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AIMCAT 2004

VARC

DIRECTIONS *for questions 1 to 5:* The passage given below is accompanied by a set of five questions. Choose the best answer to each question.

[The belief that] hierarchy in human societies [is] a natural part of who we are contradicts much of the 200,000-year history of Homo sapiens. Our [hunter-gatherer] ancestors have for the most part been “fiercely egalitarian”, intolerant of any form of inequality [...] aggressively rejecting efforts to institutionalise them into any form of hierarchy.

So, what happened to cause such a profound shift in the human psyche away from egalitarianism? The balance of archaeological, anthropological and genomic data suggests the answer lies in the agricultural revolution, which began roughly 10,000 years ago.

...Hunting and gathering was a low-risk way of making a living. Ju/'hoansi hunter-gatherers in Namibia traditionally made use of 125 different edible plant species, each of which had a slightly different seasonal cycle, varied in its response to different weather conditions, and occupied a specific environmental niche. When the weather proved unsuitable for one set of species it was likely to benefit another [...]. As a result, hunter-gatherers considered their environments to be eternally provident, and only ever worked to meet their immediate needs. They never sought to create surpluses nor over-exploited any key resources. Confidence in the sustainability of their environments was unyielding.

In contrast, Neolithic farmers assumed full responsibility for “making” their environments provident. They depended on a handful of highly sensitive crops or livestock species. When the stars were in alignment – weather favourable, pests subdued, soils still packed with nutrients – agriculture was much more productive than hunting and gathering enabling farming populations to grow far more rapidly than hunter-gatherers and sustain these growing populations over much less land.

But successful Neolithic farmers were still tormented by fears of drought, blight, pests, frost and famine. In time, this profound shift in the way societies regarded scarcity also induced fears about raids, wars, strangers – and eventually, taxes and tyrants. Not that early farmers considered themselves helpless. If they did things right, they could minimise the risks that fed their fears. This meant pleasing capricious gods in the conduct of their day-to-day lives – but above all, it placed a premium on working hard and creating surpluses.

... The productivity of a patch of land is directly proportional to the amount of energy you put into it. This principle that hard work is a virtue, and its corollary that individual wealth is a reflection of merit, is perhaps the most obvious of the agricultural revolution’s many social, economic and cultural legacies. Regular surpluses enabled a much greater degree of role differentiation: priests to pray for good rains; fighters to protect farmers from wild animals and rivals; politicians to transform economic power into social capital...The greater the surpluses a society produced, the greater the levels of inequality in that society. Their need to sustain ever-larger populations also set in motion a cycle of geographic expansion by means of conquest and war...

Many of the challenges created by the agricultural revolution, such as the problem of scarcity, have largely been solved by technology – yet our preoccupation with hard work and unrestrained economic growth remains undimmed. This obsession risks cannibalising our – and many other species’ – futures. Our current social, political and economic models are not an inevitable consequence of human nature, but a product of our recent history. That knowledge could free us to be more imaginative in changing the way we relate to our environments, and one another. Having spent 95% of Homo sapiens’ history hunting and gathering, there is surely a little of the hunter-gatherer psyche left in all of us.

Q1. In the last line of the passage, the author seems to suggest that

- a) survival instinct is still part of the human species.

- b) our hunter-gatherer psyche could lead us to cannibalise our own species.
- c) our social, political and economic models are compatible with our hunter-gatherer instincts.
- d) humanity needs to revert to the pre-agricultural era way of thinking. ✓ Your answer is correct

Number of words and Explanatory notes for RC:

Number of words: 576

Consider the sentences: '*Having spent 95% of Homo sapiens' history hunting and gathering, there is surely a little of the hunter-gatherer psyche left in all of us.*' The author hopes that human beings have the hunter-gatherer psyche which is starkly different from that of the Neolithic farmer.

Option A: Survival instinct is an alien concept in this argument as the difference between Neolithic farmer psyche and the hunter-gatherer psyche was not drawn out on the basis of survival skills. It was more with respect to their relationship with the environments. Hence, Option A is not the answer.

Option B: It is the Neolithic farmer psyche of constant economic growth and chasing surpluses that is cannibalising our species and the others, and the author suggests a reversal to the hunter-gatherer psyche. Hence, Option B is not the answer.

Option C: This is a contradiction of the information in the passage where the author suggests '*Our current social, political and economic models are not an inevitable consequence of human nature, but a product of our recent history.*' Option C is not the answer.

Option D: This is what the author implies by saying *surely there is some of that old psyche still left in us* – which is that of trusting the environment and not chasing surpluses. The author recommends reverting to the way of thinking of the hunter-gatherers (more about living in the present and not over-exploiting environmental resources). Hence, Option D is the answer. Choice (D)

Q2. The 'profound shift in the human psyche' mentioned in the second para does not involve which of the following?

- a) A greater fear for environmental and weather conditions
- b) A belief in the virtues of working hard and in creating surpluses
- c) **A change from being egalitarian to being part of a meritocratic, hierarchical structure**
- d) **A need to dominate other populations through war and conquest**

Number of words and Explanatory notes for RC:

Number of words: 576

This can be understood from the shift of tones – 'Our [hunter-gatherer] ancestors have for the most part been "fiercely egalitarian"', intolerant of any form of inequality [...] aggressively rejecting efforts to institutionalise them into any form of hierarchy... So, what happened to cause such a profound shift in the human psyche away from egalitarianism? The balance of archaeological, anthropological and genomic data suggests the answer lies in the agricultural revolution, which began roughly 10,000 years ago.' So, the shift was from egalitarianism to a society where merit and hard work were considered of utmost importance.

Option A: The farmers were indeed more vulnerable to environments and weathers, something the hunter-gatherers weren't really afraid of, because of the seasonal options available to them. Hence, Option A is not the answer.

Option B: This is a characteristic feature of the farming populations which believed that more the effort put into the land, more is the output. Enabling surpluses was also part of the farmer psyche. Hence, Option B is not the answer.

Option C: Hunter-gatherers were egalitarian while there was role differentiation in the farming populations along with a belief in merit leading to a meritocratic and hierarchical society. Hence, Option C is not the answer.

Option D: This is not part of the shift since farming populations weren't necessarily driven by the need to dominate others. War was more a consequence of the need to expand in order to support larger farming populations. Hence, Option D is the answer.

Choice (D)

Q3. The main purpose of the passage is to

- a) recommend the hunter-gatherer way of living.
- b) elucidate how agricultural revolution has destroyed human society.
- c) advocate a relook at our social, political and economic order for a less risky future.
- d) offer a solution to all the problems created by the agricultural revolution.

Number of words and Explanatory notes for RC:

Number of words: 576

Option A: While the author does suggest a return to the older psyche, it is not necessarily a recommendation for the hunter-gatherer lifestyle/way of living. It is more a recommendation to stop unprecedented economic growth chasing surpluses at the cost of our environment and the existing species. Hence, Option A is not the answer.

Option B: This is an extreme view, something that the author will not approve of. The author didn't quite indicate that humanity has been destroyed by the agricultural revolution. It is more a suggestion that certain characteristics need to be changed in order not to cannibalise our species. Hence, Option B is not the answer.

Option C: This can be understood from '*This obsession risks cannibalising our – and many other species’ – futures. Our current social, political and economic models are not an inevitable consequence of human nature, but a product of our recent history. That knowledge could free us to be more imaginative in changing the way we relate to our environments, and one another. Having spent 95% of Homo sapiens' history hunting and gathering, there is surely a little of the hunter-gatherer psyche left in all of us.*' The author points out that our present way of functioning puts our futures at risk and hence, we may need to understand that for a major part of our history, this was not our mode of functioning. Option C is the answer.

Option D: The author isn't offering 'solutions' as we have not zeroed in on 'specific problems' created by the agricultural revolution. The passage focuses on the shift caused by agricultural revolution, and therefore, the one overarching problem – cannibalising our own species and others. Hence, Option D is not the main idea of the passage.

Choice (C)

Q4. Agricultural revolution enabled role differentiation because

- a) farmers believed in pleasing capricious gods in the conduct of their day-to-day lives.
- b) **society evolved around creating a surplus of agricultural output.**
- c) **the belief in the virtue of hard work created a social hierarchy.**
- d) **the needs of larger populations had to be sustained.**

Number of words and Explanatory notes for RC:

Number of words: 576

This has been explained in the following lines: 'Regular surpluses enabled a much greater degree of role differentiation: priests to pray for good rains; fighters to protect farmers from wild animals and rivals; politicians to transform economic power into social capital...The greater the surpluses a society produced, the greater the levels of inequality in that society. Their need to sustain ever-larger populations also set in motion a cycle of geographic expansion by means of conquest and war...' Most of the roles came into existence because of the need to create regular surpluses and the consequences of it.

Option A: This was because of their fears and was a consequence of their dependence on agriculture. This is not the cause for the role differentiation. Hence, Option A is not the answer.

Option B: The surplus is what led to a cascading effect. Priests were needed to pray for rains which helped in creating surpluses. Soldiers were needed to protect farmers who grew the surpluses. So, all the roles evolved because of the central focus on agriculture and creating surplus. Hence, Option B is the answer.

Option C: This doesn't explain the creation of various roles in society, since it talks only about one aspect – that of hard work. Role differentiation and hard work have been mentioned in quite separate contexts in the passage. Hence, Option C is not the answer.

Option D: The needs of larger populations were sustained through war and conquest, but this doesn't explain the need for other roles. Hence, Option D is not the answer.

Choice (B)

Q5. The corollary that individual wealth is a reflection of merit is based on the assumption that

- a) hard work is a virtue.
- b) hard work leads to individual wealth.
- c) hard work alone is not enough to accumulate wealth.
- d) merit alone is enough to accumulate wealth.

Number of words and Explanatory notes for RC:

Number of words: 576

Consider the sentences: '*The productivity of a patch of land is directly proportional to the amount of energy you put into it. This principle that hard work is a virtue, and its corollary that individual wealth is a reflection of merit, is perhaps the most obvious of the agricultural revolution's many social, economic and cultural legacies.*' So, the author connects productivity to hard work (amount of energy you put into it) and then equates wealth (productivity of the land) to merit. So, it can be understood that the author equates hard work and merit.

Option A: This is not an assumption in the theory about merit and wealth, as this has been mentioned prior to mentioning the corollary. Hence, Option A is not the answer.

Option B: The author calls hard work a virtue and establishes that productivity comes as a result of hard work and that wealth is a sign of merit. So, there are two short-circuits that the author makes here. The author equates merit with virtue, connects merit and hard work and assumes that productivity which is a result of hard work leads to the accumulation of individual wealth. Hence, Option B is the answer.

Option C: The author's tone is positive towards hard work. At the same time, the author doesn't distinguish clearly between hard work and merit. So, the given conclusions cannot be arrived at believing hard work alone is not enough (If this is true, then it is implied that merit and hard work are different entities and hard work alone is therefore not enough. Such a distinction has not been made). Option C is not the answer.

Option D: There is no justification for the mention of the term 'alone'. The author doesn't stress on how merit and nothing else leads to wealth. Even without considering this the conclusion in the passage that merit leads to wealth can be made. So, it is not an assumption as an assumption is important to arrive at the conclusion.

Option D is not the answer.

Choice (B)

DIRECTIONS *for questions 6 to 10:* The passage given below is accompanied by a set of five questions. Choose the best answer to each question.

Of all the things currently described as being “in crisis”, literary fiction might not rank highly in terms of public alarm. But a dramatic report published by Arts Council England (ACE) in December has raised the spectre of the highbrow novelist as an endangered species – and started a combative debate about how, if at all, writers should be funded.

The study claims falling book prices, sales and advances mean that literary authors are struggling to make a living from their fiction. In today’s market, selling 3,000 copies of your novel is not unrespectable – but factor in the average hardback price of £10.12 and the retailer’s 50 per cent cut, and just £15,000 remains to share between publisher, agent and author. No wonder that the percentage of authors earning a full-time living solely from writing dropped from 40 per cent in 2005 to 11.5 per cent in 2013. To avoid novel-writing becoming a pursuit reserved for those with independent means, ACE suggests emergency intervention: direct grants for [published] authors and better funding for independent publishers and other organisations.

Tim Lott scorned these proposals [...] arguing that “literary” authors must “write better books” – that is, books with strong stories. “My impression of literary fiction,” Lott wrote, citing Eimear McBride’s *A Girl Is a Half-Formed Thing*, “is that it has lost the plot. Literally.” In 2013, McBride won the first Goldsmiths Prize which rewards authors taking the sorts of risks with form and language that Lott so objects to. The prize’s most recent winner, Nicola Barker, believes “what Tim probably doesn’t fully appreciate is how the creative milieu, as an organism, works”.

“Experimental novelists and artists provide the ideas that form a cultural plankton for bigger organisms to feast upon,” she continues. “Our ideas gradually filter through to the mainstream.” Barker, however, does not believe that literary fiction is “in crisis”. If anything, she argues, struggle is good for writers: “Working against the grain sharpens things...I refuse to accept the idea of art in terms of the market. Art isn’t capitalism.”

Books do still have monetary value – just about. The discounting of books, Philip Pullman, president of the Society of Authors, says, is a “great evil” unleashed 20 years ago with the abolition of the Net

Book Agreement and its fixed minimum prices. Pullman also points out that the loss of libraries is harming writers who in better days “would have sold 1,500, maybe 2,000 copies to libraries as a matter of course”.

... “Publishers are taking too much of a share,” says Nicola Solomon, chief executive of the Society of Authors. “There is not enough investment in authors, or in diversity.” As she and others suggest, if future writers don’t see themselves reflected – in terms of class, ethnicity and so on – in books then our literary gene pool will become worryingly narrow.

How many of these problems can be solved by subsidy? [Many] seem sceptical about the focus on “literary” writers and the idea of direct funding. “The picture is very complicated,” says Pullman, “and we need to look at the whole of it rather than just asking what we are going to do about poor writers who can’t get nominated for the Booker Prize”. Barker is “phlegmatic” about the status quo: “Most of us just live hand-to-mouth. We are no different from good potters or violin players or embroiderers.”

Q6. The purpose of the first para of the passage is to

- a) report that the situation with literary fiction is not as alarming as the general perception is.
- b) convey that literary fiction is doing better than a lot of other things in crisis.
- c) debate about whether novelists should be encouraged through funding.
- d) highlight that literary fiction is in a greater crisis than what the public perception seems to suggest.

Number of words and Explanatory notes for RC:

Number of words: 558

Consider the following sentences: ‘*Of all the things currently described as being “in crisis”, literary fiction might not rank highly in terms of public alarm. But a dramatic report published by Arts Council England (ACE) in December has raised the spectre of the highbrow novelist as an endangered species – and started a combative debate about how, if at all, writers should be funded.*’ The underlined portions highlight the main idea behind the first para.

Option A: This is positive in tone as far as literary fiction is concerned. The first para clearly suggests that although public alarm is not high, the highbrow novelist is indeed an endangered species. Hence, Option A is not the answer.

Option B: The condition of literary fiction has not really been compared with others to talk about how it is doing well. In fact, the author is raising alarm about the bad situation. On tone, this option can be eliminated since it tends to allay or reduce fears/concerns regarding literary fiction (while the para is raising concerns). Option B is not the answer.

Option C: The first para is merely reporting about an existing debate. It is not making the argument (or the debate, which the rest of the passage is doing). Hence, Option C is just a distorted reading of the para. Option C is not the answer.

Option D: This aptly represents what the para talks about – that the highbrow novelist is in danger, that there is a literary crisis, although the public perception doesn’t exactly reflect the nature of the crisis. Hence, Option D is the answer. Choice (D)

Q7. It is implied in the last para that

- a) writers don't make any money.
- b) most good potters and violin players make just about enough to meet their basic needs.
- c) poor writers who do not win awards should receive direct funding.
- d) subsidy is a solution to the crisis literary fiction finds itself in.

Number of words and Explanatory notes for RC:

Number of words: 558

Option A: We are not sure whether writers make money or not. However, from what Barker suggests we can understand that writers are like most other artisans - they make just about enough money to meet ends (hand-to-mouth). Hence, Option A is not the answer.

Option B: This can be understood from what Barker says, that most writers and good potters and violin players (most artisans for that matter, from the tone of what Barker says) live hand-to-mouth, which is an expression that means making just about enough for basic needs, without producing surplus. Hence, Option B is implied.

Option C: The para doesn't really distinguish between who should receive funding and who shouldn't. In fact, Pullman suggests that it shouldn't be based on who doesn't get awards and hence needs assistance. So, Option C is not implied.

Option D: The para doesn't send a clear note on whether the author believes in subsidy or not (definitely not in the last para). Neither Pullman nor Barker is emphatic or assertive about the need for subsidies. The para itself ends on Barker's phlegmatism (taking all things in one's stride without too many emotions). Hence, Option D is not the answer.

Choice (B)

Q8. Which of the following, if true, weakens the suggestion made by the ACE about the funding to writers and publishers in the second para?

- a) A majority of the publishers are currently making profits on the novels they publish.
- b) The quality of the literary novel increases with the desperation of the writer to be commercially successful.
- c) Financial independence is required to afford the resources needed to get published.
- d) It is difficult to discern between published writers with financial independence and aspiring writers without it.

Number of words and Explanatory notes for RC:

Number of words: 558

The suggestion made by ACE can be understood from: '*To avoid novel-writing becoming a pursuit reserved for those with independent means, ACE suggests emergency intervention: direct grants for [published] authors and better funding for independent publishers and other organisations.*'

Option A: From 'a majority of publishers' making profits we cannot really infer whether independent publishers are in need of funding or not. So, this option isn't clear enough for us to understand whether it supports or opposes the ACE's suggestion. Hence, Option A is not the answer.

Option B: The desperation of the novelist to be commercially successful doesn't necessarily allow us to conclude that the novelist 'desperately' needs money/funding/grants. It could probably also be a status symbol, or some other unknown motive. So, this option neither strengthens nor weakens the suggestion. Hence, Option B is not the answer.

Option C: If financial independence is required to afford the resources needed to get published, and the grant is available only for the published authors, the very reason of the grant is defeated. This is because such a grant can be earned only if one has independent resources (something the grant wants to circumvent). The grants should be given according to the report so that those without independent resources can still be novelists. Hence, Option C weakens the argument that the grants will be of help for the intended purpose. Option C is the answer.

Option D: This option talks about the difficulty in implementing the suggestion. However, that doesn't tell us about whether the suggestion is valid or not. So, this option neither strengthens nor weakens the argument. Option D is not the answer.

Choice (C)

Q9. All of the following factors contribute to discouraging novel writers EXCEPT:

- a) many libraries have reduced the number of novels that they purchase.
- b) there isn't a fixed minimum price for books, thereby driving down book prices.
- c) **authors are being short-changed by their publishers.**
- d) **diverse voices are not being encouraged by the publishing community.**

Number of words and Explanatory notes for RC:

Number of words: 558

Option A: Consider the sentences: '*Pullman also points out that the loss of libraries is harming writers who in better days "would have sold 1,500, maybe 2,000 copies to libraries as a matter of course".*' It can be understood that the option is a distortion of the information presented in the passage. The reason novel writers are being discouraged is because the number of libraries (all of which are consumers of these novels) are dwindling. The option on the other hand says that many libraries are consuming/purchasing fewer novels, which is an entirely different allegation on the libraries. Hence, Option A is not true. Option A is the answer.

Option B: This has been mentioned directly in the lines - 'The discounting of books, Philip Pullman, president of the Society of Authors, says, is a "great evil" unleashed 20 years ago with the abolition of the Net Book Agreement and its fixed minimum prices.' Option B is not the answer.

Option C: That authors are being exploited by their publishers can be understood from the following sentence: '... "Publishers are taking too much of a share," says Nicola Solomon, chief executive of the Society of Authors.' Option C is not the answer.

Option D: This has been mentioned directly in the following lines: "There is not enough investment in authors, or in diversity." As she and others suggest, if future writers don't see themselves reflected – in terms of class, ethnicity and so on – in books then our literary gene pool will become worryingly narrow.' There isn't enough diversity amongst the writers accepted or encouraged. Hence, Option D is not the answer.

Choice (A)

Q10. Nicola Barker is least likely to agree with which of the following?

- a) **Experimental novelists and artists conjure ideas which eventually become mainstream.**
- b) Monetization shouldn't be the primary purpose of art.
- c) **The popularity of literary fiction cannot be gauged from the market for it.**
- d) **Only those who experiment with their writing styles eventually learn the style and form that suits the mainstream.**

Number of words and Explanatory notes for RC:

Number of words: 558

Option A: Barker mentions this directly in the following lines: '*Experimental novelists and artists provide the ideas that form a cultural plankton for bigger organisms to feast upon,*' she continues. "Our ideas gradually filter through to the mainstream." Hence, Barker will agree with Option A. Option A is not the answer.

Option B: Given that Barker believes struggle is good as it sharpens authors we can clearly conclude that Barker will agree with the philosophy that one must write without keeping monetization in perspective. Hence, Option B is not the answer.

Option C: Consider this: '*Barker, however, does not believe that literary fiction is "in crisis". If anything, she argues, struggle is good for writers: "Working against the grain sharpens things...I refuse to accept the idea of art in terms of the market. Art isn't capitalism."*' It is clear that Barker doesn't equate art in terms of market or capitalism. So, a comparison and assessment of art based on the market is out of question from Barker's perspective. This option is something Barker will agree with. Option C is not the answer.

Option D: Nicola Barker didn't talk about writers 'learning to write in a style that is mainstream.' The argument was more about experimental writing slowly becoming part of what is mainstream. Barker is least likely to agree with such an option, based on Barker's remarks mentioned in the passage. Option D is the answer.

Choice (D)

DIRECTIONS for questions 11 to 14: The passage given below is accompanied by a set of four questions. Choose the best answer to each question

When people need more water, they often build dams to increase supply. But can dams increase water use in an unsustainable way, leading communities to live beyond their water means? That appears to often be the case, according to the authors of a recent paper in *Nature Sustainability*.

Las Vegas is a textbook case. Decades ago, the population was projected to reach 400,000 by 2000, so the city built a pipeline to tap into Lake Mead, a reservoir created by Hoover Dam. The population ballooned nearly four times higher than anticipated [as the pipeline attracted more people]. [Dams] can indeed create a “false sense of abundance” in places where “the natural water availability does not fit the population it’s hosting,” says Newsha Ajami, director of urban water policy at Stanford University...

Dams or other water-supply infrastructure such as desalination plants can also make communities less resilient because they mask droughts, says the paper’s lead author, Giuliano Di Baldassarre, a professor of hydrology at Uppsala University in Sweden. Communities may be less likely to reduce their water use until shortages get dire, forcing a sharp reckoning. It’s similar to the way in which a levee protects an area from small floods, encouraging development in the floodplain, making people newly vulnerable to big floods.

Rather than build dams, the authors recommend reducing consumption. That may sound like common sense, but a dam-building boom is underway in developing countries. Conservation can be a significant source of water “supply.” In the U.S. the EPA estimates Americans can use 20 percent less water just by installing water-efficient fixtures and appliances...

Another alternative is to capture rain where it falls, rather than rushing it out of a city. Dry areas are increasingly turning to this tactic... Reusing water, whether for toilet flushing, irrigation, industry or drinking is a large potential resource ...

Globally, however, annual water demand has continued to rise – from 650 cubic kilometers in 1980 to 1,000 cubic kilometers in 2010. “This is driven by emerging economies,” Di Baldassarre says. Countries including Brazil, China, Ethiopia, India, Mozambique, Rwanda and Turkey are building

dams to satisfy demand. Ajami is frustrated that Western funding agencies and engineering firms are still pushing dams in developing countries when they now understand the social and environmental impacts and have stopped building them at home...

Dams also tend to create hydrological winners and losers, according to Ajami. Between 1971 and 2010, 20 percent of the global population gained water from human interventions on rivers, including dams, but 24 percent were left with less water, according to a 2017 study. Dams on the Euphrates River in Turkey cause water shortages in Iraq and Syria; the ones on the Colorado in the U.S. deny water downstream in Mexico, often leaving the riverbed there dry.

[A]bout 70 percent of freshwater used by humans globally goes to irrigated agriculture ... A 2015 study found that, globally, nearly half of irrigation water does not benefit crops. Switching to sprinkler or drip irrigation could reduce the nonbeneficial consumption by 54 and 76 percent, respectively, while maintaining crop yields. The answer to profligate use is better regulation, possibly via higher pricing that would likely suppress demand... Even when water becomes scarce, often it's free or nearly so...

Q11. Which of the following, if true, would most weaken the author's primary argument in the passage?

- a) **We can regulate water usage only when there is water scarcity.**
- b) As long as free water is available, water regulation will be difficult.
- c) **Water regulation and not dams is the answer to dealing with water crisis.**
- d) **Dams can be used to regulate water usage and inculcate good water-usage habits.**

Q12. All of the following are ways to conserve water, as mentioned in the passage, EXCEPT:

- a) **Channelling rainwater from wet areas for usage in dry areas.**
- b) Increasing reusability of water in toilet flushes and irrigation.

- c) Using sprinklers in irrigated fields.
- d) Installing fixtures and appliances that use water efficiently.

Number of words and Explanatory notes for RC:

Number of words: 539

Option A: Consider the sentences: '*Another alternative is to capture rain where it falls, rather than rushing it out of a city. Dry areas are increasingly turning to this tactic...*' The author suggests capturing water where it falls. The option suggests capturing water in wet areas and then diverting it to dry areas, which doesn't agree at all with the author's recommendation. Hence, Option A is the answer.

Option B: This has been mentioned in the following sentences: '*Reusing water, whether for toilet flushing, irrigation, industry or drinking is a large potential resource ...*' Hence, Option B is not the answer.

Option C: This has been mentioned in the following line: '*Switching to sprinkler or drip irrigation could reduce the nonbeneficial consumption by 54 and 76 percent, respectively, while maintaining crop yields.*' Hence, Option C is not the answer.

Option D: This can be understood from: '*In the U.S., the EPA estimates Americans can use 20 percent less water just by installing water-efficient fixtures and appliances...*' Hence, Option D is not the answer.

Choice (A)

Q13. Which of the following is not one of the disadvantages of building dams as elucidated in the passage?

- a) Dams solve the water problem in one area but create a crisis in another.
- b) Dams make populations on floodplains more vulnerable to floods.
- c) Dams create the illusion of water abundance in areas of water shortage.
- d) Dams may result in communities not regulating their water use until they nearly run out of water.

Number of words and Explanatory notes for RC:

Number of words: 539

Option A: Consider the sentences: 'Dams also tend to create hydrological winners and losers, according to Ajami. Between 1971 and 2010, 20 percent of the global population gained water from human interventions on rivers, including dams, but 24 percent were left with less water, according to a 2017 study. Dams on the Euphrates River in Turkey cause water shortages in Iraq and Syria; the ones on the Colorado in the U.S. deny water downstream in Mexico, often leaving the riverbed there dry.' This para talks about how dams create imbalance, and how human intervention leaves other areas with less water. Hence, Option A has been mentioned as a disadvantage of building dams. Option A is not the answer.

Option B: Consider the sentences: 'It's similar to the way in which a levee protects an area from small floods, encouraging development in the floodplain, making people newly vulnerable to big floods.' Here, the situation created by the dams has been compared to the situation created by a levee/embankment. So, it is not dams which increase the vulnerability of the floodplains according to the passage. The author simply provides a comparison that dams increase the risk the same way as levees do in flood plains. Hence, Option B is the answer.

Option C: This can be understood from '[Dams] can indeed create a "false sense of abundance" in places where "the natural water availability does not fit the population it's hosting.' So, dams when they have reservoirs create a false sense of abundance. Hence, Option C is not the answer.

Option D: This can be understood from the following lines: 'Dams or other water-supply infrastructure such as desalination plants can also make communities less resilient because they mask droughts, says the paper's lead author, Giuliano Di Baldassarre, a professor of hydrology at Uppsala University in Sweden. Communities may be less likely to reduce their water use until shortages get dire, forcing a sharp reckoning.' Option D has been mentioned, and is not the answer.

Choice (B)

Q14. Which of the following best describes why the author mentions the example of Las Vegas?

- a) Las Vegas doesn't have as much natural water as the pipeline seemed to indicate
- b) The city attracted more people because of the abundance of natural water available.

- c) When the city needed more water, they built a dam to increase water supply.
- d) The population of Las Vegas cannot survive on its natural water availability alone.

Number of words and Explanatory notes for RC:

Number of words: 539

The reason why the author mentioned Las Vegas can be understood from the following sentences – ‘Las Vegas is a textbook case. Decades ago the population was projected to reach 400,000 by 2000, so the city built a pipeline to tap into Lake Mead, a reservoir created by Hoover Dam. The population ballooned nearly four times higher than anticipated. [Dams] can indeed create a “false sense of abundance” in places where “the natural water availability does not fit the population it’s hosting.’

Option A: This option talks about the false sense of water abundance created by the pipeline and how the Las Vegas population ballooned because of the pipeline attracting more people. So, the city started hosting more people than it had water supplies for (masked by the pipeline). Hence, Option A explains why Las Vegas is a textbook case and why the author mentioned its example. Option A is the answer.

Option B: The above lines clearly mention how Las Vegas doesn’t have sufficient natural water available for the increasing population. It is the false sense of abundance that attracted more and more people. Hence, Option B doesn’t explain why Las Vegas is a textbook case.

Option C: This option doesn’t explain why it is a textbook case (of unsustainability of a city due to hosting more people than there is natural water for). Hence, Option C is not the answer.

Option D: While this option is close, it suggests that natural water alone is not sufficient for Las Vegas. While that is true, it doesn’t explain why Las Vegas was called a ‘textbook case’ - ballooning population is an important factor here, and that is not suggested in this option. Hence, Option D is not the answer. Choice (A)

DIRECTIONS for questions 15 to 19: The passage given below is accompanied by a set of five questions. Choose the best answer to each question.

What explains prodigies? ...Psychologists have long debated this question. According to one account, it is possible that most anyone could be a prodigy, with the right environment... However, recent research indicates that basic cognitive abilities known to be influenced by genetic factors also play a role in prodigious achievement.

In the most extensive study of prodigies to date, the psychologist Joanne Ruthsatz and her colleagues administered a standardized test of intelligence to 18 prodigies – five in art, eight in music, and five in math. There was a wide range of IQs in the sample, from 100 – the average for the general population – to 147 – well above the usual cutoff for “intellectually gifted.” However, with an average score of 140 (above the 99th percentile), nearly all of the prodigies did extraordinarily well on the tests of working memory. Analogous to the central processing unit of a computer, working memory is a cognitive system responsible for carrying out the mental operations involved in complex tasks such as problem solving and language comprehension...

Working memory is measured with tests that involve both remembering information for a short period of time and manipulating that information in some way. ... Moreover, this variation is substantially influenced by genetic factors, with estimates of heritability typically around 50%. With an average score of 148, the music prodigies in the Ruthsatz study were especially high in working memory (the average for the math prodigies was 135 and for art prodigies was 132). In fact, all eight of the music prodigies were at or above the 99th percentile, and four were at or above the 99.9th percentile. The odds of eight randomly selected people scoring this high on a test are essentially zero. Ruthsatz and colleagues concluded that a superior working memory is one characteristic that prodigies in art, music, and math have in common.

Prodigies also exhibit an unusual commitment to their domain, which the developmental psychologist Ellen Winner calls a “rage to master”...Winner argues that this single-mindedness is a part of innate talent rather than a cause of it – a convergence of genetically-influenced aptitude, interest, and drive that predisposes a person to obsessively engage in some activity. And “rage to master” is a good description of Mozart’s personality. In her landmark biographical study of 301 geniuses, Catherine Cox noted that from “before his 6th year, Mozart’s sole absorbing interest was in music, and even the games he played had some musical element.”

Consistent with Winner's thesis, results of a recent study of more than 10,000 twins by Miriam Mosing, Fredrik Ullén, and their colleagues at Sweden's Karolinska Institute revealed that a common set of genes influence both music aptitude and the propensity to practice – an example of a phenomenon known as genetic pleiotropy, which occurs when one gene (or set of genes) influences multiple traits.

Taken together, these findings add to a growing body of evidence indicating that exceptional performance in music, the arts, sports, science, and other complex domains is, at its core, the product of both environmental factors and of genetically influenced traits. More generally, psychologists who study expertise are moving beyond the question of whether experts are “born” or “made.” As the psychologist Jonathan Wai put it, it is increasingly clear that “Experts are born, then made.”

Q15. The main argument of the passage is that

- a) **exceptional performance is not environmentally determined.**
- b) **prodigies are not made but born.**
- c) **exceptional cognitive abilities are a function of genes and not of the environment.**
- d) **expertise in a field is a combination of genes and upbringing.**

Number of words and Explanatory notes for RC:

Number of words: 543

Option A: The passage clearly explains that genes are an important aspect of exceptional performances. However, it doesn't rule out the role played by the environment as can be understood from the last para of the passage.

Option B: Prodigies/experts are born, and then made, according to the last line of the passage. This option clearly contradicts that. Hence, Option B is not the answer.

Option C: While cognitive abilities are largely genetic, the author doesn't rule out the role of environment. The author clearly mentions that genes along with environmental factors play a role in the development of prodigies. Option C is not the answer.

Option D: Consider the sentences: '*Taken together, these findings add to a growing body of evidence indicating that exceptional performance in music, the arts, sports, science, and other complex domains is, at its core, the product of both environmental factors and of genetically-influenced traits. More generally, psychologists who study expertise are moving beyond the question of whether experts are "born" or "made."*' As the psychologist Jonathan Wai put it, it is increasingly clear that "Experts are born, then made." This shows that exceptional performances/cognitive abilities are dependent on genes as well as environmental factors. This is the central idea of the passage that starts with one hypothesis and adds another important parameter to that hypothesis. Option D is the answer.

Choice (D)

Q16. 'Winner's thesis' mentioned in the penultimate para of the passage is weakened by which of the following?

- a) Those with exceptional talent are more committed to their field of talent than those without it.
- b) Prodigies are as committed to their domain as those who need to practice harder because of limited talent.
- c) Exceptional hard work leads to development of exceptional talent.
- d) It is an exceptional talent to be exceptionally hardworking.

Number of words and Explanatory notes for RC:

Number of words: 543

Winner's thesis mentioned in the penultimate para is elaborated in the para prior to it in the following sentences: '*Winner argues that this single-mindedness is a part of innate talent rather than a cause of it – a convergence of genetically-influenced aptitude, interest, and drive that predisposes a person to obsessively engage in some activity.*' So, to summarise, Winner's argument is that the ability to focus/single-mindedness is also part of one's talent and not the reason one's talent flourishes.

Option A: This agrees with Winner's thesis by asserting that talent and the ability to work hard go hand in hand. Hence, Option A doesn't weaken the argument. Option A is not the answer.

Option B: This option asserts that the commitment of prodigies is at least as much as that of those who are not prodigies. This option doesn't weaken Winner's thesis that says hard work is part of the talent. Even though prodigies don't need to work as hard as those with average talent, if they are as committed as the latter, then it explains their exceptional performances. Hence, Option B is not the answer.

Option C: If this were true, it weakens the thesis that hard work is not a cause behind talent, rather a part of what being talented is. In other words, this option makes hard work a cause that leads to exceptional talent, separating out the ability to focus/work hard from other talents. Option C is the answer.

Option D: This explains that hard work itself is a talent. Nevertheless, it doesn't connect hard work with other prodigious abilities a gifted person might have. This option neither strengthens nor weakens the argument. Option D is not the answer.

Choice (C)

Q17. The author mentions genetic pleiotropy to explain that

- a) **gifted musicians have the ability to practice long hours.**
- b) talent and hard work are concomitant.
- c) those who are talented are not so only because they work hard.
- d) **hard work is important to nurture talent.**

Number of words and Explanatory notes for RC:

Number of words: 543

Consider the following sentences: '*Consistent with Winner's thesis, results of a recent study of more than 10,000 twins by Miriam Mosing, Fredrik Ullén, and their colleagues at Sweden's Karolinska Institute revealed that a common set of genes influence both music aptitude and the propensity to practice – an example of a phenomenon known as genetic pleiotropy, which occurs when one gene (or set of genes) influences multiple traits.*' Genetic pleiotropy is therefore mentioned to explain that talented people are also hardworking as both qualities are controlled by the same set of genes.

Option A: Genetic pleiotropy's mention is not just about gifted musicians. It has been mentioned to reiterate that it is possible that the same set of genes influence multiple traits, in this case, talent, and the ability to work hard. Option A is not the answer.

Option B: This means that talent and hard work are associated with each other and go hand in hand. That is what the author was trying to establish by talking about the phenomenon that explains the same set of genes influencing multiple traits. Hence, Option B is the answer.

Option C: This option indicates the fallacious possibility that hard work is one of (if not the only one) the causes for the talent of people. However, the passage clearly disagrees with that. Hence, Option C is not the answer.

Option D: Genetic pleiotropy simply establishes correlation between the two traits – abilities in a particular domain and ability to work hard. The importance of hard work in nurturing talent cannot really be connected to this concept and cannot be demonstrated by mentioning this case of same genes being responsible for multiple. Hence, Option D is not the answer.

Choice (B)

Q18. It can be inferred from the study conducted by Joanne Ruthsatz and her colleagues that

- a) one cannot be termed a prodigy unless one's IQ is above the 99th percentile.
- b) an exceptional ability to retain and manipulate information is correlated with being an exceptional talent.
- c) those without a good working memory cannot really do justice to their prodigious abilities.
- d) musical abilities are the consequence of a superior memory.

Number of words and Explanatory notes for RC:

Number of words: 543

Option A: Such a statement has not been mentioned. The study merely analysed a bunch of prodigies without really setting any benchmarks or qualifications. As part of the study it was found out that these prodigies were above the 99th percentile when it comes to working memory. So, it is not necessarily a cause/initial condition. Option A cannot be inferred.

Option B: This can be understood from '*Ruthsatz and colleagues concluded that a superior working memory is one characteristic that prodigies in art, music, and math have in common.*' A superior working memory helps one store and manipulate information and that has been connected to being a prodigy in the study. So, it can be inferred that an exceptional ability to retain and manipulate information is correlated to being an exceptional talent. Hence, Option B is the answer.

Option C: Whether one does justice or not to their prodigious abilities, and whether one can or will, is not the subject of the study. The study merely analysed those who are considered to be prodigies and established a relationship between their IQ/working memory and their talent. Hence, Option C is not the answer.

Option D: Musical abilities are not the consequence of a person's superior memory. Exceptional performances /state of being a prodigy is correlated to and not necessarily caused by an exceptional working memory. So, Option D cannot be inferred.

Choice (B)

Q19. The study conducted by Catharine Cox

- a) shows that Winner's thesis is demonstrated by many real-life geniuses.
- b) provides 301 real life examples supporting Winner's thesis.
- c) offers evidence to demonstrate Winner's thesis.
- d) corrects a general misconception about Winner's thesis.

Number of words and Explanatory notes for RC:

Number of words: 543

Consider the sentences: '*In her landmark biographical study of 301 geniuses, Catherine Cox noted that from "before his 6th year, Mozart's sole absorbing interest was in music, and even the games he played had some musical element."*'

Option A: We cannot understand from the above lines that Cox's study mentions multiple examples to prove Winner's thesis. Cox described Mozart in a way that reiterated Winner's thesis, no doubt, about the presence of single-mindedness in those with great talent in their domain. However, from the study it cannot be inferred that there were many real-life geniuses who demonstrated Winner's thesis. Hence, Option A is not the answer.

Option B: As far as we are aware, there is one example that the study provides, that of Mozart. We are not sure whether the remaining examples in the study about geniuses necessarily talks about focus/single-mindedness/ability to work hard, as was the case of Mozart. Hence, Option B is not the answer.

Option C: This is the most apt reason for the author mentioning Cox's study – to strengthen Winner's thesis by giving examples. In particular, Cox's study brings up the example of Mozart, who as Winner hypothesised, had exceptional focus and interest in his own domain. Option C is the answer.

Option D: The passage doesn't really talk about any misconceptions about Winner's thesis. In fact, the author seems to approve of the thesis. And Cox's study only strengthens it further. Hence, Option D is not the answer.

Choice (C)

DIRECTIONS for questions 20 to 24: The passage given below is accompanied by a set of five questions. Choose the best answer to each question.

The Earth's iron-nickel core is made up of two layers: a solid inner core and a molten outer core. When that solid inner core formed is a long-standing mystery. "The Earth also has been losing heat since its formation 4.54 billion years ago, but we don't know what the average temperature of the earth's interior was at that time", says Peter Olson [a geophysicist at Johns Hopkins University].

The interplay of the two layers [of the earth's core] drives the geodynamo, the circulation of iron-rich fluid that powers the magnetic field. That field, surrounding Earth, protects it from being battered by the solar wind, a constant flow of charged particles ejected by the sun. As the inner core cooled and crystallized, the composition of the remaining fluid changed; more buoyant liquid [of lighter elements] rose like a plume [in the core's outer region] while the cooling crystals [of iron and other heavy elements] sank into the solid inner core. That self-sustaining, density-driven circulation (convection) aided by the Earth's rotation generated a strong magnetic field with two opposing poles (north and south).

Traces of magnetism in ancient rocks suggest that, about 4.2 billion years ago, Earth had a magnetic field generated by heat within the planet, driving circulation within the molten core. But over time, computer simulations suggest, this heat-driven magnetic field alone wouldn't have been strong enough to power a strong magnetic field. Instead, the magnetic field began to shut down, signalled in the rock record by weakening intensities and rapid polarity reversals over millions of years. Then, at some point, Earth's inner core began to crystallize, jump-starting the geodynamo and generating a new, strong magnetic field.

Now scientists think they've found evidence of when that magnetic field breakdown was happening. Geophysicist John Tarduno examined lava flows and magnetic inclusions (needle-like iron-rich grains that align themselves with the orientation of the magnetic field that existed when the lava hardened and rocks formed) in rocks in Quebec, dating to about 565 million years ago. He found that the planet's magnetic field was extremely weak at that time, with paleo-intensity values ten times less than current values. The magnetic field was also rapidly reversing polarity during that time period. The new result indicates that Earth's field may have been on the point of collapse about 565 million years ago. That suggests that the inner core hadn't yet solidified. Fortunately for life on Earth, it eventually did.

Because the rocks bearing the magnetic grains didn't cool instantaneously but over a long time, the data represent an average field intensity for about a 100,000-year period. That means the scientists haven't just captured a snapshot in time of a fluctuating field, but have found a true, persistent signal. Computer simulations have suggested that the weak field phase may have lasted much longer, from about 900 million to 600 million years ago. More paleo-intensity data from within that

time span, as well as from other locations, would help to confirm that the observed weak phase really signalled the final throes of that pre-inner core field.

Peter Driscoll, a renowned geophysicist, was one theoretician who estimated how long the weak phase might have lasted. Driscoll notes that a young solid inner core also highlights lingering conundrums about how quickly Earth cooled. For example, “if the core is cooling quickly, that means the core and lower mantle were very hot in the recent past” – so hot that both were molten just 1 billion to 2 billion years ago. “We absolutely do not see that in the rock record.” He adds, “There’s a lot more time here that we could be filling in.”

Q20. Which of the following best expresses the central idea of the passage?

- a) **Heat driving convection within Earth’s molten core powered Earth’s magnetic field for billions of years but 565 million years ago, the field weakened and exhibited polarity reversals.**
- b) Earth’s magnetic field was weak around 565 million years ago, but solidification of the earth’s inner core ultimately kick-started a new protective stronger magnetic field.
- c) When our planet’s magnetosphere nearly disappeared 565 million years ago, it may have almost taken all life with it.
- d) **The weak magnetic field phase of the earth may have lasted much longer, from about 900 million to 600 million years ago.**

Number of words and Explanatory notes for RC:

Number of words: 606

Option A: Traces of magnetism in ancient rocks suggest that, about 4.2 billion years ago, Earth had a magnetic field generated by heat within the planet driving circulation within the molten core. But over time, computer simulations suggest, this alone wouldn't have been strong enough to power a strong magnetic field. So, the first part of option A is correct.

The new result indicates that Earth's field may have been on the point of collapse about 565 million years ago. That suggests that the inner core hadn't yet solidified. From this we cannot infer that the field weakened at 565 million years ago (it may have weakened long before or it could have always been weak). So, the second part of option A is factually incorrect. Hence, option A is incorrect.

Option B: The magnetic field began to shut down, signalled in the rock record by weakening intensities and rapid polarity reversals over millions of years. **Then, at some point, Earth's inner core began to crystallize, jump-starting the geodynamo and generating a new, strong magnetic field.** ...The new result indicates that Earth's field may have been on the point of collapse about 565 million years ago. That suggests that the inner core hadn't yet solidified. Fortunately for life on Earth, it eventually did. That field, surrounding Earth, **protects it** from being battered by the solar wind, a constant flow of charged particles ejected by the sun. This, in essence, is the central idea of the passage. Option B is the correct answer.

Option C: The new result indicates that Earth's field may have been on the point of collapse about 565 million years ago. That suggests that the inner core hadn't yet solidified. Fortunately for life on Earth, it eventually did. However, "it may have almost taken all life with it" even if true, is not the central finding of the passage.

Option D: The weak field phase may have lasted much longer, from about 900 million to 600 million years ago. This is a suggestion from computer simulation studies. It cannot be the central idea of the passage.

Choice (B)

Q21. All of the following can be inferred from the passage EXCEPT?

- a) **Heat driving convection within Earth's hot, molten core powered the planet's magnetic field for billions of years.**
- b) Earth's current magnetic field is generated within the core of our planet due to the slow churning of elements in the core.
- c) The intensity of the Earth's magnetic field, though waning, now equals its average strength over millions of years.

- d) The earth's magnetic field had been quite active and, sometimes, rapidly reversed its polarity.

Number of words and Explanatory notes for RC:

Number of words: 606

Option A: Traces of magnetism in ancient rocks suggest that, about 4.2 billion years ago, Earth had a magnetic field generated by heat within the planet driving circulation within the molten core. Option A is correct and is not the answer.

Option B: As the inner core cooled and crystallized, the composition of the remaining fluid changed; **more buoyant liquid** (of lighter elements) **rose like a plume (in the core's outer region)** while the **cooling crystals** (of iron and other heavy elements) **sank into the solid inner core**. That self-sustaining, density-driven circulation (convection) aided by the Earth's rotation generated a strong magnetic field with two opposing poles (north and south). Option B is true and is not the answer.

Option C: Because the rocks bearing the magnetic grains didn't cool instantaneously but over a long time, the data represent an average field intensity for about a 100,000-year period. That means the scientists haven't just captured a snapshot in time of a fluctuating field, but have found a true, persistent signal. But option C cannot be understood and is the answer.

Option D: The magnetic field began to shut down, signalled in the rock record by weakening intensities and rapid polarity reversals over millions of years. Then, at some point, Earth's inner core began to crystallize, jump-starting the geodynamo and generating a new, strong magnetic field. Option D can be inferred and is not the answer.

Choice (C)

Q22. Which of the following, if true, will most undermine the main conclusion of the passage?

- a) Recent observations have concluded that lava flow data do not provide a reliable time series and are not confirmed in other observations.
- b) Fossil records reveal no mass extinctions during past polarity reversals of Earth's magnetic field.
- c) Thermodynamics, fluid motions and Earth's magnetic field have evolved in a compatible manner to reverse the polarity of the original magnetic field.

- d) If one turns off the magnetic field in the earth's core, the earth's magnetic field will revert to a heat driven convection field.

Number of words and Explanatory notes for RC:

Number of words: 606

The main finding of the passage is mentioned in the line: Then, at some point (565 million years ago), Earth's inner core began to crystallize, jump-starting the geodynamo and generating a new, strong magnetic field.

Option A: Geophysicist John Tarduno examined lava flows and magnetic inclusions (needle-like iron-rich grains that align themselves with the orientation of the magnetic field that existed when the lava hardened and rocks formed) in rocks in Quebec, dating to about 565 million years ago. He found that the planet's magnetic field was extremely weak at that time, with paleo-intensity values ten times less than current values. The magnetic field was also rapidly reversing polarity during that time period. Tarduno depended on lava data to make his inferences. So, if it is known that that lava flow data do not provide a reliable time series and are not confirmed in other observations, then it will weaken the new result which indicates that Earth's field may have been on the point of collapse about 565 million years ago. Hence option A is the correct answer.

Option B: Mass extinctions is not the main focus of discussion in the passage. Hence option B does not undermine the author's argument.

Option C: Option C has a positive tone to it. It points to how the reversal of polarity can take place. Reversal of polarity is a point mentioned in passing in the passage. Option C may strengthen one of the findings discussed in the passage. It does not weaken the passage's main finding.

Option D: Para 2 discusses the geodynamics of the earth's core. About 4.2 billion years ago, Earth had a magnetic field generated by heat within the planet driving circulation within the molten core. But over time, computer simulations suggest, this alone wouldn't have been strong enough to power a strong magnetic field. Option D provides a possibility which is outside the scope of the passage and will not weaken any conclusion of the passage.

Choice (A)

Q23. Which of the following additional studies would add the least depth to the research analysis given in the passage?

- a) A thermal history study of the earth's inner core, throwing light on how hot it was when it crystallized.
- b) Confirmation timeline studies of magnetized mineral grains in rocks, correlating the beginning of Earth's inner core crystallization with the end of its weak magnetic field phase.

c) 3D computer simulations of the Earth's geodynamo, indicating that paleo-intensity values of the Earth's magnetosphere 565 million years ago were ten times weaker than that of today.

d) Studies of seismic waves and geomagnetic field simulations, indicating the timeline of all the polarity reversals in earth's history.

Number of words and Explanatory notes for RC:

Number of words: 606

Option A: The Earth also has been losing heat since its formation 4.54 billion years ago but we don't know what the average temperature of the earth's interior was at that time. A young solid inner core also highlights lingering conundrums about how quickly Earth cooled. For example, "if the core is cooling quickly, that means the core and lower mantle were very hot in the recent past" – so hot that both were molten just 1 billion to 2 billion years ago. "We absolutely do not see that in the rock record." So, option A would be a useful study and is not the answer.

Option B: Computer simulations have suggested that the weak field phase may have lasted much longer, from about 900 million to 600 million years ago. More paleo-intensity data from within that time span, as well as from other locations, would help to confirm that the observed weak phase really signalled the final throes of that pre-inner core field. Option B would strengthen the research findings mentioned in the passage. It is not the answer.

Option C: Geophysicist John Tarduno examined lava flows and magnetic inclusions in rocks in Quebec, dating to about 565 million years ago. He found that the planet's magnetic field was extremely weak at that time, with paleo-intensity values ten times less than current values. So option C has already been discovered from research findings discussed in the passage. It will not throw any additional light on the research analysis presented in the passage. Option C is the required answer.

Option D: Geophysicist John Tarduno examined lava flows and magnetic inclusions (needle-like iron-rich grains that align themselves with the orientation of the magnetic field that existed when the lava hardened and rocks formed) in rocks in Quebec, dating to about 565 million years ago. He found that the planet's magnetic field was extremely weak at that time, with paleo-intensity values ten times less than current values. **The magnetic field was also rapidly reversing polarity during that time period.** Hence, one would want to understand the timelines of the geomagnetic polarity reversals that occurred in earth's history to understand more about the weak magnetic field. Option D would be a useful study and is not the answer.

Choice (C)

Q24. Which of the following best describes the function of the last sentence of the passage?

- a) **It alludes to the fact that there is disagreement in the scientific community over the importance attached to atypical geological events.**
- b) It concludes that the evidence presented in the passage is insufficient to prove the proposed hypothesis.

c) It warns the reader against seeing a connection between the results of computer simulations and geological evidence described in the passage.

d) **It alerts the reader that the geological evidence proves that the proposed hypothesis is fictitious.**

Number of words and Explanatory notes for RC:

Number of words: 606

The last sentence of the passage functions primarily to explain that the current evidence is not sufficient for a full understanding of the relationship between earth's cooling and its magnetic field.

Option A: Neither the final sentence nor the rest of the passage address any disagreements within the scientific community. Further, although there may be certain geological events that may be atypical, the final sentence of the passage does not address them. So option A is incorrect.

Option B: The final sentence of the passage does indicate that current understanding of the relationship between the paleo-intensity data discussed and the geological data (rock record) is incomplete. So, option B is the answer.

Option C: The last sentence of the passage does not advise against seeing a connection between the biological and geological changes discussed; it merely advises that such a connection is not yet fully understood. Hence option C is not the answer.

Option D: A young solid inner core also highlights lingering conundrums about how quickly Earth cooled. For example, "if the core is cooling quickly, that means the core and lower mantle were very hot in the recent past" – so hot that both were molten just 1 billion to 2 billion years ago... "There's a lot more time here that we could be filling in." From this statement, it is too extreme to say that the proposed hypothesis is fictitious. Hence, option D is not the correct answer.

Choice (B)

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

1. This could lead to the fact that all attempts at physically observing a particle with an "entangled" relationship to another are slowed down, even though the particles are not connected in any other way other than by the information they carry.
2. In 2003, J. D. Bekenstein claimed that a growing trend in physics was to define the physical world as being made of information itself.

3. Information itself cannot travel faster than light even if the information is transmitted indirectly.
4. It was as though the particles gradually lost their individual autonomy and became pawns of the collective state.
5. Examples of this trend include the phenomenon of quantum entanglement where particles can interact without reference to their separation.

Sentence 1: Sentence 1 mentions a consequence. It has some keywords like "entangled relationship" and "particles connected ... by the information they carry".

Sentence 2: Sentence 2 mentions the year, the person's name and his claim. It is general in tone when it mentions "a growing trend in physics".

Sentence 3: Sentence 3 has a reference to "information".

Sentence 4: Sentence 4 can only follow another sentence. The comparison "It was as though" needs a precedent.

Sentence 5: Sentence 5 makes a reference to the demonstrative adjective 'this trend'. If we analyse the three sentences 1, 2 and 3, we understand that these sentences have a common theme related to information. Sentence 1 (other than by the information they carry), sentence, sentence 2 (define the physical world as being made of information itself), sentence 3 (if the information is transmitted indirectly) point to some aspect about information. There is also a reference to 'speed'. Note the reference "all attempts at physically observing a particle with an "entangled" relationship to another are slowed down" (sentence 1) and "Information itself cannot travel faster than light" (sentence 3). Also, among the sentences, we can see that sentence 2 is the best sentence to introduce the background. It is a general sentence. The other sentences would need a precedent.

So sentence 2 is the introductory sentence of the paragraph. It points to a growing trend in physics. Sentences 3 and 1, in any order, cannot be placed immediately in sequence after sentence 2. They necessitate the insertion of a sentence pointing to "entangled" relationship to another" (given in sentence 1) and "speed of light" (referred to in sentence 3). This gap is best completed by sentence 5.

Sentences 2 and 5 form a logical block. "growing trend in physics" in sentence 2 links with "Examples of this trend" in sentence 5. "particles can interact without reference to their separation" in sentence 5 links with "define the physical world as being made of information itself" in sentence 2. "particles can interact without reference to their separation or the speed of light" in sentence 5 links with "information itself cannot travel faster than light" in sentence 3. So sentence 3 follows sentence 5.

Sentences 3 and 1 form another logical block. "even if the information is transmitted indirectly" in sentence 3 connects with "the particles are not connected in any other way other than by the information they carry" in sentence 1. Sentence 1 is a consequence of the point mentioned in sentence 3. "Information itself cannot travel faster than light even if" in sentence 3 is parallel to "all attempts at physically observing a particle with an "entangled" relationship to another are slowed down" in sentence 1.

So, 2531.

Sentence 4 changes the tense to past sentence and cannot be a part of the unit containing sentences 1 and 3 as these sentences talk about a present condition. "lost their individual autonomy and became pawns of the collective state" needs a precedent. It will run contrary to "without reference to their separation".

Ans: (4)

Q26. DIRECTIONS for question 26: The sentences given in the following question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper order for the four sentences and key in the sequence of four numbers as your answer, in the input box given below the question.

1. Now, a novel “reverse genomics” strategy has found a way to fish out some of these stealthy bacteria from fluids taken from the human mouth and cultivate them in the lab.
2. But researchers have struggled to grow most of the microbes in the lab because of the complexity of mimicking their natural environments.
3. It’s an advance that promises to clarify how they maintain health and ward off disease.
4. In the past decade, increasingly powerful genetic techniques have found hordes of microbial DNA in everything from the human gut to a scoop of seawater.

Sentence 1 has a time-based construct ‘Now’ where we are discussing a new (novel) strategy and what it involves.

Sentence 2 starts with a contrast marker, followed by negative information about how growing microbes in the lab has been difficult.

Sentence 3 points to some development or research ('it is an advance') and talks positively about it.

Sentence 4 is an independent sentence that introduces a finding related to microbial DNA.

This order can be solved in two ways: through tones and through grammar.

Through tones, you can note that 1 is positive and so is 3. So, 13 is a block (because 1 starts the time frame with 'now'). 2 has a negative tone and starts with 'but' making 24 a block (4 first because microbial DNA is introduced in 4). So, 4213.

You can also go in a different route. 1 uses 'these bacteria' to point to microbes in 2 or 4. Sentence 2 talks about struggling to grow the microbes in the lab, which contradicts 1, thus justifying the connector 'Now'. So, 21 is a block. 2 is downstream to 4 because 4 talks about past ('In the past decade') whereas 2 talks about present perfect tense ('have struggled'). So, 421. 3 gives the consequence/potential of the new finding. So, 4213.

Ans: (4213)

Q27. DIRECTIONS for question 27: Five sentences related to a topic are given in the question below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out. Choose its number as your answer and key it in.

1. Certainly, the appeal of new digital lenders is that they make it easy to borrow extravagant sums of money.
2. So recent evidence that it is leaving problems in its wake is causing dismay.
3. And anecdotal evidence is mounting of abuses in East Kenya – most notoriously of young Kenyans borrowing to splurge on online betting sites.
4. Mobile money, which offers the equivalent of a basic bank account to almost anyone with any sort of phone, has long been seen as a boon for financial inclusion.

5. Digital credit through mobile phones is leading in some places to overborrowing, hardship and – horror of horrors – even more financial exclusion.

Sentence 1: Sentence 1 begins with 'certainly' and mentions about extravagant sums of money. It is a negative sounding sentence.

Sentence 2: Sentence 2 mentions the pronoun 'it' and a negative view about something: leaving problems in its wake, causing dismay.

Sentence 3: Sentence 3 cites evidence of overborrowing in East Kenya.

Sentence 4: Sentence 4 defines the term 'mobile money' and showcases it in a positive light. It mentions the clue 'financial inclusion'.

Sentence 5: Sentence 5 mentions negative consequences of digital credit through mobile phones. It mentions financial exclusion as the most negative consequence.

Sentence 4 is a general sentence that can begin the paragraph. It is a positive sentence about mobile money. Sentence 4 is contrasted by sentence 2. "long been seen as a boon for financial inclusion" in sentence 4 contrasts "is leaving problems in its wake is causing dismay" in sentence 2. So 2 follows 4.

Sentences 2 and 5 form a logical block. "overborrowing, hardship and – horror of horrors – even more financial exclusion" in sentence 5 links with "leaving problems in its wake is causing dismay" in sentence 2. Hence 425.

Sentence 3 concludes the para. "anecdotal evidence is mounting of abuses ...most notoriously of young Kenyans borrowing" in sentence 3 points to "overborrowing" in sentence 5. So, 4253.

Sentence 1 is the odd sentence out. "appeal of new digital lenders" in sentence 1 needs a precedent and more substantiation. This sentence can belong to another para.

Ans: (1)

Q28. DIRECTIONS for questions 28 and 29: The sentences given in the following question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper order for the four sentences and key in the sequence of four numbers as your answer, in the input box given below the question.

1. It's easier to steal what you want than it is to earn it.
2. It's easier to beat a child than it is to raise it, because love costs - it takes effort and work.
3. Apathy is the solution.
4. I mean, it's easier to lose yourself in drugs than it is to cope with life.
- 5.

Sentence 1 is an independent sentence – an example of something, probably. Sentence 2 is also an independent example with the same tone as 1. However, 2 gives the reasoning – ‘because love costs.’ So, 2 should follow 1, since we cannot really sandwich the reason for a particular pattern between two examples. Sentence 3 introduces apathy as ‘the’ solution. For what problem? Sentence 4 starts with a positive connector ‘I mean’ and explains with an example that has the same pattern as 1 and 2 – easy to do something negative rather than do something positive. So, 412 becomes a block as 4 introduces that pattern of examples. So, the only place 3 can fit is in front of 4, to make sense of ‘I mean’. Also, there is no problem mentioned in the para. All we have are three examples of apathy. So, the introduction of ‘apathy’ as ‘the’ solution has to come first. Also, it cannot follow 412 because 2 ends with ‘love costs’, so apathy being the solution contradicts that tone.

Ans: (3412)

Q29. DIRECTIONS for questions 28 and 29: The sentences given in the following question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper order for the four sentences and key in the sequence of four numbers as your answer, in the input box given below the question.

1. On November 30th last year, it led members of the oil producers’ cartel in a pledge to remove 1.2m barrels a day (b/d) from global oil production, if non-OPEC countries such as Russia chip in with a further 600000 b/d.
2. It showed that OPEC is not dead yet.
3. Exactly two years after Saudi Arabia coaxed its fellow OPEC members into letting market forces set the oil price, it has performed a nifty half-pirouette.
4. That would amount to almost 2% of global production, far more than markets expected.
- 5.

Sentence 1: Sentence 1 has the subjective pronoun 'it' and a reference to a 'pledge to do something'.

Sentence 2: Sentence 2 mentions an observation or inference.

Sentence 3: Sentence 3 sounds like a general sentence that can begin the paragraph.

Sentence 4: Sentence 4 mentions a consequence in 'That would amount to'

On a careful reading of the sentences, it can be observed that sentence 3 establishes the background of the paragraph. It mentions a time reference 'exactly two years after'. It mentions two actions (in succession) on the part of Saudi Arabia: coaxed its fellow OPEC members into letting market forces set the oil price, and then it has performed a nifty half-pirouette (A pirouette is a turn of three hundred and sixty (360) degrees).

Sentences 3 and 1 form a logical block. "it has performed a nifty half-pirouette" in sentence 3 links with "it led members of the oil producers' cartel in a pledge to remove 1.2m barrels a day (b/d) from global oil production" in sentence 1. So sentence 1 follows sentence 3.

Sentence 1 is followed by sentence 4. "That would amount to almost 2% of global production" in sentence 4 links with "remove 1.2m barrels a day (b/d) from global oil production" in sentence 1. So, 314.

Sentence 4 is followed by sentence 2. "OPEC is not dead yet" in sentence 2 points to the action taken by OPEC members (given in sentence 1), if non-OPEC countries such as Russia chip in with a further 600000 b/d. "The pronoun "it" in sentence 2 continues from "that" in sentence 4. Sentence 2 concludes the para. So, 3142.

Ans: (3142)

Q30. DIRECTIONS for question 30: The paragraph given below is followed by four summaries. Choose the option that best represents the author's primary position in the paragraph.

There are two ways our economies can grow, ecological economists point out: through technological change, or through more intensive use of resources. Only the former, they say, is worth having. They are suspicious of GDP, a crude measure which does not take account of resource depletion, unpaid work, and countless other factors. In its place they advocate more holistic approaches, such as the Genuine Progress Indicator (GPI), a composite index that includes things like the cost of pollution, deforestation and car accidents. While GDP has kept growing, global GPI per person peaked in 1978: by destroying our environment we are making ourselves poorer, not richer. The solution, says Herman Daly, a former World Bank economist and eco-guru, is a "steady-state" economy, where the use of materials and energy is held constant.

- a) Ecological economists, who prefer technological change to resource exploitation for economic growth, recommend the GPI over the GDP as a more holistic indicator of growth.

- b) Ecological economists like Herman Daly feel that only a steady-state economy, where there is no increase in the use of materials and energy, can increase a stagnant GPI.
- c) GPI is a more holistic indicator of economic growth compared to the GDP as it deducts the cost of adverse influences like pollution from the gains made in the economy.
- d) **Ecological economists advocate a steady-state economy, measured by GPI rather than GDP, where there is no increase in the usage of resources or energy.**

The para has three distinct parts as underlined:

[**'There are two ways** our economies can grow, ecological economists point out: **through technological change, or through more intensive use of resources. Only the former, they say, is worth having.]**

[They are suspicious of GDP, a crude measure which does not take account of resource depletion, unpaid work, and countless other factors. In its place, **they advocate more holistic approaches**, such as the Genuine Progress Indicator (GPI), a composite index that includes things like the cost of pollution, deforestation and car accidents. While GDP has kept growing, global GPI per person peaked in 1978: by destroying our environment we are making ourselves poorer, not richer.]

[The solution, says Herman Daly, a former World Bank economist and eco-guru, is a "**steady-state" economy**, where the use of materials and energy is held constant.]

The third part is one man's opinion and hence, is not the main idea of the para. The main idea is that growth should have a holistic measure, and growth should be technological and not resource-intense.

Option A: This option talks about the two main ideas and also indicates the third idea subtly (by mentioning that they are against the resource exploitation). Also note we are not attributing the idea of steady-state economy to the ecological economists, just the part they agree with on a whole – reducing intensive use of resources. Hence, Option A is the answer.

Option B: This option repeats the idea at the end of para – the solution – without talking about the problem (stagnant GPI partially indicates it but we need to talk about economic growth to put GPI into perspective). Also, it takes one man's suggestion and introduces that as a standalone solution. Hence, Option B is not the answer.

Option C: That GPI 'deducts the cost of adverse influences like pollution from the gains made in the economy' is something that cannot be inferred from this para. All we know is that the GPI is a composite index that **includes** the cost of negatives like pollution. Hence, Option C is not the answer.

Option D: It is not ecological economists (we don't about the opinion of the rest, just the one) who are advocating steady-state economy. Also, this is not the central idea of the para. Option D is not the answer.

Choice (A)

Q31. DIRECTIONS for question 31: The sentences given in the following question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper order for the four sentences and key in the sequence of four numbers as your answer, in the input box given below the question.

1. As research into tissue engineering advances, so too do ways of printing the scaffolds, leading to better drug treatments for diseases such as cancer, and even to complete artificial organs suitable for transplant.
2. To provide this, tissue engineers are turning to 3D printers to make tiny bespoke scaffolds onto which cells are seeded, then encouraged to grow and develop.
3. But it is not particularly reliable as cells often need specific structural support to function correctly.
4. Cultivating cells in a Petri dish is a time-honoured way of experimenting on biological tissues.

5.

Q32. DIRECTIONS for questions 32 and 33: The paragraph given below is followed by four summaries. Choose the option that best represents the author's primary position in the paragraph.

People tend to believe, and take advice from, informants who are highly confident. However, people use more than a mere "confidence heuristic." We believe that confidence is influential because – in the absence of other information – people assume it is a valid cue to an informant's likelihood of being correct. However, when people get evidence about an informant's calibration, i.e., her confidence–accuracy relationship, they override reliance on confidence or accuracy alone. Neither confidence nor accuracy alone explains judgments of credibility; rather, whether a person is seen as credible ultimately depends on whether the person demonstrates good calibration. Credibility depends on whether sources were justified in believing what they believed.

- a) People are more confident in believing those who have credibility gained by being accurate with their information.**
- b) The credibility of a person depends on the relationship between their confidence and the accuracy of the information they offer.
- c) The confidence of a person means nothing if they don't project it to others by demonstrating good calibration.
- d) One's credibility depends on how one calibrates the relationship between their confidence and the accuracy of the information they are confident in.**

The para can be divided into two main ideas – as underlined below.
[People tend to believe, and take advice from, **informants who are highly confident**. However, people use more than a mere “confidence heuristic.” We believe that confidence is influential because – in the absence of other information – people assume it is a valid cue to an informant’s likelihood of being correct.]
[However, when people get evidence about an informant’s calibration (i.e., her confidence–accuracy relationship) they override reliance on confidence or accuracy alone. Neither confidence nor accuracy alone explains judgments of credibility; rather, whether a person is seen as **credible ultimately depends on whether the person demonstrates good calibration**. Credibility depends on whether sources were justified in believing what they believed.]
Option A: It is not the confidence of people (advice-seekers) that the para discusses but the confidence of the informants. Also, the para doesn’t say people believe those who are credible. There is no entity called ‘credible people’. How credible a person is according to the people depends on the calibration – confidence and the basis for the confidence in their information. Hence, Option A is close but not the answer.
Option B: The credibility of a person depends on the calibration which is their confidence-accuracy relationship. That’s the core of what the para says. Hence, Option B is the answer.
Option C: This option focuses on projecting one’s confidence rather than on building credibility through accuracy of the information provided. Hence, Option C is not the answer.
Option D: It is not the person who provides the information (the informant) who makes the calibration. It is the people who receive advice or information who judge the credibility (calibration). Option D is easy to eliminate. Choice (B)

Q33. DIRECTIONS for questions 32 and 33: The paragraph given below is followed by four summaries. Choose the option that best represents the author’s primary position in the paragraph.

Leon Kass has further expanded the Puppet Critique (of human cloning), which assumes that the gene strongly determines the development of a particular behavioural trait and that the modified person will be unable to avoid expressing that trait. The child is given a genotype that has already lived, with full expectation that this blueprint of a past life will control the life to come. Cloning is inherently despotic, for it seeks to make one’s children after one’s own image and their future according to one’s will. This type of argument, the cloner as the despotic puppet-master, is highly problematic because it relies on dubious biological (genetic) and psychological assumptions. Both environmental and developmental factors must be considered. To seek the sort of despotism that

Kass has in mind – "to make one's own children...after one's own image" – will require more than just a reproductive decision; it will require a lifelong commitment.

- a) **Genetic modification is despotic because it prevents the person who has been modified from making free choices related to the modified trait.**
- b) The Puppet Critique, as ideated by Leon Kass, claims that cloning is tyrannical but cloning is not that despotic as it is made out to be.
- c) Contrary to Kass's implication, exerting control over a child's genotype does not necessarily give one despotic control to shape its future according to one's will.
- d) **Contrary to Kass's implication, the Puppet Critique relies on misstatements of psychological reality, playing on the public's worst fears about the despotic powers of genetics.**

Option A: Option A covers only one side of the story. It summarizes the basic tenet of the Puppet Critique of human cloning. It does not explain why the argument of the cloner as the despotic puppet-master is highly problematic. Option A is incomplete.

Option B: Option B is a simplified version of the facts given in the paragraph. Also, Leon Kass has further expanded the Puppet Critique. He has not ideated it. So option B is incorrect.

Option C: Option C correctly captures the relevant distinction between the Puppet Critique of human cloning and the author's viewpoint given in the second part of the para. So option C is the correct answer.

Option D: Option D is distorted. The Puppet Critique is not contrary to Kass's idea. Kass has further expanded the Puppet Critique. Also "playing on the public's worst fears" is also out of scope. Hence option D cannot be the answer. Choice (C)

Q34. DIRECTIONS for question 34: Five sentences related to a topic are given in the question below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out. Choose its number as your answer and key it in.

1. Gifts are not always treated in a way that respects their original spirit.
2. And if works of art are gifts and nothing but, how are their creators to live in the physical world, in which food will sooner or later be needed by them?

3. Should they be sustained by reciprocal gifts made by the public – the equivalent of the gifts placed in the Zen monk's begging bowl?
4. If a creation or a version of it is traded in the marketplace, a creator is entitled to control who may reproduce the work and is entitled to a portion of the sale price, and this right may be inherited.
5. Present copyright law takes a stab at this problem.

Sentence 1 is an independent sentence about how 'gifts' are treated.

Sentence 3 talks about 'they' (needs a plural noun) getting reciprocal gifts.

Sentence 4 talks about what the creator is entitled to, the sale price and the marketplace.

Sentence 5 talks about a 'problem' which copyright law tries to solve.

The first connection that can be made is 54, since 4 talks about what the law says (entitled to – that's the clue). But, in front of 5 we need a problem.

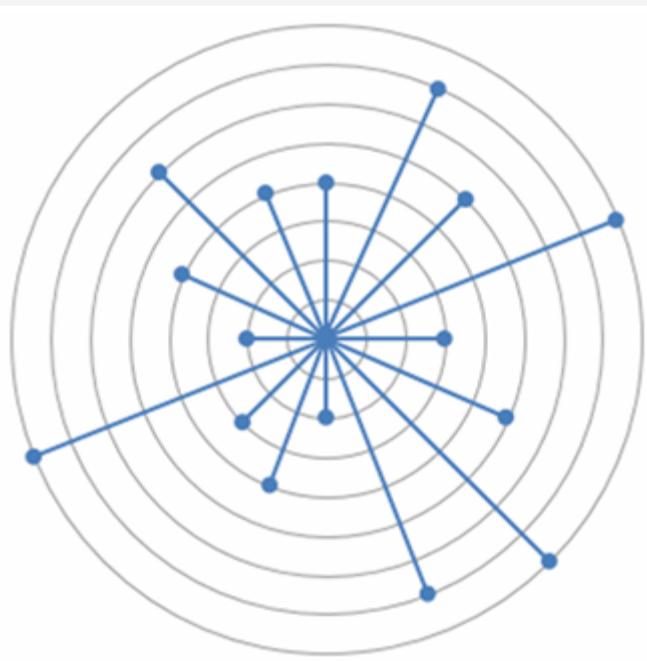
The other connection that needs to be made is 3 and 2, because 2 talks about works of art as gifts and 3 talks about reciprocal gifts. Together, the 23 block gives you the problem – the question that copyright law answers. So, 2354 is the para.

Ans: (1)

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

The radial graph given below shows the number of persons who visited a museum on each day among 16 consecutive days, from Day 1 to Day 16. Each line in the graph represents a day and its length indicates the number of persons who visited the museum on that day (as indicated by the numbers of circles that the line spans). For example, the vertical line pointing up from the centre of the graph indicates that four persons visited the museum on the day that the line represents.

The 16 days, in their chronological order, are represented by the 16 lines in the graph, in the clockwise direction. In other words, for $n = 1$ to 15 , the line representing Day $(n + 1)$ is immediately next to the line representing Day n , when considered in the clockwise direction. However, the information as to exactly which line represents which day is intentionally omitted.



Q1. DIRECTIONS for questions 1 to 4: Select the correct alternative from the given choices.

If it is known that the total number of persons who visited the museum from Day 1 to Day 5 was greater than 29, what is the difference between the number of persons who visited the museum on Day 10 and that on Day 13?

- a) 2
- b) 3
- c) 4
- d) Cannot be determined

From the graph, we can see that the number of persons who visited the museum on the 16 days are 4, 7, 5, 8, 3, 5, 8, 7, 2, 4, 3, 8, 2, 4, 6 and 4. However, we do not know which number corresponds to which day. However, if we can get any information on one day, we can find the number of persons for all the other days (since the numbers in the clockwise direction represent the number of visitors for consecutive days).

Given that the total number of persons who visited the museum on the five days, Day 1 to Day 5, is greater than 28.

Calculating the sum of values mentioned above taking five at a time, we get the following sums: 27, 28, 29, 31, 25, 26, 24, 24, 19, 21, 23, 24, 20, 25, 26, 28.

Of these values, only two are greater than 28.

If the total number of visitors is 29, then on the first five days, the number of visitors must be 5, 8, 3, 5 and 8 respectively. In this case, the number of persons who visited on Day 10 = 8.

Number of persons who visited on Day 13 = 6

Required difference = 2

If the total number of visitors is 31, then on the first five days, the number of visitors must be 8, 3, 5, 8 and 7 respectively. In this case, the number of persons who visited on Day 10 = 2.

Number of persons who visited on Day 13 = 4

Required difference = 2.

Hence, since we obtain the same difference in both the cases, the required difference = 2.

Choice (A)

Q2. DIRECTIONS for questions 1 to 4: Select the correct alternative from the given choices.

If it is known that not more than 6 persons visited the museum on any Thursday or on any Sunday and exactly 6 persons visited the museum on Day 1, what is the total number of persons who visited the museum on a Monday?

- a) 13
- b) 14
- c) 16
- d) Cannot be determined

From the graph, we can see that the number of persons who visited the museum on the 16 days are 4, 7, 5, 8, 3, 5, 8, 7, 2, 4, 3, 8, 2, 4, 6 and 4. However, we do not know which number corresponds to which day. However, if we can get any information on one day, we can find the number of persons for all the other days (since the numbers in the clockwise direction represent the number of visitors for consecutive days).

Given that exactly 6 persons visited on Day 1. On only one day, 6 persons visited the museum. Hence, this must be Day 1. The number of persons who visited the museum from Day 1 to Day 16 are 6, 4, 4, 7, 5, 8, 3, 5, 8, 7, 2, 4, 3, 8, 2 and 4 respectively.

We can make seven groups from the above 16 numbers such that each group represents a day of the week. Day 1 must fall on the same day of the week as Day 8; Day 2 must fall on the same day of the week as Day 9 and so on.

We get the following groups of numbers, where each group represents the number of persons that visited the museum on that day of the week:

- (6, 5, 2)
- (4, 8, 4)
- (4, 7)
- (7, 2)
- (5, 4)
- (8, 3)
- (3, 8)

We can see that the second, third, fourth, sixth and seventh groups cannot be Sunday or Tuesday.

We are left with only two groups – (6, 5, 2) and (5, 4). Of these, (5, 4) must be the Thursdays and (6, 5, 2) must be the Sundays (as a Thursday must fall exactly four days after a Sunday).

The number of persons who visited the museum on a Monday = $4 + 8 + 4 = 16$

Choice (C)

Q3. DIRECTIONS for questions 1 to 4: Select the correct alternative from the given choices.

If it is known that, for any day, Day n , not more than $n + 3$ persons visited on that day, how many persons visited the museum on Day 14?

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

From the graph, we can see that the number of persons who visited the museum on the 16 days are 4, 7, 5, 8, 3, 5, 8, 7, 2, 4, 3, 8, 2, 4, 6 and 4. However, we do not know which number corresponds to which day. However, if we can get any information on one day, we can find the number of persons for all the other days (since the numbers in the clockwise direction represent the number of visitors for consecutive days).

From the given condition, on Day 1, not more than 4 persons must have visited.

On Day 2, not more than 5 persons must have visited.

On Day 3, not more than 6 persons must have visited.

On Day 4, not more than 7 persons must have visited.

On Day 5, not more than 8 persons must have visited. By observation, we can see that the maximum number of persons who visited the museum is 8. Hence, for the days from Day 5 onwards, the condition given in the question need not be imposed as the given data makes the condition redundant.

The number of persons who visited the museum on the 16 days are 4, 7, 5, 8, 3, 5, 8, 7, 2, 4, 3, 8, 2, 4, 6 and 4.

If the 1st value, i.e., 4, represents Day 1, then Day 2 cannot be 7. This is not possible.

If the 5th value, i.e., 3, represents Day 1, then Day 3 cannot be 8. This is not possible.

If the 9th value, i.e., 2 represents Day 1, then Day 4 cannot be 8. This is not possible.

If the 10th value, i.e., 4, represents Day 1, then Day 3 cannot be 8. This is not possible.

If the 11th value, i.e., 3 represents Day 1, then Day 2 cannot be 8. This is not possible.

If the 13th value, i.e., 2, represents Day 1, then there are no contradictions. This is possible.

If the 14th value, i.e., 4, represents Day 1, then Day 2 cannot be 6. This is not possible.

If the 16th value, i.e., 4, represents Day 1, then Day 3 cannot be 7. This is not possible.

Hence, only one possibility exists for Day 1, i.e., the 13th value in the above list corresponds to Day 1.

On Day 14, 4 persons must have visited the museum.

Choice (B)

Q4. DIRECTIONS for questions 1 to 4: Select the correct alternative from the given choices.

If it is known that the sum of the number of persons who visited the museum on no two consecutive days among the first eleven days was 8, how many persons visited the museum on Day 14?

a) 6

b) 8

c) 7

d) 5

From the graph, we can see that the number of persons who visited the museum on the 16 days are 4, 7, 5, 8, 3, 5, 8, 7, 2, 4, 3, 8, 2, 4, 6 and 4. However, we do not know which number corresponds to which day. However, if we can get any information on one day, we can find the number of persons for all the other days (since the numbers in the clockwise direction represent the number of visitors for consecutive days).

The number of persons who visited the museum on the 16 days are 4, 7, 5, 8, 3, 5, 8, 7, 2, 4, 3, 8, 2, 4, 6 and 4.

We can add consecutive numbers to find the possibilities for total number of persons who visited on consecutive days.

We get the following numbers by adding two consecutive numbers in the above list: 11, 12, 13, 11, 8, 13, 15, 9, 6, 7, 11, 10, 6, 10, 10 and 8.

Of these numbers, for the sum not to be 8, there must be one set of 10 numbers (which correspond to the possible pairs of consecutive days from the first 11 days) in which 8 does not appear.

This set of ten numbers are 13, 15, 9, 6, 7, 11, 10, 6, 10 and 10.

In this set, 13 must represent the sum of the number of persons on Day 1 and Day 2; 15 must represent the sum of the number of persons on Day 2 and Day 3 and so on.

Hence, on Day 1, 5 persons must have visited and on Day 2, 8 persons must have visited. We can find the number of persons who visited on the remaining days from this information.

The number of persons who visited on Day 14 = 5.

Choice (D)

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

Each of six persons, A through F, receive a different monthly salary among Rs.10000, Rs.15000, Rs.20000, Rs.25000, Rs.30000 and Rs.35000, not necessarily in the same order. Among the six persons, exactly three persons receive a monthly bonus of Rs.15000 each, in addition to their monthly salaries, while the other three persons do not receive any monthly bonus. The monthly income of any person comprises the monthly salary and the monthly bonus. It is known that the monthly income of no two persons is the same.

The following information is known about their monthly incomes:

- i. A's monthly income is greater than that of B, whose monthly salary is greater than that of E.
- ii. The monthly income of the person with the second highest monthly salary is Rs.10000 more than the monthly income of the person with the fourth highest monthly salary.
- iii. F's monthly income is Rs.5000 more than C's but the difference between their monthly salaries is not Rs.5000.
- iv. D, who does not receive any monthly bonus, receives a monthly salary more than F.
- v. The monthly income of E is lower than that of D.

Q5. DIRECTIONS for question 5: Type in your answer in the input box provided below the question.

What is the total monthly income (in Rs.) of all the persons who receive a monthly bonus?

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

Each of six persons, A through F, receive a different monthly salary among Rs.10000, Rs.15000, Rs.20000, Rs.25000, Rs.30000 and Rs.35000, not necessarily in the same order. Among the six persons, exactly three persons receive a monthly bonus of Rs.15000 each, in addition to their monthly salaries, while the other three persons do not receive any monthly bonus. The monthly income of any person comprises the monthly salary and the monthly bonus. It is known that the monthly income of no two persons is the same.

The following information is known about their monthly incomes:

- i.A's monthly income is greater than that of B, whose monthly salary is greater than that of E.
- ii.The monthly income of the person with the second highest monthly salary is Rs.10000 more than the monthly income of the person with the fourth highest monthly salary.
- iii.F's monthly income is Rs.5000 more than C's but the difference between their monthly salaries is not Rs.5000.
- iv.D, who does not receive any monthly bonus, receives a monthly salary more than F.
- v.The monthly income of E is lower than that of D.

Q5. DIRECTIONS for question 5: Type in your answer in the input box provided below the question.
What is the total monthly income (in Rs.) of all the persons who receive a monthly bonus?

The second highest monthly salary is ₹30000. The fourth highest monthly salary is ₹20000.

From (ii), the difference in monthly incomes between the two of them must be ₹10000. Hence, the two of them either do not receive a monthly bonus or they do receive a monthly bonus.

If they do not receive a monthly bonus, then their monthly incomes will be ₹30000 and ₹20000.

Since the monthly income of no two persons is the same, the person with monthly salary of ₹15000 will also not receive any bonus (because, if he did, his monthly income will become ₹30000, which is the same as the monthly income of another person).

Hence, the persons with monthly salaries of ₹35000, ₹25000 and ₹10000 must be receiving a monthly bonus.

If the persons with second highest and fourth highest monthly salaries receive a bonus, then the person with the highest monthly salary (i.e., ₹35000) must also receive a bonus (since the person with monthly salary of ₹20000 has a monthly income of ₹35000).

Therefore, in this case, the persons with monthly salaries of ₹35000, ₹30000 and ₹20000 will receive monthly bonus.

The two cases are provided in the tables below:

Case 1		
Salary	Bonus	Income
35000	15000	50000
30000	0	30000
25000	15000	40000
20000	0	20000
15000	0	15000
10000	15000	25000

Case 2		
Salary	Bonus	Income
35000	15000	50000
30000	15000	45000
25000	0	25000
20000	15000	35000
15000	0	15000
10000	0	10000

From (iii), in the first case, F and C can have monthly salaries of 10000 and 20000 (with monthly incomes of 25000 and 20000) respectively OR monthly salaries of 30000 and 10000 (with monthly incomes of 30000 and 25000).

In the second case, if the monthly incomes of F and C vary by ₹5000, then their monthly salaries also vary by ₹5000. Hence, the second case is not possible.

From (iv), D receives a monthly salary more than that of F. If F's monthly salary is ₹30000, then D's monthly salary must be ₹35000. But D must be receiving a bonus which violates (iv).

Hence, F's monthly salary cannot be ₹30000.

F's monthly salary must be ₹10000 and C's monthly salary must be ₹20000.

B cannot receive a monthly salary of ₹35000 from (i). E also cannot receive a monthly salary of ₹35000 from (i). D cannot receive a monthly salary of ₹35000 from (iv). Hence, A must receive the monthly salary of ₹35000.

D's monthly salary can only be ₹30000 or ₹15000. However, it cannot be ₹15000 as E receives a lower monthly income than D from (v).

Hence, D's monthly salary must be ₹30000 and E's monthly salary must be ₹10000. B's monthly salary must be ₹25000.

The following table shows the monthly salaries, bonuses and incomes of the six persons:

Q6. DIRECTIONS for question 6: Select the correct alternative from the given choices.

What is the total monthly income of C?

- a) Rs.15000
- b) **Rs.20000 ✓ Your answer is correct**
- c) Rs.30000
- d) **Rs.35000**

The second highest monthly salary is ₹30000. The fourth highest monthly salary is ₹20000.

From (ii), the difference in monthly incomes between the two of them must be ₹10000. Hence, the two of them either do not receive a monthly bonus or they do receive a monthly bonus.

If they do not receive a monthly bonus, then their monthly incomes will be ₹30000 and ₹20000.

Since the monthly income of no two persons is the same, the person with monthly salary of ₹15000 will also not receive any bonus (because, if he did, his monthly income will become ₹30000, which is the same as the monthly income of another person).

Hence, the persons with monthly salaries of ₹35000, ₹25000 and ₹10000 must be receiving a monthly bonus.

If the persons with second highest and fourth highest monthly salaries receive a bonus, then the person with the highest monthly salary (i.e., ₹35000) must also receive a bonus (since the person with monthly salary of ₹20000 has a monthly income of ₹35000).

Therefore, in this case, the persons with monthly salaries of ₹35000, ₹30000 and ₹20000 will receive monthly bonus.

The two cases are provided in the tables below:

Case 1		
Salary	Bonus	Income
35000	15000	50000
30000	0	30000
25000	15000	40000
20000	0	20000
15000	0	15000
10000	15000	25000

Case 2		
Salary	Bonus	Income
35000	15000	50000
30000	15000	45000
25000	0	25000
20000	15000	35000
15000	0	15000
10000	0	10000

From (iii), in the first case, F and C can have monthly salaries of 10000 and 20000 (with monthly incomes of 25000 and 20000) respectively OR monthly salaries of 30000 and 10000 (with monthly incomes of 30000 and 25000).

In the second case, if the monthly incomes of F and C vary by ₹5000, then their monthly salaries also vary by ₹5000. Hence, the second case is not possible.

From (iv), D receives a monthly salary more than that of F. If F's monthly salary is ₹30000, then D's monthly salary must be ₹35000. But D must be receiving a bonus which violates (iv).

Hence, F's monthly salary cannot be ₹30000.

F's monthly salary must be ₹10000 and C's monthly salary must be ₹20000.

B cannot receive a monthly salary of ₹35000 from (i). E also cannot receive a monthly salary of ₹35000 from (i). D cannot receive a monthly salary of ₹35000 from (iv). Hence, A must receive the monthly salary of ₹35000.

D's monthly salary can only be ₹30000 or ₹15000. However, it cannot be ₹15000 as E receives a lower monthly income than D from (v).

Hence, D's monthly salary must be ₹30000 and E's monthly salary must be ₹10000. B's monthly salary must be ₹25000.

The following table shows the monthly salaries, bonuses and incomes of the six persons:

Q7. DIRECTIONS for questions 7 and 8: Type in your answer in the input box provided below the question.

What is the difference (in Rs.) between the monthly income of F and the monthly salary of E?

The second highest monthly salary is ₹30000. The fourth highest monthly salary is ₹20000.

From (ii), the difference in monthly incomes between the two of them must be ₹10000. Hence, the two of them either do not receive a monthly bonus or they do receive a monthly bonus.

If they do not receive a monthly bonus, then their monthly incomes will be ₹30000 and ₹20000.

Since the monthly income of no two persons is the same, the person with monthly salary of ₹15000 will also not receive any bonus (because, if he did, his monthly income will become ₹30000, which is the same as the monthly income of another person).

Hence, the persons with monthly salaries of ₹35000, ₹25000 and ₹10000 must be receiving a monthly bonus.

If the persons with second highest and fourth highest monthly salaries receive a bonus, then the person with the highest monthly salary (i.e., ₹35000) must also receive a bonus (since the person with monthly salary of ₹20000 has a monthly income of ₹35000).

Therefore, in this case, the persons with monthly salaries of ₹35000, ₹30000 and ₹20000 will receive monthly bonus.

The two cases are provided in the tables below:

Case 1			Case 2		
Salary	Bonus	Income	Salary	Bonus	Income
35000	15000	50000	35000	15000	50000
30000	0	30000	30000	15000	45000
25000	15000	40000	25000	0	25000
20000	0	20000	20000	15000	35000
15000	0	15000	15000	0	15000
10000	15000	25000	10000	0	10000

From (iii), in the first case, F and C can have monthly salaries of 10000 and 20000 (with monthly incomes of 25000 and 20000) respectively OR monthly salaries of 30000 and 10000 (with monthly incomes of 30000 and 25000).

In the second case, if the monthly incomes of F and C vary by ₹5000, then their monthly salaries also vary by ₹5000. Hence, the second case is not possible.

From (iv), D receives a monthly salary more than that of F. If F's monthly salary is ₹30000, then D's monthly salary must be ₹35000. But D must be receiving a bonus which violates (iv).

Hence, F's monthly salary cannot be ₹30000.

F's monthly salary must be ₹10000 and C's monthly salary must be ₹20000.

B cannot receive a monthly salary of ₹35000 from (i). E also cannot receive a monthly salary of ₹35000 from (i). D cannot receive a monthly salary of ₹35000 from (iv). Hence, A must receive the monthly salary of ₹35000.

D's monthly salary can only be ₹30000 or ₹15000. However, it cannot be ₹15000 as E receives a lower monthly income than D from (v).

Hence, D's monthly salary must be ₹30000 and E's monthly salary must be ₹10000. B's monthly salary must be ₹25000.

The following table shows the monthly salaries, bonuses and incomes of the six persons:

Your Answer:10000 Your answer is correct

Q8. DIRECTIONS for questions 7 and 8: Type in your answer in the input box provided below the question.

What is the difference (in Rs.) between the monthly salary of the person with the second highest monthly income and the monthly income of the person with the second highest monthly salary?

The second highest monthly salary is ₹30000. The fourth highest monthly salary is ₹20000.

From (ii), the difference in monthly incomes between the two of them must be ₹10000. Hence, the two of them either do not receive a monthly bonus or they do receive a monthly bonus.

If they do not receive a monthly bonus, then their monthly incomes will be ₹30000 and ₹20000.

Since the monthly income of no two persons is the same, the person with monthly salary of ₹15000 will also not receive any bonus (because, if he did, his monthly income will become ₹30000, which is the same as the monthly income of another person).

Hence, the persons with monthly salaries of ₹35000, ₹25000 and ₹10000 must be receiving a monthly bonus.

If the persons with second highest and fourth highest monthly salaries receive a bonus, then the person with the highest monthly salary (i.e., ₹35000) must also receive a bonus (since the person with monthly salary of ₹20000 has a monthly income of ₹35000).

Therefore, in this case, the persons with monthly salaries of ₹35000, ₹30000 and ₹20000 will receive monthly bonus.

The two cases are provided in the tables below:

Case 1		
Salary	Bonus	Income
35000	15000	50000
30000	0	30000
25000	15000	40000
20000	0	20000
15000	0	15000
10000	15000	25000

Case 2		
Salary	Bonus	Income
35000	15000	50000
30000	15000	45000
25000	0	25000
20000	15000	35000
15000	0	15000
10000	0	10000

From (iii), in the first case, F and C can have monthly salaries of 10000 and 20000 (with monthly incomes of 25000 and 20000) respectively OR monthly salaries of 30000 and 10000 (with monthly incomes of 30000 and 25000).

In the second case, if the monthly incomes of F and C vary by ₹5000, then their monthly salaries also vary by ₹5000. Hence, the second case is not possible.

From (iv), D receives a monthly salary more than that of F. If F's monthly salary is ₹30000, then D's monthly salary must be ₹35000. But D must be receiving a bonus which violates (iv).

Hence, F's monthly salary cannot be ₹30000.

F's monthly salary must be ₹10000 and C's monthly salary must be ₹20000.

B cannot receive a monthly salary of ₹35000 from (i). E also cannot receive a monthly salary of ₹35000 from (i). D cannot receive a monthly salary of ₹35000 from (iv). Hence, A must receive the monthly salary of ₹35000.

D's monthly salary can only be ₹30000 or ₹15000. However, it cannot be ₹15000 as E receives a lower monthly income than D from (v).

Hence, D's monthly salary must be ₹30000 and E's monthly salary must be ₹10000. B's monthly salary must be ₹25000.

The following table shows the monthly salaries, bonuses and incomes of the six persons:

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

A team of five members is to be selected from nine persons – A, B, C, D, E, F, G, H and J. After the selection, these five members stand in positions 1 to 5 in a queue, the person at the front of the queue being in the 1st position and the person at the end of the queue being in the 5th position. The selection of the members and the arrangement of the queue is to be done based on the following conditions:

- i.If B is selected, D must not be selected.
- ii.If C does not stand in the 2nd position, then H must not be selected.
- iii.Neither B nor G can stand in any position except the 1st position.
- iv.If H is not selected, then F is selected only if E is standing before him.
- v.If E is selected, then he must stand in the 4th position.
- vi.Neither A nor H can stand in the 5th position.

Q9. DIRECTIONS for question 9: Select the correct alternative from the given choices.

If C and D are standing in the 3rd and the 4th positions, not necessarily in that order, which of the following is true of the other members of the team and the positions in which they stand?



a) 1st position - B or G

2nd position - A

5th position- F



b) 1st position - G

2nd position- A

5th position- J



c) 1st position - B

2nd position - A

5th position - F



d) 1st position - G

2nd position - F

5th position- J

Since D is selected, B is not selected.

Since C is not in the 2nd place H is not selected.

Since C is in the 4th place, E, who can be only in that place, cannot be selected.

Since H is not selected and E is also not selected, F cannot be selected.

Now the only five remaining persons are A, C, D, G and J.

And G must be in the first place, while A cannot be in the 5th place. \Rightarrow 5th position = J
and 2nd = A

Choice (B)

Q10. DIRECTIONS for question 10: Type in your answer in the input box provided below the question.

If D and C are standing in the 2nd and the 3rd positions respectively, then in how many different ways can the queue be formed?

If D and C are in the 2nd and 3rd positions respectively, then H is not selected and also B is not selected. Then consider the two cases.

(i) E is not selected

Since H is also not selected, F cannot be selected.

\Rightarrow The five persons selected are A, C, D, G and J
and the only arrangement is G – D – C – A – J

(ii) E is selected

If E is selected, then E is in 4th place.

1. A/G/J
2. D
3. C
4. E
5. F/J

\Rightarrow If F = 5th position A/G/J = 1st position \Rightarrow 3 ways

If J = 5th position A/G = 1st position = 2 ways

Total of 5 ways

Case (i) + Case (ii) = 1 + 5 = 6 ways

Ans: (6)

Q11. DIRECTIONS for questions 11 and 12: Select the correct alternative from the given choices.

If D is in the 2nd position, which of the following cannot be true?



a) C stands in the 3rd position.



b) **A stands behind J.**

- c) Only one among A and C can be selected.
- d) **J is behind F.**

If D is in 2nd position \Rightarrow H cannot be selected and since H is not selected, F can only be behind E (i.e. F = 5th position, if F is selected). Hence no person can stand behind F. Choice (D) is not possible.

Choice (D)

Q12. DIRECTIONS for questions 11 and 12: Select the correct alternative from the given choices.
If H is in the 4th position, which of the following is not true?

- a) A may not be selected.
- b) **D may stand in the 5th position.**
- c) F may not stand in the 5th position.
- d) **None of the above**

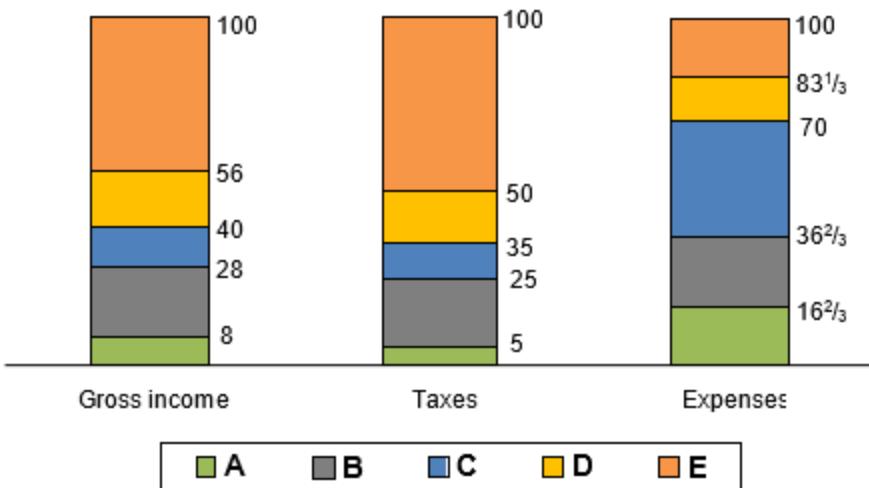
If H is 4th, then none of the choices (A), (B) and (C) can be ruled out.

Choice (D)

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

In the following graph, the first stacked bar gives the gross income of each of five friends – A, B, C, D and E – as a percentage of the total gross income of all the five friends put together. The other two stacked bars in the graph give a similar break up of the total taxes paid by the five friends and the total expenses incurred by them. For example, of the total expenses incurred by all the five friends put together, $83\frac{1}{3}\% - 70\% = 13\frac{1}{3}\%$ are the expenses incurred by D.

(All values in percentages)



The tax on any gross income upto Rs.P is 10% of the gross income and for any gross income in excess of Rs.P, the tax charged will be 10% of Rs.P plus 20% of the gross income in excess of Rs.P.

$$\text{Net Income} = \text{Gross Income} - \text{Taxes}$$

$$\text{Savings} = \text{Net Income} - \text{Expenses}$$

For none of the five friends are the expenses incurred more than the net income.

Q13. DIRECTIONS for question 13: Select the correct alternative from the given choices.

If A paid Rs.1000 as taxes, then what is the value of P?

a) 6,000

b) 8,000

c) 12,000



d) 10,000

A paid ₹1000 as tax.

Let the gross income of all the five persons put together be $100x$ and the total taxes paid be $100y$.

E paid $50y$ as taxes for a gross income of $44x$.

D paid $15y$ as taxes for a gross income of $16x$.

C paid $10y$ as taxes for a gross income of $12x$.

B paid $20y$ as taxes for a gross income of $20x$.

A paid $5y$ as taxes for a gross income of $8x$.

When compared to C, D's income is more by $4x$, but taxes paid is more by $5y$.

When compared to D, B's income is more by $4x$, but taxes paid is more by $5y$.

Here, we can observe that the taxes on a gross income of $4x$ is $5y$.

But for A, though his gross income is $8x$, he is paying only $5y$ as taxes.

∴ A must have paid the taxes at the rate of 10% and $8x$ must be the limit for charging tax at the rate of 10% and for any amount more than $8x$, tax must have been 20%.

$$10\% \text{ of } 8x = 5y$$

$$\Rightarrow 8x = 50y \text{ (or) } x = 6.25y$$

$$\text{So, } 20x = 125y, 12x = 75y, 16x = 100y, 44x = 275y$$

This can be tabulated as follows.

Person	Gross income	Taxes	Net income
A	50 y	5 y	45 y
B	125 y	20 y	105 y
C	75 y	10 y	65 y
D	100 y	15 y	85 y
E	275 y	50 y	225 y

Given, $5y = 1000$

Hence, the limit of the income must be $50y$ i.e. 10,000

Choice (D)

Q14. DIRECTIONS for question 14: Type in your answer in the input box provided in the question.
If B's expenses, as a percentage of his net income, are $x\%$, what is the maximum possible value of x ?

Enter your answer as a decimal value, rounded off to two decimal places.

A paid ₹1000 as tax.

Let the gross income of all the five persons put together be $100x$ and the total taxes paid be $100y$.

E paid $50y$ as taxes for a gross income of $44x$.

D paid $15y$ as taxes for a gross income of $16x$.

C paid $10y$ as taxes for a gross income of $12x$.

B paid $20y$ as taxes for a gross income of $20x$.

A paid $5y$ as taxes for a gross income of $8x$.

When compared to C, D's income is more by $4x$, but taxes paid is more by $5y$.

When compared to D, B's income is more by $4x$, but taxes paid is more by $5y$.

Here, we can observe that the taxes on a gross income of $4x$ is $5y$.

But for A, though his gross income is $8x$, he is paying only $5y$ as taxes.

∴ A must have paid the taxes at the rate of 10% and $8x$ must be the limit for charging tax at the rate of 10% and for any amount more than $8x$, tax must have been 20%.

$$10\% \text{ of } 8x = 5y$$

$$\Rightarrow 8x = 50y \text{ (or) } x = 6.25y$$

$$\text{So, } 20x = 125y, 12x = 75y, 16x = 100y, 44x = 275y$$

This can be tabulated as follows.

Person	Gross income	Taxes	Net income
A	50 y	5 y	45 y
B	125 y	20 y	105 y
C	75 y	10 y	65 y
D	100 y	15 y	85 y
E	275 y	50 y	225 y

Let the total expenses be K . Expenses of different persons are as follows.

Person	A	B	C	D	E
Expenses	$K/6$	$K/5$	$K/3$	$\frac{2K}{15}$	$K/6$

Given, for each person, the expenses are met with his net income. Hence,

$$\text{For A, } 45y \geq \frac{K}{6} \Rightarrow 270y \geq k$$

$$\text{For B, } 105y \geq \frac{K}{5} \Rightarrow 525y \geq k$$

$$\text{For C, } 65y \geq \frac{K}{3} \Rightarrow 195y \geq k$$

$$\text{For D, } 85y \geq \frac{2K}{15} \Rightarrow 637.5y \geq k$$

$$\text{For E, } 225y \geq \frac{K}{6} \Rightarrow 1350y \geq k$$

The maximum possible value of K for which the expenses of every person will be met with his net income is 195 y.

(∴ For D, $65y \geq K/3$)

B's expenses can be at most $\frac{K}{5}$ i.e. $39y$

$$\therefore \text{Required percentage} = \frac{39y}{105y} \times 100 = 37.14\%$$

Ans: (37.14)

Q15. DIRECTIONS for question 15: Select the correct alternative from the given choices.

The person who pays the highest percentage of his gross income as taxes is



a) E.



b) B.



c) C.



d) D.

A paid ₹1000 as tax.

Let the gross income of all the five persons put together be $100x$ and the total taxes paid be $100y$.

E paid $50y$ as taxes for a gross income of $44x$.

D paid $15y$ as taxes for a gross income of $16x$.

C paid $10y$ as taxes for a gross income of $12x$.

B paid $20y$ as taxes for a gross income of $20x$.

A paid $5y$ as taxes for a gross income of $8x$.

When compared to C, D's income is more by $4x$, but taxes paid is more by $5y$.

When compared to D, B's income is more by $4x$, but taxes paid is more by $5y$.

Here, we can observe that the taxes on a gross income of $4x$ is $5y$.

But for A, though his gross income is $8x$, he is paying only $5y$ as taxes.

∴ A must have paid the taxes at the rate of 10% and $8x$ must be the limit for charging tax at the rate of 10% and for any amount more than $8x$, tax must have been 20%.

$$10\% \text{ of } 8x = 5y$$

$$\Rightarrow 8x = 50y \text{ (or) } x = 6.25y$$

$$\text{So, } 20x = 125y, 12x = 75y, 16x = 100y, 44x = 275y$$

This can be tabulated as follows.

Person	Gross income	Taxes	Net income
A	50 y	5 y	45 y
B	125 y	20 y	105 y
C	75 y	10 y	65 y
D	100 y	15 y	85 y
E	275 y	50 y	225 y

The person with least gross income (say less than ₹P), will pay only 10% of taxes. As the person's gross income increases, the share of income on which 20% tax is levied increases and the share of income on which 10% tax is levied decreases (or) simple the tax rate increases. Hence, the person with highest income i.e. E pays at a higher tax rate.

Choice (A)

Q16. DIRECTIONS for question 16: Select the correct alternative from the given choices.
Among the five friends, expenses, as a percentage of net income, are the second highest for

- a) A.
- b) B.
- c) D.
- d) E.

A paid ₹1000 as tax.

Let the gross income of all the five persons put together be $100x$ and the total taxes paid be $100y$.

E paid $50y$ as taxes for a gross income of $44x$.

D paid $15y$ as taxes for a gross income of $16x$.

C paid $10y$ as taxes for a gross income of $12x$.

B paid $20y$ as taxes for a gross income of $20x$.

A paid $5y$ as taxes for a gross income of $8x$.

When compared to C, D's income is more by $4x$, but taxes paid is more by $5y$.

When compared to D, B's income is more by $4x$, but taxes paid is more by $5y$.

Here, we can observe that the taxes on a gross income of $4x$ is $5y$.

But for A, though his gross income is $8x$, he is paying only $5y$ as taxes.

∴ A must have paid the taxes at the rate of 10% and $8x$ must be the limit for charging tax at the rate of 10% and for any amount more than $8x$, tax must have been 20%.

$$10\% \text{ of } 8x = 5y$$

$$\Rightarrow 8x = 50y \text{ (or) } x = 6.25y$$

$$\text{So, } 20x = 125y, 12x = 75y, 16x = 100y, 44x = 275y$$

This can be tabulated as follows.

Person	Gross income	Taxes	Net income
A	50 y	5 y	45 y
B	125 y	20 y	105 y
C	75 y	10 y	65 y
D	100 y	15 y	85 y
E	275 y	50 y	225 y

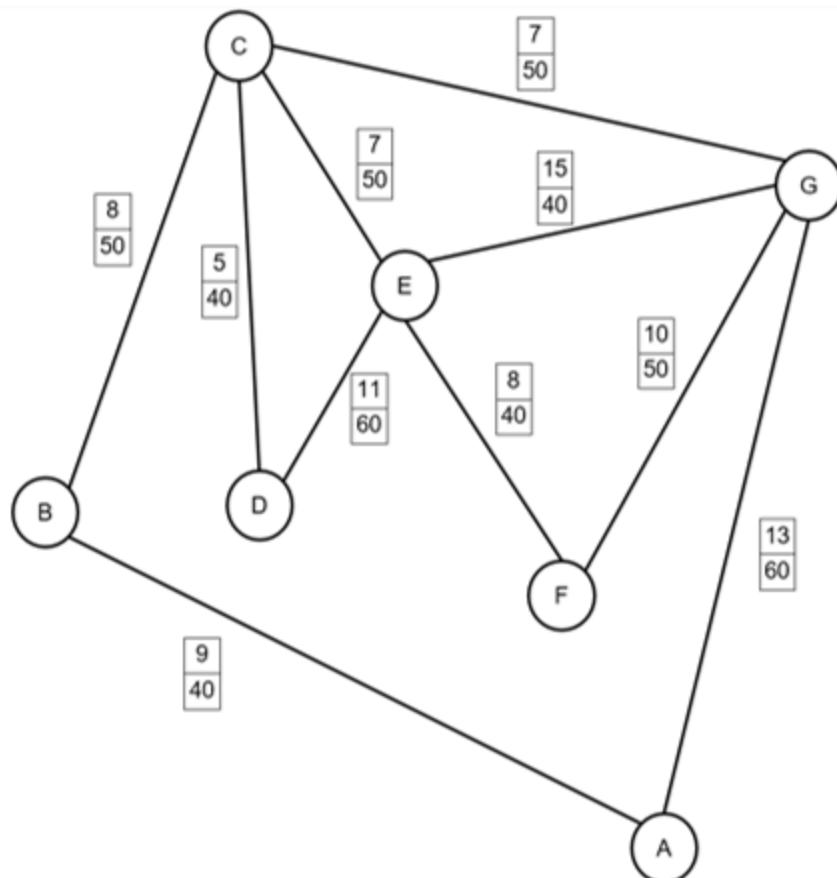
From the above tables, the expenses as a percentage of net income is the highest for C. Among A, B, D and E, it can be seen that the ratio of expenses to net income would be highest for A.

Choice (A)

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

Seven cities, A through G, are connected by certain two-way roads as shown in the figure below. Further, each road has a different weight bearing capacity, which is defined as the maximum permissible load (in tons) that a truck can carry (excluding the weight of the truck), while travelling on that road. In the figure, alongside each road, two numbers are given, in boxes, one above the other – the number at the top indicating the length of that road (in km) and the number at the bottom indicating the weight bearing capacity (in tons) of that road.

Raju owns one truck which he uses to transport cargo from one city to another and charges \$X per ton, which he decides based on several factors, including the distance between the origin and destination. Further, he incurs a cost of \$Y per km (irrespective of whether the truck is carrying any cargo or not) for transporting any cargo. This cost is applicable on the total distance that the truck travels for transporting all the cargo from the origin to the destination. He can rent warehouse space (at negligible cost) in any of the seven cities, as per his requirement, and while transporting any cargo, he can deposit his cargo (either part or whole) in any city and can return to it and, then carry it to its destination.



Q17. DIRECTIONS for questions 17 and 18: Type in your answer in the input box provided below the question.

If $X = 7$ and $Y = 4$, and Raju transported 200 tons of cargo from B to G, what is his maximum possible profit (in \$)?

Given that Raju transported from B to G. The shortest route from B to G is BCG, which is 15 km long. Raju can transport 50 tons in one trip using this route.

All the other routes are longer, and Raju cannot carry more than 50 tons using any of those routes.

Hence, this is the best route to transport cargo from B to G.

To transport 50 tons, Raju will travel 15 km.

To transport 100 tons, Raju has to come back to B and transport another 50 tons to G.

Hence, he will travel a total of 45 km to transport 100 tons.

Similarly, to transport 200 tons, Raju has to travel 105 km.

Total cost incurred = $105 \times 4 = 420$

Total revenue = $200 \times 7 = 1400$

Total profit = 980

Ans: (980)

Q18. DIRECTIONS for questions 17 and 18: Type in your answer in the input box provided below the question.

If $Y = 3$ and Raju must transport 100 tons of cargo from F to B, what is the minimum cost (in \$) that he will incur?

The shortest route from F to B is FECB, which is 23 km long. He can transport a maximum of 40 tons in a trip using this route.

Another possible route is FGCB, which is 25 km long. He can transport 50 tons using this route.

If he has to transport 100 tons from F to B, using the first route, FECB, he has to make three trips, which comes to a distance of $23 + 46 + 46 = 115$ km

If he uses the second route, he needs to make only two trips.

Further, while returning, he can use the shortest route as it will reduce the distance travelled.

Hence, for the two trips, he must travel a distance of $25 + 23 + 25 = 73$ km.

Minimum total cost = $73 \times 3 = 219$

Ans: (219)

The shortest route from F to B is FECB, which is 23 km long. He can transport a maximum of 40 tons in a trip using this route.

Another possible route is FGCB, which is 25 km long. He can transport 50 tons using this route.

If he has to transport 100 tons from F to B, using the first route, FECB, he has to make three trips, which comes to a distance of $23 + 46 + 46 = 115$ km

If he uses the second route, he needs to make only two trips.

Further, while returning, he can use the shortest route as it will reduce the distance travelled.

Hence, for the two trips, he must travel a distance of $25 + 23 + 25 = 73$ km.

Minimum total cost = $73 \times 3 = 219$

Ans: (219)

Q19. DIRECTIONS for questions 19 and 20: Select the correct alternative from the given choices.
If X = Y and Raju made a profit in transporting 100 tons of cargo from A to another city, say P, how many possibilities exist for P?

From A to B, the shortest round trip distance is 18 km and he can carry 40 tons in each trip.

Cost will be 18k, while revenue will be 40k and hence, this can be one of the cities.
Similarly, for G, the shortest round trip distance is 26 km and he can carry 60 tons.
Hence, G is also possible.

For C, he can travel along AGC, carrying 50 tons and returning through CBA.
For carrying 100 tons, he has to travel $20 + 17 + 20 = 57$ km. Hence, this is also possible.

For D, he can travel along ABCD, which has a length of 22 km. However, he can carry only 40 tons using this route and hence, he must make three trips along this route. For transporting 100 tons, he must travel $22 + 44 + 44 = 110$ km. Hence, this is not possible.

If he takes the route, AGCED, the length will be 38 km. He can transport 50 tons using this route. He can travel back along DCBA. The total distance that he travels = $38 + 22 + 38 = 98$. Hence, this is also possible.

For E, he can travel by AGCE carrying 50 tons and returning by ABCE. The total distance that he travels will be $27 + 24 + 27 = 78$ km. Hence, this is also possible.

For F, he can travel by AGF, which is 23 km. The total distance that he travels = $23 + 46 = 69$ km. Hence, this is also possible.

∴ He could have travelled to any of the other cities and made a profit. Choice (A)

Q20. DIRECTIONS for questions 19 and 20: Select the correct alternative from the given choices.
If Raju makes a profit in transporting 1000 tons of cargo from C to A, what is the minimum possible value of X/Y?

a) 0.853

b) **0.753**

c) 0.702

d) **0.723**

The shortest route from C to A is CBA, which is 17 km long. He can transport 40 tons using this route.

For transporting 1000 tons, he has to travel for 39 trips between C and B and 49 trips between B and A. He has to travel a distance of $39 \times 8 + 49 \times 9 = 753$ km

Another possible route is CGA, which is 20 km long.

To transport the cargo from C to G, he has to make 39 trips.

To transport the cargo from G to A, he has to make 33 trips.

Total distance travelled = $39 \times 7 + 33 \times 13 = 702$ km

In the first case, to maximize the value of X/Y, we can take $1000X = 753Y \Rightarrow X/Y = 0.753$

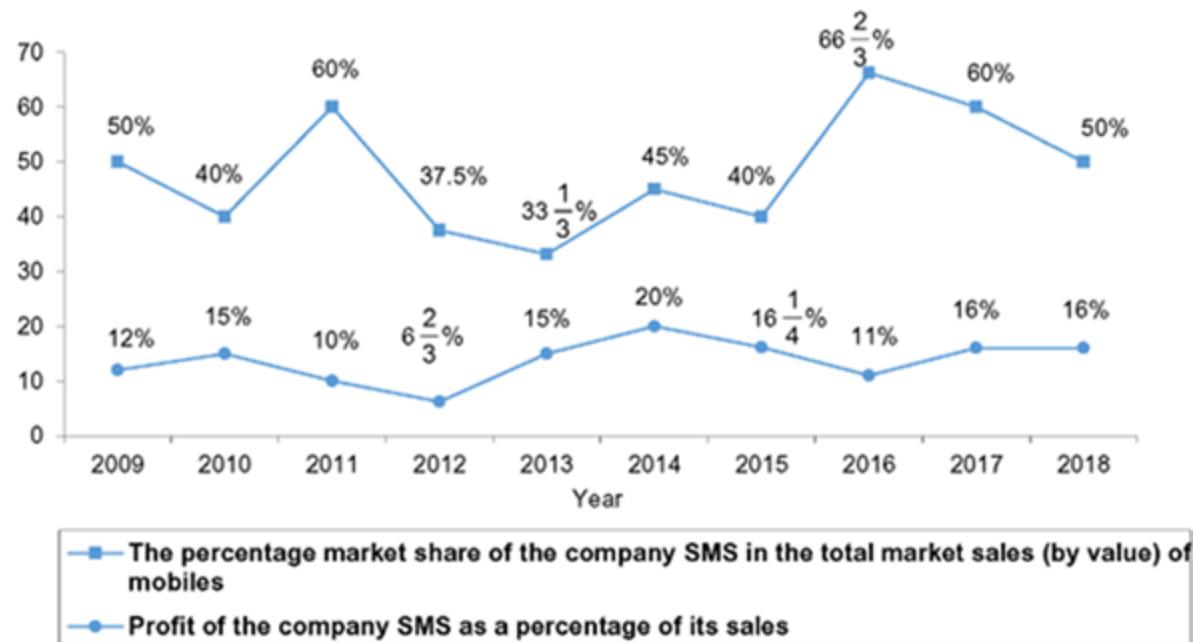
In the second case, $1000X = 702Y \Rightarrow X/Y = 0.702$.

Hence, the minimum possible value of X/Y = 0.702

Choice (C)

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

The following graph and table give information regarding the sales of mobiles by the company SMS and the total market sales of mobiles during the period 2009 to 2018



Year	Total market sales of mobiles (₹crore)	Average selling price per mobile of the company SMS (in ₹)
2009	1600	4000
2010	2500	5000
2011	2000	3000
2012	4000	2500
2013	4800	3200
2014	4000	2400
2015	4500	3000
2016	3000	3200
2017	4000	4000
2018	5000	5000

Note: The company SMS sells only mobiles.

Q21. DIRECTIONS for question 21: Type in your answer in the input box provided below the question.

If in the year 2015, the sales of the mobiles of SMS form 25% by volume of the total market sales of mobiles, what is the average selling price (in Rs.) per mobile of all the other companies together in that year?

Let the total volume of sales of the market be $100x$ and the value be ₹ $100y$.

Now, SMS earned ₹ $40y$ by selling $25x$ at ₹ 3000

$$\Rightarrow \frac{40y}{25x} = 3000$$

The average selling price per mobile of all the other companies together is

$$\frac{60y}{75x} = \frac{1.5}{3} \times \frac{40y}{25x}$$

$$\Rightarrow \frac{1}{2} \times 3000 = ₹1500.$$

Ans: (1500)

Q22. DIRECTIONS for questions 22 and 23: Select the correct alternative from the given choices.

In how many of the years from 2010 to 2018, did the value of the sales of the mobiles of SMS increase and the profit of SMS decrease over the previous year?

a) Less than 5

b) 5

c) 6

d) 7

As in all the years, the profit is given as a percentage of sales. So, sales has to increase and profit must decrease means profit percentage must decrease compared to the previous year. ∴ We have to check only four of the given nine years i.e. 2011, 2012, 2015 and 2016.

	Sales in (₹ cr)	Profit (in ₹ cr)
2010	1000	150
2011	1200	120
2012	1500	100
2014	1800	360
2015	1800	292.5
2016	2000	220

It happened only in the years 2011, 2012 and 2016.

However, as we can eliminate choices (B), (C) and (D) based on the explanation given above. There is no need to do all the above calculations.

Choice (A)

Q23. DIRECTIONS for questions 22 and 23: Select the correct alternative from the given choices.
The ratio of the profit earned by SMS in the year 2014 to that in the year 2018 is

- a) 5 : 4.
- b) 7 : 6.
- c) 10 : 11.
- d) 9 : 10.

Ratio of the profits earned by the company in the year 2014 and that in 2018 is

$$\frac{4000 \times 45\% \times 20\%}{5000 \times 50\% \times 16\%} \Rightarrow \frac{9}{10} = 9 : 10.$$

Choice (D)

Q24. DIRECTIONS for question 24: Type in your answer in the input box provided below the question.

If in any year, the average selling price per mobile in the total market is less than that of the mobiles of SMS, then in at least how many of the given years was the market share by volume of SMS less than 50% of the total market?

questions on the basis of the information given below.

As the average selling price of the total market is less than that of SMS, in each of the years where the sales value of SMS is not more than 50%, the sales volume of SMS will be less than 50% i.e., in the years 2009, 2010, 2012, 2013, 2014, 2015 and 2018.

Ans: (7)

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

Six persons, Jai, Lal, Raj, Dev, Man and Kip, were standing in a row, from East to West, with each of them facing North. Each person was ranked from 1 to 6 on two parameters – Height and Weight. They were ranked such that a taller person received a numerically lower rank than a shorter person and a heavier person received a numerically lower rank than a lighter one. Further, no person received the same rank across the two parameters. It is also known that

- i.Raj, who is standing two places away from Man, was lighter than at least three persons and shorter than at least four persons.
- ii.Kip, who was standing to the immediate left of Dev, was not the tallest and neither Kip nor Dev were standing at either end.
- iii.Jai was standing two places to the left of the tallest person and he was the third shortest among the six.
- iv.the heaviest person, who is not Kip, is next to the tallest person and the lightest person is not standing next to the shortest person.
- v.neither the shortest nor the lightest were standing at any end, while the second heaviest person was not standing next to the lightest person.
- vi.at least three persons were heavier than the tallest person and at least three persons were taller than the heaviest person.

Q25. DIRECTIONS for questions 25 to 28: Select the correct alternative from the given choices.
How many persons are taller than Lal?

a) 1

b) 2

c) 3

d) 4

Let 1, 2, 3, 4, 5, 6 represent their positions from left to right. From (ii), Kip and Dev can be at 2 and 3 OR 3 and 4 OR 4 and 5. They cannot be 3 and 4 as Raj cannot be two places away from Man (from (i)).

If they are at 4 and 5, Raj and Man must be at 1 and 3 in any order. Jai can only be at 2 as he cannot be at 6 (from (iii)). Kip has to be the tallest person in this case. However, this will violate condition (ii). Hence, this case is not possible.

Kip and Dev must be at 2 and 3. Raj and Man must be at 4 and 6 in any order. Jai can only be at 1 and Dev will be the tallest. Lal will be at 5.

From (v), the heaviest person must be standing next to Dev (who is at 3), who is the tallest. Also Kip, who is next to Dev, is not the heaviest. Hence, the person standing at 4 has to be the heaviest. From (i), Raj is not the heaviest. Hence, Man must be at 4 and he must be the heaviest.

From (iii), Jai's rank of height must be 4. From (i), Raj's rank of height can be 5 or 6. But from (v), he cannot be the shortest as he is at one of the ends. Hence, Raj's rank of height has to be 5. From (i), Raj's rank of weight must be 4 or 5 or 6. Since Raj's height rank is 5, his weight rank can only be 4 or 6. From (v), he cannot be the lightest as he is at one of the ends. Hence, his rank of weight has to be 4.

From (vi), Man's rank of height must be at least 4. However, Jai is ranked 4 and Raj is ranked 5 by height. Hence, Man's rank of height must be 6.

From (vi), Dev's rank of weight can be 4 or 5 or 6. Since Raj's rank by weight is 4, Dev's rank by weight has to be 5 or 6. From (iv), the lightest is not standing next to the shortest person, who is Man. Hence, Dev's rank by weight cannot be 6 and can only be 5.

From (iv), the heaviest person, Man, is not standing next to the lightest person. Hence, Lal cannot be the lightest person. Kip has to be the lightest person.

Jai is standing next to the lightest person, Kip. From (v), Jai cannot be the second heaviest. Hence, Jai has to be the third heaviest. Lal has to be the second heaviest. Also, Lal has to be the third tallest and Kip has to be the second tallest.

The following table provides the above information:

Person	Jai	Kip	Dev	Man	Lal	Raj
Height	4	2	1	6	3	5
Weight	3	6	5	1	2	4

Two persons are taller than Lal.

Choice (B)

Q26. DIRECTIONS for questions 25 to 28: Select the correct alternative from the given choices.
How many persons are taller than Raj but lighter than him?

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

Let 1, 2, 3, 4, 5, 6 represent their positions from left to right. From (ii), Kip and Dev can be at 2 and 3 OR 3 and 4 OR 4 and 5. They cannot be 3 and 4 as Raj cannot be two places away from Man (from (i)).

If they are at 4 and 5, Raj and Man must be at 1 and 3 in any order. Jai can only be at 2 as he cannot be at 6 (from (iii)). Kip has to be the tallest person in this case. However, this will violate condition (ii). Hence, this case is not possible.

Kip and Dev must be at 2 and 3. Raj and Man must be at 4 and 6 in any order. Jai can only be at 1 and Dev will be the tallest. Lal will be at 5.

From (v), the heaviest person must be standing next to Dev (who is at 3), who is the tallest. Also Kip, who is next to Dev, is not the heaviest. Hence, the person standing at 4 has to be the heaviest. From (i), Raj is not the heaviest. Hence, Man must be at 4 and he must be the heaviest.

From (iii), Jai's rank of height must be 4. From (i), Raj's rank of height can be 5 or 6. But from (v), he cannot be the shortest as he is at one of the ends. Hence, Raj's rank of height has to be 5. From (i), Raj's rank of weight must be 4 or 5 or 6. Since Raj's height rank is 5, his weight rank can only be 4 or 6. From (v), he cannot be the lightest as he is at one of the ends. Hence, his rank of weight has to be 4.

From (vi), Man's rank of height must be at least 4. However, Jai is ranked 4 and Raj is ranked 5 by height. Hence, Man's rank of height must be 6.

From (vi), Dev's rank of weight can be 4 or 5 or 6. Since Raj's rank by weight is 4, Dev's rank by weight has to be 5 or 6. From (iv), the lightest is not standing next to the shortest person, who is Man. Hence, Dev's rank by weight cannot be 6 and can only be 5.

From (iv), the heaviest person, Man, is not standing next to the lightest person. Hence, Lal cannot be the lightest person. Kip has to be the lightest person.

Jai is standing next to the lightest person, Kip. From (v), Jai cannot be the second heaviest. Hence, Jai has to be the third heaviest. Lal has to be the second heaviest. Also, Lal has to be the third tallest and Kip has to be the second tallest.

The following table provides the above information:

Person	Jai	Kip	Dev	Man	Lal	Raj
Height	4	2	1	6	3	5
Weight	3	6	5	1	2	4

Two persons are taller than Raj but lighter than him.

Choice (C)

Q27. DIRECTIONS for questions 25 to 28: Select the correct alternative from the given choices.
For which of the six persons was the sum of their ranks according to height and weight the highest?

a) Kip

b) **Jai**

c) Man

d) **Raj**

Let 1, 2, 3, 4, 5, 6 represent their positions from left to right. From (ii), Kip and Dev can be at 2 and 3 OR 3 and 4 OR 4 and 5. They cannot be 3 and 4 as Raj cannot be two places away from Man (from (i)).

If they are at 4 and 5, Raj and Man must be at 1 and 3 in any order. Jai can only be at 2 as he cannot be at 6 (from (iii)). Kip has to be the tallest person in this case. However, this will violate condition (ii). Hence, this case is not possible.

Kip and Dev must be at 2 and 3. Raj and Man must be at 4 and 6 in any order. Jai can only be at 1 and Dev will be the tallest. Lal will be at 5.

From (v), the heaviest person must be standing next to Dev (who is at 3), who is the tallest. Also Kip, who is next to Dev, is not the heaviest. Hence, the person standing at 4 has to be the heaviest. From (i), Raj is not the heaviest. Hence, Man must be at 4 and he must be the heaviest.

From (iii), Jai's rank of height must be 4. From (i), Raj's rank of height can be 5 or 6. But from (v), he cannot be the shortest as he is at one of the ends. Hence, Raj's rank of height has to be 5. From (i), Raj's rank of weight must be 4 or 5 or 6. Since Raj's height rank is 5, his weight rank can only be 4 or 6. From (v), he cannot be the lightest as he is at one of the ends. Hence, his rank of weight has to be 4.

From (vi), Man's rank of height must be at least 4. However, Jai is ranked 4 and Raj is ranked 5 by height. Hence, Man's rank of height must be 6.

From (vi), Dev's rank of weight can be 4 or 5 or 6. Since Raj's rank by weight is 4, Dev's rank by weight has to be 5 or 6. From (iv), the lightest is not standing next to the shortest person, who is Man. Hence, Dev's rank by weight cannot be 6 and can only be 5.

From (iv), the heaviest person, Man, is not standing next to the lightest person. Hence, Lal cannot be the lightest person. Kip has to be the lightest person.

Jai is standing next to the lightest person, Kip. From (v), Jai cannot be the second heaviest. Hence, Jai has to be the third heaviest. Lal has to be the second heaviest. Also, Lal has to be the third tallest and Kip has to be the second tallest.

The following table provides the above information:

Person	Jai	Kip	Dev	Man	Lal	Raj
Height	4	2	1	6	3	5
Weight	3	6	5	1	2	4

The sum of the ranks was the highest for Raj.

Choice (D)

Q28. DIRECTIONS for questions 25 to 28: Select the correct alternative from the given choices.
Which of the following persons is taller than at least three persons but lighter than at least four?

- a) Kip

- b) Man
- c) Raj
- d) Lal

Let 1, 2, 3, 4, 5, 6 represent their positions from left to right. From (ii), Kip and Dev can be at 2 and 3 OR 3 and 4 OR 4 and 5. They cannot be 3 and 4 as Raj cannot be two places away from Man (from (i)).

If they are at 4 and 5, Raj and Man must be at 1 and 3 in any order. Jai can only be at 2 as he cannot be at 6 (from (iii)). Kip has to be the tallest person in this case. However, this will violate condition (ii). Hence, this case is not possible.

Kip and Dev must be at 2 and 3. Raj and Man must be at 4 and 6 in any order. Jai can only be at 1 and Dev will be the tallest. Lal will be at 5.

From (v), the heaviest person must be standing next to Dev (who is at 3), who is the tallest. Also Kip, who is next to Dev, is not the heaviest. Hence, the person standing at 4 has to be the heaviest. From (i), Raj is not the heaviest. Hence, Man must be at 4 and he must be the heaviest.

From (iii), Jai's rank of height must be 4. From (i), Raj's rank of height can be 5 or 6. But from (v), he cannot be the shortest as he is at one of the ends. Hence, Raj's rank of height has to be 5. From (i), Raj's rank of weight must be 4 or 5 or 6. Since Raj's height rank is 5, his weight rank can only be 4 or 6. From (v), he cannot be the lightest as he is at one of the ends. Hence, his rank of weight has to be 4.

From (vi), Man's rank of height must be at least 4. However, Jai is ranked 4 and Raj is ranked 5 by height. Hence, Man's rank of height must be 6.

From (vi), Dev's rank of weight can be 4 or 5 or 6. Since Raj's rank by weight is 4, Dev's rank by weight has to be 5 or 6. From (iv), the lightest is not standing next to the shortest person, who is Man. Hence, Dev's rank by weight cannot be 6 and can only be 5.

From (iv), the heaviest person, Man, is not standing next to the lightest person. Hence, Lal cannot be the lightest person. Kip has to be the lightest person.

Jai is standing next to the lightest person, Kip. From (v), Jai cannot be the second heaviest. Hence, Jai has to be the third heaviest. Lal has to be the second heaviest. Also, Lal has to be the third tallest and Kip has to be the second tallest.

The following table provides the above information:

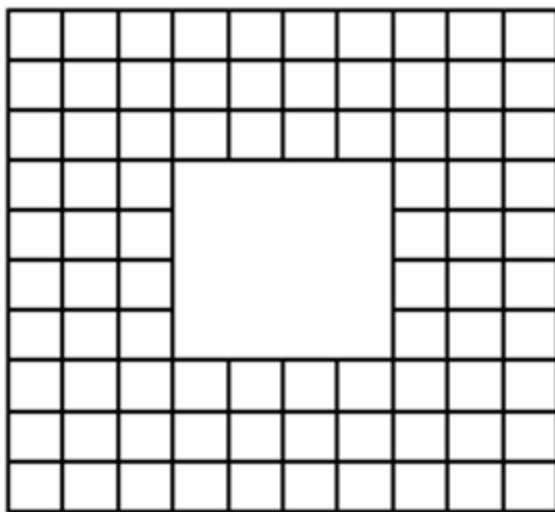
Person	Jai	Kip	Dev	Man	Lal	Raj
Height	4	2	1	6	3	5
Weight	3	6	5	1	2	4

Kip satisfies the given condition.

Choice (A)

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

The game of super chess is played on a unique board as shown below. The board is made of 84 squares on a 10 squares \times 10 squares board, with 16 squares removed from the centre.



The main pieces in the game are a queen, a rook, and a bishop. These pieces move on the board in the following manner:

1. In a single move, a queen can move along the row or the column or diagonally, in either direction, from the square in which it is placed.
2. In a single move, a rook can move only along the row or the column, in either direction, from the square in which it is placed.
3. In a single move, a bishop can move only along the diagonals, in either direction, from the square in which it is placed.

Each of the three pieces can move till the end of the board, unless there is another piece in its way, in which case, it can move only till the square just before the square on which the other piece is placed.

Further, for any piece on the board, all the squares to which the piece *can move to, in a single move*, are said to be under the control of the piece.

Q29. DIRECTIONS for questions 29 to 32: Select the correct alternative from the given choices.
For only a queen placed on the board, what is the minimum number of squares that it can control?

a) 20

- b) 18
- c) 16
- d) 15

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

The game of super chess is played on a unique board as shown below. The board is made of 84 squares on a 10 squares \times 10 squares board, with 16 squares removed from the centre.

The main pieces in the game are a queen, a rook, and a bishop. These pieces move on the board in the following manner:

1. In a single move, a queen can move along the row or the column or diagonally, in either direction, from the square in which it is placed.
2. In a single move, a rook can move only along the row or the column, in either direction, from the square in which it is placed.
3. In a single move, a bishop can move only along the diagonals, in either direction, from the square in which it is placed.

Each of the three pieces can move till the end of the board, unless there is another piece in its way, in which case, it can move only till the square just before the square on which the other piece is placed.

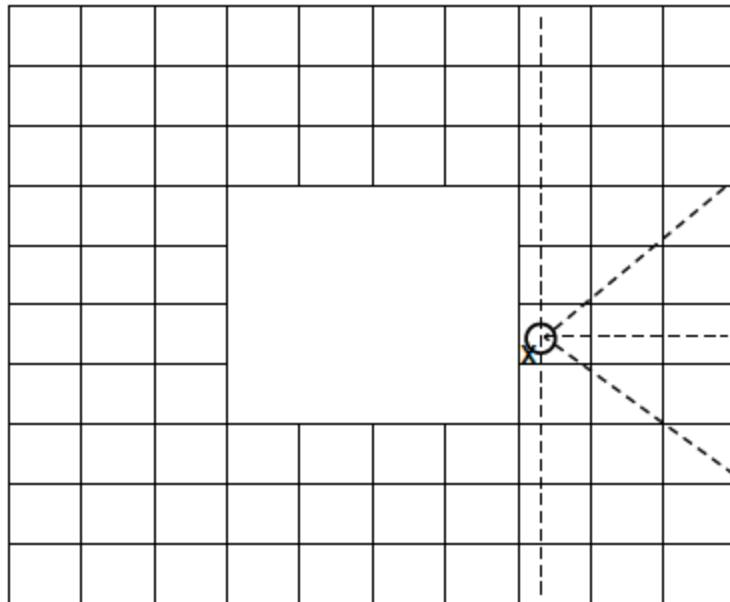
Further, for any piece on the board, all the squares to which the piece *can move to, in a single move*, are said to be under the control of the piece.

Q29. DIRECTIONS for questions 29 to 32: Select the correct alternative from the given choices.

For only a queen placed on the board, what is the minimum number of squares that it can control?

- a) 20
- b) 18
- c) 16
- d) 15

For a queen to move to the minimum number of squares, the queen must be placed in one of the squares near the center. Say if the queen is place on the square marked X, it can move to a total of 15 squares only.



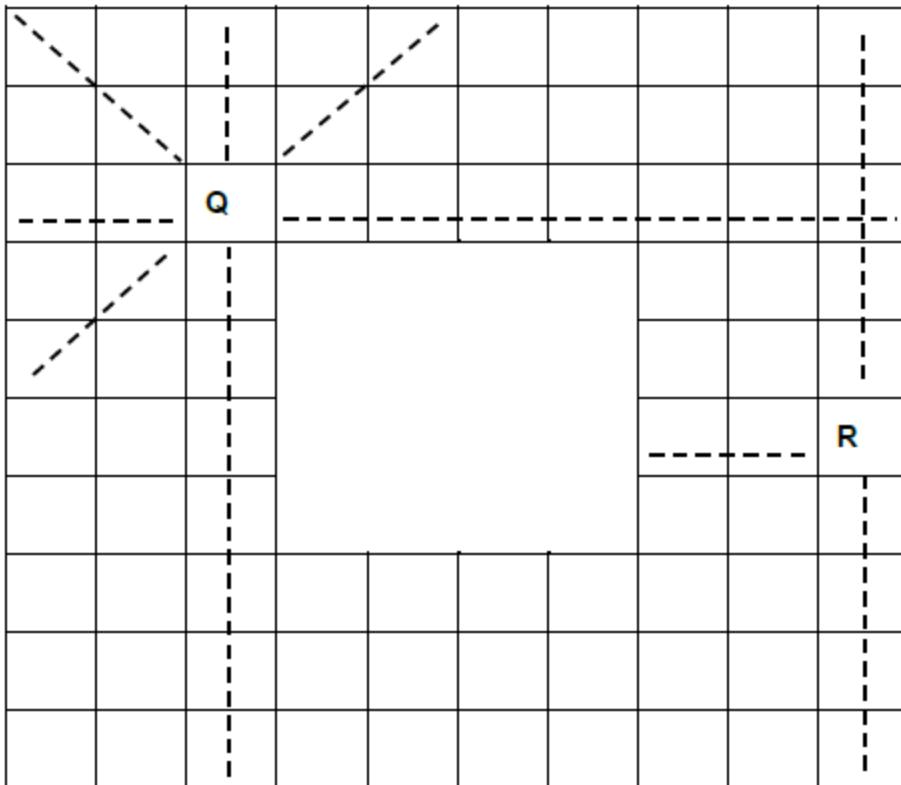
Choice (D)

Q30. DIRECTIONS for questions 29 to 32: Select the correct alternative from the given choices.
For only a rook and a queen on the board, what is the maximum number of individual squares that the queen can control but the rook cannot control?

- a) 20
- b) 19
- c) 22
- d) 23

To maximize the number of individual squares that the queen can control but the rook cannot control, we can first maximize the number of squares that a queen can control. The queen can control a maximum of 24 squares, if it is placed near the corner of the square which is removed (as shown in the figure below). In this arrangement, the rook can be placed anywhere where the rook can control only one square that the queen can also control.

One of the possible arrangements is given below:



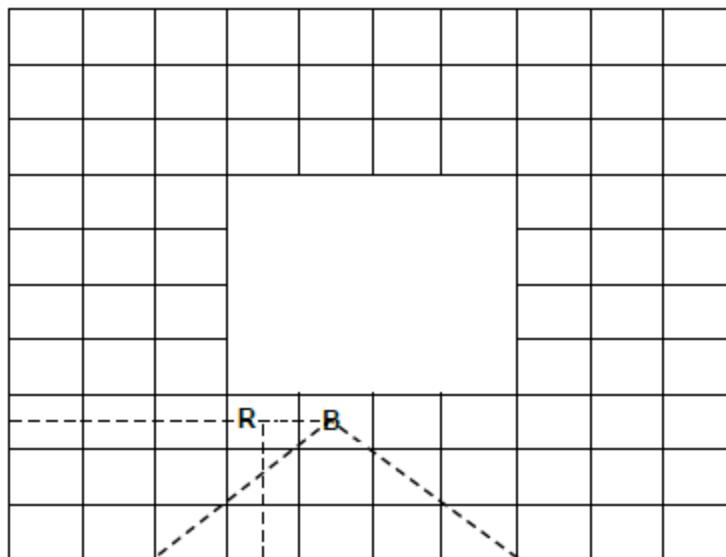
Hence, the total number of squares that the queen can control that the rook cannot control is $24 - 1 = 23$.
Choice (D)

Q31. DIRECTIONS for questions 29 to 32: Select the correct alternative from the given choices.
For only a rook and a bishop on the board, what is the minimum number of individual squares they together control?

- a) 12
- b) 8
- c) 10

d) 9

For a rook and a bishop together to control the minimum number of squares, the rook and the bishop should be placed adjacent to each other, so that the bishop blocks the rook's path along one direction. For the minimum number of squares under control, they have to be placed as shown. Number of squares they together control is 8 (one square is under the control of both the pieces and should be counted only once).



Choice (B)

Q32. DIRECTIONS for questions 29 to 32: Select the correct alternative from the given choices.
What is the minimum number of queens to be placed on the board such that the queens on the board control all the squares on it?

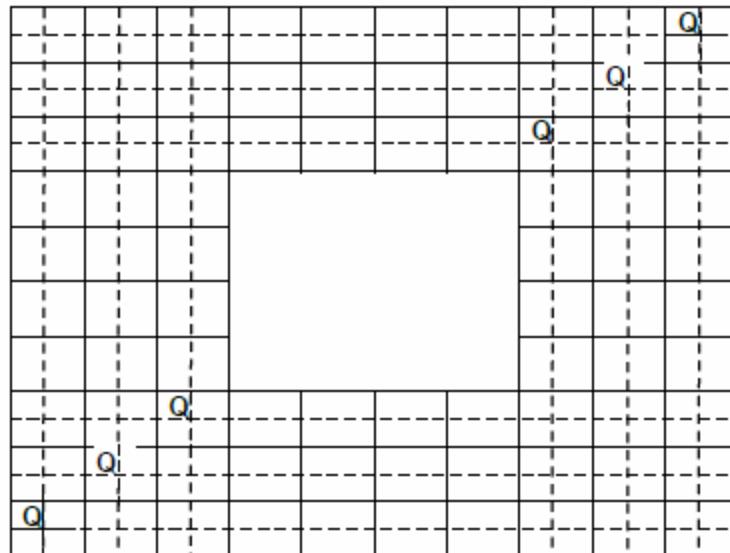
a) 6

b) 5

c) 7

d) 9

The minimum number of queens required to control all the squares on the board is 6.



Choice (A)

QA

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

In a 1000 m long running race, if Tarun gives a head start of 40 m to Amar and still beats Amar by 10 m, then find the distance (in m) by which Tarun will beat Amar, when Amar gives a head start of 40 m to Tarun.

Amar runs only 950 m, when Tarun runs for 1000 m. Now Tarun runs only 960 m,

$$\therefore \text{Amar runs for } \frac{950 \times 960}{1000} = 912 \text{ m.}$$

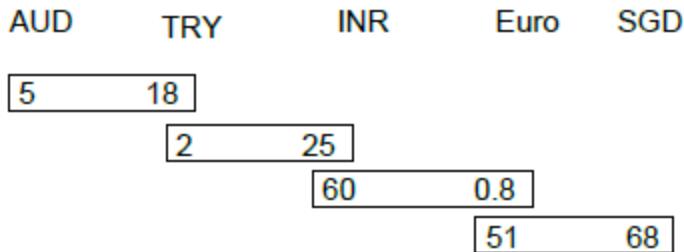
Hence, Tarun beats Amar by 88 m.

Ans: (88)

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

If 5 AUD is equivalent to 18 TRY, INR 25 is equivalent to 2 TRY, 60 INR is equivalent to 0.8 Euro, 51 Euro is equivalent to 68 SGD, then all the following statements are true except

- a) 17 AUD is equivalent to 10.2 Euro.
- b) **90 TRY is equivalent to INR 1125.**
- c) 36 SGD is equivalent to 45 AUD.
- d) 28 TRY is equivalent to 126 SGD.



Equating the ratios, we have

AUD	TRY	INR	Euro	SGD
5	18	225	3	4

$$5 \text{ AUD} \equiv 3 \text{ Euro} \Rightarrow 17 \text{ AUD} \equiv 3 \times \frac{17}{5} = 10.2 \text{ KD}$$

$$18 \text{ TRY} \equiv \text{INR } 225$$

$$\Rightarrow 90 \text{ TRY} \equiv \text{INR } 225 \times 5 = \text{INR } 1125$$

$$4 \text{ SGD} \equiv 5 \text{ AUD} \Rightarrow 36 \text{ SGD} \equiv 45 \text{ AUD}$$

$$18 \text{ TRY} \equiv 4 \text{ SGD} \Rightarrow \text{SGD is costlier than TRY.}$$

\therefore 28 TRY cannot be 126 SGD.

Choice (D)

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

Bhalu, the farmer purchased some sickles and axes for a total of Rs.2910. Each sickle costed Rs.150 and each axe costed Rs.180. If he had purchased as many axes as the sickles he actually bought and vice versa, he would have spent less than what he actually did. Find the number of axes he purchased.

- a) 13
- b) 12 ✓ Your answer is correct
- c) 15
- d) 17

Let the number of sickles and axes that Raju purchased be x and y respectively.

$$\text{Total expenditure} = \text{₹}(150x + 180y)$$

$$\text{If he bought } y \text{ sickles and } x \text{ axes, his total expenditure} = \text{₹}(150y + 180x)$$

$$150y + 180x < 150x + 180y$$

$$x < y$$

$$\text{Also, } 150x + 180y = 2910$$

$$5x + 6y = 97 \text{ ---- (1)}$$

(x, y) can be $(5, 12)$, $(11, 7)$ or $(17, 2)$

Given that $6x + 5y < 97$ ---- (2)

By (2) and (1) we get $x - y < 0$, i.e., $x < y$.

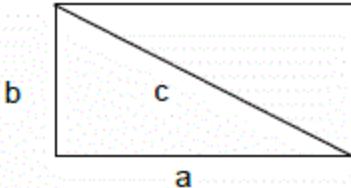
As $x < y$, the only solution is $x = 5$ and $y = 12$.

Choice (B)

Q4. DIRECTIONS for questions 2 to 5: Select the correct alternative from the given choices.

Instead of walking along the two adjacent sides of a rectangular tank, a boy swam across the tank along the diagonal. In doing that he covered a distance, which is lesser than the walking distance by a third of the longer side of the tank. The ratio of the lengths of the shorter side to the a longer side of the tank is

- a) 8 : 15
- b) 3 : 4
- c) 7 : 24
- d) 5 : 12 ✓ Your answer is correct



Let the larger and the smaller perpendicular sides of the rectangle be a , b . Let the hypotenuse be c .

$$(a + b) - c = a/3 \text{ and } c = \sqrt{a^2 + b^2}$$

$$a + b - \sqrt{a^2 + b^2} = a/3$$

$$\Rightarrow (2/3)a + b = \sqrt{a^2 + b^2}$$

$$\text{squaring on both sides} = \frac{4a^2}{9} + \frac{4ab}{3} + b^2 = a^2 + b^2$$

$$\Rightarrow 12ab = 5a^2 \Rightarrow \frac{b}{a} = \frac{5}{12}$$

Hence the ratio of the lengths of the shorter side to the longer side = 5 : 12

Alternative Solution:

The equation can be solved using the options.

(A) 8 : 15

Total length along sides is 23, and along diagonal is 17.

$$\text{Difference} = 6 \neq \frac{1}{3} \times 15 \left(\frac{1}{3} \text{ of longerside} \right)$$

(B) 3 : 4

Length along sides = 7

Diagonal = 5

$$\text{Difference} = 2 \neq \frac{1}{3} \times (4)$$

(C) 7 : 24

$$24 + 7 - 25 = 6 \neq \frac{1}{3} \times 24$$

(D) 5 : 12

$$5 + 12 - 13 = 4 = \frac{1}{3} \times 12$$

Choice (D)

Q5. DIRECTIONS for questions 2 to 5: Select the correct alternative from the given choices.
 Amar, Akbar and Antony decide to go for a cycling race, for which they first have a practice race on a racetrack OR. P and Q are points on the track between O and R such that OP : PQ : QR is 1 : 2 : 3. The ratio of the speeds with which Amar, Akbar and Antony covered the leg OP is 2 : 3 : 4, while for the leg PQ it is 3 : 4 : 2 and for the leg QR it is 4 : 2 : 3. If the ratio of the speeds with which Amar covered the legs OP, PQ and QR is 2 : 3 : 4, who among Amar, Akbar and Antony completed the practice race first?

- a) Amar
- b) **Akbar**
- c) Antony
- d) Both Amar and Antony

Let Amar's speeds for the three legs OP, PQ and QR be $2V_1$, $3V_2$ and $4V_3$ ----- (1)
 respectively.

Given, the speeds of Amar for these three legs were in the ratio of 2 : 3 : 4.

$\Rightarrow V_1 = V_2 = V_3 = V$ say ----- (2) and from (1) the speeds of the three runners for the three legs will be

	OP	PQ	QR
Amar	$2V_1$	$3V_2$	$4V_3$
Akbar	$3V_1$	$4V_2$	$2V_3$
Antony	$4V_1$	$2V_2$	$3V_3$

Since $V_1 = V_2 = V_3 = 1$, from (2), and by assuming OP = x , PQ = $2x$ and QR = $3x$, and $x = 1$.

We get times taken by Amar, Akbar and Antony as

$$\left(\frac{1}{2} + \frac{2}{3} + \frac{3}{4}\right), \left(\frac{1}{3} + \frac{2}{4} + \frac{3}{2}\right) \text{ and } \left(\frac{1}{4} + \frac{2}{2} + \frac{3}{3}\right) \text{ respectively i.e. } \frac{23}{12}, \frac{28}{12} \text{ and } \frac{27}{12}$$

\therefore Amar is the fastest.

Choice (A)

Q6. DIRECTIONS for question 6: Type in your answer in the input box provided below the question.
 A group of boys decided to contribute equally to buy a football costing a whole number of rupees between Rs.250 and Rs.270. At the last moment, two boys backed out and as a result each boy had to contribute three rupees more than what they had earlier planned for. How many boys were there in the group initially?

Let the cost of the football be C and the number of boys initially be n .

$$\text{Hence } \frac{C}{n-2} - \frac{C}{n} = 3$$

$$\Rightarrow \frac{C(n-n+2)}{n(n-2)} = 3 \Rightarrow C = \frac{3n(n-2)}{2}$$

But $250 \leq C \leq 270$, and n is a natural number. Hence, by trial and error, we get $n = 14$

$$\text{and } C = \frac{3(14)(14-2)}{2} = 252$$

Ans: (14)

Q7. DIRECTIONS for questions 7 to 9: Select the correct alternative from the given choices.

A, B and C have some chocolates among themselves. A gives to each of the other two, half the number chocolates they already have. Similarly B and C, in that order, give each of the other two half the number of chocolates each of them already has. Now, if each of them has the same number of chocolates, what could be the minimum total number of chocolates they have among themselves?

- a) 243
- b) 81
- c) 27
- d) 729

Let the final number of chocolates with each of them be x .

	A	B	C
Final \rightarrow	n	n	n
Just before C gives	$\frac{2n}{3}$	$\frac{2n}{3}$	$\frac{5n}{3}$
Just before B gives	$\frac{4n}{9}$	$\frac{13n}{9}$	$\frac{10n}{9}$
Just before A gives	$\frac{35n}{27}$	$\frac{26n}{27}$	$\frac{20n}{27}$

(or initial)

\therefore The total number of chocolates = $3n$ and $\frac{35n}{27}$, $\frac{26n}{27}$ and $\frac{20n}{27}$ are all integers

$\Rightarrow n$ is a multiple of 27.

\therefore Minimum value of $n = 27 \Rightarrow 3n = 81$.

Choice (B)

Q8. DIRECTIONS for questions 7 to 9: Select the correct alternative from the given choices.

Consider the following set of equations:

$$3x + 5y + 2z = 23$$

$$5x + 6y + 7z = 44$$

$$Px + 28y + 25z = 178$$

If x , y and z are real, then which of the statements is/are not true?

- I. The set of equations will become inconsistent (have no solution) for at least one value of P .
- II. There exists a unique solution for the set of equations for every real value of P except 21.
- III. The set of equations will have more than one solution for at least one real value of P .



a) I, II and III



b) Only II and III



c) Only I



d) None of these

If the three equations are named as (1), (2) and (3) respectively, then $(1) \times 2 + (2) \times 3 = (3)$

Hence, if $P = 21$, the system of equations becomes dependent and then they will not have a unique solution. For every other real value of P , a unique solution will exist. Further there is no value of P for which the equations become inconsistent. Hence statements II and III are true, while only statement I is not true.

Choice (C)

Q9. DIRECTIONS for questions 7 to 9: Select the correct alternative from the given choices.

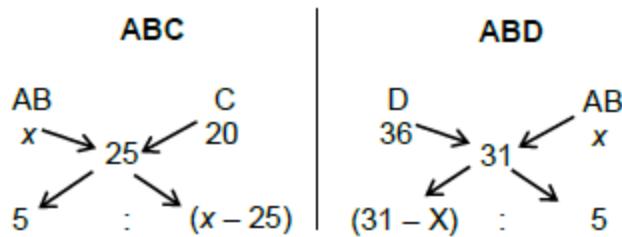
A rice merchant has four varieties of rice – A, B, C and D – with him. He mixed the entire quantity of the rice of varieties A and B with him. With this mixture, if he mixes the entire quantity of the rice of variety C, which costs Rs.20 per kg, the mixture so formed would cost Rs.25 per kg. Instead, if he mixes with it the entire quantity of the rice of variety D, which costs Rs.36 per kg, the mixture so formed would cost Rs.31 per kg. If the entire quantity of the rice of variety D is thrice that of the rice of variety C, how much would the mixture of the entire quantity of the rice of all the four varieties cost?



a) Rs.26.5 per kg

- b) Rs.28 per kg
- c) Rs.29.5 per kg
- d) Cannot be determined

Let the cost per kg of the mixture (AB) of the rice of varieties A and B be ₹x.



Since the quantity of the mixture of A and B is the same in both (ABC) and (ABD), and

$$\text{the quantity of D is thrice that of C, } \frac{(31-x)}{5} = 3\left(\frac{x-25}{5}\right).$$

$$\Rightarrow x = 26.5$$

∴ The ratio of quantities of (AB), C and D is
 $5 : (26.5 - 25) : (31 - 26.5)$ i.e., $10 : 3 : 9$.

Hence the cost per kg of the mixture of ABCD (in ₹)

$$= \frac{(26.5)10 + (20)3 + (36)9}{10 + 3 + 9} = \frac{649}{22} = 29.5$$

Choice (C)

Q10. DIRECTIONS for question 10: Type in your answer in the input box provided below the question.

There are two geometric progressions, G_1 and G_2 , whose first terms are 4 and 8 respectively and whose common ratios are and respectively. The last term of both progressions is 2^{69} . Find the number of terms of common to G_1 and G_2 .

You did not answer this question

The indices of the terms in the two GPs are in AP.

$$G_1 : 2^2, 2^{3.5}, 2^5, \dots, 2^{269}$$

$$G_2 : 2^3, 2^{4.75}, 2^{6.5}, \dots, 2^{269}$$

The two APs are

$$A_1 : 2, 3.5, 5, \dots, 269$$

$$A_2 : 3, 4.75, 6.5, \dots, 269$$

We can get rid of fractions by considering

$$4A_1 : 8, 14, 20, 26, \dots, 1076$$

$$4A_2 : 12, 19, 26, \dots, 1076$$

The common differences are 6 and 7 (LCM = 42) respectively. Therefore the AP of the common terms is A : 26, 68, 110, 1076

$$\text{Number of terms} = \frac{1076 - 26}{42} + 1 = 26$$

Ans: (26)

Q11. DIRECTIONS for questions 11 to 16: Select the correct alternative from the given choices.

A vendor bought a certain number of kites. Three-fifths of them were white and the rest were yellow. He sold three-sevenths of the kites, which included one-sixth of the yellow kites. What fraction of the unsold kites were white?

a) ✓ Your answer is correct

b)

c)

d)

Let the number of kites bought be 210 (LCM of 5, 7 and 6)

$$\text{Number of white kites} = \frac{3}{5}(210) = 126$$

$$\text{Number of yellow kites} = 210 - 126 = 84$$

$$\text{Number of kites sold} = \frac{3}{7}(210) = 90$$

$$\text{Number of kites unsold} = 120$$

$$\text{Number of yellow kites sold} = \frac{1}{6}(84) = 14$$

$$\text{Number of white kites sold} = 90 - 14 = 76$$

$$\text{Number of white kites unsold} = 126 - 76 = 50$$

	White	Yellow	Total
Sold	126	84	210
Unsold	50		120

$$\therefore \frac{\text{No of unsold white kites}}{\text{No of unsold kites}} = \frac{50}{120} = \frac{5}{12}$$

Choice (A)

Q12. DIRECTIONS for questions 11 to 16: Select the correct alternative from the given choices.

If 2 is one of the roots of the quadratic equation $x^2 - (4 - \alpha)x + (\alpha + 1/\alpha) = 0$, where α is some positive number, which of the following could be the other root?

a) 5/3 ✓ Your answer is correct

b) -1

c) 1/2

d) -2

The product of the roots of $x^2 - (4 - \alpha)x + (\alpha + 1/\alpha) = 0$ is $(\alpha + 1/\alpha)$

As 2 is one root, considering the 4 options, the product of the roots would be 10/3, -2, 1 and -4.

As the product is $\alpha + 1/\alpha$, where α is some positive real number, it has to be at least 2.
Only choice (A) is possible.

Choice (A)

Q13. DIRECTIONS for questions 11 to 16: Select the correct alternative from the given choices.

If the ratio of the lengths of two trains is 2 : 3 and the ratio of the times taken by them to cross each other when travelling in the same direction and when travelling in opposite directions is 4 : 1, the ratio of the speed of the faster train to the speed of the slower train is

- a) 5 : 2
- b) 3 : 2
- c) 5 : 3
- d) 5 : 4

Given ratio of lengths of the trains is 2 : 3

Let their original lengths be $2k$ and $3k$ and their speeds be u and v , in any order, where $v > u$.

Time taken by them to cross each other when moving in the same direction = $\frac{5k}{v-u}$

and when moving in opposite direction = $\frac{5k}{v+u}$

$$\text{Given } \frac{5k/v-u}{5k/v+u} = \frac{4}{1}$$

$$\Rightarrow 5v = 3u \Rightarrow \frac{v}{u} = 5/3.$$

Choice (C)

Note: The ratio 2 : 3 can be seen to be redundant, and it does not affect the required answer.

Q14. DIRECTIONS for questions 11 to 16: Select the correct alternative from the given choices.

The length, MN, and the breadth, NO, of a rectangle MNOP are 10 cm and 5 cm respectively. MN is split up into ten equal segments, by marking nine equidistant points – A, B, H and I – between M and N. Now, if ten straight lines are drawn connecting P with each of the ten points A, B, H, I and N, find the total area (in sq.cm) of all the triangles which can be observed in the resultant figure.

- a) 575
- b) 550
- c) 1100



d) 1150

The number of triangles of bases of different lengths are listed below

Base length	Number of triangles	Base length	Number of triangle
1	10	6	5
2	9	7	4
3	8	8	3
4	7	9	2
5	6	10	1

\therefore Total area A

$$= \frac{5}{2} [(1(10) + 2(9) + 3(8) + \dots + 10(1)] + \frac{1}{2}(10)(5)$$

$$\text{Let } S = 1(10) + 2(9) + \dots + 10(1)$$

$$\text{and } T = 1(1) + 2(2) + \dots + 10(10) = 10(11)(21)/16 = 35(11)$$

$$\therefore S + T = (1 + 2 + \dots + 10)(11) = 55(11)$$

$$\therefore S = 20(11) \text{ and } A = \frac{5}{2}(20)(11) + \frac{1}{2}(10)(5)$$

$$= \frac{1150}{2} = 575$$

Choice (A)

Q15. DIRECTIONS for questions 11 to 16: Select the correct alternative from the given choices.

Statistics show that 30% of the people who drink are heart patients and 80% of heart patients are those who drink. If 40% of the population drink, then what percentage of the population are heart patients?



a) 15



b) 20



c) 12



d) 10

Let the total population be x .

The number of drinkers is $\frac{40}{100}x$.

\therefore the number of drinkers who are heart patients

$$= \frac{30}{100} \left(\frac{40}{100}x \right) = \frac{12}{100}x.$$

Given 80% of heart patients are drinkers.

$$\therefore \text{the number of heart patients} = \left(\frac{12}{100}x \right) \left(\frac{100}{80} \right) = \frac{3x}{20}$$

\therefore the percentage of heart patients

$$= \frac{3x}{20} \left(\frac{100}{x} \right)\% = 15\%$$

Choice (A)

Q16. DIRECTIONS for questions 11 to 16: Select the correct alternative from the given choices.

Given that $-8 \leq x \leq -5$, $-4 \leq y < 2$ and $-1 \leq z \leq 5$, which of the following statements is/are always true?

- a) $9z + 5 > x + 2y$
- b) $6z > 5x + 9y$
- c) $2(x + y) < 5z$
- d) More than one of the above ✓ Your answer is correct

We check each of the given options to determine which of the given statement(s) is/are always true.

$$-1 \leq z \leq 5$$

$$-9 \leq 9z \leq 45$$

$$-4 \leq y < 2 \Rightarrow -8 \leq 2y \leq 4 \Rightarrow -4 \leq -2y \leq 8$$

$$-8 \leq x \leq -5 \Rightarrow 5 \leq -x \leq 8$$

$$-9 - 4 + 5 \leq 9z - 2y - x \leq 45 + 8 + 8$$

$$-8 \leq 9z - 2y - x \leq 61$$

$$9z - 2y - x \geq -8$$

$$9z + 5 - 2y - x \geq -8 + 5$$

$$9z + 5 \geq -3 + 2y + x$$

Therefore statement (A) need not be true.

$$-8 \leq x \leq -5 \Rightarrow 25 \leq -5x < 40$$

$$-4 \leq y \leq 2 \Rightarrow -18 \leq -9y \leq 36$$

$$-1 \leq z \leq 5 \Rightarrow -6 \leq 6z \leq 30$$

$$25 - 18 - 6 \leq -5x - 9y + 6z \leq 40 + 36 + 30$$

$$1 \leq 62 - 5x - 9y \leq 106$$

$62 - 5x - 9y$ is always positive

$$\text{or } 6z - 5x - 9y > 0$$

$$6z > 5x + 9y$$

Therefore statement (B) is always true.

$$\text{Again } -16 \leq 2x \leq -10, -8 \leq 2y \leq 4 \text{ and } -25 \leq -5z \leq 5$$

$$-16 - 8 - 25 \leq 2x + 2y - 5z \leq -10 + 4 + 5$$

$$-49 \leq 2x + 2y - 5z \leq -1$$

$$2x + 2y - 5z < 0$$

$2(x + y) < 5z$, therefore statement (C) is true.

Thus both statement (B) and statement (C) are true.

Choice (D)

Q17. DIRECTIONS for question 17: Type in your answer in the input box provided below the question.

Six people have to go to attend an event in three different vehicles each of which can accommodate a maximum of six persons. In how many ways can they go, so that they use all the three vehicles?

The different splits and the number of such splits of the 6 people into 3 groups are tabulated below.

Splits	Selecting vehicles	Selecting persons	
1, 1, 4	3	${}^6C_4 {}^2C_1$	$15(2)(3) = 90$
1, 2, 3	6	${}^6C_3 {}^3C_2$	$20(3)(6) = 360$
2, 2, 2	1	${}^6C_2 {}^4C_2$	$15(6)(1) = 90$

[As the 3 groups have to go in 3 distinct vehicles, we have to count A, B, CDEF and B, A, CDEF separately etc]

$$\therefore \text{Total number of ways} = 90 + 360 + 90 = 540$$

Ans: (540)

Q18. DIRECTIONS for questions 18 and 19: Select the correct alternative from the given choices.

This morning, all the students of our school assembled for the assembly. The students stood in an odd number of rows with as many students per row as the number of rows. After the assembly, when they went back to their classes, they were all given chocolates. Each student was given exactly 10 chocolates. The chocolates given were distributed from packets of chocolates, each packet containing exactly 240 chocolates. After distributing all the chocolates, it was found that exactly one packet remained with some chocolates in it. Which of the following can be the number of chocolates remaining in this packet?

- a) 180
- b) 150
- c) 160
- d) 220

The number of students in the school = (Number of rows) \times (Number of students per row) = (Number of rows) 2 (\because Number of rows = Number of students per row).

\therefore Number of students is a perfect square.

Let this be N^2 (where N is odd). Let the number of packets from which chocolates were distributed be T. Total number of chocolates distributed = $10N^2$ (because each student got exactly 10 chocolates). Let the remaining number of chocolates in the last packet be R.

$$\text{Then } 240T = 10N^2 + R \quad (1)$$

$$\Rightarrow N^2 = 24T - \frac{R}{10}$$

$\therefore \frac{-R}{10}$ denotes the remainder when 24 divides N^2 , which is a perfect square. Any odd perfect square when divided by 24 must leave a remainder of 1 or 9.

$$\therefore \frac{-R}{10} = 1 \text{ or } 9$$

$$\therefore \frac{R}{10} = -1 \text{ or } -9$$

$$\therefore \frac{R}{10} = (-1 + 24) \text{ or } (-9 + 24) = 23 \text{ or } 15$$

i.e., R = 230 or 150.

\therefore From the given choices, only Choice (B) can be a possible value of R.

Choice (B)

Q19. DIRECTIONS for questions 18 and 19: Select the correct alternative from the given choices.

Everyday, Rishab's mother starts from home, drives to his school and reaches there at exactly 4:00 p.m., and immediately picks him up from there and drives him back home. One day, Rishab left school at 3.00 p.m. and, without waiting for his mother, started walking towards home. He met his mother on the way and together they reached home minutes earlier than usual. If the next day, he left school at 3:30 p.m., and started walking towards home, how many minutes earlier than usual did they reach home?

- a) 12
- b) 8
- c)
- d)

The first day since Rishabh and his mother reach home $13\frac{1}{3}$ minutes earlier than usual, his mother must have saved $6\frac{2}{3}$ minutes either way, i.e. she met Rishabh at $(4:00 - 6\frac{2}{3})$ or at $3:53\frac{1}{3}$. The distance that Rishabh covered in $53\frac{1}{3}$ minutes, his

mother normally covers in $6\frac{2}{3}$ minutes. i.e., the mother is $\frac{53\frac{1}{3}}{6\frac{2}{3}}$ i.e., 8 times as fast

as Rishabh.

The second day, school got over at 3 : 30 pm. Dividing 30 minutes ($4 : 00 - 3 : 30$) into 9 parts we get each part as $3\frac{1}{3}$ minutes. Rishabh uses up 8 of these parts to cover a certain distance, while his mother would need only 1 part to cover this distance. On that day, she did not cover this distance (as Rishabh had already covered it).

She saved $3\frac{1}{3}$ minutes one way and $6\frac{2}{3}$ minutes on the to and fro trip.

Choice (C)

DIRECTIONS for questions 20 and 21: Answer the questions on the basis of the information given below.

A five-digit number $abcde$ is such that it is divisible by 6 and $a < b < c < d < e$.

Q20. DIRECTIONS for questions 20 and 21: Select the correct alternative from the given choices. If $e < 8$, then how many such five-digit numbers are possible?

- a) 1 ✓ Your answer is correct
- b) 2
- c) 4
- d) 12

Since $abcde$ is a five-digit number with $a < b < c < d < e$ and divisible by 6, e must be 6 or 8.

Given $e < 8 \Rightarrow e = 6$;

Then $a + b + c + d$ must be multiple of 3 and each digit is less than or equal to 5.

\therefore The only possible value of $abcd$ is 1245.

(The five digit number = 12456)

Choice (A)

DIRECTIONS for questions 20 and 21: Answer the questions on the basis of the information given below.

A five-digit number $abcde$ is such that it is divisible by 6 and $a < b < c < d < e$.

Q21. DIRECTIONS for questions 20 and 21: Select the correct alternative from the given choices.
How many such five-digit numbers are possible in all?

- a) 13
- b) 14
- c) 17
- d) 15

Since $abcde$ is a five-digit number with $a < b < c < d < e$ and divisible by 6, e must be 6 or 8.

In addition to the possibility of $e = 6$, we need to consider the case when $e = 8$.

If $e = 8$, then $a + b + c + d$ must be of the form $3k + 1$ and each digit is less than or equal to 7.

For the digits 1, 2, 3, 4, 5, 6, 7, the remainders when divided by 3 are 1, 2, 0, 1, 2, 0, 1 respectively. The sum $1 + 2 + 3 + 4 + 5 + 6 + 7 = 28$ is itself of the form $3k + 1$. Hence exactly three of these seven digits, with their sum adding to a multiple of 3, need to be removed (and the remaining four will form $abcd$).

Now the remainders of the three digits removed need to add up to a multiple of 3. This is possible in two ways.

- (i) Remainders of 1, 2 and 0 are chosen.
- (ii) Remainders of 1, 1 and 1 are chosen.

Since there are three 1's, two 2's and two 0's, there are $3 \times 2 \times 2 = 12$ combinations in (i) and since there are only three 1's, there is only one combination in (ii)

Hence, the possible number of values of $abcd$, if $e = 8$ is $12 + 1 = 13$.

Therefore, the total number of possible values of $abcde = 1 + 13 = 14$.

Choice (B)

Q22. DIRECTIONS for questions 22 to 25: Select the correct alternative from the given choices.

A metal sheet in the shape of an equilateral triangle was perfectly cut into a number of smaller equilateral triangles, not necessarily all of the same size. From each of these smaller triangles, a circle of the maximum possible area was cut out. If the thickness of the sheet is uniform, then the total weight of all the circles cut out forms approximately what percentage of the weight of the original triangle?



a) 60.43%



b) 68.37%



c) 66.67%



d) Depends on the number and dimensions of the triangles cut.

As the thickness is uniform, weight is proportional to area.

For any equilateral triangle, the percentage of area of maximum possible circle is the same.

Area of the equilateral triangle with side s is $\frac{\sqrt{3}}{4} s^2$

In an equilateral triangle, the radius of the maximum possible circle (in-circle) is one-third the length of the median of the triangle.

$$\therefore \text{radius} = \frac{1}{3} \left(\frac{\sqrt{3}}{2} s \right) = \frac{1}{2\sqrt{3}} s.$$

$$\therefore \text{Area of circle} = \pi \left(\frac{s}{2\sqrt{3}} \right)^2 = \frac{\pi s^2}{12}$$

$$\therefore \text{Required percentage} = \frac{\left(\frac{\pi s^2}{12} \right)}{\left(\frac{\sqrt{3}}{4} s^2 \right)}$$

$$\cong \frac{3.14}{12} \times \frac{4}{1.732} \cong 60.4\%$$

Choice (A)

Q23. DIRECTIONS for questions 22 to 25: Select the correct alternative from the given choices.

Yesterday, A and B sold a distinct number of mangoes each and both of them received the same amount of money. Today, A increased the price of his mangoes by a certain percentage, while B decreased the price of his mangoes by the same percentage. If each of them sold the same number of mangoes today as they did the previous day and the sum received by A is twice the sum received by B, find the percentage by which A increased the price of his mangoes?

- a) 25%
- b) 33 $\frac{1}{3}$ %
- c) 50%
- d) Cannot be determined

Let the number of Mangoes sold by A and B be a and b respectively and the price of each mango sold by A and B be p and q respectively.

Sum received by A = ap = sum received by B = bq .

Let the change in price be $x\%$ on the second day

$$\therefore a \left(p + \frac{x}{100} p \right) = 2b \left(q - \frac{x}{100} q \right)$$

$$\Rightarrow ap \left[1 + \frac{x}{100} \right] = 2bq \left(1 - \frac{x}{100} \right)$$

As $ap = bq$

$$1 + \frac{x}{100} = 2 \left[1 - \frac{x}{100} \right]$$

$$\Rightarrow x = 33 \frac{1}{3}\%$$

Choice (B)

Q24. DIRECTIONS for questions 22 to 25: Select the correct alternative from the given choices.

A normal pack of 52 cards comprises four suits – Spades, Clubs, Diamonds and Hearts – of 13 cards each, the Spades and Clubs being black and the other two red. Further, each suit of 13 cards comprises nine numbered cards – numbered from 2 to 10 – and four honour cards – Ace, King, Queen and Jack. Now, it is known that a card is missing from a normal pack of 52 cards. If from that pack, two black cards can be selected in 300 ways and two numbered cards can be selected in 630 ways, which of the following could be the missing card?



a) Spade Ace



b) Diamond king



c) Club king



d) More than one of the above

In normal pack of cards there are 26 black cards.

Two cards can be selected from 26 black cards in ${}^{26}C_2$ or 325 ways.

But a black card can be drawn in 300 ways.

∴ The missing card is black.

In a normal pack, there are 36 numbered cards.

Two cards can be drawn from 36 cards in ${}^{36}C_2$ or 630 ways.

∴ The missing card is not numbered card.

Hence the missing card is a black honour. It can be the king of clubs or the ace of spades. Option (D) is the correct answer. Choice (D)

Q25. DIRECTIONS for questions 22 to 25: Select the correct alternative from the given choices.

If 15/08/1997 was a Friday, 15/08/1947 must have been a

a) **Tuesday**

b) **Wednesday**

c) Thursday

d) **Friday**

From 15/08/1947 to 15/08/1997, there are 13 leap years and 37 non-leap years.

Hence we have a total of 13 (2) + 37 odd days = 63 odd days. Hence 15/08/1947 was Choice (D)

Q26. DIRECTIONS for question 26: Type in your answer in the input box provided below the question.

$$\begin{aligned}
 & \log_{\sqrt{2}} 2^2 + \log_{\sqrt[3]{3}} 3^3 + \dots + \log_{\sqrt[50]{50}} 50^{50} \\
 &= 2 \log_{\sqrt{2}} 2 + 3 \log_{\sqrt[3]{3}} 3 + 4 \log_{\sqrt[4]{4}} 4 + \dots + 50 \log_{\sqrt{50}} 50 \\
 &= \frac{2}{(1/2)} \log_2 2 + \frac{3}{(1/3)} \log_3 3 + \frac{4}{(1/4)} \log_4 4 + \dots + \frac{50}{(1/50)} \log_{50} 50 \\
 &= 2^2 + 3^2 + 4^2 + \dots + 50^2 \\
 &(\log_{\sqrt[a]{a}} a^a = \frac{a}{(1/a)} \log_a a = a^2) \\
 &= \frac{50(50+1)(2 \times 50 + 1)}{6} - 1^2 = 42925 - 1 = 42924 \quad \text{Ans: (42924)}
 \end{aligned}$$

Q27. DIRECTIONS for questions 27 to 29: Select the correct alternative from the given choices.

- a) 22 cm
- b) 36 cm
- c) 50 cm
- d) 44 cm

Let R be the radius of the quadrant.

$$\text{Area of the quadrant} = \frac{\pi}{4}(R^2) = 154$$

$$\Rightarrow R = 14$$

$$\begin{aligned}
 \text{The perimeter of the quadrant} &= \frac{2\pi R}{4} + 2R \\
 &= \frac{2 \times \frac{22}{7} \times 14}{4} + 2(14) = 22 + 28 = 50 \text{ cm}
 \end{aligned}$$

Choice (C)

Q28. DIRECTIONS for questions 27 to 29: Select the correct alternative from the given choices.

Let $f_{n+1}(x) = f_n(x) + 1$, if n is a multiple of 3.

$$= f_n(x) - 1, \text{ otherwise.}$$

If $f_1(1) = 0$, then find the value of $f_{50}(1)$.

- a) **-18**
- b) **-16**
- c) -17
- d) **None of these**

$$f_1(1) = 0$$

$$f_2(1) = f_1(1) - 1 = -1 \text{ (since } n = 1\text{)}$$

$$f_3(1) = f_2(1) - 1 = -1 - 1 = -2 \text{ (since } n = 2\text{)}$$

$$f_4(1) = f_3(1) + 1 = -2 + 1 = -1 \text{ (since } n = 3\text{)}$$

$$f_5(1) = -2 \quad f_8(1) = -3$$

$$f_6(1) = -3 \quad f_9(1) = -4$$

$$f_7(1) = -2 \quad f_{10}(1) = -3$$

By the same pattern

$$f_{48}(1) = -17 \Rightarrow f_{49}(1) = f_{48}(1) + 1 = -17 + 1 = -16$$

$$\therefore f_{50}(1) = f_{49}(1) - 1 = -16 - 1 = -17.$$

Choice (C)

Q29. DIRECTIONS for questions 27 to 29: Select the correct alternative from the given choices.

In a school, a chess tournament was conducted, in which, all the contestants were boys, except two girls. Each contestant played exactly once against each of the other contestants. The two girls together scored a total of 8 points. Among the boys, each boy scored the same number of points. In the tournament, a contestant gets one point for a win, half a point for a tie, and no points for a loss. The number of boys who participated in the tournament is

- a) **14 or 7.**
- b) **7 or 11.**
- c) 11 or 5.
- d) **Cannot be determined**

Let x be the number of boys who participated and let y be the number of points scored by each of them.

Hence the total number of points won in the tournament is $xy + 8$.

Clearly this number is equal to the total number of games played.

Since the total number of players is $(x + 2)$ and each of them played with all the others once, the total number of games is

$${}_{x+2}C_2 = \frac{(x+2)(x+1)}{2}$$

$$\therefore xy + 8 = \frac{(x+2)(x+1)}{2}$$

$$\Rightarrow 2xy + 16 = x^2 + 3x + 2 \Rightarrow x^2 + 3x - 2xy = 14$$

$$\Rightarrow x(x+3-2y) = 14$$

Clearly x is an integer.

Since y is either an integer or a fraction, with denominator 2, $(x+3-2y)$ is also an integer.

Since x must divide 14, x can 1, 2, 7 or 14.

But $x = 1$ and $x = 2$ is not possible since in either of these cases the total number of students will not exceed 4 and two girls cannot score 8 points.

Hence $x = 7$ or 14 .

If $x = 7$

$$7(7+3-(2)(4)) = 14$$

$$\Rightarrow y = 4$$

If $x = 14$

$$14(14+3-24) = 14$$

$$\Rightarrow y = 8$$

Hence the number of boys in the tournament can be either 7 or 14.

Alternate method:

The answer can be verified from the options,

$$xy + 8 = \frac{(x+2)(x+1)}{2}$$

$$x = 7 \Rightarrow 7y + 8 = \frac{9 \times 8}{2} = 36$$

$$\Rightarrow y = 4$$

$\therefore x = 7$ satisfies

$$x = 11 \Rightarrow 11y + 8 = \frac{13 \times 12}{2} = 78 \Rightarrow y = \frac{70}{11}$$

This is not a valid value of y since y can take only multiples of $\frac{1}{2}$.

$$x = 14 \Rightarrow 14y + 8 = \frac{16 \times 15}{2} = 120 \Rightarrow y = 8$$

This is valid. $\therefore x = 7$ or 14 satisfies.

Choice (A)

Q30. DIRECTIONS for question 30: Type in your answer in the input box provided below the question.

What is the remainder when 7^{700} is divided by 100?

Consider 7^4 , whose value is 2401

$$\therefore 7^{700} = (7^4)^{175} = (2401)^{175}$$

Any power of 2401 will end with 1 as the units digit and 0 as the tens digit.

\therefore When it is divided by 100, the remainder is 1.

Ans: (1)

Q31. DIRECTIONS for questions 31 and 32: Select the correct alternative from the given choices.

A, B and C started a job. On the first day, C being unwell is not able to work at his full capacity and he leaves after one day. The other two complete the work and B gets a share of Rs.5100 out of a total of Rs.18000 paid for the job. If each of A, B and C can complete the job normally in 10 days, 20 days and 5 days respectively, then find the percentage efficiency with which C worked on the first day.

- a) 50%
- b) 60%
- c) 75%
- d) 80%

Since A and B worked for the same amount of time and A is twice as efficient as B, A's share will be twice that of B. Hence, C's share = $18000 - (5100 + 10200) = 2700$.

Hence, C did $\left(\frac{2700}{18000}\right)^{\text{th}}$ part of the job.

$\Rightarrow \frac{9}{60}^{\text{th}}$ of the work is completed by C on the 1st day.

$$\therefore \% \text{ efficiency of C} = \frac{\left(\frac{9}{60}\right)}{\left(\frac{1}{5}\right)} \times 100 = 75\%.$$

Choice (C)

Q32. DIRECTIONS for questions 31 and 32: Select the correct alternative from the given choices.

- a) 1.
- b)

c)

d)

$$\frac{1}{12} + \frac{1}{20} + \frac{1}{30} + \frac{1}{42} + \dots$$

$$= \frac{1}{3(4)} + \frac{1}{4(5)} + \frac{1}{5(6)} + \frac{1}{6(7)} + \dots \infty$$

$$t_n = \frac{1}{(n+2)(n+3)} = \frac{1}{n+2} - \frac{1}{n+3}$$

$$t_1 = \frac{1}{3} - \frac{1}{4}$$

$$t_2 = \frac{1}{4} - \frac{1}{5}$$

$$t_3 = \frac{1}{5} - \frac{1}{6}$$

$$\therefore t_n = \frac{1}{n+2} - \frac{1}{n+3}$$

$$S_n = t_1 + t_2 + t_3 + \dots + t_n$$

$$= \left(\frac{1}{3} - \frac{1}{4} \right) + \left(\frac{1}{4} - \frac{1}{5} \right) + \left(\frac{1}{5} - \frac{1}{6} \right) + \dots + \left(\frac{1}{n+2} - \frac{1}{n+3} \right)$$

$$S_n = \frac{1}{3} - \frac{1}{n+3}$$

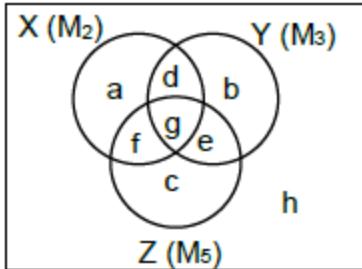
$$\text{As } n \rightarrow \infty, \frac{1}{n+3} \rightarrow 0 \text{ and } S_n \rightarrow \frac{1}{3}$$

$$\therefore \frac{1}{12} + \frac{1}{20} + \frac{1}{30} + \frac{1}{42} + \dots = \frac{1}{3}$$

Choice (D)

Q33. DIRECTIONS for question 33: Type in your answer in the input box provided below the question.

For any two sets A and B, $A \Delta B$ is defined as the set of elements which belong to either of the sets A and B but not both. X, Y and Z are subsets of the set of natural numbers, containing all the multiples of 2, 3 and 5 respectively, that are not greater than 100. Find the number of elements in $(X \Delta Y) \Delta Z$.



Consider the given diagram

$$\text{Now, } X \Delta Y = \{a, f, b, e\}$$

$$\therefore (X \Delta Y) \Delta Z = \{a, f, b, e\} \Delta \{e, f, g, c\}$$

$$X \Delta Y \Delta Z = \{a, b, c, g\}$$

$\therefore X \Delta Y \Delta Z$ is a set of elements which either belong to exactly one of the sets or to all the three sets.

In the interval 1 to 100,

The number multiples of only 2 = 27

The number multiples of only 3 = 14

The number multiples of only 5 = 7

The number of multiples of 2, 3, and 5 = 3

$$\therefore \text{required result} = 27 + 14 + 7 + 3 = 51$$

Ans: (51)

Q34. DIRECTIONS for question 34: Select the correct alternative from the given choices.

If $T = 2\cos 4\theta + \sin 2\theta + 3$, then the range of T is

a) $\left[\frac{1}{2}, 5 \right]$

b) [2, 3]

c) $\left[\frac{31}{8}, 5 \right]$

d) $\left[\frac{31}{7}, 4 \right]$

$$T = 2 \cos^4 \theta + \sin^2 \theta + 3$$

$$T = 2 \cos^4 \theta + 1 - \cos^2 \theta + 3$$

$$T = 2 \cos^4 \theta - \cos^2 \theta + 4$$

$$T = 2\left[\cos^4 \theta - \frac{1}{2} \cos^2 \theta + 2\right]$$

$$T = 2\left[\left(\cos^2 \theta - \frac{1}{4}\right)^2 + 2 - \frac{1}{16}\right]$$

$$0 \leq \cos^2 \theta \leq 1$$

$$\frac{-1}{4} \leq \cos^2 \theta - \frac{1}{4} \leq \frac{3}{4}$$

$$0 \leq \left(\cos^2 \theta - \frac{1}{4}\right)^2 \leq \frac{9}{16}$$

$$2\left[2 - \frac{1}{16}\right] \leq T \leq 2\left[\frac{1}{16} + 2 - \frac{1}{16}\right]$$

$$\frac{31}{8} \leq T \leq 5$$

$$T \in \left[\frac{31}{8}, 5\right]$$

Alternative Solution:

By inspection, it can be observed that for $\cos \theta = 1$, the expression can be equal to 5. Also, since $\cos^4 \theta$ and $\sin^2 \theta$ are both positive, the expression cannot be less than 3. By observing the choices, only choice (C) can be the answer. Choice (C)