

CAT Exam

Sample Paper – 03

VARC

Direction (1–4): Read the following passage and answer the question that follows.

George Orwell's most acclaimed work, 1984, is a dystopian novel set in a futuristic surveillance society. The term Orwell coins in the book for this type of culture is "oligarchical collectivism". Set in the fictional Oceanian colony of Airstrip One (formally Britain), the narrative charts the fall of rebellious propagandist Winston Smith. Written as he lay dying of tuberculosis, the novel illustrates Orwell's fears for the future in the aftermath of World War II. In a totalitarian state led by the Stalinesque Big Brother, the individual has lost virtually all of their rights. Civil liberties are non-existent and total control is maintained through a combination of propaganda, brainwashing and physical punishment. So adept is Orwell at creating his dystopian world, that his very name is now synonymous with totalitarian regimes, while words such as "newspeak" and "doublethink" have integrated their way into mainstream lexis.

Recent events during the War had left a left a marked impression on Orwell, with inherent references to Communism and Fascism littering the narrative. Figures such as Josef Goebbels had shown just how damaging propaganda and psychological manipulation could be in the wrong hands. In 1984, the Party utilises a number of different population control devices to keep the nation under the yolk of imperial oppression.

Big Brother is the Party's enigmatic leader. The parallels between him and Stalin are glaringly obvious, even down to his physical appearance. On the opening page he is described as "...a man of about forty-five with a heavy black moustache and ruggedly handsome features." He is the primary symbol of the Party's propaganda machine and is ambiguous in his very nature. Big Brother represents the image of the Party that has been created for public consumption. His name suggests a protective nature; that he will nurture and protect the population, who are of the

same flesh and blood as he. Yet he is simultaneously intimidating and somewhat threatening as his gaze cannot be avoided. Each picture is emblazoned with the slogan "BIG BROTHER IS WATCHING YOU" and the posters are so numerous that Winston is rarely out of sight of one. His face is described as "simply enormous" and gazes "down from every commanding corner". It is this dichotomy of protection and intimidation that Orwell's Party utilises to instil obedience in its citizens.

From the reader's perspective, it is unclear as to whether or not Big Brother is even a real person. Orwell presents several possibilities. It could be that he is a literal figure and is the dictator at the head of the Party or he may well not exist at all and is merely a character created for the purposes of propaganda. A third option is that he was a real character during the 'great purges' but the legend has since far superseded the real man and it is quite possible that he is no involved with the Party or perhaps not even alive. This is an issue that Orwell never resolves in his narrative and indeed there is evidence to support all of these theories within the text. Even his protagonist is deliberately uncertain as to Big Brother's real origins. Orwell tackles the subject through Winston's interior monologue.

On page 36 Winston says, "The story really began in the middle sixties, the period of the great purges in which the original leaders of the Revolution were wiped out once and for all. By 1970 none of them was left, except Big Brother himself. All the rest had by that time been exposed as traitors and counter-revolutionaries." This quotation would support the notion that Big Brother is in fact a real man and is indeed the autocratic leader of the Party. He could, however, just as easily represent a group or collective.

1. **All of the following inferences from the passage are false, EXCEPT:**

- (a) Big Brother is a fictional character created by the Party solely for the purpose of propaganda.

- (b) Orwell's 1984 focuses on the fall of Winston Smith and demonstrates the impact of totalitarian regimes on individual rights.
- (c) Orwell's 1984 is primarily a critique of the British government during the post-World War II era.
- (d) The Party's utilization of Big Brother's image is meant to evoke a sense of love and trust in the citizens without any intimidation.

2. Which one of the following statements best captures the sense of the first paragraph?

- (a) The first paragraph focuses on the role of propaganda in 1984, highlighting its effectiveness in controlling the population.
- (b) The first paragraph primarily describes the setting and themes of 1984, emphasizing the bleakness of a dystopian surveillance society.
- (c) The first paragraph delves into the historical events that influenced Orwell's writing, specifically World War II and its aftermath.
- (d) The first paragraph explores the character of Big Brother, comparing his appearance and role to that of Stalin.

3. Based on the details in the passage, which of the following best captures the underlying implications of George Orwell's '1984'?

- (a) The novel serves as a critique of totalitarianism, underscored by the pervasive influence of World War II and its aftermath.
- (b) Orwell's novel is a nuanced narrative on the excesses of unregulated capitalism and its societal impacts.
- (c) '1984' expresses Orwell's deep-seated concerns about the potential effects of extreme collectivism in society.
- (d) The book warns against the potential dangers of losing individual freedoms to an surveillance state.

4. As per the information given in the passage, what could be the possible roles or identities of Big Brother in '1984'?

- (a) Big Brother could represent the embodiment of an authoritarian regime and its mechanisms of control.
- (b) Big Brother is conclusively an individual who is the physical leader of the Party.
- (c) Big Brother might symbolize an abstract concept created for the purpose of Party propaganda.
- (d) Big Brother could stand for a collective entity representing the Party, rather than an individual.

Direction (5–7): Read the following passage and answer the question that follows.

The theme of misogyny and patriarchy arises through the presentation of the minor female characters as well as Bianca and Katherine. The fact that Shakespeare chooses not to give Hortensio's 'Widow' her own name creates the impression of her as someone with no individual existence of her own. Her name is defined by her husband's death, suggesting the men in her life therefore define her and her disposition also illustrating their control over her. Shakespeare is trying to convey society at the time's views and their treatment of women; how women were repressed by male-centred societies and classed as subservient while men were superior and had power over women in the late 16th century.

Also the "wealthy widow" was Hortensio's second choice to Bianca, he very swiftly moves on after he declares he is "never to woo her more" saying he will marry "ere three days pass". Shakespeare does this to illustrate to the audience how dismissive men were of women, he uses Hortensio's attitudes towards Bianca as an example of society's attitudes towards women at the time. Shakespeare based the character of Bianca on the stock character of 'Ingénue', a young woman who is beautiful, gentle, sweet and virginal. However once Hortensio realises she is a "proud disdainful haggard", Hortensio quickly "forsores her as one unworthy of all the former favours that I have fondly flattered her with". By using fricative alliteration, Shakespeare makes Hortensio's anger and feelings of disgust at Bianca's actions clear to us. This shows us that Hortensio only wanted Bianca when she was obedient and submissive representing how women were judged by their appearances and Bianca was only sought after and made

endearing due to Shakespeare's first presentation of her as a chaste and wholesome "young modest girl". Hortensio then goes on to say that he requires "kindness of women", portraying a stereotypical male chauvinist attitude toward women's role in the Elizabethan era, to what is expected of a woman and how they should offer "love, fair looks and true obedience" to their husbands because they have "such a duty as the subject owes a prince".

In Act 5 Scene 2, the widow becomes insubordinate and refuses to come when asked by her husband. "She says you have some goody jest in hand" showing how the widow is in control of the situation and thus representing her control over her marriage to Hortensio; this is backed up when Petruchio claims that "Hortensio fears his widow". By doing this Shakespeare presents the widow as a strong character which juxtaposes the earlier interpretation that she is weak and controlled by men due to the name given to her. This oxymoronic presentation of the widow suggests that Shakespeare did not intend the play to seem misogynistic but instead he was actually trying to put across his view that society's treatment of women was imprudent. Bill Alexander wrote "on one level *Shrew* is about the power of theatre to change people, to actually make people see themselves, and you, through seeing life reproduced on the stage." I believe Shakespeare wanted his audiences to view his play and then reflect on their own treatment of women in general; this allows 'The Taming of the Shrew' to be relevant when viewed in any time period, and not just when women were considered to be beneath men.

5. Which one of the following, if true, would not undermine the argument that Shakespeare intended 'The Taming of the Shrew' to criticize society's treatment of women in the late 16th century?
 - (a) Shakespeare named all female characters only in relation to their male counterparts.
 - (b) The Taming of the Shrew' was a comedy meant to entertain audiences without any deeper message.
 - (c) Shakespeare used the character of the Widow to challenge societal expectations of women.

(d) The character of Bianca is an example of a woman who conforms to societal expectations of obedience and submission.

6. Which one of the following sets of words and phrases serves best as keywords of the passage?
 - (a) Hortensio, misogyny, patriarchy, widow, Bianca, Ingénue, Elizabethan era
 - (b) Shakespeare, marriage, death, obedience, subservient, stock character
 - (c) Power of theatre, Bill Alexander, late 16th century, chaste, wholesome
 - (d) Fricative alliteration, subject owes a prince, men's control, namelessness
7. On the basis of the information in the passage, all of the following are true about the portrayal of women in "The Taming of the Shrew" EXCEPT that it:
 - (a) showcases the misogyny and patriarchal attitudes of the late 16th century.
 - (b) implies that women's worth is determined by their obedience and submission.
 - (c) presents women as assertive and independent from the beginning of the play.
 - (d) uses the character of the widow to challenge the perception of women being weak and controlled by men.

Direction (8–12): Read the following passage and answer the question that follows.

Samuel Beckett's *Endgame*, like most of his works contain many comedic features, but they are not traditional comedies. In a sense, they can be called black comedy—they feature tough and distressing subjects and use characters in depressing situations that are dealt in a humorous way. Beckett's major plays were written during the years after World War II. He lived and worked alongside the French Resistance until 1942 to undermine the Nazi control in Paris that was occupied by Germany. Post-war Europe brought to trend what was called absurdist drama, which was then popularised by Martin Esslin (1961), a theatre scholar, the term "Theatre of the

Absurd", in which he dissected plays and dramas that most closely associated with 'absurdist characteristics'. Such plays present actions and characters in which a lack of purpose and self-determination create uncertainty, anxiety, hopelessness and humour. *Endgame* commentates on the unsettling human conditions, as well as the nature of existence; that life and our existence in it is meaningless. It also explores that it is absurd to try to find or shape some kind of meaning, which will be explored through the characters of Hamm, Clov, Nell and Nagg.

Particular events in the play are dark and comical, to the point that seem quite absurd and unnatural. Like Nell states, "Nothing is funnier than unhappiness". One of these events is Nagg and Nell's kissing routine, where Nell seems to get tired of it and asks to no one in particular, "Why this farce day after day?". Yet as the only sense of reality, Beckett elevates the tension by pointing out Nagg's missing tooth. His character is the oldest, yet the most childlike. He is trying to maintain a sense of humour, to keep his spirits up. But he has his rare moments of vulnerabilities. One of them is when his wife asks why he keeps telling his joke, and he replies with "to cheer you up". The other is when he knocks on Nell's bin and she does not reply, leading to him sinking back into his bin to cry. The other routine is where Hamm carries around a stuffed three-legged dog—a tragically routine that occurs daily, yet humorous as it means no harm. There is also Clov who despite knowing what he says is untrue, but just to appease the Blind Ham, he tells him exactly what he wants to hear about the dog's appearance. This scene is also quite ridiculous. The absurd requests that Hamm makes towards the dog, telling Clov to decorate it with ribbons, asking him (Clov) to speak when the dog looks at him making the dog stand upright on his three legs. Eventually, he throws away the dog because he is angry at it and calls it a "dirty brute". Dark humour is a representative of the philosophy of the theatre of the absurd and throughout the play, Beckett uses displays through the actions of the characters, even if they are a daily occurrence and consecutively enables the reader to know that actions of these characters are ridiculous and irrational.

Beckett's characters have an awareness of their fate, their misery. Clov confesses that he has never been happy, while

Hamm hates and blames his parents for giving birth to him and throwing him in such a dreadful life. While some people choose to indulge in their suffering and pain, others take it out on those that surround them. Nell is the nicest character in the play, yet she is in visible despair. When she hears Hamm complain about something dripping in his head and wondering whether it is his heart, he laughs.

8. Based on the passage's exploration of *Endgame*, identify the inaccurate representation of the play:
 - (a) Dark humor is a principal tool in conveying the philosophy of the Theatre of the Absurd.
 - (b) The characters in the play live oblivious to their state of desolation and suffering.
 - (c) The play delves into the existentialist thought that life and our existence within it is devoid of meaning.
 - (d) The play integrates routines that oscillate between the boundaries of absurdity and humor.
9. Which of the following inferences would not hold validity considering the context of the passage?
 - (a) *Endgame* stands as Beckett's embodiment of the Theatre of the Absurd.
 - (b) The characters in *Endgame* are encapsulated by an air of hopelessness and despair.
 - (c) Traditional family values serve as a comforting mechanism for the characters in *Endgame*.
 - (d) The play integrates elements of dark humor and absurd situations.
10. Which of the following encapsulates the core essence of Samuel Beckett's *Endgame* as per the information presented in the passage?
 - (a) The play is a conventional comedy emphasizing the amusing aspects of life.
 - (b) *Endgame* offers commentary on the human condition and the essence of existence, using elements of dark humor and absurdity to showcase life's lack of inherent meaning.
 - (c) The play is an extensive historical narrative of post-war Europe and the emergence of absurdist drama.

- (d) Endgame celebrates life and human spirit, incorporating light-hearted humor to uplift the audience's mood.

11. Which one of the following statements best reflects the main argument of the second paragraph of the passage?
- (a) Beckett's characters in Endgame are aware of their fate and misery.
 - (b) The absurdity of Endgame is used to explore the nature of existence and the human condition.
 - (c) The play primarily focuses on the relationship between Hamm and Clov.
 - (d) Endgame is a prime example of a traditional comedy.
12. In this passage, the author is making the claim that:
- (a) Beckett's works are solely about the hopelessness of post-war Europe.
 - (b) Endgame is a black comedy that reflects the philosophy of the Theatre of the Absurd.
 - (c) The characters in Endgame are meant to portray the French Resistance during World War II.
 - (d) Beckett uses dark humor to criticize the actions of the Nazi regime in Paris.

Direction (13–16): Read the following passage and answer the question that follows.

In the early 1900s, the Joseon Empire of Korea was deeply agrarian. Komatsu Midori, an official of the Japanese foreign ministry during the Japanese annexation of Korea (1910–1945), described his first hand experiences, stating that "commerce in its true sense did not exist in Korea. The only branch of human activity remaining in the country was agriculture" (Midori).

Because South Korean history in the 20th century was one wrought with political strife and warfare that interrupted and destroyed their attempts at development and modernization, South Korea's industrial state remained relatively unchanged after World War II. Indeed, South Korea was one of the world's poorest countries until the 1960s, lacking both domestic capital and the natural resources necessary to attract foreign investors. However,

in less than a century, South Korea was able to miraculously transition from a developing state with minimal production and commerce to the economic powerhouse it is today.

Surmounting all odds, South Korea grew at an average annual growth rate of 9% between the 1960's – 1990s with a hundredfold increase in per capita income. For this reason, historians call this period of rapid growth and industrialization The Miracle on the Han. During this time, the South Korean government implemented interventionist policies and reforms to promote export-oriented industrialization that caused South Korea's extraordinary boom in economic growth.

The first important form of government intervention was Land Reform on agricultural land during the early years of the presidency of Syngman Rhee (1948 to 1960). Until then, South Korea had a land tenure system, where in 1930, 77.5% of farmers were tenants who paid up to 60% of their annual crop yields to mostly absentee landlords, or yangban, who controlled around two thirds of total farmland. The tenure system caused the formation of a very small wealthy aristocracy, the yangban, but kept the majority of the population in a cycle of chronic poverty as subsistence farmers, burdened by hefty rent and taxes.

Complete lack of expendable income for most of the population inhibited social mobility and economic diversification, especially since very few rural families could send their children to school or spend money on anything but food and basic necessities. The system also limited agricultural production as there was no incentive for tenant farmers to be more efficient by increasing input supply or improving technology as only the absentee landlords would reap the benefits. The faulty system persisted during the Japanese occupation because the yangban would inevitably have surplus crops which the Japanese authorities wanted to import.

At the beginning of Rhee's presidency, urgent reforms were called for and procured in the form of the Land Reform Act of 1950. The purpose of the act was, as set forth in its own first article, "to improve the living conditions of farmers [and] to keep the balance of and to

develop the national economy by increasing agricultural productivity". The reforms effectively abolishing tenancy by setting the limit for maximum farm size at 7.35 acres causing the redistribution of 577 chungbos of land to 1.6 mil farmers. This had two main impacts.

First, a new commoner class emerged of land-owning farmers who were no longer burdened by high rent costs and were incentivized to increase production (Lew and Im). This increase in agricultural production created a strong foundation for population increases and meant that fewer farmers were needed to sustain the population, allowing for less focus on agriculture.

Second, because the previous landowners could no longer invest their money in land, they invested in businesses and schools. The presence of more schools combined with the ability of families to send children to school meant that modern education increased rapidly after 1953 which is why, between 1945–1960, enrollment in higher education increased tenfold (Seth). By 1961, South Korea had a well-educated young workforce which built the foundation for later economic growth.

13. Which of the following was NOT a consequence of the Land Reform Act of 1950, according to the passage?
- (a) The emergence of a new commoner class
 - (b) Rapid modernization of education
 - (c) Decrease in the population of farmers
 - (d) Increased emphasis on the service sector
14. Which statement best reflects the overall argument made in the passage?
- (a) South Korea's economic success can be solely attributed to the Land Reform Act of 1950.
 - (b) The Land Reform Act of 1950, combined with government interventionist policies, laid a strong foundation for the significant economic growth experienced in South Korea during The Miracle on the Han.
 - (c) South Korea could not have achieved its economic success without foreign aid.

- (d) The success of South Korea's economy lies in its rapid industrialization during the late 1900s.

15. Which one of the following statements best summarizes the author's position about the role of land reforms in South Korea's economic transformation?
- (a) Land reforms played a minor role in South Korea's economic transformation, as they only affected a small percentage of the population.
 - (b) Land reforms were the primary driver of South Korea's economic transformation, as they directly led to the industrialization of the country.
 - (c) Land reforms were a crucial first step in South Korea's economic transformation, as they enabled the growth of a well-educated workforce and increased agricultural productivity.
 - (d) Land reforms had no significant impact on South Korea's economic transformation, as they were overshadowed by the government's export-oriented industrialization policies.
16. The passage implies that the land tenure system in South Korea prior to 1950:
- (a) Contributed to a strong economy by enabling a small group of landlords to control most of the farmland.
 - (b) Limited agricultural productivity by dissuading tenant farmers from investing in efficiency improvements.
 - (c) Helped maintain social balance by distributing wealth evenly among landlords and tenant farmers.
 - (d) Provided a source of national income through high rent and tax payments
17. Carefully read the statements in the questions below and arrange them in a logical order. [TITA]
- (1) The concept of creative destruction emphasizes the importance of innovation in shaping the economy.

- (2) Creative destruction leads to the replacement of old, outdated industries with new, more efficient ones.
- (3) Joseph Schumpeter, an Austrian economist, coined the term "creative destruction" to describe the process of industrial mutation.
- (4) This process continually revolutionizes the economic structure from within, incessantly destroying the old one, and creating a new one.

18. Carefully read the statements in the questions below and arrange them in a logical order. [TITA]

- (1) Green bonds finance projects with positive environmental impacts, such as renewable energy and clean transportation.
- (2) To encourage sustainable development and combat climate change, financial markets have introduced green bonds.
- (3) Green bonds have specific criteria that must be met, ensuring the projects they finance are indeed environmentally friendly.
- (4) Investors who purchase green bonds contribute to financing projects that aim to reduce the impact of climate change.

19. Carefully read the statements in the questions below and arrange them in a logical order. [TITA]

- (1) The use of AI has led to concerns about its ethical implications, such as algorithmic bias and privacy violations.
- (2) Artificial intelligence (AI) has the potential to revolutionize various industries, from healthcare to transportation.
- (3) Companies need to implement AI responsibly by considering its potential consequences and addressing ethical concerns.
- (4) As AI technology continues to develop, its applications become more widespread and integrated into daily life

20. Carefully read the statements in the questions below and arrange them in a logical order.

- (1) Emissions trading systems have been implemented in various countries to help combat climate change.
- (2) The demand for renewable energy sources has grown as a result of these systems, driving the growth of industries like solar and wind power.
- (3) Companies that produce fewer emissions than their allocated limit can sell their surplus allowances to other companies that have exceeded their limit.
- (4) Emissions trading systems create a market for greenhouse gas emissions by allocating a limited number of allowances to companies based on their emissions levels.

21. Read the following passage and answer the question that follows:

Nature is famously, gloriously complex. But it wasn't always so. When the Earth was young, physics ruled. Steam spewed from prodigious volcanoes and seeped through the cracked surface, transforming our planet into an ocean-covered mass, circling in the darkness. The physics that governs a phase change from steam to water in the oceans is as true today as it was 4.5 billion years ago. Gas would turn to liquid on any planet at any time, so long as the temperature and air pressure oblige. Then, as now, the laws of physics were predictable and straight forward. But the history of life that followed from that fateful phase change didn't proceed along such a simple trajectory. Its evolution over billions of years defies simple rules and predictable outcomes. Nature became a complex system, a tangled web of invisible connections. As nature's intricacy ramped up, it brought with it opportunities for expansion, but also possibilities for annihilation. Fortunately, with each problem that arose, a strategy evolved to overcome it.

Which of the following best summarizes the passage?

- (a) The Earth's evolution is a predictable progression from a simple physical state to a complex natural system.
- (b) The laws of physics governed the early Earth, creating an environment for the emergence of life.
- (c) The transition from a physics-driven Earth to the complex natural system defies simple rules and predictability.
- (d) The development of life on Earth is a response to the various challenges posed by nature's increasing complexity.

22. Read the following passage and answer the question that follows:

The U.S wanted to sustain their successful economy by bringing the idea of expansion to light, they brought on imperialism. Imperialism was a policy that incorporated the expansion of power and military force. Their biggest competitor was Britain whose military force was far greater than that of the U.S. Throughout the 19th century, Imperialism also led to the creation of unions such as the AFL and they Knights of Labor. Integrated into Imperialism was Manifest Destiny, which was a belief that it was our God given right to settle in a new land. Manifest Destiny existed globally and was involved in the Spanish–American war when Spain surrendered their islands. The ultimate idea of Manifest Destiny was to rule as much of the nation and advise the ones that were less fortunate. The side that influenced support for Imperialism, were motivated by economics. They wanted to be able to maintain a successful economy and also gain natural resources such as land. The fact that the U.S was doing very well economically, it did not stop them for wanting to seek a much bigger profit, that would come with expansion, also known as Imperialism. It was thought that Imperialism was economically beneficial because it had cheap labor cost and would allow for more control in the trade market, which would also lead to more control over their profit.

Which of the following best summarizes the passage?

- (a) The passage primarily discusses the role of Manifest Destiny in American history.
- (b) The passage outlines the motivations and economic benefits of Imperialism for the United States.
- (c) The passage focuses on the competition between the United States and Britain in the 19th century.
- (d) The passage highlights the role of labor unions in promoting Imperialism in the United States.

23. Which of the following is the ODD ONE OUT?

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

- (a) In ancient Greece, inscriptions on stone monuments were also used as a way to deliver a ruler's message, such as the decrees of Gortyn, which outlined the legal system of the city.
- (2) The fact that Ashoka's edicts were not confined to one language showcases the emperor's understanding of diversity in his vast kingdom.
- (3) On Ashoka's pillars, there is an underlying ethos of moral and ethical conduct, encouraging subjects to strive towards virtuous living.
- (4) Following Ashoka's footsteps, his successors also used edicts on rocks and pillars as tools to propagate their messages and govern their realms effectively.
- (5) Throughout his reign, Ashoka made use of vernaculars, Greek, and Aramaic, to communicate his vision to a diverse set of populations, with the intention of inspiring people from all walks of life.

24. Which of the following is the ODD ONE OUT?

Five sentences related to a topic are given below. Four of them can be put together to form a

meaningful and coherent short paragraph. Identify the Odd One Out.

- (1) Mars also holds vast quantities of iron oxide, which could potentially be used for the creation of steel, an essential material in construction.
- (2) The process of electrolysis, which breaks water into hydrogen and oxygen, can be harnessed on Mars to create breathable air and potential rocket fuel.
- (3) Since Mars is smaller and has a thinner atmosphere than Earth, it has less gravitational pull, making the launch of return missions to Earth less energy-consuming.
- (4) The Martian atmosphere, predominantly made of carbon dioxide, could be used to synthesize methane, which can act as a potent fuel source.
- (5) Abundant water ice on Mars is a significant asset as it can be melted for drinking, and utilized for various chemical processes.

LRDI

Directions (25–29): Read the following information and answer the question the follows:

A business strategy competition was conducted in which 5 schools A, B, C, D and E participated in the final round. The event was finally won by school C. The following table gives the number of girls from A, B, D and E who participated in the event as a percentage of the total students from school C who participated in the event.

School	%
A	40
B	15
D	25
E	20

It is also known that the ratio of the number of girls to boys in the schools A, B, D and E who participated in the event was 1:3, 3:2, 4:3 and 5:3 in no particular order.

25. If it is known that 80 students participated from school C, find the difference between the number of boys who participated from school B and school D?
 - (a) 4
 - (b) 6
 - (c) 8
 - (d) Can not be determined
26. It is known that the number of boys who participated from schools A, B, D and E were 14, 24, 27 and 30 in no particular order. Find the maximum number of students who participated from the four schools put together?
 - (a) 235
 - (b) 225
 - (c) 210
 - (d) Cannot be determined
27. It is known that 180 students participated from school C. The maximum number of students who participated is from which school?
 - (a) A
 - (b) B
 - (c) E
 - (d) Cannot be determined
28. It is known that 80 students participated from school C. Which among the following can be the ratio of the number of boys who participated from school A to the total number of students who participated from school B?
 - (a) 5 : 6
 - (b) 6 : 5
 - (c) 1 : 1
 - (d) Cannot be determined
29. It is known that 180 students participated from school C. Find the number of boys who participated from school D?
 - (a) 27
 - (b) 45
 - (c) 72
 - (d) 36

Directions (30–34): Read the following information and answer the question the follows:

Six companies – McKinsey, JPMC, Goldman, Citi, Bank of America and HUL – went to 8 different B-schools – C1, C2, ..., C8 – to hire the students. The number of students hired from a B-school is different for every company. The table shown below comprised the number of students hired from the B-schools by the 6 companies. However, some cells are left blank intentionally in the

table. But it is known that these values were either 3,1 or 0.

	Mc-Kinsey	JPMC	Gold-man	Citi	Bank of America	HUL
C1	35		12			15
C2		20	9		23	
C3	24		22	35	9	7
C4	21	24		15		26
C5		25		17		27
C6	38		13		37	
C7	10	18	17			
C8		10	25			16

- (1) Only McKinsey and JPMC hired a different number of students from each B-school.
- (2) The total number of students hired by all these companies from B-school C3 was 13 more than that from B-school C4.
- (3) Goldman hired at least one student from each of these eight B-schools.
- (4) Goldman hired more students than what HUL hired but less students than what JPMC hired.
- (5) Sum of the number of students hired by Citi from C1, C4 and C8 is equal to the number of students hired by Goldman from C7 alone.
- (6) Total number of students hired from the B-schools C5 by all the six companies was 1 more than the total number of students hired by Citi from all the eight B-schools. Similarly, the total number of students hired from the B-school C3 was 3 more than the total number of students hired by HUL from all the 8 B-schools.

30. If Citi hired the same number of students from B-school C6 and C7, then how many students did HUL hire from B-school C2?
31. What is the total number of students hired by all the companies taken together?
32. If 17 students, out of those hired by HUL, switch to McKinsey and JPMC next year in such a way that the new ratio of total number of students in

McKinsey and JPMC becomes 27:23, then the number of students switched to McKinsey is how much less than those who switched to JPMC?

33. What is the number of students hired by Bank of America from college C5?
(a) 0 (b) 1
(c) 3 (d) Cannot be determined
34. What is the number of students hired by Bank of America from college C7?
(a) 0 (b) 1
(c) 3 (d) Cannot be determined

Directions (35–39): Read the following information and answer the question the follows:

Twelve people were born in a given year on different days. The months in which they were born are March, April, May, June, July and August and the dates are 15 and 22 of these months.

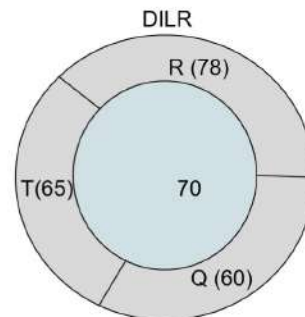
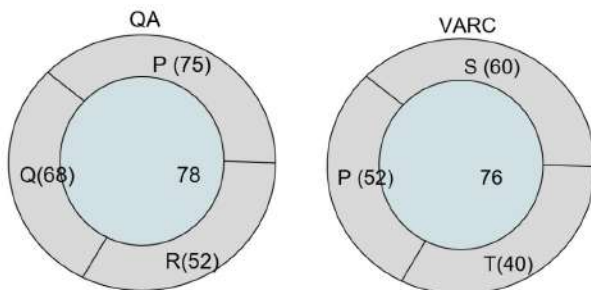
- (1) P was born in a month with 30 days on an even date.
- (2) Three people were born in between U and P.
- (3) Five people were born in between R and U.
- (4) R was born before U.
- (5) Two people were born in between M and R and M was born in April.
- (6) S was born immediately after M.
- (7) T was born on 22nd of a month but not in July.
- (8) N was born before V in the same month.
- (9) W was born in a month having 30 days.
- (10) Q was born before L but after Y.

35. How many people were born in between Q and V?
(a) 4 (b) 8
(c) 7 (d) 9
36. Who among the following was/were born after W?
I. L
II. Y
III. T
(a) Only I and II (b) Only II and III
(c) Only I (d) Only III

37. The number of people born before _____ is the same as the number of people born after M.
 (a) N (b) R
 (c) Q (d) V
38. Three of the following are similar in some manner. Find the odd one.
 (a) Y (b) Q
 (c) L (d) U
39. On which date was Q born?
 (a) 15th April (b) 15th May
 (c) 22nd July (d) 15th August

Directions (40–44): Read the following information and answer the question the follows:

In recently held Common Admission Test (CAT) exam, five female friends P, Q, R, S and T were comparing their marks in of three sections namely Quantitative aptitude (QA), Data Interpretation and Logical Reasoning (DILR), and Verbal Ability and Reading Comprehension (VARC). The diagrams given below show marks scored by them in each of the sections. The outer circles represent the marks scored by three girls who scored the highest marks in that section. Also the middle circle represents the percentage of marks scored by these three girls as a percentage of total marks scored by all the five girls in that particular section. Given that no two girls scored the same marks in any of the sections and also marks scored by all the girls are integer and each girl scored at least 20 marks in each section.



To check the consistency in their scores, they devised a consistency Index (CI) which is the difference between the highest and lowest score in the three sections and a reliability index (RI), which is the middle value when the scores of each girl are arranged in increasing order.

40. Which of the following could be the score of S in the DILR section?
 (a) 26 (b) 68
 (c) 36 (d) 18
41. Which of the following can not be the score of Q in all the three sections combined?
 (a) 157 (b) 148
 (c) 150 (d) 153
42. The value of CI for which of the following girls can be highest?
 (a) P (b) Q
 (c) R (d) T
43. The value of RI for which of the following girls can be highest?
 (a) Q (b) T
 (c) R (d) P
44. If the total score (of all the three sections) are considered then which of the following girl's total scores can be highest?
 (a) P (b) Q
 (c) S (d) T

QUANT

45. Simmy has a collection of 10 different Comic cards arranged in a stack. She selects 3 Comic

cards out of these 10 Comic cards. What is the probability that no 2 Comic cards selected are adjacent to each other?

- (a) $\frac{1}{2}$ (b) $\frac{1}{3}$
(c) $\frac{2}{5}$ (d) $\frac{7}{15}$

46. A regular octagon has a side length of 4 meters. The area of the octagon is transmitted to the control center using a base-8 numbering system. What is the approximate integer value of the area in base 10 after multiplying it by the base-10 equivalent of 5? [Take $\sqrt{2} = 1.41$]

47. If x and y are non-negative real numbers such that $3x + 2y = 12$, then the average of the maximum and minimum possible values of $(x + 2y)$ is:

48. PQR Company has launched a Multi-Level-Marketing (MLM) scheme in which one person can sell products for the company and can also keep many people under him as a distributor who can again sell the products of PQR Company and can keep people (different from the ones already included in the MLM Scheme) under them. This branching can happen infinitely. For selling a product the seller gets 30% commission on the MRP. If a person A who is just above B on the chain and B directly reports to him, gets 10% commission of whatever B earns from either selling or commissions from immediate lower layer. This way of income is common for every people in the MLM branch. If the company PQR produces a product at ₹160 cost whose MRP is ₹300, then what can be the minimum profit margin of the company (in %)? [Assume that all the products are sold at MRP and no discounts are given by the sellers on MRP.]

49. There is a total of 9 bus stoppage from Arambagh to Tarakeswar. The number of types of bus tickets required in order that it may be possible to book a passenger from every stoppage to every other is M.

- (a) 210 (b) 110
(c) 72 (d) 36

50. The interest received from a sum of 15000 which is invested in scheme A that offer 10% annual rate of compound interest for 2 years is invested in scheme B that offer 20% simple rate of interest for 2 years. Find the interest amount received from scheme B.

- (a) Rs. 1540 (b) Rs. 1260
(c) Rs. 1440 (d) Rs. 1200

51. Given ΔPQR is inscribed in the semicircle with diameter PQ. The area of ΔPQR equals $\frac{2}{5}$ of the area of the semicircle. If the measure of the smallest angle in ΔPQR is m , then what is the value of $\sin(2m)$?

- (a) $\frac{\pi}{5}$ (b) $\frac{2\pi}{5}$
(c) $\frac{\pi}{10}$ (d) $\frac{\pi}{10}$

52. Let $\log_6(2x + 1) = a$, $\frac{1}{2} \log_{\sqrt{6}}(3x + 2) = b$, and $c = \log_{(4x+3)} 6 = 1$. Also, $a + b + c = \log_6(5x + 4)$. Then, if the product of the roots of the resulting equation is k , find the value of $1/|k|$.

53. What is the last digit of $[1289^{982} (962^{962} + 1563^{1563}) + 884^{884} (1676^{1676} + 1)]^{999}$?

54. A well-known EdTech company ABC buys 6 sets of DILR, 16 sets of VARC and 8 sets of Quant sectional mock test papers of CAT from a vendor where the cost of 5 sets of DILR is the same as that of 20 sets of VARC or 7 sets of Quant. They mix all the three sectional mock test papers and marks a price for the mixture in order to make a profit of \$1695. They sell 6 combined papers at this marked price and the remaining at a 16.66% discount on the marked price, thus making a total profit of \$1117. Then the amount, in rupees, that they had spent in buying DILR sectional mock test papers is:

55. In a class, there are 20 students. The average marks of all the students in English is 76 and in math is 96. If 2 students left the class, what could be the maximum decrement in the average marks in English?
 (a) 2.67 and 0 marks
 (b) 2.67 and 10.67 marks
 (c) 3 marks and 10 marks
 (d) 5 and 4 marks
56. Malinga is 25% less efficient than Bumrah. Malinga, when works alone, takes 36 days to finish the job. He works alone for 'p' days. After that, Bumrah joins him and the two work together to finish the job in exactly 28 days (counting from the day Malinga began working alone). What is the value of 'p'?
 (a) 12 (b) 20
 (c) 22 (d) 30
57. There are two canisters of the same capacity. $\frac{1}{3}$ rd of the first canister is filled with honey and $\frac{1}{3}$ rd of the second canister is filled with tea. $\frac{1}{3}$ rd of the content of the first canister is transferred to the second canister, and then the $\frac{1}{3}$ rd of this mixture is transferred back to the first canister. Next, $\frac{1}{3}$ rd of the content of the first canister is transferred back to the second canister. Then the ratio of honey and tea in the second canister is:
 (a) 12 : 25 (b) 16 : 21
 (c) 14 : 25 (d) 13 : 21
58. A number when successively divided by 12, 8 and 5 leaves respective remainders of 8, 4 and 3. What will be sum of the remainders if the original number is divided successively by 7, 3 and 2?
59. Two rectangles having same area are inscribed in a semicircle of radius R such that one of the sides of both the rectangles lie on the diameter of the semicircle. Then what is the area of the circle which circumscribes the common area of the two rectangles? It is given that the common zone between the two rectangles divides one of the rectangles into 3 equal parts.
 (a) $\frac{\pi R^2}{8}$ (b) $\frac{\pi R^2}{5}$
 (c) $\frac{\pi R^2}{3}$ (d) $\frac{1}{4}(1 - \pi R^2)$
60. Two workers are filling an empty vessel. The capacity of the vessel is 50 cups. Each worker pours a cup of liquid to it in one minute. One worker adds milk while the other naughty worker adds a cup of water after every two cups of milk that he adds. If two workers add a cup of milk/water to the vessels one cup at a time in turns, how many cups of milk will be in the vessel when the vessel is half filled?
61. There are three beakers A, B, and C with nitric acid concentrations of 18%, 16%, and 21%, respectively. Himani combined 120 ml of A with 160 ml of B. If he needs the final solution's concentration to be between 17 and 19 percent, what is the sum of the maximum and minimum amounts of C (in ml) that he can add to the solution of A and B?
62. If one of the roots of the quadratic equation $(ax^2 + bx + c) = 0$ is $(5 + 2\sqrt{6})$ where a & c are natural numbers with the same absolute value, then find the value of p so that $(cx^2 + px + a) = 0$ whose one root is $(3 + 2\sqrt{2})$
 (a) $\frac{3b}{5}$ (b) $\frac{4c}{\sqrt{2}}$
 (c) $\frac{b}{\sqrt{3}}$ (d) All of the above

63. One morning, a tree had 9 kg of mangoes. Each afternoon, a bird comes to the tree and eats m kg of mangoes. Each night, the mangoes on the tree increased by 10%. Find the maximum value of m for which the bird can sustain itself indefinitely on the mangoes of the tree.

(a) $\frac{11}{9}$ (b) $\frac{7}{11}$

(c) $\frac{9}{11}$ (d) Can't be determined.

64. If $x^3 = 1$ but x is not equal to 1, then the value of $\log(x^{2015} + 1/x^{2015} + x^{2016} + 1/x^{2016})$ is
- (a) 3 (b) 2
- (c) 1 (d) 0

65. Let f be a function such that $f(xy) = f(x)f(y)$ for every natural numbers x and y . If $f(i)$'s are natural numbers for $i = 1, 2, 3$; $f(1) < f(2)$, and $f(48) = 162$, then $f(36)$ equals:

66. Sunita and Danish are playing a dice game where each of them rolled a fair dice thrice. Whatever numbers come while rolling the dice thrice, Sunita used to multiply the outcomes and write all the natural numbers which are less than or equal to it without any repetition in an ascending manner. Danish then removed all the numbers which will have a common factor greater than 1 to the largest number in the sequence.

Let N be the count of the number of terms in the sequence thus formed after Danish's editing. Then which of the following cannot be the value of N ?

- I) 25 II) 42
- III) 100 IV) 120
- (a) I & II (b) II & III
- (c) III & IV (d) I, II & IV

VARC

1.	(b)	5.	(c)	9.	(c)	13.	(d)	17.	(1342)	21.	(c)
2.	(b)	6.	(a)	10.	(b)	14.	(b)	18.	(2413)	22.	(b)
3.	(d)	7.	(c)	11.	(b)	15.	(c)	19.	(2413)	23.	(1)
4.	(d)	8.	(b)	12.	(b)	16.	(b)	20.	(4123)	24.	(1)

LRDI

25.	(a)	29.	(a)	33.	(d)	37.	(d)	41.	(a)
26.	(c)	30.	(0)	34.	(b)	38.	(d)	42.	(c)
27.	(d)	31.	(578)	35.	(a)	39.	(b)	43.	(a)
28.	(b)	32.	(11)	36.	(c)	40.	(c)	44.	(a)

QUANT

45.	(d)	50.	(b)	55.	(a)	60.	(21)	65.	(36)
46.	(381)	51.	(a)	56.	(c)	61.	(310)	66.	(d)
47.	(8)	52.	(12)	57.	(d)	62.	(d)		
48.	(25)	53.	(7)	58.	(2)	63.	(c)		
49.	(c)	54.	(1008)	59.	(a)	64.	(d)		

Hints & Solutions

VARC

1. (b)

Option (a) : The passage does not confirm whether Big Brother is a fictional character created by the Party solely for the purpose of propaganda. The text states that Orwell presents several possibilities about the nature of Big Brother, but never resolves the issue in the narrative. Hence, it is false, and we can eliminate it.

Option (b) : The passage mentions that 1984 follows the fall of rebellious propagandist Winston Smith in a totalitarian state led by the Stalinesque Big Brother. It also states that civil liberties are non-existent and total control is maintained through propaganda, brainwashing, and physical punishment. This option is true, as it accurately describes the themes and focus of the novel.

Option (c) : Although the passage states that the novel is set in the fictional Oceanian colony of Airstrip One (formally Britain), it does not imply that the book primarily critiques the British government during the post-World War II era. The passage discusses how recent events during the War left a marked impression on Orwell, with references to Communism and Fascism in the narrative. However, it does not specifically target the British government. Therefore, this option is false, and we can eliminate it using the Alien aspect of the BANE Theory.

Option (d) : The passage actually presents a dichotomy regarding Big Brother's image, stating that his name suggests a protective nature, while he is also intimidating and somewhat threatening. The passage specifically mentions that it is this combination of protection and intimidation that the Party uses to instill obedience in its citizens. Thus, this option is false and can be eliminated using the Extreme aspect of the BANE Theory.

Options A, C, and D are false, while option B is true. Therefore, the correct answer is B.

2. (b)

Using the BANE Theory, let's analyze each option:

(a) Broad – This statement seems too broad, as the first paragraph covers more than just propaganda in 1984. While it does mention the role of propaganda, brainwashing, and physical punishment in maintaining control, it also discusses Orwell's fears, the setting of the novel, and the impact of the book on language and culture.

(b) Narrow – This statement is not too narrow, as it accurately summarizes the main ideas presented in the first paragraph. It highlights the setting (dystopian surveillance society) and the themes (loss of individual rights, totalitarian state) that are clearly expressed in the paragraph.

(c) Alien – This statement is alien, as it refers to historical events and their influence on Orwell's writing, which are not discussed in the first paragraph. These topics are covered in the second paragraph, making this option irrelevant to the question.

(d) Extreme – This statement is extreme, as it focuses solely on the character of Big Brother and his comparison to Stalin. The first paragraph does not discuss Big Brother or his resemblance to Stalin; this topic is explored in the third paragraph.

Based on the BANE Theory analysis, option B is the best answer, as it accurately captures the main ideas presented in the first paragraph without being too broad, narrow, alien, or extreme. Option A is close but too broad, while options C and D are easily eliminated due to their alien and extreme nature, respectively.

3. (d)

The book warns against the potential dangers of losing individual freedoms to an overpowering surveillance state.

A careful reading of the passage reveals certain essential features of Orwell's '1984.' The detailed exploration of the text suggests that the novel is primarily about a dystopian future characterized by extreme surveillance, loss of individual rights, and totalitarian rule.

Option (a) – posits that the novel is a critique of totalitarianism, which, though partly correct, doesn't fully encompass the breadth of the novel's themes as presented in the passage. It hints at the influence of World War II and its aftermath, but it omits the crucial aspect of surveillance, making it less comprehensive. Hence, it can be eliminated.

Option (b) – suggests that the novel is a narrative on the excesses of unregulated capitalism. However, the passage doesn't mention capitalism at all. The primary focus of '1984,' as gleaned from the passage, is the fear of totalitarianism and a surveillance state, not capitalism. Therefore, option B can be dismissed.

Option (c) – infers that '1984' is a commentary on extreme collectivism. While the term "oligarchical collectivism" is mentioned in the passage, the central thrust of the novel, as inferred from the passage, is not on collectivism per se, but on the dangers of a surveillance state and the loss of individual freedoms. Thus, option C can be discarded.

Option (d) – on the other hand, seems to encapsulate the main points of Orwell's novel as presented in the passage: the dangers of losing individual freedoms to an overpowering surveillance state. The description of Big Brother and the constant surveillance, combined with the absence of civil liberties, points toward this interpretation, making D the best answer.

4. (d)

Big Brother could stand for a collective entity representing the Party, rather than an individual.

The passage presents different possibilities regarding the nature of the Big Brother character in '1984'.

Option (a) – posits that Big Brother represents an authoritarian regime and its control mechanisms. While this is partly correct, the passage suggests that Big Brother could be more than just a symbol of control. He could be a literal figure, a created entity for propaganda, or a representation of a collective. Hence, option A can be eliminated as it doesn't fully capture the complexities of Big Brother's character as presented in the passage.

Option (b) – asserts that Big Brother is definitively an individual who is the physical leader of the Party. However, the passage makes it clear that this is only one of the possibilities. It does not conclusively state that Big Brother is an actual person, leaving room for interpretation. As such, option B can be dismissed.

Option (c) – suggests that Big Brother might be an abstract concept for Party propaganda. This is one of the possibilities mentioned in the passage. However, this option doesn't consider the other possible interpretations of Big Brother's character, making it less comprehensive than it could be. Therefore, option C can be eliminated.

Option (d) – posits that Big Brother could be a collective entity representing the Party, rather than an individual. This option incorporates the different possibilities presented in the passage: Big Brother could be a literal figure, a created entity for propaganda, or a representation of a collective. Given the multifaceted nature of Big Brother's character as described in the passage, this interpretation seems the most likely, making D the best answer.

5. (c)

According to the BANE Theory:

(a) Alien – This statement is unrelated to the argument that Shakespeare intended to criticize society's treatment of women. It suggests that all female characters are named only in relation to their male counterparts, which is not true in the case of Bianca and Katherina. Therefore, it can be eliminated.

(b) Broad – This statement is too broad, as it disregards any potential deeper message in the play.

It also undermines the argument that the play was meant to criticize society's treatment of women. Therefore, it can be eliminated.

(c) Narrow – This statement is narrow and focuses on the specific example of the Widow, a character who is presented as both weak and strong in different parts of the play. The Widow's strong character in Act 5 Scene 2 challenges societal expectations of women and supports the argument that Shakespeare intended to criticize society's treatment of women. Therefore, it cannot be eliminated.

(d) Extreme – This statement is extreme, as it claims that Bianca is an example of a woman who conforms to societal expectations of obedience and submission. While Bianca is initially presented as obedient and submissive, the passage explains how Hortensio's anger and disgust at her actions later in the play reveal society's judgment of women based on appearances. This statement undermines the argument that Shakespeare intended to criticize society's treatment of women and can be eliminated.

Answer: (c)

Shakespeare used the character of the Widow to challenge societal expectations of women.

The two options that are close and not easily eliminated are C and D. Option C supports the argument that Shakespeare intended to criticize society's treatment of women, as it highlights how the character of the Widow challenges societal expectations. On the other hand, option D is extreme and undermines the argument, as it claims that Bianca conforms to societal expectations, disregarding how her character is used to reveal society's judgment of women based on appearances.

6. **(a)**

Hortensio, misogyny, patriarchy, widow, Bianca, Ingénue, Elizabethan era

We will use the BANE Theory to eliminate options:

Option (c) – contains "Bill Alexander," which is not central to the passage's theme and is an external reference. So, we can eliminate option c.

Option (d) – contains "fricative alliteration" and "subject owes a prince," which are specific phrases

from the passage, making the option too narrow. So, we can eliminate option d.

Now we are left with options (a) and (b).

Let's compare them:

Option (a) – includes keywords central to the passage's themes, such as "Hortensio," "misogyny," "patriarchy," "widow," "Bianca," "Ingénue," and "Elizabethan era." These words highlight the main topics discussed, such as the treatment of women, the portrayal of female characters, and the attitudes of men during that time.

Option (b) – includes words like "Shakespeare," "marriage," "death," "obedience," "subservient," and "stock character." While these words are related to the passage, they do not cover the core themes as comprehensively as option (a).

Thus, the correct answer is (a) Hortensio, misogyny, patriarchy, widow, Bianca, Ingénue, Elizabethan era, as it best represents the keywords of the passage, capturing the main themes and issues discussed.

7. **(c)**

Option (a) – This statement is true as the passage discusses the theme of misogyny and patriarchy throughout the play, which reflects the late 16th-century societal views on women. Therefore, this option is not the correct answer as it does not contradict the passage's information.

Option (b) – The passage explains that women were judged by their appearances and obedience, such as Bianca being sought after because she was initially presented as a chaste and wholesome young girl. Furthermore, Hortensio expects women to offer "love, fair looks and true obedience" to their husbands. Thus, this statement is true and not the correct answer.

Option (c) – This statement is false because, according to the passage, women are not portrayed as assertive and independent from the beginning of the play. The passage mentions that the widow's initial portrayal is weak and controlled by men. However, her later actions challenge this perception. This is the correct answer as it is the only statement

that contradicts the information provided in the passage.

Option (d) – This statement is true as the passage points out that the widow's insubordination in Act 5 Scene 2 challenges the initial perception of her being weak and controlled by men. She refuses to come when asked by her husband, which demonstrates her control over the situation and her marriage to Hortensio. This portrayal of the widow serves as a counterpoint to the earlier perception of her as weak and controlled by men, and it highlights Shakespeare's intention to challenge the misogynistic views of the time. Therefore, this option is not the correct answer as it does not contradict the information provided in the passage.

Using the BANE Theory to analyze the options:

Broad – None of the options are too broad as they specifically address aspects of the portrayal of women in "The Taming of the Shrew."

Alien – None of the options are alien or strange as they are all related to the information provided in the passage.

Narrow – Option C is the narrowest choice, focusing on the portrayal of women as assertive and independent from the beginning of the play. This contradicts the passage's information, making it the correct answer.

Extreme – None of the options are too extreme as they all discuss the portrayal of women and its implications in "The Taming of the Shrew."

Considering the BANE Theory and the explanations provided, Option C is the correct answer as it is the only statement that contradicts the information in the passage, stating that women are presented as assertive and independent from the beginning of the play

8. (b)

Upon inspection of the options, it is crucial to identify the statements in direct alignment with the passage's description of the play, and those that contradict it.

- (a) The statement aligns with the text, confirming the use of dark humor as a significant element representative of the Theatre of the Absurd.
- (b) Contradictory to the passage, this statement inaccurately assumes the characters' ignorance of their own plight, whereas, the text clearly states their awareness of their misery and despair. This conflict labels this option as the correct answer.
- (c) This option is validated by the passage's assertion that Endgame presents the unsettling human conditions and the nature of existence, exploring the concept of life and our existence in it being meaningless.
- (d) The text affirms the presence of absurd and comical routines within the play, verifying the accuracy of this statement.

9. (c)

An inference requires a clear analysis and understanding of the given information, hence, every statement must be cross-checked with the text to validate its authenticity.

- (a) This option can be substantiated by the text's discussion of Endgame as a representation of the Theatre of the Absurd, incorporating existentialist thought and absurd characteristics.
- (b) The characters' sentiments of hopelessness and despair are apparent within the text, validating the authenticity of this statement.
- (c) The text does not mention traditional family values or indicate their function as a comfort mechanism for the characters, hence, this inference does not hold validity and is the correct answer.
- (d) The text expounds on the use of dark humor and absurd situations in Endgame, confirming the authenticity of this statement.

10. (b)

Each option presents a different perspective of the play, however, only one statement accurately encapsulates the core essence of Endgame as per the text.

- (a) The text dismisses the notion of Endgame being a conventional comedy, contradicting this option.
- (b) The statement aligns with the passage's description of the play. Endgame embodies the principles of the Theatre of the Absurd, revealing the human condition and the existential nature of existence through dark humor and absurd situations.
- (c) Although the passage mentions post-war Europe and the emergence of absurdist drama, it does not label the play as a historical narrative of these events. Hence, this option is inconsistent with the text's description.
- (d) The text does not imply a celebratory attitude towards life and human spirit, nor does it suggest the use of light-hearted humor, contradicting this option. Thus, this statement does not encapsulate the essence of Endgame

11. (b)

The absurdity of Endgame is used to explore the nature of existence and the human condition.

Using the BANE Theory, let's analyze each option:

- (a) Beckett's characters in Endgame are aware of their fate and misery.
This option is too narrow, as it only focuses on the awareness of the characters' fate and misery. The second paragraph goes beyond this aspect, discussing the absurd events and how they commentate on the human condition and the nature of existence.
- (b) The absurdity of Endgame is used to explore the nature of existence and the human condition.
This option accurately captures the main argument of the second paragraph. The paragraph discusses the absurd, dark, and comical events in the play and how they demonstrate that life and our existence in it is meaningless. The characters' actions are shown as ridiculous and irrational, which are representative of the philosophy of the theatre of the absurd.

- (c) The play primarily focuses on the relationship between Hamm and Clov.

This option is too narrow, as the second paragraph doesn't primarily focus on the relationship between Hamm and Clov. The paragraph discusses multiple characters and events, emphasizing the absurdity and dark humor to explore the nature of existence and the human condition.

- (d) Endgame is a prime example of a traditional comedy.

This option is alien, as the passage clearly states that Beckett's works, including Endgame, are not traditional comedies. They can be called black comedies, featuring distressing subjects and characters in depressing situations that are dealt with humorously.

Option B is the best choice, as it accurately reflects the main argument of the second paragraph.

12. (b) Endgame is a black comedy that reflects the philosophy of the Theatre of the Absurd.

- (a) Beckett's works are solely about the hopelessness of post-war Europe.

This option is too narrow. The passage mentions that Beckett's major plays were written during the years after World War II and that Endgame commentates on the unsettling human conditions. However, it doesn't claim that his works are solely about the hopelessness of post-war Europe.

- (b) Endgame is a black comedy that reflects the philosophy of the Theatre of the Absurd.

This option is supported by the passage, which states that Beckett's Endgame contains many comedic features, but they are not traditional comedies. Instead, they can be called black comedy. It also discusses the Theatre of the Absurd, which is characterized by a lack of purpose, uncertainty, anxiety, hopelessness, and humor, all elements present in Endgame.

- (c) The characters in Endgame are meant to portray the French Resistance during World War II.

This option is alien. The passage mentions Beckett's involvement with the French Resistance, but it doesn't connect the characters in *Endgame* to the French Resistance.

- (d) Beckett uses dark humor to criticize the actions of the Nazi regime in Paris.

This option is too extreme. The passage does mention Beckett's involvement with the French Resistance and the use of dark humor in his plays. However, it doesn't specifically claim that the dark humor in *Endgame* is used to criticize the actions of the Nazi regime in Paris.

Options a, c and d can be eliminated based on the BANE Theory. Option A is too narrow, option C is alien, and option D is too extreme. Option B closely aligns with the passage's claim and is the correct answer.

13. (d) Increased emphasis on the service sector

Option (a) – The emergence of a new commoner class: This is directly mentioned in the passage as a consequence of the Land Reform Act of 1950. It's said that a new commoner class emerged of land-owning farmers who were no longer burdened by high rent costs and were incentivized to increase production.

Option (b) – Rapid modernization of education: The passage implies that the redistribution of land, and the subsequent investment in businesses and schools by previous landowners, resulted in the rapid modernization of education in South Korea. So, this statement is true according to the text.

Option (c) – Decrease in the population of farmers: The text explains that fewer farmers were needed to sustain the population due to increased agricultural production, allowing for less focus on agriculture. This implies a decrease in the farmer population.

Option (d) – Increased emphasis on the service sector: This is not mentioned anywhere in the passage. While there was a general movement towards diversification of the economy and modernization, there is no specific mention of an increased emphasis on the service sector as a result of the Land Reform Act of 1950.

14. (b)

The Land Reform Act of 1950, combined with government interventionist policies, laid a strong foundation for the significant economic growth experienced in South Korea during The Miracle on the Han.

Option (a) – South Korea's economic success can be solely attributed to the Land Reform Act of 1950: This statement is too extreme. While the passage acknowledges the importance of the Land Reform Act of 1950 in establishing a foundation for economic growth, it doesn't claim that it was the sole factor responsible.

Option (b) – The Land Reform Act of 1950, combined with government interventionist policies, laid a strong foundation for the significant economic growth experienced in South Korea during The Miracle on the Han: This best captures the overall argument of the passage, acknowledging the role of the Land Reform Act, the government's interventionist policies, and the period of The Miracle on the Han.

Option (c) – South Korea could not have achieved its economic success without foreign aid: Foreign aid isn't mentioned anywhere in the passage, making this statement unrelated to the text.

Option (d) – The success of South Korea's economy lies in its rapid industrialization during the late 1900s: This statement is too narrow and doesn't adequately encapsulate the argument made in the passage about the importance of government policies and land reform in laying the groundwork for economic growth.

15. (c)

Land reforms were a crucial first step in South Korea's economic transformation, as they enabled the growth of a well-educated workforce and increased agricultural productivity.

(a) Broad – Eliminate choices that are too broad.

Option (a) can be eliminated, as it states that land reforms played a minor role in the economic transformation, which is not consistent with the passage. The passage indicates that land reforms had a significant impact on the transformation by creating a land-owning farmer class, increasing

agricultural productivity, and contributing to the growth of a well-educated workforce.

(b) Alien—Eliminate choices that are Alien or Strange.

Option (b) can be eliminated, as it claims that land reforms were the primary driver of South Korea's economic transformation. The passage does not support this assertion, as it acknowledges that the government's interventionist policies and export-oriented industrialization also played a significant role in the transformation.

(c) Narrow – Eliminate choices that are too narrow.

Option (c) is not too narrow, as it accurately summarizes the author's position on the role of land reforms in South Korea's economic transformation. The passage highlights the impacts of land reforms, such as the creation of a land-owning farmer class, increased agricultural productivity, and the growth of a well-educated workforce, which were crucial first steps in the country's economic transformation.

(d) Extreme – Eliminate choices that are too extreme.

Option (d) can be eliminated, as it asserts that land reforms had no significant impact on South Korea's economic transformation. This claim is extreme and contradicts the passage, which emphasizes the importance of land reforms in enabling the growth of a well-educated workforce and increasing agricultural productivity.

In conclusion, option C best summarizes the author's position, as it emphasizes the crucial role of land reforms in laying the foundation for South Korea's economic transformation by enabling the growth of a well-educated workforce and increasing agricultural productivity.

16 (b)

Limited agricultural productivity by dissuading tenant farmers from investing in efficiency improvements.

Option (a) – Contributed to a strong economy by enabling a small group of landlords to control most of the farmland: This is contradicted by the passage, which states that the system contributed to chronic poverty for the majority of the population.

Option (b) – Limited agricultural productivity by dissuading tenant farmers from investing in efficiency improvements: This is consistent with the passage, which explains that tenant farmers had no incentive to be more efficient because any benefits would go to the landlords.

Option (c) – Helped maintain social balance by distributing wealth evenly among landlords and tenant farmers: This is not supported by the passage, which describes a system in which a small wealthy aristocracy benefited at the expense of a larger population of subsistence farmers.

Option (d) – Provided a source of national income through high rent and tax payments: The passage does not mention this aspect. Instead, it explains how the system kept the majority of the population in a cycle of poverty.

17. (1342)

The correct sequence is 1342 because the statements follow a logical flow of introducing the concept, its origin, the purpose, and its effects on the economy.

(1) The concept of creative destruction emphasizes the importance of innovation in shaping the economy. This statement serves as an introduction to the concept of creative destruction, setting the context for the discussion. It should be placed first in the sequence.

(3) Joseph Schumpeter, an Austrian economist, coined the term "creative destruction" to describe the process of industrial mutation. This statement provides the origin of the term "creative destruction" and credits Joseph Schumpeter for coining it. It gives background information on the concept and should follow the introductory statement.

(4) This process continually revolutionizes the economic structure from within, incessantly destroying the old one, and creating a new one. This statement describes the purpose and mechanism of creative destruction, explaining how it affects the economic structure. It should follow the statement that introduces the term and its origin.

- (2) Creative destruction leads to the replacement of old, outdated industries with new, more efficient ones. Finally, this statement highlights the effect of creative destruction on industries, mentioning that it leads to the replacement of outdated industries with more efficient ones. It logically follows the statement that explains the purpose and mechanism of creative destruction.

Thus, the logical sequence of statements is 1342, which presents a coherent explanation of the concept of creative destruction, its origin, purpose, and effects on the economy.

18. (2413)

The correct sequence is 2413, as it provides a logical flow of ideas. Statement 2 introduces the concept of green bonds as a financial market instrument to combat climate change. Statement 4 expands on the purpose of green bonds by describing the role of investors in financing environmentally friendly projects. Statement 1 further defines green bonds by providing examples of the types of projects they finance. Finally, statement 3 explains the specific criteria that green bonds must meet to ensure the projects are environmentally friendly.

19. (2413)

The correct sequence is **2413**, as it presents a logical progression of ideas. Statement 2 introduces the potential of artificial intelligence (AI) to revolutionize various industries. Statement 4 expands on this idea, noting the increasing integration of AI into daily life. Statement 1 introduces the ethical concerns associated with the use of AI, such as algorithmic bias and privacy violations. Finally, statement 3 suggests that companies need to implement AI responsibly by addressing these ethical concerns and considering the potential consequences of its use.

20. (4123)

The correct sequence is **4123** because it follows a logical order in which the statements first introduce the concept of emissions trading systems and their

purpose, then describe how they function, and finally discuss the consequences of their implementation.

The passage starts with statement 4, which introduces the concept of emissions trading systems and their purpose: to create a market for greenhouse gas emissions by allocating a limited number of allowances to companies based on their emissions levels.

Statement 1 comes next, as it provides context about the prevalence of emissions trading systems by mentioning that they have been implemented in various countries to help combat climate change.

Statement 2 follows, as it discusses the consequences of implementing emissions trading systems: the demand for renewable energy sources has grown, driving the growth of industries like solar and wind power.

Lastly, **statement 3** describes how emissions trading systems function in practice, with companies that produce fewer emissions than their allocated limit being able to sell their surplus allowances to other companies that have exceeded their limit. This statement is an essential part of understanding how emissions trading systems incentivize companies to reduce their greenhouse gas emissions.

21. (c)

The transition from a physics-driven Earth to the complex natural system defies simple rules and predictability.

(a) The Earth's evolution is a predictable progression from a simple physical state to a complex natural system.

While it's true that Earth moved from a simple physical state to a complex natural system, the keyword "predictable" doesn't hold for the whole statement. The passage clearly points out that "the history of life that followed from that fateful phase change didn't proceed along such a simple trajectory. Its evolution over billions of years defies simple rules and predictable outcomes." This makes the claim of predictability in option A an extreme

one, contradicting the overall message of the passage.

(b) The laws of physics governed the early Earth, creating an environment for the emergence of life.

This option may seem plausible, but it's slightly too narrow. While the passage does explain how the laws of physics were a fundamental part of Earth's early existence and facilitated the initial conditions for life, it doesn't stop there. The passage also discusses the complexity of life that emerged and how it deviated from simple rules and predictability, a part of the narrative that this option fails to encapsulate.

(c) The transition from a physics-driven Earth to the complex natural system defies simple rules and predictability.

This option aligns well with the central theme of the passage. It acknowledges both the early rule of physics on Earth and the shift to the complex system that nature has become. It also correctly includes the idea that this transition, particularly the evolution of life, defies simple rules and predictability. Thus, it comprehensively represents the core points of the passage without being too broad, too narrow, or containing any extreme or alien elements.

(d) The development of life on Earth is a response to the various challenges posed by nature's increasing complexity.

This option is somewhat misleading as it suggests that the development of life is a reactionary process to the complexities of nature. Although the passage mentions that "with each problem that arose, a strategy evolved to overcome it", it doesn't imply that life developed solely in response to nature's challenges. This option therefore feels slightly alien to the overall message of the passage, which focuses more on the unpredictability and complexity of nature's evolution.

Thus, option C best encapsulates the overarching theme of the passage, incorporating the key elements of Earth's transition from a physics-driven environment to a complex, unpredictable natural system. It manages to cover the important points without straying into the realms of being too broad,

narrow, alien, or extreme. It aptly conveys the dualistic journey of Earth's evolution, from the predictable phase changes governed by physical laws, to the intricate web of life that emerged, bringing both opportunities for growth and threats of annihilation, and challenging the idea of predictable outcomes.

22. **(b)**

The passage outlines the motivations and economic benefits of Imperialism for the United States.

(a) The passage primarily discusses the role of Manifest Destiny in American history.

Eliminate: Narrow – While Manifest Destiny is mentioned in the passage, it is only one aspect of the larger topic of Imperialism. The passage does not primarily focus on the role of Manifest Destiny.

(b) The passage outlines the motivations and economic benefits of Imperialism for the United States.

Correct: This option accurately captures the main theme of the passage, which discusses the motivations behind Imperialism (economic success and expansion) and its perceived benefits (cheap labor, control of trade market, and control over profit).

(c) The passage focuses on the competition between the United States and Britain in the 19th century.

Eliminate: Narrow – While the passage does mention the competition between the U.S. and Britain, it is not the main focus of the passage. The primary topic is the motivations and economic benefits of Imperialism for the United States.

(d) The passage highlights the role of labor unions in promoting Imperialism in the United States.

Eliminate: Alien – The passage mentions labor unions (AFL and Knights of Labor) in the context of the 19th century Imperialism, but it does not specifically discuss their role in promoting Imperialism. This option does not accurately summarize the passage.

Options b and c are close, but option B is more accurate as it encompasses the broader theme of the

passage, which discusses the motivations and perceived economic benefits of Imperialism for the United States.

Option c, while relevant, is too narrow in its focus on the competition between the U.S. and Britain. Options A and D are easily eliminated as they do not capture the main idea of the passage.

23. (1)

Statements 2, 3, 4, and 5 all revolve around Ashoka and his methods of using diverse languages, edicts, and ethical messages to inspire his kingdom, which makes them a coherent paragraph when arranged in the order 2534.

Statement 1, on the other hand, pertains to ancient Greece, and does not seamlessly fit into this narrative focused on Ashoka's reign. Even though it also talks about inscriptions on stone monuments, it is not connected to Ashoka or his methods, making it the odd one out.

24. (1)

Statements 2, 3, 4, and 5 all make a coherent narrative about the processes and benefits of using available resources on Mars, such as water and atmospheric carbon dioxide, for essential needs like breathing air, creating fuel, and facilitating return missions. When arranged in the order 5243, these statements form a well-connected flow of ideas.

Statement 1, although also addressing the use of Mars's resources, does not fit well into the specific narrative the other four statements are building around the utility of water and carbon dioxide. It discusses the utilization of iron oxide, an entirely different resource, making it the odd one out.

LRDI

25. (a)

It is known that 80 students participated from school C. The number of girls from schools A, B, D and E will be as follows

School	%	Number of Girls
--------	---	-----------------

A	40	32
B	15	12
D	25	20
E	20	16

It is also known that the ratio of the number of girls to boys in the schools A, B, D and E who participated was 1:3, 3:2, 4:3 and 5:3 in no particular order.

The ratio 5 : 3 must be of school D as there is no other number for the total girls which is a multiple of 5. If we take the ratio as 4 : 3 for D then for E we don't have any ratio because 16 is not a multiple of 5 and 3. Similarly, the ratio 3 : 2 must be of school B.

For school D, $\frac{5}{8}$ of total = 20
Total students in D = 32

Number of boys in D = $12 \left(\frac{3}{8} \text{ of } 32 \right)$

For school B, $\frac{3}{5}$ of total = 12

Total students = 20

Number of boys in B = 8

Required difference = $12 - 8 = 4$.

26. (c)

It is known that the ratio of the number of girls to boys in the schools A,B,D and E who participated was 1:3, 3:2, 4:3 and 5:3 in no particular order.

Boys will be $\frac{3}{4}$ of the total, $\frac{2}{5}$ of the total, $\frac{3}{7}$ of the total and $\frac{3}{8}$ of the total.

It is given that the number of boys who participated from the mentioned 4 schools is 14, 24, 27 and 30 in no particular order.

For maximum value we need to have $\frac{3}{8}$ of total = 30

Total 1 = 80

$\frac{3}{7}$ of total 2 = 27

Total 2 = 63

$\frac{3}{4}$ of total 3 = 24

Total 3 = 32

$\frac{2}{5}$ of total 4 = 14

Total 4 = 35

Maximum strength = $80 + 63 + 32 + 35 = 210$ students.

27. (d)

School	%	Number of Girls
A	40	72
B	15	27
D	25	45
E	20	36

It is given that 180 students participated from school C and so the number of girls from schools A, B, D and E will be as shown above.

It is known that the ratio of the number of girls to boys in the schools A, B, D and E who participated was 1:3, 3:2, 4:3 and 5:3 in no particular order.

Since we do not know the particular order, we cannot definitely identify the school with the maximum participation.

28. (b)

It is known that 80 students participated from school C. The number of girls from schools A, B, D and E will be as follows:

School	%	Number of Girls
A	40	32
B	15	12
D	25	20

E	20	16
---	----	----

It is also known that the ratio of the number of girls to boys who participated in the schools A, B, D and E was 1:3, 3:2, 4:3, and 5:3 in no particular order.

The ratio of 5:3 must be of school D as there is no other number for the total girls which is a multiple of 5. If we take the ratio as 4 : 3 for D then for E we don't have any ratio because 16 is not a multiple of 5 and 3. Similarly, the ratio of 3 : 2 must be of school B.

Let the total number of students in school B be q.

$\frac{3}{5}$ of q = 12

q = 20

Let the total number of students in School A be p.

The ratio of girls to boys for school A can be either 1 : 3 or 4 : 3.

If the ratio is 1:3 then $\frac{1}{4}$ of the total p is 32

Therefore, p = 128

Number of boys from A = $128 - 32 = 96$

The required ratio of the number of boys from A to the number of students from B = $96 : 20 = 24 : 5$

If the ratio is 4 : 3 then $\frac{4}{7}$ of the total p is 32

Therefore, p = 56

Number of boys from A = $56 - 32 = 24$

The required ratio of the number of boys from A to the number of students from B = $24 : 20 = 6 : 5$.

29. (a)

School	%	Number of Girls
A	40	72
B	15	27
D	25	45

E	20	36
---	----	----

It is given that 180 students participated from school C and so the number of girls from schools A, B, D and E will be as shown above.

It is known that the ratio of the number of girls to boys in the schools A, B, D and E who participated was 1:3, 3:2, 4:3 and 5:3 in no particular order.

The ratio of girls to boys for school D must be 5:3 because if we choose any other ratio then there is no number which could be divided by 5.

Let the total students in school D be s.

$$\frac{5}{8} \text{ of } s = 45$$

$$s = 72.$$

Number of boys who participated from school

$$D = 72 - 45 = 27.$$

30. (0)

The number of students hired from a college is different for every college. That means, all six companies – McKinsey, JPMC, Goldman, Citi, Bank of America and HUL – hired a different number of students from college C1 and so on.

Since missing numbers will be 0, 1 or 3 and it will be different for every missing cell in a row.

Therefore, the students hired from college C1 will definitely be 66.

	Mc-Kinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0/1/3	12	0/1/3	0/1/3	15	66

Similarly, this sum can be calculated for the colleges C2, C5, C6, C7 and C8.

	McKinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0/1/3	12	0/1/3	0/1/3	15	66
C2	0/1/3	20	9	0/1/3	23	0/1/3	56
C3	24		22	35	9	7	
C4	21	24		15		26	
C5	0/1/3	25	0/1/3	17	0/1/3	27	73
C6	38	0/1/3	13	0/1/3	37	0/1/3	92
C7	10	18	17	0/1/3	0/1/3	0/1/3	49
C8	0/1/3	10	25	0/1/3	0/1/3	16	55

By statement 1, only McKinsey and JPMC hired a different number of students from each college.

	McKinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0/1/3	12	0/1/3	0/1/3	15	66
C2	0/1/3	20	9	0/1/3	23	0/1/3	56
C3	24		22	35	9	7	
C4	21	24		15		26	
C5	0/1/3	25	0/1/3	17	0/1/3	27	73
C6	38	0/1/3	13	0/1/3	37	0/1/3	92
C7	10	18	17	0/1/3	0/1/3	0/1/3	49
C8	0/1/3	10	25	0/1/3	0/1/3	16	55
Total	132	101					

By statement 3, the total number of students hired by all the companies from C3 was 13 more than that from C4 college.

Sum of values present in the row of C3:

$$(24 + x + 22 + 35 + 9 + 7) = 97 + x$$

Sum of values present in the row of C4:

$$(21 + 24 + a + 15 + b + 26) = 86 + a + b, \text{ where } a \text{ and } b \text{ are distinct.}$$

$$\text{Given, } 97 + x = 86 + a + b + 13,$$

hence $x = a + b + 2$, which is possible only if $x = 3$, $a, b = (0, 1)$ or $(1, 0)$, and $(a, b) = (0, 1)$ is not possible by statement 3, as Goldman hired at least one student from each college.

By statement 5, students Citi hired from C1, C4 and C8 is p, 15 and q respectively is equal to the number of students hired by Goldman from C7 which is 17. Therefore, $p + 15 + q = 17$, implies $p + q = 2$, which is possible only when $(p, q) = (1, 1)$

By statement 4, Goldman hired fewer students than what JPMC hired.

Since a missing cell of the students hired by Goldman could be 1 or 3, therefore total students hired by Goldman could be either 102, which is not possible or 100, which is possible.

Some missing values are now found and the table looks like:

	McKinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0	12	1	3	15	66
C2	1	20	9	0/3	23	3/0	56
C3	24	3	22	35	9	7	100
C4	21	24	1	15	0	26	87
C5	3/0	25	1	17	0/3	27	73
C6	38	1	13	0/3	37	3/0	92
C7	10	18	17				49
C8	0/3	10	25	1	3/0	16	55
Total	132	101	100				

By statement 6, students hired from the college C5, which is 73, is one more than the total number of students Citi hired, which means Citi hired 72 students.

Sum of students Citi hired from different colleges: $1 + d + 35 + 15 + 17 + e + f + 1 = 72$, which implies $d + e + f = 3$, the possible combinations are: (0, 1, 3) Similarly, students hired from the college C3, which is 100, is 3 more than the total number of students HUL hired, which means HUL hired 97 students.

Sum of students HUL hired from different colleges: $15 + r + 7 + 26 + 27 + s + t + 16 = 97$, which implies $r + s + t = 6$, the possible combination is: (0, 3, 3).

	McKinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0	12	1	3	15	66
C2	1	20	9	0/3	23	3/0	56
C3	24	3	22	35	9	7	100
C4	21	24	1	15	0	26	87
C5	3/0	25	1	17	0/3	27	73
C6	38	1	13	0/3	37	3/0	92
C7	10	18	17				49
C8	0/3	10	25	1	3/0	16	55
Total	132	101	100	72	76	97	

Sum of students Bank of America hired from different colleges: $3 + 23 + 9 + 0 + g + 37 + h + i = 76$, which implies, $g + h + i = 4$, the possible combinations is: (g, h, i) = (3, 1, 0) or (0, 1, 3)

So, the final table looks like:

	Mc-Kinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0	12	1	3	15	66
C2	1	20	9	0/3	23	3/0	56
C3	24	3	22	35	9	7	100
C4	21	24	1	15	0	26	87
C5	3/0	25	1	17	0/3	27	73
C6	38	1	13	0/3	37	3/0	92
C7	10	18	17	0/3	1	3/0	49
C8	0/3	10	25	1	3/0	16	55
Total	132	101	100	72	76	97	

HUL hired 0 students from C2 college.

31. (578)

The number of students hired from a college is different for every college. That means, all six companies – McKinsey, JPMC, Goldman, Citi, Bank of America and HUL – hired a different number of students from college C1 and so on.

Since missing numbers will be 0, 1 or 3 and it will be different for every missing cell in a row.

Therefore, the students hired from college C1 will definitely be 66.

	Mc-Kinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0/1/3	12	0/1/3	0/1/3	15	66

Similarly, this sum can be calculated for the colleges C2, C5, C6, C7 and C8.

	McKinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0/1/3	12	0/1/3	0/1/3	15	66
C2	0/1/3	20	9	0/1/3	23	0/1/3	56
C3	24		22	35	9	7	
C4	21	24		15		26	
C5	0/1/3	25	0/1/3	17	0/1/3	27	73
C6	38	0/1/3	13	0/1/3	37	0/1/3	92
C7	10	18	17	0/1/3	0/1/3	0/1/3	49
C8	0/1/3	10	25	0/1/3	0/1/3	16	55

By statement 1, only McKinsey and JPMC hired a different number of students from each college.

	McKinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0/1/3	12	0/1/3	0/1/3	15	66
C2	0/1/3	20	9	0/1/3	23	0/1/3	56
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C4	21	24		15		26	
C5	0/1/3	25	0/1/3	17	0/1/3	27	73
C6	38	0/1/3	13	0/1/3	37	0/1/3	92
C7	10	18	17	0/1/3	0/1/3	0/1/3	49
C8	0/1/3	10	25	0/1/3	0/1/3	16	55
Total	132	101					

By statement 3, the total number of students hired by all the companies from C3 was 13 more than that from C4 college.

Sum of values present in the row of C3:

$$(24 + x + 22 + 35 + 9 + 7) = 97 + x$$

Sum of values present in the row of C4:

$$(21 + 24 + a + 15 + b + 26) = 86 + a + b, \text{ where } a \text{ and } b \text{ are distinct.}$$

$$\text{Given, } 97 + x = 86 + a + b + 13,$$

hence $x = a + b + 2$, which is possible only if $x = 3$, $a, b = (0, 1)$ or $(1, 0)$, and $(a, b) = (0, 1)$ is not possible by statement 3, as Goldman hired at least one student from each college.

By statement 5, students Citi hired from C1, C4 and C8 is p , 15 and q respectively is equal to the number of students hired by Goldman from C7 which is 17. Therefore, $p + 15 + q = 17$, implies $p + q = 2$, which is possible only when $(p, q) = (1, 1)$

By statement 4, Goldman hired fewer students than what JPMC hired.

Since a missing cell of the students hired by Goldman could be 1 or 3, therefore total students hired by Goldman could be either 102, which is not possible or 100, which is possible.

Some missing values are now found and the table looks like:

	McKinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0	12	1	3	15	66
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C3	24	3	22	35	9	7	100
C4	21	24	1	15	0	26	87
C5	3/0	25	1	17	0/3	27	73
C6	38	1	13	0/3	37	3/0	92
C7	10	18	17				49
C8	0/3	10	25	1	3/0	16	55
Total	132	101	100				

By statement 6, students hired from the college C5, which is 73, is one more than the total number of students Citi hired, which means Citi hired 72 students.

Sum of students Citi hired from different colleges:

$$1 + d + 35 + 15 + 17 + e + f + 1 = 72, \text{ which implies } d + e + f = 3, \text{ the possible combinations are: } (0, 1, 3)$$

Similarly, students hired from the college C3, which is 100, is 3 more than the total number of students HUL hired, which means HUL hired 97 students.

Sum of students HUL hired from different colleges:

$$15 + r + 7 + 26 + 27 + s + t + 16 = 97, \text{ which implies } r + s + t = 6, \text{ the possible combination is: } (0, 3, 3).$$

	McKinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0	12	1	3	15	66
C2	1	20	9	0/3	23	3/0	56
C3	24	3	22	35	9	7	100
C4	21	24	1	15	0	26	87
C5	3/0	25	1	17	0/3	27	73
C6	38	1	13	0/3	37	3/0	92
C7	10	18	17				49
C8	0/3	10	25	1	3/0	16	55
Total	132	101	100	72	76	97	

Sum of students Bank of America hired from different colleges: $3 + 23 + 9 + 0 + g + 37 + h + i = 76$, which implies, $g + h + i = 4$, the possible combinations is: $(g, h, i) = (3, 1, 0)$ or $(0, 1, 3)$

So, the final table looks like:

	Mc-Kinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0	12	1	3	15	66
C2	1	20	9	0/3	23	3/0	56
C3	24	3	22	35	9	7	100
C4	21	24	1	15	0	26	87
C5	3/0	25	1	17	0/3	27	73
C6	38	1	13	0/3	37	3/0	92
C7	10	18	17	0/3	1	3/0	49
C8	0/3	10	25	1	3/0	16	55
Total	132	101	100	72	76	97	

Hence, the required answer is 578.

32. (11)

The number of students hired from a college is different for every college. That means, all six companies – McKinsey, JPMC, Goldman, Citi, Bank of America and HUL – hired a different number of students from college C1 and so on.

Since missing numbers will be 0, 1 or 3 and it will be different for every missing cell in a row.

Therefore, the students hired from college C1 will definitely be 66.

	Mc-Kinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0/1/3	12	0/1/3	0/1/3	15	66

Similarly, this sum can be calculated for the colleges C2, C5, C6, C7 and C8.

	McKinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0/1/3	12	0/1/3	0/1/3	15	66
C2	0/1/3	20	9	0/1/3	23	0/1/3	56
C3	24		22	35	9	7	
C4	21	24		15		26	
C5	0/1/3	25	0/1/3	17	0/1/3	27	73
C6	38	0/1/3	13	0/1/3	37	0/1/3	92
C7	10	18	17	0/1/3	0/1/3	0/1/3	49
C8	0/1/3	10	25	0/1/3	0/1/3	16	55

By statement 1, only McKinsey and JPMC hired a different number of students from each college.

	McKinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0/1/3	12	0/1/3	0/1/3	15	66
C2	0/1/3	20	9	0/1/3	23	0/1/3	56
C3	24		22	35	9	7	
C4	21	24		15		26	
C5	0/1/3	25	0/1/3	17	0/1/3	27	73
C6	38	0/1/3	13	0/1/3	37	0/1/3	92
C7	10	18	17	0/1/3	0/1/3	0/1/3	49
C8	0/1/3	10	25	0/1/3	0/1/3	16	55
Total	132	101					

By statement 3, the total number of students hired by all the companies from C3 was 13 more than that from C4 college.

Sum of values present in the row of C3:

$$(24 + x + 22 + 35 + 9 + 7) = 97 + x$$

Sum of values present in the row of C4:

$$(21 + 24 + a + 15 + b + 26) = 86 + a + b, \text{ where } a \text{ and } b \text{ are distinct.}$$

$$\text{Given, } 97 + x = 86 + a + b + 13,$$

hence $x = a + b + 2$, which is possible only if $x = 3$, $a, b = (0, 1)$ or $(1, 0)$, and $(a, b) = (0, 1)$ is not possible by statement 3, as Goldman hired at least one student from each college.

By statement 5, students Citi hired from C1, C4 and C8 is p , 15 and q respectively is equal to the number of students hired by Goldman from C7 which is 17.

Therefore, $p + 15 + q = 17$, implies $p + q = 2$, which is possible only when $(p, q) = (1, 1)$

By statement 4, Goldman hired fewer students than what JPMC hired.

Since a missing cell of the students hired by Goldman could be 1 or 3, therefore total students hired by Goldman could be either 102, which is not possible or 100, which is possible.

Some missing values are now found and the table looks like:

	McKinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0	12	1	3	15	66
C2	1	20	9	0/3	23	3/0	56
C3	24	3	22	35	9	7	100
C4	21	24	1	15	0	26	87
C5	3/0	25	1	17	0/3	27	73
C6	38	1	13	0/3	37	3/0	92
C7	10	18	17				49
C8	0/3	10	25	1	3/0	16	55
Total	132	101	100				

By statement 6, students hired from the college C5, which is 73, is one more than the total number of students Citi hired, which means Citi hired 72 students.

Sum of students Citi hired from different colleges: $1 + d + 35 + 15 + 17 + e + f + 1 = 72$, which implies $d + e + f = 3$, the possible combinations are: (0, 1, 3) Similarly, students hired from the college C3, which is 100, is 3 more than the total number of students HUL hired, which means HUL hired 97 students.

Sum of students HUL hired from different colleges: $15 + r + 7 + 26 + 27 + s + t + 16 = 97$, which implies $r + s + t = 6$, the possible combination is: (0, 3, 3).

	McKinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0	12	1	3	15	66
C2	1	20	9	0/3	23	3/0	56
C3	24	3	22	35	9	7	100
C4	21	24	1	15	0	26	87
C5	3/0	25	1	17	0/3	27	73
C6	38	1	13	0/3	37	3/0	92
C7	10	18	17				49
C8	0/3	10	25	1	3/0	16	55
Total	132	101	100	72	76	97	

Sum of students Bank of America hired from different colleges: $3 + 23 + 9 + 0 + g + 37 + h + i = 76$, which implies, $g + h + i = 4$, the possible combinations is: (g, h, i) = (3, 1, 0) or (0, 1, 3)

So, the final table looks like:

	Mc-Kinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0	12	1	3	15	66
C2	1	20	9	0/3	23	3/0	56
C3	24	3	22	35	9	7	100
C4	21	24	1	15	0	26	87
C5	3/0	25	1	17	0/3	27	73
C6	38	1	13	0/3	37	3/0	92
C7	10	18	17	0/3	1	3/0	49
C8	0/3	10	25	1	3/0	16	55
Total	132	101	100	72	76	97	

Let the students who switched to McKinsey are 'x', then the students who switched to JPMC are '17 - x'.

Given: The new ratio of a total number of students in McKinsey and JPMC is 27:23.

Therefore,

$$\frac{(132 + x)}{(101 + 17 - x)} = \frac{27}{23}$$

$$x = 3$$

Hence, the number of students switched to McKinsey is 11 less than those who switched to JPMC.

33. (d)

The number of students hired from a college is different for every college. That means, all six companies – McKinsey, JPMC, Goldman, Citi, Bank of America and HUL – hired a different number of students from college C1 and so on.

Since missing numbers will be 0, 1 or 3 and it will be different for every missing cell in a row.

Therefore, the students hired from college C1 will definitely be 66.

	Mc-Kinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0/1/3	12	0/1/3	0/1/3	15	66

Similarly, this sum can be calculated for the colleges C2, C5, C6, C7 and C8.

	McKinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0/1/3	12	0/1/3	0/1/3	15	66
C2	0/1/3	20	9	0/1/3	23	0/1/3	56
C3	24		22	35	9	7	
C4	21	24		15		26	
C5	0/1/3	25	0/1/3	17	0/1/3	27	73
C6	38	0/1/3	13	0/1/3	37	0/1/3	92
C7	10	18	17	0/1/3	0/1/3	0/1/3	49
C8	0/1/3	10	25	0/1/3	0/1/3	16	55

By statement 1, only McKinsey and JPMC hired a different number of students from each college.

	McKinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0/1/3	12	0/1/3	0/1/3	15	66
C2	0/1/3	20	9	0/1/3	23	0/1/3	56
C3	24		22	35	9	7	
C4	21	24		15		26	
C5	0/1/3	25	0/1/3	17	0/1/3	27	73
C6	38	0/1/3	13	0/1/3	37	0/1/3	92
C7	10	18	17	0/1/3	0/1/3	0/1/3	49
C8	0/1/3	10	25	0/1/3	0/1/3	16	55
Total	132	101					

By statement 3, the total number of students hired by all the companies from C3 was 13 more than that from C4 college.

Sum of values present in the row of C3:

$$(24 + x + 22 + 35 + 9 + 7) = 97 + x$$

Sum of values present in the row of C4:

$$(21 + 24 + a + 15 + b + 26) = 86 + a + b, \text{ where } a \text{ and } b \text{ are distinct.}$$

$$\text{Given, } 97 + x = 86 + a + b + 13,$$

hence $x = a + b + 2$, which is possible only if $x = 3$, $a, b = (0, 1)$ or $(1, 0)$, and $(a, b) = (0, 1)$ is not possible by statement 3, as Goldman hired at least one student from each college.

By statement 5, students Citi hired from C1, C4 and C8 is p , 15 and q respectively is equal to the number of students hired by Goldman from C7 which is 17. Therefore, $p + 15 + q = 17$, implies $p + q = 2$, which is possible only when $(p, q) = (1, 1)$

By statement 4, Goldman hired fewer students than what JPMC hired.

Since a missing cell of the students hired by Goldman could be 1 or 3, therefore total students

hired by Goldman could be either 102, which is not possible or 100, which is possible.

Some missing values are now found and the table looks like:

	McKinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0	12	1	3	15	66
C2	1	20	9	0/3	23	3/0	56
C3	24	3	22	35	9	7	100
C4	21	24	1	15	0	26	87
C5	3/0	25	1	17	0/3	27	73
C6	38	1	13	0/3	37	3/0	92
C7	10	18	17				49
C8	0/3	10	25	1	3/0	16	55
Total	132	101	100				

By statement 6, students hired from the college C5, which is 73, is one more than the total number of students Citi hired, which means Citi hired 72 students.

Sum of students Citi hired from different colleges:

$$1 + d + 35 + 15 + 17 + e + f + 1 = 72, \text{ which implies } d + e + f = 3, \text{ the possible combinations are: } (0, 1, 3)$$

Similarly, students hired from the college C3, which is 100, is 3 more than the total number of students HUL hired, which means HUL hired 97 students.

Sum of students HUL hired from different colleges:

$$15 + r + 7 + 26 + 27 + s + t + 16 = 97, \text{ which implies } r + s + t = 6, \text{ the possible combination is: } (0, 3, 3).$$

	McKinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0	12	1	3	15	66
C2	1	20	9	0/3	23	3/0	56
C3	24	3	22	35	9	7	100
C4	21	24	1	15	0	26	87
C5	3/0	25	1	17	0/3	27	73
C6	38	1	13	0/3	37	3/0	92
C7	10	18	17				49
C8	0/3	10	25	1	3/0	16	55
Total	132	101	100	72	76	97	

Sum of students Bank of America hired from different colleges: $3 + 23 + 9 + 0 + g + 37 + h + i = 76$, which implies, $g + h + i = 4$, the possible combinations is: $(g, h, i) = (3, 1, 0)$ or $(0, 1, 3)$

So, the final table looks like:

	Mc-Kinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0	12	1	3	15	66
C2	1	20	9	0/3	23	3/0	56
C3	24	3	22	35	9	7	100
C4	21	24	1	15	0	26	87
C5	3/0	25	1	17	0/3	27	73
C6	38	1	13	0/3	37	3/0	92
C7	10	18	17	0/3	1	3/0	49
C8	0/3	10	25	1	3/0	16	55
Total	132	101	100	72	76	97	

Hence, cannot be determined.

34. (b)

The number of students hired from a college is different for every college. That means, all six companies – McKinsey, JPMC, Goldman, Citi, Bank of America and HUL – hired a different number of students from college C1 and so on.

Since missing numbers will be 0, 1 or 3 and it will be different for every missing cell in a row.

Therefore, the students hired from college C1 will definitely be 66.

	Mc-Kinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0/1/3	12	0/1/3	0/1/3	15	66

Similarly, this sum can be calculated for the colleges C2, C5, C6, C7 and C8.

	McKinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0/1/3	12	0/1/3	0/1/3	15	66
C2	0/1/3	20	9	0/1/3	23	0/1/3	56
C3	24		22	35	9	7	
C4	21	24		15		26	
C5	0/1/3	25	0/1/3	17	0/1/3	27	73
C6	38	0/1/3	13	0/1/3	37	0/1/3	92
C7	10	18	17	0/1/3	0/1/3	0/1/3	49
C8	0/1/3	10	25	0/1/3	0/1/3	16	55

By statement 1, only McKinsey and JPMC hired a different number of students from each college.

	McKinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0/1/3	12	0/1/3	0/1/3	15	66
C2	0/1/3	20	9	0/1/3	23	0/1/3	56
C3	24		22	35	9	7	
C4	21	24		15		26	
C5	0/1/3	25	0/1/3	17	0/1/3	27	73
C6	38	0/1/3	13	0/1/3	37	0/1/3	92
C7	10	18	17	0/1/3	0/1/3	0/1/3	49
C8	0/1/3	10	25	0/1/3	0/1/3	16	55
Total	132	101					

By statement 3, the total number of students hired by all the companies from C3 was 13 more than that from C4 college.

Sum of values present in the row of C3:

$$(24 + x + 22 + 35 + 9 + 7) = 97 + x$$

Sum of values present in the row of C4:

$$(21 + 24 + a + 15 + b + 26) = 86 + a + b, \text{ where } a \text{ and } b \text{ are distinct.}$$

$$\text{Given, } 97 + x = 86 + a + b + 13,$$

hence $x = a + b + 2$, which is possible only if $x = 3$, $a, b = (0, 1)$ or $(1, 0)$, and $(a, b) = (0, 1)$ is not possible by statement 3, as Goldman hired at least one student from each college.

By statement 5, students Citi hired from C1, C4 and C8 is p , 15 and q respectively is equal to the number of students hired by Goldman from C7 which is 17. Therefore, $p + 15 + q = 17$, implies $p + q = 2$, which is possible only when $(p, q) = (1, 1)$

By statement 4, Goldman hired fewer students than what JPMC hired.

Since a missing cell of the students hired by Goldman could be 1 or 3, therefore total students hired by Goldman could be either 102, which is not possible or 100, which is possible.

Some missing values are now found and the table looks like:

	McKinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0	12	1	3	15	66
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C4	21	24	1	15	0	26	87
C5	3/0	25	1	17	0/3	27	73
C6	38	1	13	0/3	37	3/0	92
C7	10	18	17				49
C8	0/3	10	25	1	3/0	16	55
Total	132	101	100				

By statement 6, students hired from the college C5, which is 73, is one more than the total number of students Citi hired, which means Citi hired 72 students.

Sum of students Citi hired from different colleges: $1 + d + 35 + 15 + 17 + e + f + 1 = 72$, which implies $d + e + f = 3$, the possible combinations are: (0, 1, 3) Similarly, students hired from the college C3, which is 100, is 3 more than the total number of students HUL hired, which means HUL hired 97 students.

Sum of students HUL hired from different colleges: $15 + r + 7 + 26 + 27 + s + t + 16 = 97$, which implies $r + s + t = 6$, the possible combination is: (0, 3, 3).

	McKinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0	12	1	3	15	66
C2	1	20	9	0/3	23	3/0	56
C3	24	3	22	35	9	7	100
C4	21	24	1	15	0	26	87
C5	3/0	25	1	17	0/3	27	73
C6	38	1	13	0/3	37	3/0	92
C7	10	18	17				49
C8	0/3	10	25	1	3/0	16	55
Total	132	101	100	72	76	97	

Sum of students Bank of America hired from different colleges: $3 + 23 + 9 + 0 + g + 37 + h + i = 76$, which implies, $g + h + i = 4$, the possible combinations is: (g, h, i) = (3, 1, 0) or (0, 1, 3)

So, the final table looks like:

	McKinsey	JPMC	Goldman	Citi	Bank of America	HUL	Total
C1	35	0	12	1	3	15	66
C2	1	20	9	0/3	23	3/0	56
C3	24	3	22	35	9	7	100
C4	21	24	1	15	0	26	87
C5	3/0	25	1	17	0/3	27	73
C6	38	1	13	0/3	37	3/0	92
C7	10	18	17	0/3	1	3/0	49
C8	0/3	10	25	1	3/0	16	55
Total	132	101	100	72	76	97	

Hence, the number of students hired by Bank of America from college C7 is 1.

35. (a)

P was born in a month with 30 days on an even date.

Three people were born in between U and P.

Case 1:

	MA R	APR .	MAY	JU N	JU L	AU G
1 5						
2 2				P		U

Case 2:

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5						
2 2		U		P		

Case 3:

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5						
2 2		P		U		

Five people were born in between R and U. R was born before U.

So, case 2 is invalid.

Case 1:

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5						
2 2			R	P		U

Case 3:

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5						
2 2	R	P		U		

Two people were born in between M and R and M was born in April. So, case 3 is invalid.

Case 1:

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5		M				
2 2			R	P		U

S was born immediately after M. T was born on 22nd of a month but not in July.

Case 1:

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5		M				
2 2	T	S	R	P		U

N was born before V in the same month. W was born in a month having 30 days.

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5		M		W	N	
2 2	T	S	R	P	V	U

Q was born before L but after Y.

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5	Y	M	Q	W	N	L
2 2	T	S	R	P	V	U

4 people were born in between Q and V.

Answer: (a)

36. (c)

P was born in a month with 30 days on an even date. Three people were born in between U and P.

Case 1:

	MA R	APR .	MAY	JU N	JU L	AU G
1 5						
2 2				P		U

Case 2:

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5						
2 2		U		P		

Case 3:

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5						

2		P		U		
2						

Five people were born in between R and U. R was born before U.

So, case 2 is invalid.

Case 1:

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5						
2 2			R	P		U

Case 3:

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5						
2 2	R	P		U		

Two people were born in between M and R and M was born in April. So, case 3 is invalid.

Case 1:

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5		M				
2 2			R	P		U

S was born immediately after M. T was born on 22nd of a month but not in July.

Case 1:

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5		M				
2 2	T	S	R	P		U

N was born before V in the same month. W was born in a month having 30 days.

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5		M		W	N	
2 2	T	S	R	P	V	U

Q was born before L but after Y.

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5	Y	M	Q	W	N	L
2 2	T	S	R	P	V	U

Only L was born after W among the given persons.

Answer: (c)

37. **(d)**

P was born in a month with 30 days on an even date.

Three people were born in between U and P.

Case 1:

	MA R	APR .	MAY	JU N	JU L	AU G
1 5						
2 2				P		U

Case 2:

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5						
2 2		U		P		

Case 3:

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5						
2 2		P		U		

Five people were born in between R and U. R was born before U.

So, case 2 is invalid.

Case 1:

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5						
2 2			R	P		U

Case 3:

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5						
2 2	R	P		U		

Two people were born in between M and R and M was born in April. So, case 3 is invalid.

Case 1:

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5		M				
2 2			R	P		U

S was born immediately after M. T was born on 22nd of a month but not in July.

Case 1:

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5						

1 5		M				
2 2	T	S	R	P		U

N was born before V in the same month. W was born in a month having 30 days.

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5		M		W	N	
2 2	T	S	R	P	V	U

Q was born before L but after Y.

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5	Y	M	Q	W	N	L
2 2	T	S	R	P	V	U

The number of people born before V is the same as the number of people born after M.

Answer: (d)

38. **(d)**

P was born in a month with 30 days on an even date. Three people were born in between U and P.

Case 1:

	MA R	APR .	MAY	JU N	JU L	AU G
1 5						
2 2				P		U

Case 2:

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5						

2		U		P		
2						

Case 3:

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5						
2 2		P		U		

Five people were born in between R and U. R was born before U.

So, case 2 is invalid.

Case 1:

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5						
2 2			R	P		U

Case 3:

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5						
2 2	R	P		U		

Two people were born in between M and R and M was born in April. So, case 3 is invalid.

Case 1:

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5		M				
2 2			R	P		U

S was born immediately after M. T was born on 22nd of a month but not in July.

Case 1:

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5		M				
2 2	T	S	R	P		U

N was born before V in the same month. W was born in a month having 30 days.

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5		M		W	N	
2 2	T	S	R	P	V	U

Q was born before L but after Y.

	MA R	APR .	MAY	JUN .	JU L	AU G
1 5	Y	M	Q	W	N	L
2 2	T	S	R	P	V	U

All the people were born on the 15th except for the U.

Answer: (d)

39. **(b)**

P was born in a month with 30 days on an even date. Three people were born in between U and P.

Case 1:

	MA R	APR .	MAY	JU N	JU L	AU G
1 5						
2 2				P		U

Case 2:

	MA R	APR .	MAY	JUN .	JU L	AU G
--	---------	----------	-----	----------	---------	---------

1						
5						
2		U		P		
2						

Case 3:

	MA R	APR .	MAY	JUN .	JU L	AU G
1						
5						
2		P		U		
2						

Five people were born in between R and U. R was born before U.

So, case 2 is invalid.

Case 1:

	MA R	APR .	MAY	JUN .	JU L	AU G
1						
5						
2			R	P		U
2						

Case 3:

	MA R	APR .	MAY	JUN .	JU L	AU G
1						
5						
2	R	P		U		
2						

Two people were born in between M and R and M was born in April. So, case 3 is invalid.

Case 1:

	MA R	APR .	MAY	JUN .	JU L	AU G
1		M				
5						
2			R	P		U
2						

S was born immediately after M. T was born on 22nd of a month but not in July.

Case 1:

	MA R	APR .	MAY	JUN .	JU L	AU G
1		M				
5						
2	T	S	R	P		U
2						

N was born before V in the same month. W was born in a month having 30 days.

	MA R	APR .	MAY	JUN .	JU L	AU G
1		M		W	N	
5						
2	T	S	R	P	V	U
2						

Q was born before L but after Y.

	MA R	APR .	MAY	JUN .	JU L	AU G
1	Y	M	Q	W	N	L
5						
2	T	S	R	P	V	U
2						

Q was born on 15th May

Answer: (b).

40. (c)

It is given that the marks scored by three girls who have scored highest marks in the QA section is 78% or 195 of the total marks scored by all the five girls in that section. So total marks scored by the five girls in QA is

$$78\% \text{ of } X = 195$$

$$\text{So } X = 250$$

Means the sum marks score by S and T in QA section is 55

Similarly we can find out the sum of marks of other two girls for the other two sections.

In VARC, total marks scored by five girls is 200 so marks scored by $Q+R = 48$

In DILR, total marks scored by five girls is 290 so marks scored by $P+S = 87$

Now the Final table look like this:

	QA	VARC	DILR	Total
P	75	52	z	$127+z$
Q	68	y	60	$128+y$
R	52	$48-y$	78	$178-y$
S	x	60	$87-z$	$147+x-z$
T	$55-x$	40	65	$160-x$
Total	250	200	290	740

For first question, check options

Option (a) – if the score of S in DILR is 26 then the score of P will be 61 which is not possible because it is given in the question that highest of the three marks are scored by Q,R and T in DILR section so it will violate the given condition so this option can be rejected.

Option (b) – As like option 1, it also violates the given condition.

Option (c) – If the score of S is 36 then the score of P will be 51 which is possible and satisfies all the given conditions. So this option is correct.

Option (d) – Score of less than 20 is not possible for any girls as per the given condition so this option can be rejected.

Answer – 36

41. (a)

It is given that the marks scored by three girls who have scored highest marks in the QA section is 78% or 195 of the total marks scored by all the five girls in that section. So total marks scored by the five girls in QA is

$$78\% \text{ of } X = 195$$

$$\text{So } X = 250$$

Means the sum marks score by S and T in QA section is 55

Similarly we can find out the sum of marks of other two girls for the other two sections.

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S	x	60	$87-z$	$147+x-z$
T	$55-x$	40	65	$160-x$
Total	250	200	290	740

Now, Q's score is $128+y$, since y can take values from 20 to 28 because of the constraint given, the value of Q's score will be in the range of 148 to 156. So from the given options, only 157 is out of range so it's not possible.

42. (c)

It is given that the marks scored by three girls who have scored highest marks in the QA section is 78% or 195 of the total marks scored by all the five girls in that section. So total marks scored by the five girls in QA is

$$78\% \text{ of } X = 195$$

$$\text{So } X = 250$$

Means the sum marks score by S and T in QA section is 55

Similarly we can find out the sum of marks of other two girls for the other two sections.

In VARC, total marks scored by five girls is 200 so marks scored by $Q + R = 48$

In DILR, total marks scored by five girls is 290 so marks scored by $P+S = 87$

Now the Final table look like this:

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S	x	60	$87-z$	$147+x-z$
T	$55-x$	40	65	$160-x$
Total	250	200	290	740

Now, to check the highest CI score, we are given the highest section wise score of each of the girls and if we minimize their lowest scores in each of the sections then their CI score will be high.

P's highest score is 75 and if we minimize the value of z (her DILR score) then her CI will be maximized. So by checking the range, z can take a range of 28 to 59.

Hence P's CI can be $75-28 = 47$

Similarly checking for Q, y can take a minimum value of 20, so CI will be $68-20 = 48$

Checking for R, the maximum value that Y can take is 28 so her minimum score in VARC can be 20. So her CI will be $78-20 = 58$

Now checking for T, the maximum value that x can take is 35 so her minimum score in QA will be 20, hence her CI score can be $65-20 = 45$

So from this we can see that R's CI score can be the highest, which is 58.

43. (a)

It is given that the marks scored by three girls who have scored highest marks in the QA section is 78% or 195 of the total marks scored by all the five girls in that section. So total marks scored by the five girls in QA is

78% of $X = 195$

So $X = 250$

Means the sum marks score by S and T in QA section is 55

Similarly we can find out the sum of marks of other two girls for the other two sections.

In VARC, total marks scored by five girls is 200 so marks scored by $Q + R = 48$

In DILR, total marks scored by five girls is 290 so marks scored by $P+S = 87$

Now the Final table look like this:

	QA	VARC	DILR	Total
P	75	52	z	$127+z$
Q	68	y	60	$128+y$
R	52	$48-y$	78	$178-y$
S	x	60	$87-z$	$147+x-z$
T	$55-x$	40	65	$160-x$
Total	250	200	290	740

Scores of each girl in all the three sections are arranged in ascending order which means that RI for each girl will be the second highest value in all three sections.

Now maximize RI for each girl,

P's RI can be either 52 or z , but the maximum value that z can take is 59 so P's RI can be 59.

Similarly checking for other girls,

Q's RI can be either 60 or y , but the maximum value that y can take is 28 so Q's RI can be 60.

R's RI can be either 52 or $48-y$ so it is clearly visible that 52 can be the RI for Q.

T's RI can be either of 40 or $55-x$, and the minimum value that x can take is 20 so $55-20=35$ hence her RI can be 40.

Hence Q's RI will be highest which is 60.

44. (a)

It is given that the marks scored by three girls who have scored highest marks in the QA section is 78% or 195 of the total marks scored by all the five girls in that section. So total marks scored by the five girls in QA is

78% of $X = 195$

So $X = 250$

Means the sum marks score by S and T in QA section is 55

Similarly we can find out the sum of marks of other two girls for the other two sections.

In VARC, total marks scored by five girls is 200 so marks scored by $Q + R = 48$

In DILR, total marks scored by five girls is 290 so marks scored by $P + S = 87$

Now the Final table look like this:

	QA	VARC	DILR	Total
P	75	52	z	127+z
Q	68	y	60	128+y
R	52	48-y	78	178-y
S	x	60	87-z	147+x-z
T	55-x	40	65	160-x
Total	250	200	290	740

To maximize P's total score, we have to maximize the value of z. here z can take a maximum value of 59 so her total score can be $127+59 = 186$

To maximize Qs total score, we have to maximize the value of y. here y can take a maximum value of 28 so her total score can be $128+28 = 156$

To maximize S's total score, we have to maximize the value of x and minimize the value of z. here x can take a maximum value of 35 and z can take a minimum value of 28 so her total score can be $147+35-28 = 154$

To maximize T's total score, we have to minimize the value of x. Here x can take a minimum value of 20 so her total score can be $160-20 = 140$.

Hence P's total score can be the highest which is 186.

QUANT

45. (d)

The number of ways of selecting 3 Comic cards out of 10 = ${}^{10}C_3 = 120$

The number of ways of selecting 2 Comic cards lying next to each other = 9

The number of ways selecting the 3rd Comic card such that the 3rd Comic card does not lie adjacent to the first 2 Comic cards = $2 * 7 + 6 * 7 = 56$

The number of ways selecting 3 Comic cards such that all the 3 Comic cards lie next to each other = 8

Thus, the total number of ways of selecting 3 Comic cards such that none of the 2 were lying next to each other = $120 - 56 - 8 = 56$

Hence, the required probability = $\frac{56}{120} = \frac{7}{15}$

Hence, option d is the correct answer.

46. (381)

Area = $\left(2 * (1 + \sqrt{2}) * s^2\right)$, where s is the length of a side.

Using this formula, we can calculate the area of the octagon:

$$= \left(2 * (1 + \sqrt{2}) * 4^2\right)$$

Area

$$= (2 * (1 + 1.41) * 16)$$

$$= 77.12 \text{ m}^2$$

To convert the area in base 10 to base 8, we can use the method of repeated division. Divide the number by the target base and keep track of the remainder. Repeat this process until the quotient is zero. Read the remainders from the whole portion from the bottom up.

The Steps to Convert Decimal to Base 8

$$77 \div 8 = 9 \text{ R } 5$$

$$9 \div 8 = 1 \text{ R } 1$$

$$1 \div 8 = 0 \text{ R } 1$$

Hence, $(77.12)_{10} \approx (115)_8$

Now, to multiply the area in base 8 by the base-10 equivalent of 5, we can treat it like a base 10 number and multiply it by 5.

$$\begin{array}{r}
 1 \quad 3 \\
 1 \quad 1 \quad 5 \\
 \times \quad 5 \\
 \hline
 6 \quad 0 \quad 1
 \end{array}$$

The result will be $(115)_8 \times (5)_8 = (601)_8$

[Since, $(5)_{10} = (5)_8$]

Steps to Convert Base 8 to Decimal

$$(5 \times 8^2)$$

$$+ (7 \times 8^1)$$

$$+ (5 \times 8^0)$$

$$381$$

Hence, the required value $= (575)_8 = (381)_{10}$

47. (8)

$$3x + 2y = 12$$

$$x + 2y = 12 - 2x$$

From the above equation, we can say that maximum value x can take is 4 and minimum value x can take is 0.

$x + 2y$ is maximum when $2x$ is minimum, when $x=0$.

i.e., at $x = 0$,

$$\text{Maximum value of } x + 2y = 12 - 0 = 12$$

$x + 2y$ is minimum when $2x$ is maximum, i.e., $x = 4$

$$\text{Minimum value of } x + 2y = 12 - 2(4) = 4$$

$$= \frac{(12+4)}{2} = 8$$

Now, the required average

48. (25)

PQR will have the least profit if the product was sold by the person who is in the bottom most position of the pyramid.

The profits distributed as commission is

$$(30\% + 10\% \cdot 30\% + 10\% \cdot 10\% \cdot 30\% + \dots)$$

$$= 30\% \cdot (1 + 10\% + (10\%)^2 + \dots)$$

$$= 30\% \cdot \left(\frac{1}{(1-10\%)} \right)$$

$$= \frac{100\%}{3}$$

The true selling price of the company is

$$= \left(100\% - \frac{100\%}{3} \right) * ₹300 = ₹200$$

$$\% \text{ Profit} = \frac{(\text{Rs.}200 - \text{Rs.}160)}{\text{Rs.}160} = 25\%$$

49. (72)

There are total 9 stoppages.

Let name them as A, B, C, ..., I

If anyone want to travel from A to B, C, D, E, ..., I then there will be 8 tickets required.

Now from B station to C, D, E.....I then there will be 7 ticket required. In the same it will go until 1 ticket will be required.

So, the total bus tickets required will be

$$= 8 + 7 + 6 + 5 + 4 + \dots + 1$$

$$= \frac{(8 \times 9)}{2}$$

$$= 36$$

But for both way double tickets will be required.

$$\text{So, total tickets} = 36 \times 2 = 72$$

50. (b)

Compound interest from scheme

$$A = 15000 \times \left[\left(1 + \frac{10}{100} \right)^2 - 1 \right]$$

$$= 15000 \times \frac{21}{100}$$

$$= 150 \times 21$$

$$= \text{Rs. } 3150$$

Amount invested in scheme B = Rs.3150

Rate% = 20%

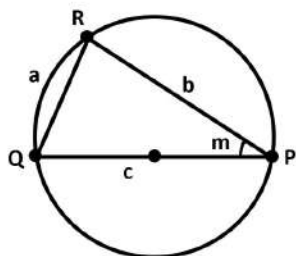
$$\text{Simple interest} = 3150 \times 20 \times \frac{2}{100}$$

$$= 630 \times 2 = \text{Rs. } 1260$$

So, interest amount received from scheme B is Rs. 1260.

Hence, option (b) is correct.

51. (a)



Since, $a^2 + b^2 = c^2 = 4r^2$ (i)

Also, $\frac{1}{2} ab = \frac{2}{5} \left(\frac{1}{2} \pi r^2 \right)$

i.e., $5ab = 2\pi r^2$ (ii)

From (i) and (ii) we get

$$\frac{(a^2 + b^2)}{5ab} = \frac{2}{\pi}$$

$$\frac{a}{b} + \frac{b}{a} = \frac{10}{\pi}$$

Now, $\angle QPR = m$, then

$$\frac{\sin m}{\cos m} + \frac{\cos m}{\sin m} = \frac{10}{\pi}$$

$$\Rightarrow \frac{(\cos^2 m + \sin^2 m)}{(\sin m \times \cos m)} = \frac{10}{\pi}$$

$$\Rightarrow \sin(2m) = \frac{\pi}{5}$$

52. (12)

We are given $a + b + c = \log_6(5x + 4)$ (i)

Also, $\log_6(2x + 1) = a$ (ii) $\frac{1}{2} \log_{\sqrt{6}}(3x + 2) = b$

$$\Rightarrow \log_{(\sqrt{6})^2}(3x + 2) = b$$

$$\Rightarrow \log_6(3x + 2) = b \quad \dots (iii)$$

And, $c \log_{(4x+3)} 6 = 1$

$$\Rightarrow c \times \frac{1}{\log_6(4x + 3)} = 1$$

$$\Rightarrow \log_6(4x + 3) = c \quad \dots (iv)$$

Adding equations (ii), (iii) and (iv), we get

$$a + b + c = \log_6(2x + 1) + \log_6(3x + 2) + \log_6(4x + 3)$$

$$\Rightarrow a + b + c = \log_6[(2x + 1)(3x + 2)(4x + 3)] \dots (v)$$

Now, we can equate the two expressions (i) and (v) for $a + b + c$:

$$\log_6((2x + 1)(3x + 2)(4x + 3)) = \log_6(5x + 4)$$

$$\Rightarrow (2x + 1)(3x + 2)(4x + 3) = (5x + 4)$$

Expanding both sides of the equation, we get:

$$24x^3 + 46x^2 + 29x + 6 = 5x + 4$$

Rearranging the equation into a cubic equation, we get:

$$24x^3 + 46x^2 + 24x + 2 = 0$$

Therefore, the product of the root of the equation is

$$-\frac{2}{24} = -\frac{1}{12}$$

$$\text{Hence, } k = -\frac{1}{12}$$

$$\text{So, } \frac{1}{|k|} = 12$$

53. (7)

The last digit of 1289^{982} is same as the last digit of 9^{982} , which is 1 as 982 is even.

The last digit of 962^{972} is same as the last digit of

$$2^{962}, \text{ which is } 2^{\text{Rem}\left[\frac{962}{4}\right]}, \text{ i.e., } 2^2 = 4.$$

[Since the cyclicity of 2 is 4.]

Also, the unit digit of 1563^{1563} is same as the unit

$$\text{digit of } 3^{1563}, \text{ which is the unit digit of } 3^{\text{Rem}\left[\frac{1563}{4}\right]},$$

i.e., $3^3 = 27$, i.e., 7 [Since the cyclicity of 3 is 4.]

The last digit of 884^{884} is same as the last digit of 4^{884} , which is 6. [Since 4 to the power any even number produces a number whose unit digit is always 6.]

The last digit of 1676^{1676} is same as the last digit of 6^{1676} , which is 6. [Since the cyclicity of 6 is 1.]

$$\text{Hence, the last digit of } 1289^{982} (962^{962} + 1563^{1563}) + 884^{884} (1676^{1676} + 1)$$

$$= \text{The last digit of } 1(4 + 7) + 6(6 + 1)$$

$$= \text{The last digit of } 53$$

$$= 3$$

Now, the last digit of $[1289^{982} (962^{962} + 1563^{1563}) + 884^{884} (1676^{1676} + 1)]^{999}$
 = The last digit of 3^{999}
 = The last digit of $3^{\text{Rem}[999/4]}$
 = The last digit of 3^3
 = 7

54. (1008)

It is given, $5D = 20V = 7Q$ and Ankita bought 6D, 16V and 8Q.

Let, $5D = 20V = 7Q = 140k$

$D = 28k$, $V = 7k$, and $Q = 20k$

Cost price of 6D, 16V and 8Q

$= 6(28k) + 16(7k) + 8(20k) = 440k$

Marked up price $= 440k + 1695$

$$\text{S.P.} = \frac{6}{30} \times (440k + 1695) + \left(1 - \frac{6}{30}\right) (440k + 1695) \left(1 - \frac{50}{3\%}\right) \left[\text{Since, } 16.66\% = \frac{50}{3\%}\right]$$

$$= \frac{1}{5} (440k + 1695) + \frac{4}{5} \times \frac{5}{6} \times (440k + 1695)$$

$$= \frac{13}{15} (440k + 1695)$$

So, the profit $= \text{S.P.} - \text{C.P.}$

$$= \frac{13}{15} (440k + 1695) - 440k$$

$$= 1469 - \frac{176k}{3}$$

Therefore, by the condition,

$$1469 - \frac{176k}{3} = 1117$$

$$\frac{176k}{3} = 1469 - 1117$$

$$\frac{176k}{3} = 352$$

$$k = 6$$

Then, the cost of almonds $= 6D = 6 \times 28 \times 6 = \$1008$

55. (a)

Maximum decrease is possible when two students having 100 marks each left the class.

Initially, the total marks in English $= 76 \times 20 = 1520$

When two students left the class, then the total mark would be $= 1520 - 200 = 1320$

$$\text{The new average would be} = \frac{1320}{18} = 73.33$$

So, the maximum decrease in English is

$$76 - 73.33 = 2.67.$$

Option (a) is the correct answer.

56. (c)

Given Malinga is 25% less efficient than Bumrah.

If Bumrah can complete 4 units of work in a day,

then Malinga can complete

$[4 - (25\% \text{ of } 4)] = 3$ units of work of same work in a day

Given Malinga takes 36 days to finish the work

Total work of X $= 36 \times 3 = 108$ units

Malinga works alone for 'p' days and the two work together for $(25 - p)$ days

Using the concept of man days,

we get $3p + [(28 - p) \times 7] = 108$

$$\Rightarrow 3p - 7p + 196 = 108$$

$$\Rightarrow 4p = 88$$

$$\Rightarrow p = 22$$

$\therefore$ Required number of days $= 22$.

Hence, option (c) is correct

57. (d)

Assuming capacity of each canister is 2700 litres.

So, Canister 1 has $\frac{1}{3} \times 2700 = 900$ litres of honey

and Canister 2 has $\frac{1}{3} \times 2700 = 900$ litres of tea.

After first transfer,

Canister 1 has $(900 - 900 \times \frac{1}{3}) = 600$ litres of honey and Canister 2 has 900 litres Tea and 300 litres honey.

After second transfer,

$\frac{1}{3}$ rd of the second canister i.e., 300 litres tea and 100 litres honey will get transferred to canister 1. So, Canister 1 has $(600+100) = 700$ litres honey and 300 litres tea and

Canister 2 has $(900 - 900 \times \frac{1}{3}) = 600$ litres tea and $(300 - 300 \times \frac{1}{3}) = 200$ litres honey.

After third transfer,

$\frac{1}{3}$ rd of the first canister i.e., $\frac{700}{3}$ litres honey and $\frac{300}{3} = 100$ litres tea go to second canister.

So, second canister has $(600 + 100) = 700$ litres tea

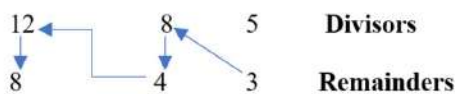
and $\left(200 + \frac{700}{3}\right) = \frac{1300}{3}$ litres honey.

Required ratio = $\frac{1300}{3} : 700$

= 1300: 2100

= 13: 21

58. (2)



So, the smallest number that satisfy the given condition is $\{(8 \times 3) + 4\} \times 12 + 8 = 344$.

The general form of numbers that satisfy the given condition is got by adding the LCM of divisors, which is 120, to 344.

i.e., the general form is $120k+344$, $k = 0, 1, 2, 3, \dots$

Therefore, the smallest number is 344.

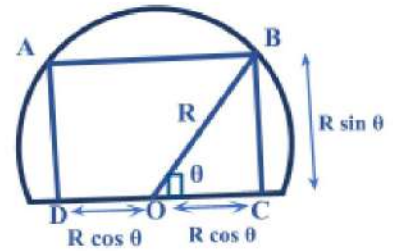
Now, when 344 is divided by 7, quotient obtained as 49 and leaves remainder as 1.

When 49 is divided by 3, quotient obtained as 16, remainder as 1.

When 16 is divided by 2, quotient obtained as 8, remainder as 0.

Hence, the required sum of the remainders = $1 + 1 + 0 = 2$

59.

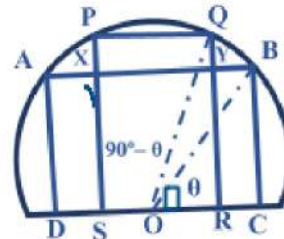


Let's assume that, $\angle BOC = \theta$.

So, the area of ABCD is $2R^2 \sin \theta \cos \theta = R^2 \sin 2\theta$

We can say that, $R^2 \sin 2\theta = R^2 \sin 2(90^\circ - \theta)$

Thus, if we have another rectangle with the angle being $90^\circ - \theta$, then we get



So, XYRS is the common area.

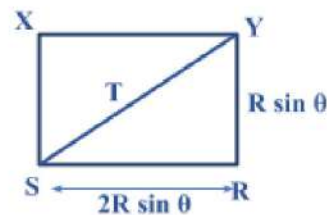
$YR = BC = R \sin \theta$

$PQ = XY = 2 R \sin \theta$

$\square XYRS = 2R^2 \sin^2 \theta = \frac{2}{3} R^2 \sin \theta \cos \theta$

$\Rightarrow \tan \theta = \frac{1}{3}$

$\Rightarrow \sin \theta = \frac{1}{\sqrt{10}}$ [As, $0^\circ < \theta < 90^\circ$]



$$\begin{aligned}\text{Circumradius} &= TY = \frac{1}{2} \times SY \\ &= \frac{1}{2} \times (R \sin \theta) \sqrt{5} \\ &= \frac{R}{2\sqrt{2}}\end{aligned}$$

Hence, the area of circumcircle is $\frac{\pi R^2}{8}$ unit².

60. (21)

Let worker A add milk and B add water after two cups of milk. We have the two possibilities— worker A starts first or worker B starts first.

If worker A starts first, the composition of the first 6 cups will be M M M M M W. So, the 25th cup will also be a cup of milk and there will be 4 cups of water in the first 25 cups poured.

If worker B starts first, the composition of the first 6 cups will be M M M M W M. So, the 25th cup will also be a cup of milk and there will be 4 cups of water in the first 25 cups poured.

In either case, the number of cups of milk = $25 - 4 = 21$.

Therefore, the required answer is 21.

61. (310)

Himani will add the minimum amount of C when he needs a solution of 17%.

Let x be the minimum amount of C he needs to add to the solution.

Thus,

$$0.18 \times 120 + 0.16 \times 160 + 0.21x = 0.17(280 + x)$$

$$\text{Thus, } 18 \times 120 + 16 \times 160 + 21x = 17(280 + x)$$

$$2160 + 2560 + 21x = 4760 + 17x$$

$$\Rightarrow 4x = 40$$

Thus, x = 10 is the minimum amount of C he needs to add.

He will add the maximum amount of C when he needs a solution of concentration 19%.

Let y be the maximum amount of C that Harish can add.

Thus,

$$0.18 \times 120 + 0.16 \times 160 + 0.21y = 0.19(280 + y)$$

$$18 \times 120 + 16 \times 160 + 21y = 19(280 + y)$$

$$4720 + 21y = 5320 + 19y$$

$$2y = 600$$

$\Rightarrow y = 300$ is the maximum amount of C that can be added.

Hence, x + y = 10 + 300 = 310 is the required answer.

62. (d)

As a & c are natural numbers in the quadratic equation $(ax^2 + bx + c) = 0$ the other root of the

equation can be $(5 - 2\sqrt{6})$ or $(2\sqrt{6} - 5)$. In the first case b will be a natural number and in the second case it will not be a natural number.

Case I : The root is $(5 - 2\sqrt{6})$

$$-\frac{b}{a} = 5 + 2\sqrt{6} + 5 - 2\sqrt{6} = 10$$

$$\Rightarrow b = -10a$$

$$\frac{c}{a} = (5 + 2\sqrt{6})(5 - 2\sqrt{6}) = 1$$

$$\Rightarrow c = a$$

$cx^2 + px + a = 0$ has one root as $(3 + 2\sqrt{2})$ and the other root as β (lets us assume)

So,

$$\beta(3 + 2\sqrt{2}) = \frac{a}{c} = 1$$

$$\Rightarrow \beta = 3 - 2\sqrt{2}$$

So,

$$\text{The sum of the roots is } (3 + 2\sqrt{2}) + (3 - 2\sqrt{2}) = 6$$

$$= -\frac{p}{a}$$

$$\Rightarrow p = -6a = \frac{3b}{5} = -6c$$

Thus, option a is correct.

Case II : The root is $-(5 - 2\sqrt{6})$

$$-\frac{b}{a} = 5 + 2\sqrt{6} - 5 + 2\sqrt{6} = 4\sqrt{6}$$

$$\Rightarrow b = -\frac{4a}{\sqrt{6}}$$

$$\frac{c}{a} = -(5 + 2\sqrt{6})(5 - 2\sqrt{6}) = -1$$

$$\Rightarrow c = -a$$

$cx^2 + px + a = 0$ has one root as $(3 + 2\sqrt{2})$ and the other root as β (lets us assume)

So,

$$\beta(3 + 2\sqrt{2}) = \frac{a}{c} = -1$$

$$\Rightarrow \beta = -\frac{1}{3 + 2\sqrt{2}}$$

So,

The sum of the roots is $(3 + 2\sqrt{2}) - (3 - 2\sqrt{2}) = 4\sqrt{2}$

$$= -\frac{p}{a}$$

$$\Rightarrow p = -4a\sqrt{2} = \frac{b}{\sqrt{3}} = 4c\sqrt{2}$$

Thus, both option b & c are also correct.

Thus, option "d" is the correct choice.

63. (c)

Let us consider the day on which the tree had 9 kg of mangoes in the morning to day 1.

On the night of day 1, after the increase, the tree had $(9 - y)1.1$ mangoes.

If $(9 - y)1.1$ is more than 9, the mangoes on the tree effectively increased on day 1.

$\therefore$ The mangoes on the tree after the bird eats on day 2 will be more than that on day 1.

$\therefore$ After the increase on day 2, the mangoes on the tree will be more than that on day 1.

$\therefore$ Everyday, the mangoes on the tree will increase.

66. (d)

If $(9 - x)1.1$ is equal to 9, every day the mangoes on the tree will be maintained.

If $(9 - x)1.1$ is less than 9, every day the mangoes on the tree will be decreased.

For the bird to sustain itself indefinitely with the apples of the tree,

$(9 - x)1.1$ at least 9.

$$\therefore x \text{ must be at most } = \frac{9}{11}$$

Thus, option (c) is correct

64. (d)

$$x^3 = 1$$

$$\text{So, } x^{2016} = 1 \text{ and } x^{2015} = x^2 * x^{2012} = x^2$$

$$x^3 - 1 = (x - 1)(x^2 + x + 1)$$

Now as x is not equal to 1, so $x^2 + x = -1$

$$\log\left(x^{2015} + \frac{1}{x^{2015}} + x^{2016} + \frac{1}{x^{2016}}\right)$$

$$= \log\left(x^2 + \frac{1}{x^2} + 1 + 1\right) = \log(x^2 + x + 1 + 1)$$

$$= \log(-1 + 1 + 1) = \log 1 = 0$$

Hence option (d) is correct.

65. (36)

It is given that $f(2) > 1$ and $f(xy) = f(x)f(y)$

$$\text{So, } f(2) = f(2)f(1).$$

As, x and y are positive integers, only possible value for $f(1) = 1$

$$f(2) > 1$$

$$\text{Now we know, } f(48) = 162$$

$$\text{So, } f(2)^2 f(3) f(4) = 162$$

$$f(3) f(2)^4 = 162$$

$$\text{Now we know, } 162 = 2 \times 3^4$$

$$\text{Therefore, } f(2) = 3, f(3) = 2 \text{ and } f(1) = 1$$

Now, we need to find the value of $f(36)$

$$f(36) = f(18) \times f(2) = f(2) \times f(9) \times f(2) = f(2)^2 \times f(3)^2$$

$$f(36) = 3^2 \times 2^2$$

$$f(36) = 36$$

Let's say Sunita and Danish came up with 3 numbers in the dice as 3, 4 & 5 then first they

multiply the number and they write all the natural numbers which are less than the $(3*4*5)$ in an ascending order and then deletes the number which are not co-prime to the number $3*4*5$. So, eventually, they will be left with all the numbers which are less than $(3*4*5)$ and co-prime to it which we can find through Euler's theorem.

So, for $3*4*5$, value of N is

$$3*4*5*\left(1-\frac{1}{2}\right)*\left(1-\frac{1}{2}\right)*\left(1-\frac{1}{5}\right)$$

= 16

From the given options, 42 is not possible as 42 has a prime factor as 7 which can not appear when we are rolling a dice. Thus, option II is not possible.

The highest outcome post multiplying the 3 rolls which do not have any multiple of 2 is $5*5*5 = 125$.

N for 125 is $125*\left(1-\frac{1}{5}\right) = 100$. Thus, 100 is possible. So, option III is possible.

The value of N should always be less than 108 as –

Any number which is more than 125 (that can come as an outcome) is going to have 2 as one of it's factor, so the value of N corresponding to that value

is going to be less than $\frac{1}{2}$ of the value. As it is not possible to have an outcome of 240 as a product of the three rolls (maximum number is 216), thus 120 is wrong.

As, option II, IV are wrong, the only option supporting these 2 are option d. Hence, option d is the right answer.