CAT 2017 SOLVED PAPER

Section I: VRC

Question Numbers (1 to 6) : *The passage below is accompanied by a set of six questions. Choose the best answer to each question.*

Creativity is at once our most precious resource and our most inexhaustible one. As anyone who has ever spent any time with children knows, every single human being is born creative; every human being is innately endowed with the ability to combine and recombine data, perceptions, materials and ideas, and devise new ways of thinking and doing. What fosters creativity? More than anything else: the presence of other creative people. The big myth is that creativity is the province of great individual geniuses. In fact creativity is a social process. Our biggest creative breakthroughs come when people learn from, compete with, and collaborate with other people.

Cities are the true fonts of creativity... With their diverse populations, dense social networks, and public spaces where people can meet spontaneously and serendipitously, they spark and catalyze new ideas. With their infrastructure for finance, organization and trade, they allow those ideas to be swiftly actualized.

As for what staunches creativity, that's easy, if ironic. It's the very institutions that we build to manage, exploit and perpetuate the fruits of creativity – our big bureaucracies, and sad to say, too many of our schools. Creativity is disruptive; schools and organizations are regimented, standardized and stultifying.

The education expert Sir Ken Robinson points to a 1968 study reporting on a group of 1,600 children who were tested over time for their ability to think in out-of-the-box ways. When the children were between 3 and 5 years old, 98 percent achieved positive scores. When they were 8 to 10, only 32 percent passed the same test, and only 10 percent at 13 to 15. When 280,000 25-year-olds took the test, just 2 percent passed. By the time we are adults, our creativity has been wrung out of us.

I once asked the great urbanist Jane Jacobs what makes some places more creative than others. She said, essentially, that the question was an easy one. All cities, she said, were filled with creative people; that's our default state as people. But some cities had more than their shares of leaders, people and institutions that blocked out that creativity. She called them "squelchers."

Creativity (or the lack of it) follows the same general contours of the great socio-economic divide - our rising inequality - that plagues us. According to my own estimates, roughly a third of us across the United States, and perhaps as much as half of us in our most creative cities - are able to do work which engages our creative faculties to some extent, whether as artists, musicians, writers, techies, innovators, entrepreneurs, doctors, lawyers, journalists or educators - those of us who work with our minds. That leaves a group that I term "the other 66 percent," who toil in low-wage rote and rotten jobs - if they have jobs at all - in which their creativity is subjugated, ignored or wasted.

Creativity itself is not in danger. It's flourishing is all around us - in science and technology, arts and culture, in our rapidly revitalizing cities. But we still have a long way to go if we want to build a truly creative society that supports and rewards the creativity of each and every one of us.

1. In the author's view, cities promote human creativity for all the following reasons EXCEPT that they
   (1) contain spaces that enable people to meet and share new ideas.
   (2) expose people to different and novel ideas, because they are home to varied groups of people.
   (3) provide the financial and institutional networks that enable ideas to become reality.
   (4) provide access to cultural activities that promote new and creative ways of thinking.
2. The author uses 'ironic' in the third paragraph to point out that
   (1) people need social contact rather than isolation to nurture their creativity.
   (2) institutions created to promote creativity eventually stifle it.
   (3) the larger the creative population in a city, the more likely it is to be stifled.
   (4) large bureaucracies and institutions are the inevitable outcome of successful cities.

This is where the fantasy of autonomy comes full circle. The logical outcome of cars which need no driver is that they will become cars which need no owner either. Instead, they will work as taxis do, summoned at will but only for the journeys we actually need. This the future towards which Ubem.is working. The ultimate development of the private car will be to reinvent public transport. Traffic jams will be abolished only when the private car becomes a public utility. What then will happen to our fantasies of independence? We'll all have to take to electrically powered bicycles.

13. Which of the following statements best reflects the author's argument?

(1) Hybrid and electric vehicles signal the end of the age of internal combustion engines.

(2) Elon Musk is a remarkably gifted salesman.

(3) The private car represents an unattainable myth of independence.

(4) The future Uber car will be environmentally friendlier than even the Tesla.

14. The author points out all of the following about electric cars EXCEPT

(1) Their reliance on rare materials for batteries will support despotic rule.

(2) They will reduce air and noise pollution.

(3) They will not decrease the number of traffic jams.

(4) They will ultimately undermine rather than further driver autonomy.

15. According to the author, the main reason for Tesla's remarkable sales is that

(1) in the long run, the Tesla is more cost effective than fossil fuel-driven cars.

(2) the US government has announced a tax subsidy for Tesla buyers.

(3) the company is rapidly upscaling the number of specialised charging stations for customer convenience

(4) people believe in the autonomy represented by private cars.

16. The author comes to the conclusion that

(1) car drivers will no longer own cars but will have to use public transport.

(2) cars will be controlled by technology that is more efficient than car drivers.

(3) car drivers dream of autonomy but the future may be public transport.

(4) electrically powered bicycles are the only way to achieve autonomy in transportation.

17. In paragraphs 5 and 6, the author provides the example of Uber to argue that

(1) in the future, electric cars will be equipped with mechanisms that prevent collisions.

(2) in the future, traffic jams will not exist.

(3) in the future, the private car will be transformed into a form of public transport.

(4) in the future, Uber rides will outstrip Tesla sales.

18. In paragraph 6, the author mentions electrically powered bicycles to argue that

(1) if Elon Musk were a true visionary, he would invest funds in developing electric bicycles.

(2) our fantasies of autonomy might unexpectedly require us to consider electric bicycles.

(3) in terms of environmental friendliness and safety, electric bicycles rather than electric cars are the future

(4) electric buses are the best form of public transport.

Question Numbers (19 to 21) : Typewriters are the epitome of a technology that has been comprehensively rendered obsolete by the digital age. The ink comes off the ribbon, they weigh a ton, and second thoughts are a disaster. But they are also personal, portable and, above all, private. Type a document and lock it away and more or less the only way anyone else can get it is if you give it to them. That is why the Russians have decided to go back to typewriters in some government offices, and why in the US, some departments have never abandoned them. Yet it is not just their resistance to algorithms and secret surveillance that keeps typewriter production lines – well one, at least – in business (the last British one closed a year ago). Nor is it only the nostalgic appeal of the metal body and the stout well-defined keys that make them popular on eBay. A typewriter demands something particular: attentiveness. By the time the paper is loaded, the ribbon tightened, the carriage returned, the spacing and the margins set, there's a big premium on hitting the right key. That means sorting out ideas, pulling together a kind of order and organising details before actually striking off. There can be no thinking on screen with a typewriter. Nor are there any easy distractions. No online shopping. No urgent emails. No Twitter. No need even for electricity - perfect for writing in a remote hideaway. The thinking process is accompanied by the encouraging clack of keys, and the ratchet of the carriage return. Ping!

19. Which one of the following best describes what the passage is trying to do?

(1) It describes why people continue to use typewriters even in the digital age.

(2) It argues that typewriters will continue to be used even though they are an obsolete technology.

(3) It highlights the personal benefits of using typewriters.

(4) It shows that computers offer fewer options than typewriters.

20. According to the passage, some governments still use typewriters because:

(1) they do not want to abandon old technologies that may be useful in the future.

(2) they want to ensure that typewriter production lines remain in business.

(3) they like the nostalgic appeal of typewriter.

(4) they can control who reads the document.

21. The writer praises typewriters for all the following reasons EXCEPT

(1) Unlike computers, they can only be used for typing.

(2) You cannot revise what you have typed on a typewriter.

(3) Typewriters are noisier than computers.

(4) Typewriters are messier to use than computers.

Question Numbers (22 to 24) : Despite their fierce reputation, Vikings may not have always been the plunderers and pillagers popular culture imagines them to be. In fact, they got their start trading in northern European markets, researchers suggest.

Combs carved from animal antlers, as well as comb manufacturing waste and raw antler material has turned up at three archaeological sites in Denmark, including a medieval marketplace in the city of Ribe. A team of researchers from Denmark and the U.K. hoped to identify the species of animal to which the antlers once belonged by analyzing collagen proteins in the samples and comparing them across the animal kingdom, Laura Geggel reports for Live Science. Somewhat surprisingly, molecular analysis of the artifacts revealed that some combs and other material had been carved from reindeer antlers.... Given that reindeer (Rangifer tarandus) don't live in Denmark, the researchers posit that it arrived on Viking ships from Norway. Antler craftsmanship, in the form of decorative combs, was part of Viking culture. Such combs served as symbols of good health, Geggel writes. The fact that the animals shed their antlers also made them easy to collect from the large herds that inhabited Norway.

Since the artifacts were found in marketplace areas at each site it's more likely that the Norsemen came to trade rather than pillage. Most of the artifacts also date to the 780s, but some are as old as 725. That predates the beginning of Viking raids on Great Britain by about 70 years. [Traditionally, the so-called "Viking Age" began with these raids in 793 and ended with the Norman conquest of Great Britain in 1066.) Archaeologists had suspected that the Vikings had experience with long maritime voyages [that] might have preceded their raiding days. Beyond Norway, these combs would have been a popular industry in Scandinavia as well. It's possible that the antler combs represent a larger trade network, where the Norsemen supplied raw material to craftsmen in Denmark and elsewhere.

22. The primary purpose of the passage is:

(1) to explain the presence of reindeer antler combs in Denmark.

(2) to contradict the widely-accepted beginning date for the Viking Age in Britain, and propose an alternate one.

(3) to challenge the popular perception of Vikings as raiders by using evidence that suggests their early trade relations with Europe.

(4) to argue that besides being violent pillagers, Vikings were also skilled craftsmen and efficient traders.

23. The evidence – "Most of the artifacts also date to the 780s, but some are as old as 725" – has been used in the passage to argue that:

(1) the beginning date of the Viking Age should be changed from 793 to 725.

(2) the Viking raids started as early as 725.

(3) some of the antler artifacts found in Denmark and Great Britain could have come from Scandinavia.

(4) the Vikings' trade relations with Europe pre-dates the Viking raids.

24. All of the following hold true for Vikings EXCEPT

(1) Vikings brought reindeer from Norway to Denmark for trade purposes.

(2) Before becoming the raiders of northern Europe, Vikings had trade relations with European nations.

(3) Antler combs, regarded by the Vikings as a symbol of good health, were part of the Viking culture

(4) Vikings, once upon a time, had trade relations with Denmark and Scandinavia.

25. The passage given below is followed by four summaries. Choose the option that best captures the author's position.

North American walnut sphinx moth caterpillars (Amorpha juglandis) look like easy meals for birds, but they have a trick up their sleeves – they produce whistles that sound like bird alarm calls, scaring potential predators away. At first, scientists suspected birds were simply startled by the loud noise. But a new study suggests a more sophisticated mechanism: the caterpillar's whistle appears to mimic a bird alarm call, sending avian predators scrambling for cover. When pecked by a bird, the caterpillars whistle by compressing their bodies like an accordion and forcing air out through specialised holes in their sides. The whistles are impressively loud - they have been measured at over SO dB from 5 cm away from the caterpillar - considering they are made by a two-inch long insect.

(1) North American walnut sphinx moth caterpillars will whistle periodically to ward off predator birds - they have a specialized vocal tract that helps them whistle.

(2) North American walnut sphinx moth caterpillars can whistle very loudly; the loudness of their whistles is shocking as they are very small insects.

(3) North American walnut sphinx moth caterpillars, in a case of acoustic deception, produce whistles that mimic bird alarm calls to defend themselves.

(4) North American walnut sphinx moth caterpillars, in a case of deception and camouflage, produce whistles that mimic bird alarm calls to defend themselves.

26. The passage given below is followed by four summaries. Choose the option that best captures the author's position.

Both Socrates and Bacon were very good at asking useful questions. In fact, Socrates is largely credited with coming up with a way of asking questions, 'the Socratic method', which itself is at the core of the 'scientific method', popularised by Bacon. The Socratic method disproves arguments by finding exceptions to them, and can therefore lead your opponent to a point where they admit something that contradicts their original position. In common with Socrates, Bacon stressed it was as important to disprove a theory as it was to prove one - and real-world observation and experimentation were key to achieving both aims. Bacon also saw science as a collaborative affair, with scientists working together, challenging each other.

(1) Both Socrates and Bacon advocated clever questioning of the opponents to disprove their arguments and theories.

(2) Both Socrates and Bacon advocated challenging arguments and theories by observation and experimentation.

(3) Both Socrates and Bacon advocated confirming arguments and theories by finding exceptions.

(4) Both Socrates and Bacon advocated examining arguments and theories from both sides to prove them.

27. The passage given below is followed by four summaries. Choose the option that best captures the author's position.

A fundamental property of language is that it is slippery and messy and more liquid than solid, a gelatinous mass that changes shape to fit. As Wittgenstein would remind us, "usage has no sharp boundary."

Oftentimes, the only way to determine the meaning of a word is to examine how it is used. This insight is often described as the "meaning is use" doctrine. There are differences between the "meaning is use" doctrine and a dictionary-first theory of meaning. "The dictionary's careful fixing of words to definitions, like butterflies pinned under glass, can suggest that this is how language works. The definitions can seem to ensure and fix the meaning of words, just as the gold standard can back a country's currency." What Wittgenstein found in the circulation of ordinary language, however, was a free-floating currency of meaning. The value of each word arises out of the exchange. The lexicographer abstracts a meaning from that exchange, which is then set within the conventions of the dictionary definition.

(1) Dictionary definitions are like 'gold standards' - artificial, theoretical and dogmatic. Actual meaning of words is their free-exchange value.

(2) Language is already slippery; given this, accounting for 'meaning in use' will only exasperate the problem. That is why lexicographers 'fix' meanings.

(3) Meaning is dynamic; definitions are static. The 'meaning in use' theory helps us understand that definitions of words are culled from their meaning in exchange and use and not vice versa.

(4) The meaning of words in dictionaries is clear, fixed and less dangerous and ambiguous than the meaning that arises when words are exchanged between people.

28. The five sentences (labelled 1, 2, 3, 4, 5) given in this question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper order for the sentences and key in this sequence of five numbers as your answer.

(1) The implications of retelling of Indian stories, hence, takes on new meaning in a modern India.

(2) The stories we tell reflect the world around us.

(3) We cannot help but retell the stories that we value - after all, they are never quite right for us - in our time.

(4) And even if we manage to get them quite right, they are only right for us - other people living around us will have different reasons for telling similar stories.

(5) As soon as we capture a story, the world we were trying to capture has changed.

29. The five sentences (labelled 1, 2, 3, 4, 5) given in this question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper order for the sentences and key in this sequence of five numbers as your answer.

(1) Before plants can take life from atmosphere, nitrogen must undergo transformations similar to ones that food undergoes in our digestive machinery.

(2) In its aerial form nitrogen is insoluble, unusable and is in need of transformation.

(3) Lightning starts the series of chemical reactions that need to happen to nitrogen, ultimately helping it nourish our earth.

(4) Nitrogen - an essential food for plants - is an abundant resource, with about 22 million tons of it floating over each square mile of earth.

(5) One of the most dramatic examples in nature of ill wind that blows goodness is lightning.

30. The five sentences (labelled 1, 2, 3, 4, 5) given in this question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper order for the sentences and key in this sequence of five numbers as your answer.

(1) This has huge implications for the health care system as it operates today, where depleted resources and time lead to patients rotating in and out of doctor's offices, oftentimes receiving minimal care or concern (what is commonly referred to as "bed side manner") from doctors.

(2) The placebo effect is when an individual's medical condition or pain shows signs of improvement based on a fake intervention that has been presented to them as a real one and used to be regularly dismissed by researchers as a psychological effect.

(3) The placebo effect is not solely based on believing in treatment, however, as the clinical setting in which treatments are administered is also paramount.

(4) That the mind has the power to trigger biochemical changes because the individual believes that a given drug or intervention will be effective could empower chronic patients through the notion of our bodies' capacity for self-healing.

(5) Placebo effects are now studied not just as foils for "real" interventions but as a potential portal into the self-healing powers of the body.

31. The five sentences (labelled 1, 2, 3, 4, 5) given in this question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper order for the sentences and key in this sequence of five numbers as your answer.

(1) Johnson treated English very practically, as a living language, with many different shades of meaning and adopted his definitions on the principle of English common law - according to precedent.

(2) Masking a profound inner torment, Johnson found solace in compiling the words of a language that was, in its coarse complexity and comprehensive genius, the precise analogue of his character.

(3) Samuel Johnson was a pioneer who raised common sense to heights of genius, and a man of robust popular instincts whose watchwords were clarity, precision and simplicity.

(4) The 18th century English reader, in the new world of global trade and global warfare, needed a dictionary with authoritative acts of definition of words of a language that was becoming seeded throughout the first British empire by a vigorous and practical champion.

(5) The Johnson who challenged Bishop Berkeley's solipsist theory of the nonexistence of matter by kicking a large stone ("I refute it thus") is the same Johnson for whom language must have a daily practical use.

32. Five sentences related to a topic are given below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out.

(1) Although we are born with the gift of language, research shows that we are surprisingly unskilled when it comes to communicating with others.

(2) We must carefully orchestrate our speech if we want to achieve our goals and bring our dreams to fruition.

(3) We often choose our words without thought, oblivious of the emotional effects they can have on others.

(4) We talk more than we need to, ignoring the effect we are having on those listening to us.

(5) We listen poorly, without realising it, and we often fail to pay attention to the subtle meanings conveyed by facial expressions, body gestures, and the tone and cadence of our voice.

33. Five sentences related to a topic are given below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out.

(1) Over the past fortnight, one of its finest champions managed to pull off a similar impression.

(2) Wimbledon's greatest illusion is the sense of timelessness it evokes.

(3) At 35 years and 342 days, Roger Federer became the oldest man to win the singles title in the Open Era – a full 14 years after he first claimed the title as a scruffy, pony-tailed upstart.

(4) Once he had survived the opening week, the second week witnessed the range of a rested Federer's genius.

(5) Given that his method isn't reliant on explosive athleticism or muscular ball-striking, both vulnerable to decay, there is cause to believe that Federer will continue to enchant for a while longer.

34. Five sentences related to a topic are given below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out.

(1) Those geometric symbols and aerodynamic swooshes are more than just skin deep.

(2) The Commonwealth Bank logo - a yellow diamond, with a black chunk sliced out in one corner - is so recognisable that the bank doesn't even use its full name in its advertising.

(3) It's not just logos with hidden shapes; sometimes brands will have meanings or stories within them that are deliberately vague or lost in time, urging you to delve deeper to solve the riddle.

(4) Graphic designers embed cryptic references because it adds a story to the brand; they want people to spend more time with a brand and have that idea that they are an insider if they can understand the hidden message

(5) But the CommBank logo has more to it than meets the eye, as squirrelled away in that diamond is the Southern Cross constellation.

Section II: DI & LR

Question Numbers: (35 to 38): Funky Pizzaria was required to supply pizzas to three different parties. The total number of pizzas it had to deliver was 800, 70% of which were to be delivered to Party 3 and the rest equally divided between Party 1 and Party 2.

Pizzas could be of Thin Crust (T) or Deep Dish (D) variety and come in either Normal Cheese (NC) or Extra Cheese (EC) versions. Hence, There are four types of pizzas: T-NC, T-EC, D-NC and D-EC. Partial information about proportions of T and NC pizzas ordered by the three parties is given below:

	Thin Crust (T)	Normal Cheese (NC)
Party 1	0.6	
Party 2	0.55	0.3
Party 3		0.65
Total	0.375	0.52

35. How many Thin Crust pizzas were to be delivered to Party 3?

(1) 398 (2) 162

(3) 196 (4) 364

36. How many Normal Cheese pizzas were required to be delivered to Party 1?

(1) 104 (2) 84

(3) 16 (4) 196

37. For Party 2, if 50% of the Normal Cheese pizzas were of Thin Crust variety, what was the difference between the numbers of T-EC and D-EC pizzas to be delivered to Party 2?

(1) 18 (2) 12

(3) 30 (4) 24

38. Suppose that a T-NC pizza cost as much as a D-NC pizza, but 3/5th of the price of a D-EC pizza. A D-EC pizza costs Rs.50 more than a T-EC pizza, and the latter costs Rs.500.

If 25% of the Normal Cheese pizzas delivered to Party 1 were of Deep Dish variety, what was the total bill for Party 1?

(1) Rs. 59480 (2) Rs. 59840

(3) RS. 42520 (4) Rs. 45240

Question Numbers : (39 to 42) : There were seven elective courses - E1 to E7 - running in a specific term in a college. Each of the 300 students enrolled had chosen just one elective from among these seven. However, before the start of the term, E7 was withdrawn as the instructor concerned had left the college. The students who had opted for E7 were allowed to join any of the remaining electives, Also, the students who had chosen other electives were given one chance to change their choice. The table below captures the movement of the students from one elective to another during this process. Movement from one elective to the same elective simply means no movement. Some numbers

in the table got accidentally erased; however, it is known that these were either 0 or 1.

From Elective \ To Elective	E1	E2	E3	E4	E5	E6
E1	9	5	10	1	4	2
E2		34	8		2	2
E3	2	6	25			2
E4		3	2	14		4
E5		5			30	
E6		7	3		2	9
E7	4	16	30	5	5	41

Further, the following are known:

1. Before the change process there were 6 more students in E1 than in E4, but after the reshuffle, the number of students in E4 was 3 more than that in E1.
2. The number of students in E2 increased by 30 after the change process.
3. Before the change process, E4 had 2 more students than E6, while E2 had 10 more students than E3.

39. How many elective courses among E1 to E6 had a decrease in their enrollments after the change process?

(1) 4 (2) 1

(3) 2 (4) 3

40. After the change process, which of the following is the correct sequence of number of students in the six electives E1 to E6?

(1) 19, 76, 79, 21, 45, 60

(2) 19, 76, 78, 22, 45, 60

(3) 18, 76, 79, 23, 43, 61

(4) 18, 76, 79, 21, 45, 61

41. After the change process, which course among E1 to E6 had the largest change in its enrollment as a percentage of its original enrollment?

(1) E1 (2) E2

(3) E3 (4) E6

42. Later, the college imposed a condition that if after the change of electives, the enrollment in any elective (other than E7) dropped to less than 20 students, all the students who had left that course will be required to reenroll for that elective.

Which of the following is a correct sequence of electives in decreasing order of their final enrollments?

(1) E2, E3, E6, E5, E1, E4

(2) E3, E2, E6, E5, E4, E1

(3) E2, E5, E3, E1, E4, E6

(4) E2, E3, E5, E6, E1, E3

Question Numbers (43 to 46) : *An old woman had the following assets:*

(a) Rs.70 lakh in bank deposits

(b) 1 house worth Rs.50 lakh

(c) 3 flats, each worth Rs.30 lakh

(d) Certain number of gold coins, each worth Rs.1 lakh

She wanted to distribute her assets among her three children; Neeta, Seeta and Geeta.

The house, any of the flats or any of the coins were not to be split. That is, the house went entirely to one child; a flat went to one child and similarly, a gold coin went to one child.

43. Among the three, Neeta received the least amount in bank deposits, while Geeta received the highest. The value of the assets was distributed equally among the children, as were the gold coins.

How much did Seeta receive in bank deposits (in lakhs of rupees)?

(1) 30 (2) 40

(3) 20 (4) 10

44. Among the three, Neeta received the least amount in bank deposits, while Geeta received the highest. The value of the assets was distributed equally among the children, as were the gold coins.

How many flats did Neeta receive?

45. The value of the assets distributed among Neeta, Seeta and Geeta was in the ratio of 1 : 2 : 3, while the gold coins were distributed among them in the ratio of 2 : 3 : 4. One child got all three flats and she did not get the house. One child, other than Geeta, got Rs.30 lakh in bank deposits.

How many gold coins did the old woman have?

(1) 72

(2) 90

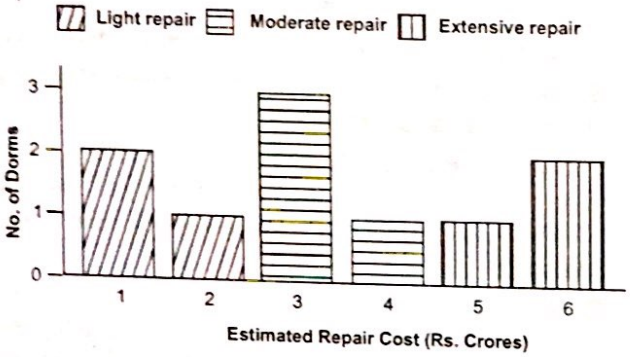
(3) 180

(4) 216

46. The value of the assets distributed among Neeta, Seeta and Geeta was in the ratio of 1 : 2 : 3, while the gold coins were distributed among them in the ratio of 2 : 3 : 4. One child got all three flats and she did not get the house. One child, other than Geeta, got Rs.30 lakh in bank deposits.

How much did Geeta get in bank deposits (in lakhs of rupees)?

Question Numbers : (47 to 50) : At a management school, the oldest 10 dorms, numbered 1 to 10, need to be repaired urgently. The following diagram represents the estimated repair costs (in Rs. Crores) for the 10 dorms. For any dorm, the estimated repair cost (in Rs. Crores) is an integer. Repairs with estimated cost Rs. 1 or 2 Crores are considered light repairs, repairs with estimated cost Rs. 3 or 4 are considered moderate repairs and repairs with estimated cost Rs. 5 or 6 Crores are considered extensive repairs.



Further, the following are known:

1. Odd-numbered dorms do not need light repair; even-numbered dorms do not need moderate repair and dorms, whose numbers are divisible by 3, do not need extensive repair.
2. Dorms 4 to 9 all need different repair costs, with Dorm 7 needing the maximum and Dorm 8 needing the minimum.

47. Which of the following is NOT necessarily true?

(1) Dorm 1 needs a moderate repair

(2) Dorm 5 repair will cost no more than Rs. 4 Crores

(3) Dorm 7 needs an extensive repair

(4) Dorm 10 repair will cost no more than Rs. 4 Crores

48. What is the total cost of repairing the odd-numbered dorms (in Rs. Crores)?

49. Suppose further that:

(1) 4 of the 10 dorms needing repair are women's dorms and need a total of Rs.20 Crores for repair

(2) Only one of Dorms 1 to 5 is a women's dorm.

What is the cost for repairing Dorm 9 (in Rs. Crores)?

50. Suppose further that:

(1) 4 of the 10 dorms needing repair are women's dorms and need a total of Rs.20 Crores for repair.

(2) Only one of Dorms 1 to 5 is a women's dorm.

Which of the following is a women's dorm?

(1) Dorm 2 (2) Dorm 5

(3) Dorm 8 (4) Dorm 10

Question Numbers (51 to 54) : A tea taster was assigned to rate teas from six different locations - Munnar, Wayanad, Ooty, Darjeeling, Assam and Himachal. These teas were placed in six cups, numbered 1 to 6, not necessarily in the same order The tea taster was asked to rate these teas on the strength of their flavour on a scale of 1 to 10. He gave a unique integer rating to each tea. Some other information is given below:

1. Cup 6 contained tea from Himachal.
2. Tea from Ooty got the highest rating, but it was not in Cup 3.
3. The rating of tea in Cup 3 was double the rating of the tea in Cup 5.
4. Only two cups got ratings in even numbers.
5. Cup 2 got the minimum rating and this rating was an even number.
6. Tea in Cup 3 got a higher rating than that in Cup 1.
7. The rating of tea from Wayanad was more than the rating of tea from Munnar, but less than that from Assam.

51. What was the second highest rating given?

52. What was the number of the cup that contained tea from Ooty?

53. If the tea from Munnar did not get the minimum rating, what was the rating of the tea from Wayanad?

(1) 3 (2) 5

(3) 1 (4) 6

54. If cups containing teas from Wayanad and Ooty had consecutive numbers, which of the following statements may be true?

(1) Cup 5 contains tea from Assam

(2) Cup 1 contains tea from Darjeeling

(3) Tea from Wayanad has got a rating of 6

(4) Tea from Darjeeling got the minimum rating

Question Numbers : (55 to 58) : In an 8 × 8 chessboard a queen placed anywhere can attack another piece if the piece is present in the same row, or in the same column or in any diagonal position in any possible 4 directions, provided there is no other piece in between in the path from the queen to that piece.

The columns are labelled a to h (left to right) and the rows are numbered 1 to 8 (bottom to top). The position of a piece is given by the combination of column and row labels. For example, position c5 means that the piece is in c^{th} column and 5^{th} row.

Sub questions

55. If the queen is at c5, and the other pieces at positions c2, g1, g3, g3 and a3, how many are under attack by the queen? There are no other pieces on the board.

(1) 2

(3) 4 (2) 3

(4) 5

56. If the other pieces are only at positions a1, a3, b4, d7, h7 and h8, then which of the following positions of the queen results in the maximum number of pieces being under attack?

(1) f8 (2) a7

(3) c1 (4) d3

57. If the other pieces are only at positions a1, a3, b4, d7, h7 and h8, then from how many positions the queen cannot attack any of the pieces?

(1) 0 (2) 3

(3) 4 (4) 6

58. Suppose the queen is the only piece on the board and it is at position d5.

In how many positions can another piece be placed on the board such that it is safe from attack from the queen?

(1) 32 (2) 33

(3) 36 (4) 37

Question Numbers : (59 to 62) : Eight friends: Ajit, Byomkesh, Gargi, Jayanta, Kikira, Manik, Prodosh and Tapesh are going to Delhi from Kolkata by a flight operated by Cheap Air. In the flight, sitting is arranged in 30 rows, numbered 1 to 30, each consisting of 6 seats, marked by letters A to F from left to right, respectively. Seats A to C are to the left of the aisle (the passage running from the front of the aircraft to the back), and seats D to F are to the right of the aisle. Seats A and F are by the windows and referred to as Window seats, C and D are by the aisle and are referred to as Aisle seats while B and E are referred to as Middle seats. Seats marked by consecutive letters are called consecutive seats (or seats next to each other). A seat number is a combination of the row number, followed by the letter indicating the position in the row; e.g., 1A is the left window seat in the first row, while 12E is the right middle seat in the 12th row.

Cheap Air charges Rs.1000 extra for any seats in Rows 1, 12 and 13 as those have extra legroom. For Rows 210, it charges Rs.500 extra for Window seats and Rs.300 extra for Aisle seats. For Rows 11 and 14 to 20, it charges Rs.200 extra for Window seats and Rs.400 extra for Aisle seats. All other seats are available at no extra charge.

The following are known:

1. The eight friends were seated in six different rows.
2. They occupied 3 Window seats, 4 Aisle seats and 1 Middle seat.
3. Seven of them had to pay extra amounts, totaling to Rs. 4600, for their choices of seat. One of them did not pay any additional amount for his/her choice of seat.
4. Jayanta, Ajit and Byomkesh were sitting in seats marked by the same letter, in consecutive rows in increasing order of row numbers; but all of them paid different amounts for their choices of seat. One of these amounts may be zero.
5. Gargi was sitting next to Kikira, and Manik was sitting next to Jayanta.
6. Prodosh and Tapesh were sitting in seats marked by the same letter, in consecutive rows in increasing order of row numbers; but they paid different amounts for their choices of seat. One of these amounts may be zero.

59. In which row was Manik sitting?

(1) 10 (2) 11

(3) 12 (4) 13

60. How much extra did Jayanta pay for his choice of seat?

(1) Rs. 300 (2) RS. 400

(3) Rs. 500 (4) RS. 1000

61. How much extra did Gargi pay for her choice of seat?

(1) 0 (2) Rs. 300

(3) Rs. 400 (4) Rs. 1000

62. Who among the following did not pay any extra amount for his/her choice of seat?

(1) Kikira (2) Manik

(3) Gargi (4) Tapesh

Question Numbers : (63 to 66) : A high security research lab requires the researchers to set a pass key sequence Passed on the scan of the five fingers of their left hands. When an employee first joins the lab, her fingers are scanned in an order of her choice, and then when she wants to re-enter the facility, she has to scan the five fingers in the same sequence.

The lab authorities are considering some relaxations of the scan order requirements, since it is observed that some employees often get locked-out because they forget the sequence.

63. The lab has decided to allow a variation in the sequence of scans of the five fingers so that at most two scans (out of five) are out of place. For example, if the original sequence is Thumb (T), index finger (I), middle finger (M), ring finger (R) and little finger (L) then TLMRI is also allowed, but TMRLI is not.

How many different sequences of scans are allowed for any given person's original scan?

64. The lab has decided to allow variations of the original sequence so that input of the scanned sequence of five fingers is allowed to vary from the original sequence by one place for any of the fingers. Thus, for example, if TIMRL is the original sequence, then ITRML is also allowed, but LIMRT is not.

How many different sequences are allowed for any given person's original scan?

(1) 7

(2) 5

(3) 8

(4) 13

65. The lab has now decided to require six scans in the pass key sequence, where exactly one finger is scanned twice, and the other fingers are scanned exactly once, which can be done in any order. For example, a possible sequence is TIMTRL.

Suppose the lab allows a variation of the original sequence (of six inputs) where at most two scans (out of six) are out of place, as long as the finger originally scanned twice is scanned twice and other fingers are scanned once.

How many different sequences of scans are allowed for any given person's original scan?

66. The lab has now decided to require six scans in the pass key sequence, where exactly one finger is scanned twice, and the other fingers are scanned exactly once, which can be done in any order. For example, a possible sequence is TIMTRL.

Suppose the lab allows a variation of the original sequence (of six inputs) so that input in the form of scanned sequence of six fingers is allowed to vary from the original sequence by one place for any of the fingers, as long as the finger originally scanned twice is scanned twice and other fingers are scanned once.

How many different sequences of scans are allowed if the original scan sequence is LRLTIM?

(1) 8 (2) 11

(3) 13 (4) 14

Section III: QA

67. The numbers 1, 2, ... 9 are arranged in a 3 × 3 square grid in such a way that each number occurs once and the entries along each column, each row, and each of the two diagonals add up to the same value.

If the top left and the top right entries of the grid are 6 and 2, respectively, then the bottom middle entry is

68. In a 10 km race. A, B, and C, each running at uniform speed, get the gold, silver, and bronze medals, respectively. If A beats B by 1 km and B beats C by 1 km, then by how many metres does A beat C?

69. Bottle 1 contains a mixture of milk and water in 7 : 2 ratio and Bottle 2 contains a mixture of milk and water in 9 : 4 ratio. In what ratio of volumes should the liquids in Bottle 1 and Bottle 2 be combined to obtain a mixture of milk and water in 3 : 1 ratio?

(1) 27 : 14

(2) 27 : 13

(3) 27 : 16

(4) 27 : 18

70. Arun drove from home to his hostel at 60 miles per hour. While returning home he drove half way along the same route at a speed of 25 miles per hour and then took a bypass road which increased his driving distance by 5 miles, but allowed him to drive at 50 miles per hour along this bypass road. If his return journey took 30 minutes more than his onward journey, then the total distance traveled by him is

(1) 55 miles (2) 60 miles

(3) 65 miles (4) 70 miles

71. Out of the shirts produced in a factory, 15% are defective, while 20% of the rest are sold in the domestic market. If the remaining 8840 shirts are left for export, then the number of shirts produced in the factory is

(1) 13600 (2) 13000

(3) 13400 (4) 14000

72. The average height of 22 toddlers increases by 2 inches when two of them leave this group. If the average height of these two toddlers is one-third the average height of the original 22, then the average height, in inches, of the remaining 20 toddlers is

(1) 30 (2) 23

(3) 32 (4) 26

73. The manufacturer of a table sells it to a wholesale dealer at a profit of 10%. The wholesale dealer sells the table to a retailer at a profit of 30%. Finally, the retailer sells it to a customer at a profit of 50%. If the customer pays Rs.4290 for the table, then its manufacturing cost (in Rs) is

(1) 1500 (2) 2000

(3) 2500 (4) 3000

74. A tank has an inlet pipe and an outlet pipe. If the outlet pipe is closed then the inlet pipe fills the empty tank in 8 hours. If the outlet pipe is open then the inlet pipe fills the empty tank in 10 hours. If only the outlet pipe is open then in how many hours the full tank becomes half-full?

(1) 20 (2) 30

(3) 40 (4) 45

75. Mayank buys some candies for Rs.15 a dozen and an equal number of different candies for Rs.12 a dozen. He sells all for Rs.16.50 a dozen and makes a profit of Rs.150. How many dozens of candies did he buy altogether?

(1) 50 (2) 30

(3) 25 (4) 45

76. In a village, the production of food grains increased by 40% and the per capita production of food grains increased by 27% during a certain period. The percentage by which the population of the village increased during the same period is nearest to

(1) 16 (2) 13

(3) 10 (4) 7

77. If a, b, c are three positive integers such that a and b are in the ratio 3 : 4 while b and c are in the ratio 2:1, then which one of the following is a possible value of (a + b + c)?

(1) 201 (2) 205

(3) 207 (4) 210

78. A motorbike leaves point A at 1 pm and moves towards point B at a uniform speed. A car leaves point B at 2 pm and moves towards point A at a uniform speed which is double that of the motorbike. They meet at 3:40 pm at a point which is 168 km away from A. What is the distance, in km, between A and B?

(1) 364 (2) 378

(3) 380 (4) 388

79. Amal can complete a job in 10 days and Bimal can complete it in 8 days. Amal, Bimal and Kamal together complete the job in 4 days and are paid a total amount of Rs 1000 as remuneration. If this amount is shared by them in proportion to their work, then Kamal's share, in rupees, is

(1) 100 (2) 200

(3) 300 (4) 400

80. Consider three mixtures - the first having water and liquid A in the ratio 1 : 2, the second having water and liquid B in the ratio 1 : 3, and the third having water and liquid C in the ratio 1 : 4. These three mixtures of A, B, and C, respectively, are further mixed in the proportion 4 : 3 : 2. Then the resulting mixture has

(1) The same amount of water and liquid B

(2) The same amount of liquids B and C

(3) More water than liquid B

(4) More water than liquid A

81. Let ABCDEF be a regular hexagon with each side of length 1 cm. The area (in sq cm) of a square with AC as one side is

(1) $3\sqrt{2}$ (2) 3

(3) 4 (4) $\sqrt{3}$

82. The base of a vertical pillar with uniform cross section is a trapezium whose parallel sides are of lengths 10 cm and 20 cm while the other two sides are of equal length. The perpendicular distance between the parallel sides of the trapezium is 12 cm. If the height of the pillar is 20 cm, then the total area, in sq cm, of all six surfaces of the pillar is

(1) 1300 (2) 1340

(3) 1480 (4) 1520

83. The points (2, 5) and (6, 3) are two end points of a diagonal of a rectangle. If the other diagonal has the equation y = 3x + c, then c is

(1) –5 (2) –6

(3) –7 (4) –8

84. ABCD is a quadrilateral inscribed in a circle with centre O. If $\angle COD = 120$ degrees and $\angle BAC = 30$ degrees, then the value of $\angle BCD$ (in degrees) is

85. If three sides of a rectangular park have a total length 400 ft, then the area of the park is maximum when the length (in ft) of its longer side is

86. Let P be an Interior point of a right-angled isosceles triangle ABC with hypotenuse AB.If the perpendicular distance of P from each of AB, BC, and CA is $4(\sqrt{2}-1)$ cm, then the area, in sq cm, of the triangle ABC is

87. If the product of three consecutive positive integers is 15600 then the sum of the squares of these integers is

(1) 1777 (2) 1785

(3) 1875 (4) 1877

88. If x is a real number such that $\log_3 5 = \log_5 (2 + x)$, then which of the following is true?

(1) $0 < x < 3$ (2) $23 < x < 30$

(3) $x > 30$ (4) $3 < x < 23$

89. Let $f(x) = x^2$ and $g(x) = 2^x$, for all real x. Then the value of $f(f(g(x)) + g(f(x)))$ at $x = 1$ is

(1) 16 (2) 18

(3) 36 (4) 40

90. The minimum possible value of the sum of the squares of the roots of the equation

$x^2 + (a + 3)x - (a + 5) = 0$ is

(1) 1 (2) 2

(3) 3 (4) 4

91. If $9^{x^{\frac{1}{2}}} - 2^{2x-2} = 4^x - 3^{2x-3}$, then X is

(1) $\frac{3}{2}$ (2) $\frac{2}{5}$

(3) $\frac{3}{4}$ (4) $\frac{4}{9}$

92. If $\log(2^a \times 3^b \times 5^c)$ is the arithmetic mean of $\log(2^2 \times 3^3 \times 5)$, $\log(2^5 \times 3 \times 5^7)$, and $\log(2 \times 3^2 \times 5^4)$, then a equals

93. Let a_1, a_2, a_3, a_4, a_5 be a sequence of five consecutive odd numbers. Consider a new sequence of five consecutive even numbers ending with $2a_3$.

If the sum of the numbers in the new sequence is 450, then a_5 is

94. How many different pairs (a, b) of positive integers are there such that $a \le b$ and $\frac{1}{a} + \frac{1}{b} = \frac{1}{9}$?

95. In how many ways can 8 identical pens be distributed among Amal, Bimal, and Kamal so that Amal gets at least 1 pen, Bimal gets at least 2 pens, and Kamal gets at least 3 pens?

96. How many four digit numbers, which are divisible by 6, can be formed using the digits 0, 2, 3, 4, 6, such that no digit is used more than once and 0 does not occur in the left-most position?

97. If f(ab) = f(a)f(b) for all positive integers a and b, then the largest possible value of f(1) is

98. Let f(x) = 2x – 5 and g(x) = 7 – 2x. Then |f(x) + g(x)| = |f(x)| + |g(x)| if and only if

(1) $\frac{5}{2} < x < \frac{7}{2}$ (2) $x \le \frac{5}{2}$ or $x \ge \frac{7}{2}$

(3) $x < \frac{5}{2}$ or $\ge \frac{7}{2}$ (4) $\frac{5}{2} \le x \le \frac{7}{2}$

99. An infinite geometric progression $a_1, a_2, a_3, \ldots$ has the property that $a_n = 3(a_{n+1} + a_{n+2} + \ldots)$ for every $n \ge 1$. If the sum $a_1 + a_2 + a_3 + \ldots = 32$, then a_5 is

(1) $\frac{1}{32}$ (2) $\frac{2}{32}$

(3) $\frac{3}{32}$ (4) $\frac{4}{32}$

100. If $a_1 = \frac{1}{2 \times 5}, a_2 = \frac{1}{5 \times 8}, a_3 = \frac{1}{8 \times 11}, \ldots$, then $a_1 + a_2 + a_3 + \ldots + a_{100}$ is

(1) $\frac{25}{151}$ (2) $\frac{1}{2}$

(3) $\frac{1}{4}$ (4) $\frac{111}{55}$

ANSWERS

1. (4)	**2.** (2)	**3.** (1)	**4.** (3)	**5.** (2)	**6.** (1)	**7.** (3)	**8.** (2)	**9.** (2)	**10.** (4)
11. (1)	**12.** (3)	**13.** (3)	**14.** (4)	**15.** (4)	**16.** (3)	**17.** (3)	**18.** (2)	**19.** (1)	**20.** (4)
21. (4)	**22.** (3)	**23.** (4)	**24.** (1)	**25.** (3)	**26.** (4)	**27.** (3)	**28.** (25341)	**29.** (53421)	**30.** (25431)
31. (43512)	**32.** (2)	**33.** (4)	**34.** (1)	**35.** (2)	**36.** (3)	**37.** (2)	**38.** (1)	**39.** (3)	**40.** (4)
41. (4)	**42.** (1)	**43.** (3)	**44.** (2)	**45.** (2)	**46.** (20)	**47.** (4)	**48.** (19)	**49.** (3)	**50.** (4)
51. (7)	**52.** (4)	**53.** (2)	**54.** (2)	**55.** (3)	**56.** (4)	**57.** (3)	**58.** (3)	**59.** (1)	**60.** (3)
61. (4)	**62.** (4)	**63.** (11)	**64.** (3)	**65.** (15)	**66.** (3)	**67.** (3)	**68.** (1900)	**69.** (2)	**70.** (3)
71. (2)	**72.** (3)	**73.** (2)	**74.** (1)	**75.** (1)	**76.** (3)	**77.** (3)	**78.** (2)	**79.** (1)	**80.** (3)
81. (2)	**82.** (3)	**83.** (4)	**84.** (90)	**85.** (200)	**86.** (16)	**87.** (4)	**88.** (4)	**89.** (3)	**90.** (3)
91. (1)	**92.** (3)	**93.** (51)	**94.** (3)	**95.** (6)	**96.** (50)	**97.** (1)	**98.** (4)	**99.** (3)	**100.** (1)

EXPLANATIONS

1. Option 4 is the correct answer as in paragraph 2 of the given passage, where the author talks about the promotion of creativity in cities, he does not mention that cities provide access to cultural activities. This is nowhere stated in the passage.
2. Option 2 is the correct answer as in paragraphs 3 and 4 of passage it is presented that organizations that were supposed to foster creativity, actually stifle it.
3. Option 1 is the correct answer as the entire passage revolves around the idea how cities help in flourishing of creativity. The author describes the importance of social interaction and how the lack of it, spoils creativity. Option 2 is ruled out because the author explicitly states that "creativity itself is not in danger". Option 3 is incorrect since it is discussed only in the last 2 paragraphs. Option 4 is too generic. It can't be the main idea.
4. Option 3 is the correct answer as from paragraph 5 it can be easily inferred that Jane Jacobs holds leaders responsible for promoting creativity in people and cities.
5. Option 2 is the correct answer as after talking about what stifles creativity (in paragraph 3), the author presents the 1968 report(in order to validate the previous point). Option 1 states exactly the opposite of what is stated in the passage. Option 3 is incorrect because the reduction of creativity cannot be attributed to learning more. Option 4 is unrelated. The passage does not talk about technology. However, the second option is only the best option. "Schools today" makes it a dicey option.
6. In the 2nd last paragraph of the passage, it is stated that the creativity of only those people can be utilized who use their minds to work. This implies that people who work with their hands are not creative. Hence, option 1 is the correct answer.
7. Option 3 is the correct answer as the entire passage presents the effects of climate change on Subnivium. This rules out options 1 and 2 that keep Subnivium (and not the effects of climate change on it) as the point of focus. Option 4 is used as an example only in the first paragraph of the passage and therefore it can't be the purpose of the passage.
8. Option 2 is the correct answer as the entire passage does not mention even a single positive effect of climate change on the Subnivium. Though one may infer that there may be some hints of positive impact, the overall effect is not positive. All other options are stated in the passage.
9. All options 1, 3 and 4 address the symptoms of climate change. They fail to attack the main cause, let alone providing a solution to that cause. Option 2 addresses the cause and even provides a solution to the issue of climate change. Hence it is the correct answer.
10. Options 1 and 3 are too generic. Option 2 is incorrect because such information has not been provided. In the last paragraph of the passage it is stated that the effects of colder Subnivium are interrelated and multilayered. This has been substantiated through the example of shrubs. Therefore, option 4 is the correct answer.
11. Option 1 is correct as the entire passage is about how the effects of climate change are interrelated. Options 2, 3 and 4 are incorrect because the passage does not give us enough information to claim them.
12. Clearly, option 3 is the correct answer as the passage uses the example of blankets to draw an analogy. First it is shown that having spaces between the layers of a blanket increases the insulating property. Next, using the same logic, the effects of increase in snow density is explained.
13. Option 3 is the correct answer as it is explicitly stated in paragraph 2 of the passage. Other options are beyond the scope of the passage.
14. Options 1 and 3 are ruled out since they are stated in paragraph 3. Option 2 is stated towards the end of paragraph Option 4 cannot be inferred from anywhere in the passage. Hence, it is correct answer.
15. Option 4 is the correct answer and can be inferred from paragraph Options 1 and 2 cannot be inferred from anywhere in the passage. Option 3 is incorrect because this distorted information about charging stations is not there in the passage.
16. Towards the end of the passage, the author states that though car drivers want autonomy, public transport will be the future as this is the only solution to traffic problem. This makes option 3 correct. Options 1 and 4 are beyond the scope of the passage. Option 2 is ambiguous.
17. Option 4 is ruled out since the passage does not compare the sales of Uber and Tesla. Option 2 is incorrect since this cannot be determined. Option 1 is beyond the passage's scope. Option 3 is correct as it is clearly demonstrated in paragraphs 5 and 6- private cars will operate as taxis so that one can use them in the hour of need. And this is the future towards which Uber is working.

18. Option 2 is stated in the last paragraph of the passage, where we are told that traffic jams will not exist if personal cars become public utility products. And the only way one can get autonomy is through the use of bicycle. Option 1 is not stated in the passage. The comparison drawn between electric powered bicycle and electrics is not in the passage. Hence, option 3 is ruled out. Option 4 is a personal judgment, which is nowhere in the passage.

19. Option 1 is the correct answer as the author provides examples of the US and Russia to tell that these countries have taken up the use of typewriter. The author also supports their using of typewriters by providing us with positive aspects of the typewriters. Option 2 is beyond the scope of the passage. Option 3 is incorrect since clearly it is not the main aim of the passage. There is no hint to make that claim. Option 4 is incorrect since this difference has nowhere been made.

20. "Type a document and lock it away and more or less the only way anyone else can get..... some departments have never abandoned them". This information, which says that using of typewriters helps one control who views the document, makes option 4 correct.

21. Towards the end of the passage, it is written- "Nor are there any easy distractions." – i.e that typewriters can be used only for one single thing-writing. Hence 1 is stated in the passage and is therefore not the answer. It is also stated- "there's a big premium on hitting the right key." This means that once something has been typed, it cannot be revised. Hence option 2 is also stated. It is also stated- "....encouraging clack of keys". This is associated with typewriters making more noise than computers. Hence option 3 is also stated. Nothing in the passage points towards option 4. Therefore, it is the correct answer.

22. The main aim of the author appears to dismiss the popular believe that Vikings were pillagers. The passage revolves around the idea that Vikings started out as traders. This makes option 3 correct. Option 1 is ruled out because the example of combs has been used only as an illustration. Option 4 is incorrect because the passage discusses a period before Vikings turned into pillagers. Option 2 is beyond the scope of the passage.

23. Option 4 is the correct answer. The author states that the age of Viking started in 793 and extended till the Norman conquest of Great Britain in 1066. This means that Vikings had trade relations with Britain before the Viking age.

24. In the passage it is stated that Vikings only brought the combs from Norway to Denmark. Hence option 1 cannot be concluded from the passage, making it the correct answer.

25. According to the given paragraph the North American walnut sphinx moth caterpillar often whistles which is very loud in nature. The birds often mimic these whistles by which they understand the location of these prey birds and they get time to take cover. Option 1 is incorrect since it talks about vocal tracks, which is out of scope. Option 2 is partially correct since it does not talk about the correct use of the whistling. Option 4 uses the word 'camouflage' which is also beyond the scope of the given context. Option 3 describes the passage correctly and accurately.

26. According to the given paragraph, both Socrates and Bacon stressed on arguments from both ends, that is, to prove as well as disprove. To both, it was important to disprove a theory as is to prove it when it came to asking questions. Option 1 is incorrect since it only talks about disapproving arguments. Option 2 is beyond the scope of the context since it fails to capture the main theme of the passage. Option 3 is partially correct, since it only talks about confirming an argument and not the other way. Option 4 is the only correct answer.

27. The passage talks about the importance o0f meaning which is dynamic in nature whereas definitions are dynamic. Definitions are extracted from the meanings and not the other way round. Hence 3 is the correct option here. Option A is incorrect since it talks about the dogmatic nature of meaning. Option 2 is also incorrect factually. Option D is beyond the scope of the given context.

28. 2 is the opening sentence of the paragraph which introduces the topic 'The stories we tell reflect the world around us'. follows 2, which further justifies the above mentioned statement. It is followed by 3 which tells us that we often retell the stories which we value. and 1 form a mandatory pair justifying sentence 3.

29. The paragraph begins with sentence 5 talking about the goodness of lightning. It is followed by 3 which discusses the useful nature of lightning, helping Nitrogen to react. It is further followed by 4 which in continuation with 3 introduces the need of Nitrogen for plants. and 1 form a mandatory pair as they go on discussing the process by which Nitrogen reacts and help the plants.

30. Sentence 2 introduces the topic defining the placebo effect. It is sequentially followed by 5 which showcases the study of this effect. and 3 form a mandatory pair discussing in details how this placebo effect works. The paragraph ends with 1 which showcases the implications this placebo effec6t has in the health care system.

31. This is an impossible to attempt question. Due to lack of any key words in the sentences, one can come to multiple possible arrangements. Hence, one should have left this question. Only 3 and 5 make a mandatory pair. As 5 is the explanation of 3.

32. The sentences if arranged sequentially form a coherent paragraph on the importance of communication of which speech is an integral part. Leaving aside the 2nd sentence all of them talk on this topic. although may seem correct but actually it is farfetched ("achieve our goals and bring our dreams to fruition") as far as the context of the given paragraph is concerned.

33. The jumbled paragraph if arranged sequentially, IT talks about Federer achieving greatness in spite of his age. He is the oldest tennis player to win a singles title. But, option 4 is an anomaly. It talks about some ongoing tournament, which Federer may be a part of. However, even the third sentence can be the odd one out as it talks about a very specific technique of Federer.

34. This is a wrong answer. The correct answer should have been. The entire paragraph talks about subtlety. The second sentence talks about something else.

For questions 35 to 38:

Total number of pizza = 800

70% were delivered to party 3 = $\frac{70 \times 800}{100}$ = 560 pizza

800 – 560 = 240

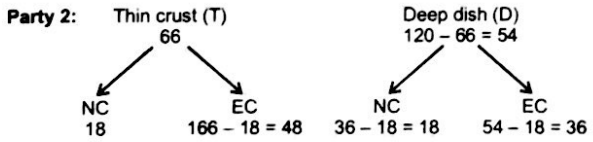
∴ 120 pizza each were delivered to party 1 and party

	(T) THIN CRUST	Normal Cheese (NC)
Party 1	0.6 × 120 =- 112	416 – 364 – 36 = 16
Party 2	0.55 × 120 = 66	0.3 × 120 = 36
Party 3	300 – 72 – 66 = 162	0.66 × 560 = 364
Total	0.375 × 800 = 300	0.52 × 800 = 416

35. From table, 162 thin crust pizzas were to be delivered to party 3.

36. From table, 16 normal cheese pizzas were required to be delivered to party.

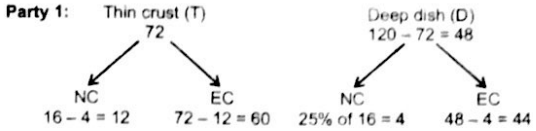
37. 50% of normal cheese of party 2 = $\frac{50 \times 36}{100}$ = 18 pizza were thin crust.



Difference between number of T – EC and D – EC

= 48 – 36 = 12

38.



Given: T-EC (Thin crust with extra cheese)

= Rs.500

D-EC = 500 + 50 = Rs.550

T-NC costs = $\frac{3}{5}$ of D-EC = $\frac{3}{5}$ × 550 = 330 Rs.

D-NC costs = Rs.330

Total biu for party 1

= (12 × 330) + (500 × 60) + 4 × (330) + (550 × 44)

= 3960 + 30,000 + 1320 + 24200 = 59480

For questions 39 to 42:

Total students = 300

After change process = 292

Missing information = 8 students

	E1	E2	E3	E4	E5	E6
E1	9	5	10	1	4	2
E2	D	34	8	0	2	2
E3	2	6	25	0	1	2
E4	1	3	2	14	1	4
E5	1	5	1	0	30	1
E6	1	7	3	1	2	9
E7	4	16	30	5	5	41

Before the change process

E1 = E4 + 6

E1 = 31 (With missing information)

E4 = 23 (With missing information)

After the change process E4 = E1 + 3

E1 = 16

E4 = 20

Number of E2 increased by 30

After reshuffling E2 = 76

Before = 76 – 36 = 46

With missing information E2 = 46, number change

Before reshuffling E4 = E6 + 2

Since with missing information E4 = 25, E6 = 21.

Before, reshuffling E2 = e3 + 10

E2 = 46, E3 = 35

Since after change, E4 = E1 + 3

E4 = 21, E1 = 17

Now, since total students are 300, fill out missing information

39.

	Before	After
E1	31	18
E2	46	76
E3	36	79
E4	25	21
E5	38	45
E6	23	61

40. 18, 76, 79, 21, 45, 61

41. $\frac{E3_{After} - E3_{Before}}{E3_{Before}} \times 100 = \frac{61-23}{61} \times 100 = 165.217.$

Which is largest.

42. After reshuffling E1 has 18 students which is less than 20. E1 + (5 + 10 + 1 + 4 + 2) = 18 + 22 = 40

From E1 to E2 = 5 students

E2 – 5 = (76 – 5) students = 71

From E1 to E3 = 10 students

E3 – 10 = (79 – 10) students = 69

From E1 to E4 = 1 students

E4 – 1 = 21 – 1 = 20 students

From E1 to E5 = 4 students

E5 – 4 = 45 – 4 = 41 students

From E1 to E6 = 2 students

E6 – 2 = (61 – 2) = 59 students

Decreasing order

E2 > E3 > E6 > E5 > E1 > E4.

43. Given value of the assets was distributed equally

∴ Neeta, Seeta & Geeta received 70 lakh each each.

Since, neeta received the least amount and Geeta received the highest amount in bank deposits

∴ The only possibility is

Neeta: 2 flats : 30 × 2 = 60 lakh and

70 – 60 = 10 lakh in bank deposit

Seeta: 1 house : 50 lakh and

70 – 50 = 20 lakh in bank deposit

Geeta: 70 – 10 – 20 = 40 lakh in bank deposit

Option (3).

44. Neeta received 2 flats.

45. Total assets is worth Rs = (210 + x) lakhs, where x is the number of Gold coins worth of 1 lakh each.

Given:

Ratio for assets is 1 : 2 : 3 and for gold coins is 2 : 3 : 4

∴ Seeta has $[210 + x] \times \frac{2}{6}$ lakhs of assets and

$x \times \frac{3}{9}$ gold coins.

$\Rightarrow \left(70 + \frac{x}{3}\right)$ lakhs, where $\frac{x}{3}$ is the gold coins and

70 lakhs (bank deposits, home and flat)

Since, one child got all three flats which costs = 3 × 30 = 90 lakhs

∴ Seeta doesn't get flats

and other than Geeta, one child got 30 lakhs in deposits

⇒ Seeta gets home, i.e. she has (70 – 50) = 20 lakhs in bank deposit.

∴ Neeta gets 30 lakhs indeposits and Geeta gets (70 – 30 – 20) lakhs = 20 lakhs in bank deposits.

Also, Geeta gets 3 flats each of 30 lakhs.

Let the number of gold coins received by Neeta, Seeta and Geeta be 2a, 3a, 4a respectively.

$\Rightarrow \frac{30 + 2a}{70 + 3a} = \frac{1}{2}$

⇒ a = 10

Gold coins (x) = (2 × 10) + 3(10) + 4 × 10

= 90

46. 20 lakhs from above explanations.

For questions 47 to 50:

Dorms 1, 3, 5, 7, 9 – either need moderate repair

Or

Extensive repair

Dorms 2, 4, 6, 8, 10 – either need light repair or extensive repair

Since 3/6, 3/9, dorm 6, light repair dorm 9 – moderate repair.

Since, dorm 8 needing the minimum repair = 1 crore.

We gather following information from the data given.

Dorms	Estimated repair cost (crore)
1	3–4
2	2
3	3–4
4	5
5	3–4
6	2
7	6
8	1
9	3–4
10	6

47. Dorm 10 estimated repair cost is 6 crore

48. 9 Odd number dorms are 1, 2, 5, 7, 9

Since there are 3 dorms whose repair cost is 3 crore and 1 dorm with repair cost of 4 crore

∴ total cost for odd-numbered dorms

= 3 × 3 + 4 + 6 = 19 crore.

49. Since total cost for repairing 4 women's dorm = 20 crores

The only possible combination is repair cost of dorm 4, 7, 9, 10.

∴ dorm 4 + dorm 7 + dorm 9 + dorm 10 = 20 crore

5 + 6 + dorm 9 + 6 = 20.

Dorm 9 = 3 crore.

50. Dorm 10 is a women's dorm

For questions 51 to 54:

Only two cups got even ratings

even numbers from 1–10

⇒ 2, 4, 6, 8, 10

Other 4 places got odd ratings

1, 3, 5, 7, 7

Since, smallest rating is even

and rating of cup 3

= 2 × rating of cup 5

∴ Possible combinations are (3, 6) (5, 10)

Out of which the only acceptable scenario is

minimum rating is 2 which is of cup 2

cup 3 rating is 6 and cup 5 rating is 3

Since only 2 cups have even ratings. Therefore, cup 1, cup 4, cup 6 have ratings 5, 7 and 9 not necessarily in this order.

Also, since cup 3 got higher rating than cup 1, the only possibility is cup 1 got the rating of 5.

Tea from Himachal is cup 6 and Tea from Ooty got the highest rating.

Therefore Ooty is cup 4 and got rating of 9 and cup 6 that is Himachal got rating of 7.

The final information is tabulated below.

Places	Cup no	Rating	Rank
	1	5	4
	2	2	6
	3	6	3
Ooty	4	9	1
	5	3	5
Himachal	6	7	2

55.

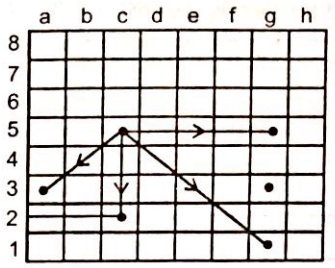


Figure 1

Directly from the diagram

56.

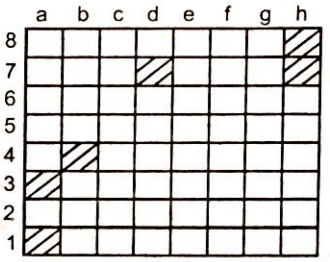


Figure 2

See the fgiure 2

If queen is at f8 then it can attack h8 and B4

Similarly, when queen is at a7 and c1 it can attack maximum of 2 piece

But when queen is at D3 then it can attack a3, d7 and h7.

57. Queen cannot attack 4 positions.

58. Another pieces can be at 36 positions.

For questions 59 to 62:

Since Jayanta, Ajit and Byomkesh are sitting in rows 10, 11, 12 respectively since only this combination of rows have 3 different consecutive amount for their choices of seat.

Possible combination

Aisle	Jayanta, 10 500	Ajit, 11 400	Byomkesh, 12 1000
Window	300	200	1000

Since, Manik is sitting next to Jayanta, so possible combinations for Manik is

Jayanta	Manik	Amount
Aisle, C	Auskem, D	500
Aisle, D	E, Middle	0
Window, A	Middle, B	0

Total amount = 4600

∴ Jayanta, Ajim, Byomkesh and Manik sits at Aisle seat, which costs them total of 24000.

Information gathered by details given:-

	Seat	Row	Extra amount paid
Ajit	Aisle	10	400
Byomkesh	Aisle	12	1000
Gargi	Middle	1/13	1000
Jayanta	Aisle	10	500
Kikira	Window	1/13	1000
Manik	Aisle	10	500
Prodosh	Window	20	200
Tapesh	Window	21	0
Total			4600

59. Since Jayanta is sitting in row 10, and Manik is next to Jayanta, therefore he is sitting in row 10.

60. Jayanta is sitting in row 10, seat C which is an Aisle seat, therefore she paid 500 extra.

61. Gargi was sitting at middle seat in either row 1 or 13, therefore she paid 1000 extra.

62. Tapesh sat in row 21, for which there extra amount.

63. 1 Let original sequence be abcde.

Therefore, possible combinations could be:

bacde			
cbade	acbde		
dbcae	adcbe	abdce	
ebcda	aecdb	abedc	abced

⇒ 11 sequences.

64. Let original sequence be abcde.

Therefore, possible combinations could be:

bacde			
badce	acbed		
baced	acbde	abdce	abced

⇒ 8 sequences.

65. 5 5 + 4 + 3 + 2 + 1

⇒ 15 sequences.

66. Let original sequence be LRLTIM.

Therefore, possible combinations could be:

RLLTIM				
RLTLIM				
RLTLMI	LLRTIM			
RLLITM	LLRITM	LRTLIM		
RLLTMI	LLRTMI	LRTLMI	LRLITM	LRLTMI

67. Numbers in the square grid is shown below.

6	7	2
1	5	9
8	3	4

68. 900

Ratio of speed of A and B is 10 : 9 and that of B to C is 10 : 9

∴ Ratio of speed of A and C is 100 : 81

⇒ So, in 100 km race, A beats C by 19 km

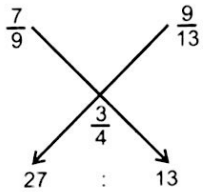
⇒ So, in 10 km race A beats C by $= \frac{19}{100} \times 10$ km

$= \frac{19}{10} \times 1000$ m $= 1900$ m

69.

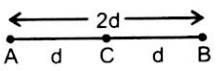
	Milk	Water
I.	7	2
II.	9	4

For milk, using allegation method,



Hence, the required ratio = 27 : 13

70.



Total time taken to cover distance AB = $\frac{2d}{60}$.

Time taken to cover BC = $\frac{d}{25}$.

Time taken to reach point A through bypass road

$= \frac{d+5}{50}$.

So, $\frac{d}{25} + \frac{(d+5)}{50} - \frac{2d}{60} = \frac{30}{60}$

$\Rightarrow \frac{12d + 6d + 30 - 10d}{5} = \frac{30}{60}$

⇒ 8d + 30 = 150

⇒ 8d = 120

⇒ d = 15

⇒ So, total distance travelled by him is 4d + 5 = 65 miles.

71. Let total shirts produced = 100x

Defective = 15x

Rest = 85x

Shirts sold in domestic market = 17x

Remaining shirts = 68x

So, 68x = 8840

⇒ 100x = 13000.

72. Let the average height of 22 toddlers be x.

Average height of two toddlers = $\frac{1x}{3}$.

Now, Average increases by 2 inches when two leave the group.

So, sum of the heights of 20 toddlers = 20(x + 2)

So, $22x = (x + 2) \times 20 + \frac{2x}{3}$.

$\Rightarrow x = 30$.

So, the average height of the remaining 20 toddlers is 30 + 2 = 32 inches.

73. Let the CP be x

$\therefore x \times \frac{110}{100} \times \frac{130}{100} \times \frac{150}{100} = 4290$

x = Rs. 000.

74. A → inlet pipe, B → outlet pipe

A takes 8 hours to fill the tank

(A and B) together takes 10 hours

So, total volume of the tank is LCM of 8, 10 i.e. 0 ltrs(say)

Half filled tank means $\frac{40}{2}$ = 20 ltrs.

In 1 hour, A fills $\frac{40}{8}$ = 5 ltrs and

(A + B) fills $\left(\frac{40}{10}\right)$ = 4 ltrs.

So, B empties in 1 hour = 5 – 4 = 1 ltr

So, total time taken by B to make the full tank half filled $= \frac{20}{1} = 20$ hours.

75. Let he buys one dozen candies of each type IInd type

Total C.P. = Rs. 7

S.P. = Rs. 33

Profit = Rs. 6

For getting profit of Rs. 50

He must sold 50 dozens

76. The required percentage

$= \left(\frac{40}{127} - 1\right) \times 100 = 10\%$

77. a : b = 3 : 4

b : c = 2 : 1

a : b : c = 3 : 4 : 2

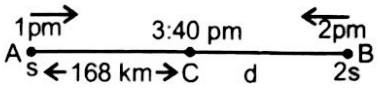
Let a = 3x, b = 4x, c = 2x.

So, a + b + c = 9x which is a multiple of 9.

So, among options, only 207 is a multiple of 9.

∴ The possible value of (a + b + c) is 207.

78.



Time taken to cover distance AC = $2 + \frac{40}{60} = \frac{8}{3}$ hrs.

So, speed of motorbike = $\frac{168}{8} \times 3$ = 63 km/hr

So, speed of car = 2 × 63 = 126 km/hr

BC (distance) = $126 \times \left(1 + \frac{40}{60}\right) = 126 \times \frac{5}{3} = 210$ km

So, total distance = 168 + 210 = 378 km.

79. Amal can complete the work in 10 days

Bimla can complete the work in 8 days

(Amal + Bimla + Kamal) can complete the work in 4 days

Total work done = LCM of 10, 8 and 4 = 40 units.

So, Amal's 1 day work is 4 units.

Bimal's 1 day work is 5 units

Amal's + Bimal's + Kamal's together 1 day work is = 10 units

⇒ Kamal's 1 day work is 1 unit.

So, their amount of work done is in the ratio of 4 : 5 : 1

⇒ Share of Kamla = Rs.100

80. Ratio of liquid $A = \frac{\frac{2}{3} \times 4}{9} \Rightarrow \frac{8}{27}$

Ratio of liquid $B = \frac{\frac{3}{4} \times 3}{9} \Rightarrow \frac{1}{4}$

Ratio of liquid $C = \frac{\frac{4}{5} \times 2}{9} \Rightarrow \frac{8}{45}$

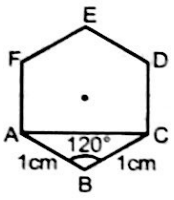
Ratio of water $= \frac{\frac{1}{3} \times 4 + \frac{1}{4} \times 3 + \frac{1}{5} \times 2}{9}$

$\Rightarrow \frac{\frac{4}{3} + \frac{3}{4} + \frac{2}{5}}{9}$

$\Rightarrow \frac{149}{60 \times 9} = \frac{149}{540}$

∴ Water in more than liquid B.

81.



$\cos 120° = \frac{1^2 + 1^2 - AC^2}{2 \times 1 \times 1}$

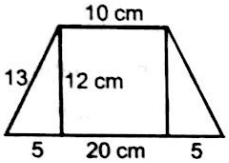
$-\frac{1}{2} = \frac{2 - AC^2}{2}$

$AC^2 = 2 + 1 = 3$

$AC = \sqrt{3}$ cm

Area of square = $AC^2 = 3$ cm.

82.



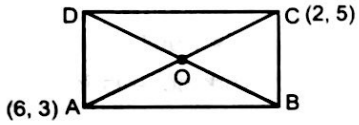
Area of a base = $\frac{1}{2}(10 + 20) \times 12 = 180$ cm

Total area of all six surfaces of the pillar is

$= 10 \times 20 + 20 \times 20 + 2 \times 180 + 2 \times (13 \times 20)$

$= 200 + 400 + 360 + 520 = 1480$ cm^2.

83.



Since diagonals of a rectangle bisect each other so O is the mid point of AC.

Co-ordinates of O = $\left(\frac{6+2}{2}, \frac{5+3}{2}\right) = (4, 4)$

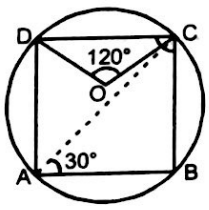
Point O will satisfy the equation of the other diagonal too. So,

$y = 3x + c$

$4 = 3 \times 4 + c$

$c = -8$.

84. 90



$\angle DOC = 120°$

So, $\angle DAC = 60°$

$\Rightarrow \angle DAB = 90°$

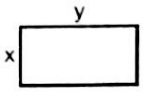
[Angle made at the circumference is half of the angle made at the centre]

As ABCD is a cyclic quadrilateral

So $\angle DAB + \angle BCD = 180°$

$\Rightarrow \angle BCD = 90°$.

85. 00



So $x + 2y = 400$

$x = 400 - 2y$

Area = xy

$= (400 - 2y)y$

$= 400y - 2y^2$

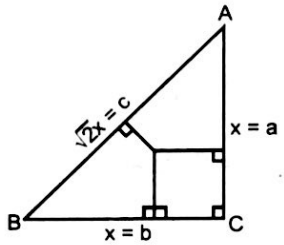
Maximum value of quadratic function is $\frac{-b}{2a}$ (when a is –ve)

So, value of $y = \frac{-400}{-2 \times 2} = 100$,

So if $y = 100$

$x = 200$.

86. 6



In-radius of a right $\angle\Delta$ is $r = \frac{a+b-c}{2}$

$\Rightarrow 4(\sqrt{2} - 1) = \frac{x + x - \sqrt{2}x}{2}$

$\Rightarrow 4(\sqrt{2} - 1) = \frac{2x - \sqrt{2}x}{2}$

$\Rightarrow 4(\sqrt{2} - 1) = \frac{\sqrt{2}x(\sqrt{2} - 1)}{2}$

$x = 4\sqrt{2}$ cm.

$\therefore$ Area = $\frac{1}{2} \times 4\sqrt{2} \times 4\sqrt{2}$

$= 16$ cm^2

87. $a(a + 1)(a + 2) = 15600$.

Now factors of $15600 = 2 \times 2 \times 2 \times 2 \times 3 \times 5 \times 5 \times 13$

So, 15600 is the product of 24, 25, 26

So, sum of the squares of these integers is $24^2 + 25^2 + 26^2 = 1877$.

88. $\log_3 5 = \log_5 (2 + x)$

Only $3 < x < 23$ is true.

89. $f(x) = x^2$, $g(x) = 2$

At $x = 1$, $f(1) = 1$, $g(1) = 2$

So, $f(f(g(1)) + g(1)))$

$= f(f(2) + g(1))$

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

So $f(4 + 2) = f(6)$

$f(6) = 6^2 = 36$.

90. $x^2 + (a + 3)x - (a + 5) = 0$

Let α and β are the roots of the above equation

$$\text{So } \alpha + \beta = -\frac{(a+3)}{1}$$

$$\alpha\beta = -\frac{(a+5)}{1}$$

Now, $\alpha^2 + \beta^2 = (\alpha + \beta)^2 - \alpha \times \beta$

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

$a = a^2 + 9 + 6a + 2a + 10$

$= a^2 + 8a + 19$.

$= (a + 4)^2 + 3$

At $a = -4$, minimum value = 3.

91. $9^{x-\frac{1}{2}} - 2^{2x-2} = 4^x - 3^{2x-3}$

$\Rightarrow 3^{2x-1} + 3^{2x-3} = 2^{2x} + 2^{2x-2}$

$$\Rightarrow \frac{3^{2x}}{3} + \frac{3^{2x}}{27} = 2^{2x} + \frac{2^{2x}}{4}$$

$$\Rightarrow \frac{210 \times 3}{27} = \frac{5 \times 2}{4}$$

$$\Rightarrow \left(\frac{3}{2}\right)^{2x} = \frac{27}{8} = \left(\frac{3}{2}\right)^3 \Rightarrow 2x = 3 \Rightarrow x = 3/2.$$

92. $$\frac{\log(2^5 \times 3^5 \times 5) + \log(2^6 \times 3 \times 5^7) + \log(2 \times 3^2 \times 5^4)}{3}$$

$= \log (2^a \times 3^b \times 5^c)$

$\Rightarrow \log(2^6 \times 3^4 \times 5^8) + \log(2 \times 3^2 \times 5^4)$

$= 3 \log(2^a \times 3^b \times 5^c)$

$\log (2^8 \times 3^6 \times 5^{12}) = 3 \log (2^a \times 3^b \times 5^c)$.

$\Rightarrow 2^8 \times 3^6 \times 5^{12} = (2^a \times 3^b \times 5^c)^3$

$\Rightarrow 3a = 9$, $a = 3$.

93. 1 Let five consecutive odd numbers be

$x - 4$, $x - 2$, x, $x + 2$, $x + 4$.

Now new sequence in revenue order

$2x$, $2x - 2$, $2x - 4$; $2x - 6$, $2x - 8$

So, sum = 450

$10x - 20 = 450$

$10x = 470$

$x = 47$

$a_5 = x + 4 = 47 + 4 = 51$.

94. $\frac{1}{a} + \frac{1}{b} = \frac{1}{9}$

$ab = 9(a + b)$

$ab = 9a + 9b$

$9a = b(a - 9)$

$$b = \frac{9a}{a-9} = \frac{9a - 81 + 81}{a-9}$$

$$= \frac{9(a-9)}{a-9} + \frac{81}{a-9}$$

$$b = \frac{81}{a-9} + 9$$

For b to be integer and $a \le b$, the first term should be an integer. So factors of 81 are 1, 3, 9, 27, 81. Now put these values satisfying $a \le b$. So only 3 values (1, 3, 9) will satisfy the given condition.

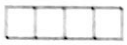
So, answer will be 3.

95.

	Amal	Bimal	Kamal	
	≥ 1	≥ 2	≥ 3	
Pens	A	B	K	
	3	2	3	Total cases = 6
	1	4	3	
	1	2	5	
	2	3	3	
	1	3	4	
	2	2	4	

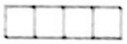
96. 0 For divisibility by 6, last digit should be even and sum of digits is divisible by 3.

Case I: 2, 3, 4, 6

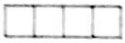


$3 \times 2 \times 1 \times 3$ = 18 ways

Case II: (i) 2, 3, 4, 0 (when last digit is zero)



$3 \times 2 \times 1 \times 1$ = 6 ways



(ii) $2 \times 2 \times 1 \times 2$ = 8 ways

Total 8 + 6 = 14 ways

Case III: 0, 2, 4, 6

$3 \times 3 \times 2 \times 1$ = 18 ways

So, total possible ways = 50.

97. $f(ab) = f(a)\, f(b)$

$f(1) = f(1)^2$

$f(1)^2 - f(1) = 0$

$f(1)\,[f(1) - 1] = 0$

$f(1) - 1 = 0$

$f(1) =$

24

98. To satisfy this, both function should be either less than or equal to zero or greater than equal to zero

Both cannot be less than zero

$f(x) \geq 0$ and $g(x) \geq 0$

$\Rightarrow 2x - 5 \geq 0$ and $7 - 2x \geq 0$

$\Rightarrow 2x \geq 5$ and $7 \geq 2x$

$\Rightarrow x \geq \frac{5}{2}$ and $x \leq \frac{7}{2}$

Hence, $\frac{5}{2} \leq x \leq \frac{7}{2}$

99. $a_1 = 3(a_2 + a_3 + \ldots\infty)$

let $a_2 + a_3 + \ldots\infty = x$

$a_1 = 3x$

So, $a_1 + a_2 + a_3 + \ldots. = 32$

$\Rightarrow 4x = 32$

$\Rightarrow x = 8$

$\Rightarrow a_1 = 24$ and $a_2 + a_3 + \ldots = 8$

Now $a_2 = 3(a_3 + a_4 + \ldots)$

Let $a_3 + a_4 + \ldots = y$

$\Rightarrow a_2 = 3y$

$\Rightarrow 24 + 3y + y = 32$

$\Rightarrow 4y = 8$

$\Rightarrow y = 2$

$\Rightarrow a_2 = 6$

As $a_1 = 24$ and $a_2 = 6$

$$\Rightarrow a_5 = 24 \times \frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} = 24\left(\frac{1}{4}\right)^4 = \frac{3}{32}.$$

100. $a_1 + a_2 + a_3 + \ldots a_{100}$

$$= \frac{1}{2\times5} + \frac{1}{5\times8} + \frac{1}{8\times11} + \cdots \frac{1}{299\times302}$$

$$= \frac{1}{3}\left[\frac{3}{2\times5} + \frac{3}{5\times8} + \frac{3}{8\times11} + \cdots \frac{3}{299\times302}\right]$$

$$= \frac{1}{3}\left[\frac{1}{2} - \frac{1}{5} + \frac{1}{5} - \frac{1}{8} + \frac{1}{8} - \frac{1}{11} + \cdots \frac{1}{299} - \frac{1}{302}\right]$$

$$= \frac{1}{3}\left[\frac{1}{2} - \frac{1}{302}\right] = \frac{1}{3}\left[\frac{151-1}{302}\right] = \frac{150}{3\times302} = \frac{25}{151}.$$