CAT 2023 Qusetion paper with Solution -Slot2

Verbal Ability & Reading Comprehension (VARC)

Reading Comprehension (RC)

The passage below is accompanied by four questions. Based on the passage, choose the best answer for each question.

RC 1:

The Second Hand September campaign, led by Oxfam . . . seeks to encourage shopping at local organisations and charities as alternatives to fast fashion brands such as Primark and Boohoo in the name of saving our planet. As innocent as mindless scrolling through online shops may seem, such consumers are unintentionally—or perhaps even knowingly—contributing to an industry that uses more energy than aviation. . . .

Brits buy more garments than any other country in Europe, so it comes as no shock that many of those clothes end up in UK landfills each year: 300,000 tonnes of them, to be exact. This waste of clothing is destructive to our planet, releasing greenhouse gasses as clothes are burnt as well as bleeding toxins and dyes into the surrounding soil and water. As ecologist Chelsea Rochman bluntly put it, "The mismanagement of our waste has even come back to haunt us on our dinner plate."

It's not surprising, then, that people are scrambling for a solution, the most common of which is second-hand shopping. Retailers selling consigned clothing are currently expanding at a rapid rate . . . If everyone bought just one used item in a year, it would save 449 million lbs of waste, equivalent to the weight of 1 million Polar bears. "Thrifting" has increasingly become a trendy practice. London is home to many second-hand, or more commonly coined 'vintage', shops across the city from Bayswater to Brixton.

So you're cool and you care about the planet; you've killed two birds with one stone. But do people simply purchase a second-hand item, flash it on Instagram with #vintage and call it a day without considering whether what they are doing is actually effective?

According to a study commissioned by Patagonia, for instance, older clothes shed more microfibres. These can end up in our rivers and seas after just one wash due to the worn material, thus contributing to microfibre pollution. To break it down, the amount of microfibres released by laundering 100,000 fleece jackets is equivalent to as many as 11,900 plastic grocery bags, and up to 40 per cent of that ends up in our oceans. . . . So where does this leave second-hand consumers? [They would be well advised to buy] high-quality items that shed less and last longer [as this] combats both microfibre pollution and excess garments ending up in landfills. . . .

Luxury brands would rather not circulate their latest season stock around the globe to be sold at a cheaper price, which is why companies like ThredUP, a US fashion resale marketplace, have not yet caught on in the UK. There will always be a market for consignment but there is also a whole generation of people who have been taught that only buying new products is the norm; second-hand luxury goods are not in their psyche. Ben Whitaker, director at Liquidation Firm B-Stock, told Prospect that unless recycling becomes cost-effective and filters into mass production, with the right technology to partner it, "high-end retailers would rather put brand before sustainability."

1.The central idea of the passage would be undermined if:

A. Primark and Boohoo recycled their clothes for vintage stores.
B. customers bought all their clothes online.
C. second-hand stores sold only high-quality clothes.
D. clothes were not thrown and burnt in landfills.

2.The act of "thrifting", as described in the passage, can be considered ironic because it:

A. has created environmental problems.
B. is an anti-consumerist attitude.
C. is not cost-effective for retailers.
D. offers luxury clothing at cut-rate prices.

3. Based on the passage, we can infer that the opposite of fast fashion, 'slow fashion', would most likely refer to clothes that:

A. do not shed microfibres.
B. are of high quality and long lasting.
C. are sold by genuine vintage stores.
D. do not bleed toxins and dyes.

4. According to the author, companies like ThredUP have not caught on in the UK for all of the following reasons EXCEPT that:

A. recycling is currently not financially attractive for luxury brands.
B. luxury brands do not like their product to be devalued.
C. the British don't buy second-hand clothing.
D. luxury brands want to maintain their brand image.

RC 2:

Over the past four centuries liberalism has been so successful that it has driven all its opponents off the battlefield. Now it is disintegrating, destroyed by a mix of hubris and internal contradictions, according to Patrick Deneen, a professor of politics at the University of Notre Dame. . . . Equality of opportunity has produced a new meritocratic aristocracy that has all the aloofness of the old aristocracy with none of its sense of noblesse oblige. Democracy has degenerated into a theatre of the absurd. And technological advances are reducing ever more areas of work into meaningless drudgery. "The gap between liberalism's claims about itself and the lived reality of the citizenry" is now so wide that "the lie can no longer be accepted," Mr Deneen writes. What better proof of this than the vision of 1,000 private planes whisking their occupants to Davos to discuss the question of "creating a shared future in a fragmented world"? . . .

Deneen does an impressive job of capturing the current mood of disillusionment, echoing left-wing complaints about rampant commercialism, right-wing complaints about narcissistic and bullying students, and general worries about atomisation and selfishness. But when he concludes that all this adds up to a failure of liberalism, is his argument convincing? . . . He argues that the essence of liberalism lies in freeing individuals from constraints. In fact, liberalism contains a wide range of intellectual traditions which provide different answers to the question of how to trade off the relative claims of rights and responsibilities, individual expression and social ties. . . . liberals experimented with a range of ideas from devolving power from the centre to creating national education systems.

Mr Deneen's fixation on the essence of liberalism leads to the second big problem of his book: his failure to recognise liberalism's ability to reform itself and address its internal problems. The late 19th century saw America suffering from many of the problems that are reappearing today, including the creation of a business aristocracy, the rise of vast companies, the corruption of politics and the

sense that society was dividing into winners and losers. But a wide variety of reformers, working within the liberal tradition, tackled these problems head on. Theodore Roosevelt took on the trusts. Progressives cleaned up government corruption. University reformers modernised academic syllabuses and built ladders of opportunity. Rather than dying, liberalism reformed itself.

Mr Deneen is right to point out that the record of liberalism in recent years has been dismal. He is also right to assert that the world has much to learn from the premodern notions of liberty as self-mastery and self-denial. The biggest enemy of liberalism is not so much atomisation but old-fashioned greed, as members of the Davos elite pile their plates ever higher with perks and share options. But he is wrong to argue that the only way for people to liberate themselves from the contradictions of liberalism is "liberation from liberalism itself". The best way to read "Why Liberalism Failed" is not as a funeral oration but as a call to action: up your game, or else.

5. The author of the passage faults Deneen's conclusions for all of the following reasons, EXCEPT:

A. its repeated harking back to premodern notions of liberty.
B. its failure to note historical instances in which the process of declining liberalism has managed to reverse itself.
C. its very narrow definition of liberalism limited to individual freedoms.
D. its extreme pessimism about the future of liberalism today and predictions of an ultimate decline.

6. The author of the passage is likely to disagree with all of the following statements, EXCEPT:

A. the essence of liberalism lies in greater individual self-expression and freedoms.
B. liberalism was the dominant ideal in the past century, but it had to reform itself to remain so.
C. claims about liberalism's disintegration are exaggerated and misunderstand its core features.
D. if we accept that liberalism is a dying ideal, we must work to find a viable substitute.

7. All of the following statements are evidence of the decline of liberalism today, EXCEPT:

A. ". . . the creation of a business aristocracy, the rise of vast companies . . ."
B. "And technological advances are reducing ever more areas of work into meaningless drudgery."
C. "Democracy has degenerated into a theatre of the absurd."
D. "'The gap between liberalism's claims about itself and the lived reality of the citizenry' is now so wide that 'the lie can no longer be accepted,'.

8. The author of the passage refers to "the Davos elite" to illustrate his views on:

A. the way the debate around liberalism has been captured by the rich who have managed to insulate themselves from economic hardships.
B. the fact that the rise in liberalism had led to a greater interest in shared futures from unlikely social classes.
C. the unlikelihood of a return to the liberalism of the past as long as the rich continue to benefit from the decline in liberal values.
D. the hypocrisy of the liberal rich, who profess to subscribe to liberal values while cornering most of the wealth.

RC 3:

The Positivists, anxious to stake out their claim for history as a science, contributed the weight of their influence to the cult of facts. First ascertain the facts, said the positivists, then draw your conclusions from them. . . . This is what may [be] called the common-sense view of history. History consists of a corpus of ascertained facts. The facts are available to the historian in documents,

inscriptions, and so on . . . [Sir George Clark] contrasted the "hard core of facts" in history with the surrounding pulp of disputable interpretation forgetting perhaps that the pulpy part of the fruit is more rewarding than the hard core. . . . It recalls the favourite dictum of the great liberal journalist C. P. Scott: "Facts are sacred, opinion is free.". . .

What is a historical fact? . . . According to the common-sense view, there are certain basic facts which are the same for all historians and which form, so to speak, the backbone of history—the fact, for example, that the Battle of Hastings was fought in 1066. But this view calls for two observations. In the first place, it is not with facts like these that the historian is primarily concerned. It is no doubt important to know that the great battle was fought in 1066 and not in 1065 or 1067, and that it was fought at Hastings and not at Eastbourne or Brighton. The historian must not get these things wrong. But [to] praise a historian for his accuracy is like praising an architect for using well-seasoned timber or properly mixed concrete in his building. It is a necessary condition of his work, but not his essential function. It is precisely for matters of this kind that the historian is entitled to rely on what have been called the "auxiliary sciences" of history—archaeology, epigraphy, numismatics, chronology, and so forth. . . .

The second observation is that the necessity to establish these basic facts rests not on any quality in the facts themselves, but on an apriori decision of the historian. In spite of C. P. Scott's motto, every journalist knows today that the most effective way to influence opinion is by the selection and arrangement of the appropriate facts. It used to be said that facts speak for themselves. This is, of course, untrue. The facts speak only when the historian calls on them: it is he who decides to which facts to give the floor, and in what order or context. . . . The only reason why we are interested to know that the battle was fought at Hastings in 1066 is that historians regard it as a major historical event. . . . Professor Talcott Parsons once called [science] "a selective system of cognitive orientations to reality." It might perhaps have been put more simply. But history is, among other things, that. The historian is necessarily selective. The belief in a hard core of historical facts existing objectively and independently of the interpretation of the historian is a preposterous fallacy, but one which it is very hard to eradicate.

9. All of the following, if true, can weaken the passage's claim that facts do not speak for themselves, EXCEPT:

A. the truth value of a fact is independent of the historian who expresses it.
B. facts, like truth, can be relative: what is fact for person X may not be so for person Y.
C. a fact, by its very nature, is objective and universal, irrespective of the context in which it is placed.
D. the order in which a series of facts is presented does not have any bearing on the production of meaning.

10. If the author of the passage were to write a book on the Battle of Hastings along the lines of his/her own reasoning, the focus of the historical account would be on:

A. deriving historical facts from the relevant documents and inscriptions.
B. providing a nuanced interpretation by relying on the auxiliary sciences.
C. exploring the socio-political and economic factors that led to the Battle.
D. producing a detailed timeline of the various events that led to the Battle.

11. According to this passage, which one of the following statements best describes the significance of archaeology for historians?

A. Archaeology helps historians to carry out their primary duty.
B. Archaeology helps historians to interpret historical facts.
C. Archaeology helps historians to ascertain factual accuracy.
D. Archaeology helps historians to locate the oldest civilisations in history.

12. All of the following describe the "common-sense view" of history, EXCEPT:

A. history is like science: a selective system of cognitive orientations to reality.
B. only the positivist methods can lead to credible historical knowledge.
C. history can be objective like the sciences if it is derived from historical facts.
D. real history can be found in ancient engravings and archival documents.

RC4

Umberto Eco, an Italian writer, was right when he said the language of Europe is translation. Netflix and other deep-pocketed global firms speak it well. Just as the EU employs a small army of translators and interpreters to turn intricate laws or impassioned speeches of Romanian MEPs into the EU's 24 official languages, so do the likes of Netflix. It now offers dubbing in 34 languages and subtitling in a few more. . . .

The economics of European productions are more appealing, too. American audiences are more willing than before to give dubbed or subtitled viewing a chance. This means shows such as "Lupin", a French crime caper on Netflix, can become global hits. . . . In 2015, about 75% of Netflix's original content was American; now the figure is half, according to Ampere, a media-analysis company. Netflix has about 100 productions under way in Europe, which is more than big public broadcasters in France or Germany. . . .

Not everything works across borders. Comedy sometimes struggles. Whodunits and bloodthirsty maelstroms between arch Romans and uppity tribesmen have a more universal appeal. Some do it better than others. Barbarians aside, German television is not always built for export, says one executive, being polite. A bigger problem is that national broadcasters still dominate. Streaming services, such as Netflix or Disney+, account for about a third of all viewing hours, even in markets where they are well-established. Europe is an ageing continent. The generation of teens staring at phones is outnumbered by their elders who prefer to gawp at the box.

In Brussels and national capitals, the prospect of Netflix as a cultural hegemon is seen as a threat. "Cultural sovereignty" is the watchword of European executives worried that the Americans will eat their lunch. To be fair, Netflix content sometimes seems stuck in an uncanny valley somewhere in the mid-Atlantic, with local quirks stripped out. Netflix originals tend to have fewer specific cultural references than shows produced by domestic rivals, according to Enders, a market analyst. The company used to have an imperial model of commissioning, with executives in Los Angeles cooking up ideas French people might like. Now Netflix has offices across Europe. But ultimately the big decisions rest with American executives. This makes European politicians nervous.

They should not be. An irony of European integration is that it is often American companies that facilitate it. Google Translate makes European newspapers comprehensible, even if a little clunky, for the continent's non-polyglots. American social-media companies make it easier for Europeans to talk politics across borders. (That they do not always like to hear what they say about each other is another matter.) Now Netflix and friends pump the same content into homes across a continent, making culture a cross-border endeavour, too. If Europeans are to share a currency, bail each other out in times of financial need and share vaccines in a pandemic, then they need to have something in common—even if it is just bingeing on the same series. Watching fictitious northern and southern Europeans tear each other apart 2,000 years ago beats doing so in reality.

13.Based on information provided in the passage, all of the following are true, EXCEPT:

A. European television productions have the potential to become global hits.
B. only half of Netflix's original programming in the EU is now produced in America.
C. national broadcasters dominate in the EU in terms of total television viewing hours.
D. Netflix has been able to transform itself into a truly European entity.

14.The author sees the rise of Netflix in Europe as:

A. a unifying force.
B. a looming cultural threat.
C. filling an entertainment gap.
D. an economic threat.

15.Which one of the following research findings would weaken the author's conclusion in the final paragraph?

A. Research shows that Netflix has been gradually losing market share to other streaming television service providers.
B. Research shows there is a wide variance in the popularity and viewing of Netflix shows across different EU countries.
C. Research shows that older women across the EU enjoy watching romantic comedies on Netflix, whereas younger women prefer historical fiction dramas.
D. Research shows that Netflix hits produced in France are very popular with North American audiences.

16.Based only on information provided in the passage, which one of the following hypothetical Netflix shows would be most successful with audiences across the EU?

A. A trans-Atlantic romantic drama set in Europe and America.
B. An original German TV science fiction production.
C. A murder mystery drama set in North Africa and France.
D. An Italian comedy show hosted by an international star.

17. There is a sentence that is missing in the paragraph below. Look at the paragraph and decide where (option 1, 2, 3, or 4) the following sentence would best fit.

Sentence: And probably much earlier, moving the documentation for kissing back 1,000 years compared to what was acknowledged in the scientific community.

Paragraph: Research has hypothesised that the earliest evidence of human lip kissing originated in a very specific geographical location in South Asia 3,500 years ago.___(1)___. From there it may have spread to other regions, simultaneously accelerating the spread of the herpes simplex virus 1. According to Dr Troels Pank Arbøll and Dr Sophie Lund Rasmussen, who in a new article in the journal Science draw on a range of written sources from the earliest Mesopotamian societies, kissing was already a well-established practice 4,500 years ago in the Middle East.___(2)___. In ancient Mesopotamia, people wrote in cuneiform script on clay tablets.___(3)___. Many thousands of these clay tablets have survived to this day, and they contain clear examples that kissing was considered a part of romantic intimacy in ancient times.___(4)___. "Kissing could also have been part of friendships and family members' relations," says Dr Troels Pank Arbøll, an expert on the history of medicine in Mesopotamia.

A. Option 4
B. Option 3
C. Option 1
D. Option 2

18. There is a sentence that is missing in the paragraph below. Look at the paragraph and decide where (option 1, 2, 3, or 4) the following sentence would best fit.

Sentence: Dualism was long held as the defining feature of developing countries in contrast to developed countries, where frontier technologies and high productivity were assumed to prevail.

Paragraph: ___(1)___. At the core of development economics lies the idea of 'productive dualism': that poor countries' economies are split between a narrow 'modern' sector that uses advanced technologies and a larger 'traditional' sector characterized by very low productivity.___(2)___. While this distinction between developing and advanced economies may have made some sense in the 1950s and 1960s, it no longer appears to be very relevant. A combination of forces have produced a widening gap between the winners and those left behind.___(3)___. Convergence between poor and rich parts of the economy was arrested and regional disparities widened.___(4)___. As a result, policymakers in advanced economies are now grappling with the same questions that have long preoccupied developing economies: mainly how to close the gap with the more advanced parts of the economy.

A. Option 1
B. Option 2
C. Option 3
D. Option 4

19. Five jumbled up sentences (labelled 1, 2, 3, 4 and 5), related to a topic, are given below. Four of them can be put together to form a coherent paragraph. Identify the odd sentence and key in the number of that sentence as your answer.

1.Self-care particularly links to loneliness, behavioural problems, and negative academic outcomes.
2."Latchkey children" refers to children who routinely return home from school to empty homes and take care of themselves for extended periods of time.
3.Although self-care generally points to negative outcomes, it is important to consider that the bulk of research has yet to track long-term consequences.
4.In research and practice, the phrase "children in self-care" has come to replace latchkey in an effort to more accurately reflect the nature of their circumstances.
5.Although parents might believe that self-care would be beneficial for development, recent research has found quite the opposite.

20. Five jumbled up sentences (labelled 1, 2, 3, 4 and 5), related to a topic, are given below. Four of them can be put together to form a coherent paragraph. Identify the odd sentence and key in the number of that sentence as your answer.

1.The banning of Northern Lights could be considered a precursor to censoring books for "moral", world view or religious reasons.
2. Attempts to ban books are attempts to silence authors who have summoned immense courage in telling their stories.
3. Now the banning and challenging of books in the US has escalated to an unprecedented level.
4. The widely acclaimed fantasy novel Northern Lights was banned in some parts of the US, and was the second most challenged book in the US.
5. The American Library Association documented an unparalleled number of reported book challenges in 2022, about 2,500 unique titles.

21. The four sentences (labelled 1, 2, 3 and 4) given below, when properly sequenced, would yield a coherent paragraph. Decide on the proper sequencing of the order of the sentences and

key in the sequence of the four numbers as your answer.
1. Contemporary African writing like 'The Bottled Leopard' voices this theme using two children and two backgrounds to juxtapose two varying cultures.
2. Chukwuemeka Ike explores the conflict, and casts the Western tradition as condescending, enveloping and unaccommodating towards local African practice.
3. However, their views contradict the reality, for a rich and sustaining local African cultural ethos exists for all who care, to see and experience.
4. Western Christian concepts tend to deny or feign ignorance about the existence of a genuine and enduring indigenous African tradition.

22. The four sentences (labelled 1, 2, 3 and 4) given below, when properly sequenced, would yield a coherent paragraph. Decide on the proper sequencing of the order of the sentences and key in the sequence of the four numbers as your answer.

1. Like the ants that make up a colony, no single neuron holds complex information like self-awareness, hope or pride.
2. Although the human brain is not yet understood enough to identify the mechanism by which emergence functions, most neurobiologists agree that complex interconnections among the parts give rise to qualities that belong only to the whole.
3. Nonetheless, the sum of all neurons in the nervous system generate complex human emotions like fear and joy, none of which can be attributed to a single neuron.
4. Human consciousness is often called an emergent property of the human brain.

23.The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

Heatwaves are becoming longer, frequent and intense due to climate change. The impacts of extreme heat are unevenly experienced; with older people and young children, those with pre-existing medical conditions and on low incomes significantly more vulnerable. Adaptation to heatwaves is a significant public policy concern. Research conducted among at-risk people in the UK reveals that even vulnerable people do not perceive themselves as at risk of extreme heat; therefore, early warnings of extreme heat events do not perform as intended. This suggests that understanding how extreme heat is narrated is very important. The news media play a central role in this process and can help warn people about the potential danger, as well as about impacts on infrastructure and society.

A. Protection from heat waves is important but current reports and public policies seem ineffective.
B. Heatwaves pose an enormous risk; the media plays a pivotal role in alerting people to this danger.
C. People are vulnerable to heatwaves caused due to climate change; measures taken are ineffective.
D. News stories help in warning about heatwaves, but they have to become more effective.

24.The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

People spontaneously create counterfactual alternatives to reality when they think "if only" or "what if" and imagine how the past could have been different. The mind computes counterfactuals for many reasons. Counterfactuals explain the past and prepare for the future, they implicate various relations including causal ones, and they affect intentions and decisions. They modulate emotions such as

regret and relief, and they support moral judgments such as blame. The ability to create counterfactuals develops throughout childhood and contributes to reasoning about other people's beliefs, including their false beliefs.

A. People create counterfactual alternatives to reality for various reasons, including reasoning about other people's beliefs.
B. Counterfactual thinking helps to reverse past and future actions and reason out false beliefs.
C. Counterfactual alternatives to reality are created for a variety of reasons and is part of one's developmental process.
D. Counterfactuals help people to prepare for the future by understanding intentions and making decisions.

Logical Reasoning & Data Interpretation

i.There are nine boxes arranged in a 3×3 array as shown in Tables 1 and 2. Each box contains three sacks. Each sack has a certain number of coins, between 1 and 9, both inclusive.

The average number of coins per sack in the boxes are all distinct integers. The total number of coins in each row is the same. The total number of coins in each column is also the same.

	1st column	2nd column	3rd column
1st row		9	6
2nd row	2		
3rd row	8		

Table 1

	1st column	2nd column	3rd column
1st row	1**	2*	2*
2nd row	1**	0*	3*
3rd row	3*	2**	0**

Table 2

Table 1 gives information regarding the median of the numbers of coins in the three sacks in a box for some of the boxes. In Table 2 each box has a number which represents the number of sacks in that box having more than 5 coins. That number is followed by a * if the sacks in that box satisfy exactly one among the following three conditions, and it is followed by ** if two or more of these conditions are satisfied.

i) The minimum among the numbers of coins in the three sacks in the box is 1.
ii) The median of the numbers of coins in the three sacks is 1.
iii) The maximum among the numbers of coins in the three sacks in the box is 9.

1.What is the total number of coins in all the boxes in the 3rd row?

A. 36
B. 30
C. 45
D. 15

2. How many boxes have at least one sack containing 9 coins?

A. 3
B. 5
C. 4
D. 8

3. For how many boxes are the average and median of the numbers of coins contained in the three sacks in that box the same?

4. How many sacks have exactly one coin?

5. In how many boxes do all three sacks contain different numbers of coins?

ii. Three participants – Akhil, Bimal and Chatur participate in a random draw competition for five days. Every day, each participant randomly picks up a ball numbered between 1 and 9. The number on the ball determines his score on that day. The total score of a participant is the sum of his scores attained in the five days. The total score of a day is the sum of participants' scores on that day. The 2-day average on a day, except on Day 1, is the average of the total scores of that day and of the previous day. For example, if the total scores of Day 1 and Day 2 are 25 and 20, then the 2-day average on Day 2 is calculated as 22.5. Table 1 gives the 2-day averages for Days 2 through 5.

Table 1: 2-day averages for Days 2 through 5			
Day 2	Day 3	Day4	Day 5
15	15.5	16	17

Participants are ranked each day, with the person having the maximum score being awarded the minimum rank (1) on that day. If there is a tie, all participants with the tied score are awarded the best available rank. For example, if on a day Akhil, Bimal, and Chatur score 8, 7 and 7 respectively, then their ranks will be 1, 2 and 2 respectively on that day. These ranks are given in Table 2.

Table 2: Ranks of participants on each day					
	Day 1	Day 2	Day 3	Day 4	Day 5
Akhil	1	2	2	3	3
Bimal	2	3	2	1	1
Chatur	3	1	1	2	2

The following information is also known.
1. Chatur always scores in multiples of 3. His score on Day 2 is the unique highest score in the competition. His minimum score is observed only on Day 1, and it matches Akhil's score on Day 4.
2. The total score on Day 3 is the same as the total score on Day 4.
3. Bimal's scores are the same on Day 1 and Day 3.

6.What is Akhil's score on Day 1?

A. 5
B. 6
C. 7
D. 8

7. Who attains the maximum total score?

A. Chatur
B. Bimal
C. Cannot be determined
D. Akhil

8. What is the minimum possible total score of Bimal?

9. If the total score of Bimal is a multiple of 3, what is the score of Akhil on Day 2?

A. Cannot be determined.
B. 4
C. 6
D. 5

10. If Akhil attains a total score of 24, then what is the total score of Bimal?

iii. Odsville has five firms – Alfloo, Bzygoo, Czechy, Drjbna and Elavalaki. Each of these firms was founded in some year and also closed down a few years later.

Each firm raised Rs. 1 crore in its first and last year of existence. The amount each firm raised every year increased until it reached a maximum, and then decreased until the firm closed down. No firm raised the same amount of money in two consecutive years. Each annual increase and decrease was either by Rs. 1 crore or by Rs. 2 crores.
The table below provides partial information about the five firms.

Firm	First year of existence	Last year of existence	Total amount raised (Rs. crores)
Alfloo	2009	2016	21
Bzygoo	2012	2015	
Czechy	2013		9
Drjbna	2011	2015	10
Elavalaki	2010		13

11. For which firm(s) can the amounts raised by them be concluded with certainty in each year?

A. Only Czechy and Drjbna
B. Only Bzygoo and Czechy and Drjbna
C. Only Czechy
D. Only Drjbna

12.What can best be concluded about the total amount of money raised in 2015?
It is either Rs. 7 crores or Rs. 8 crores.

A. It is either Rs. 7 crores or Rs. 8 crores or Rs. 9 crores.
B. It is exactly Rs. 8 crores.
C. It is either Rs. 8 crores or Rs. 9 crores.
D. It is exactly Rs. 9 crores.

13. What is the largest possible total amount of money (in Rs. crores) that could have been raised in 2013?

14.If Elavalaki raised Rs. 3 crores in 2013, then what is the smallest possible total amount of money (in Rs. crores) that could have been raised by all the companies in 2012?

A. 12
B. 11
C. 10
D. 9

15.If the total amount of money raised in 2014 is Rs. 12 crores, then which of the following is not possible?

A. Bzygoo raised the same amount of money as Elavalaki in 2013.
B. Alfloo raised the same amount of money as Drjbna in 2013.
C. Alfloo raised the same amount of money as Bzygoo in 2014.
D. Bzygoo raised more money than Elavalaki in 2014.

iv. Anjali, Bipasha, and Chitra visited an entertainment park that has four rides. Each ride lasts one hour and can accommodate one visitor at one point. All rides begin at 9 am and must be completed by 5 pm except for Ride-3, for which the last ride has to be completed by 1 pm. Ride gates open every 30 minutes, e.g. 10 am, 10:30 am, and so on. Whenever a ride gate opens, and there is no visitor inside, the first visitor waiting in the queue buys the ticket just before taking the ride. The ticket prices are Rs. 20, Rs. 50, Rs. 30 and Rs. 40 for Rides 1 to 4, respectively. Each of the three visitors took at least one ride and did not necessarily take all rides. None of them took the same ride more than once. The movement time from one ride to another is negligible, and a visitor leaves the ride immediately after the completion of the ride. No one takes a break inside the park unless mentioned explicitly.

The following information is also known.

1. Chitra never waited in the queue and completed her visit by 11 am after spending Rs. 50 to pay for the ticket(s).
2. Anjali took Ride-1 at 11 am after waiting for 30 mins for Chitra to complete it. It was the only ride where Anjali waited.
3. Bipasha began her first of three rides at 11:30 am. All three visitors incurred the same amount of ticket expense by 12:15 pm.
4. The last ride taken by Anjali and Bipasha was the same, where Bipasha waited 30 mins for Anjali to complete her ride. Before standing in the queue for that ride, Bipasha took a 1-hour coffee break after completing her previous ride.

16.What was the total amount spent on tickets (in Rs.) by Bipasha?

A. 120
B. 110
C. 100
D. 90

17.Which were all the rides that Anjali completed by 2:00 pm?

A. Ride-1 and Ride-4

B. Ride-1, Ride-2, and Ride-3
C. Ride-1 and Ride-3
D. Ride-1, Ride-2, and Ride-4

18.Which ride was taken by all three visitors?

A. Ride-3
B. Ride-1
C. Ride-4
D. Ride-2

19.How many rides did Anjali and Chitra take in total?

20.What was the total amount spent on tickets (in Rs.) by Anjali?

Quantitative Ability

1.Let a,b,m and n be natural numbers such that a>1and b>1. If $a^m b^n=144^{145}$,then the largest possible value of n−m is

A. 580
B. 290
C. 579
D. 289

2.The sum of all possible values of x satisfying the equation $2^{4x^2} - 2^{2x^2+x+16} + 2^{2x+30} = 0$, is

A. 3/2
B. 5/2
C. 1/2
D. 3

3.For any natural numbers m,n and k, such that k divides both m+2n and 3m+4n,k must be a common divisor of

A. 2m and 3n
B. m and 2n
C. 2m and n
D. m and n

4.Any non-zero real numbers x,y such that y≠3 and xy<x+3y−3, will satisfy the condition

A. If y>10, then −x>y
B. If x<0, then −x<y
C. If y<0, then −x<y
D. x/y<y/x

5.For some positive real number x,if $log\sqrt{3}$(x)+$\log_x(25)/\log_x(0.008)=16/3$,then the value of $\log_3(3x^2)$ is

6.The number of positive integers less than 50, having exactly two distinct factors other than 1 and itself, is

7.Let k be the largest integer such that the equation $(x-1)^2+2kx+11=0$ has no real roots. If y is a

positive real number, then the least possible value of k/4y+9y is

8.**In a company, 20% of the employees work in the manufacturing department. If the total salary obtained by all the manufacturing employees is one-sixth of the total salary obtained by all the employees in the company, then the ratio of the average salary obtained by the manufacturing employees to the average salary obtained by the non-manufacturing employees is**

A. 4 : 5
B. 5 : 6
C. 5 : 4
D. 6 : 5

9.Minu purchases a pair of sunglasses at Rs.1000 and sells to Kanu at 20% profit. Then, Kanu sells it back to Minu at 20% loss. Finally, Minu sells the same pair of sunglasses to Tanu. If the total profit made by Minu from all her transactions is Rs.500, then the percentage of profit made by Minu when she sold the pair of sunglasses to Tanu is

A. 35.42%
B. 31.25%
C. 52%
D. 26%

10.Pipes A and C are fill pipes while Pipe B is a drainpipe of a tank. Pipe B empties the full tank in one hour less than the time taken by Pipe A to fill the empty tank. When pipes A, B and C are turned on together, the empty tank is filled in two hours. If pipes B and C are turned on together when the tank is empty and Pipe B is turned off after one hour, then Pipe C takes another one hour and 15 minutes to fill the remaining tank. If Pipe A can fill the empty tank in less than five hours, then the time taken, in minutes, by Pipe C to fill the empty tank is

A. 90
B. 60
C. 120
D. 75

11.Ravi is driving at a speed of 40 km/h on a road. Vijay is 54 meters behind Ravi and driving in the same direction as Ravi. Ashok is driving along the same road from the opposite direction at a speed of 50 km/h and is 225 meters away from Ravi. The speed, in km/h, at which Vijay should drive so that all the three cross each other at the same time, is

A. 58.8
B. 64.4
C. 67.2
D. 61.6

12.Anil borrows Rs 2 lakhs at an interest rate of 8% per annum, compounded half-yearly. He repays Rs 10320 at the end of the first year and closes the loan by paying the outstanding amount at the end of the third year. Then, the total interest, in rupees, paid over the three years is nearest to

A. 45311
B. 51311
C. 33130
D. 40991

13.The price of a precious stone is directly proportional to the square of its weight. Sita has a precious stone weighing 18 units. If she breaks it into four pieces with each piece having distinct integer weight, then the difference between the highest and lowest possible values of the total price of the four pieces will be 288000. Then, the price of the original precious stone is

A. 1296000
B. 1944000
C. 972000
D. 1620000

14.A container has 40 liters of milk. Then, 4 liters are removed from the container and replaced with 4 liters of water. This process of replacing 4 liters of the liquid in the container with an equal volume of water is continued repeatedly. The smallest number of times of doing this process, after which the volume of milk in the container becomes less than that of water, is

15.Jayant bought a certain number of white shirts at the rate of Rs 1000 per piece and a certain number of blue shirts at the rate of Rs 1125 per piece. For each shirt, he then set a fixed market price which was 25% higher than the average cost of all the shirts. He sold all the shirts at a discount of 10% and made a total profit of Rs 51000. If he bought both colors of shirts, then the maximum possible total number of shirts that he could have bought is

16.If a certain amount of money is divided equally among n persons, each one receives Rs 352 . However, if two persons receive Rs 506 each and the remaining amount is divided equally among the other persons, each of them receive less than or equal to Rs 330 . Then, the maximum possible value of n is

17.In a rectangle ABCD, AB = 9 cm and BC = 6 cm. P and Q are two points on BC such that the areas of the figures ABP, APQ, and AQCD are in geometric progression. If the area of the figure AQCD is four times the area of triangle ABP, then BP : PQ : QC is

A. 1 : 1 : 2
B. 1 : 2 : 4
C. 2 : 4 : 1
D. 1 : 2 : 1

18. A triangle is drawn with its vertices on the circle C such that one of its sides is a diameter of Cand the other two sides have their lengths in the ratio a:b. If the radius of the circle is r, then the area of the triangle is

A. $abr^2/2(a^2+b^2)$
B. abr^2/a^2+b^2
C. $4abr^2/a^2+b^2$
D. $2abr^2/a^2+b^2$

19.The area of the quadrilateral bounded by the Y-axis, the line x=5, and the lines $|x-y|-|x-5|=2$,is

20.Let both the series $a_1,a_2,a_3,\ldots$ and $b_1,b_2,b_3\ldots$be in arithmetic progression such that the common differences of both the series are prime numbers. If $a_5=b_9,a_{19}=b_{19}$ and $b_2=0$, then a_{11} equals

A. 79
B. 83
C. 86

D. 84

21.If $p^2+q^2-29=2pq-20=52-2pq$, then the difference between the maximum and minimum possible value of (p^3-q^3) is

A. 486
B. 189
C. 378
D. 243

22.Let a_n and b_n be two sequences such that $a_n=13+6(n-1)$ and $b_n=15+7(n-1)$ for all natural numbers n. Then, the largest three-digit integer that is common to both these sequences, is

Answers

Verbal Ability & Reading Comprehension (VARC)

1. **C**	2.**A**	3.**B**	4.**C**	5.**A**	6.**B**	7.**B**	8.**D**	9.**B**	10.**C**	11.**C**	12.**A**
13.**D**	14.**A**	15.**B**	16.**C**	17.**D**	18.**B**	19.**3**	20.**2**	21.**4312**	22.**4132**	23.**B**	24.**C**

Logical Reasoning & Data Interpretation (LRDI)

1.**45**	2.**5**	3.**4**	4.**9**	5.**5**	6.**C**	7.**A**	8.**25**	9.**B**	10.**26**
11.**A**	12.**A**	13.**17**	14. **B**	15.**A**	16.**B**	17.**B**	18.**B**	19.**6**	20.**140**

Quantitative Aptitude (QA)

1.**C**	2.**C**	3.**B**	4.**C**	5.**7**	6.**15**	7.**6**	8.**A**	9.**B**	10.**A**	11.**D**
12.**B**	13.**A**	14.**7**	15.**407**	16.**16**	17.**C**	18.**D**	19.**45**	20.**A**	21.**C**	22.**967**

Solution

Verbal Ability & Reading Comprehension (VARC)

Solution 1

The passage states that though second-hand shopping can help reduce pollution due to clothing ending up in landfills, such purchases are actually effective in saving the planet only in the case of high-quality second hand clothes, as low-quality older clothes cause microfibre pollution.

If second-hand clothes only sold high-quality clothes, then the central idea of the passage, that not all second-hand clothing purchases are effective is saving the planet, would be undermined. Option C is the right choice.

Primark and Boohoo are, according to the passage, 'fast fashion' brands. That is, they sell inexpensive, low-quality trendy clothing. If option A were true, then it would support (not undermine) the central idea that people should not simply purchase second-hand clothes without considering whether what they are doing is effective.

Even if options B or D were true, these options do not directly undermine the question of effectiveness of second-hand purchases in saving the planet. So, these options are ruled out.

The question is **" The central idea of the passage would be undermined if: "**
Hence, the answer is 'second-hand stores sold only high-quality clothes.'
Choice C is the correct answer.

Solution 2

From the context in which the word 'thrifting' is used in the passage, we can conclude that it refers to the purchase of second-hand items at low costs, a practice which is now a trend as consumers get to be 'cool' while also caring for the planet. However, as explained in the passage, the act of thrifting can be considered ironic if, instead of saving the planet, it actually contributes to microfibre pollution of the rivers and oceans. Option A is the correct choice.

The question is **" The act of "thrifting", as described in the passage, can be considered ironic because it: "**
Hence, the answer is 'has created environmental problems.'
Choice A is the correct answer.

Solution 3

Fast fashion refers to inexpensively priced, low-quality clothing that is produced fast to meet market trends. The opposite of this, slow fashion, would most likely refer to clothes that are high quality and long-lasting.

Note that while option C is easily eliminated, options A and D both relate to the quality of clothing and can be thought of as attributes of slow fashion. However, B is a better choice than these options as 'long-lasting' is the direct opposite of 'fast' fashion which is produced fast to meet trends without considering quality.

The question is **" Based on the passage, we can infer that the opposite of fast fashion, 'slow fashion', would most likely refer to clothes that: "**
Hence, the answer is 'are of high quality and long lasting.'
Choice B is the correct answer.

Solution 4

Refer to the last paragraph. All given reasons except C are mentioned. Option C contradicts what the passage says: ' There will always be a market for consignment...'

The question is **" According to the author, companies like ThredUP have not caught on in the UK for all of the following reasons EXCEPT that: "**
Hence, the answer is 'the British don't buy second-hand clothing.'
Choice C is the correct answer.

Solution 5

In considering whether Deneen's argument on liberalism is convincing, the author points out Deneen's narrow definition of liberalism is limited to individual freedoms: ' He argues that the essence of liberalism lies in freeing individuals from constraints. In fact, liberalism contains a wide range of intellectual traditions which provide different answers to the question of how to trade off the relative claims of rights and responsibilities, individual expression and social ties..'

The author also says Deneen fails to recognise liberalism's ability to reform itself: 'Mr Deneen's

fixation on the essence of liberalism leads to the second big problem of his book: his failure to recognise liberalism's ability to reform itself and address its internal problems.'

Finally, in the last two lines of the passage, the author states Deneen is wrong in his extreme pessimism about the future of liberalism.

Options B, C and D are true.
The author does not say that Deneen harks back to premodern notions of liberty. So, option A is the correct answer choice.

The question is **" The author of the passage faults Deneen's conclusions for all of the following reasons, EXCEPT: "**
Hence, the answer is 'its repeated harking back to premodern notions of liberty.'
Choice A is the correct answer.

Solution 6

Consider option A. The author is likely to disagree with this. Note the lines, 'He argues that the essence of liberalism lies in freeing individuals from constraints. In fact, liberalism contains a wide range of intellectual traditions which provide different answers to the question of how to trade off the relative claims of rights and responsibilities, individual expression and social ties.'

Consider option B. The author starts the passage by saying, 'Over the past four centuries liberalism has been so successful that it has driven all its opponents off the battlefield'. He also argues in the penultimate paragraph that liberalism has the ability to reform itself to remain dominant. So, the author is likely to agree with this option. Option B is the correct choice.

Let us also consider options C and D to rule them out.

The author is likely to disagree with the statement that claims about liberalism's disintegration are exaggerated and misunderstand its core features. Note the lines, 'Mr Deneen is right to point out that the record of liberalism in recent years has been dismal. He is also right to assert that the world has much to learn from the premodern notions of liberty as self-mastery and self-denial.'

The author is also likely to disagree with the idea that if we accept that liberalism is a dying ideal, we must work to find a viable substitute. The author argues against liberation from liberalism and states the liberalism must heed the call to action and reform itself.

So, option B is the correct answer choice.

The question is **" The author of the passage is likely to disagree with all of the following statements, EXCEPT: "**
Hence, the answer is 'liberalism was the dominant ideal in the past century, but it had to reform itself to remain so.'
Choice B is the correct answer.

Solution 7

All options except B relate to liberalism and the problems caused by its disintegration. Technological advances cannot be considered evidence of the decline of liberalism.

The question is **" All of the following statements are evidence of the decline of liberalism today, EXCEPT: "**
Hence, the answer is '"And technological advances are reducing ever more areas of work into meaningless drudgery."'
Choice B is the correct answer.

Solution 8

Note the context in which the author talks about the 'Davos elite': 'The biggest enemy of liberalism is not so much atomisation but old-fashioned greed, as members of the Davos elite pile their plates ever higher with perks and share options.' Only option D relates to the greed of the Davos elite. This is the correct answer choice.

The question is **" The author of the passage refers to "the Davos elite" to illustrate his views on: "**Hence, the answer is 'the hypocrisy of the liberal rich, who profess to subscribe to liberal values while cornering most of the wealth.'
Choice D is the correct answer.

Solution 9

If option B is true, that is, if facts are relative and subject to interpretation, then that strengthens the passage's claim that facts do not speak for themselves. So, option B is the right answer choice.

The passage claims that facts do not speak for themselves by arguing that while facts are objective and universal and hold true irrespective of the historian who expresses it, it is the historian who decides to which facts to give the floor, and in what order or context, thereby influencing their interpretation. So, all options except B, if true, weaken the passage's claim.

The question is **" All of the following, if true, can weaken the passage's claim that facts do not speak for themselves, EXCEPT: "**
Hence, the answer is 'facts, like truth, can be relative: what is fact for person X may not be so for person Y.'
Choice B is the correct answer.

Solution 10

The main idea of the passage is that facts speak only when the historian calls on them. The author says that it is because historians regard the Battle of Hastings as a major historical event that we are interested in knowing about it. It is the historian's interpretation of facts that we are interested in. So, if the author were to write a book on the Battle of Hastings, the focus of the account would be on subjective interpretations, like exploring the socio-political and economic factors that led to the Battle.

Options A and D are easily ruled out as they focus on the importance of facts.

Option B is close, as 'nuanced interpretation' is what the author says historians have to focus on. But option B, unlike option C, emphasizes the role of auxillary sciences in helping a historian do his work. The author says relying on facts that can be gathered from auxiliary sciences of history is "a necessary condition" of a historians' work, "but not his essential function". So, option C is better than B.

The question is " **If the author of the passage were to write a book on the Battle of Hastings along the lines of his/her own reasoning, the focus of the historical account would be on: "**
Hence, the answer is 'exploring the socio-political and economic factors that led to the Battle.'
Choice C is the correct answer.

Solution 11

Note the context in which the author talks about archaeology and other the "auxiliary sciences" of history: 'But [to] praise a historian for his accuracy is like praising an architect for using well-seasoned timber or properly mixed concrete in his building. It is a necessary condition of his work, but not his essential function. It is precisely for matters of this kind that the historian is entitled to rely on what have been called the "auxiliary sciences" of history-archaeology, epigraphy, numismatics, chronology, and so forth...'

The author states auxiliary sciences like archaeology only help historians to ascertain the accuracy of facts. They do not help in the essential function of his work, which is to interpret the facts.
Option C is the correct choice.

The question is " **According to this passage, which one of the following statements best describes the significance of archaeology for historians? "**
Hence, the answer is 'Archaeology helps historians to ascertain factual accuracy.'
Choice C is the correct answer.

Solution 12

According to the passage, the "common-sense" view of history is influenced by the positivist view and so it places great weight on facts. In this view, facts are available to the historian in documents, inscriptions, and so on and history can be objective like the sciences if it is derived from historical facts.

The author's view contrasts with the common-sense view. The author believes history is a 'selective' system of cognitive orientations to reality. Facts only speak as the historian interprets them. Option A is the correct answer choice.

The question is " **All of the following describe the "common-sense view" of history, EXCEPT: "**
Hence, the answer is 'history is like science: a selective system of cognitive orientations to reality.'
Choice A is the correct answer.

Solution 13

Easy question. All options except D are true, based on the passage.

Option A is true, based on the lines, 'The economics of European productions are more appealing, too. American audiences are more willing than before to give dubbed or subtitled viewing a chance. This means shows such as "Lupin", a French crime caper on Netflix, can become global hits.'

Option B is true, too: 'In 2015, about 75% of Netflix's original content was American; now the figure is half, according to Ampere, a media-analysis company.'

Option C is clearly stated in the passage:'A bigger problem is that national broadcasters still dominate. Streaming services, such as Netflix or Disney+, account for about a third of all viewing hours, even in markets where they are well-established.'

Only option D is incorrect: 'Now Netflix has offices across Europe. But ultimately the big decisions rest with American executives.'

The question is **" Based on information provided in the passage, all of the following are true, EXCEPT: "**
Hence, the answer is 'Netflix has been able to transform itself into a truly European entity.'
Choice D is the correct answer.

Solution 14

The author clearly sees Netflix as a unifying force in Europe: 'Now Netflix and friends pump the same content into homes across a continent, making culture a cross-border endeavour, too. If Europeans are to share a currency, bail each other out in times of financial need and share vaccines in a pandemic, then they need to have something in common-even if it is just bingeing on the same series.'

The question is **" The author sees the rise of Netflix in Europe as: "**
Hence, the answer is 'a unifying force.'
Choice A is the correct answer.

Solution 15

In the last paragraph, the author concludes that Netflix is a unifying force in Europe, making culture "a cross-border endeavour". If there were a wide variance in the popularity and viewing of Netflix shows across different EU countries, then the author's assumption that Netflix is popular across Europe, giving Europeans something to share across borders, is weakened. Option B is the correct answer choice.

All other options are unrelated to the author's conclusion in the final paragraph.

The question is **" Which one of the following research findings would weaken the author's conclusion in the final paragraph? "**
Hence, the answer is 'Research shows there is a wide variance in the popularity and viewing of Netflix shows across different EU countries.'
Choice B is the correct answer.

Solution 16

Talking about which shows have better appeal, the passage states, 'Not everything works across borders. Comedy sometimes struggles. Whodunits and bloodthirsty maelstroms between arch Romans and uppity tribesmen have a more universal appeal...'. So, a murder mystery drama set in North Africa and France is likely, according to the passage, to be successful with audiences across the EU.

Based on the lines above, option D is easily eliminated. The passage declares 'German television is not always built for export', so option B is also ruled out. The passage focuses on translations of European productions and their success. Option A does not relate to this.

The question is **" Based only on information provided in the passage, which one of the following**

hypothetical Netflix shows would be most successful with audiences across the EU? "
Hence, the answer is 'A murder mystery drama set in North Africa and France.'
Choice C is the correct answer.

Solution 17

The given sentence begins with 'and probably much earlier...', so the sentence before must have some reference to time. This narrows down the options to 1 and 2. Of these options 2 makes better sense as the given sentence talks about documentation for kissing and the sentence before 2 talks about written sources that confirm new research findings.

The answer is 'Option 2'
Choice D is the correct answer.

Solution 18

The given sentence is about dualism, long held as a distinction between developing and developed countries. The sentence before option 2 introduces dualism and the sentence after it begins with 'while this distinction between developing and advanced economies.', making option 2 the best choice for fitting in the given sentence.

The answer is 'Option 2'
Choice B is the correct answer.

Solution 19

Of the given sentences, only sentence 3 maintains that self-care may not necessarily result in negative outcomes.

24 is a strong link. These sentences discuss the main focus of the paragraph-children who routinely return home from school to empty homes and take care of themselves for extended periods of time.

51 is also a strong link, with 5 stating that self-care is not beneficial for development and 1 explaining why so.

2451 makes a cogent paragraph.

Sentence 3 is the odd one out.

The answer is '3'

Solution 20

All sentences except 2 focus on the banning and challenging of books in the US. Option 2 focuses on authors who have summoned courage in telling their stories. This is a related but slightly different idea.

Sentence 3 is the best opening sentence as it is the most general one. 5 adds to 3, supporting 3 with data. Sentences 4 and 1 discu ss a specific case-- the banning of the book Northern Lights. 3541 makes a cogent paragraph.

The answer is '2'

Solution 21
Sentence 4 is the best opening sentence.

43 is a strong link: 4 states in the Western Christian concepts tend to deny or ignore the existence of an indigenous African tradition. 3 explains that this view contradicts reality.

Sentence 1 offers an example to support 3 and sentence 2 adds to 1.
4312 is the correct order.

The answer is '4312'

Solution 22
4 is the best starting sentence.

13 is a strong link: 1 state that no single neuron holds complex information like self-awareness, hope or pride. 3 explains that, nonetheless, the sum of all neurons in the nervous system generates complex human emotions like fear and joy.

2 concludes the paragraph stating that though the mechanism by which emergence functions is not yet understood, most neurobiologists agree that complex interconnections among the parts give rise to qualities of the whole.

4132 is the correct order.

The answer is '4132'

Solution 23
The main idea of the paragraph is that while heatwaves are becoming longer, frequent and intense due to climate change, even vulnerable people do not seem to perceive the risk of extreme heat and so news media should undertake to warn people about the potential danger. Option B sums up the paragraph best.

Option A talks about ineffective public policies on heatwaves. This is not what the paragraph is about.

Option C too, misses the key point about the role of news media and states 'measures' (which are not discussed in the paragraph at all) are ineffective. So, C is out.

Option D does not touch upon the risk heatwaves pose. Also, the paragraph does not talk about the effectiveness of news stories. B is a better summary than D.

The answer is 'Heatwaves pose an enormous risk; the media plays a pivotal role in alerting people to this danger.'
Choice B is the correct answer.

Solution 24
The paragraph given lists the many reasons why the mind computes counterfactuals and states that this ability develops throughout childhood and contributes to reasoning about other people's beliefs. Option C is a good summary.

Option A suggests people intentionally create counterfactuals in order to reason about other people's beliefs. The paragraph, on the other hand, states counterfactuals are created spontaneously by the mind.
Option B is logically incorrect as it says counterfactual thinking helps to 'reverse' past and future actions.
Option D relates to specific reasons listed in the paragraph. C is a better summary.

The answer is 'Counterfactual alternatives to reality are created for a variety of reasons and is part of one's developmental process.'
Choice C is the correct answer.

Quantitative Ability

Solution 1

$a^m b^n = 144^{145}$

$a^m b^n = (2^4 \times 3^2)^{145}$

$a^m b^n = 3^{290} \times 2^{580}$

Since the highest power of a prime in the prime factorization of 144^{145} is 580, n can never be more than 580. Since m is a natural number the smallest value that m can take is 1. So, the maximum value of (n – m) is 580 – 1 = 579.

But is that possible??

Yes!

When $a^m b^n = (3^{290})^1 \times 2^{580}$, where $a = 3^{290}; m = 1; b = 2; n = 580$.

The question is " **Let a, b, m and n be natural numbers such that $a > 1$ and $b > 1$. If $a^m b^n = 144^{145}$, then the largest possible value of $n - m$ is** "

Hence, the answer is '579'

Choice C is the correct answer.

Solution 2

$2^{4x^2} - 2^{2x^2+x+16} + 2^{2x+30} = 0$

$\div$ by 2^{2x^2+x+16} on both sides.

$2^{2x^2-x-16} + 2^{-2x^2+x+14} = 1$

$2^{2x^2-x-16} + 2^{-2x^2+x+16-2} = 1$

$2^{2x^2-x-16} + 2^{-(2x^2-x-16)-2} = 1$

let $y = 2^{2x^2-x-16}$

$y + \frac{1}{4y} = 1$

$4y^2 - 4y + 1 = 0$

$4y^2 - 2y - 2y + 1 = 0$

$2y(2y-1) - 1(2y-1) = 0$

(

The question is "**The sum of all possible values of x satisfying the equation $2^{4x^2} - 2^{2x^2+x+16} + 2^{2x+30} = 0$, is**"

Hence, the answer is '$\frac{1}{2}$'

Choice C is the correct answer.

$\therefore 2y = 1$

$2 \times 2^{2x^2-x-16} = 1 = 2^0$

$2^{2x^2-x-15} = 2^0$

$2x^2 - x - 15 = 0$

$2x^2 - 6x + 5x - 15 = 0$

$2x(x-3) + 5(x-3) = 0$

$(2x+5)(x-3) = 0$

$\therefore x = 3$ or $x = -5/2$

Sum of all possible values of x $= 3 + (-5/2) = \frac{1}{2}$

Solution 3

k divides m + 2n

So, k also divides 2(m + 2n) = 2m + 4n

It is given that k divides 3m + 4n

Which means, k should also divide (3m + 4n) − (2m + 4n)

∴k divides m

Since k divides m and m + 2n

k should also divide (m + 2n) − m = 2n

Therefore, k divides m and 2n.

The question is " **For any natural numbers m, n, and k, such that k divides both $m + 2n$ and $3m + 4n$, k must be a common divisor of** "

Hence, the answer is 'm and $2n$'

Choice B is the correct answer.

Solution 4

Case I)

If both x and y are both positive.

Then, $\frac{x}{y} < \frac{x+3}{y-3}$ is always true, since We are increasing the numerator and decreasing the denominator.

Case II)

If both x and y are both negative.

$\frac{x}{y} = \frac{|x|}{|y|}$

$\frac{x+3}{y-3} = \frac{-(|x|-3)}{-(|y|+3)} = \frac{|x|-3}{|y|+3}$

$\frac{|x|-3}{|y|+3} < \frac{|x|}{|y|}$, since we are decreasing the numerator and increasing the denominator.

So, $\frac{x}{y} > \frac{x+3}{y-3}$ therefore the given condition $\frac{x}{y} < \frac{x+3}{y-3}$ always fails in this case.

Case III)

x is positive and y is negative.

$\frac{x}{y} = -\frac{x}{|y|}$

$\frac{x+3}{y-3} = -\frac{x+3}{|y|+3}$

for $\frac{x}{y} < \frac{x+3}{y-3}$,

$-\left(\frac{x}{y}\right) > -\left(\frac{x+3}{y-3}\right)$

$\frac{x}{|y|} > \frac{x+3}{|y|-3}$. This is always true since we are increasing the numerator and decreasing the denominator.

Case IV)

x is negative and y is positive.

$\frac{x}{y} = -\frac{|x|}{y}$

$\frac{x+3}{y-3} = -\frac{|x|-3}{y-3}$

for $\frac{x}{y} < \frac{x+3}{y-3}$

$-\left(\frac{x}{y}\right) < -\left(\frac{x+3}{y-3}\right)$

$\frac{|x|}{4} < \frac{|x|-3}{y-3}$

let $3 = k|x|$, then $3 = k\frac{|x|}{y} \times y$

Observe that k is always positive.

$\frac{|x|}{4} < \frac{|x|-3}{y-3}$

$\frac{|x|}{y} < \frac{|x|(1-k)}{y\left(1-k\frac{|x|}{y}\right)}$

This is only true when $(1-k) > \left(1-k\frac{|x|}{y}\right)$

$-k > -k\frac{|x|}{y}$

$1 < \frac{|x|}{y}$

$y < -x$

So, the given condition holds good when both x & y are positive or x is positive but y is negative or x is negative, y is positive and $y < -x$

Since y is negative in the third option, $-x < y$, implies that x > |y|, that is x is positive.

We know that when y is negative and x is positive the condition always holds good.

The question is " **Any non-zero real numbers x, y such that $y \neq 3$ and $\frac{x}{y} < \frac{x+3}{y-3}$, will satisfy the condition** "

Hence, the answer is 'If $y < 0$, then $-x < y$'

Choice C is the correct answer.

Solution 5

$(x) + \frac{5^2}{(0.008)} = \frac{16}{3}$

$0.008 = \frac{8}{1000} = \frac{2^3}{10^3} = 5^{-3}$

$(x) + \frac{5^2}{5^{-3}} = \frac{16}{3}$

$(x) - \frac{2}{3}\frac{\log\log x}{5} = \frac{16}{3}$

$(x) = \frac{16}{3} + \frac{2}{3} = \frac{18}{3} = 6$

$x = (\sqrt{3})^6 = 3^{\frac{6}{2}} = 3^3$

$3x^2 = 3 \times 3^6 = 3^7$

$\therefore (3x^2) = (3^7) = 7$

The question is " **For some positive real number x, if $\log_{\sqrt{3}}(x) + \frac{\log_x(25)}{\log_x(0.008)} = \frac{16}{3}$, then the value of $\log_3(3x^2)$ is** "

Hence, the answer is '7'

Solution 6

A positive integer less than 50, having exactly two distinct factors other than 1 and itself, is either a perfect cube below 50 or an integer that is a product of exactly two distinct primes.

Case i)

Perfect cubes below 50 are 2^3 and 3^3. So, two numbers here

Case ii)

For the product of two primes to be below 50, the individual primes should be below 25.

(Because, the smallest prime is 2 and multiplying 2 with anything greater than or equal to 25 yields a number greater than or equal to 50.)

2, 3, 5, 7, 11, 13, 17, 19, 23 are prime numbers less than 25.

2, 3, 5, 7 are the primes less than $\sqrt{50}$, any product of two numbers among them yields a product less than 50.

So, there are $4C_2 = 6$ pairs here.

11, 13, 17, 19, 23 are the primes greater than $\sqrt{50}$, any product of two numbers among them yields a product greater than 50.

So, there are 0 pairs here.

Between the two lists 11 and 13 can pair with 2 and 3, while 17, 19, and 23 can only pair with 2.

So, there are 7 pairs here

are 2 + 6 + 0 + 7 = 15 such numbers

The question is " **The number of positive integers less than 50, having exactly two distinct factors other than 1 and itself, is** "

Hence, the answer is '15'

Solution 7

$$(x-1)^2 + 2kx + 11 = 0$$

$$x^2 - 2x + 1 + 2kx + 11 = 0$$

$$x^2 + 2(k-1)x + 12 = 0$$

Since the equation above has no real roots, the discriminant of the equation should be negative.

$$b^2 - 4ac < 0$$

$$b^2 < 4ac$$

$$(2(k-1))^2 < 4 \cdot 1 \cdot 12$$

$$4(k-1)^2 < 4 \cdot 12$$

$$(k-1)^2 < 12$$

$$-\sqrt{12} < k - 1 < \sqrt{12}$$

$$-3.46 \leq k \quad 1 \leq 3.46$$

$$-2.46 \leq k \leq 4.46$$

The largest integral value that k can take is 4.

Now, we need to minimize $\frac{k}{4y} + 9y$ where k takes the largest integral value and y is positive..

$\frac{k}{4y} + 9y - \frac{4}{4y} + 9y = \frac{1}{y} + 9y$

$\frac{1}{y}$ &$9y$ are both positive real numbers, therefore, their A.M is greater than equal to their G.M.

$AM\left(\frac{1}{y}, 9y\right) \geq GM\left(\frac{1}{y}, 9y\right)$

$\frac{\frac{1}{y}+9y}{2} \geq \sqrt{\frac{1}{y}(9y)}$

$\frac{\frac{1}{y}+9y}{2} \geq 3$

$\frac{1}{y} + 9y \geq 6$

$\therefore \left(\frac{k}{ky} + 9y\right) = 6$

The question is " Let k be the largest integer such that the equation $(x-1)^2 + 2kx + 11 = 0$ has no real roots. If y is a positive real number, then the least possible value of $\frac{k}{4y} + 9y$ is "

Hence, the answer is '6'

Solution 8

" In a company, 20% of the employees work in the manufacturing department."

Ratio of number of manufacturing to non-manufacturing employees = 1 : 4

So, let the number of manufacturing to non-manufacturing employees be x and 4x respectively.

"the total salary obtained by all the manufacturing employees is one-sixth of the total salary obtained by all the employees in the company,"

Ratio of total salaries of manufacturing to non-manufacturing employees = 1 : 5

So, let the total salaries of manufacturing to non-manufacturing employees be y and 5y respectively.

So, the ratio of average salaries of manufacturing to non-manufacturing employees will be $\frac{y}{x} : \frac{5y}{4x} = 4 : 5$

The answer is '4 : 5'

Choice A is the correct answer.

Solution 9

"Minu purchases a pair of sunglasses at Rs.1000 and sells to Kanu at 20% profit."

This means, Minu purchased the glasses at Rs.1000 and sold them to Kanu at Rs.1200.

Minu made a profit of Rs. 200 so far.

"Then, Kanu sells it back to Minu at 20% loss."

This means, Kanu sold the glasses back to Minu at 80% of 1200 = Rs. 960

"Finally, Minu sells the same pair of sunglasses to Tanu. ... the total profit made by Minu from all her transactions is Rs.500"

This means, Minu has to make a further profit of Rs. 300. She achieves this by selling the glasses back to Tanu at 960 + 300 = Rs.1260

So the profit % in the transaction is $\frac{300}{960} \times 100 = 31.25\%$

The answer is '31.25%'

Choice B is the correct answer.

Solution 10

Let A, B and C be the number of hours taken by pipes A, B and C to completely fill (or completely empty) a tank.

So the fraction of the tank filled(or emptied) by them in one hour is $\frac{1}{A}, \frac{1}{B}, \frac{1}{C}$

"Pipe B empties the full tank in one hour less than the time taken by Pipe A to fill the empty tank"

B = A − 1

"When pipes A, B and C are turned on together, the empty tank is filled in two hours"

$$\frac{1}{A} + \frac{1}{C} - \frac{1}{A-1} = \frac{1}{2}$$

"If pipes B and C are turned on together when the tank is empty and Pipe B is turned off after one hour, then Pipe C takes another one hour and 15 minutes to fill the remaining

This means, after pipe C worked for 2 hrs 15 mins (or $\frac{9}{4} hrs$) and the Pipe B draining for 1 hour, the tank got filled.

$$\frac{9/4}{C} - \frac{1}{A-1} = 1$$
$$\frac{9}{4C} - \frac{1}{A-1} = 1$$
$$\frac{9}{4C} = 1 + \frac{1}{A-1} = \frac{A}{A-1}$$
$$9A - 9 = 4AC$$
$$\frac{9}{4}\left(1 - \frac{1}{A}\right) = C$$
$$\frac{9}{4}\left(\frac{A-1}{A}\right) = C$$
$$\frac{1}{A} + \frac{1}{C} - \frac{1}{A-1} = \frac{1}{2}$$
$$\frac{1}{A} + \frac{4A}{9(A-1)} - \frac{9}{9(A-1)} = \frac{1}{2}$$
$$\frac{1}{A} + \frac{4A-9}{9(A-1)} = \frac{1}{2}$$
$$\frac{9A-9+4A^2-9A}{9A^2-9A} = \frac{1}{2}$$
$$8A^2 \quad 18 = 9A^2 - 9A$$
$$A^2 \cdot 9A + 18 = 0$$
$$A^2 - 6A - 3A - 18 = 0$$
$$A = 6 \text{ or } A = 3$$

"Pipe A can fill the empty tank in less than five hours"

A = 3

$$C = \frac{9}{4}\left(\frac{A-1}{A}\right)$$
$$C = \frac{9}{4}\left(\frac{3-1}{3}\right)$$
$$C = \frac{9}{4}\left(\frac{2}{3}\right) = \frac{3}{2} = 1.5\text{hrs} = 90\text{mins}$$

Therefore, the time taken by pipe C to fill an empty tank is 90 min

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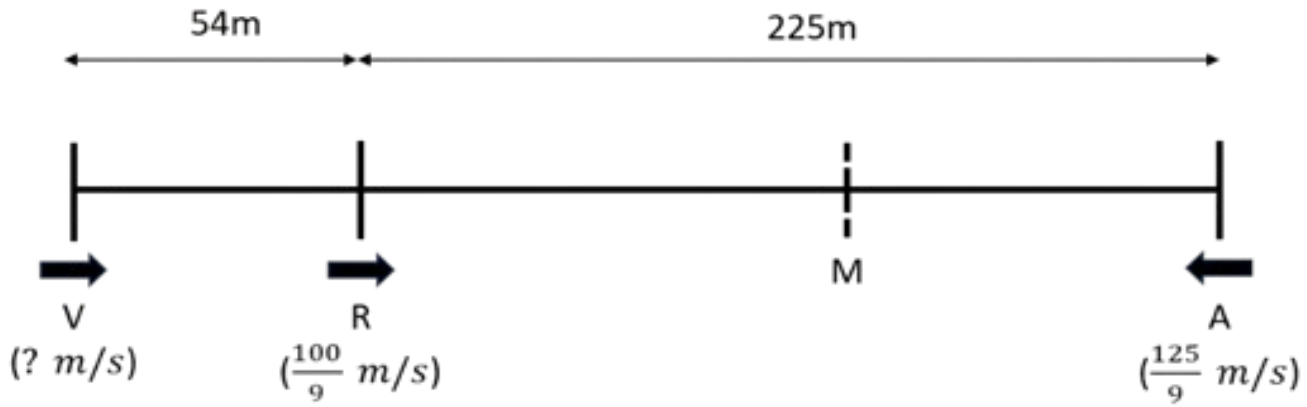
The answer is '90'

Choice A is the correct answer.

Solution 11

The speeds of Ravi and Ashok converted to meters per second are $40 \times \frac{5}{18} = \frac{100}{9}$ m/s and $50 \times \frac{5}{18} = \frac{125}{9}$ m/s respectively.

Let M be the meeting point between Ravi and Ashok.



The relative speed between Ravi and Ashok = $\frac{100}{9} + \frac{125}{9} = \frac{225}{9}$ m/s

So they meet exactly after $\frac{225}{\frac{225}{9}} = 9$ seconds.

The distance covered by R in 9 seconds = $\frac{100}{9} \times 9 = 100$ m.

So, for all three of them to meet at the same time Vijay has to cover 54 + 100 = 154m in 9 seconds.

∴ The speed of Vijay = $\frac{154}{9}$ m/s $= \frac{154}{9} \times \frac{18}{5} = 61.6$kmph

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The answer is '61.6'

Choice D is the correct answer.

Solution 12

"Anil borrows Rs 2 lakhs at an interest rate of 8% per annum, compounded half-yearly. He repays Rs 10,320 at the end of the first year and closes the loan by paying the outstanding amount at the end of the third year."

This means, the amount paid by Anil at the end of the third year = $\left(2,00,000 \times 1.04^2 - 10,320\right) \times 1.04^4 = 2,40,990.8634 \cong 2,40,991$

So the total amount paid by Anil = $10,320 + 2,40,991 = 2,51,311$

So the total interest paid $= 2,51,311 - 2,00,000 = 51,311$

The answer is '51311'

Choice B is the correct answer.

Solution 13

"The price of a precious stone is directly proportional to the square of its weight."

If W is the weight of the stone and P is the price of that stone, then $P = k \times W^2$

For the entire, unbroken stone, the price will be $18^2 \times k = 324$ k.

"If she breaks it into four pieces with each piece having distinct integer weight, then the difference between the highest and lowest possible values of the total price of the four pieces will be 288000."

The minimum profit is achieved when the weights of the broken stones are close to each other, that is, the weights are 3, 4, 5, and 6 units.

In this case the combines worth of the four stones $= \left(3^2 + 4^2 + 5^2 + 6^2\right) k = 86k$

The maximum profit is achieved when the weights of the broken stones are far from each other, that is, the weights are 1, 2, 3, and 12 units.

In this case the combines worth of the four stones $= \left(1^2 + 2^2 + 3^2 + 12^2\right) k = 158k$

The difference in the total value = 2,88,000.

158k – 86k = 72k = 2,88,000

k = 4,000

So, the price of the original stone = 324 k = 12,96,000

The answer is '1296000'

Choice A is the correct answer.

Solution 14

Every time 10% of the mixture is replace with a pure adulterant (here water), the concentration of the mixture becomes 90% of the initial concentration.

Similarly when a proportion p of a mixture is replaced with pure adulterant, the concentration of the mixture becomes (1 - p) times the previous concentration. ($0 \leq p \leq 1$)

Here p = $\frac{4}{40} = 0.1$

Initially there was pure milk, so the strength of the mixture is 100% or 1 (in terms of proportion)

After repeating the process n times the concentration of Milk in the mixture will be 1×0.9^n

For the volume of milk to be less than the volume of water, p should be less than 0.5

So we are looking for the smallest n, such that $1 \times 0.9^n < 0.5$

This happens when n = 7

(You can check this by trial and error)

The answer is '7'

Solution 15

Let the number of white and black shirts bought by Jayant be w and b respectively.

Then the total Cost Price (CP) $= 1000 \times w + 1125 \times b = 1000(w + b) + 125 \times b$

Since the goods are marked up by 25% and then offered at a discount of 10%, the total Selling Price (SP) $= CP \times 1.25 \times 0.9 = 1.125CP$

This implies that there was a 12.5% of Profit, which is given to be 51, 000

12.5%(CP) = 51,000

CP = 4,08,000

$1000(w + b) + 125 \times b = 4,08,000$

w and b are positive integers (since at least one shirt of each color needs to be purchased.)

To purchase maximum number of shirts, you need to purchase minimum number of the costlier shirts, which are the blue ones...

Observe that the total CP is a multiple of 1000. And for that to happen b should be a multiple of 8 in $1000(w+b)+125\times b=4,08,000$.

So the minimum value of b = 8, in which case, w = 399. Hence, the maximum number of [redacted] = 407

The answer is '407'

Solution 16

"If a certain amount of money is divided equally among n persons, each one receives Rs 352."

Let the total amount be equal to T.

$$T = n \times 352$$

"However, if two persons receive Rs 506 each and the remaining amount is divided equally among the other persons, each of them receive less than or equal to Rs 330"

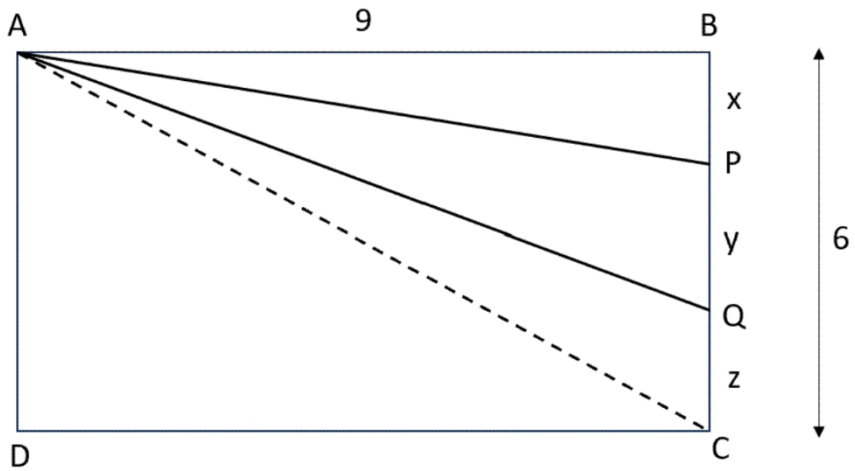
$$T \leq 2 \times 506 + (n-2) \times 330$$
$$n \times 352 \leq 2 \times 506 + (n-2) \times 330$$
$$n \times 352 \leq 352 + n \times 330$$
$$n \times 22 \leq 352$$
$$n \leq \frac{352}{22}$$
$$n \leq 16$$

So, the maximum value that n can take is 16.

The answer is '16'

Solution 17

Let BP = x, PQ = y and QC = z.



Since $\text{Ar}(ABP), \text{Ar}(APQ) \& Ar(AQCD)$ are in GP and $\text{Ar}(AQCD) = 4 \times \text{Ar}(ABP)$

$\text{Ar}(ABP) : \text{Ar}(APQ) : \text{Ar}(AQCD) = 1 : 2 : 4$

$\frac{9x}{2} : \frac{9y}{2} : 27 + \frac{9z}{2} = 1 : 2 : 4$

$x : y : 6 + z = 1 : 2 : 4$

$y = 2x$

$6 + z = 4x$

x + y + z = 6

x + 2x + 4x − 6 = 6

x = $\frac{12}{7}$

z = 4x − 6 = $\frac{48-42}{7} = \frac{6}{7}$

∴ x = 2z

Therefore, $x : y : z = 2 : 4 : 1$

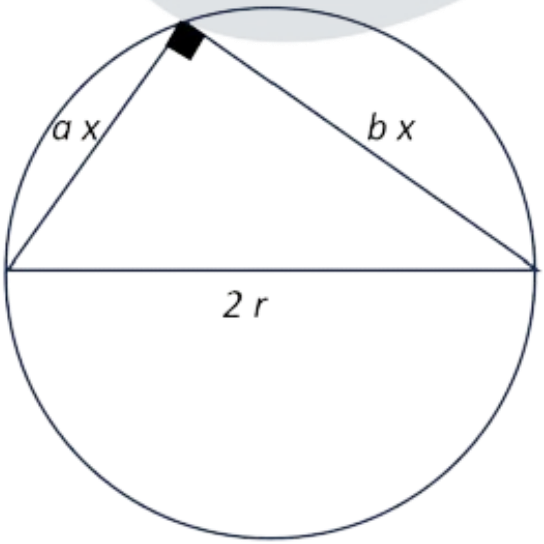
BP : PQ : QC = 2 : 4 : 1

The answer is '2 : 4 : 1'

Choice C is the correct answer

Solution 18

Since the angle subtended by the diameter on the circle is a right-angle, such a triangle inscribed in a circle with the diameter as one of its sides will be right angled.



"...and the other two sides have their lengths in the ratio a: b."

Let the two sides be *ax* and *bx*.

The area of the triangle = $\frac{1}{2} \times ax \times bx = \frac{ab}{2}x^2$

By the Pythagoras theorem, $(ax)^2 + (bx)^2 = (2r)^2$

$(a^2 + b^2) \times x^2 = 4r^2$

$x^2 = \frac{4r^2}{(a^2+b^2)}$

∴The area of the triangle $= \frac{ab}{2} \times \frac{4r^2}{(a^2+b^2)} = \frac{2abr^2}{a^2+b^2}$

The answer is '$\frac{2abr^2}{a^2+b^2}$'

Choice D is the correct answer.

Solution 19

$|x-y|-|x-5|=2$

let $|x-5|=\Delta$ *(Observe that Δ is a non-negative number.)*

$x=\Delta+5$ or $x=5-\Delta$

$|x-y|-\Delta=2$

$|x-y|=\Delta+2$

$y=x+\Delta+2$ or $y=x-\Delta-2$

So, four pairs of points satisfy the condition $|x-y|-|x-5|=2$

Case I)

$x=\Delta+5$ & $y=x+\Delta+2$

In this case, x is at least 5.

$y=x+\Delta+2=x+\Delta+2+3-3=2x-3$

So, every point on the line $y=2x-3$ where $x\geq 5$ satisfies the given condition.

Case II)

$x=\Delta+5$ & $y=x-\Delta-2$

In this case, x is at least 5.

$y=x-\Delta-2=\Delta+5-\Delta-2=3$

So, every point on of the form $(x,3)$ where $x\geq 5$ satisfies the given condition.

Case III)

$x=5\quad\Delta$ & $y=x+\Delta+2$

In this case, the highest value of x Is 5.

$y=x+\Delta+2=5-\Delta+\Delta+2=7$

So, every point on of the form $(x,7)$ where $x\leq 5$ satisfies the given condition.

Case IV)

$x=5-\Delta$ & $y=x-\Delta-2$

In this case, the highest value of x Is 5.

$y=x-\Delta-2=x+x-5-2=2x-7$

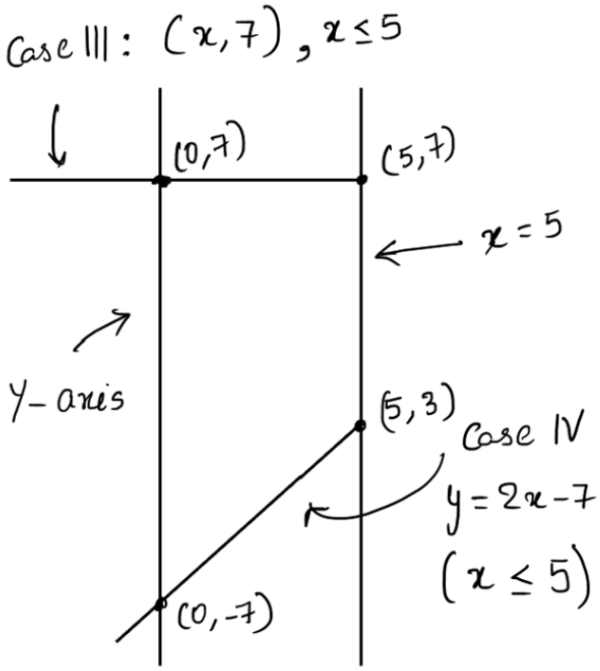
So, every point on the line $y=2x-7$ where $x\leq 5$ satisfies the given condition.

We are to find the area enclosed by the y-axis, x = 5 and the lines of $|x-y|-|x-5|=2$.

Because the area we are interested is bounded by x = 0 (y-axis) and x = 5, $0\leq x\leq 5$.

So, we'll only be concerned about Case III and Case IV.

A rough sketch of the bounded region looks like...



The line y = 2x − 7 touches x = 0 and x = 5 at (0, -7) and (5, 3) respectively.

So, the total area enclosed = $5 \times (7 + 7) - \frac{1}{2} \times 5 \times (3 + 7) = 45$.

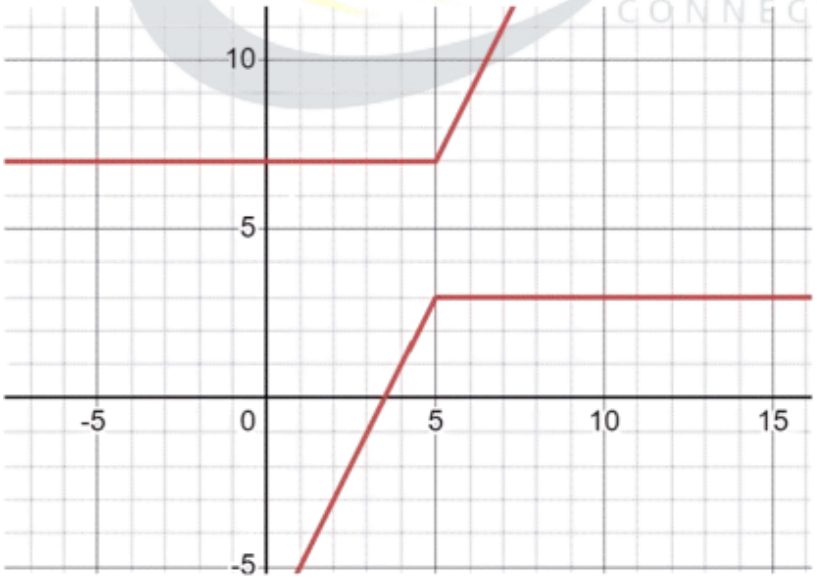
Some Suggestions.

- *Notice that, since the area is bounded by x = 5, we know that x ≤ 5 and therefore the case where $x = \Delta + 5$ will never arise... which leaves us just with Case III and Case IV.*

(We did Case I and Case II just for the solution to be thorough and complete.)

- *Graphing the equations using graphing tools before visualizing is not advisable.*

The graph of $|x - y| - |x - 5| = 2$ looks like...



The question is " **The area of the quadrilateral bounded by the Y-axis, the line $x = 5$, and the lines $|x - y| - |x - 5| = 2$, is** "

Hence, the answer is '45'

Solution 20

Let the common differences of the series $a_1, a_2, a_3, \ldots$ and b_1, b_2, b_3 be p and q respectively.

We are told that p and q are prime numbers.

$a_5 = b_9$

$a_{19} = b_{19}$

$a_{19} - a_5 = b_{19} - b_9$

$14 \times p = 10 \times q$

$\frac{p}{q} = \frac{10}{14} = \frac{5}{7}$

Since $p\&q$ are primes \& \(\frac { p } { q } = \frac { 5 } { 7 } \), we have \(p = 5 \& q = 7 \)

\(a _ { 11 } = a _ { 5 } + 6 p \)

\(a _ { 11 } = b _ { 9 } + 6 p \)

\(a _ { 11 } = b _ { 2 } + 7 q + 6 p \)

\(a _ { 11 } = 0 + 7 \times 7 + 6 \times 5 \)

\(a _ { 11 } = 79 \)

The answer is '79'

Choice A is the correct answer.

Solution 21

$p^2 + q^2 - 29 = 2pq - 20 = 52 - 2pq$

$2pq - 20 = 52 - 2pq$

$4pq = 72$

$pq = 18$

$p^2 + q^2 - 29 = 2pq - 20$

$p^2 + q^2 - 2pq = 29 - 20$

$(p - q)^2 = 3^2$

$p - q = \pm 3$

$(p \quad q)^3 = p^3 \quad q^3 - 3pq(p - q)$

$p^3 - q^3 = (p - q)^3 + 3pq(p - q)$

The maximum value of $p^3 - q^3$ occurs when $p - q = 3$

$p^3 \quad - q^3 = 3^3 + 3(18)3 = 3^3(1 + 6) = 27 \times 7 = 189$

The minimum value of $p^3 - q^3$ occurs when $p - q = -3$

$p^3 - q^3 = (-3)^3 + 3(18)(-3) = -189$

The difference between the maximum and minimum values $= 189 - (-189) = 2(189) = 378$

The question is " If $p^2 + q^2 - 29 = 2pq - 20 = 52 - 2pq$, then the difference between the maximum and minimum possible value of $(p^3 - q^3)$ is "

Hence, the answer is '378'

Choice C is the correct answer.

Solution 22

$a_n = 13 + 6(n-1) = 7 + 6n$

$b_m = 15 + 7(m-1) = 8 + 7m$

For some m, n, let $7 + 6n = 8 + 7m$

$6n - 7m = 1$

$n = 6, m = 5$ works!

$a_6 = 43$ and $b_5 = 43$

Since, $L \cdot C \cdot M(6,7) = 42$, the common terms of the series are of the form $43 + 42k$

Let's find the smallest 4-digit number of this form...

$\frac{1000}{42} \cong 23.80$

$43 + 42(23) = 1009$

$\therefore 43 + 42(22) = 967$ is the largest 3-digit such value.

The answer is '967'

Logical Reasoning & Data Interpretation (LRDI)

i.We are given that each box contains three sacks. Each sack has a certain number of coins, between 1 and 9, both inclusive.
The average number of coins per sack in the boxes are all distinct integers. The total number of coins in each row is the same. The total number of coins in each column is also the same.
=> The total number of coins in a box range from 3 (1 + 1 + 1) to 27 (9+9+9)
Since, it is given that the average number of coins per sack in the boxes are all distinct integers => The total number of coins in a box would be 3, 6, 9, 12, 15, 18, 21, 24, 27 => averages of 1, 2, 3, 4,....,9 => Sum = 45.
=> Sum of averages coins in a box in a row or column = 45/3 = 15 [The total number of coins in each row is the same. The total number of coins in each column is also the same.] ==> (1)
Let us represent the final configuration of the sacks in boxes as follows:

		Table	
	C-1	C-2	C-3
R-1			
R-2			
R-3			

Also a bag (x,y) => bag in xth row and yth column.
We are given 2 clues => Table-1 & Table-2

Consider bag (3,1)
=> From Table-1 => Median = 8 & From Table-2 all 3 sacks have more than 5 coins. Also * => There is a 9 in one of the sacks.
=> c, 8, 9 are the coins in bag (3,1), now c > 5 & c +8 +9 should be a multiple of 3 => c = 7 is the only possiblility.
=> bag (3,1) has 7, 8, 9 coins with average = 8.
Consider bag (2,1)
Median = 2 and 1 sack has more than 5 coins. Also ** => conditions i & iii should be satisfied.
=> 1, 2, 9 are the coins in bag (2,1) with average = 4
Consider bag (1,2)
Median = 9 and 2 elements are more than 5. Also * => (9 is present & 1 is not present)
=> c, 9, 9 are the coins in bag (1,2) and c is not equal to 1 and less than 5 => c = 3 for c + 18 to be a multiple of 3.
=> 3, 9, 9 are the coins in bag (1,2) with average = 7.
Capturing this info. in the table:

		Table	
	C-1	C-2	C-3
R-1		3,9,9 (7)	
R-2	1,2,9 (4)		
R-3	7,8,9 (8)		

From (1), The average in bag (1,1) is 15 - 4 - 8 = 3.
From (1), The average in bag (1,3) is 15 - 3 - 7 = 5.
Consider bag (1,1)
Avg = 3, 1 sack has more than 5 and ** => 2 conditions are being satisfied. => (can't be condition-3 => 9 coins as the total sum of coins is it self 3*3 = 9) => bag (1,1) has 1, 1, 7 coins with average = 3.
Consider bag (1,3)
Avg. = 5 => Sum = 15.
Median = 6 and 2 sacks have more than 5 and * => (1 condition is satisfied)
Not condition ii as the median is 6 & Not condition iii as the sum of 2 sacks itself will become 6 + 9 = 15 => 1, 6, c are the coins => For sum = 15 => c = 15-1-6=8 => bag (1,3) has 1, 6, 8 coins with average = 5.
Consider bag (3,3)

		Table	
	C-1	C-2	C-3
R-1	1,1,7 (3)	3,9,9 (7)	1,6,8 (5)
R-2	1,2,9 (4)		
R-3	7,8,9 (8)		

0 sacks have more than 5 coins and ** => conditions i & ii are being satisfied. => 1,1,c are the coins.
Now c = 1 or 2 or 3 or 4 => c = 1 or 4 for number of coins to be a multiple of 3.
But c = 1 as no other bag has the possibility to get avg. = 1 as bag (2,2) should have 1, b, c coins and b and c should be more than 1 as only 1* => bag (3,3) has 1, 1, 1 coins with average = 1.

Now, we can fill the averages in all the bags.
In bag (2,3) Avg. = 9 => 9, 9, 9 are the coins.
In bag (2,2) => Avg. = 2 => Sum = 6 and only 1* => smallest elemens=t should be 1.
=> 1, b, c are the coins where b + c = 5 and b,c can't be equal to 1 and less than 5 => 2 + 3 = 5 is the only possibility.
=> 1, 2, 3 are the coins with average = 2.
Considering bag (3,2)

		Table	
	C-1	C-2	C-3
R-1	1,1,7 (3)	3,9,9 (7)	1,6,8 (5)
R-2	1,2,9 (4)	Avg = 2	Avg = 9
R-3	7,8,9 (8)	Avg = 6	1,1,1 (1)

Avg. = 6 => Sum = 18.
2 sacks more than 5 coins and ** => 2 sacks have 1 and 9 coins.
=> bag (3,2) has 1, c, 9 coins and c = 18-1-9 = 8 => bag (3,2) has 1, 8, 9 coins with average = 6 coins. ==> Final required table, bracket number => average coins per sack in the bag.

		Table	
	C-1	C-2	C-3
R-1	1,1,7 (3)	3,9,9 (7)	1,6,8 (5)
R-2	1,2,9 (4)	1,2,3 (2)	9,9,9 (9)
R-3	7,8,9 (8)	1,8,9 (6)	1,1,1 (1)

1. Sum of coins in 3rd row = 8*3 + 6*3 + 1*3 = 45.

2. Bags (2,1), (3,1), (1,2), (3,2), (2,3) have at least 1 sack with 9 coins. => Total of 5 bags.

3. Average = Median in boxes (3,1), (2,2), (2,3) and (3,3) => 4 boxes

4. Bag (1,1) => 2 sacks with 1 coin, (2,1) => 1 sack, (2,2) => 1 sack, (3,2) => 1 sack, (1,3) => 1 sack, (3,3) => 3 sacks.
=> Total = 2 + 1 + 1 + 1 + 1 + 3 = 9 sacks.

5. Bags with different number of coins in all 3 sacks are (2,1), (3,2), (2,2), (3,2), (1,3) => 5 bags.

ii.

Table 1: 2-day averages for Days 2 through 5			
Day 2	**Day 3**	**Day 4**	**Day 5**
15	15.5	16	17

Let the total score of day 1, day 2, day 3, day 4, and day 5 are d1, d2, d3, d4, and d5, respectively.
The table shows that d1+d2 = 30... eq (1), d2+d3 = 31 eq (2), d3+d4 = 32 .... eq(3), d4+d5 = 34 ... eq(4)
It is given that participants are ranked each day, with the person having the maximum score being awarded the

minimum rank (1) on that day. All participants with a tied score are awarded the best available rank if there is a
tie.
It is given that the total score on Day 3 is the same as the total score on Day 4.
Therefore, d3 = d4 => d3 = d4 = 16, which implies d2 = 15, d5 = 18, and d1 = 15.
The day-wise score is given below:

	Day 1	Day 2	Day 3	Day 4	Day 5
Akhil					
Bimal					
Chatur					
Total Score	15	15	16	16	18

It is known that Chatur always scores in multiples of 3. His score on Day 2 is the unique highest score in the competition. His minimum score is observed only on Day 1, and it matches Akhil's score on Day 4.
Hence, only Chatur scored 9 (one time) on Day 2, and no other person scored 9 on any of the given 5 days.
Chatur scored 3 only one time, which was on Day 1. Therefore, the scores obtained by Chatur on Day 3, Day 4, and Day 5 are 6, 6, and 6, respectively. It is also known that Akhil's score on Day 4 is the same as the score

	Day 1	Day 2	Day 3	Day 4	Day 5
Akhil				3	
Bimal				7	
Chatur	3	9	6	6	6
Total Score	15	15	16	16	18

obtained by Chatur on Day 1. Hence, Akhil's score on Day 4 is 3.
Hence, we get the following table:

From Table 2, we see that the rank of Bimal and Akhil is the same, which is 2. Hence, The score obtained by Akhil and Bimal is the same. Let the score be x. Therefore, 6+2x = 16 => x = 5
The rank of Chatur on Day 5 is 2, and the rank of Bimal is 1, which implies the score obtained by Bimal will be more than Chatur. Hence, Bimal can score either 7 or 8 on Day 5. Therefore, the score obtained by Akhil on Day 5 is either 5 or 4.

	Day 1	Day 2	Day 3	Day 4	Day 5
Akhil			5	3	5/4
Bimal			5	7	7/8
Chatur	3	9	6	6	6
Total Score	15	15	16	16	18

It is given that Bimal's scores are the same on Day 1 and Day 3. Hence, the score obtained by Bimal on Day 1 is 5, which implies The score obtained by Akhil is 7 on Day 1.
From Table 2, we can see that the rank of Bimal is 3 on Day 2, and the rank of Akhil is 2 on Day 2. Hence, the score of Bimal will be lower than Akhil on Day 2.

Let the score of Akhil be a, and the score of Bimal be b. Then 9+a+b = 15, and a > b => a+b =6, and a> b
Hence, the value of a can be 4/5, and the value of b can be 2/1
Therefore, the final table is given below:
6.From the table, we can see that the score of Akhil is 7 on day 1.

	Day 1	Day 2	Day 3	Day 4	Day 5
Akhil	7	4/5	5	3	5/4
Bimal	5	2/1	5	7	7/8
Chatur	3	9	6	6	6
Total Score	15	15	16	16	18

The correct option is C.
7. From the table, we can see that the maximum score is obtained by Chatur. The correct option is A.

8. From the table, we can see that the minimum score obtained by Bimal is 25.

9. In the question, it is given that the total score obtained by Bimal is a multiple of 3, which implies the total score obtained by Bimal is 27, which implies the total score obtained by Akhil is 23.
Akhil will score 23, when his scores on Days 1, 2, 3, 4, and 5 are 7, 4, 5, 3, 4, respectively.
Hence, the score obtained by him on Day 2 is 4.
The correct option is B.

10. In the question, it is given that the score obtained by Akhil is 24, which implies the score obtained by Bimal is 26. The answer is 26.

iii. In this set, we are told that the amount each firm raised every year increased until it reached a maximum, and then decreased until the firm closed down and no firm raised the same amount of money in two consecutive years.
The increase or decrease can be ± 1 or 2. => (1)
We are also told that each firm raised Rs. 1 crore in its first and last year of existence
Consider A:
It raised money for 8 years
=> The raising pattern looks like follows:
1, a, b, c, d, e, f, 1 => where a, b, c,..,, f are the unknown amounts raised.
Also a+b+c+d+e+f= 21 - 2 = 19.
We can observe that 19/6 is slightly greater than 3 => The average amount raised should be around 3.
If a = 3 and f = 3 => b + c + d + e = 13 (not possible) as the minimum case would be (4, 5, 6, 4) => Not possible.
If a = 3 and f = 2 => b + c + d + e = 14 (not possible) as the minimum case would be (4, 5, 4, 3) => Not possible.
=> a = 2 and f = 2 => b + c + d + e = 15 the minimum case is (3, 4, 5, 3) or (3, 5, 4, 3) which gives a sum of 15.
So, the possible cases for A are:
Consider B:

	2009	2010	2011	2012	2013	2014	2015	2016
A	1	2	3	4	5	3	2	1
	1	2	3	5	4	3	2	1

The patterns looks as follows:
1, a, b, 1
If a = 2, b has to be equal to 3 to satisfy (1)

if a = 3, b has to be equal to 2 to satisfy (1)
=> The possible cases for B are:
Consider C:
The pattern looks as follows:

B	2012	2013	2014	2015
	1	2	3	1
	1	3	2	1

1,..., 1
Let us assume there are 2 gaps between => a + b = 7 (Not possible) as maximum case would be 1, 3, 2, 1
Let us assume there are 3 gaps between => a + b + c = 7 . the minimum case possible is 1, 2, 3, 2, 1 => Satisfies.
Now, if there are 4 gaps => a + b + c + d = 7 => The average value is 7/4 which is less than 2 => Not possible.
=> The possible cases for C are:
Consider D:

C	2013	2014	2015	2016	2017
	1	2	3	2	1

The pattern looks as follows:
1, a, b, c, 1
=> a + b + c = 8
When a = 2 and c = 2 => b = 4 => 2, 4, 2 => Satisfies.
When a = 2 and c = 3, b should be 3 (Not satisfying (1))
When a = 3 and c = 3, b should be 2 (Not satisfying (1))
=> The possible cases for D are:
Consider E:

D	2011	2012	2013	2014	2015
	1	2	4	2	1

The pattern looks as follows:
For 1 or 2 gaps, we can't get a sum of 11.
Assume 3 gaps => a + b + c = 11, the maximum case is 3, 5, 3 => Satisfies.
Now, assume 4 gaps
=> a + b + c + d = 11, the minimum case is 2, 3, 4, 2 or 2, 4, 3, 2 which satisfies (1) and 2+ 3+ 4+2 = 11.
=> The possible cases for E are:

E	2010	2011	2012	2013	2014	2015
	1	3	5	3	1	-
	1	2	3	4	2	1
	1	2	4	3	2	1

In summary, the possible cases for all 5 companies is:

11. In sum we see that only for C and D, we can conclude the amounts raised with certainty.

	2009	2010	2011	2012	2013	2014	2015	2016
A	1	2	3	4	5	3	2	1
	1	2	3	5	4	3	2	1

B	2012	2013	2014	2015
	1	2	3	1
	1	3	2	1

C	2013	2014	2015	2016	2017
	1	2	3	2	1

D	2011	2012	2013	2014	2015
	1	2	4	2	1

E	2010	2011	2012	2013	2014	2015
	1	3	5	3	1	-
	1	2	3	4	2	1
	1	2	4	3	2	1

12. Money raised in 2015 is 2 + 1 + 3 + 1 + 0/1 = 7 or 8.

13. Maximum money raised in 2013 is 5 + 3 + 1 + 4 + 4 = 17.

14. Given that E raised 3 in 2013 => in 2012 he could have raised a minimum of 4 crores. => Minimum amount is 4 + 1 + 0 + 2 + 4 = 11.

15. Given that total amount raised in 2014 is 12 => 3 + 3/2 + 2 + 2 + 1/2 = 12 => => possible case is 3 + 3 + 2 + 2 + 2 = 12.
A) In 2013, B raised 2 crores and E also raised 3/4 crores => Not Possible.
B) In 2013, A could have raised 5/4 and D raised 4 => Possible.
C) In 2014, A raised 3 and B raised 3 => Possible.
D) In 2014, B raised 3 whereas E raised 2 => 3 > 2 => Possible.

iv. Consider Statement 2: Anjali took Ride-1 at 11 am after waiting for 30 minutes for Chitra to complete it. It was the only ride where Anjali waited.
This implies that Chitra took Ride 1 at 10 am. Now we also know that she spent Rs 50 and that she left at 11 am. Now, since she did one ride costing Rs 20 at 10, she must have taken Ride-3 at 9 am. So we get the following table for Chitra.

	Ride 3	Ride 1
Time	9 am- 10 am	10 am- 11 am
Cost	Rs 30	Rs 20

Now we know that Chitra and Anjali spent Rs 50 before 12:15 pm. It is not possible for Anjali to go on Ride-3 at 10 am as we know that she was waiting for 30 minutes before taking Ride-1 (She was waiting from 10:30 am).
Now, since we know that Ride-1 was the only ride for which she waited, we can say that she took Ride-1 at 11 am and started Ride-3 at 12 am

So we get the following table for Anjali.

	Ride-1	Ride-3
Time	11 am- 12 pm	12 pm - 1pm
Cost	20	30

Now, we know that Bipasha started her first ride at 11:30 am. We also know that they all spent Rs 50 before 12:15 pm.
Therefore, the first ride Bipasha takes will be Ride-2, costing Rs 50.
So we get the following table for Bipasha.

	Ride-2	
Time	11:30 am- 12:30am	
Cost	50	

We know that Ride 3 stops at 1 pm. So the last ride taken by Anjali will either be Ride-2 or Ride-4.
Now, considering Statement 4,we know that the last ride taken by Anjali and Bipasha was same and that Bipasha rode it after Anjali. So their last ride can't be 2.
So the last ride of both Bipasha and Anjali will be 4.
Now if we assume that immediately after ending Ride-3, Anjali goes to Ride-4, then the last ride of Bipasha will be Ride-4 from 2 pm - 3pm. But we know that Bipasha rode 3 rides. So this case is not possible.
Since Anjali didn't have any break or waiting time, the only ride she can ride at 1 pm will be Ride 2 and then she will go on Ride-4 from 2 pm to 3 pm.
So we get the following table for Anjali:
Now we know that the last ride that Bipasha took was Ride-4 and that she had a gap of 1.5 hrs before

	Ride-1	Ride-3	Ride-2	Ride-4
Time	11 am- 12 pm	12 pm -1 pm	1 pm- 2 pm	2 pm- 3pm
Cost	20	30	50	40

it. This is only possible when she takes one ride between Ride-2 and Ride-4. Since Ride-3 is closed at 1 pm, she can only take Ride 1. So we get the following table for her.

	Ride-2	Ride-1	Break	Waiting time	Ride-4
Time	11:30 am-12:30 pm	12:30 pm- 1:30 pm	1:30 pm- 2:30 pm	2:30 pm to 3:00pm	3 pm - 4 pm
Cost	50	20			40

16.As we can see from the table for Bipasha, she spent a total of 50+20+40= 110 Therefore the required answer is Option B: 110.

17. Anjali completed a total of 4 rides, 3 of which were completed at 2. Therefore the answer is Option B: Ride-1, Ride 3, and Ride -2.

18. Only Ride-1 was taken by all the visitors. Therefore the correct answer is Option B: Ride-1.

19. Anjali took 4 rides, and Chitra took 2 rides. Therefore the correct answer is 6.

20. As we can see from the table of Anjali she spent a total of 20+30+50+40= 140 Therefore the required answer is 140.