

Time: 180 Mins

Total Marks: 300

Important Instructions

- (i) Total number of questions: 100
- (ii) Number of questions in Verbal Ability and Reading Comprehension (VARC): 34
- (iii) Number of questions in Data Interpretation and Logical Reasoning (DILR): 32
- (iv) Number of questions in Quantitative Ability (QA): 34
- (v) 60 minutes are allotted to attempt each section.
- (vi) 4 answer options for each MCQ type question.
- (vii) Answers are typed in the given space on the computer screen for Non-MCQ.
- (viii) For each correct answer: + 3 marks
- (ix) Negative marking (Applicable for wrong answers in MCQs): - 1 mark

Verbal Ability and Reading Comprehension (VARC)**Passage 1**

Directions (Q. 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. Infact, 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 catalyse new ideas. With their infrastructure for finance, organisation and trade, they allow those ideas to be swiftly actualised.

As for what stanches 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 organisations are regimented, standardised 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 the 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 rate 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 all around us — in science and technology, arts and culture, in our rapidly revitalising 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.

Q. 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.
- Q. 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.
- Q. 3.** The central idea of this passage is that
1. social interaction is necessary to nurture creativity.
 2. creativity and ideas are gradually declining in all societies.
 3. the creativity divide is widening in societies in line with socio-economic trends.
 4. more people should work in jobs that engage their creative faculties.
- Q. 4.** Jane Jacobs believed that cities that are more creative
1. have to struggle to retain their creativity.
 2. have to 'squench' unproductive people and promote creative ones.
 3. have leaders and institutions that do not block creativity.
 4. typically do not start off as creative hubs.
- Q. 5.** The 1968 study is used here to show that
1. as they get older, children usually learn to be more creative.
 2. schooling today does not encourage creative thinking in children.
 3. the more children learn, the less creative they become.
 4. technology today prevents children from being creative.
- Q. 6.** The author's conclusions about the most 'creative cities' in the US (paragraph 6) are based on his assumption that
1. people who work with their hands are not doing creative work.
 2. more than half the population works in non-creative jobs.
 3. only artists, musicians, writers, and so on should be valued in a society.
 4. most cities ignore or waste the creativity of low-wage workers.

Passage 2

Directions (Q. 7 to 12): *The passage below is accompanied by a set of six questions. Choose the best answer to each question.*

During the frigid season... it's often necessary to nestle under a blanket to try to stay warm. The temperature difference between the blanket and the air outside is so palpable that we often have trouble leaving our warm refuge. Many plants and animals similarly hunker down, relying on snow cover for safety from winter's harsh conditions. The small area between the snowpack and the ground, called the subnivium... might be the most important ecosystem that you have never heard of.

The subnivium is so well-insulated and stable that its temperature holds steady at around 32 degree Fahrenheit (0 degree Celsius). Although that might still sound cold, a constant temperature of 32 degree Fahrenheit can often be 30 to 40 degrees warmer than the air temperature during the peak of winter. Because of this large temperature difference, a wide variety of species depend on the subnivium for winter protection.

For many organisms living in temperate and Arctic regions, the difference between being under the snow or outside it is a matter of life and death. Consequently, disruptions to the subnivium brought about by climate change will affect everything from population dynamics to nutrient cycling through the ecosystem.

The formation and stability of the subnivium requires more than a few flurries. Winter ecologists have suggested that eight inches of snow is necessary to develop a stable layer of insulation. Depth is not the only factor, however. More accurately, the stability of the subnivium depends on the interaction between snow depth and snow density. Imagine being under a stack of blankets that are all flattened and pressed together. When compressed, the blankets essentially form one compacted layer. In contrast, when they are lightly placed on top of one another, their insulative capacity increases because the air pockets between them trap heat. Greater depths of low-density snow are therefore better at insulating the ground.

Both depth and density of snow are sensitive to temperature. Scientists are now beginning to explore how climate change will affect the subnivium, as well as the species that depend on it. At first glance, warmer winters seem beneficial for species that have difficulty surviving subzero temperatures; however, as with most ecological phenomena, the consequences are not so straightforward. Research has shown that the snow season (the period when snow is more likely than rain) has become shorter since 1970. When rain falls on snow, it increases the density of the snow and reduces its insulative capacity. Therefore, even though winters are expected to become warmer overall from the future climate change, the subnivium will tend to become colder and more variable with less protection from the above-ground temperatures.

The effects of a colder subnivium are complex... For example, shrubs such as crowberry and alpine azalea that grow along the forest floor tend to block the wind and so retain higher depths of snow around them. This captured snow helps to keep soils insulated and in turn increases plant decomposition and nutrient release. In field experiments, researchers removed a portion of the snow cover to investigate the importance of the subnivium's insulation. They found that soil frost in the snow-free area resulted in damage to plant roots and sometimes even the death of the plant.

Q. 7. The purpose of this passage is to

1. introduce readers to a relatively unknown ecosystem: the subnivium.
2. explain how the subnivium works to provide shelter and food to several species.
3. outline the effects of climate change on the subnivium.
4. draw an analogy between the effect of blankets on humans and of snow cover on species living in the subnivium.

Q. 8. All of the following statements are true EXCEPT

1. Snow depth and Snow density both influence the stability of the subnivium.
2. Climate change has some positive effects on the subnivium.
3. The subnivium maintains a steady temperature that can be 30 to 40 degrees warmer than the winter air temperature.
4. Researchers have established the adverse effects of dwindling snow cover on the subnivium.

Q. 9. Based on this extract, the author would support which one of the following actions?

1. The use of snow machines in winter to ensure snow cover of at least eight inches.
2. Government action to curb climate change.
3. Adding nutrients to the soil in winter.
4. Planting more shrubs in areas of short snow season.

Q. 10. In paragraph 6, the author provides the examples of crowberry and alpine azalea to demonstrate that

1. Despite frigid temperatures, several species survive in temperate and Arctic regions.
2. Due to frigid temperatures in the temperate and Arctic regions, plant species that survive tend to be shrubs rather than trees.
3. The crowberry and alpine azalea are abundant in temperate and Arctic regions.
4. The stability of the subnivium depends on several interrelated factors, including shrubs on the forest floor.

Q. 11. Which one of the following statements can be inferred from the passage?

1. In an ecosystem, altering any one element has a ripple effect on all others.
2. Climate change affects temperate and Arctic regions more than equatorial or arid ones.
3. A compact layer of wool is warmer than a similarly compact layer of goose down.
4. The loss of the subnivium, while tragic, will affect only temperate and Arctic regions.

Q. 12. In paragraph 1, the author uses blankets as a device to

1. evoke the bitter cold of winter in the minds of readers.
2. explain how blankets work to keep us warm.
3. draw an analogy between blankets and the snow pack.
4. alert readers to the fatal effects of excessive exposure to the cold.

Passage 3

Directions (Q. 13 to 18): The passage below is accompanied by a set of six questions. Choose the best answer to each question.

The end of the age of the internal combustion engine is in sight. There are small signs everywhere: the shift to hybrid vehicles is already under way among manufacturers. Volvo has announced—it will make no purely petrol-engined cars after 2019...and Tesla has just started selling its first electric car aimed squarely at the middle classes: the Tesla 3 sells for \$35,000 in the US and 400,000 people have put down a small, refundable deposit towards one. Several thousand have already taken delivery and the company hopes to sell half a million more next year. This is a remarkable figure for a machine with a fairly short range and a very limited number of specialised charging stations.

Some of it reflects the remarkable abilities of Elon Musk, the company's founder, as a salesman, engineer and a man able to get the most out his factory workers and the governments he deals with...Mr Musk is selling a dream that the world wants to believe in. This last may be the most important factor in the story. The private car is a device of immense practical help and economic significance, but at the same time a theatre for myths of unattainable self-fulfilment.

The one thing you will never see in a car advertisement is traffic, even though that is the element in which drivers spend their lives. Every single driver in a traffic jam is trying to escape from it, yet it is the inevitable consequence of mass car ownership. The sleek and swift electric car is at one level merely the most contemporary fantasy of autonomy and power. But it might also disrupt our exterior landscapes nearly as much as the fossil fuel-engined car did in the last century. Electrical cars would of course pollute far less than fossil fuel-driven ones; instead of oil

reserves, the rarest materials for batteries would make undeserving despots and their dynasties fantastically rich. Petrol stations would disappear. The air in cities would once more be breathable and their streets as quiet as those of Venice. This isn't an unmixed good. Cars that were as silent as bicycles would still be as dangerous as they are now to anyone they hit without audible warning.

The dream goes further than that. The electric cars of the future will be so thoroughly equipped with sensors and reaction mechanisms that they will never hit anyone. Just as brakes don't let you skid today, the steering wheel of tomorrow will swerve you away from danger before you even noticed it...

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 Uber 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.

Q. 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.

Q. 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.

Q. 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.

Q. 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.

Q. 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.

Q. 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.

Passage 4

Directions (Q. 19 to 21): The passage below is accompanied by a set of three questions. Choose the best answer to each question.

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 while 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 one day. 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!

Q. 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.

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

1. they do not want to abandon old technolo-

gies 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.

Q. 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.

Passage 5

Directions (Q. 22 to 24): The passage below is accompanied by a set of three questions. Choose the best answer to each question.

Despite their fierce reputation, Vikings may not have always been the plunderers and pillagers that 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 analysing 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.

Q. 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.

Q. 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.

Q. 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.

Q. 25. 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 specialized holes in their sides. The whistles are impressively loud — they have been measured at over 80 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 specialised 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. The 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.

Q. 26. 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.

Q. 27. 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 freefloating 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.

Q. 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.
- Q. 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.
- Q. 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.
- Q. 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 non-existence of matter by kicking a large stone ("I refute it thus") is the same Johnson for whom language must have a daily practical use.
- Q. 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. Choose its number as your answer and key it in.
1. The water that made up ancient lakes and perhaps an ocean was lost.
 2. Particles from the sun collided with molecules in the atmosphere, knocking them into space or giving them an electric charge that caused them to be swept away by the solar wind.
 3. Most of the planet's remaining water is now frozen or buried, but clues over the past decade suggested that some liquid water, a presumed necessity for life, might survive in underground aquifers.

4. Data from NASA's MAVEN orbiter show that solar storms stripped away most of Mars's once-thick atmosphere.
5. A recent study reveals how Mars lost much of its early water, while another indicates that some liquid water remains.
- Q. 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.
- Over the past fortnight, one of its finest champions managed to pull off a similar impression.
 - Wimbledon's greatest illusion is the sense of timelessness it evokes.
 - 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.
 - Once he had survived the opening week, the second week witnessed the range of a rested Federer's genius.
 - 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.
- Q. 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. Choose its number as your answer and key it in.
- Those geometric symbols and aerodynamic swooshes are more than just skin deep.
 - 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.
 - 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.
 - 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.
 - But the Commonwealth Bank logo has more to it than meets the eye, as squirrelled away in that diamond is the Southern Cross constellation.

Data Interpretation and Logical Reasoning (DILR)

Passage 1

Directions (Q. 1 to 4): Answer the questions on the basis of following information.

Funky Pizzeria 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

- Q. 1.** How many Thin Crust pizzas were to be delivered to Party 3?
1. 398 2. 162 3. 96 4. 364
- Q. 2.** How many Normal Cheese pizzas were required to be delivered to Party 1?
1. 104 2. 84 3. 16 4. 196
- Q. 3.** 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
- Q. 4.** Suppose that a T-NC pizza cost as much as a D-NC pizza, but $\frac{3}{5}$ th of the price of a D-EC pizza. A D-EC pizza costs ₹ 50 more than a T-EC pizza, and the latter costs ₹ 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. ₹59480 2. ₹59840
3. ₹42520 4. ₹45240

Passage 2

Directions (Q. 5 to 8): Answer the questions on the basis of following information.

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	S	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:

- 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.
- The number of students in E2 increased by 30 after the change process.
- Before the change process, E4 had 2 more students than E6, while E2 had 10 more students than E3.

Q. 5. How many elective courses among E1 to E6 had a decrease in their enrollments after the change process?

- 4
- 1
- 2
- 3

Q. 6. After the change process, which of the following is the correct sequence of number of students in the six electives E1 to E6?

- 19, 76, 79, 21, 45, 60
- 19, 76, 78, 22, 45, 60
- 18, 76, 79, 23, 43, 61
- 18, 76, 79, 21, 45, 61

Q. 7. After the change process, which course among E1 to E6 had the largest change in its enrollment as a percentage of its original enrollment?

- E1
- E2
- E3
- E6

Q. 8. Later, the college imposed a condition 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 re-enroll for that elective.

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

- E2, E3, E6, E5, E1, E4
- E3, E2, E6, E5, E4, E1
- E2, E5, E3, E1, E4, E6
- E2, E3, E5, E6, E1, E3

Passage 3

Directions (Q. 9 to 12): Answer the questions on the basis of following information.

An old woman had the following assets:

- ₹70 lakh in bank deposits
- 1 house worth ₹50 lakh
- 3 flats, each worth ₹30 lakh
- Certain number of gold coins, each worth ₹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.

Q. 9. 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)?

- 30
- 40
- 20
- 10

Q. 10. 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?

- Q. 11.** 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 ₹30 lakh in bank deposits.

How many gold coins did the old woman have?

1. 72
2. 90
3. 180
4. 216

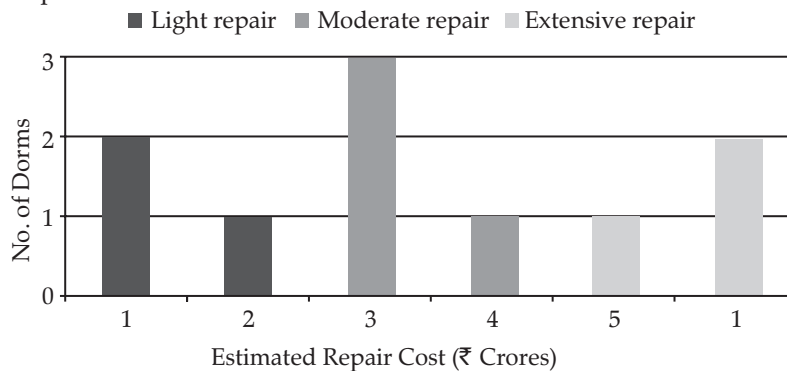
- Q. 12.** The value of the assets distributed among Neeta, Seeta and Geeta was in the ratio of 1 : 2 : 3, while the gold coins were distributed among them in the ratio of 2 : 3 : 4. One child got all three flats and she did not get the house. One child, other than Geeta, got ₹30 lakh in bank deposits.

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

Passage 4

Directions (Q. 13 to 16): Answer the questions on the basis of following information.

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



Further, the following information is 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.

- Q. 13.** Which of the following is NOT necessarily true?

1. Dorm 1 needs a moderate repair
2. Dorm 5 repair will cost no more than ₹4 crores
3. Dorm 7 needs an extensive repair
4. Dorm 10 repair will cost no more than ₹4 crores

- Q. 14.** What is the total cost of repairing the odd-numbered dorms (in ₹ crores)?

- Q. 15.** Suppose further that:

1. 4 of the 10 dorms needing repair are women's dorms and need a total of ₹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 ₹ crores)?

- Q. 16.** Suppose further that:

1. 4 of the 10 dorms needing repair are women's dorms and need a total of ₹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

Passage 5

Directions (Q. 17 to 20): Answer the questions on the basis of following information.

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.

Q. 17. What was the second highest rating given?

Q. 18. What was the number of the cup that contained tea from Ooty?

Q. 19. 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

Q. 20. 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

Passage 6

Directions (Q. 21 to 24): Answer the questions on the basis of following information.

In an 8×8 chess board 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 C_5 means that the piece is in C^{th} column and 5^{th} row.

Q. 21. If the queen is at C_5 and the other pieces at positions C_2 , G_1 , G_3 , G_5 and A_3 , how many are under attack by the queen? There are no other pieces on the board.

1. 2 2. 3 3. 4 4. 5

Q. 22. If the other pieces are only at positions A_1 , A_3 , B_4 , D_7 , H_7 and H_8 , then which of the following positions of the queen results in the maximum number of pieces being under attack?

1. F_7 2. A_5 3. C_1 4. D_3

Q. 23. If the other pieces are only at positions A_1 , A_3 , B_4 , D_7 , H_7 and H_8 , then from how many positions the queen cannot attack any of the pieces?

1. A_2 2. B_3 3. G_2 4. G_8

Q. 24. Suppose the queen is the only piece on the board and it is at position D_5 . 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. 35 3. 36 4. 37

Passage 7

Directions (Q. 25 to 28): Answer the questions on the basis of following information.

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 ₹1000 extra for any seats in Rows 1, 12 and 13 as those have extra legroom. For Rows 2 to 10, it charges ₹300 extra for Window seats and ₹500 extra for Aisle seats. For Rows 11 and 14 to 20, it charges ₹200 extra for Window seats and ₹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 ₹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 Tapeshe 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.
- Q. 25.** In which row was Manik sitting?
1. 10 2. 11
3. 12 4. 13
- Q. 26.** How much extra did Jayanta pay for his choice of seat?
1. ₹300 2. ₹400
3. ₹500 4. ₹1000
- Q. 27.** How much extra did Gargi pay for her choice of seat?
1. 0 2. ₹300
3. ₹400 4. ₹1000
- Q. 28.** Who among the following did not pay any extra amount for his/her choice of seat?
1. Kikira 2. Manik
3. Gargi 4. Tapeshe

Passage 8

Directions (Q. 29 to 32): Answer the questions on the basis of following information.

A high security research lab requires the researchers to set a pass key sequence based 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.

- Q. 29.** 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?
- Q. 30.** 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
- Q. 31.** 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?
- Q. 32.** 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

Quantitative Aptitude (QA)

- Q. 1.** 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:
- Q. 2.** 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?
- Q. 3.** 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
- Q. 4.** 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
- Q. 5.** 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
- Q. 6.** 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. 28
 3. 32
 4. 26
- Q. 7.** 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 ₹4290 for the table, then its manufacturing cost (in ₹) is
1. 1500
 2. 2000
 3. 2500
 4. 3000
- Q. 8.** 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
- Q. 9.** Mayank buys some candies for ₹15 a dozen and an equal number of different candies for ₹12 a dozen. He sells all for ₹16.50 a dozen and makes a profit of ₹150. How many dozens of candies did he buy altogether?
1. 50
 2. 30
 3. 25
 4. 45
- Q. 10.** 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
- Q. 11.** 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
- Q. 12.** A motorbike leaves point A at 1 p.m. and moves towards point B at a uniform speed. A car leaves point B at 2 p.m. and moves towards point A at a uniform speed which is double that of the motorbike. They meet at 3:40 p.m. 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
- Q. 13.** 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 ₹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
- Q. 14.** 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
- Q. 15.** 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. $\sqrt{3}$
- Q. 16.** 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
- Q. 17.** 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
- Q. 18.** 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
- Q. 19.** 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
- Q. 20.** 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:
- Q. 21.** 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

- Q. 22.** 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. $3 < x < 23$
- Q. 23.** Let $f(x) = x^2$ and $g(x) = x^2$, 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
- Q. 24.** 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
- Q. 25.** 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. $\frac{4}{9}$
- Q. 26.** If $\log(2^a \times 3^b \times 5^c)$ is the arithmetic mean of $\log(2^2 \times 3^3 \times 5)$, $\log(2^6 \times 3 \times 5^7)$, and $\log(2 \times 3^2 \times 5^4)$, then a equals:
- Q. 27.** 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
- Q. 28.** How many different pairs (a, b) of positive integers are there such that $a \geq b$ and $\frac{1}{a} + \frac{1}{b} = \frac{1}{9}$?
- Q. 29.** 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?
- Q. 30.** 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?
- Q. 31.** If $f(ab) = f(a)f(b)$ for all positives integers a and b , then the largest possible value of $f(1)$ is
- Q. 32.** 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. $x \leq \frac{5}{2}$ or $x \geq \frac{7}{2}$
 3. $x < \frac{5}{2}$ or $x \geq \frac{7}{2}$ 4. $\frac{5}{2} \leq x \leq \frac{7}{2}$
- Q. 33.** An infinite geometric progression a_1, a_2, \dots has the property that $a_n = 3(a_{n+1} + a_{n+2} + \dots)$ for every $n \geq 1$. If the sum $a_1 + a_2 + a_3 + \dots = 32$, then a_5 is:
 1. $\frac{1}{32}$ 2. $\frac{2}{32}$ 3. $\frac{3}{32}$ 4. $\frac{4}{32}$
- Q. 34.** If $a_1 = \frac{1}{2 \times 5}, a_2 = \frac{1}{5 \times 8}, a_3 = \frac{1}{8 \times 11}, \dots$, then $a_1 + a_2 + a_3 + \dots + a_{100}$ is:
 1. $\frac{25}{151}$ 2. $\frac{1}{2}$ 3. $\frac{1}{4}$ 4. $\frac{111}{55}$

Answer Key

Verbal Ability and Reading Comprehension (VARC)

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						

Data Interpretation and Logical Reasoning (DILR)

1. (2)	2. (3)	3. (2)	4. (1)	5. (3)	6. (4)	7. (4)	8. (1)	9. (3)	10. (2)
11. (2)	12. 20	13. (4)	14. 19	15. 3	16. (4)	17. 7	18. 4	19. (2)	20. (2)
21. (3)	22. (4)	23. (3)	24. (3)	25. (1)	26. (3)	27. (4)	28. (4)	29. 11	30. (3)
31. 15	32. (3)								

Quantitative Aptitude (QA)

1. 3	2. 1900	3. (2)	4. (3)	5. (2)	6. (3)	7. (2)	8. (1)	9. (1)	10. (3)
11. (3)	12. (2)	13. (1)	14. (3)	15. (2)	16. (3)	17. (4)	18. 90	19. 200	20. 16
21. (4)	22. (4)	23. (3)	24. (3)	25. (1)	26. 3	27. 51	28. 3	29. 6	30. 50
31. 1	32. (4)	33. (3)	34. (1)						

Answers and Explanations

Verbal Ability and Reading Comprehension (VARC)

1. **Option (4) is correct.**
From the second paragraph all the options can be derived except for option (4). The paragraph does not suggest that cities provide access to cultural activities and that this promotes creativity.
2. **Option (2) is correct.**
The lines in the third paragraph, 'As for what subdues creativity, that's easy, if ironic. It's the very institutions that we build to manage, exploit and perpetuate the fruits of creativity...', makes it clear that the very institutions that are meant to promote creativity subdue creativity. Option (2) expresses this idea.
3. **Option (1) is correct.**
Throughout, the passage states that this is a myth that creativity is the province of great individual geniuses and it asserts that creativity is fostered in the cities because they provide conducive environment to it. It goes on saying how schools stifle creativity. Option (1) makes it clear that the environment needed to nurture creativity, social interaction and feasibility of converting the ideas is there in cities.
Rest of the options are easily ruled out. Option (2) is contradictory to the first line of the last paragraph. Option (3) though a close option, but the entire passage focuses upon the importance of social interactions. So, option (3) is ruled out. Option (4) is eliminated for the same reason as option (3).
4. **Option (3) is correct.**
This is a direct question, which can be derived directly from the lines given in the passage. From the fifth paragraph, 'All cities, she said, were filled with creative people....But some cities had more than their shares of leaders, people and institutions that blocked out that creativity.', option (3) is derived.
5. **Option (2) is correct.**
The passage asserts that cities promote creativity, while schools smother creativity. To prove his point that schools smother creativity, the author used the study of 1968 which establishes that kids who are young and not exposed to schools are the most creative one. Option (2) encompasses it. Option (1) is wrong because it correlates creativity with age, which is not given in the passage.
6. **Option (1) is correct.**
Option (3) also distorts the fact given in the passage. The passage does not establish any connection between creativity and age of kids. The age of kids was mentioned to connect creativity with school.
Option (4) is eliminated because it is out of scope.
6. **Option (1) is correct.**
In paragraph six, the author asserts that those of us who work with our minds are creative people. Hence, you can infer that people, whose profession demands more use of hand than mind, are not creative.
7. **Option (3) is correct.**
The passage mainly talks about change in climate and its negative impact upon subnivium. It goes on to say that change in subnivium affects everything from population dynamics to nutrient cycling through the ecosystem. Option (3) is the only one that mentions climate change. Rest all the options are mentioned to drive the central idea home.
8. **Option (2) is correct.**
The passage states, 'Both depth and density of snow are sensitive to temperature.' Therefore, option (1) is easily eliminated.
The insulating properties of subnivium are clearly mentioned in the passage - 'Although that might still sound cold, a constant temperature of 32°F can often be 30 to 40 degrees warmer than the air temperature during the peak of winter.' Therefore, option (3) is ruled out.
From the line, 'research has shown that...', you can understand that the effects of the dwindling snow cover on subnivium has been established, option (4) is ruled out.
From the lines, 'even though winters are expected to become warmer overall from future climate change, the subnivium will tend to become colder and more variable with less protection from the above-ground temperatures.', option (2) is incorrect. Hence, option (2) is the answer.
9. **Option (2) is correct.**
The entire passage talks about negative impact of climate change, especially on subnivium. Option (1) is incorrect because the passage says that quality of snow also matters a lot along with temperature.

Option (3) is factually incorrect. Nowhere in the passage is mentioned that nutrients will fix the problem.

Option (4) is ruled out. In the last paragraph the author mentions that the effects are multi-layered and complex. So, only planting shrubs is not going to fix the problem.

10. Option (4) is correct.

The passage cites crowberry and alpine azalea to make a point that the effects of a colder subnivium are complex. The last paragraph clearly mentions that the effects of colder subnivium are multilayered and interrelated. Crowberry and alpine azalea help retain higher depths of snow around them, thereby keeping soils insulated, which in turn increase plant decomposition and nutrient release. Clearly, this is a pretty complex phenomenon at work here.

11. Option (1) is correct.

Options (2) and (4) are about the arctic region. Both the options distort the information given in the passage. (2) talks about equatorial or arid ones, which is not mentioned in the passage, (4) again says it will only affect Arctic, which is not hinted in the passage. Hence, options (2) and (4) are ruled out.

Option (3) is incorrect because the passage says that compression increases density and reduces insulation.

The entire passage talks about the complexity of climate change and its multilayer effect. This is expressed in option (1) as ripple effects.

12. Option (3) is correct.

Paragraph 4 elaborates that the stability of the subnivium depends on the interaction between snow depth and snow density. To explain this, the author uses the example of blankets.

13. Option (3) is correct.

From the lines, "...The private car is a device of immense practical but at the same time a theatre for myths of unattainable self-fulfilment...", option (3) is inferred.

14. Option (4) is correct.

From the third paragraph's line, "...the rarest materials for batteries would make undeserving despots and their dynasties fantastically rich...", you can infer option (1). Hence, Option (1) is ruled out.

From the same paragraph, "The air in cities would once more be breathable and their streets as quiet as those of Venice.", option (2) is true. Hence, option (2) is ruled out.

From the second paragraph, "Every single driver in a traffic jam is trying to escape from it, yet it is the inevitable consequence of mass car ownership.", option (3) is true. Hence, option (3) is eliminated.

Option (4) states that drivers' autonomy will be undermined is not hinted in the passage.

15. Option (4) is correct.

The paragraph says that Mr. Musk is selling a dream that the world wants to believe and the dream is of autonomy and power. This can be derived from the third paragraph's first line.

Option (1) is out of scope because it is not mentioned in the passage anywhere as reason for high sales for Tesla.

The passage does not talk about tax subsidy to Tesla buyers. Hence, option (2) is eliminated.

Option (3) is ruled out. The author mentions that there are limited number of specialised charging stations. But nowhere does he assert that there will be significant increase in charging stations which would increase the sales.

16. Option (3) is correct.

In the last paragraph the author makes it clear that the dream of autonomy will come full circle and the ultimate development of cars will be to reinvent public transport to avoid traffic jams. Option (3) paraphrases it aptly.

Option (1) is a close option but does not capture the essence of the paragraph.

Option (2) is out of scope of the passage.

Option (4) is ruled out because, the author mentions electric bicycles just to provide an illustration.

17. Option (3) is correct.

The author mentioned Uber to explain that finally private cars will become taxies to abolish traffic jams. This is paraphrased in option (3).

Option (2) and option (4) are not mentioned in the passage. Hence, they are eliminated.

Option (1) is ruled out because it is not mentioned in the context of Uber.

18. Option (2) is correct.

The passage focuses upon the dream of autonomy by private car owners and the difficulties in achieving that dream. While trying to figure out the solution of the traffic jam in case of increased car ownership the author refers to electric bicycles. Options (1), (3), and (4) are not mentioned in the passage. Hence, they are ruled out.

19. Option (1) is correct.

Option (1) explains why typewriters are 'still in business', though rendered obsolete in the digital age.

Option (2) is rightly ruled out. The passage does not say that typewriters will continue to be used; it merely states why typewriters are still used.

Option (3) is eliminated because it is not the primary purpose of the author.

Option (4) is eliminated because the passage nowhere says computers offer fewer options than typewriters.

20. Option (4) is correct.

The lines, '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', make it clear that governments still use typewriters to avoid any technical leakage of information. Which is the stated in option (4).

21. Option (4) is correct.

The passage mentions, "...Nor are there any easy distractions...". So, unlike computers, one can do one thing using typewriter that is type. Option (1) is true.

Option (2) is true. From the lines "... there's a big premium on hitting the right key...". There's premium attached on hitting right keys because as you cannot revise what you've typed on the typewriter.

From the lines "...thinking process is accompanied by the encouraging clack of keys..." it is apparent that option (3) is true.

The passage does not hint that typewriters are messier than the computers. Hence, option (4) is not the reason why the author praises typewriters. Thus, option (4) is the correct answer.

22. Option (3) is correct.

From the first two lines of the passage it becomes clear that the author wants to assert that vikings did not start out as pillagers but as traders. The author seems to dispel the notion that the Vikings were pillagers. Option (3) paraphrases this aptly. The author uses the combs as an illustration to prove his hypothesis. So explaining comb's presence can't be the primary purpose. Hence, option (1) is ruled out.

Option (2) says that the purpose of the passage is to change the period of Viking age. But the author mentions about combs to support the fact that Vikings were traders before they became pillagers. So, option (2) is ruled out.

Option (4) is also ruled out because it says that despite being pillagers, Vikings were efficient traders and craftsmen. But the passage focuses about a period prior to which Vikings turned pillagers.

23. Option (4) is correct.

The passage revolves around the fact that Vikings did not start as pillagers. Earlier, they were traders and then later on they turned to be plunderers. To prove this the author gave the example of the artifacts. Hence, option (4) is the correct answer.

24. Option (1) is correct.

Option (2) is the main idea of the passage. Hence, it can be ruled out.

Option (3) is eliminated. It can be inferred from the line, "Such combs served as symbols of good health, Geggel writes".

Option (4) is eliminated. In the last paragraph it is stated that "Beyond Norway, these combs would have been a popular industry in Scandinavia as well." So, it is possible Vikings had a wide trade relationship.

The passage mentions that Vikings brought artifacts made from reindeer antlers, but nowhere the passage suggests that they brought reindeer. Hence, option (1) is not true according to the passage. The passage asks you to select the option which can't be held true according to the passage.

25. Option (3) is correct.

The paragraph tells about the strategy employed by North American walnut sphinx moth caterpillars to scare off bird predators. The caterpillars mimic a bird alarm call and whistle to scare off avian predators. This idea is best captured in option (3).

Option (1) is easily ruled out because it brings an external information: 'specialised tract vocal tract'.

Option (2) is ruled out because it fails to mention that it was the sound of bird's alarm that scare off predators.

Option (4) is eliminated because it mentions 'camouflage', which is not there in the passage.

26. Option (4) is correct.

The paragraph states both Socrates and Bacon are good at useful questioning. Both stressed that 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. Option (4) captures this key idea aptly. Rest of the options talk about either proving or disproving, not both. Hence, rest of the options are eliminated.

27. Option (3) is correct.

The passage states that meanings of words are derived by usage and a lexicographer abstracts a meaning from that exchange and then sets it down in the dictionary.

Option (1) is ruled out because it says that definitions are dogmatic, which is not there in the paragraph.

Option (2) is eliminated because the paragraph doesn't tell the reason why lexicographers fix meanings.

Option (3) captures all the key ideas of the paragraph. Hence, it is the right choice.

Option (4) is eliminated because the passage doesn't intend to compare meaning of words in dictionaries with meaning which arises from exchange.

28. Correct answer is [25341].

Sentence (2) is a general statement; it introduces the topic what story tells. (2) is followed by (5), as it carries forward the idea and tells how the world is captured in stories. (34) makes a pair: (3) says "stories are never quite right" for us, and

(4) says "even if we manage to get them quite right". (1) concludes the paragraph.

29. **Correct answer is [53421].**

Sentence (5) opens the paragraph by saying that lightning is an example of ill wind that blows goodness; (3) explains why so. So, (3) follows (5). (4) talks about the importance of nitrogen, which is stated in the sentence (3). Sentence (2) talks about aerial nitrogen being unusable by plants and sentence (1) tells why nitrogen must undergo transformation.

30. **Correct answer is [25431].**

The paragraph is placebo effect. Sentence (2) introduces the topic by explaining placebo effect. Sentence (5) follows sentence (2) by saying that placebo effects are now not just studied for real interventions, as stated in sentence (2). Sentence (4) carries forward the idea of self-healing mentioned in (5). (4) discusses the role of the mind in self-healing. (3) further states that the placebo effect "is not solely based on believing in treatment". (3) is followed by (1). Sentence (1) talks about the clinical setting in which treatments are administered is also important.

31. **Correct answer is [43512].**

Sentence (3) introduces Samuel Johnson. Sentence (3) is followed by sentence (5) as it uses Johnson. (5) says that for Johnson "language must have a daily practical use" and (1) carries on this by explaining how he treated language "very practically, as a living language". (2) concludes the paragraph. Sentence (4) is an obvious opener. As it gives a generic base to the paragraph and tells about the need for a dictionary in the 18th century.

32. **Option (2) is correct.**

The subject of this paragraph is 'lost water of mars'. Sentence 5 initiates the topic by talking about two findings related to the subject matter. The first one tells how mars lost its water and the other talks about remaining water. Rest of the sentences explain these studies. (2) and (4) elaborates how mars lost its water and (3) tells where the remaining water is. Only sentence 1 can't fit in the sequence.

33. **Option (4) is correct.**

The paragraph talks about timelessness of Wimbledon and of Roger Federer. Sentence (2) introduces the topic and sentence (1) follows it. (1) talks about similar impression, which indicates timelessness mentioned in the sentence (2). Sentence (3) further elaborates how Federer did this. Sentence (5) continues the idea by claiming that he will continue to enchant for a while longer. But, 4 talks about a particular week, which makes it different in terms of scope of the paragraph.

34. **Option (1) is correct.**

The topic of the paragraph is brand logo and purpose behind logos. (25) makes a pair as both of them talk about Commonwealth Bank logo. Similarly, (43) makes a pair because both talk about giving insight about logos and why they are made cryptic by designers. All four sentences are about the same topic but sentence (5) talks about geometric symbols and aerodynamic swooshes, which does not fit in with the rest of the sentences.

Data Interpretation and Logical Reasoning (DILR)

1. **Option (2) is correct.**

T Pizzas delivered to Party 3 = 162

2. **Option (3) is correct.**

Out of 300 total NC Pizza

$$= 0.52 \times 300 = 416$$

Party 2: Out of 120 total NC Pizza

$$= 0.3 \times 120 = 36$$

Party 3: Out of 560 total NC Pizza

$$= 560 \times 0.65 = 364$$

So, NC Pizza for Party 1

$$= 416 - 36 - 364 = 16$$

3. **Option (2) is correct.**

Given that out of 36 NC Pizza

$$\Rightarrow T = \frac{50}{100} \times 36 = 18$$

then

$$D = 18$$



So, difference of T-EC & D-EC = 48 - 36 = 12

4. **Option (1) is correct.**

Given, T-EC cost = 500

then D-EC cost = 550

As T-NC and D-NC are $\frac{3}{5}$ th of D-EC

$$\text{So, T-NC and D-NC cost} = 550 \times \frac{3}{5} = ₹330$$

Now in party out of 16 NC Pizza

$$\Rightarrow D = 4$$

and T = 12

As total T in Party 1 = 72

then T-EC = 72 - 12 = 60

and Total D in Party 1 = 48

then T-EC = 48 - 4 = 44

Total bill of Party 1:

T-NC	T-EC	D-NC	D-EC
330	+ 500	+ 330	+ 550
<u>×12</u>	<u>×60</u>	<u>×4</u>	<u>×44</u>
3960	30000	1320	24200

$$= ₹59480$$

For solutions 5 to 8:

		To Elective						
From Elective		E1	E2	E3	E4	E5	E6	
		E1	9	5	10	1	4	2
		F2		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

Also can be conclude that

Each row sum = Initial number of enrolled students

Each column sum = Final number enrolled students

So,

initially enrolled in E1 = 31

Initially enrolled in E7 = 101

Finally enrolled in E2 = 76

According to point, 1 E4 = 31 - 6 = 25

Also given blank space value is either 0 or 1.

E₄ row two blank space value are 1 and 1.

And after shuffle,

$$E_4 = E_1 + 3$$

From Point 2:

$$\text{After shuffle } E_2 = \text{Before shuffle } E_2 + 30$$

$$\text{Means before shuffle } E_2 = 76 - 30$$

$$= 46$$

Means E₂ Row both vacant places would be 0 only as the sum is already 46.

from point 3 ⇒

$$\text{Before change } E_6 = E_4 - 2$$

$$= 25 - 2$$

$$= 23$$

Means both empty places in E₆ row would be 1 each, as sum is already 21 here.

And before change,

$$E_3 = E_2 - 10$$

$$= 46 - 10$$

$$= 36$$

As E₃ Row already have a sum of 35 and there are two empty places. Means either places have $\frac{0}{1}$.

Now,

$$E_5 \text{ row sum} = 300 - [31 + 46 + 36 + 25 + 23 + 101]$$

$$= 38$$

	E1	E2	E3	E4	E5	E6	Sum (initial no.)
E1	9	5	10	1	4	2	31
E2	0	34	8	0	2	2	46
E3	2	6	25	0/1	1/0	2	36
E4	1	3	2	14	1	4	25
E5		5			30		38
E6	1	7	3	1	2	9	23
E7	4	16	30	5	5	41	101

17 18 76

21/22/23

300

As maximum possible value for E₄ column sum = 18 + 3

$$= 21$$

So,

$$E_2 \text{ column sum} = 18$$

and E5 Row would be:

E1	E2	E3	E4	E5	E6
E5: 1	5	1	0	30	1

and E₃ Row:

E1	E2	E3	E4	E5	E6
E5: 2	6	25	0	1	2

5. **Option (3) is correct.**

For initial number of enrollments add row value.

So, initial enrollment in E1 = 31

Initial enrollment in E2 = 46

Initial enrollment in E3 = 36

Initial enrollment in E4 = 25

Initial enrollment in E5 = 38

Initial enrollment in E6 = 23

Initial enrollment in E7 = 101

For final number of enrollments add column value.

So, final enrollment in E1 = 18

Final enrollment in E2 = 76

Final enrollment in E3 = 79

Final enrollment in E4 = 21

Final enrollment in E5 = 45

Final enrollment in E6 = 61

So, clearly two causes E1 and E4 decrease in their enrollments after change process.

6. **Option (4) is correct.**

As can be seen from column sum, the correct sequence of number of students from

E1 to E4: 18, 76, 79, 21, 45, 61

7. **Option (4) is correct.**

Changes in E1: 31 to 18

Changes in E2: 46 to 76

Changes in E3: 36 to 79

Changes in E4: 25 to 21

Changes in E5: 38 to 45

Changes in E6: 23 to 61

Maximum percentage change in E6

and $\% \text{ change} = \frac{28}{23} \times 100 = 165.2\%$

8. **Option (1) is correct.**

Only course in this category is E2. So, now all students who had left again enroll to E1.

Now column sum of E1 = 31, E2 = 71, E3 = 69, E4 = 20, E5 = 41 and E6 = 59.

So, final decreasing order of final enrollments = E2, E3, E6, E5, E1, E4

For solutions 9 to 12:

Old woman had three children:

Neeta, Seeta and Geeta

Old woman have:

1. 70 lakh in bank deposits.

2. 1 house worth 50 lakh.

3. 3 flats, each worth ₹ 30 lakhs.

4. Certain number of gold coins, each worth ₹ 1 Lakh.

9. **Option (3) is correct.**

Total value of assets = 70 + 50 + 30
= 150

Each will get equal valued assets means 70 lakh as worth.

So, possible combination is:

1	2	3
1 house	2 flats	1 flat
+20 lakh	+ 10 lakh	+ 40 lakh
bank deposit	bank deposit	bank deposit
+ Gold coin	+ Gold coin	+ Gold coin

As per question condition 1st child is Seeta, 2nd is Neeta and 3rd is Geeta.

10. **Option [2] is correct.**

As already solved ⇒ Neeta received 2 flats.

11. **Option (2) is correct.**

Assets distributed among Neeta, Seeta and Geeta are in ratio of 1 : 2 : 3

and gold coin ratio = 2 : 3 : 4

Let total gold coin = 9x

So, total value of assets = 50 + 3 × 30 + 70 + 9x
= 210 + 9x

As Seeta received $\frac{1}{3}$ rd of total asset = 70 + 3x

Means Seeta getting 1 house + 20 lakh + 3x coins

Means Neeta getting 30 Lakh deposit and Neeta getting least means Geeta is getting all 3 flats.

Neeta	Seeta	Geeta
30 lakh	70 lakh	110 lakh
	(H + 20L)	(3 flat + 20L)
+ 2x	+3x	+ 4x
coin	coin	coin
1	2	3

Now, $\frac{30 + 2x}{7 + 3x} = \frac{1}{2}$

x = 10 L

Total value of gold coin = 9×10
 = 90 Lakh
 So, total gold coin = $\frac{90}{1} = 90$

12. Correct answer is [20].
 As discussed in question 33,
 Geeta get 20 lakh in bank deposit.

For solutions 13 to 16:

Point 1:

D_1, D_3, D_5, D_7, D_9 = Moderate/Extensive repair
 $D_2, D_4, D_6, D_8, D_{10}$ = Light/Extensive repair
 D_3, D_6, D_9 = Light/Moderate repair

from here:

D_3, D_9 = Extensive repair
 D_6 = Light repair

Also given that the cost of,

1. Light repair = 1 or 2 crores
2. Moderate repair = 3 or 4 crores
3. Extensive repair = 5 or 6 crores

Point 2: All D_4 to D_9 need different repair cost and D_7 is maximum and D_8 is minimum.

Means, D_7 need = 6 crore
 D_8 need = 1 crore

so D_6 must needed = 2 crore

from point 1 the possible cost for:

D_1, D_3, D_5, D_7, D_9 = 3/4/5/6 crore ...(x)
 & $D_2, D_4, D_6, D_8, D_{10}$ = 1/2/5/6 crore ...(y)

As D_6, D_7, D_8 repair cost is 2, 6 and 1 crore respectively, then possible value for

D_4, D_5 & D_9 = 3/4/5 crore ...(z)

From point (y) and point (z):

D_4 repair cost = 5 crore
 and cost for D_5 & D_9 = 3/4 crore.

From the table of given question:

Repair Cost	No. of Dorms
1	2
2	1
3	3
4	1
5	1
6	2
Total Dorms = 10	

Now, from both tables the costs are left now for

D_1, D_2, D_3, D_{10} = 1, 3, 3, 6 crores

Also, known even dorms can have only 1/2/5/6 crore.

Means possible value for D_2 and D_{10} = 1/6 crores

So, for D_1 and D_3 repair cost = 3 crore each.

	D ₁	D ₂	D ₃	D ₄	D ₅	D ₆	D ₇	D ₈	D ₉	D ₁₀
Repair cost (crore)	3	1/6	3	5	3/4	2	6	1	4/3	6/1

13. **Option (4) is correct.**

Point 1: True [from table]

Point 2: True [from table]

Point 3: True [from table]

Point 4: May or may not be true

14. **Correct answer is [19].**

$$D_1 + D_3 + D_5 + D_7 + D_9 = 3 + 3 + 3 + 4 + 6 \\ = 19 \text{ crore}$$

15. **Correct answer is [3].**Now, out of 10 dorm's \rightarrow 4 women's & 6 men's

Total repair cost for women dorms = 20 cr

only possible values for this 20 cr = 6,6,5,3 cr

Also, given that from D_1 to D_5 only one women's dorm.Means, D_4 which repair cost is 5 cr, is women dormthen, D_2 repair cost = 1 cr D_{10} repair cost = 6 cr [women's dorm] D_7 repair cost = 6 cr [women's dorm] D_9 repair cost = 3 cr [women's dorm]16. **Option (4) is correct.**

Dorm 10 is women's dorm.

For solutions 17 to 20:**From statement 4 & 5:** Only two cups have been given even numbered ratings and one of them is given to the tea in Cup 2.

So, the Cup 2 can either be 2 or 4. As it can not be more than 4 else statement 3 will become wrong.

From statement 3: It can be inferred that the rating of the tea in Cup 3, is an even number as the rating of the tea in Cup 3 is double the rating of the tea in Cup 5.

So, Cups 3 and 5 could have ratings 1 & 2, 3 & 6, or 5 & 10. Cup 2 has the least rating and so, Cup 5 cannot have 1.

Hence, Cups 3 & 5 could have ratings 3 & 6, or 5 & 10. From statement 2, Cup 3 does not have the highest rating, so we can say Cup 5 has rating of 3 and Cup 3 has a rating of 6.

From statement 6: We can say that Cup 1 < Cup 3. Rating of Cup 1 cannot be 1 and 3. It also cannot 4 as the number of even integer ratings is only 2. Hence, Cup 1 has a rating of 5.

So far, we can conclude that Cup 1 = Rating of 5, Cup 2 = Rating of 2, Cup 3 = Rating of 6, Cup 5 = Rating of 3. The only possible remaining ratings are 7 and 9. Cups 4 and 6 should have these two ratings in some order.

Cup 6 is Himachal and Ooty has the highest rating, so Cup 6's rating is 7 as the cup containing tea from Ooty has to be Cup 4.

So, table will look like;

Cup No.	Rating	Place
1	5	
2	2	
3	6	
4	9	Ooty
5	3	
6	7	Hiamchal

17. **Correct answer is [7].**

From the above explanation, 7 is the second highest rating.

18. **Correct answer is [4].**

From above explanation,

4th number cup contained the tea from Ooty.19. **Option (2) is correct.**

We also have rating of Assam > Wayanad > Munnar

Now, let us say tea from Wayanad is in Cup 3. Then, tea from Assam will have a lower rating than Wayanad. Therefore, Wayanad cannot be in Cup 3.

Hence, tea from Wayanad is in Cup 5. Rating of Cup 5 is 3. Also, rating of Wayanad > Munnar. Hence, tea from Munnar is in Cup 2.

Now remaining possibilities;

Tea from Assam is in Cup 1 with a rating of 5. Then, Cup 3 will have tea from Darjeeling and will have a rating of 6.

Tea from Assam is in Cup 3 with a rating of 6. Then, Cup 1 will have tea from Darjeeling and will have a rating of 5.

Among the given choices, we can eliminate A, C and D.

So, option (2) is correct.

20. **Option (2) is correct.**

Also given that the rating of Assam > Wayanad > Munnar

The cup no.'s that are still unassigned to the places are Cup 1, 2, 3 and 5.

Now, among these four teas from Munnar can either be in Cup 2 or Cup 5. If the tea from Munnar does not have the lowest rating, then it has a rating of 3 and hence it is in Cup 5.

According to statement 7, if Munnar has a rating of 3, then, Wayanad should have a rating of 5 and Assam should have rating of 6.

Hence, Wayanad has a rating of 5.

For solutions 21 to 24:

21. Option (3) is correct.

	A	B	C	D	E	F	G	H
1							•	
2			•					
3	•						•	
4								
5			Q				•	
6								
7								
8								

Given five pieces of chess:

C_2, G_1, G_3, G_5 and A_3

Now G_5 is in same row to Q and C_2 is in same column.

A_3 and G_1 are at diagonal positions.

So, Q can attack total 4 pieces.

22. Option (4) is correct.

Pieces are placed at positions A_1, A_3, B_4, D_7, H_7 and H_8 .

	A	B	C	D	E	F	G	H
1	•							
2								
3	•							
4		•						
5								
6								
7				•				•
8								•

Option 1: If Q at F_7 then pieces under attack = 2 [D_7 and H_7]

Option 2: If Q at A_5 then pieces under attack = 2 [A_3 and A_1]

Option 3: If Q at C_1 then pieces under

attack = 2 [A_1 and A_3]

Option 4: If Q at D_3 then pieces under attack = 3 [A_3, D_7 and H_7]

23. Option (3) is correct.

If pieces are only at positions A_1, A_3, B_4, D_7, H_7 and H_8 .

	A	B	C	D	E	F	G	H
1	A_1							
2								
3	A_3							
4		B_4						
5								
6								
7				D_7				H_7
8								H_8

There are only four places E_2, F_2, G_2 and G_5 from where Q cannot attack any of the pieces.

24. Option (3) is correct.

Now Q is placed at D_5 . Then Q can attack at all places in column D and row 5 along with all diagonal positions pieces.

	A	B	C	D	E	F	G	H
1								
2	↖			↑				↗
3								
4								
5	←			Q				→
6								
7								
8	↙							↘

Positions where Q can attack
 = 6 + 5 + 5 + 5 + 5 + 5 + 5
 = 36

For solutions 25 to 28:

Extra charges

Given that

(1) for Row 1, 12 and 13 = ₹1000.

(2) for Row 2 to 10 = [300 for window seat, 500 for aisle seat]

(3) for Row 11, 14 to 20 = [200 for window seat, 400 for aisle seat]

Point (1) and (2): Total 8 friends occupied 3 W seat, 4 A seat and 1 M seat in six different rows.

Point 3: Seven of them paid ₹4600 extra amount.

Point 4: J, A, B were sitting in seats marked by same letter in consecutive row paying different amount.

The only possible combination of Rows are:

10	J
11	A
12	B

Point 5: G K and M J are next to each other in same row.

Point 6: $\begin{bmatrix} P \\ T \end{bmatrix}$ same letter marked seats in increasing order of row number and they paid different amount for their choices of seat.

Possible sitting arrangement is:

	A	B	C		D	E	F
10			J		M		
11			A				
12			B				
13					G	K	
20						P	
21						T	

From above table following answers can be concluded.

25. **Option (1) is correct.**
M is in Row 10.
26. **Option (3) is correct.**
As J is sitting at Aisle seat, so, he have to pay ₹500 extra.
27. **Option (4) is correct.**
As G is sitting in Row 13 so have to pay ₹1000 extra.
28. **Option (4) is correct.**
T did not paid any extra amount for his choice of seat.

For solutions 29 to 32:



29. **Correct answer is [11].**

Let TLMRI is original sequence.

Two fingers can be out of place. So, number of combinations possible = ${}^5C_2 = 10$ and 1 original sequence is acceptable.

So, total allowed sequence = $10 + 1 = 11$

30. **Option (3) is correct.**

Given original 
allowed 

Possible combination which are acceptable.

- 1 = original
- 4 = any two consecutive place changing each other.
- 2 = first two interchanged and simultaneously from last three any one pair.



- 1 = when BC changed along with DE



The number of possible combination
= $1 + 4 + 2 + 1 = 8$

31. **Correct answer is [15].**

Given that two scans are out of place.

Original sequence = TIMTRL

Case 1: When T interchanged then possible ways are ITMTRL, MITTRL, RIMTTL, LIMTRT.

Case 2: Same when I is interchanged then possible ways are 4.

Case 3: When M is interchanged then possible ways are 3.

Case 4: When T is interchanged then possible ways are 2.

Case 5: When R is interchanged then one way is possible.

Total possible ways = 14

One original sequence is also allowed.

Final total = $14 + 1 = 15$

32. **Option (3) is correct.**

Total number of possible ways:

(1) Original sequence which is LRLTIM.

(2) If either LR, RL, LT, TI, IM is interchanged then 5 ways.

(3) If LR and LT and IM interchanged.

(4) If LR and LT are interchanged.

(5) If LR and TI are interchanged.

(6) If LR and IM are interchanged.

(7) If RL and TI are interchanged.

(8) If RL and IM are interchanged.

(9) If LT and IM are interchanged.

Total possible ways = 13

Quantitative Aptitude (QA)

1. **Correct answer is [3].**

According to the question,

$$\text{Sum of total given numbers} = \frac{9 \times 10}{2} = 45$$

As there are 3 rows and 3 columns.

So, sum of the numbers of each row and column

$$= \frac{45}{3} = 15$$

Also given that two numbers in first row are 6 & 2.

So, third number of first row = $15 - (6 + 2) = 7$

From given numbers 1, 2, 3, 4, 5, 6, 7, 8, and 9, five is the middle number. So, 5 comes in the middle of 2nd row.

Last number of 2nd column = $15 - (7 + 5) = 3$

Hence, row and column numbers are as shown below,

6	7	2
	5	
	3	

Now, last number of 3rd column = 15 - (6 + 5) = 4
 And 2nd number of 3rd column = 15 - (2 + 4) = 9
 3rd number of 1st column = 15 - (5 + 2) = 8
 And 2nd number of 1st column = 15 - (6 + 8) = 1
 So, now final table would be:

6	7	2
1	5	9
8	3	4

Hence the bottom middle number is 3.

2. **Correct answer is [1900].**

By the time A traveled 10 km, B traveled 9 km.

Hence, $V_A : V_B = 10:9$

Similarly, $V_B : V_C = 10:9$

Hence, $V_A : V_C = V_A : V_B \times V_B : V_C =$

$$\frac{10}{9} \times \frac{10}{9} = \frac{100}{81}$$

Hence, by the time A traveled 10 kms, C should have travelled 8.1 kms.

So, A beat C by 1.9 km = 1900 m

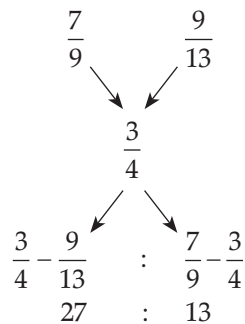
3. **Option (2) is correct.**

Milk proportion in the 1st bottle = $\frac{7}{9}$

Milk proportion in the 2nd bottle = $\frac{9}{13}$

Milk proportion in the resultant = $\frac{3}{4}$

Using allegation:



4. **Option (3) is correct.**

Let's say the distance between home and hostel is D.

$$\left(\frac{D}{2} + 5\right) \div \frac{D}{2} = \frac{D}{60} + 0.5$$

$\Rightarrow D = 30$

So, the total distance is $2 \times D + 5 = 65$

5. **Option (2) is correct.**

Let the total number of shirts be 100. Hence, number of non defective shirts $100 - 15 = 85$

Number of shirts left for export
 = No. of non defective shirts
 - number of shirts sold in domestic market
 = No. of non defective shirts
 - 20% of No. of non defective shirts
 = 80% of 85 = 68
 Hence, if 68 = 8840

Then $100 = \left(\frac{8840}{68}\right) \times 100 = 13000$

6. **Option (3) is correct.**

Let the average height of 22 toddlers is x inches.

So, total height of 22 toddlers = $22x$ inches

According to the question,

Total height of 20 toddlers = $20(x + 2)$ inches

And total of other two toddlers

$$= \frac{x}{3} \times 2 = \frac{2x}{3} \text{ inches}$$

Hence, $22x = 20(x + 2) + \frac{2x}{3}$

$\Rightarrow 66x = 60x + 120 + 2x$

$\Rightarrow x = 30$

So, average of those 20 toddlers = $30 + 2 = 32$ inches.

7. **Option (2) is correct.**

Let, the manufacturing price of the table = x

Hence, the price at which the wholesaler bought from the manufacturer = $1.1x$

The price at which the retailer bought from the wholesaler = $1.3 \times 1.1x$

The price at which the customer bought from the retailer = $1.5 \times 1.3 \times 1.1x$

$= 2.145x = 4290$

$\Rightarrow x = 2000$

We have 3 successive increases 30%, 10% and 50%.

We can use successive percentage for 2 groups of

30 and 10 which will be $30 + 10 + (30 \times \frac{10}{100})$, i.e.,

43 and then club with 50 which will result in a net increase of 114.5%.

So, the net value is 214.5% of x or $2.145x$.

8. **Option (1) is correct.**

Let, the capacity of the cistern be 40 litres.

Efficiency of inlet pipe = $\frac{40}{8} = 5$ litres/h.

Total efficiency of inlet and outlet pipe

$$= \frac{40}{10} = 4 \text{ litres/h}$$

Hence, the efficiency of the outlet pipe = $5 - 4 = 1$ litre/h

Time taken to completely empty a full tank = 40 hrs

Hence, the time taken by the outlet pipe to make

the tank half - full = $\frac{40}{2} = 20$ hours

9. **Option (1) is correct.**

Let the number of dozens of candies he bought of each variety be x .

$$\text{Hence, the total cost} = 12x + 15x = 27x$$

$$\text{Total selling price} = 16.50 \times 2x = 33x$$

$$\text{Profit} = 33x - 27x = 6x$$

$$\text{Given, } 6x = 150 \Rightarrow x = 25$$

Hence, he bought 50 dozens of candies in total.

10. **Option (3) is correct.**

Production = Per-capita \times Population

$$\begin{array}{ccc} \uparrow 40\% & \uparrow 27\% & \uparrow \end{array}$$

By successive percentage,

$$40 = 27 + x + \frac{27x}{100}$$

$$x = \frac{13}{1.27} \approx 10\%$$

11. **Option (3) is correct.**

Given that:

$$a : b = 3 : 4 \text{ and } b : c = 2 : 1$$

$$\text{So, } a : b : c = 3 : 4 : 2$$

Let the values of a , b and c are $3x$, $4x$ and $2x$ respectively.

$$\text{Now, } a + b + c = 3x + 4x + 2x = 9x$$

Hence, the sum of given numbers must be divisible by 9.

From the given options, only 207 is divisible by 9.

12. **Option (2) is correct.**

Speed of the Bike

$$= 168 \text{ km} / (2 \text{ h } 40 \text{ mins})$$

$$= 63 \text{ km/h}$$

$$\text{So, the Speed of the car} = 63 \times 2 = 126 \text{ km/h}$$

$$\text{Distance travelled by the car} = 126 \times (1 \text{ h } 40 \text{ mins})$$

$$\text{or } 126 \times \frac{5}{3} = 210 \text{ (Since, The car starts at 2 p.m.)}$$

$$\text{Hence, the total distance} = 210 + 168 = 378 \text{ km.}$$

13. **Option (1) is correct.**

Let, the work be 40 units.

$$\begin{aligned} \text{Hence, the efficiency of Amal} &= \frac{40}{10} \\ &= 4 \text{ units/day} \end{aligned}$$

$$\text{Efficiency of Bimal} = \frac{40}{8} = 5 \text{ units/day}$$

$$\begin{aligned} \text{Efficiency of Amal + Kamal + Bimal} &= \frac{40}{4} \\ &= 10 \text{ units/day} \end{aligned}$$

$$\text{Hence, the efficiency of Kamal} = 10 - 4 - 5 = 1$$

$$\text{Kamal gets } \frac{1}{10} \text{ of } 1000 = ₹100. \text{ Since, money will}$$

be divided in the ratio of their efficiencies which is 4 : 5 : 1.

14. **Option (3) is correct.**

Mixtures A, B, & C are mixed in the ratio 4 : 3 : 2.

Let, the volumes = $4x$, $3x$, $2x$, respectively

Mixtures	Ratio	Water	Liquid
Mixture A	1 : 2	$4k \left(\frac{1}{3}\right)$	$4k \left(\frac{2}{3}\right)$
Mixture B	1 : 3	$3k \left(\frac{1}{4}\right)$	$3k \left(\frac{3}{4}\right)$
Mixture C	1 : 4	$2k \left(\frac{1}{5}\right)$	$2k \left(\frac{4}{5}\right)$

Assume $x = 60$ [LCM (3, 4, 5) = 60]

$$\text{Volume of Liquid A} = \frac{8x}{3} = 160$$

$$\text{Volume of Liquid B} = \frac{9x}{4} = 135$$

$$\text{Volume of Liquid C} = \frac{8x}{5} = 96$$

$$\begin{aligned} \text{Volume of water} &= \frac{4x}{3} + \frac{3x}{4} + \frac{2x}{5} = 80 + 45 + 24 \\ &= 149 \end{aligned}$$

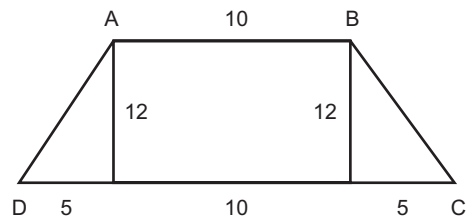
\Rightarrow There is more water than Liquid B.

15. **Option (2) is correct.**

The length of diagonals of a regular hexagon with side s are $\sqrt{3}s$.

Here, length of AC = $\sqrt{3}$ cm = length of the square.

Hence, Area of the square = 3 sq cm

16. **Option (3) is correct.**

$$\text{Length of AD} = \sqrt{12^2 + 5^2} = 13$$

$$\text{Area of the trapezium} = \frac{12 \times (10 + 20)}{2} = 180$$

Perimeter of the trapezium

$$= 10 + 20 + 13 + 13 = 56$$

Area of the sides of the pillar

$$= 56 \times \text{height} = 56 \times 20 = 1120.$$

Total area of the pillar

$$= 1120 + \text{area of base} + \text{area of the top}$$

$$= 1120 + 180 + 180 = 1480$$

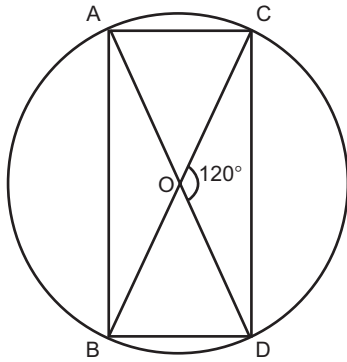
17. **Option (4) is correct.**

The midpoint of one diagonal lies on the other diagonal.

$$\text{Midpoint is } \left(\frac{(2+6)}{2}, \frac{(5+3)}{2} \right) = (4, 4)$$

$$\begin{aligned} \text{Hence,} & \quad 4 = 3 \times 4 + c \\ \Rightarrow & \quad c = -8 \end{aligned}$$

18. Correct answer is [90].



$$\angle CAD = \frac{1}{2} (\angle COD)$$

$$\angle CAD = 60$$

Hence, $\angle BAD = 60 + 30 = 90$

$$\angle BAD + \angle BCD = 180$$

(Opposite angles of a cyclic quadrilateral is 180)

$$\Rightarrow \angle BCD = 180 - 90 = 90$$

19. Correct answer is [200].

Let the length and breadth of the park be l and $b, l > b$

Case 1: $2l + b = 400$

Area = lb

Area is maximum when $2l \times b$ is maximum, which is maximum when $2l = b$

$$\Rightarrow l = 100, b = 200$$

Which can't happen since $l > b$

Case 2: $l + 2b = 400$

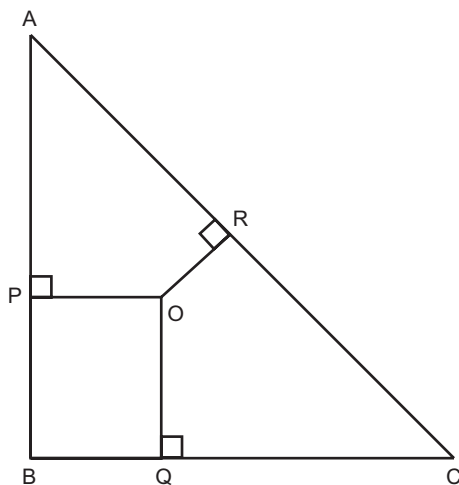
Area = lb

Area is maximum when $l \times 2b$ is maximum, which is maximum when $l = 2b$

$$\Rightarrow l = 200, b = 100.$$

Hence, the length of the longer side is 200 ft.

20. Correct answer is [16].



Let, $AB = BC = a$

Then, $AC = a\sqrt{2}$

Given, $OP = OQ = OR = 4(\sqrt{2} - 1)$

Here, radius $r = \frac{a + a - a\sqrt{2}}{2}$

$$\Rightarrow (4\sqrt{2} - 1) = \left(\frac{2a - a\sqrt{2}}{2} \right)$$

$$\therefore a = \frac{8}{\sqrt{2}}$$

$$\therefore \text{Area of } \triangle ABC = \frac{1}{2} \times \frac{8}{\sqrt{2}} \times \frac{8}{\sqrt{2}} = 16$$

Shortcut method:

Since $AC = BC$, it follows that $AF = AD = BD = BE$

Let $AF = AD = BD = BE = a$ (assume)

For right angled triangle,

$$ABC, AB^2 = AC^2 + BC^2$$

$$\Rightarrow (2a)^2 = (a + r)^2 + (a + r)^2$$

$$\Rightarrow 4a^2 = 2(a + r)^2$$

$$\Rightarrow r = a(\sqrt{2} - 1)$$

Given, $r = 4(\sqrt{2} - 1)$

$$= a(\sqrt{2} - 1)$$

$$\Rightarrow a = 4$$

Side $AC = BC = a + r = 4 + 4\sqrt{2} - 4 = 4\sqrt{2}$

\Rightarrow Area of triangle $ABC = 1/2 \times AC \times BC$

$$= \frac{1}{2} \times 4\sqrt{2} \times 4\sqrt{2} = 16$$

21. Option (4) is correct.

Given, that $(x - 1)(x)(x + 1) = 15600$. Hence, $x^3 - x = 15600$ The nearest cube to 15600 is $15625 = 25^3$

Hence, making a calculated approximation, we can say that $x = 25$

Hence, the three numbers are 24, 25, 26. Sum of their squares = 1877.

22. Option (4) is correct.

$$1 < \log_5 5 < 2$$

$$\Rightarrow 1 < \log_5 (2 + x) < 2$$

$$\Rightarrow 5 < 2 + x < 25$$

$$\Rightarrow 3 < x < 23$$

23. Option (3) is correct.

$$\begin{aligned} f[f(g(1)) + g(f(1))] &= f[f(2^1) + g(1^2)] \\ &= f[f(2) + g(1)] \\ &= f[2^2 + 2^1] \\ &= f(6) \\ &= 6^2 \\ &= 36 \end{aligned}$$

24. Option (3) is correct.

Let the roots be 'm' & 'n'

\Rightarrow Sum of the roots,

$m + n = -(a + 3)$ and product of the roots,
 $m \times n = -(a + 5)$

Sum of the squares of the roots,

$$\begin{aligned} m^2 + n^2 &= (m + n)^2 = 2m \times n \\ &= [a(a + 3)^2 - 2 \times (-(a + 5))] \\ &= [(a + 3)^2 + 2(a + 5)] \\ &= a^2 + 8a + 19 \\ &= 12 + 2 \times 4 \times a + 4^2 + 3 \\ &= (a + 4)^2 + 3 \end{aligned}$$

The minimum value of this expression is 3.

25. **Option (1) is correct.**

Given, $9^{\left(x - \frac{1}{2}\right)} - 2^{(2x-2)} = 4^x - 3^{(2x-3)}$

Rearrange: $9^{\left(x - \frac{1}{2}\right)} + 3^{(2x-3)} = 4^x + 2^{(2x-2)}$

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

$$\Rightarrow 3^{(2x-3)}(10) = 2^{(2x-2)}(5)$$

$$\Rightarrow 3^{(2x-3)} = \frac{2^{(2x-2)}(5)}{10}$$

$$\Rightarrow 3^{(2x-3)} = \frac{2^{(2x-2)}}{2}$$

$$\Rightarrow 3^{(2x-3)} = 2^{(2x-3)}$$

$$\Rightarrow \frac{3^{(2x-3)}}{2^{(2x-3)}} = 1$$

$$\Rightarrow \left(\frac{3}{2}\right)^{(2x-3)} = 1$$

Comparing power on, both sides, we get

$$2x - 3 = 0$$

$$\Rightarrow x = \frac{3}{2}$$

26. **Correct answer is [3].**

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

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

$$3 \log(2^a \times 3^b \times 5^c) = \log(2^{2+6+1} \times 3^{3+1+2} \times 5^{1+7+4})$$

$$\log(2^{3a} \times 3^{3b} \times 5^{3c}) = \log(2^9 \times 3^6 \times 5^{12})$$

Hence, $3a = 9$

or $a = 3$

27. **Correct answer is [51].**

The 5 consecutive odd numbers are

$$a_1, a_2, a_3, a_4, a_5$$

The 5 consecutive even numbers are

$$2a_3 - 8, 2a_3 - 6, 2a_3 - 4, 2a_3 - 2, 2a_3$$

The sum of these 5 numbers = $10a_3 - 20$

$$= 450 \text{ (given)}$$

$$\therefore a_3 = 47 \text{ and } a_5 = 51.$$

28. **Correct answer is [3].**

Given $\frac{1}{a} + \frac{1}{b} = \frac{1}{9}$

$$ab = 9(a + b)$$

$$\Rightarrow ab - 9(a + b) = 0$$

$$\Rightarrow ab - 9(a + b) + 81 = 81$$

$$\Rightarrow (a - 9)(b - 9) = 81, a \geq b.$$

The pairs of factor of 81 which make 81 are (81, 1) (27, 3) (9, 9)

Hence,

$$a - 9 = 81, b - 9 = 1 \Rightarrow (a, b) = (90, 10)$$

$$a - 9 = 27, b - 9 = 3 \Rightarrow (a, b) = (36, 12)$$

$$a - 9 = 9, b - 9 = 9 \Rightarrow (a, b) = (18, 18)$$

29. **Correct answer is [6].**

According to the question, Possible cases are as written below.

Amal	Bimal	Kamal
1	2	5
1	3	4
2	4	3
2	2	4
3	3	3
3	2	3

So, total 6 ways are possible.

30. **Correct answer is [50].**

For the number to be divisible by 6, the sum of the digits should be divisible by 3 and the units digit should be even.

Hence, we have the digits as:

Case I: 2, 3, 4, 6

Now, the units place can be filled in three ways (2, 4, 6), and the remaining three places can be filled in $3! = 6$ ways.

Hence, total number of ways = $3 \times 6 = 18$

Case II: 0, 2, 3, 4

Case II (a): 0 is in the units place

$$\Rightarrow 3! = 6 \text{ ways}$$

Case II (b): 0 is not at the units place

\Rightarrow units place can be filled in 2 ways (2, 4), thousands place can be filled in 2 ways (remaining 3 - 0 and remaining can be filled in $2! = 2$ ways. Hence, total number of ways = $2 \times 2 \times 2 = 8$

Total number of ways in this case = $6 + 8 = 14$ ways.

Case III: 0, 2, 4, 6

Case III (a): 0 is in the units place

$$\Rightarrow 3! = 6 \text{ ways}$$

Case III (b): 0 is not in the units place

\Rightarrow units place can be filled in 3 ways (2, 4, 6), thousands place can be filled in 2 ways (remaining 3 - 0) and remaining can be filled in $2! = 2$ ways. Hence, total number of ways

$$= 3 \times 2 \times 2 = 12$$

Total number of ways in this case = $6 + 12$

$$= 18 \text{ ways.}$$

Hence, the total number of ways = $18 + 14 + 18$

$$= 50 \text{ ways}$$

31. **Correct answer is [1].**

Given that: $f(ab) = f(a).f(b)$
 For largest possible value of $f(1)$,

$$\begin{aligned} \Rightarrow f(a \times 1) &= f(a) \times f(1) \\ \Rightarrow [f(a) \times f(1)] - f(a) &= 0 \\ \Rightarrow f(a)[f(1) - 1] &= 0 \end{aligned}$$

So, either $f(a) = 0$ or $f(1) - 1 = 0$.

If $f(a) = 0$, then it is a constant function. Hence, $f(1) = 0$.

But, if $f(1) - 1 = 0$
 $\Rightarrow f(1) = 1$.

Hence, $f(1) = 0$ or $f(1) = 1$.

Out of these, $f(1) = 1$ is the largest possible value.

32. **Option (4) is correct.**

$$\begin{aligned} |f(x) + g(x)| &= |f(x)| + |g(x)| \\ \Rightarrow |2x - 5 + 7 - 2x| &= |2x - 5| + |7 - 2x| \\ \Rightarrow |2| &= |2x - 5| + |7 - 2x| \\ \Rightarrow |2x - 5| + |7 - 2x| &= 2 \end{aligned}$$

The only case possible is when $|2x - 5| = +(2x - 5)$ and $|7 - 2x| = +(7 - 2x)$

$$\begin{aligned} \Rightarrow |2x - 5| \geq 0 \ \&\& \ |7 - 2x| \geq 0 \\ \Rightarrow |2x - 5| \geq 0 \ \&\& \ 7 - 2x \geq 0 \\ \Rightarrow 2x \geq 5 \ \&\& \ 2x \leq 7 \\ \Rightarrow 5 \leq 2x \leq 7 \\ \Rightarrow \frac{5}{2} \leq x \leq \frac{7}{2} \end{aligned}$$

33. **Option (3) is correct.**

For any $n \geq 1, a_n = 3(a_{n+1} + a_{n+2} + \dots)$

The G.P is 24, 6, 1.5, $\frac{1.5}{4}, \frac{1.5}{16}, \dots$

$$\begin{aligned} \therefore a_5 &= \frac{1.5}{16} \\ &= \frac{3}{32} \end{aligned}$$

34. **Option (1) is correct.**

$$\begin{aligned} a_1 &= \frac{1}{2(5)} \\ &= \frac{1}{3} \left(\frac{1}{2} - \frac{1}{5} \right) \\ a_2 &= \frac{1}{5(8)} \\ &= \frac{1}{3} \left(\frac{1}{5} - \frac{1}{8} \right) \\ a_{100} &= \frac{1}{299(302)} \end{aligned}$$

All the terms like $\frac{1}{5}, \frac{1}{8}, \dots, \frac{1}{299}$ will cancel out.

$$\begin{aligned} \therefore \text{The sum} &= \frac{1}{3} \left(\frac{1}{2} - \frac{1}{302} \right) \\ &= \frac{1}{3} \frac{(300)}{(2)(302)} \\ &= \frac{50}{302} = \frac{25}{151} \end{aligned}$$