) and can only follow another sentence.

Sentence 2: Sentence 2 points to the fluctuation of a person's sense of self-worth.

Sentence 3: Sentence 3 is a conditional sentence. It tells us how being in the presence of a person of high/ low worth, fame or status affects us.

Sentence 4: Sentence 4 mentions the role of material and intangible possessions.

Sentence 5: Sentence 5 is a conditional sentence. It has a clue 'sense of security'.

On a careful reading of the sentences, it can be observed that sentences 5 and 3 are cause-effect sentences that can serve as introductory sentences in the paragraph. Both these sentences must also come early in the flow. Sentences 3 and 2 refer to the author's sense of self-worth and form a logical block. So sentence 5 which talks about 'sense of security' must precede sentence 3.

Sentence 5 is a general sentence that can begin the paragraph. Sentence 5 is followed by sentence 3. "If my sense of security lies in my reputation or in the things I have" in sentence 5 links with "If I'm in the presence of someone of greater net worth or fame or status" in sentence 3.

Sentences 3 and 2 form a logical block. "greater net worth or fame or status, I will feel inferior" and "lesser net worth or fame or status, I will feel superior" in sentence 3 links with "sense of self-worth constantly fluctuates" in sentence 2.

Sentences 2 and 1 form another logical block. "constantly trying to protect and insure my assets, properties, securities, position, or reputation" in sentence 1 is a consequence of "I won't have any sense of constancy or anchorage or persistent selfhood" in sentence 2. So, 5321. It must be noted that all these four sentences have the pronoun "I" or "me" in them.

Sentence 4 is the odd sentence out. It does not refer to "me" or "I". It mentions "many people". This sentence runs tangent to "my sense of security/ self-worth/ feelings" or "my actions". This sentence is a general standalone sentence on possessions and is not related to the remaining sentences. It can be a part of another paragraph.

Ans: (4)

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. You mitigate and say, "Don't bother, if it's too much trouble, but if you have a chance to look at this over the weekend, that would be wonderful."

2. We mitigate when we're being polite, ashamed or embarrassed, or when we're being deferential to authority.
3. The term used by linguists to describe what Klotz was engaging in, in that moment, is "mitigated speech", which refers to any attempt to downplay or sugarcoat the meaning of what is being said.
4. If you want your boss to do you a favour, you don't say, "I'll need this by Monday."

Sentence 1: Sentence 1 has the clue "mitigate" and a continuation of a conversation.

Sentence 2: Sentence 2 gives us a list of occasions when we mitigate.

Sentence 3: Sentence 3 defines what "mitigated speech" is. "*what Klotz was engaging in in that moment*" in sentence 3 refers to an earlier context.

Sentence 4: Sentence 4 has a specific example.

On a careful reading of the sentences, it can be observed that sentence 3 is the best general sentence that can begin the paragraph. It defines mitigated speech. Here, "engaging in that moment" is another (prior) context. "that moment" has not been explained in the remaining sentences. So we can infer that this para is taken from the latter part of another extract and not from the beginning of the same. Sentence 2 tells us when we mitigate and follows the definition of 'mitigated speech' in sentence 3. So, 32.

Sentences 2 and 4 form a logical block. "when we're being deferential to authority" in sentence 2 links with "If you want your boss to do you a favour" in sentence 4. "I'll need this by Monday." in sentence 4 is not an attempt to downplay or sugarcoat the meaning of what is being said. Sentence 4 is followed by sentence 1. "you don't say, "I'll need this by Monday."" in sentence 4 is followed by "Don't bother, if it's too much trouble over the weekend, that would be wonderful" in sentence 1. Sentence 1 completes the conversational example. So, 3241. Ans: (3241)

Q31. DIRECTIONS for question 31: The following question has a paragraph from which the last sentence has been left incomplete. From the given options, choose the one that completes the paragraph in the most appropriate way.

Historically, health systems in Latin America have been marked by fragmentation and gross unfairness. The rich have private health insurance and patronise private hospitals, some world-class and others merely overpriced. Workers with formal jobs are enrolled in contributory social-security systems. Unusually, these do not just provide health insurance but also run hospitals. As for the poor, who tend to work in the uninsured informal sector, they have had to rely on the patchy services provided by health ministries, often having to pay for drugs and even for syringes and sheets.

- a) With the economic slowdown putting pressure on budgets, governments should be urged to continue to give priority to enrolling the poor in universal health schemes.
- b) Over the past thirty years, this picture has begun to change with many countries having written a right to health care into their constitutions.
- c) Thanks to a complex but hugely positive transition towards universal health care, they are capable of coping with them.
- d) Serious illness often bankrupted poor families.

The para highlights an important point that health systems in Latin America paint a picture of gross unfairness: the rich enjoy several benefits while the poor rely on patchy health services provided by health ministries.

Option A: Choice A mentions a course of action that is positive in tone. This point can come in a later paragraph that talks about solutions to the problem. Choice A cannot complete the given para.

Option B: Choice B is again positive in tone. It starts a new point of view. How "this picture has begun to change" can begin a new viewpoint in another paragraph. Choice B does not connect with the penultimate sentence nor does it mirror the introduction: health systems in Latin America have been marked by fragmentation and gross unfairness (difference in reality for the rich and the poor).

Option C: Choice C is positive in tone. "thanks to a complex but hugely positive transition towards universal health care" in choice C runs tangent to the para's theme: health systems in Latin America have been marked by fragmentation and gross unfairness. Choice C cannot connect with the penultimate sentence of the para without a suitable contrast conjunction such as 'yet or 'but". Choice C does not conclude, nor does it complete the paragraph.

Option D: The contrast between the rich and the poor (especially in their access to health care) established in the paragraph best finds a conclusion in choice D. "bankrupted poor families" in choice D links with "having to pay for drugs and even for syringes and sheets" in the penultimate sentence of the para. Choice D is the correct answer. It also mirrors the introduction.

Choice (D)

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. Tyrants always fear art because tyrants want to mystify, while art tends to clarify.
2. This has always been so, but, it may be admitted that in this age, art seems to have rather more enemies than usual.
3. The tyrant persecutes the artist by silencing him or by attempting to degrade or buy him.
4. A good artist is a vehicle of truth, who formulates ideas which would otherwise remain vague, and focuses attention upon facts which can then no longer be ignored.

Sentence 1: Sentence 1 talks about the fear tyrants have for art and the reason behind it.

Sentence 2: Sentence 2 refers to a previous phenomenon and how it is always the case. We need to figure out what 'This' refers to. Sentence 2 also includes a contrasting idea introduced through 'but' about how in the age, art seems to have rather more enemies. The structure of this sentence seems to say that things have always been bad, but now they are more bad than usual.

Sentence 3: Sentence 3 talks about what tyrants do to artists, depicting a negative relationship.

Sentence 4 talks about how a good artist promotes truth.

Sentence 4: While 4 is independent, it is an elaboration of 1, where we are introduced to the idea that art 'clarifies' – ideas which would otherwise remain vague as mentioned in 4. So, 14 is a block. Similarly, 14 leads to 3, 3 being the consequence of 14. 14 is upstream to 3, so, 143 becomes a block. It is easy to place 2, which talks about the bad situation and asserts that things are worse.

Ans: (1432)

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. Helium Hydride was, in fact, synthesised in the laboratory nearly a century ago in 1925.
2. Scientists trying to make sense of the chemistry of the early universe conjectured that 380,000 years after the Big Bang, the temperatures would have dropped to a level when helium would have stabilised as atoms, but hydrogen would still be ionised.

3. To understand Helium Hydride, we need to travel back to the Big Bang which kickstarted our universe 13.8 billion years ago.
4. During this period, they further hypothesised, helium atoms and hydrogen ions would have collided to form the first ever molecular bond of the universe resulting in Helium Hydride.
5. But all attempts to detect it in nature proved inconclusive, casting serious doubts on the hypothesis.

Sentence 1: Sentence 1 talks about the synthesis of Helium Hydride with a positive connector 'in fact'.

Sentence 2: Sentence 2 talks about scientists and their hypothesis about what happened to hydrogen and helium 380,000 years after the Big Bang.

Sentence 3: Sentence 3 connects Helium Hydride and Big Bang, 13.8 billion years ago, without elaborating on it.

Sentence 4: Sentence 4 is about a particular period (referred to as 'this') when helium and hydrogen ions collided. This period is the one in 2 and not in 3 (13.8 billion years ago) because the sentence says 'they further hypothesised'. So, we know 4 follows 2 because the personal pronoun should follow the sentence with the plural noun 'Scientists'. 24 is a pair.

Sentence 5: Sentence 5 starts with a negative connector 'but' followed by negative information – all attempts to detect it in nature proved inconclusive. The 'but' is the perfect contrast between 1 and 5. It was synthesised in the laboratory 'but' couldn't be found in nature.

Since, 24 is a pair and 15 is a pair, the only odd sentence here is 3. While the rest of the hypothesis is about what happened much later after the Big Bang, 3 mentions that Big Bang is important without any mention elsewhere as to why it is the case.

Ans: (3)

Q34. DIRECTIONS for question 34: The following question has a paragraph from which the last sentence has been left incomplete. From the given options, choose the one that completes the paragraph in the most appropriate way.

The word "renaissance" refers not only to the sudden and widespread flourishing of literature and the arts in fifteenth-century Italy but also to the revival of antique culture as a vital force at that time. Long the subject of antiquarian curiosity, ancient artifacts then became sources of potent creativity, firing artists with inspiration and a desire to emulate the achievements of the past. In the remains of ancient Rome, Renaissance artists found stimulating images and ideas that spurred fresh invention. Few Greek or Roman paintings had yet come to light, but an array of more durable three-dimensional objects – such as coins, medals, statuary, and gems – furnished a vast lexicon of classical forms and motifs for direct quotation or imaginative adaptation. These artifacts also

assisted artists in piecing together plausible reconstructions of ancient Rome. Drawing on their own fertile imaginations to fill gaps in the fragmentary record of antiquity, artists developed inventive interpolations of ancient artifacts and literary texts, which in turn spawned entirely new modes of painting and sculpture.

- a) The quintessence of the Renaissance is probably best exemplified by the self-fashioning of Renaissance artists as rivals and heirs to their ancient predecessors.
- b) Ultimately, the achievements of Renaissance artists rivalled, rather than reproduced, the accomplishments of the ancient past, adding a brilliant modern chapter to the history of the classical tradition.
- c) The imagery of ancient relief sculptures inspired painters to aim for greater historical verisimilitude in their reconstructions of the ancient Roman world.
- d) Innovative use of the arch, the vault, and the dome allowed architects to advance beyond the Greeks' post-and-lintel construction to more complex designs commensurate with the Roman predilection for grandeur and massiveness.

Option A: Choice A sounds like the introduction sentence of a text or a paragraph. It cannot complete the given paragraph. Also the penultimate sentence of the paragraph definitely states that artists **developed inventive interpolations of ancient artifacts and literary texts**, which in turn spawned **entirely new modes** of painting and sculpture. So "probably best exemplified by the self-fashioning of Renaissance artists as rivals and heirs to their ancient predecessors" does not sound conclusive enough. Choice A leaves the thoughtflow incomplete.

Option B: The paragraph talks about the importance of the revival of antique culture. ... Ancient artifacts became sources of potent creativity, firing artists with inspiration and a desire to emulate the achievements of the past. ... spurred fresh invention for direct quotation or imaginative adaptation. Artifacts helped artists in piecing together plausible reconstructions of ancient Rome. Now, carefully analyse the penultimate sentence: Drawing on their own fertile imaginations to fill gaps in the fragmentary record of antiquity, artists developed **inventive interpolations of ancient artifacts and literary texts**, which in turn **spawned entirely new modes of painting and sculpture**. Hence choice B best brings the para to a close. "furnished a vast lexicon of classical forms and motifs for direct quotation or imaginative adaptation" in the para points to "the classical tradition" in choice B.

Option C: Choice C would negate the point in the penultimate sentence of the para. "aim for greater historical verisimilitude (or truth) in their reconstructions of the ancient Roman world" contrasts "developed inventive interpolations of ancient artifacts and literary texts, spawned entirely new modes of painting and sculpture" given in the penultimate sentence. Choice C is not the answer.

Option D: Choice D points to a difference between the Greek and the Roman architectural designs. This differentiating factor cannot be a part of this para. The para talks about how artifacts assisted artists in piecing together plausible reconstructions of ancient Rome without differentiating between the style adopted by Greek or Roman architects. Hence choice D is not the answer.

Choice (B)

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

Rakesh measured the temperature (in °C) on each of 14 days, from June 1st to June 14th. He made two tables – Table I and Table II – for noting down the temperatures that he measured. He noted down the temperature measured on June 1st in Table I.

On any subsequent day,

- if the temperature increased as compared to the previous day, he noted down the temperature in Table I itself.
- if the temperature did not increase as compared to the previous day, he noted down the temperature in Table II.

While noting down the temperature on any day, he made the entry in the appropriate table, below the previous entry (if any) that he made in that table.

The tables that he made are provided below:

| Table I | Table II |
|----------------|-----------------|
| 30 | 21 |
| 31 | 25 |
| 34 | 27 |
| 33 | 32 |
| 30 | 29 |
| 22 | 20 |
| 19 | 18 |

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

What is the temperature (in °C) that Rakesh measured on June 6th?

In Table I, Rakesh will record the temperature only if there was an increase in the temperature.

In Table I, we can see that 34 is followed by 33. Hence, these two measurements cannot represent temperatures on consecutive days.

Similarly, in Table I, 33 and 30 cannot be for consecutive days, 28 and 22 cannot be for consecutive days and 22 and 19 cannot be for consecutive days.

If we were to arrange these values in an order, they would be of the form 34 ___ 33 ___ 30 ___ 22 ___ 19. In between each of these values, there can be one or more values. For 22 to be present in Table I, there must be at least one value less than 22 in Table II. And for 19 to be in Table I, there must be at least one value less than 19 in Table II. We can see that in Table II, there are 20 and 18. Hence, these four values must be in the order 20 - 22 - 18 - 19, on four consecutive days.

Also, in Table II, there is a value of 32. This must follow a value from Table I which is greater than 32.

Hence, 32 can be after 34 or 33.

If 32 is after 34, then before these two values, there must be 30, 31, 21, 25 and 27 in any order. Also, of the three values, 21, 25 and 27, in Table II, between 21 and 25 there must be at least one value from Table I; between 25 and 27 there must be at least one value from Table I. However, 30 is temperature of June 1st and only one other value is left from Table I. Hence, this is not possible.

Hence 32 must be after 33. 21, 25 and 27 can be after 30, 31 and 34 in Table I respectively. This will be followed by 33 and 32.

After 32, the next value can be 29 (from Table II) or 30 (from Table I). We also know that the temperature on the last four days are 20, 22, 18 and 19, in that order. Hence, 29 and 30 must be the temperatures on ninth and tenth days.

Since 30 is in Table I, 30 must be the temperature on the June 10th and 29 must be the temperature on the June 9th.

The following table provides the temperature on each day of June:

| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Temp | 30 | 21 | 31 | 25 | 34 | 27 | 33 | 32 | 29 | 30 | 20 | 22 | 18 | 19 |

The temperature that Rakesh measured on June 6th is 27 °C.

Ans: (27)

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

What is the temperature (in °C) that Rakesh measured on June 9th?

In Table I, Rakesh will record the temperature only if there was an increase in the temperature.

In Table I, we can see that 34 is followed by 33. Hence, these two measurements cannot represent temperatures on consecutive days.

Similarly, in Table I, 33 and 30 cannot be for consecutive days, 28 and 22 cannot be for consecutive days and 22 and 19 cannot be for consecutive days.

If we were to arrange these values in an order, they would be of the form 34 ___ 33 ___ 30 ___ 22 ___ 19. In between each of these values, there can be one or more values. For 22 to be present in Table I, there must be at least one value less than 22 in Table II. And for 19 to be in Table I, there must be at least one value less than 19 in Table II. We can see that in Table II, there are 20 and 18. Hence, these four values must be in the order 20 - 22 - 18 - 19, on four consecutive days.

Also, in Table II, there is a value of 32. This must follow a value from Table I which is greater than 32.

Hence, 32 can be after 34 or 33.

If 32 is after 34, then before these two values, there must be 30, 31, 21, 25 and 27 in any order. Also, of the three values, 21, 25 and 27, in Table II, between 21 and 25 there must be at least one value from Table I; between 25 and 27 there must be at least one value from Table I. However, 30 is temperature of June 1st and only one other value is left from Table I. Hence, this is not possible.

Hence 32 must be after 33. 21, 25 and 27 can be after 30, 31 and 34 in Table I respectively. This will be followed by 33 and 32.

After 32, the next value can be 29 (from Table II) or 30 (from Table I). We also know that the temperature on the last four days are 20, 22, 18 and 19, in that order. Hence, 29 and 30 must be the temperatures on ninth and tenth days.

Since 30 is in Table I, 30 must be the temperature on the June 10th and 29 must be the temperature on the June 9th.

The following table provides the temperature on each day of June:

| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Temp | 30 | 21 | 31 | 25 | 34 | 27 | 33 | 32 | 29 | 30 | 20 | 22 | 18 | 19 |

The temperature that Rakesh measured on June 9th is 29 °C.

Ans: (29)

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

What is the maximum difference in temperature (in °C) that Rakesh measured between any two consecutive days?

In Table I, Rakesh will record the temperature only if there was an increase in the temperature.

In Table I, we can see that 34 is followed by 33. Hence, these two measurements cannot represent temperatures on consecutive days.

Similarly, in Table I, 33 and 30 cannot be for consecutive days, 28 and 22 cannot be for consecutive days and 22 and 19 cannot be for consecutive days.

If we were to arrange these values in an order, they would be of the form 34 ___ 33 ___ 30 ___ 22 ___ 19. In between each of these values, there can be one or more values. For 22 to be present in Table I, there must be at least one value less than 22 in Table II. And for 19 to be in Table I, there must be at least one value less than 19 in Table II. We can see that in Table II, there are 20 and 18. Hence, these four values must be in the order 20 - 22 - 18 - 19, on four consecutive days.

Also, in Table II, there is a value of 32. This must follow a value from Table I which is greater than 32.

Hence, 32 can be after 34 or 33.

If 32 is after 34, then before these two values, there must be 30, 31, 21, 25 and 27 in any order. Also, of the three values, 21, 25 and 27, in Table II, between 21 and 25 there must be at least one value from Table I; between 25 and 27 there must be at least one value from Table I. However, 30 is temperature of June 1st and only one other value is left from Table I. Hence, this is not possible.

Hence 32 must be after 33. 21, 25 and 27 can be after 30, 31 and 34 in Table I respectively. This will be followed by 33 and 32.

After 32, the next value can be 29 (from Table II) or 30 (from Table I). We also know that the temperature on the last four days are 20, 22, 18 and 19, in that order. Hence, 29 and 30 must be the temperatures on ninth and tenth days.

Since 30 is in Table I, 30 must be the temperature on the June 10th and 29 must be the temperature on the June 9th.

The following table provides the temperature on each day of June:

| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Temp | 30 | 21 | 31 | 25 | 34 | 27 | 33 | 32 | 29 | 30 | 20 | 22 | 18 | 19 |

The maximum difference in temperature that Rakesh measured between any two consecutive days = 10 °C (for June 2nd and June 3rd; June 10th and June 11th).

Ans: (10)

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

For how many pairs of consecutive days during the given period can it be said that the temperatures measured on the two days are consecutive numbers?

In Table I, Rakesh will record the temperature only if there was an increase in the temperature.

In Table I, we can see that 34 is followed by 33. Hence, these two measurements cannot represent temperatures on consecutive days.

Similarly, in Table I, 33 and 30 cannot be for consecutive days, 28 and 22 cannot be for consecutive days and 22 and 19 cannot be for consecutive days.

If we were to arrange these values in an order, they would be of the form 34 ___ 33 ___ 30 ___ 22 ___ 19. In between each of these values, there can be one or more values. For 22 to be present in Table I, there must be at least one value less than 22 in Table II. And for 19 to be in Table I, there must be at least one value less than 19 in Table II. We can see that in Table II, there are 20 and 18. Hence, these four values must be in the order 20 - 22 - 18 - 19, on four consecutive days.

Also, in Table II, there is a value of 32. This must follow a value from Table I which is greater than 32.

Hence, 32 can be after 34 or 33.

If 32 is after 34, then before these two values, there must be 30, 31, 21, 25 and 27 in any order. Also, of the three values, 21, 25 and 27, in Table II, between 21 and 25 there must be at least one value from Table I; between 25 and 27 there must be at least one value from Table I. However, 30 is temperature of June 1st and only one other value is left from Table I. Hence, this is not possible.

Hence 32 must be after 33. 21, 25 and 27 can be after 30, 31 and 34 in Table I respectively. This will be followed by 33 and 32.

After 32, the next value can be 29 (from Table II) or 30 (from Table I). We also know that the temperature on the last four days are 20, 22, 18 and 19, in that order. Hence, 29 and 30 must be the temperatures on ninth and tenth days.

Since 30 is in Table I, 30 must be the temperature on the June 10th and 29 must be the temperature on the June 9th.

The following table provides the temperature on each day of June:

| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Temp | 30 | 21 | 31 | 25 | 34 | 27 | 33 | 32 | 29 | 30 | 20 | 22 | 18 | 19 |

For three pairs of days, (June 7th, June 8th), (June 9th, June 10th), (June 13th, June 14th), the temperature measured on the two days are consecutive numbers.

Ans: (3)

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

Kiran has four boxes, labelled Box 1 through Box 4, each of which initially has marbles of at most four different colours – Red, Blue, Green and Yellow. He wants to sort all the marbles by their colour such that, after he finishes sorting the marbles, Box 1 will have only Red marbles, Box 2 will have only Blue marbles, Box 3 will have only Green marbles and Box 4 will have only Yellow marbles. He wants to sort the marbles in the following manner:

- First, he takes out all the Blue, Green and Yellow marbles that are in Box 1 and keeps them in Box 2.

- Then, he takes out all the Red, Green and Yellow marbles that are in Box 2 and keeps them in Box 3.
- Then, he takes out all the Red, Blue and Yellow marbles that are in Box 3 and keeps them in Box 4.
- Then, he takes out all the Red, Blue and Green marbles that are in Box 4 and keeps them in Box 1.
- He continues this process until he sorts all the marbles as per his requirement.

Each time that he takes out marbles from a box and keeps them in another box is counted as one redistribution.

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

What is the maximum number of redistributions required for sorting all the marbles as per his requirement?

a) 5

b) 6

c) 7

d) 8

Initially, let there be R_1, R_2, R_3, R_4 red marbles in Box 1 through Box 4 respectively. Similarly, let there be G_1 through G_4 green marbles, B_1 through B_4 blue marbles, Y_1 through Y_4 yellow marbles. Let R, G, B and Y represent the total number of marbles of each colour. The following table provides the number of marbles of each colour in each box after each redistribution:

| | First Redistribution | | | | Second Redistribution | | | |
|--------|----------------------|-----------|-------|-------|-----------------------|-----------|---------------|-------|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Red | R_1 | R_2 | R_3 | R_4 | R_1 | 0 | R_2+R_3 | R_4 |
| Blue | 0 | B_1+B_2 | B_3 | B_4 | 0 | B_1+B_2 | B_3 | B_4 |
| Green | 0 | G_1+G_2 | G_3 | G_4 | 0 | 0 | $G_1+G_2+G_3$ | G_4 |
| Yellow | 0 | Y_1+Y_2 | Y_3 | Y_4 | 0 | 0 | $Y_1+Y_2+Y_3$ | Y_4 |

| | Third Redistribution | | | | Fourth Redistribution | | | |
|--------|----------------------|-----------|---------------|---------------|-----------------------|-----------|---------------|----------|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Red | R_1 | 0 | 0 | $R_2+R_3+R_4$ | R | 0 | 0 | 0 |
| Blue | 0 | B_1+B_2 | 0 | B_3+B_4 | B_3+B_4 | B_1+B_2 | 0 | 0 |
| Green | 0 | 0 | $G_1+G_2+G_3$ | G_4 | G_4 | 0 | $G_1+G_2+G_3$ | 0 |
| Yellow | 0 | 0 | 0 | Y | 0 | 0 | 0 | Y |

| | Fifth Redistribution | | | | Sixth Redistribution | | | |
|--------|----------------------|----------|---------------|----------|----------------------|----------|----------|----------|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Red | R | 0 | 0 | 0 | R | 0 | 0 | 0 |
| Blue | 0 | B | 0 | 0 | 0 | B | 0 | 0 |
| Green | 0 | G_4 | $G_1+G_2+G_3$ | 0 | 0 | 0 | G | 0 |
| Yellow | 0 | 0 | 0 | Y | 0 | 0 | 0 | Y |

The maximum number of redistributions required is 6.

Choice (B)

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

If the number of marbles in Box 1 after the third redistribution is the same as that after the fourth redistribution, how many of the following statements must be true about the marbles in the boxes initially?

- I. The number of Blue marbles in Box 1 is 0.
- II. The number of Blue marbles in Box 3 is 0.
- III. The number of Green marbles in Box 4 is 0.

IV. The number of Yellow marbles in Box 2 is 0.

a) 1

b) 2

c) 3

d) 4

Initially, let there be R_1, R_2, R_3, R_4 red marbles in Box 1 through Box 4 respectively. Similarly, let there be G_1 through G_4 green marbles, B_1 through B_4 blue marbles, Y_1 through Y_4 yellow marbles. Let R, G, B and Y represent the total number of marbles of each colour. The following table provides the number of marbles of each colour in each box after each redistribution:

| | First Redistribution | | | | Second Redistribution | | | |
|--------|----------------------|-----------|-------|-------|-----------------------|-----------|---------------|-------|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Red | R_1 | R_2 | R_3 | R_4 | R_1 | 0 | R_2+R_3 | R_4 |
| Blue | 0 | B_1+B_2 | B_3 | B_4 | 0 | B_1+B_2 | B_3 | B_4 |
| Green | 0 | G_1+G_2 | G_3 | G_4 | 0 | 0 | $G_1+G_2+G_3$ | G_4 |
| Yellow | 0 | Y_1+Y_2 | Y_3 | Y_4 | 0 | 0 | $Y_1+Y_2+Y_3$ | Y_4 |

| | Third Redistribution | | | | Fourth Redistribution | | | |
|--------|----------------------|-----------|---------------|---------------|-----------------------|-----------|---------------|-----|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Red | R_1 | 0 | 0 | $R_2+R_3+R_4$ | R | 0 | 0 | 0 |
| Blue | 0 | B_1+B_2 | 0 | B_3+B_4 | B_3+B_4 | B_1+B_2 | 0 | 0 |
| Green | 0 | 0 | $G_1+G_2+G_3$ | G_4 | G_4 | 0 | $G_1+G_2+G_3$ | 0 |
| Yellow | 0 | 0 | 0 | Y | 0 | 0 | 0 | Y |

| | Fifth Redistribution | | | | Sixth Redistribution | | | |
|--------|----------------------|-------|---------------|-----|----------------------|-----|-----|-----|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Red | R | 0 | 0 | 0 | R | 0 | 0 | 0 |
| Blue | 0 | B | 0 | 0 | 0 | B | 0 | 0 |
| Green | 0 | G_4 | $G_1+G_2+G_3$ | 0 | 0 | 0 | G | 0 |
| Yellow | 0 | 0 | 0 | Y | 0 | 0 | 0 | Y |

The number of marbles in Box 1 after third redistribution = R_1

Number of marbles in Box 1 after fourth redistribution = $R_1 + R_2 + R_3 + R_4 + B_3 + B_4 + G_4$

If these two are equal, then $R_1 = R_3 = R_4 = B_3 = B_4 = G_4 = 0$

Among the given statements, statement II and III must be true.

Choice (B)

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

If Kiran was able to sort all the marbles as per his requirement after exactly five redistributions, which of the following must be true about the marbles in the boxes initially?

- a) There are no Blue marbles in Box 2.
- b) There are no Yellow marbles in Box 1.
- c) There are no Red marbles in Box 3.
- d) There are no Green marbles in Box 4.

Initially, let there be R_1, R_2, R_3, R_4 red marbles in Box 1 through Box 4 respectively. Similarly, let there be G_1 through G_4 green marbles, B_1 through B_4 blue marbles, Y_1 through Y_4 yellow marbles. Let R, G, B and Y represent the total number of marbles of each colour. The following table provides the number of marbles of each colour in each box after each redistribution:

| | First Redistribution | | | | Second Redistribution | | | |
|--------|----------------------|-----------|-------|-------|-----------------------|-----------|---------------|-------|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Red | R_1 | R_2 | R_3 | R_4 | R_1 | 0 | R_2+R_3 | R_4 |
| Blue | 0 | B_1+B_2 | B_3 | B_4 | 0 | B_1+B_2 | B_3 | B_4 |
| Green | 0 | G_1+G_2 | G_3 | G_4 | 0 | 0 | $G_1+G_2+G_3$ | G_4 |
| Yellow | 0 | Y_1+Y_2 | Y_3 | Y_4 | 0 | 0 | $Y_1+Y_2+Y_3$ | Y_4 |

| | Third Redistribution | | | | Fourth Redistribution | | | |
|--------|----------------------|-----------|---------------|---------------|-----------------------|-----------|---------------|-----|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Red | R_1 | 0 | 0 | $R_2+R_3+R_4$ | R | 0 | 0 | 0 |
| Blue | 0 | B_1+B_2 | 0 | B_3+B_4 | B_3+B_4 | B_1+B_2 | 0 | 0 |
| Green | 0 | 0 | $G_1+G_2+G_3$ | G_4 | G_4 | 0 | $G_1+G_2+G_3$ | 0 |
| Yellow | 0 | 0 | 0 | Y | 0 | 0 | 0 | Y |

| | Fifth Redistribution | | | | Sixth Redistribution | | | |
|--------|----------------------|-------|---------------|-----|----------------------|-----|-----|-----|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Red | R | 0 | 0 | 0 | R | 0 | 0 | 0 |
| Blue | 0 | B | 0 | 0 | 0 | B | 0 | 0 |
| Green | 0 | G_4 | $G_1+G_2+G_3$ | 0 | 0 | 0 | G | 0 |
| Yellow | 0 | 0 | 0 | Y | 0 | 0 | 0 | Y |

If Kiran was able to sort everything after five redistributions, then G_4 must be 0.

Choice (D)

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

If the total number of marbles in Box 3 after the second redistribution is the same as the total number of marbles in Box 4 after the third redistribution, then the total number of marbles initially in Box 4 is equal to

- a) 0.
- b) the total number of marbles initially in Box 3.
- c) the number of Green marbles initially in Box 1, Box 2 and Box 3 combined.
- d) the number of Yellow marbles initially in Box 1, Box 2 and Box 3 combined.

Initially, let there be R_1, R_2, R_3, R_4 red marbles in Box 1 through Box 4 respectively. Similarly, let there be G_1 through G_4 green marbles, B_1 through B_4 blue marbles, Y_1 through Y_4 yellow marbles. Let R, G, B and Y represent the total number of marbles of each colour. The following table provides the number of marbles of each colour in each box after each redistribution:

| | First Redistribution | | | | Second Redistribution | | | |
|--------|----------------------|-----------|-------|-------|-----------------------|-----------|---------------|-------|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Red | R_1 | R_2 | R_3 | R_4 | R_1 | 0 | R_2+R_3 | R_4 |
| Blue | 0 | B_1+B_2 | B_3 | B_4 | 0 | B_1+B_2 | B_3 | B_4 |
| Green | 0 | G_1+G_2 | G_3 | G_4 | 0 | 0 | $G_1+G_2+G_3$ | G_4 |
| Yellow | 0 | Y_1+Y_2 | Y_3 | Y_4 | 0 | 0 | $Y_1+Y_2+Y_3$ | Y_4 |

| | Third Redistribution | | | | Fourth Redistribution | | | |
|--------|----------------------|-----------|---------------|---------------|-----------------------|-----------|---------------|-----|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Red | R_1 | 0 | 0 | $R_2+R_3+R_4$ | R | 0 | 0 | 0 |
| Blue | 0 | B_1+B_2 | 0 | B_3+B_4 | B_3+B_4 | B_1+B_2 | 0 | 0 |
| Green | 0 | 0 | $G_1+G_2+G_3$ | G_4 | G_4 | 0 | $G_1+G_2+G_3$ | 0 |
| Yellow | 0 | 0 | 0 | Y | 0 | 0 | 0 | Y |

| | Fifth Redistribution | | | | Sixth Redistribution | | | |
|--------|----------------------|-------|---------------|-----|----------------------|-----|-----|-----|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Red | R | 0 | 0 | 0 | R | 0 | 0 | 0 |
| Blue | 0 | B | 0 | 0 | 0 | B | 0 | 0 |
| Green | 0 | G_4 | $G_1+G_2+G_3$ | 0 | 0 | 0 | G | 0 |
| Yellow | 0 | 0 | 0 | Y | 0 | 0 | 0 | Y |

Total number of marbles in Box 3 after second redistribution = $R_2 + R_3 + B_3 + G_1 + G_2 + G_3 + Y_1 + Y_2 + Y_3$

Total number of marbles in Box 4 after third redistribution = $R_2 + R_3 + R_4 + B_3 + B_4 + G_4 + Y_1 + Y_2 + Y_3 + Y_4$

If these two are equal, then $G_1 + G_2 + G_3 = R_4 + B_4 + G_4 + Y_4$

Hence, the number of marbles initially in Box 4 will be equal to the number of Green marbles in Box 1, 2 and 3 combined.

Choice (C)

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

Seven persons – A through G – each of a different height, are standing in a line, from left to right, all facing the same direction. They are standing such that there are exactly three persons for each of whom, there are two persons standing adjacent to him, with both of them being taller than he is.

It is also known that

- i. A, who is not the shortest, is standing adjacent to the third tallest person in the group.
- ii. B, who is the fourth tallest person, is standing adjacent to the tallest person, but is not standing adjacent to the second tallest person.
- iii. D, who is not standing at any end, is standing four places to the left of the second tallest person.
- iv. F is standing to the immediate left of B.
- v. there are at least three persons who are both taller than C and shorter than E.

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

Who is the sixth tallest person?

- a) D
- b) C
- c) A
- d) G

Let 1 to 7 represent the positions of the persons along the line such that 1 represents the position at the extreme left and 7 represents the position at the extreme right.

Given there are seven persons, and for three persons, both the persons standing adjacent to each of them are taller than he is. These three persons cannot be at any extreme end. Further, no two of these three persons can be next to each other (if they were, then for one of them, the given condition will not be satisfied). Hence, the three persons must be in alternate positions, i.e., at positions 2, 4 and 6. Further, these three persons cannot be the tallest or the second tallest (since there must be at least two persons taller than them).

The four persons in positions 1, 3, 5 and 7 will be taller than the three persons in the alternate positions. These four persons cannot be the shortest (since they have to be taller than the three persons adjacent to them).

From (iii), D is standing four places to the left of the second tallest person. The second tallest person can only be at 5 or 7 (for D to be standing four places to his left). However, D is not standing at any end. Hence, the second tallest person cannot be at 5. Hence, the second tallest person must be at 7 and D must be at 3.

From (ii), B is standing adjacent to the tallest person. Any person who is standing adjacent to the tallest person will be among the three who are shorter than both their neighbours. Hence, B can be at 2 or 4 or 6. However, from (ii), B is not standing adjacent to the second tallest person. Hence, B cannot be at position 6. From (iv), F is to the immediate left of B. Hence, B cannot be at 4 (because D will be at his immediate left). Hence, B must be at 2. From (iv), F must be at 1.

Given that B is the fourth tallest. The two persons adjacent to him must be the tallest or second tallest or the third tallest. Since the second tallest is not adjacent to B, the two persons standing adjacent to B must be the tallest and the third tallest. Hence, F and D must be the tallest and the third tallest, in any order.

From (i), A is standing adjacent to the third tallest person in the group. If F is the third tallest, A cannot be standing adjacent to him. Hence, D must be the third tallest and A must be standing to the immediate right of D. F must be the tallest person.

In positions 4, 5 and 6, there must be the fifth, sixth and seventh tallest persons, in any order. Further, for the positions 4 and 6, the two persons standing adjacent to these positions must be taller than the persons in 4 and 6. If the fifth tallest person is standing in position 4 or 6, then in position 5 there must be the sixth or the seventh tallest. But this is not possible because the two persons standing adjacent to the fifth tallest person will not be taller than him. Hence, the fifth tallest person cannot be at 4 or 6. The fifth tallest person will be in position 5. In positions 4 and 6, the sixth and seventh tallest persons must be present.

From (i), A is not the shortest person. Hence, A, at position 4, must be the sixth tallest. In position 6, there must be the shortest person.

From (v), at least three persons are taller than C and shorter than E. Hence, C can be fifth tallest or seventh tallest. If C is fifth tallest, from (v), E must be the tallest. However, this is not possible. Hence, C must be the seventh tallest. E must be the second tallest. G must be the fifth tallest.

The following table provides the order in which the seven persons are standing and their relative heights (with 1 representing the tallest and 7 representing the shortest person):

| Order | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|--------|---|---|---|---|---|---|---|
| Person | F | B | D | A | G | C | E |
| Height | 1 | 4 | 3 | 6 | 5 | 7 | 2 |

A is the sixth tallest person.

Choice (C)

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

Who among the following is standing two places away from the third tallest person?

a) B

b) C

c) G

d) E

Let 1 to 7 represent the positions of the persons along the line such that 1 represents the position at the extreme left and 7 represents the position at the extreme right.

Given there are seven persons, and for three persons, both the persons standing adjacent to each of them are taller than he is. These three persons cannot be at any extreme end. Further, no two of these three persons can be next to each other (if they were, then for one of them, the given condition will not be satisfied). Hence, the three persons must be in alternate positions, i.e., at positions 2, 4 and 6. Further, these three persons cannot be the tallest or the second tallest (since there must be at least two persons taller than them).

The four persons in positions 1, 3, 5 and 7 will be taller than the three persons in the alternate positions. These four persons cannot be the shortest (since they have to be taller than the three persons adjacent to them).

From (iii), D is standing four places to the left of the second tallest person. The second tallest person can only be at 5 or 7 (for D to be standing four places to his left). However, D is not standing at any end. Hence, the second tallest person cannot be at 5. Hence, the second tallest person must be at 7 and D must be at 3.

From (ii), B is standing adjacent to the tallest person. Any person who is standing adjacent to the tallest person will be among the three who are shorter than both their neighbours. Hence, B can be at 2 or 4 or 6. However, from (ii), B is not standing adjacent to the second tallest person. Hence, B cannot be at position 6. From (iv), F is to the immediate left of B. Hence, B cannot be at 4 (because D will be at his immediate left). Hence, B must be at 2. From (iv), F must be at 1.

Given that B is the fourth tallest. The two persons adjacent to him must be the tallest or second tallest or the third tallest. Since the second tallest is not adjacent to B, the two persons standing adjacent to B must be the tallest and the third tallest. Hence, F and D must be the tallest and the third tallest, in any order.

From (i), A is standing adjacent to the third tallest person in the group. If F is the third tallest, A cannot be standing adjacent to him. Hence, D must be the third tallest and A must be standing to the immediate right of D. F must be the tallest person.

In positions 4, 5 and 6, there must be the fifth, sixth and seventh tallest persons, in any order. Further, for the positions 4 and 6, the two persons standing adjacent to these positions must be taller than the persons in 4 and 6. If the fifth tallest person is standing in position 4 or 6, then in position 5 there must be the sixth or the seventh tallest. But this is not possible because the two persons standing adjacent to the fifth tallest person will not be taller than him. Hence, the fifth tallest person cannot be at 4 or 6. The fifth tallest person will be in position 5. In positions 4 and 6, the sixth and seventh tallest persons must be present.

From (i), A is not the shortest person. Hence, A, at position 4, must be the sixth tallest. In position 6, there must be the shortest person.

From (v), at least three persons are taller than C and shorter than E. Hence, C can be fifth tallest or seventh tallest. If C is fifth tallest, from (v), E must be the tallest. However, this is not possible. Hence, C must be the seventh tallest. E must be the second tallest. G must be the fifth tallest.

The following table provides the order in which the seven persons are standing and their relative heights (with 1 representing the tallest and 7 representing the shortest person):

| Order | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|--------|---|---|---|---|---|---|---|
| Person | F | B | D | A | G | C | E |
| Height | 1 | 4 | 3 | 6 | 5 | 7 | 2 |

F and G are standing two places away from the third tallest person (i.e., D). Among the two, G is given in the options.

Choice (C)

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

If the seven persons are ranked from 1 to 7 in the ascending order of their heights, how many pairs of persons standing adjacent to each other have consecutive ranks?

- a) 0
- b) 1
- c) 3
- d) 2

Let 1 to 7 represent the positions of the persons along the line such that 1 represents the position at the extreme left and 7 represents the position at the extreme right.

Given there are seven persons, and for three persons, both the persons standing adjacent to each of them are taller than he is. These three persons cannot be at any extreme end. Further, no two of these three persons can be next to each other (if they were, then for one of them, the given condition will not be satisfied). Hence, the three persons must be in alternate positions, i.e., at positions 2, 4 and 6. Further, these three persons cannot be the tallest or the second tallest (since there must be at least two persons taller than them).

The four persons in positions 1, 3, 5 and 7 will be taller than the three persons in the alternate positions. These four persons cannot be the shortest (since they have to be taller than the three persons adjacent to them).

From (iii), D is standing four places to the left of the second tallest person. The second tallest person can only be at 5 or 7 (for D to be standing four places to his left). However, D is not standing at any end. Hence, the second tallest person cannot be at 5. Hence, the second tallest person must be at 7 and D must be at 3.

From (ii), B is standing adjacent to the tallest person. Any person who is standing adjacent to the tallest person will be among the three who are shorter than both their neighbours. Hence, B can be at 2 or 4 or 6. However, from (ii), B is not standing adjacent to the second tallest person. Hence, B cannot be at position 6. From (iv), F is to the immediate left of B. Hence, B cannot be at 4 (because D will be at his immediate left). Hence, B must be at 2. From (iv), F must be at 1.

Given that B is the fourth tallest. The two persons adjacent to him must be the tallest or second tallest or the third tallest. Since the second tallest is not adjacent to B, the two persons standing adjacent to B must be the tallest and the third tallest. Hence, F and D must be the tallest and the third tallest, in any order.

From (i), A is standing adjacent to the third tallest person in the group. If F is the third tallest, A cannot be standing adjacent to him. Hence, D must be the third tallest and A must be standing to the immediate right of D. F must be the tallest person.

In positions 4, 5 and 6, there must be the fifth, sixth and seventh tallest persons, in any order. Further, for the positions 4 and 6, the two persons standing adjacent to these positions must be taller than the persons in 4 and 6. If the fifth tallest person is standing in position 4 or 6, then in position 5 there must be the sixth or the seventh tallest. But this is not possible because the two persons standing adjacent to the fifth tallest person will not be taller than him. Hence, the fifth tallest person cannot be at 4 or 6. The fifth tallest person will be in position 5. In positions 4 and 6, the sixth and seventh tallest persons must be present.

From (i), A is not the shortest person. Hence, A, at position 4, must be the sixth tallest. In position 6, there must be the shortest person.

From (v), at least three persons are taller than C and shorter than E. Hence, C can be fifth tallest or seventh tallest. If C is fifth tallest, from (v), E must be the tallest. However, this is not possible. Hence, C must be the seventh tallest. E must be the second tallest. G must be the fifth tallest.

The following table provides the order in which the seven persons are standing and their relative heights (with 1 representing the tallest and 7 representing the shortest person):

| Order | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|--------|---|---|---|---|---|---|---|
| Person | F | B | D | A | G | C | E |
| Height | 1 | 4 | 3 | 6 | 5 | 7 | 2 |

There are two pairs of persons satisfying the given criteria: (B, D) and (A, G).

Choice (D)

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

If the seven persons are ranked from 1 to 7 in the ascending order of their heights, what is the maximum difference between the ranks of any two persons standing adjacent to each other?

- a) 5
- b) 3
- c) 4
- d) 6

Let 1 to 7 represent the positions of the persons along the line such that 1 represents the position at the extreme left and 7 represents the position at the extreme right.

Given there are seven persons, and for three persons, both the persons standing adjacent to each of them are taller than he is. These three persons cannot be at any extreme end. Further, no two of these three persons can be next to each other (if they were, then for one of them, the given condition will not be satisfied). Hence, the three persons must be in alternate positions, i.e., at positions 2, 4 and 6. Further, these three persons cannot be the tallest or the second tallest (since there must be at least two persons taller than them).

The four persons in positions 1, 3, 5 and 7 will be taller than the three persons in the alternate positions. These four persons cannot be the shortest (since they have to be taller than the three persons adjacent to them).

From (iii), D is standing four places to the left of the second tallest person. The second tallest person can only be at 5 or 7 (for D to be standing four places to his left). However, D is not standing at any end. Hence, the second tallest person cannot be at 5. Hence, the second tallest person must be at 7 and D must be at 3.

From (ii), B is standing adjacent to the tallest person. Any person who is standing adjacent to the tallest person will be among the three who are shorter than both their neighbours. Hence, B can be at 2 or 4 or 6. However, from (ii), B is not standing adjacent to the second tallest person. Hence, B cannot be at position 6. From (iv), F is to the immediate left of B. Hence, B cannot be at 4 (because D will be at his immediate left). Hence, B must be at 2. From (iv), F must be at 1.

Given that B is the fourth tallest. The two persons adjacent to him must be the tallest or second tallest or the third tallest. Since the second tallest is not adjacent to B, the two persons standing adjacent to B must be the tallest and the third tallest. Hence, F and D must be the tallest and the third tallest, in any order.

From (i), A is standing adjacent to the third tallest person in the group. If F is the third tallest, A cannot be standing adjacent to him. Hence, D must be the third tallest and A must be standing to the immediate right of D. F must be the tallest person.

In positions 4, 5 and 6, there must be the fifth, sixth and seventh tallest persons, in any order. Further, for the positions 4 and 6, the two persons standing adjacent to these positions must be taller than the persons in 4 and 6. If the fifth tallest person is standing in position 4 or 6, then in position 5 there must be the sixth or the seventh tallest. But this is not possible because the two persons standing adjacent to the fifth tallest person will not be taller than him. Hence, the fifth tallest person cannot be at 4 or 6. The fifth tallest person will be in position 5. In positions 4 and 6, the sixth and seventh tallest persons must be present.

From (i), A is not the shortest person. Hence, A, at position 4, must be the sixth tallest. In position 6, there must be the shortest person.

From (v), at least three persons are taller than C and shorter than E. Hence, C can be fifth tallest or seventh tallest. If C is fifth tallest, from (v), E must be the tallest. However, this is not possible. Hence, C must be the seventh tallest. E must be the second tallest. G must be the fifth tallest.

The following table provides the order in which the seven persons are standing and their relative heights (with 1 representing the tallest and 7 representing the shortest person):

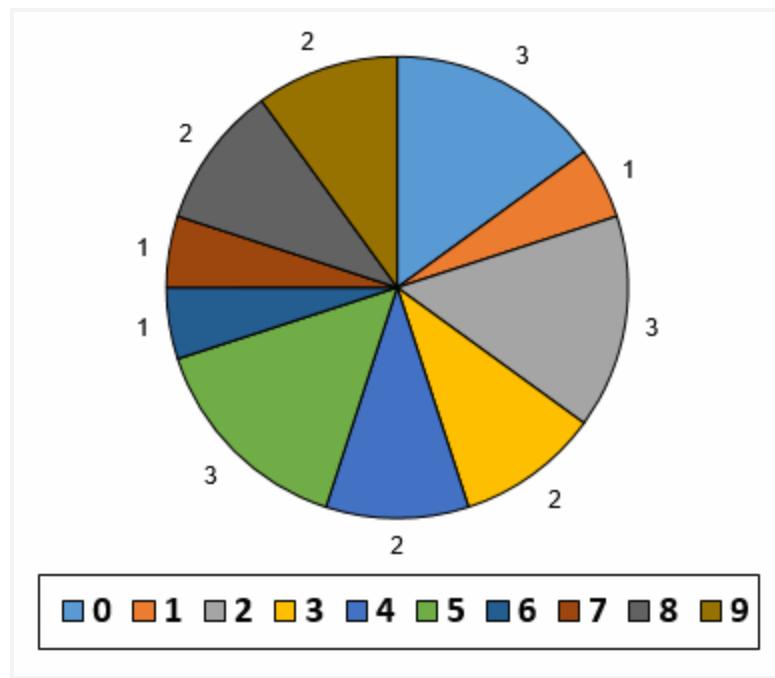
| Order | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|--------|---|---|---|---|---|---|---|
| Person | F | B | D | A | G | C | E |
| Height | 1 | 4 | 3 | 6 | 5 | 7 | 2 |

The maximum difference is for C and E, which is equal to 5.

Choice (A)

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

The following pie chart provides the number of times each digit (from 0 to 9) occurs between the 121st digit and the 140th digit (both inclusive) after the decimal point in the expansion of the constant, π :



It is also known that

- i. the 125th and the 126th digits are the same; the 122nd and the 129th digits are the same; the 130th, the 131st and the 133rd digits are the same and the 135th, the 136th and the 140th digits are the same.
- ii. there are exactly nine digits between the two times that 8 appears.
- iii. neither the 128th digit nor the 123rd digit is 6, while the 123rd digit is not 0.
- iv. the 121st digit and the 132nd digits are both 0, while the 138th digit is 8 less than the 129th digit.
- v. the 137th digit is the sum of the two digits adjacent to it (i.e., on either side of it), while 1, 7 and 2 appear one after the other, in that order, exactly once.

All the questions that follow are related only to the 121st till the 140th digits after the decimal point in the expansion of π .

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

What is the maximum possible difference between any two consecutive digits?

- a) 9
- b) 8
- c) 7
- d) 6

Given that the 130th, 131st and 133rd digits are the same, while the 135th, 136th and 140th digits are the same. From the pie chart, we can see that only 3 numbers appear thrice – 0, 2 and 5. Hence, two of these three numbers must occur in these places. From (iv), the 121st and 132nd digits are both 0. Hence, the 130th, 131st, 133rd digits and the 135th, 136th and 140th digits must be 2 and 5 in any order.

From (iv), the 138th digit must be 1 and the 129th digit must be 9. From (i), the 122nd digit must also be 9.

From (v), the 137th digit can be 6 or 3 (since the 138th digit is 1 and the 136th digit can only be 2 or 5).

Also, from (v), the numbers 1, 7 and 2 appear one after the other. Since there is only one 1 and this is the 138th digit, the 139th digit must be 7 and the 140th digit must be 2. From (i), the 135th, 136th and 140th digits are same. Hence, all these three digits must be 2. From (v), the 137th digit must be 3.

The 130th, 131st and 133rd digits must be 5.

From (i), the 125th and 126th digits are the same. The only digits that appear twice are 3, 4, 8 and 9. Of these we know the position of 9. We also know that the 137th digit is 3. Hence, neither 9 nor 3 can be the 125th or 126th digit. Among the digits that appear thrice (i.e., 0, 5 and 2), we do not know the position of only one 0. Hence, the only possibilities for the 125th and 126th digits are 4 and 8.

From (ii), 8 cannot be the 125th or 126th digit. Hence, 4 must be in these places.

Also, there are nine digits between the two 8's. Hence, the 124th and the 134th digits must be 8. From (iii), 6 must be the 127th digit and 0 must be the 128th digit.

The 123rd digit must be 3.

The following table provides the digit place (with 1 to 20 representing the 121st to 140th digits) and the value:

| Place | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|-------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| Value | 0 | 9 | 3 | 8 | 4 | 4 | 6 | 0 | 9 | 5 | 5 | 0 | 5 | 8 | 2 | 2 | 3 | 1 | 7 | 2 |

The maximum possible difference between any two consecutive digits = 9 (between the 121st and 122nd digits).
Choice (A)

Q14. DIRECTIONS for questions 13 to 16: Select the correct alternative from the given choices.
Which of the following digits does not appear twice in succession?

a) 4

b) 5

c) 2

d) 0

Given that the 130th, 131st and 133rd digits are the same, while the 135th, 136th and 140th digits are the same. From the pie chart, we can see that only 3 numbers appear thrice – 0, 2 and 5. Hence, two of these three numbers must be occur in these places. From (iv), the 121st and 132nd digits are both 0. Hence, the 130th, 131st, 133rd digits and the 135th, 136th and 140th digits must be 2 and 5 in any order.

From (iv), the 138th digit must be 1 and the 129th digit must be 9. From (i), the 122nd digit must also be 9.

From (v), the 137th digit can be 6 or 3 (since the 138th digit is 1 and the 136th digit can only be 2 or 5).

Also, from (v), the numbers 1, 7 and 2 appear one after the other. Since there is only one 1 and this is the 138th digit, the 139th digit must be 7 and the 140th digit must be 2. From (i), the 135th, 136th and 140th digits are same. Hence, all these three digits must be 2. From (v), the 137th digit must be 3.

The 130th, 131st and 133rd digits must be 5.

From (i), the 125th and 126th digits are the same. The only digits that appear twice are 3, 4, 8 and 9. Of these we know the position of 9. We also know that the 137th digit is 3. Hence, neither 9 nor 3 can be the 125th or 126th digit. Among the digits that appear thrice (i.e., 0, 5 and 2), we do not know the position of only one 0. Hence, the only possibilities for the 125th and 126th digits are 4 and 8.

From (ii), 8 cannot be the 125th or 126th digit. Hence, 4 must be in these places.

Also, there are nine digits between the two 8's. Hence, the 124th and the 134th digits must be 8. From (iii), 6 must be the 127th digit and 0 must be the 128th digit.

The 123rd digit must be 3.

The following table provides the digit place (with 1 to 20 representing the 121st to 140th digits) and the value:

| Place | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|-------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| Value | 0 | 9 | 3 | 8 | 4 | 4 | 6 | 0 | 9 | 5 | 5 | 0 | 5 | 8 | 2 | 2 | 3 | 1 | 7 | 2 |

0 does not appear twice one after the other.

Choice (D)

Q15. DIRECTIONS for questions 13 to 16: Select the correct alternative from the given choices.
What is the 127th digit?

- a) 0
- b) 6
- c) 3
- d) 8

Given that the 130th, 131st and 133rd digits are the same, while the 135th, 136th and 140th digits are the same. From the pie chart, we can see that only 3 numbers appear thrice – 0, 2 and 5. Hence, two of these three numbers must occur in these places. From (iv), the 121st and 132nd digits are both 0. Hence, the 130th, 131st, 133rd digits and the 135th, 136th and 140th digits must be 2 and 5 in any order.

From (iv), the 138th digit must be 1 and the 129th digit must be 9. From (i), the 122nd digit must also be 9.

From (v), the 137th digit can be 6 or 3 (since the 138th digit is 1 and the 136th digit can only be 2 or 5).

Also, from (v), the numbers 1, 7 and 2 appear one after the other. Since there is only one 1 and this is the 138th digit, the 139th digit must be 7 and the 140th digit must be 2.

From (i), the 135th, 136th and 140th digits are same. Hence, all these three digits must be 2. From (v), the 137th digit must be 3.

The 130th, 131st and 133rd digits must be 5.

From (i), the 125th and 126th digits are the same. The only digits that appear twice are 3, 4, 8 and 9. Of these we know the position of 9. We also know that the 137th digit is 3. Hence, neither 9 nor 3 can be the 125th or 126th digit. Among the digits that appear thrice (i.e., 0, 5 and 2), we do not know the position of only one 0. Hence, the only possibilities for the 125th and 126th digits are 4 and 8.

From (ii), 8 cannot be the 125th or 126th digit. Hence, 4 must be in these places.

Also, there are nine digits between the two 8's. Hence, the 124th and the 134th digits must be 8. From (iii), 6 must be the 127th digit and 0 must be the 128th digit.

The 123rd digit must be 3.

The following table provides the digit place (with 1 to 20 representing the 121st to 140th digits) and the value:

| Place | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|-------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| Value | 0 | 9 | 3 | 8 | 4 | 4 | 6 | 0 | 9 | 5 | 5 | 0 | 5 | 8 | 2 | 2 | 3 | 1 | 7 | 2 |

The 127th digit is 6.

Choice (B)

Q16. DIRECTIONS for questions 13 to 16: Select the correct alternative from the given choices. What is the sum of all the digits in even positions (i.e., the 122nd, 124th, 126th, ... 140th digits)?

a) 33

b) 43

c) 39

d) 36

Given that the 130th, 131st and 133rd digits are the same, while the 135th, 136th and 140th digits are the same. From the pie chart, we can see that only 3 numbers appear thrice – 0, 2 and 5. Hence, two of these three numbers must be occur in these places. From (iv), the 121st and 132nd digits are both 0. Hence, the 130th, 131st, 133rd digits and the 135th, 136th and 140th digits must be 2 and 5 in any order.

From (iv), the 138th digit must be 1 and the 129th digit must be 9. From (i), the 122nd digit must also be 9.

From (v), the 137th digit can be 6 or 3 (since the 138th digit is 1 and the 136th digit can only be 2 or 5).

Also, from (v), the numbers 1, 7 and 2 appear one after the other. Since there is only one 1 and this is the 138th digit, the 139th digit must be 7 and the 140th digit must be 2. From (i), the 135th, 136th and 140th digits are same. Hence, all these three digits must be 2. From (v), the 137th digit must be 3.

The 130th, 131st and 133rd digits must be 5.

From (i), the 125th and 126th digits are the same. The only digits that appear twice are 3, 4, 8 and 9. Of these we know the position of 9. We also know that the 137th digit is 3. Hence, neither 9 nor 3 can be the 125th or 126th digit. Among the digits that appear thrice (i.e., 0, 5 and 2), we do not know the position of only one 0. Hence, the only possibilities for the 125th and 126th digits are 4 and 8.

From (ii), 8 cannot be the 125th or 126th digit. Hence, 4 must be in these places.

Also, there are nine digits between the two 8's. Hence, the 124th and the 134th digits must be 8. From (iii), 6 must be the 127th digit and 0 must be the 128th digit.

The 123rd digit must be 3.

The following table provides the digit place (with 1 to 20 representing the 121st to 140th digits) and the value:

| Place | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|-------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| Value | 0 | 9 | 3 | 8 | 4 | 4 | 6 | 0 | 9 | 5 | 5 | 0 | 5 | 8 | 2 | 2 | 3 | 1 | 7 | 2 |

The sum of all the digits in even positions = $9 + 8 + 4 + 0 + 5 + 0 + 8 + 2 + 1 + 2 = 39$
Choice (C)

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

A company manufactures and sells bolts in the following manner: In any year, the company manufactures bolts only during the first week of January and the first week of May. The company sells these bolts throughout the year.

The company did not have any bolts in its inventory at the beginning of 2018 and manufactured 18000 bolts in January and 20000 bolts in May. The following table provides the number of bolts that

the company sold in each month from January to August in 2018 as a percentage of the number of bolts that remained unsold at the end of that month:

| Month | Percentage |
|----------|-------------------|
| January | 20% |
| February | $11\frac{1}{9}\%$ |
| March | 35% |
| April | 150% |
| May | 50% |
| June | $33\frac{1}{3}\%$ |
| July | 20% |
| August | $33\frac{1}{3}\%$ |

Q17.

DIRECTIONS for questions 17 to 20: Select the correct alternative from the given choices.

During the given period, in which month was the fifth highest number of bolts sold?

- a) January
- b) March
- c) August
- d) June

Let the number of bolts that the company sold in January be x .
The number of bolts in the inventory at the end of January = $18000 - x$
The company sold 3000 bolts in January.

$$\text{Hence, } \frac{x}{18000-x} = 0.2 \Rightarrow x = 3000.$$

$$\text{Similarly, in February, } \frac{x}{15000-x} = 11\frac{1}{9}\% = \frac{1}{9} \Rightarrow x = 1500$$

$$\text{In March, } \frac{x}{13500-x} = 0.35 \Rightarrow x = 3500$$

$$\text{In April, } \frac{x}{10000-x} = 1.5 \Rightarrow x = 6000$$

Till April, a total of 14000 bolts were sold and 4000 bolts would have remained unsold.
In May, an additional 20000 bolts were manufactured. Hence, after this was manufactured, the company would have 24000 bolts in inventory.

$$\text{In May, } \frac{x}{24000-x} = 0.5 \Rightarrow x = 8000$$

$$\text{In June, } \frac{x}{16000-x} = \frac{1}{3} \Rightarrow x = 4000$$

$$\text{In July, } \frac{x}{12000-x} = 0.2 \Rightarrow x = 2000$$

$$\text{In August, } \frac{x}{10000-x} = \frac{1}{3} \Rightarrow x = 2500$$

Hence, a total of 16500 bolts were sold during this period and 7500 bolts would have remained in the inventory.

The fifth highest number of bolts were sold in January.

Choice (A)

Q18.

DIRECTIONS for questions 17 to 20: Select the correct alternative from the given choices.

What is the total number of bolts sold during the given period?

- a) 25500
- b) 28000
- c) 32500
- d) 30500

Let the number of bolts that the company sold in January be x .

The number of bolts in the inventory at the end of January = $18000 - x$

The company sold 3000 bolts in January.

$$\text{Hence, } \frac{x}{18000-x} = 0.2 \Rightarrow x = 3000.$$

$$\text{Similarly, in February, } \frac{x}{15000-x} = 11\frac{1}{9}\% = \frac{1}{9} \Rightarrow x = 1500$$

$$\text{In March, } \frac{x}{13500-x} = 0.35 \Rightarrow x = 3500$$

$$\text{In April, } \frac{x}{10000-x} = 1.5 \Rightarrow x = 6000$$

Till April, a total of 14000 bolts were sold and 4000 bolts would have remained unsold.

In May, an additional 20000 bolts were manufactured. Hence, after this was manufactured, the company would have 24000 bolts in inventory.

$$\text{In May, } \frac{x}{24000-x} = 0.5 \Rightarrow x = 8000$$

$$\text{In June, } \frac{x}{16000-x} = \frac{1}{3} \Rightarrow x = 4000$$

$$\text{In July, } \frac{x}{12000-x} = 0.2 \Rightarrow x = 2000$$

$$\text{In August, } \frac{x}{10000-x} = \frac{1}{3} \Rightarrow x = 2500$$

Hence, a total of 16500 bolts were sold during this period and 7500 bolts would have remained in the inventory.

The total number of bolts sold during the given period = $14000 + 16500 = 30500$

Choice (D)

Q19.

DIRECTIONS for questions 17 to 20: Select the correct alternative from the given choices.

For which of the following months was the number of bolts sold during the month as a percentage of that sold in the previous month the highest?

- a) April
- b) March
- c) August
- d) May

Let the number of bolts that the company sold in January be x .

The number of bolts in the inventory at the end of January = $18000 - x$

The company sold 3000 bolts in January.

$$\text{Hence, } \frac{x}{18000-x} = 0.2 \Rightarrow x = 3000.$$

$$\text{Similarly, in February, } \frac{x}{15000-x} = 11\frac{1}{9}\% = \frac{1}{9} \Rightarrow x = 1500$$

$$\text{In March, } \frac{x}{13500-x} = 0.35 \Rightarrow x = 3500$$

$$\text{In April, } \frac{x}{10000-x} = 1.5 \Rightarrow x = 6000$$

Till April, a total of 14000 bolts were sold and 4000 bolts would have remained unsold.

In May, an additional 20000 bolts were manufactured. Hence, after this was manufactured, the company would have 24000 bolts in inventory.

$$\text{In May, } \frac{x}{24000-x} = 0.5 \Rightarrow x = 8000$$

$$\text{In June, } \frac{x}{16000-x} = \frac{1}{3} \Rightarrow x = 4000$$

$$\text{In July, } \frac{x}{12000-x} = 0.2 \Rightarrow x = 2000$$

$$\text{In August, } \frac{x}{10000-x} = \frac{1}{3} \Rightarrow x = 2500$$

Hence, a total of 16500 bolts were sold during this period and 7500 bolts would have remained in the inventory.

The number of bolts sold during that month as a percentage of that sold in the previous month the highest for the month of March. Choice (B)

Q20.

DIRECTIONS for questions 17 to 20: Select the correct alternative from the given choices.

If the company first sells all the bolts manufactured in January before it sells any bolt manufactured in May, in which month would it have sold the last bolt manufactured in January?

- a) April
- b) May
- c) June
- d) July

Let the number of bolts that the company sold in January be x .

The number of bolts in the inventory at the end of January = $18000 - x$

The company sold 3000 bolts in January.

$$\text{Hence, } \frac{x}{18000-x} = 0.2 \Rightarrow x = 3000.$$

$$\text{Similarly, in February, } \frac{x}{15000-x} = 11\frac{1}{9}\% = \frac{1}{9} \Rightarrow x = 1500$$

$$\text{In March, } \frac{x}{13500-x} = 0.35 \Rightarrow x = 3500$$

$$\text{In April, } \frac{x}{10000-x} = 1.5 \Rightarrow x = 6000$$

Till April, a total of 14000 bolts were sold and 4000 bolts would have remained unsold.

In May, an additional 20000 bolts were manufactured. Hence, after this was manufactured, the company would have 24000 bolts in inventory.

$$\text{In May, } \frac{x}{24000-x} = 0.5 \Rightarrow x = 8000$$

$$\text{In June, } \frac{x}{16000-x} = \frac{1}{3} \Rightarrow x = 4000$$

$$\text{In July, } \frac{x}{12000-x} = 0.2 \Rightarrow x = 2000$$

$$\text{In August, } \frac{x}{10000-x} = \frac{1}{3} \Rightarrow x = 2500$$

Hence, a total of 16500 bolts were sold during this period and 7500 bolts would have remained in the inventory.

After April, the company has 4000 bolts unsold. All these would have been sold in May as it sold 8000 bolts in May. Hence, the company would have sold all the bolts manufactured in January by May.

Choice (B)

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

During a particular day, exactly nine persons, Arpita, Bhargav, Charu, Divya, Eswar, Farhan, Gaurav, Haritha and Indira, stayed in a hotel, which had six floors, from first floor to sixth floor. All the nine persons belong to the same family. At least one person and at most two persons stayed on each floor of the hotel. On each floor, exactly one person stayed on that floor, only if that person is unmarried, and exactly two persons stayed on that floor, only if they are married to each other. The nine persons belong to three different generations and there are no widows or widowers among

them. Among the nine persons, Bhargav, Eswar, Farhan and Gaurav are males and the rest are females.

The following information is known about the persons who stayed on each floor:

- i. Exactly three persons stayed on the floors above the floor on which Eswar's father stayed but Eswar did not stay on any of those floors.
- ii. Exactly two married couples had children, and one of these two married couples had exactly one child, while the other had four children.
- iii. The father-in-law of Bhargav and the mother-in-law of Haritha both stayed on the second floor.
- iv. Exactly one person stayed on the sixth floor, and it was not Divya.
- v. Charu stayed on the floor immediately above the floor on which her brother stayed, while Gaurav stayed on a floor above the floor on which his father stayed.
- vi. Indira had at least one daughter and none of Indira's daughters stayed on the first floor, while Bhargav is not Eswar's father.

Q21. DIRECTIONS for questions 21 to 24: Select the correct alternative from the given choices.
On which floor did Eswar stay?

- a) First floor
- b) Second floor
- c) Third floor
- d) Fourth floor

Given that nine persons stayed on six floors and married couples stayed on the same floor. Unmarried people stayed alone on a floor. Since there are six floors and nine members, there must be three married couples.

From (ii), one of the married couples has one child while another couple had four children.

Three cases arise from this:

1. The grandfather and grandmother have one child, who is married. This couple has four children, one of whom is married.
2. The grandfather and grandmother have four children, two of whom are married. Among these two couples, one couple will have one child.
3. The grandfather and grandmother have four children, one of whom is married. This couple has a child, who is also married.

From (iii), the father-in-law of Bhargav and mother-in-law of Haritha must be married to each other (since they stay in the same floor).

From the above cases, we need to identify the case in which the spouses of two children have in-laws married to each other. This is only possible in the second case. Hence, the grandfather and grandmother have four children, two of whom are married. The husband of one of the daughters of the grandfather and grandmother is Bhargav and the wife of one of the sons of the grandfather and grandmother is Haritha. From (iii), the grandfather and the grandmother stay on the second floor.

From (i), the father of Eswar could have stayed on the fourth floor (with one married couple and one unmarried person staying in the floors above him) or he can stay on the third floor (with three unmarried persons staying in the floors above him).

In any case, Eswar's father is not the grandfather (since the grandparents live in the second floor). Hence, Eswar's father has to be either Bhargav or the husband of Haritha. From (vi), Eswar is the son of Haritha.

Since Eswar stayed on a floor above which his father stayed, Eswar's father (and mother) could not have stayed on the third floor (since the three unmarried persons, including Eswar, have to stay above Eswar's father). Hence, Eswar's father and mother (Haritha) stayed on the fourth floor.

The father of Eswar and the grandfather can only be Farhan and Gaurav in any order. From (v), Gaurav must be the father of Eswar, while Farhan must be the father of Gaurav.

From (vi), since Indira has a daughter, she must be the grandmother. Charu, Divya and Arpita must be her daughters. Since none of them stayed on the first floor, Eswar must have stayed on the first floor.

From (iv), exactly one person stayed on the sixth floor. Hence, there must be two persons on the fifth floor (since three persons stayed above Gaurav). From (v), Charu stayed on a floor above her brother. Her brother is Gaurav. Hence, Charu stayed on the fifth floor along with her husband. Since Charu is the one who is married, Charu must be Bhargav's wife. Since Divya is not on the sixth floor, Arpita will be on the sixth floor and Divya will be on the third floor.

The following table presents the floors in which the nine persons stayed:

| Floor | Persons |
|-------|-----------------|
| 6 | Arpita |
| 5 | Charu, Bhargav |
| 4 | Gaurav, Haritha |
| 3 | Divya |
| 2 | Farhan, Indira |
| 1 | Eswar |

Eswar stayed on the first floor.

Choice (A)

Q22. DIRECTIONS for questions 21 to 24: Select the correct alternative from the given choices.

How many persons stayed on the floors above the floor on which Bhargav stayed?

a) 1

b) 3

c) 5

d) 6

Given that nine persons stayed on six floors and married couples stayed on the same floor. Unmarried people stayed alone on a floor. Since there are six floors and nine members, there must be three married couples.

From (ii), one of the married couples has one child while another couple had four children.

Three cases arise from this:

1. The grandfather and grandmother have one child, who is married. This couple has four children, one of whom is married.
2. The grandfather and grandmother have four children, two of whom are married. Among these two couples, one couple will have one child.
3. The grandfather and grandmother have four children, one of whom is married. This couple has a child, who is also married.

From (iii), the father-in-law of Bhargav and mother-in-law of Haritha must be married to each other (since they stay in the same floor).

From the above cases, we need to identify the case in which the spouses of two children have in-laws married to each other. This is only possible in the second case. Hence, the grandfather and grandmother have four children, two of whom are married. The husband of one of the daughters of the grandfather and grandmother is Bhargav and the wife of one of the sons of the grandfather and grandmother is Haritha. From (iii), the grandfather and the grandmother stay on the second floor.

From (i), the father of Eswar could have stayed on the fourth floor (with one married couple and one unmarried person staying in the floors above him) or he can stay on the third floor (with three unmarried persons staying in the floors above him).

In any case, Eswar's father is not the grandfather (since the grandparents live in the second floor). Hence, Eswar's father has to be either Bhargav or the husband of Haritha. From (vi), Eswar is the son of Haritha.

Since Eswar stayed on a floor above which his father stayed, Eswar's father (and mother) could not have stayed on the third floor (since the three unmarried persons, including Eswar, have to stay above Eswar's father). Hence, Eswar's father and mother (Haritha) stayed on the fourth floor.

The father of Eswar and the grandfather can only be Farhan and Gaurav in any order. From (v), Gaurav must be the father of Eswar, while Farhan must be the father of Gaurav.

From (vi), since Indira has a daughter, she must be the grandmother. Charu, Divya and Arpita must be her daughters. Since none of them stayed on the first floor, Eswar must have stayed on the first floor.

From (iv), exactly one person stayed on the sixth floor. Hence, there must be two persons on the fifth floor (since three persons stayed above Gaurav). From (v), Charu stayed on a floor above her brother. Her brother is Gaurav. Hence, Charu stayed on the fifth floor along with her husband. Since Charu is the one who is married, Charu must be Bhargav's wife. Since Divya is not on the sixth floor, Arpita will be on the sixth floor and Divya will be on the third floor.

The following table presents the floors in which the nine persons stayed:

| Floor | Persons |
|-------|-----------------|
| 6 | Arpita |
| 5 | Charu, Bhargav |
| 4 | Gaurav, Haritha |
| 3 | Divya |
| 2 | Farhan, Indira |
| 1 | Eswar |

Only one person stayed on the floors above Bhargav.

Choice (A)

Q23. DIRECTIONS for questions 21 to 24: Select the correct alternative from the given choices.
Who among the following stayed on the third floor?

- a) Brother of Charu
- b) Sister-in-law of Divya
- c) Father of Arpita
- d) Sister of Gaurav

Given that nine persons stayed on six floors and married couples stayed on the same floor. Unmarried people stayed alone on a floor. Since there are six floors and nine members, there must be three married couples.

From (ii), one of the married couples has one child while another couple had four children.

Three cases arise from this:

1. The grandfather and grandmother have one child, who is married. This couple has four children, one of whom is married.
2. The grandfather and grandmother have four children, two of whom are married. Among these two couples, one couple will have one child.
3. The grandfather and grandmother have four children, one of whom is married. This couple has a child, who is also married.

From (iii), the father-in-law of Bhargav and mother-in-law of Haritha must be married to each other (since they stay in the same floor).

From the above cases, we need to identify the case in which the spouses of two children have in-laws married to each other. This is only possible in the second case. Hence, the grandfather and grandmother have four children, two of whom are married. The husband of one of the daughters of the grandfather and grandmother is Bhargav and the wife of one of the sons of the grandfather and grandmother is Haritha. From (iii), the grandfather and the grandmother stay on the second floor.

From (i), the father of Eswar could have stayed on the fourth floor (with one married couple and one unmarried person staying in the floors above him) or he can stay on the third floor (with three unmarried persons staying in the floors above him).

In any case, Eswar's father is not the grandfather (since the grandparents live in the second floor). Hence, Eswar's father has to be either Bhargav or the husband of Haritha. From (vi), Eswar is the son of Haritha.

Since Eswar stayed on a floor above which his father stayed, Eswar's father (and mother) could not have stayed on the third floor (since the three unmarried persons, including Eswar, have to stay above Eswar's father). Hence, Eswar's father and mother (Haritha) stayed on the fourth floor.

The father of Eswar and the grandfather can only be Farhan and Gaurav in any order. From (v), Gaurav must be the father of Eswar, while Farhan must be the father of Gaurav.

From (vi), since Indira has a daughter, she must be the grandmother. Charu, Divya and Arpita must be her daughters. Since none of them stayed on the first floor, Eswar must have stayed on the first floor.

From (iv), exactly one person stayed on the sixth floor. Hence, there must be two persons on the fifth floor (since three persons stayed above Gaurav). From (v), Charu stayed on a floor above her brother. Her brother is Gaurav. Hence, Charu stayed on the fifth floor along with her husband. Since Charu is the one who is married, Charu must be Bhargav's wife. Since Divya is not on the sixth floor, Arpita will be on the sixth floor and Divya will be on the third floor.

The following table presents the floors in which the nine persons stayed:

| Floor | Persons |
|-------|-----------------|
| 6 | Arpita |
| 5 | Charu, Bhargav |
| 4 | Gaurav, Haritha |
| 3 | Divya |
| 2 | Farhan, Indira |
| 1 | Eswar |

Arpita, the sister of Gaurav, stayed on the third floor.

Choice (D)

Q24. DIRECTIONS for questions 21 to 24: Select the correct alternative from the given choices.
Which of the following pairs of persons are married to each other?

a) Farhan, Divya

b) Gaurav, Arpita

c) Bhargav, Charu

d) Eswar, Indira

Given that nine persons stayed on six floors and married couples stayed on the same floor. Unmarried people stayed alone on a floor. Since there are six floors and nine members, there must be three married couples.

From (ii), one of the married couples has one child while another couple had four children.

Three cases arise from this:

1. The grandfather and grandmother have one child, who is married. This couple has four children, one of whom is married.
2. The grandfather and grandmother have four children, two of whom are married. Among these two couples, one couple will have one child.
3. The grandfather and grandmother have four children, one of whom is married. This couple has a child, who is also married.

From (iii), the father-in-law of Bhargav and mother-in-law of Haritha must be married to each other (since they stay in the same floor).

From the above cases, we need to identify the case in which the spouses of two children have in-laws married to each other. This is only possible in the second case. Hence, the grandfather and grandmother have four children, two of whom are married. The husband of one of the daughters of the grandfather and grandmother is Bhargav and the wife of one of the sons of the grandfather and grandmother is Haritha. From (iii), the grandfather and the grandmother stay on the second floor.

From (i), the father of Eswar could have stayed on the fourth floor (with one married couple and one unmarried person staying in the floors above him) or he can stay on the third floor (with three unmarried persons staying in the floors above him).

In any case, Eswar's father is not the grandfather (since the grandparents live in the second floor). Hence, Eswar's father has to be either Bhargav or the husband of Haritha. From (vi), Eswar is the son of Haritha.

Since Eswar stayed on a floor above which his father stayed, Eswar's father (and mother) could not have stayed on the third floor (since the three unmarried persons, including Eswar, have to stay above Eswar's father). Hence, Eswar's father and mother (Haritha) stayed on the fourth floor.

The father of Eswar and the grandfather can only be Farhan and Gaurav in any order. From (v), Gaurav must be the father of Eswar, while Farhan must be the father of Gaurav.

From (vi), since Indira has a daughter, she must be the grandmother. Charu, Divya and Arpita must be her daughters. Since none of them stayed on the first floor, Eswar must have stayed on the first floor.

From (iv), exactly one person stayed on the sixth floor. Hence, there must be two persons on the fifth floor (since three persons stayed above Gaurav). From (v), Charu stayed on a floor above her brother. Her brother is Gaurav. Hence, Charu stayed on the fifth floor along with her husband. Since Charu is the one who is married, Charu must be Bhargav's wife. Since Divya is not on the sixth floor, Arpita will be on the sixth floor and Divya will be on the third floor.

The following table presents the floors in which the nine persons stayed:

| Floor | Persons |
|-------|-----------------|
| 6 | Arpita |
| 5 | Charu, Bhargav |
| 4 | Gaurav, Haritha |
| 3 | Divya |
| 2 | Farhan, Indira |
| 1 | Eswar |

Bhargav and Charu are married to each other.

Choice (C)

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

Hari is the owner of a plant which manufactures plastic bottles. He has two machines in his plant for manufacturing plastic bottles:

- i. Machine A can manufacture plastic bottles only in lots of 10,000 and the manufacturing cost per bottle is Rs.7 for this machine.
- ii. Machine B can manufacture plastic bottles only in lots of 1,000 and the manufacturing cost per bottle is Rs.12 for this machine.

Hari sells each bottle that he manufactures at a price of Rs.15. For each order that Hari receives, he decides to use exactly one of the two machines for manufacturing the bottles, depending on which machine will maximize his profit. After catering to each order, all the remaining bottles that were manufactured for that order have to be disposed of, incurring a cost of disposal of Rs.3 per bottle.

Net profit for Hari for any order = Total Revenue – Total Manufacturing Cost – Total Cost of Disposal

Q25. DIRECTIONS for questions 25 to 28: Select the correct alternative from the given choices.
If Hari received an order for 16,438 bottles, what is his maximum possible net profit for that order?

- a) Rs.40,884
- b) Rs.59,234
- c) Rs.95,884
- d) Rs.1,05,674

$$\text{Revenues} = 16438 \times 15 = 246570$$

$$\text{Manufacturing Cost using Machine A} = 20000 \times 7 = 140000$$

$$\text{Manufacturing Cost using Machine B} = 17000 \times 12 = 204000$$

$$\text{Cost of Disposal for Machine A} = 3562 \times 3 = 10,686$$

$$\text{Cost of Disposal for Machine B} = 562 \times 3 = 1686$$

$$\text{Net Profit for Machine A} = 246570 - 140000 - 10686 = 95884$$

$$\text{Net Profit for Machine B} = 246570 - 204000 - 1686 = 40884$$

Hence, the highest net profit will be ₹95884.

Choice (C)

Q26. DIRECTIONS for questions 25 to 28: Select the correct alternative from the given choices.
Hari received an order of more than 10,000 bottles from a hotel. If he decided to use Machine B for manufacturing the bottles, what is the minimum number of bottles that the hotel could have ordered?

- a) 11,011
- b) 11,001
- c) 11,999
- d) 10,001

For manufacturing even one bottle more than 10000 bottles using Machine A, Hari will have to manufacture two lots and dispose 9999 bottles. This will result in a high increase in manufacturing cost.

Total Cost using Machine A for manufacturing 10001 bottles = $20000 \times 7 + 9999 \times 3$
= 169997

Total Cost using Machine B for manufacturing 10001 bottles = $11000 \times 12 + 999 \times 3$
= 134997

Since the cost is lower for Machine B, the least number of bottles that Hari could have sold is 10001. Choice (D)

Q27. DIRECTIONS for questions 25 to 28: Select the correct alternative from the given choices.
Hari received an order from a bottling plant. If he used machine B for manufacturing the bottles, what is the maximum number of bottles that the bottling plant could have ordered?

- a) 10,001
- b) 11,001
- c) 12,000
- d) 13,000

Let k be the number of bottles ordered, m be the number of lots that needs to be manufactured in Machine A and n be the number of bottles that needs to be manufactured in Machine B.

Since the revenues will be same, the cost has to be lower for Machine B, if Machine B is to be used.

$$\begin{aligned}70000m + (10000m - k) \times 3 &> 12000n + (1000n - k) \times 3 \\ \Rightarrow 100000m &> 15000n \\ \Rightarrow \frac{n}{m} &< 6\frac{2}{3}\end{aligned}$$

If Machine B is to be cheaper, n/m should be less than 6.67.

For $m = 1$, $n < 6.67$, i.e., n can be between 1 and 6.

For $m = 2$, $n < 13.33$, i.e., n can be between 10 and 13 (n cannot be from 1 as two lots are manufactured in Machine A, i.e., more than 10000 bottles are ordered).

For $m = 3$, $n < 20$. If n is less than 20, less than 20000 bottles will be manufactured. If less than 20000 bottles are to be manufactured, m cannot be 3 (as it will result in manufacturing 30000 bottles).

Hence, for $m \geq 3$, Machine B will not be cheaper than Machine A.

Therefore, the maximum number of bottles that can be manufactured using Machine B is 13000.
Choice (D)

Q28. DIRECTIONS for questions 25 to 28: Select the correct alternative from the given choices.

If the cost of disposing a bottle increased to Rs.5 per bottle, and, for a particular order, Hari decided to use Machine A for manufacturing the bottles, what is the minimum number of bottles that could have been ordered?

- a) 7000
- b) 7001
- c) 8000
- d) 8001

For a disposal cost of ₹5, we get the following equation:

$$\begin{aligned}70000m + (10000m - k) \times 5 &< 12000n + (1000n - k) \times 5 \\ \Rightarrow 120000m &< 17000n \\ \Rightarrow \frac{n}{m} &> 7\frac{1}{17}\end{aligned}$$

Hence, the lowest number of bottles that can be manufactured will be 7001.

Choice (B)

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

In a school, there are five different classes – Class 6 through Class 10 – with each class having a distinct number of students. It is known that, for any class, say Class N, N students from that class can be distributed among the other four classes such that there are an equal number of students in all the other four classes.

Q29. The question below is followed by two statements I and II, each providing some information. Study the question and the statements and enter your answer in the input box provided below the statements as per the instructions given below:

Enter your answer as

1. if each of the two statements is independently sufficient to answer the question.
2. if statement I alone is sufficient to answer the question but statement II alone is not.
3. if statement II alone is sufficient to answer the question but statement I alone is not.
4. if both the statements together are sufficient to answer the question, but neither statement alone is sufficient.
5. if both the statements together are also not sufficient to answer the question.
6. if the question can be answered even without using either of the two statements.

Which class has the highest number of students?

- I. The number of students in Class 6 is greater than the number of students in Class 10.
- II. The number of students in Class 6 is less than the number of students in Class 10.

Given that, if 6 students were distributed among the classes 7, 8, 9 and 10, these four classes will have an equal number of students.

Since the number of students in these four classes are distinct, the number of students that must be added to each class to get an equal number of students must also be distinct. The only possibility to have four distinct numbers adding up to 6 is 0, 1, 2 and 3.

If the number of students in one of the four classes is a , then the number of students in the other three classes must be $a - 1$, $a - 2$ and $a - 3$.

Now, if 7 students were distributed among the classes 6, 8, 9 and 10, these four classes will have an equal number of students.

If there are a students in class 7, then to have an equal number of students in classes 8, 9 and 10, we need to add 1, 2 and 3 students OR 0, 1, 2 students to these classes (since the number of students in these three classes will be $a - 1$, $a - 2$ and $a - 3$). In the first case, the number of students in Class 6 must be $a - 1$ (since we can add only one more student). However, this is not possible as this is already the number of students in one of the other classes.

In the second case, the number of students in Class 6 must be $a - 5$. This is possible. If the number of students in Class 7 is $a - 1$, the number of students in classes 8, 9 and 10 will be a , $a - 2$ and $a - 3$, in any order. For the number of students in these three classes to be equal we need to add 0, 2 and 3 students. This implies that the number of students in Class 6 will be $a - 2$ (as we can add only 2 more students to this class). However, this is not possible.

If the number of students in Class 7 is $a - 2$, the number of students in classes 8, 9 and 10 will be a , $a - 1$ and $a - 3$, in any order. For the number of students in these three classes to be equal we need to add 0, 1 and 3 students OR 1, 2 and 4 students. In the first case, the number of students in Class 6 will be $a - 3$ (as we can add only 2 more students to this class). However, this is not possible. In the second case, the number of students in Class 6 will be $a + 1$ (as we cannot add any more students to this Class). This case is possible.

If the number of students in Class 7 is $a - 3$, the number of students in classes 8, 9 and 10 will be a , $a - 1$ and $a - 2$, in any order. For the number of students in these three classes to be equal we need to add 0, 1 and 2 students. This implies that the number of students in Class 6 will be $a - 4$. This case is possible.

Hence, there are three cases possible: Class 6 has $a - 5$ students, Class 7 has a students OR Class 6 has $a + 1$ students, and Class 7 has $a - 2$ students OR Class 6 has $a - 4$ students and Class 7 has $a - 3$ students.

If we add 8 students to classes 6, 7, 9 and 10, there must be an equal number of students.

In the first case, we have to add 5 students to Class 6 to make it equal to that in Class 7. The remaining 2 students must be added to Class 9 and Class 10. So Class 9 and Class 10 can have $a - 1$ and $a - 2$ students in any order. Hence, Class 8 must have $a - 3$ students.

In the second case, we have to add 1, 3 and 4 students to 7, 9 and 10. To Class 6 we will not add any students.

Hence, Class 8 must have $a - 1$ students.

Class 9 and 10 has a and a – 3 students in any order.

In the third case, we have to add one more student to either of Class 9 or Class 10. Hence, the number of students in Class 9 and Class 10 must be a – 1 and a in any order. The number of students in Class 8 must be a – 2.

If we add 9 students to classes 6, 7, 8 and 10, there must be an equal number of students.

This implies that in the first case, the number of students in Class 9 must be a – 2 and that in Class 10 must be a – 1.

In the second case, the number of students in Class 9 will be a and that in Class 10 will be a – 3.

In the third case, the number of students in Class 9 must be a – 1 and that in Class 10 must be a.

The three possible cases for the number of students are presented in the table below:

| Class | Case 1 | Case 2 | Case 3 |
|----------|--------|--------|--------|
| Class 6 | a – 5 | a + 1 | a – 4 |
| Class 7 | a | a – 2 | a – 3 |
| Class 8 | a – 3 | a – 1 | a – 2 |
| Class 9 | a – 2 | a | a – 1 |
| Class 10 | a – 1 | a – 3 | a |

Since we know that there must be at least 6, 7, 8, 9 and 10 students in Class 6, 7, 8, 9 and 10. By observation, we can see that the minimum value of a in case 1 is 11, in case 2 is 13 and in case 3 is 10.

Statement I is true only for Case 2. In this case, the highest number of students are in Class 9.

Statement II is true for Case 1 and Case 3. In these cases, the highest number of students can be in Class 7 or 10.

Hence, the question can be answered using Statement I alone but not using Statement II alone.

Ans: (2)

Q30. The question below is followed by two statements I and II, each providing some information. Study the question and the statements and enter your answer in the input box provided below the statements as per the instructions given below:

Enter your answer as

1. if each of the two statements is independently sufficient to answer the question.
2. if statement I alone is sufficient to answer the question but statement II alone is not.
3. if statement II alone is sufficient to answer the question but statement I alone is not.
4. if both the statements together are sufficient to answer the question, but neither statement alone is sufficient.
5. if both the statements together are also not sufficient to answer the question.
6. if the question can be answered even without using either of the two statements.

In how many classes is the number of students greater than 15?

- I. The number of students in Class 10 is a multiple of 10.
 II. The number of students in Class 6 is a multiple of 8.

The three possible cases for the number of students are presented in the table below:

| Class | Case 1 | Case 2 | Case 3 |
|----------|---------|---------|---------|
| Class 6 | $a - 5$ | $a + 1$ | $a - 4$ |
| Class 7 | a | $a - 2$ | $a - 3$ |
| Class 8 | $a - 3$ | $a - 1$ | $a - 2$ |
| Class 9 | $a - 2$ | a | $a - 1$ |
| Class 10 | $a - 1$ | $a - 3$ | a |

Since we know that there must be at least 6, 7, 8, 9 and 10 students in Class 6, 7, 8, 9 and 10. By observation, we can see that the minimum value of a in case 1 is 11, in case 2 is 13 and in case 3 is 10.

From Statement I, in Case 1, $a - 1$ is a multiple of 10.

From Statement II, in Case 1, $a - 5$ is a multiple of 8.

The minimum possible value of a is 21.

For $a = 21$ or any value greater than 21, the number of students in all the classes will be greater than 15.

From statement I, in Case 2, $a - 3$ is a multiple of 10.

From statement II, in Case 2, $a + 1$ is a multiple of 8.

Hence, a can be a minimum of 23. The number of students in all classes will be greater than 15.

From Statement I, in Case 3, we can say that a is a multiple of 10.

From Statement II, in Case 3, $a - 4$ is a multiple of 8.

The minimum possible value of a is 20.

For $a = 20$ or any value greater than 20, the number of students in all the classes will be greater than 15.

Hence, the question can be answered using both the statements together.

Ans: (4)

Q31. The question below is followed by two statements I and II, each providing some information. Study the question and the statements and enter your answer in the input box provided below the statements as per the instructions given below:

Enter your answer as

1. if each of the two statements is independently sufficient to answer the question.
2. if statement I alone is sufficient to answer the question but statement II alone is not.
3. if statement II alone is sufficient to answer the question but statement I alone is not.
4. if both the statements together are sufficient to answer the question, but neither statement alone is sufficient.
5. if both the statements together are also not sufficient to answer the question.
6. if the question can be answered even without using either of the two statements.

What is the number of students in Class 9?

- I. The number of students in Class 10 is two more than the number of students in Class 8.
- II. The number of students in Class 10 is eight less than twice the number of students in Class 6.

The three possible cases for the number of students are presented in the table below:

| Class | Case 1 | Case 2 | Case 3 |
|----------|---------|---------|---------|
| Class 6 | $a - 5$ | $a + 1$ | $a - 4$ |
| Class 7 | a | $a - 2$ | $a - 3$ |
| Class 8 | $a - 3$ | $a - 1$ | $a - 2$ |
| Class 9 | $a - 2$ | a | $a - 1$ |
| Class 10 | $a - 1$ | $a - 3$ | a |

Since we know that there must be at least 6, 7, 8, 9 and 10 students in Class 6, 7, 8, 9 and 10. By observation, we can see that the minimum value of a in case 1 is 11, in case 2 is 13 and in case 3 is 10.

Statement I:

From this statement, we can eliminate Case 2, but we will not get any additional information.

Statement II:

$$\text{Case 1: } a - 1 = 2a - 10 - 8 \Rightarrow a = 17.$$

$$\text{Number of students in Class 9} = a - 2 = 15.$$

Case 2: The condition is not applicable for Case 2.

$$\text{Case 3: } 2a - 8 - 8 = a \Rightarrow a = 16.$$

$$\text{Number of students in Class 9} = a - 1 = 15.$$

Hence, the question can be answered using the second statement alone but not by using the first statement alone.

Ans: (3)

Q32. The question below is followed by two statements I and II, each providing some information.

Study the question and the statements and enter your answer in the input box provided below the statements as per the instructions given below:

Enter your answer as

1. if each of the two statements is independently sufficient to answer the question.
2. if statement I alone is sufficient to answer the question but statement II alone is not.
3. if statement II alone is sufficient to answer the question but statement I alone is not.
4. if both the statements together are sufficient to answer the question, but neither statement alone is sufficient.
5. if both the statements together are also not sufficient to answer the question.

6. if the question can be answered even without using either of the two statements.

Is the number of students in Class 9 greater than that in Class 8?

- I. The number of students in Class 7 is greater than the number of students in Class 10.
- II. The number of students in Class 9 is the same as the number of students in Class 7.

The three possible cases for the number of students are presented in the table below:

| Class | Case 1 | Case 2 | Case 3 |
|----------|---------|---------|---------|
| Class 6 | $a - 5$ | $a + 1$ | $a - 4$ |
| Class 7 | a | $a - 2$ | $a - 3$ |
| Class 8 | $a - 3$ | $a - 1$ | $a - 2$ |
| Class 9 | $a - 2$ | a | $a - 1$ |
| Class 10 | $a - 1$ | $a - 3$ | a |

Since we know that there must be at least 6, 7, 8, 9 and 10 students in Class 6, 7, 8, 9 and 10. By observation, we can see that the minimum value of a in case 1 is 11, in case 2 is 13 and in case 3 is 10.

In each of the three cases, the number of students in Class 9 is greater than that in Class 8. Hence, the question can be answered without any additional information.

Ans: (6)

QA

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

If $x + \frac{1}{x} = 1$, find the value of $x^{12} + x^9 + x^6 + x^3 + 1$.

$$\begin{aligned}x + \frac{1}{x} &= 1 \\ \Rightarrow x^2 + 1 &= x \\ \Rightarrow x^2 &= x - 1 \\ \therefore x^3 &= x(x^2) = x(x-1) = x^2 - x = x - 1 - x = -1 \\ \therefore x^6 &= (-1)^2 = 1 \\ x^9 &= (x^3)^3 = (-1)^3 = -1 \\ x^{12} &= (x^3)^4 = (-1)^4 = 1 \\ x^{12} + x^9 + x^6 + x^3 + 1 &= 1 - 1 + 1 - 1 + 1 = 1\end{aligned}$$

Ans: (1)

Q2. DIRECTIONS for questions 2 to 5: Select the correct alternative from the given choices.

Find the ratio of x and y , if $2x - 7y + t = 0$ and $5x - 3y - 2t = 0$.

a) $\frac{3}{5}$

b) $\frac{17}{9}$

c) $\frac{10}{7}$

d) Cannot be determined

$$2x - 7y + t = 0 \quad \text{and} \quad 5x - 3y - 2t = 0$$
$$\Rightarrow t = 7y - 2x \quad \Rightarrow t = \frac{5x - 3y}{2}$$

Equating t , we get

$$7y - 2x = \frac{5x - 3y}{2}$$

$$14y - 4x = 5x - 3y$$
$$17y = 9x$$

$$\therefore \frac{x}{y} = \frac{17}{9}$$

Choice (B)

Q3. DIRECTIONS for questions 2 to 5: Select the correct alternative from the given choices.

In the quadratic equation $ax^2 + bx + c = 0$, if the sum of the roots is equal to the product of the roots, find the sum of the reciprocals of the roots.

a) $\frac{1}{2}$

b) 1

c) $\frac{2}{3}$

d) Cannot be determined

Let m and n be the roots of the given quadratic equation. It is given that $m + n = m \cdot n$. Dividing both sides by $m \cdot n$, we get

$$\frac{m+n}{mn} = 1$$

$$\frac{1}{n} + \frac{1}{m} = 1$$

which is the sum of the reciprocals of the roots

Alternative Solution:

Since sum of roots = product of roots

$$\frac{-b}{a} = \frac{c}{a} \rightarrow (1)$$

The quadratic equation whose roots are reciprocals of the roots of the given equation

is $cx^2 + bx + a = 0$ and sum of its roots = $\frac{-b}{c} = 1$ (from (1)). Choice (B)

Q4. DIRECTIONS for questions 2 to 5: Select the correct alternative from the given choices.
Each of four girls, A, B, C and D, had a few chocolates with her. First, A gave one-third of the chocolates that she had with her to B. Then, B gave one-fourth of the chocolates that she had with her to C, after which C gave one-fifth of the chocolates that she had with her to D. Finally, all the four girls had an equal number of chocolates. If initially, the number of chocolates with A was 80 more than that with B, find the difference between the number of chocolates that C and D initially had.

- a) 20
- b) 30
- c) 15
- d) Cannot be determined

Let's calculate this from the last.

| | | | |
|---|---|---|---|
| A | B | C | D |
| x | x | x | x |

So after 'C' gave $\frac{1}{5}$ of her share to D she is left with 'x'.

$$\Rightarrow \text{Before she gave to D she had } \frac{5}{4}x.$$

| | | | |
|---|---|----------------|----------------|
| A | B | C | D |
| x | x | $\frac{5}{4}x$ | $\frac{3}{4}x$ |

So this is the situation before C gave to D (or) after B gave to C.

So B is left with 'x' after she gave $\frac{1}{4}$ th of his chocolates to C.

$$\Rightarrow \text{Before B gave to C, she had } \frac{4}{3}x.$$

| | | | |
|---|----------------|------------------|----------------|
| A | B | C | D |
| x | $\frac{4}{3}x$ | $\frac{11}{12}x$ | $\frac{3}{4}x$ |

This is the situation after A gave $\frac{1}{3}$ rd of his share to B.

$$\Rightarrow \text{Initially 'A' had } \frac{3}{2}x$$

| | | | |
|----------------|----------------|------------------|----------------|
| A | B | C | D |
| $\frac{3}{2}x$ | $\frac{5}{6}x$ | $\frac{11}{12}x$ | $\frac{3}{4}x$ |

Given that the difference between the number of chocolates that A and B had initially = 80

$$\Rightarrow \frac{4}{6}x = 80 \Rightarrow x = 120 \text{ and } C - D = \frac{1}{6}x = 20$$

Alternative solution:

Considering only the transactions A \rightarrow B and B \rightarrow C, A will have $\frac{2}{3}A$ and B will have

$\frac{3}{4}\left(B + \frac{A}{3}\right)$. But it is given that A and B finally had an equal number. So we get

$$\frac{2}{3}A = \frac{3}{4}\left(B + \frac{A}{3}\right) \text{ --- (1). Also, given that } A - B = 80 \text{ --- (2).}$$

Now, from (1) and (2) we get A = 180 and B = 100 and also that everyone has 120 chocolates with them in the end.

Now considering the transactions B \rightarrow C and C \rightarrow D, we get

$$\frac{4}{5}\left(\frac{C + \left(100 + \frac{80}{3}\right)}{4}\right) = \frac{1}{5}\left(C + \frac{\left(100 + \frac{180}{3}\right)}{4}\right) + D = 120$$

$$\Rightarrow C = 110 \text{ and } D = 90$$

$$\Rightarrow C - D = 20$$

Choice (A)

Q5. DIRECTIONS for questions 2 to 5: Select the correct alternative from the given choices.
In a cart, the diameters of the front and rear wheels are 4 ft and 10 ft respectively. If the sum of the number of revolutions made by the two wheels is 98, find the distance covered (in ft) by the cart.

(Take $\pi = \frac{22}{7}$)

a) **880**

b) **1760**

c) 2200

d) **352**

The distance covered by the cart = Circumference of a wheel \times No of revolutions made by it

The distance covered by the cart would be the same irrespective of the wheels.

Let the number of revolutions made by the front and rear wheels be n_f and n_r respectively.

$2\pi (2)n_f = 2\pi (5)n_r$ = Distance covered the cart.

$$\frac{n_f}{n_r} = \frac{5}{2} \text{ if } n_f = 5k, \text{ then } n_r = 2k.$$

Total no. of revolutions = $7k = 98 \Rightarrow k = 14$

$$\therefore \text{the distance covered by the cart} = 2 \times \frac{22}{7} (2)(70) = 880 \text{ feet.} \quad \text{Choice (A)}$$

Q6. DIRECTIONS for question 6: Type in your answer in the input box provided below the question.

If the maximum value of $\sin^2\theta - 2\sin^3\theta$ is $\frac{1}{A}$, for $0^\circ < \theta < 90^\circ$, find the value of A.

$$\sin^2 \theta - 2\sin^3 \theta = (\sin \theta)(\sin \theta)(1 - 2\sin \theta)$$

now, $(\sin \theta) + (\sin \theta) + (1 - 2\sin \theta) = 1$ (i.e., a constant)

∴ the product will be maximum when

$$\sin \theta = \sin \theta = 1 - 2\sin \theta \Rightarrow \sin \theta = \frac{1}{3}$$

Therefore the maximum value of the product is

$$\left(\frac{1}{3}\right)\left(\frac{1}{3}\right)\left(1 - \frac{2}{3}\right) = \frac{1}{27} = \frac{1}{A} \text{ (given)}$$

$$\therefore A = 27$$

Ans: (27)

Q7. DIRECTIONS for questions 7 to 14: Select the correct alternative from the given choices.

A shopkeeper marks up the price of each pen that he sells by 20%. He then sells the pens individually or in packs of 20. Further, he gives a 10% discount on each pack of 20 pens that he sells. If Tarun bought two packs of pens and another five pens individually for a total of Rs.492, what is the cost price of a single pen?

a) Rs.12

b) Rs.11

c) Rs.10

d) Rs.9

Let the cost price of a pen be c .

The selling price of the pen will be $1.2c$.

The selling price of a pack of pens will be $1.2c \times 20 \times 0.9$

The total amount that Tarun would have paid will be

$$(1.2c \times 20 \times 0.9 \times 2) + (5 \times 1.2c)$$

$$\therefore (1.2c \times 20 \times 0.9 \times 2) + (5 \times 1.2c) = 492$$

$$\Rightarrow 49.2c = 492 \Rightarrow c = 10.$$

Hence, the cost price of a single pen will be ₹10.

Choice (C)

Q8. DIRECTIONS for questions 7 to 14: Select the correct alternative from the given choices.
If the product of all the factors of N is equal to N^8 , which of the following cannot be a factor of N?

a) $2^2 \times 3^1 \times 5^1$

b) $2^3 \times 3^2$

c) $2^6 \times 5^1$

d) $2^2 \times 3^2 \times 5^1$

The product of all the factors of

$$N = N^{(\text{No. of factors of } N)/2} = N^8$$

Therefore, the number of factors of N is 16

Now, checking for the number of factors of the number given in each option, we get
(A) $\rightarrow 12$; (B) $\rightarrow 12$; (C) $\rightarrow 14$ and (D) $\rightarrow 18$. Since (D) has 18 factors, it cannot be a factor of N.

\therefore Among the options, only (D) cannot be a factor of N.

Choice (D)

Q9. DIRECTIONS for questions 7 to 14: Select the correct alternative from the given choices.
Given below are two statements I and II:

I. The ratio of the altitudes of a triangle ABC is 2 : 5 : 6.

II. The ratio of the altitudes of a triangle DEF is 3 : 4 : 8.

Which of the above two statements can be true?

a) Only I

b) Only II

c) Both I and II

d) Neither I nor II

For any triangle, the sides are inversely proportional to corresponding altitudes.
From statement I,

$$\text{The ratio of the sides of the triangle } ABC = \frac{1}{2} : \frac{1}{5} : \frac{1}{6}$$

$$= 30 : 12 : 10$$

This is not possible as the sum of any two sides in a triangle must be greater than the third side and $10 + 12 \not> 0$

From statement II,

$$\text{The ratio of the sides of the triangle } DEF = \frac{1}{3} : \frac{1}{4} : \frac{1}{8}$$

$$= 32 : 24 : 12$$

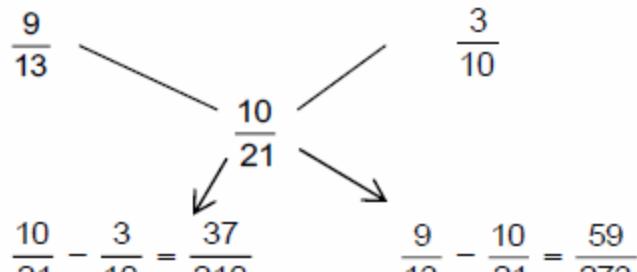
This is possible as it satisfies the triangle inequality

Choice (B)

Q10. DIRECTIONS for questions 7 to 14: Select the correct alternative from the given choices.
Two vessels contain milk and water in the ratio 9 : 4 and 3 : 7 respectively. In what ratio should the contents of these vessels be mixed, if the resultant mixture should contain milk and water in the ratio 10 : 11?

- a) 69 : 48
- b) 68 : 49
- c) 590 : 481
- d) 481 : 590

Using the rule of alligations,



$$\text{Required ratio} = \frac{37}{210} : \frac{59}{273} = 481 : 590$$

Choice (D)

Q11. DIRECTIONS for questions 7 to 14: Select the correct alternative from the given choices.
In a sequence of 400 numbers, the product of any two consecutive terms is 20, and the 59th term is 15. If the sum of the terms from the 278th term to the 378th term is equal to S, find the value of 300S.

- a) 245400
- b) 246500
- c) 245000
- d) 246000

Let us denote the n^{th} term in the series by T_n .

Now, $T_{59} = 15$

$$T_{60} = \frac{20}{T_{59}} = \frac{20}{15} = \frac{4}{3}$$

$$T_{61} = \frac{20}{T_{60}} = \frac{20}{\frac{4}{3}} = 15$$

\therefore Each odd term is 15 and each even term is $\frac{4}{3}$.

Thus, the required sum, from 278th term to 378th term =

$S = \text{sum of 51 even terms} + \text{sum of 50 odd terms}$

$$= 51 \times \frac{4}{3} + 50 \times 15 = 68 + 750 = 818.$$

$$\therefore 300S = 818 \times 300 = 245400.$$

Choice (A)

Q12. DIRECTIONS for questions 7 to 14: Select the correct alternative from the given choices.
Ram and Laxman were paid Rs.6,000 for completing a piece of work together. If Laxman received Rs.2000 as his share, and he can complete the work in twelve days when working alone, find the number of days in which Ram alone can complete the work.

- a) 5 days
- b) 10 days

- c) 8 days
- d) 6 days

Laxman received 2,000 out of 6000 \Rightarrow he has done $1/3^{\text{rd}}$ of the work and Ram has done $2/3^{\text{rd}}$ of the work.

\Rightarrow Ram is twice as efficient as Laxman.

\Rightarrow If Laxman can do the work in 12 days, Ram will take half that time, i.e., 6 days.

Choice (D)

Q13. DIRECTIONS for questions 7 to 14: Select the correct alternative from the given choices.
A right-angled triangle is cut along a line parallel to the hypotenuse of the triangle, such that the length of the hypotenuse of the smaller triangle is 35% less than that of the initial triangle. If the area of the smaller triangle is x percent of the area of the initial triangle, find the value of x , rounded off to the nearest whole number.

- a) 65
- b) 35
- c) 12
- d) 42

When the hypotenuse is reduced by 35% by cutting to along a line parallel to the hypotenuse, the perpendicular sides also get reduced by 35%. That is, the entire triangle is similar to the original triangle.

\therefore Each side is now 65% of its initial value.

\therefore New area is $65\% \times 65\%$

$$= 42.25\% \text{ of original area (since } A = \frac{1}{2} ab \Rightarrow A \propto ab)$$

$\Rightarrow x = 42$ (rounded off to the nearest whole number)

Choice (D)

Q14. DIRECTIONS for questions 7 to 14: Select the correct alternative from the given choices.
Find the number of digits in N , if $N = (80)^{100}$.

(Take $\log 2 = 0.3010$)

a) 189

b) 191

c) 190

d) 192

It is given that

$$N = (80)^{100}$$

Taking log of both sides, we get

$$\log N = \log (80)^{100}$$

$$\log N = 100 \log 80$$

$$= 100 [\log 8 + \log 10]$$

$$= 100 [3\log 2 + 1]$$

$$= 100 [3 \times 0.3010 + 1]$$

$$= 100 [1.903]$$

$$= 190.3$$

Therefore the number of digits in N is $190 + 1 = 191$.

Choice (B)

Q15. DIRECTIONS for question 15: Type in your answer in the input box provided below the question.

The ages of Aditi and her mother were both two-digit numbers comprising the same pair of digits. If fifteen years ago, Aditi's age was one-third the age of her mother, find the sum of their present ages (in years).

Let the ages of Aditi and her mother be denoted by ab and ba respectively.

Their ages, before 15 years were $(10a + b - 15)$ and $(10b + a - 15)$

$$\text{It is given that } (10a + b - 15) = \frac{(10b + a - 15)}{3}$$

$$\Rightarrow 3(10a + b - 15) = (10b + a - 15)$$

$$\Rightarrow 29a = 7b + 30$$

Since a and b are both single digit numbers, only $a = 2$ and $b = 4$ is a possible solution.

\therefore Aditi's age is ab i.e., 24 and her mother's age is ba . i.e., 42.

The sum of their present ages is 66.

Ans: (66)

Q16. DIRECTIONS for questions 16 to 18: Select the correct alternative from the given choices.
Three circles, of radii 6 cm, 14 cm and 15 cm, touch each other externally. Find the area (in sq. cm) of the triangle formed by joining the centres of these three circles.

a)

$$81\sqrt{7}$$

b)

$$150\sqrt{2}$$

c) 290

d) 210

Ans. 210

Q17. DIRECTIONS for questions 16 to 18: Select the correct alternative from the given choices.
How many four-digit numbers divisible by 9 can be formed by using exactly two distinct digits?

a) 26

b) 42

c) 69

d) 56

Any number with two distinct digits will be of the form $aabb$ or $abab$ or $abba$ or $aaab$ or $abaa$ or $aaba$ or $baaa$

Case I

If $aabb$ or $abab$ or $abba$ is to be divisible by 9, then $2a + 2b$ must be either 9 or 18 or 27 or 36.

$2a + 2b$ cannot be 9 or 27 because it must be even.

Hence, if $2a + 2b = 18$, then (a, b) can be $(1, 8), (2, 7), (3, 6), (4, 5), (9, 0)$.

For each possibility of (a, b) except $(9, 0)$, there will be 6 numbers possible.

For $(9, 0)$ there will be three possible numbers.

Hence, there are a total of $4 \times 6 + 3 = 27$ possibilities.

If $2a + 2b = 36$, then $a + b = 18$. This is only possible if $a = b = 9$. Since this does not have two distinct digits, there are no possibilities.

Case II

If $aaab$ or $abaa$ or $aaba$ or $baaa$ is to be divisible by 9, then $3a + b$ can be 9 or 18 or 27 or 36.

If $3a + b = 9$, then (a, b) can be $(0, 9), (1, 6), (2, 3), (3, 0)$.

If $3a + b = 18$, then (a, b) can be $(3, 9), (4, 6), (5, 3), (6, 0)$.

If $3a + b = 27$, then (a, b) can be $(6, 9), (7, 6), (8, 3), (9, 0)$.

If $3a + b = 36$, then (a, b) can be $(9, 9)$ (not possible).

For each value of (a, b) except for $(0, 9), (6, 0), (9, 0), (3, 0)$, there will be four possible numbers.

For $(0, 9)$ only one value is possible (9000).

For $(6, 0)$, three values are possible.

For $(9, 0)$, three values are possible.

For $(3, 0)$, three values are possible.

Hence, the total number of possibilities are $8 \times 4 + 10 = 42$

Total possible numbers = $42 + 27 = 69$.

Choice (C)

Q18. DIRECTIONS for questions 16 to 18: Select the correct alternative from the given choices.
Find the range of a for which the expression $x^2 + ax + 2a - 3$ is always positive.

- a) (2, 6)
- b) (1, 5)
- c) (3, 8)
- d) (4, 10)

Given $x^2 + ax + 2a - 3 > 0$

$$\Rightarrow x^2 + 2\frac{(ax)}{2} + \frac{a^2}{4} - \frac{a^2}{4} + 2a - 3 > 0$$

$$\Rightarrow \left(x + \frac{a}{2}\right)^2 - \frac{a^2}{4} + 2a - 3 > 0$$

Now, since $\left(x + \frac{a}{2}\right)^2$ is always non-negative,

we can conclude that

$$\frac{-a^2}{4} + 2a - 3 > 0$$

$$\Rightarrow -a^2 + 8a - 12 > 0$$

$$\Rightarrow a^2 - 8a + 12 < 0$$

$$\Rightarrow (a - 2)(a - 6) < 0$$

$$\Rightarrow a \in (2, 6).$$

Alternative Solution:

It is given that, $x^2 + ax + 2a - 3 > 0$

If the value of a quadratic expression is always positive (or always negative), then the discriminant will be negative. This is because the graph of the expression will not intersect the x-axis, as a result of which the roots will be imaginary.

Therefore, the discriminant in the given case.

$$a^2 - 4(2a - 3) < 0.$$

$$a^2 - 8a + 12 < 0$$

$$(a - 2)(a - 6) < 0$$

$$2 < a < 6 \text{ or } a \in (2, 6)$$

Choice (A)

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

$f(x)$ is a quadratic function, such that $f(4) = 4 \times f(1)$. If one of the roots of $f(x) = 0$ is 2, find the second root.

$$f(x) = ax^2 + bx + c$$

$$f(4) = 16a + 4b + c$$

$$f(1) = a + b + c$$

It is given that $f(4) = 4f(1)$

$$16a + 4b + c = 4(a + b + c)$$

$$12a = 3c$$

$$\Rightarrow c = 4a$$

∴ The product of the roots of the quadratic equation $ax^2 + bx + c = 0$ is $\frac{c}{a} = 4$.

Since 2 is given to be one of the roots of $ax^2 + bx + c = 0$

the other root will be $\frac{4}{2} = 2$.

Alternative Solution:

$$\text{Let } f(x) = k(x - 2)(x - a)$$

$$\text{Given, } k(4 - 2)(4 - a) = 4k(1 - 2)(1 - a) [\because f(4) = 4f(1)]$$

$$\Rightarrow 8 - 2a = -4 + 4a$$

$$\Rightarrow a = 2.$$

Ans: (2)

Q20. DIRECTIONS for questions 20 to 22: Select the correct alternative from the given choices.

If $\log_a 12 = x$, $\log_a 75 = y$ and $\log_a 40 = z$, what is the value of $\log_a 120$, in terms of x , y and z ?

a)

$$\frac{3x + y + 2z}{4}$$

b)

$$\frac{x + 3y + 2z}{4}$$

c)

$$\frac{2x + 3y + z}{4}$$

d)

$$\frac{3x + y + z}{4}$$

This question can be best solved by considering the answer choices.

$$\log_a 120 = \log_a 5 + \log_a 24$$

$$\therefore \text{Coefficient of } \log_a 5 = 1$$

\therefore We look for a combination of x, y, z which gives 1 as the coefficient of $\log_a 5$.

$$\log_a 75 = 2 \log_a 5 + \log_a 3 = y$$

$$\log_a 40 = \log_a 5 + \log_a 8 = z$$

$$\therefore \frac{y + 2z}{4} \text{ gives coefficient of } \log_a 5 \text{ as 1.}$$

\therefore Only 1st choice satisfies.

Choice (A)

Q21. DIRECTIONS for questions 20 to 22: Select the correct alternative from the given choices.

The reduction in the length of the cloth that a weaver will weave on a day is directly proportional to the square root of the number of days for which he has already worked since his last break (i.e., day off from work). If the only break that the weaver took in the month of August was on the 1st of August, and the length of cloth that he wove on the 18th and the 27th of August was 14 m and 10 m respectively, find the length of cloth (in m) that he wove on the 2nd of August.

a) 24

b) 20

c) 30

d) 48

Reduction in the length of cloth woven $\alpha \sqrt{n}$

Where n = no. of consecutive days worked without a break

\therefore Reduction in the length of cloth woven = $k\sqrt{n}$

Length of cloth woven on a day = $M - k\sqrt{n}$

Where M = Max length of cloth woven on a day, when

$n = 0$

It is given that, on August 18th he wove 14 m of cloth, i.e., he had worked for 16 days already.

$$\Rightarrow 14 = M - k\sqrt{16}$$

Similarly, $10 = M - k\sqrt{25}$ (since he wove 10 m of cloth on 27th August)

Subtracting, we get $4 = k$

$$\therefore 14 = M - 4k$$

$$\Rightarrow M = 30, \text{ this is the length of cloth woven on the 2nd of August.}$$

Choice (C)

Q22. DIRECTIONS for questions 20 to 22: Select the correct alternative from the given choices.

The amount of discount offered on an article was three times the profit made on selling it. If the article was marked up by 100% before offering the discount, then what was the percentage of profit made on selling it?

- a) 10%
- b) 20%
- c) 25%
- d) 75%

Let the marked price, the selling price and the cost price of the article be denoted by M , S and C respectively.

It is given that $M - S = 3(S - C)$ and $M = 2C$

$$\therefore 2C - S = 3S - 3C$$

$$\Rightarrow 5C = 4S$$

$$\Rightarrow S = 1.25C$$

Hence, the profit made was 25%.

Choice (C)

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

The average of the marks of ten students in a test was 4.4. The test comprised ten questions, each carrying one mark, without any negative marks for incorrect answers or unattempted questions. However, one question was eventually removed from evaluation, because of which the average became 3.8. How many students had not earned any marks for the question that was removed?

The ten students combined must have scored $4.4 \times 10 = 44$ marks in the test.

After removing the question, the total marks scored by the ten students would have been $3.8 \times 10 = 38$.

∴ The total score of the students is reduced by 6 marks. Hence, 6 students must have been awarded marks for the question that was removed and 4 students must not have been awarded any marks for that question.

Ans: (4)

Q24. DIRECTIONS for questions 24 and 25: Select the correct alternative from the given choices.

A natural number, N, when divided by another natural number, D, leaves a remainder of r . If $5N$ when divided by $2D$ leaves a remainder of $3r$, which of the following gives the value D?

- a) r
- b) $2r$
- c) $3r$
- d) $4r$

$$N = Dq_1 + r \rightarrow (1)$$

$$\therefore D > r$$

It is also given that $5N = 2Dq_2 + 3r$

$$\therefore 2D > 3r$$

$$D > \frac{3r}{2}$$

Multiplying Equation (1) by 5, we get

$$5N = 5Dq_1 + 5r$$

Now, equating $5N$, we get

$$2Dq_2 + 3r = 5Dq_1 + 5r$$

$$D(2q_2 - 5q_1) = 2r$$

$\therefore D$ is a factor of $2r$

As $D > \frac{3r}{2}$, D must be equal to $2r$.

Choice (B)

Q25. DIRECTIONS for questions 24 and 25: Select the correct alternative from the given choices.

At how many distinct points do any two of the three graphs $x^2 + y^2 = 25$, $4x + 3y = 25$ and $x = 0$ meet each other?

- a) 2
- b) 3
- c) 5
- d) 4

Given $4x = 25 - 3y$

$$\Rightarrow x = \frac{25 - 3y}{4}$$

Now, substituting the value of x in the equation of the circle, we get

$$\frac{(25-3y)^2}{4} + y^2 = 25$$

$$625 - 150y + 9y^2 + 16y^2 = 400$$

$$25y^2 - 150y + 225 = 0$$

$$y^2 - 6y + 9 = 0 \Rightarrow y = 3$$

$$\therefore x = \frac{25 - 3y}{4} = \frac{25 - 9}{4} = 4$$

Therefore the curves $x^2 + y^2 = 25$ and $4x + 3y = 25$ meet at exactly one point whose coordinates are $(4, 3)$.

Again, the graphs of $4x + 3y = 25$ and $x = 0$ intersect at one point i.e., (y -intercept) at

$$\left(0, \frac{25}{3}\right)$$
, whereas $x^2 + y^2 = 25$

and $x = 0$ intersect at two points i.e., $(0, 5)$ and $(0, -5)$.

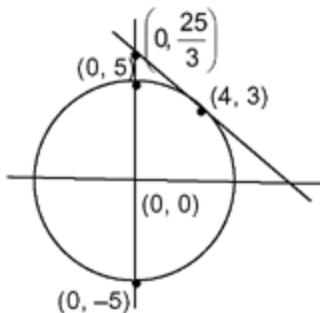
Hence, there are a total of four distinct points at which any two of the three given graphs meet.

Alternate solution:

By observation $4x + 3y = 25$, is a straight line and $x^2 + y^2 = 25$ is a circle with centre $(0, 0)$. Now, the perpendicular distance of the centre $(0, 0)$ from the straight line

$$4x + 3y - 25 = 0 \text{ is } \frac{|4(0) + 3(0) - 25|}{\sqrt{4^2 + 3^2}} = 5. \text{ Since this is equal to the radius of the}$$

circle, the straight line is tangent to the circle. Hence, we get a total of four distinct points (as explained in the above solution).



Choice (D)

Q26. DIRECTIONS for question 26: Type in your answer in the input box provided below the question.

If in a GP, the sum of the first n terms is P ; the sum of the first $2n$ terms is $9P$, and the sum of the first $3n$ terms is kP , find k .

Type in '0' as your answer, if you think that the answer cannot be determined.

Let the first term and the common ratio of the GP be a and r respectively. Now,
 Sum of the first n terms = $(a + ar + ar^2 + \dots + ar^{n-1}) = P$. [Sum of the first N terms]
 Sum of the next n terms = $(ar^n + ar^{n+1} + \dots + ar^{2n-1}) = r^n(a + ar + \dots + ar^{n-1}) = r^n P$
 It is given that Sum of the first $2n$ terms = $(a + ar + ar^2 + \dots + ar^{2n-1}) = 9P$.
 $\therefore (a + ar + \dots + ar^{n-1}) + (ar^n + ar^{n+1} + \dots + ar^{2n-1}) = 9P$
 $(a + ar + \dots + ar^{n-1})(1 + r^n) = 9P$
 $P(1 + r^n) = 9P$
 $\Rightarrow r^n = 8$
 Now, Sum of the next n terms = $ar^{2n} + ar^{2n+1} + \dots + ar^{3n-1} = r^{2n}(a + ar + \dots + ar^{n-1})$
 $= (r^n)^2 P$
 $= 8^2 P$
 $= 64P$
 \therefore Sum of first $3n$ terms = $(a + ar + \dots + ar^{n-1}) + (ar^n + ar^{n+1} + \dots + ar^{2n-1}) +$
 $(ar^{2n} + ar^{2n+1} + \dots + ar^{3n-1})$
 $= P + 8P + 64P$
 $= 73P \Rightarrow k = 73.$

Note: In a G.P, the sum of the first n terms, the next n terms, the n terms after that, and so on, are also in G.P (with a common ratio of r^n).

Alternative Solution:

Let $n = 1$
 \Rightarrow First term = P and sum of first two terms = $9P$
 \Rightarrow Second term = $9P - P = 8P$
 \Rightarrow common ratio = 8 and third term = $64P$.
 Hence, required sum = $P + 8P + 64P = 73P$.

Ans: (73)

Q27. DIRECTIONS for question 27: Select the correct alternative from the given choices.

How many positive integral values of n exist, such that $\frac{n+76}{n+4}$ is an integer?

- a) 5
- b) 6
- c) 7
- d) 8

$$m = \frac{n+76}{n+4} = \frac{n+4+72}{n+4} = 1 + \frac{72}{n+4}$$

For m to be an integer, 72 must be divisible by $n+4$ i.e., $n+4$ must be a factor of 72.

$$72 = 2^3 \times 3^2 \text{ number of factors} = (3+1)(2+1)$$

$$= 12$$

Therefore $n+4$ can take 12 values of which 1, 2, 3 and 4 are not admissible as n must be positive. Thus 8 values are possible. Choice (D)

Q28. DIRECTIONS for question 28 and 29: Type in your answer in the input box provided below the question.

In how many ways can six different fruits be given to three boys, such that each boy gets a different number of fruits and each boy gets at least one fruit?

The fruits needs to be divided into 3 groups consisting of 3, 2 and 1 fruits respectively.
This can be done in ${}^6C_3 \times {}^3C_2 \times {}^1C_1 = 60$ ways.

Now these 3 groups can be distributed among the 3 boys in $3!$ ways.

$$\therefore \text{The total number of ways} = 60 \times 6 = 360.$$

Ans: (360)

Q29. DIRECTIONS for question 28 and 29: Type in your answer in the input box provided below the question.

A person, A, starts descending from the first floor of a building to the ground floor, on a descending escalator. Simultaneously, another person, B, starts ascending from the ground floor of the building to the first floor, using the same escalator. If the speed of B is twice that of A, and A and B take 30 steps and 120 steps respectively to reach their destinations, find the number of steps that are visible on the escalator when it is stationary.

Let the speed at which the escalator is descending be e steps per second.

Let the time taken by A be t seconds.

$30 + te$ = Total number of steps in the escalator.

In the time A covers 30 steps, B would cover 60 steps.

As B has covered 120 steps so the time taken must be $2t$.

$120 - 2te$ = Total number of steps in the escalator

$$\therefore 30 + te = 120 - 2te$$

$$3te = 90$$

$$\Rightarrow te = 30.$$

Thus the total number of steps visible on the escalator.

$$= 30 + te = 60$$

Ans: (60)

Q30. DIRECTIONS for question 30: Select the correct alternative from the given choices.

If the rate of simple interest on a certain sum becomes one and a half times what it is, then what would be the percentage reduction in the time taken for the sum to become three times itself?

a) 20%

b)

$33 \frac{1}{3} \%$

c)

$66 \frac{2}{3} \%$

d) 50%

$$\text{As } p + \frac{npr}{100} = 3p$$

$$nr = 200$$

Now, n and r are inversely proportional to each other, so if r is increased by 50%, it

becomes $\frac{3}{2}$ times itself, so n will become $\frac{2}{3}$ times itself, i.e., it will decrease by

$33 \frac{1}{3} \%$.

Choice (B)

Q31. DIRECTIONS for question 31: Type in your answer in the input box provided below the question.

Two persons, A and B, simultaneously started running, from the same point, around a circular track, in the same direction, and met each other for the first time after 15 min from the start, during which time B had completed exactly five laps. Instead, if they had run in opposite directions, after how many minutes from the start would their 11th meeting have taken place, given that the speed of A is more than the speed of B?

Speed of A > Speed of B

On a circular track, starting simultaneously and moving in the same direction, two bodies meet for the first time when the faster body takes a lead of one complete lap over the slower body.

| Number of laps | B | A | Total |
|----------------|---|---|-------|
| | 5 | 6 | 11 |

Together they complete 11 laps in 15 minutes. When moving in opposite directions, they will meet every time they together complete one lap. Therefore 11th meeting will take place when they together complete 11 laps, i.e., after 15 minutes.

Ans: (15)

Q32. DIRECTIONS for question 32: Select the correct alternative from the given choices.

The provisions for a garrison of 240 men are sufficient to last for exactly 120 days. If after the first 40 days, a reinforcement of 60 men joins the garrison and every person decreases his daily consumption by 20%, for how many days more or less than the scheduled time will the provisions last?

- a) 10 days less
- b) 12 days more
- c) 40 days more
- d) None of the above

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

Quantity of provision left after 40 days.

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

Let the remaining quantity of food last for d days

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

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

$$\Rightarrow d = 80$$

\therefore The provisions will get over as per the scheduled time.

Choice (D)

Q33. DIRECTIONS for question 33: Type in your answer in the input box provided below the question.

If the sum of the interior angles of a convex polygon is seven times the sum of its exterior angles, how many sides does the polygon have?

The sum of all the exterior angles of any convex polygon is 360° .

Let the number of sides of the polygon be n

Sum of all the interior angles = $(n-2) 180^\circ$

It is given that $(n-2) 180^\circ = 7(360^\circ)$

$$\Rightarrow n-2 = 14$$

$$\Rightarrow n = 16.$$

Ans: (16)

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

If $S = 1 - \frac{4}{3} + \frac{9}{3^2} - \frac{16}{3^3} + \frac{25}{3^4} - \frac{36}{3^5} + \dots$, the value of S =

a) $\frac{9}{32}$

b) $\frac{7}{25}$

c) $\frac{11}{36}$

d) $\frac{13}{45}$

Considering $\frac{1}{3} = x$, we get,

Let $S = 1 - 4x + 9x^2 - 16x^3 + 25x^4 - 36x^5 + \dots$ where $x = \frac{1}{3}$.

$$\begin{aligned}\therefore Sx &= x - 4x^2 + 9x^3 - 16x^4 + 25x^5 \\ S(1+x) &= 1 - 3x + 5x^2 - 7x^3 + 9x^4 - 11x^5 + \dots\end{aligned}$$

$$\begin{aligned}xS(1+x) &= x - 3x^2 + 5x^3 - 7x^4 + 9x^5 - \dots \\ S(1+x)^2 &= 1 - 2x + 2x^2 - 2x^3 + 2x^4 - 2x^5 + \dots \\ S(1+x)^2 &= 1 - 2x \{1 - x + x^2 - x^3 + \dots\} \\ S(1+x)^2 &= 1 - \frac{2x}{1+x} \\ S(1+x)^2 &= \frac{1-x}{1+x}. \\ \therefore S &= \frac{1-x}{(1+x)^3}.\end{aligned}$$

Now, substituting $x = \frac{1}{3}$, we get

$$S = \frac{1 - \frac{1}{3}}{\left(1 + \frac{1}{3}\right)^3} = \frac{2}{3} \times \frac{3^3}{4^3} = \frac{9}{32}.$$

Choice (A)