CAT MOCK 3

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Instructions

Read the passage and answer the questions that follow.

With our climate-impacted world now highly prone to fires, extreme storms and sea-level rise, nuclear energy is touted as a possible replacement for the burning of fossil fuels for energy - the leading cause of climate change. Nuclear power can demonstrably reduce carbon dioxide emissions. Yet scientific evidence and recent catastrophes call into question whether nuclear power could function safely in our warming world. Wild weather, fires, rising sea levels, earthquakes and warming water temperatures all increase the risk of nuclear accidents, while the lack of safe, long-term storage for radioactive waste remains a persistent danger.

The Santa Susana Field Laboratory property has had a long history of contaminated soil and groundwater. Indeed, a 2006 advisory panel compiled a report suggesting that workers at the lab, as well as residents living nearby, had unusually high exposure to radiation and industrial chemicals that are linked to an increased incidence of some cancers. Discovery of the pollution prompted California's DTSC in 2010 to order cleanup of the site by its current owner - Boeing - with assistance from the US Department of Energy and NASA. But the required cleanup has been hampered by Boeing's legal fight to perform a less rigorous cleaning.

Like the Santa Susana Field Lab, Chernobyl remains largely unremediated since its meltdown in 1986. With each passing year, dead plant material accumulates and temperatures rise, making it especially prone to fires in the era of climate change. Radiation releases from contaminated soils and forests can be carried thousands of kilometres away to human population centres, according to experts.

Kate Brown, a historian at the Massachusetts Institute of Technology and the author of Manual for Survival: A Chernobyl Guide to the Future (2019), and Tim Mousseau, an evolutionary biologist at the University of South Carolina, also have grave concerns about forest fires. 'Records show that there have been fires in the Chernobyl zone that raised the radiation levels by seven to 10 times since 1990,' Brown says. Further north, melting glaciers contain 'radioactive fallout from global nuclear testing and nuclear accidents at levels 10 times higher than elsewhere'. As ice melts, radioactive runoff flows into the ocean, is absorbed into the atmosphere, and falls as acid rain. 'With fires and melting ice, we are basically paying back a debt of radioactive debris incurred during the frenzied production of nuclear byproducts during the 20th century,' Brown concludes.

Flooding is another symptom of our warming world that could lead to nuclear disaster. Many nuclear plants are built on coastlines where seawater is easily used as a coolant. Sea-level rise, shoreline erosion, coastal storms and heat waves - all potentially catastrophic phenomena associated with climate change - are expected to get more frequent as the Earth continues to warm, threatening greater damage to coastal nuclear power plants. 'Mere absence of greenhouse gas emissions is not sufficient to assess nuclear power as a mitigation for climate change,' conclude Natalie Kopytko and John Perkins in their paper 'Climate Change, Nuclear Power, and the Adaptation-Mitigation Dilemma' (2011) in Energy Policy.

Proponents of nuclear power say that the reactors' relative reliability and capacity make this a much clearer choice than other non-fossil-fuel sources of energy, such as wind and solar, which are sometimes brought offline by fluctuations in natural resource availability. Yet no one denies that older nuclear plants, with an aged infrastructure often surpassing expected lifetimes, are extremely inefficient and run a higher risk of disaster.

Heidi Hutner & Erica Cirino

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1. Why does the author give the examples of the Santa Susana Lab and Chernobyl?

A. To illustrate why we should not be investing in nuclear power generation.

B. To highlight how climate change is going to make nuclear disasters of the past even worse in the future.

C. To show that nuclear power is not a clean alternative to fossil fuels as it is claimed to be.

D. To highlight the extreme negative impact of nuclear disasters on people and the planet.

Sol. Through the passage, the author argues against nuclear power generation as an alternative to fossil fuels especially in the context of climate change. The author then gives these two examples to highlight how much damage they did to people and the planet and continue to do so. These two examples are extreme examples of how nuclear power generation can go terribly wrong. Thus, the primary reason to introduce these examples is to highlight the impact of nuclear disasters on the planet and people. Hence, option D.

Though the author does say that with climate change, the nuclear fallout of these disasters is likely to get worse, these examples are not introduced for that purpose. By highlighting the negative impact of these disasters, the author is trying to make the larger point against nuclear power. Hence, we can eliminate option B.

Though option A is the purpose behind the whole passage, it is not the reason why these two examples are introduced. Hence, we can eliminate option A. For the same reason we can eliminate option C.

2. What is the author's opinion on nuclear energy?

A. The risks involved in nuclear power generation are too high for it to be considered a clean alternative to fossil fuels.

B. The author does not offer his/her own opinions on the topic.

C. Nuclear power is a viable replacement for fossil fuels as long as we take into consideration climate change.

D. In the context of climate change, nuclear power generation could lead to calamitous disasters and hence should be avoided.

Sol. Through the passage, the author argues against nuclear power. Hence, options B and C which are not negative can be eliminated. Both options A and D are close. But option A misses the primary motivation behind the author's recommendation. The author feels that with climate change, the number of nuclear disasters is likely to increase and thus nuclear power should be avoided. Hence, option D.

3. What is the main point of the last paragraph?

A. Though initially offering benefits like capacity and reliability, nuclear power plants get riskier and less efficient with time.

B. In the context of climate change, the benefits of nuclear power outweigh the risks.

C. In the context of climate change, the risks of nuclear power outweigh the benefits.

D. In spite of their higher capacity and reliability, nuclear power plants are not worth the risk.

Sol. Through the last paragraph, the author is trying to counter the argument in favour of nuclear energy. The author says that though they have the advantage of reliability and capability, as the plants age they become inefficient and risky. Hence, option A is the right answer.

Options B, C and D miss out the point of how aging of plants makes them a worse bet. Hence, option A.

4. What was the conclusion based on the research by the MIT ?

A. With climate change, areas with nuclear radiation will be susceptible to fires and acid rain.

B. The nuclear byproducts of the past are still around and will continue to haunt us forever.

C. We are still in the process of experiencing the fall-out of nuclear disasters and experiments of the past.

D. With climate change, nuclear debris is even more riskier than it was before.

Sol. The MIT research showed conclusively that the frequent forest fires, surface runoffs and flooding spread radiation. The research concluded that we are still paying for the nuclear by-products that were made in the 20th century. Only option C captures this point and hence is the right answer.

Option D, though true, is not the main conclusion of the study.

Option A contains a distortion. The study does not mention that only areas with radiation will experience acid rain. Hence, we can eliminate option A.

Option B is an exaggeration and hence can be eliminated.

Thus option C is the correct answer.

Instructions

Read the passage carefully and answer the following questions.

Country music has often been misrepresented to the world. Early on, it was deemed ‘hillbilly music’ by the very recording industry producing it, stereotypically linking it to a supposedly degenerate and backwards culture. We can see this image echoed on the front page of Variety in 1926, where the music critic Abel Green first defines the audience: ‘The “hill-billy” is a North Carolina or Tennessee and adjacent mountaineer type of illiterate white whose creed and allegiance are to the Bible … and the phonograph.’ Then the music got its lashing when Green

described it as 'the sing-song, nasal-twanging vocalising of a Vernon Dalhart or a Carson Robison … reciting the banal lyrics of a Prisoner's Song or The Death of Floyd Collins …'

These kinds of negative projections of the people who have made country music, and have listened to it, linger even unto today. The stereotype is that they all harbour conservative political and social beliefs, setting them as sexist, racist, jingoistic and fundamentalist Christian by nature. But this image is a lie. For, right from the start, country music spoke up with a progressive voice.

One early example of this is from Blind Alfred Reed, who crafted How Can a Poor Man Stand Such Times and Live? (1929). The song takes on the unjust practices of groups in power, such as in the lines: 'preachers preach for gold and not for souls' and 'Officers kill without a cause.' It presents the entirety of the working class as being victimised at the very dawn of the Great Depression. But Reed also wrote the religious song There'll Be No Distinction There (1929), which illustrated an egalitarian afterlife in the lines: 'We'll all sit together in the same kind of pews, / The whites and the coloured folks, the gentiles and the Jews.' But Reed was not alone in expressing sympathy for the working class or in calling out for a more equitable society: others from this early era - such as Uncle Dave Macon, Fiddlin' John Carson and Henry Whitter - expressed similar sentiments, just as Johnny Cash, Steve Earle and John Rich have done in later decades.

Country music has also spoken out on women's issues, such as in Loretta Lynn's hit The Pill (1975). The song celebrates freedom from pregnancy, with the narrator noting how her husband has always been carefree and unfaithful while she was tied down with 'a couple [babies] in my arms' and another one on the way. Lynn's message here is clear - she despises this kind of unequitable relationship, as she bluntly states in her autobiography Coal Miner's Daughter (1976): 'Well, shoot, I don't believe in double standards, where men can get away with things that women can't.' In the country-music market, this song stands out as an unabashed and rather radical call for sexual liberation and biological control, challenging the man's past sexual prerogative and presenting a situation where the woman may also enjoy a variety of sexual liaisons without the social/economic restrictions that come with pregnancy, childbirth and childcare. Lynn rejoices both in the song and in her own overall personal belief that the contraceptive pill will allow women greater control of their own lives.

Mark Allan Jackson

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5. Which of the following adds the least depth to the author's argument?

A. Country music, from its very beginnings to its latest hits, has addressed a number of social issues.

B. The cultural ambassadors of country music exhibit the varied history of America.

C. Certain country music icons such as Toby Keith have sung religious songs that created the genre of Christian music.

D. Certain country music icons such as Kitty Wells have sung songs on gender prejudice and domestic abuse.

Sol. The author begins the passage by explaining how country music has been termed "hill-billy". He then goes on to explain what it means. The second paragraph speaks of the negative

perceptions that country music has and the author states that this image is not true. The author explains how country music has been more progressive right from the beginning. The remaining paragraphs cite examples of issues that country music has dealt with. It is clear from the passage that the main argument of the author is to show that country music is progressive and not conservative.

Option A is incorrect since it contributes to the author's argument that country music is progressive.

Option B is a possible answer. Cultural ambassadors have not been discussed in the passage, although them exhibiting a varied history of America would still be beneficial for country music.

Option C is correct. Furthering "Christian" music would bolster Country Music's conservative credentials and not its progressive ones.

Option D is incorrect since it tackles social issues which have been discussed in the passage.

6. The passage makes all the following claims EXCEPT:

1. "Hill-billy" was considered a derogatory word.

2. Country music was more progressive than it was perceived to be.

3. The audience of country music was diverse.

A. Statements 1 and 3 only.

B. Statements 2 and 3 only.

C. Statement 3 only.

D. None amongst statements 1, 2 and 3.

Sol. The claim in statement 1 is made in the first paragraph. "Hill billy" has been stereotypically linked to a supposedly degenerate and backwards culture. We can further infer this from Abel Green's description.

The claim in statement 2 is the main argument of the passage. We can infer it from the second paragraph.

Statement 3 can be inferred from the lines "These kinds of negative projections of the people who have made country music, and have listened to it, linger even unto today. The stereotype is that they all harbour conservative political and social beliefs, setting them as sexist, racist, jingoistic and fundamentalist Christian by nature. But this image is a lie. For, right from the start, country music spoke up with a progressive voice."

So, Option D is correct.

7. What is the author is trying to do by citing the example of Loretta Lynn?

A. To highlight the progressive voices within country music on women's health and rights.

B. To show how country music facilitated the women rights movement.

C. To give an example of a song that stands out in the country music market.

D. To showcase the thoughts of country music ambassadors who were pro-choice.

Sol. Through the passage, the author argues that country music has always had a progressive voice. To support this assertion, the author first gives the example of Blind Alfred Reed who spoke of racial equality and equitable society. Then he gives the example of Loretta Lynn's progressive stand on women's reproductive rights. Thus, through this paragraph, the author is trying to highlight the progressive voices in country music's history to show that country music always had a progressive voice. Thus, option A is closest to the answer.

Option B is incorrect because the author has not claimed that country music facilitated the human rights movement.

Option C is incorrect. Although the author does say that "The Pill" stands out that is not the main point. We must see why the author believes it stands out. Read the lines "In the country-music market, this song stands out as an unabashed and rather radical call for sexual liberation and biological control, challenging the man's past sexual prerogative and presenting a situation where the woman may also enjoy a variety of sexual liaisons without the social/economic restrictions that come with pregnancy, childbirth and childcare." Through this example, the author is trying to make a larger point.

Option D is true but only captures a part of what Loretta Lynn's song indicates. Option A is more accurate.

8. Which of the following statements can be inferred from the passage?

A. The audience of country music was literate and liberal.

B. As every song in country music dealt with social issues, we cannot call country music regressive.

C. The negative perceptions surrounding country music can be solely attributed to it being misrepresented by critics.

D. People are often ignorant of the rich and varied history that country music represents.

Sol. The author says that "These kinds of negative projections of the people who have made country music, and have listened to it, linger even unto today. The stereotype is that they all harbour conservative political and social beliefs, setting them as sexist, racist, jingoistic and fundamentalist Christian by nature. But this image is a lie. For, right from the start, country music spoke up with a progressive voice." However, from these lines we cannot infer that the entire audience was literate and liberal. Hence, option A is incorrect.

Similarly "every song" need not have been progressive. Option B is gross generalization of country music.

Option C is incorrect because it is a generalization as well.

Option D is correct, we can infer this from the lines "These kinds of negative projections of the people who have made country music, and have listened to it, linger even unto today. The stereotype is that they all harbour conservative political and social beliefs, setting them as sexist, racist, jingoistic and fundamentalist Christian by nature."

Instructions

Read the passage carefully and answer the following questions.

Dancing is a human universal, but why? It is present in human cultures old and new; central to those with the longest continuous histories; evident in the earliest visual art on rock walls from France to South Africa to the Americas, and enfolded in the DNA of every infant who invents movements in joyful response to rhythm and song, long before she can walk, talk or think of herself as an 'I'. Dancing remains a vital, generative practice around the globe into the present in urban neighbourhoods, on concert stages, as part of healing rituals and in political revolutions. Despite efforts waged by Christian European and American colonists across six continents over 500 years to eradicate indigenous dance traditions and to marginalise dancing within their own societies, dancing continues wherever humans reside. Any answer to the question of why humans dance must explain its ubiquity and tenacity. In so doing, any answer will challenge Western notions of human being that privilege mind over body as the seat of agency and identity.

Current explanations for why humans dance tend to follow one of two approaches. The first, seen in psychological and some philosophical circles, begins with a human as an individual person who chooses to dance (or not) for entertainment, exercise, artistic expression or some other personal reason. Such approaches assume that dance is one activity among others offering benefits to an individual that may be desirable, but not necessary, for human well being. Alternatively, a raft of sociological and anthropological explanations focus on community, asserting that dancing is one of the first means by which the earliest humans solidified strong social bonds irrespective of bloodlines. In these accounts, dancing is eventually replaced by more rational and effective means of social bonding that the dancing itself makes possible, such as language, morality and religion. While the first type of reasoning struggles to explain why so many humans choose to dance, the second struggles to explain why humans continue to dance. What is missing from these accounts?

What if humans are the primates whose capacity to dance (shared by some birds and mammals) was the signature strategy enabling the evolution of a distinctively large and interconnected brain, empathic heart and ecological adaptability? And what if dancing plays this role for humans not just in prehistoric times, but continuing into the present? What if humans are creatures who evolved to dance as the enabling condition of their own bodily becoming?

Recent evidence for such a thesis is gathering across scientific and scholarly disciplines. Time and again, researchers are discovering the vital role played by bodily movement not only in the evolution of the human species, but in the present-day social and psychological development of healthy individuals.

Kimerer LaMothe

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9. What is the primary purpose of the passage?

A. To present a hypothesis on why dancing is universal and enduring.

B. To explain the theories about why humans dance and their pros and cons.

C. To show why dancing is necessary for human development.

D. To identify the singular reason why humans dance.

Sol. The author begins by asking the question why dancing is universal to humans? Then she goes on to give the current theories that try to explain this. She dismisses the first theory on the basis that it does not explain the ubiquity of dancing and dismisses the second on the basis that it does not explain the tenacity of the practice. Then she goes on to propose a hypothesis that dancing is an evolutionary strategy that allows for our social and psychological development. She goes on to add that research seems to back up this hypothesis and how this explains both the ubiquity and tenacity of dancing.

Hence, the passage is written with the purpose of introducing the author's hypothesis. Hence, option A is the most apt answer.

Option B is incorrect because the theories and their pros and cons are discussed only as a part of the passage. This also omits the hypothesis presented by the author.

Option C is incorrect because although the passage does discuss human development in relation to dancing, why humans dance is the focal point of the passage.

Option D and Option A are close. However, the author does not conclude with on one reason as to why humans dance. Thus, option A is more accurate.

10. What is the main idea behind the second paragraph?

A. To explain why the reason for humans dancing might be more complex than originally thought.

B. To show why a third theory of why humans dance is required.

C. To show how the two theories of why humans dance are incomplete alone but complete when used together.

D. To explain the two theories of why humans dance and their short-comings.

Sol. The second paragraph begins by citing the two approaches used currently to explain why humans dance. Then it states the shortcomings of these theories. Option D summarizes this, so it is correct.
Though the second paragraph hints at options A and C, the main idea behind the paragraph is neither A nor B. Hence option (a) and option (b) are incorrect.
Option C is incorrect because it is not mentioned that the two theories complete each other. Hence option C is incorrect as well.

11. The author mentions that dance is the enabling condition of a human's bodily becoming to,

A. question if humans slowly evolved into what they danced to become.

B. question if dancing is necessary for humans to evolve.

C. show that dancing is the catalyst for human evolution.

D. give scientific proof of bodily movement playing a vital role in evolution.

Sol. The author mentions the given line to raise a question if dance is a necessary condition to evolve. He then continues with the final paragraph that states scientific studies which discover the vital role of dance in evolution.

Option A mentions that humans know what they want to evolve into. This information is not conveyed. Hence it is incorrect.

Option C mentions that dancing is the catalyst for evolution. This means that dancing has merely sped up the evolutionary process, but is not necessarily an enabling condition for evolution. Hence it is incorrect.

Option D is one of the reasons supporting the authors claim.

Option B is the idea conveyed behind the line and it is hence the correct option.

12. Which of the following is the author most likely to support?

A. Making dancing an essential part of school education.

B. Encouraging traditional forms of dance that have survived over centuries over modern dance forms.

C. Dancing to be made mandatory at all social functions.

D. Studying the different dance forms of different regions to understand how they have impacted the local human culture.

Sol. Through the passage, the author presents the hypothesis that dancing is an evolutionary strategy that plays a role in our social and psychological development. Hence, she is likely to support the inclusion of dance in schooling. Thus, the author is likely to agree with option A.

The author does not distinguish between different dance forms. Hence, B is unlikely to be the answer.

Though dancing helps human beings, we cannot infer that the author would agree with making it mandatory at social functions, especially when the function is not geared towards social or psychological development. Hence, option C can be ruled out.

The impact of dance on culture has not been discussed in the passage. Hence, the author's views on option D cannot be inferred.

Instructions

Read the following passage carefully and answer the questions that follow.
The whole civilized world is mourning the death of Asa Gray with a depth of feeling and appreciation perhaps never accorded before to a scholar and man of science. To the editors of this Journal, the loss at the very outset of their labors is serious indeed. They lose a wise and sympathetic adviser of great experience and mature judgment to whom they could always have turned with entire freedom and in perfect confidence; and they lose a contributor whose vast stores of knowledge and graceful pen might, it was reasonable to hope, have long enriched their columns.

The career of Asa Gray is interesting from many points of view. It is the story of the life of a man born in humble circumstances, without the advantages of early education, without inherited genius—for there is no trace in his yeoman ancestry of any germ of intellectual

greatness—who succeeded in gaining through native intelligence, industry, and force of character, a position in the very front rank of the scientific men of his age. Among the naturalists who, since Linnæus, have devoted their lives to the description and classification of plants, four or five stand out prominently in the character and importance of their work. In this little group, Asa Gray has fairly won for himself a lasting position. But he was something more than a mere systematist. He showed himself capable of drawing broad philosophical conclusions from the dry facts he collected and elaborated with such untiring industry and zeal. This power of comprehensive generalization he showed in his paper upon the "Characters of Certain New Species of Plants Collected in Japan" by Charles Wright, published nearly thirty years ago. Here he first pointed out the extraordinary similarity between the Floras of Eastern North America and Japan, and then explained the peculiar distribution of plants through the northern hemisphere by tracing their direct descent through geological eras from ancestors which flourished in the arctic regions down to the latest tertiary period. This paper was Professor Gray's most remarkable and interesting contribution to science. It at once raised him to high rank among philosophical naturalists and drew the attention of the whole scientific world to the Cambridge botanist.

Asa Gray did not devote himself to abstract science alone; he wrote as successfully for the student as for the professional naturalist. His long list of educational works have no equals in accuracy and in beauty and compactness of expression. They have had a remarkable influence upon the study of botany in this country during the half century which has elapsed since the first of the series appeared.

Botany, moreover, did not satisfy that wonderful intellect, which hard work only stimulated but did not weary, and one of Asa Gray's chief claims to distinction is the prominent and commanding position he took in the great intellectual and scientific struggle of modern times, in which, almost alone and single-handed he bore in America the brunt of the disbelief in the Darwinian theory.
But the crowning labor of Asa Gray's life was the preparation of a descriptive work upon the plants of North America. This great undertaking occupied his attention and much of his time during the last forty years of his life. Less fortunate than his greatest botanical contemporary, George Bentham, who turned from the last page of corrected proof of his work upon the genera of plants to the bed from which he was never to rise again, Asa Gray's great work is left unfinished. The two volumes of the "Synoptical Flora of North America" will keep his memory green, however, as long as the human race is interested in the study of plants.

But his botanical writings and his scientific fame are not the most valuable legacy which Asa Gray has left to the American people. More precious to us is the example of his life in this age of grasping materialism. It is a life that teaches how industry and unselfish devotion to learning can attain to the highest distinction and the most enduring fame. Great as were his intellectual gifts, Asa Gray was greatest in the simplicity of his character and in the beauty of his pure and stainless life.

13. Which of the following best explains the reason behind the author stating Asa Gray as less fortunate than George Bentham?

A. George Bentham was more famous than Asa Gray.

B. George Bentham gained more popularity for corrected proof of Asa's work than Asa himself did.

C. George Bentham accolades were based on Asa's work

D. None of these

Sol. In the 5th para of the passage, the author states that 'Less fortunate than his greatest botanical contemporary, George Bentham, who turned from the last page of corrected proof of his work upon the genera of plants to the bed from which he was never to rise again, Asa Gray's great work is left unfinished.' From this we can infer that the author calls Asa as less fortunate because unlike George Bentham, his work was left unfinished. None of the options suggest this. Thus, the answer is D.

14. Which of the following can be inferred about Asa Gray?
I: He studied at Cambridge University
II: He was a writer
III: He was an editor
IV: He was a confidant of the editors of the journal from which the article is taken

A. I and III

B. I, III, and IV

C. II, and IV

D. I, II, III, and IV

Sol. Only II and IV are mentioned in the passage. The passage refers to Asa as 'Cambridge botanist', but that doesn't mean that he studied at Cambridge University. In the 3rd passage, it is mentioned that Asa wrote for both student and professional naturalist. In the first passage, the author states 'They lose a wise and sympathetic adviser of great experience and mature judgment to whom they could always have turned with entire freedom and in perfect confidence', from which we can infer that IV is true. Thus, the answer is C.

15. What, according to the author, is the highlight of Asa Gray's career?

A. Laying the groundwork for detailed work on plants of North America

B. Championing the wave which regarded Darwinian Theory as dubious.

C. Tracing the descent of plants from the geological era to the latest tertiary period.

D. His paper on "Characters of Certain New Species of Plants Collected in Japan"

Sol. The fifth para starts with, 'But the crowning labor of Asa Gray's life was the preparation of a descriptive work upon the plants of North America'. From this, we can infer that the author considered this as the most significant work of Asa Gray's career. Thus, the answer is A.

16. According to the passage, what were Gray's views on Darwin?

A. He admired Darwin

B. He acknowledged him as one of his fiercest rivals

C. He despised Darwin and his work

D. Cannot be inferred

Sol. Refer to this line from the 4th para, 'almost alone and single-handed he bore in America the brunt of the disbelief in the Darwinian Theory'. The only takeaway from this sentence is that Gray did believe the Darwinian theory to be true. However, the question asks about Gray's views on Darwin, which cannot be inferred from the passage. The answer is D.

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

Like many thought experiments, the Veil of Ignorance could never be carried out in the literal sense, nor should it be. Its purpose is to explore ideas about justice, morality, equality, and social status in a structured manner. Behind the Veil of Ignorance, no one knows who they are. They lack clues as to their class, their privileges, their disadvantages, or even their personality. They exist as an impartial group, tasked with designing a new society with its own conception of justice. As a thought experiment, the Veil of Ignorance is powerful because our usual opinions regarding what is just and unjust are informed by our own experiences. We are shaped by our race, gender, class, education, appearance, sexuality, career, family, and so on. On the other side of the Veil of Ignorance, none of that exists. Technically, the resulting society should be a fair one.

A. The Veil of Ignorance thought experiment enables us to envision a fair society where ideas about justice, morality, equality, and social status are unambiguous and unbiased.

B. The Veil of Ignorance thought experiment encourages us to explore the true meaning of ideas about justice, morality, equality, and social status.

C. The Veil of Ignorance thought experiment allows us to examine ideas about justice, morality, equality, and social status for fairness without prejudice or bias.

D. The Veil of Ignorance thought experiment helps us formulate decisions on justice, morality, equality, and social status by leveraging the right social factors.

Sol. According to the passage, the Veil of Ignorance thought experiment should be not be taken in its literal sense; it is not about being ignorant - instead, the purpose of the experiment is to explore or examine the ideas about justice, morality, equality, and social status, without prejudice or bias (or influence from other innate/accumulated factors). The author highlights how, as a consequence, the resulting society would be a fair one, and in this regard, the exercise is essentially a test of perception associated with the aforementioned ideals. Option C best conveys the inference elucidated above.

Option A is close but states that the ideas would be unambiguous in the fair society envisioned. First of all, the purpose of the exercise is not to envision a fair society; rather, it is an exploratory exercise to examine the ideas about justice, morality, equality, and social status. Furthermore, it cannot be concluded that the exercise would produce unambiguous ideas.

Option B misses out on the lack of influence of, otherwise, imperative factors on our perception of ideas such as justice, morality, equality and so on. Additionally, the phrase "true meaning" mentioned in the option comes across as a distortion. Hence, we can eliminate B.

Option D has not been implied in the passage; the purpose of the exercise is not to make decisions but to explore certain ideas in a structured manner, devoid of certain influences.

Hence, Option C is the correct answer.

18. Complete the following paragraph with the most suitable sentence.

After almost a month of protests and people living in the streets, rocks being thrown, blood being spilled, and many injured, Egyptian President Mubarak finally resigns. There was partying and cheers from the streets all night. The people had spoken and the people had won.

by:Brian Gosur

A. Unfortunately there was bloodshed and deaths.

B. The basis of any democracy is a government for the people and by the people.

C. Are we starting to see a domino effect with these uprisings?

D. Now we come back to today, and right after the Egyptian conflict, the Iranian people are back in the streets and they are wanting a change.

Sol. From the paragraph, we can see that Egypt's current government has been toppled and the people are rejoicing their new got freedom. An apt conclusion to the preceding events should be a statement describing the constituents of a real people's government. Option B has all the elements of a suitable conclusion.

19. Four alternative summaries are given below the text. Choose the option that best captures the essence of the text.

Many argue that health sciences, economics, mathematics, and geography related professions are enterprising because their industries have been established already and those professions are well paid and as such highly respected. Moreover, they are pursued by academically giants and gurus who had higher grading points. Though somehow true, these professions are no better than the arts. A retrospection into the renaissance age stresses this assertion

Article Source:Ezinearticles.com

A. Many people nowadays consider artistic professions less enterprising than professions involving health sciences, economics, mathematics and geography despite the fact that artistic professions were given more importance during the renaissance period.

B. Professions related to health sciences, economics, mathematics, and geography are considered to be superior than art by many. Though this is partially true, this was not always the case as indicated by the renaissance period

C. The renaissance age valued professions involving art as more enterprising than those involving health sciences, economics, mathematics, and geography

D. Even though professions related to health sciences, economics, mathematics, and geography are considered to be more enterprising by many, they are not in any way superior to professions involving art as indicated by the renaissance age

Sol. The main purpose of the passage is to make the point that professions involving art are not inferior to professions involving health sciences, economics etc.
The paragraph does not acknowledge the fact that health sciences, economics etc professions are superior to art in any way. Thus, we cannot say that it is partially true. Thus, option B is incorrect.

Option C is incorrect as we cannot say that in the Renaissance period, Art was given more importance. We can only infer from the paragraph that art was at least given equal importance in the Renaissance period as other major subjects.
In the passage, the example of the Renaissance age is not used to express that there was a period in which Art was considered important but to contradict the argument of people that professions involving health sciences, economics etc are more enterprising than art. Thus, D is more suitable than A.

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

1. It's an inexorable erosion of our skies that mirrors our impact on the Earth.

2. Instead of thousands of stars in the heavens, artificial light pollution means that in today's cities we see only a few dozen.

3. This shift in our nature is sometimes traced to the Industrial Revolution, or further back to the birth of science, or perhaps the invention of farming.

4. At what point did we become entitled masters of the cosmos, using our technological power to dominate our environment?

Sol. 2 will be the starting sentence since it introduces the topic and is not dependent on any other line. 'It' in 1 refers to the artificial light pollution mentioned in 2. So, 1 will follow 2. 4 will follow 1 because the question asked in 4 is about our impact on the earth. 'This shift in our nature' in 3 refers to us becoming entitled masters of the cosmos as mentioned in 4. So, 3 will follow 4. Hence, the sequence is 2143.

21. **Four sentences are given below. These sentences, when rearranged in proper order, form a logical and meaningful paragraph. Rearrange the sentences and enter the correct order as the answer.**

1. Wherever the rhythm was most delicate, wherever the emotion was most ecstatic, her art was the most beautiful, and yet, although she sometimes spoke to a little tune, it was never singing, as we sing to-day, never anything but speech.

2. I have always known that there was something I disliked about singing, and I naturally dislike print and paper, but now at last I understand why, for I have found something better.

3. A friend, who was here a few minutes ago, has sat with a beautiful stringed instrument upon her knee, her fingers passing over the strings, and has spoken to me some verses from Shelley's Skylark and Sir Ector's lamentation over the dead Launcelot out of the Morte d'Arthur and some of my own poems.

4. I have just heard a poem spoken with so delicate a sense of its rhythm, with so perfect a respect for its meaning, that if I were a wise man and could persuade a few people to learn the art I would never open a book of verses again.

Sol. After reading all the sentences, we know that the paragraph is about the author's dislike for singing and his new found love for spoken poetry. Statement 2 is the opening sentence as it

mentions the author's dislike for singing. The author also mentions how discovering spoken poetry changed his understanding of why he disliked singing. Statements 4,3 and 1 together describe the author's experience of the poem recited with the help of a stringed instrument.

Hence, the order is 2-4-3-1.

Hence, 2431 is the correct answer.

22. **Five sentences are given below. Four of which when arranged in a proper order, form a logical and meaningful paragraph. Identify the sentence that does not belong to the paragraph and enter its number as your answer.**

1. With the modern tendency toward specialization, the natural outgrowth of necessity, there is no inherent reason why the bones of a building should not be devised by one man and its fleshly clothing by another, so long as they understand one another, and are in ideal agreement, but there is in general all too little understanding, and a confusion of ideas and aims.

2. Preoccupied as he is with the building's strength, safety, economy; solving new and staggeringly difficult problems with address and daring, he has scant sympathy with such inconsequent matters as the stylistic purity of a façade, or the profile of a moulding.

3. To the designer, on the other hand, the engineer appears in the light of a subordinate to be used for the promotion of his own ends, or an evil to be endured as an interference with those ends.

4. In the field of domestic architecture these dramatic contrasts are less evident, less sharply marked.

5. To the average structural engineer the architectural designer is a mere milliner in stone, informed in those prevailing architectural fashions of which he himself knows little and cares less.

Sol. The correct order is 1523. 4 is the odd one out. The passage begins by saying that a building could possibly be built and styled by two different people as long as they worked in harmony. Sentence 5 goes on to explain why this is not so since the average engineer does not value the average designer. Sentence 2 explains what the priorities of the engineer are, while sentence 5 states what a designer feels. Option 4 is the odd one out since it speaks of contrasts in domestic architecture which is unrelated to the remaining lines.

23. **Five sentences are given below labelled as 1, 2, 3, 4 and 5. Of these, four sentences, when arranged properly, make a meaningful and coherent paragraph. Identify the odd one out**.

1. Even where the advancer of the art was also a psychologist, the pedagogics and the psychology ran side by side, and the former was not derived in any sense from the latter.

2. To know psychology, therefore, is absolutely no guarantee that we shall be good teachers.

3. The art of teaching grew up in the schoolroom, out of inventiveness and sympathetic concrete observation.

4. That ingenuity in meeting and pursuing the pupil, that tact for the concrete situation, though they are the alpha and omega of the teacher's art, are things to which psychology cannot help us in the least.

5. The two were congruent, but neither was subordinate.

Sol. All the five sentences talk about the relation between psychology and teaching. But the structure of sentence 4 indicates that the topic of "ingenuity" and "tact" has already been discussed in the preceding lines. Since, there is no mention of "ingenuity" and "tact" in any other sentences, sentence 4 cannot be a continuation of any of the sentences given. The other 4 sentences can be arranged in the sequence 3-1-5-2.

24. **Five sentences are given below. Four of these, when rearranged properly, form a logical and meaningful paragraph. Identify the sentence which does not belong to this paragraph and then enter its number as the answer.**

1. Of course, this was not so clear then.

2. In the discharge of all these duties and in all his relations with men, whether above him in office or under his command, he had shown himself trustworthy and efficient, a man of clear mind and decisive action—one who commanded men's respect, obedience, and even love.

3. In electing George Washington commander-in-chief of the Continental army, the Continental Congress probably made the very wisest choice possible.

4. But they had learned enough about his wonderful power over men and his great skill as a leader in time of war to believe that he was the man to whom they might trust the great work of directing the army in this momentous crisis.

5. For even leaders like Samuel Adams and John Adams and Patrick Henry did not know Washington's ability as we have come to know it now.

Sol. 3 initiates the discussion by mentioning how Congress made a wise choice by appointing George Washington as the commander in chief. 1 mentions how things were not so clear then and 5 explains why. Hence 315 form a pair. 4 continues from 5 by saying that they knew enough about him to select. Hence 3154 form a logical paragraph. 2 focuses more on describing Washington as a person. This is not the main focus of the passage. Hence, 2 is the odd one out.

Instructions

In the Olympics 2021 there were 9 teams contending. The teams were USA, Russia, India, Japan, Germany, Brazil, China, Denmark and Austria.

In the closing ceremony the top sports person from each country was asked to be the flag bearer for the country. The athletes were asked to march in the form of a parade one following the other.

The nine athletes were : Neeraj, Usain, Blake, Beck, Michel, Arturo, Daniel, Dmitri and Christ.

The order of the parade was on the basis of number of individual medals secured by the athletes such that the person with the highest number of medals was ranked first. The medals scored were from 1 to 9 and each of them secured different number of medals.

The additional instructions that were provided :

1) Christ was the only athlete who belonged to a country where the country and the sportsmen had the same starting letters. He secured an even number of medals.

2) The Indian flag bearer was followed by at least one person.

3) Blake was immediately followed by the athlete from Brazil who was immediately followed by Beck.

4) The flag bearer from USA was walking ahead of the Austrian flag bearer.

5) Daniel represented Germany and the number of medals won by Japanese sports person was in the multiples of 3.

6) The sports persons from India, Brazil and Austria scored medals which formed an increasing arithmetic progression in the given order.There was at least a difference of two medals among any pair of these three sportsmen.

7) The Russian flag bearer was at the center of the parade.

8) Arturo procured four medals and Michel is an Austrian Sportsman.

9) The number of medals won by Dmitri is a prime number.

10) There were at least 2 people between the Russian flag bearer and the USA flag bearer.

25. What are the total number of possible ways the countries, athletes and medals can be arranged ?

A. 1

B. 2

C.3

D.5

Sol. The medals of flag bearers from India, Brazil, Austria were in an Arithmetic progression and since the difference between any pair is at least 2 this hints that the common difference was at least 2.

The possible cases are : (India, Brazil, Austria) : (1,3,5), (2,4,6), (3,5,7), (4,6,8), (5,7,9), (1,4,7), (2,5,8), (3,6,9), (1,5,9).

In condition 7 it was given that the flag bearer from Russia was at the center of the parade and hence must have had 5 medals.

Given in condition 2 that the Indian sports men was followed by at least one person. Hence Indian sports men was not the one who secured 1 medal.

Since India cannot have 1 medal and Russia has 5 medals. None of the three countries can have 5 medals.

Hence the possible cases are (2,4,6), (4,6,8), (3,6,9).

In condition 4 it was mentioned that the flag bearer of USA was ahead of the Austrian flag bearer.Hence the Austrian flag bearer did not win 9 medals. The final possibilities are two cases

(India, Brazil, Austria) : (2,4,6), (4,6,8)

Given that Christ and the country he belonged had the same starting letters. Hence he must belong to China.

Drawing a table for Country, Sportsman and Number of Medals we have two cases.

Case 1 and Case 2:

Country	Name	Medal
India		2
China	Christ	
USA		
Brazil		4
Russia		5
Austria		6
Japan		
Germany		
Denmark		

Country	Name	Medal
India		4
China	Christ	
USA		
Brazil		6
Russia		5
Austria		8
Japan		
Germany		
Denmark		

Now going further we were mentioned :
For case 1 :
Daniel is a German sportsmen.
Since Christ secured an even numbered rank this must be 8. As other even numbered medals are already fixed.
Since in condition 4 it was mentioned that the USA flag bearer is ahead of the Australian flag bearer hence the USA flag bearer can have 7 or 9 medals.
The following cases 1A and 1B are possible :

Country	Name	Medal
India		2
China	Christ	8
USA		7
Brazil		4
Russia		5
Austria		6
Japan		3
Germany	Daniel	1/9
Denmark		9/1

Country	Name	Medal
India		2
China	Christ	8
USA		9
Brazil		4
Russia		5
Austria		6
Japan		3
Germany	Daniel	1/7
Denmark		7/1

Case 1A fails because there must be at least 2 people between Russian and American flag bearers and this condition fails.

Case 2 :

Since Christ secured an even number of medals the medals must be 8 because there are no other possibilities.

Daniel is a German sportsmen.

Since in condition 4 it was given the flag bearer of USA was ahead of Australian flag bearer.The Australian flag bearer must have 9 medals.

Country	Name	Medal
India		4
China	Christ	2
USA		9
Brazil		6
Russia		5
Austria		8
Japan		3
Germany	Daniel	1/7
Denmark		7/1

Since in condition 3 it was mentioned that Japanese sportsmen scored medals in multiples of 3.

Since 6 and 9 medals have already been fixed. Japanese sportsmen must have won 3 medals .

In condition 3 it was mentioned that Blake was followed by the athlete from Brazil and he was followed by Beck

Hence Blake must have scored one medal more than the sportsmen from Brazil and the sportsmen from Brazil must have scored one medal more than beck.

For case 1B this gives :

Blake : 5medals, Brazil : 4 medals, Beck : 3 medals.

In condition 9 it was mentioned Dmitri medals were a prime number and hence must have 2 medals.

For case 2 this gives :

Blake: 7 medals, Brazil : 6 medals, Beck : 5 medals.

In condition 9 it was mentioned Dmitri medals were a prime number and hence must have 3 medals.(For case 2)

The tables for case 1B and case 2 the tables are given by :

Country	Name	Medal
India	Dmitri	2
China	Christ	8
USA		9
Brazil		4
Russia	Blake	5
Austria		6
Japan	Beck	3
Germany	Daniel	1/7
Denmark		7/1

Country	Name	Medal
India		4
China	Christ	2
USA		9
Brazil		6
Russia	Beck	5
Austria		8
Japan	Dmitri	3
Germany	Daniel	1
Denmark	Blake	7

In condition 8 it was mentioned that Arturo won 4 medals and in condition 9 Michel is an Austrian.

As Usain cannot be from USA due to the same starting letters. Neeraj must be from USA.

Hence the final tables looks like :

Country	Name	Medal
India	Dmitri	2
China	Christ	8
USA	Neeraj	9
Brazil	Arturo	4
Russia	Blake	5
Austria	Michel	6
Japan	Beck	3
Germany	Daniel	1/7
Denmark	Usain	7/1

Country	Name	Medal
India	Arturo	4
China	Christ	2
USA	Neeraj	9
Brazil	Usain	6
Russia	Beck	5
Austria	Michel	8
Japan	Dmitri	3
Germany	Daniel	1
Denmark	Blake	7

Hence in total there are 2 possibilities for case 1 and 1 possibility for case 2.

Total = 2+1 = 3

26. Which of the the following cannot be the the number of medals of Usain ?

A. 1

B. 2

C.6

D.7

Sol. The medals of flag bearers from India, Brazil, Austria were in an Arithmetic progression and since the difference between any pair is at least 2 this hints that the common difference was at least 2.

The possible cases are : (India, Brazil, Austria) : (1,3,5), (2,4,6), (3,5,7), (4,6,8), (5,7,9), (1,4,7), (2,5,8), (3,6,9), (1,5,9).

In condition 7 it was given that the flag bearer from Russia was at the center of the parade and hence must have had 5 medals.

Given in condition 2 that the Indian sports men was followed by at least one person. Hence Indian sports men was not the one who secured 1 medal.

Since India cannot have 1 medal and Russia has 5 medals. None of the three countries can have 5 medals.

Hence the possible cases are (2,4,6), (4,6,8), (3,6,9).

In condition 4 it was mentioned that the flag bearer of USA was ahead of the Austrian flag bearer.Hence the Austrian flag bearer did not win 9 medals. The final possibilities are two cases

(India, Brazil, Austria) : (2,4,6), (4,6,8)

Given that Christ and the country he belonged had the same starting letters. Hence he must belong to China.

Drawing a table for Country, Sportsman and Number of Medals we have two cases.

Case 1 and Case 2:

Country	Name	Medal
India		2
China	Christ	
USA		
Brazil		4
Russia		5
Austria		6
Japan		
Germany		
Denmark		

Country	Name	Medal
India		4
China	Christ	
USA		
Brazil		6
Russia		5
Austria		8
Japan		
Germany		
Denmark		

Now going further we were mentioned :
For case 1 :
Daniel is a German sportsmen.
Since Christ secured an even numbered rank this must be 8. As other even numbered medals are already fixed.
Since in condition 4 it was mentioned that the USA flag bearer is ahead of the Australian flag bearer hence the USA flag bearer can have 7 or 9 medals.
The following cases 1A and 1B are possible :

Country	Name	Medal
India		2
China	Christ	8
USA		7
Brazil		4
Russia		5
Austria		6
Japan		3
Germany	Daniel	1/9
Denmark		9/1

Country	Name	Medal
India		2
China	Christ	8
USA		9
Brazil		4
Russia		5
Austria		6
Japan		3
Germany	Daniel	1/7
Denmark		7/1

Case 1A fails because there must be at least 2 people between Russian and American flag bearers and this condition fails.

Case 2 :

Since Christ secured an even number of medals the medals must be 8 because there are no other possibilities.

Daniel is a German sportsmen.

Since in condition 4 it was given the flag bearer of USA was ahead of Australian flag bearer.The Australian flag bearer must have 9 medals.

Country	Name	Medal
India		4
China	Christ	2
USA		9
Brazil		6
Russia		5
Austria		8
Japan		3
Germany	Daniel	1/7
Denmark		7/1

Since in condition 3 it was mentioned that Japanese sportsmen scored medals in multiples of 3.

Since 6 and 9 medals have already been fixed. Japanese sportsmen must have won 3 medals .

In condition 3 it was mentioned that Blake was followed by the athlete from Brazil and he was followed by Beck

Hence Blake must have scored one medal more than the sportsmen from Brazil and the sportsmen from Brazil must have scored one medal more than beck.

For case 1B this gives :

Blake : 5medals, Brazil : 4 medals, Beck : 3 medals.

In condition 9 it was mentioned Dmitri medals were a prime number and hence must have 2 medals.

For case 2 this gives :

Blake: 7 medals, Brazil : 6 medals, Beck : 5 medals.

In condition 9 it was mentioned Dmitri medals were a prime number and hence must have 3 medals.

The tables for case 1B and 2 the tables are given by :

Country	Name	Medal
India	Dmitri	2
China	Christ	8
USA		9
Brazil		4
Russia	Blake	5
Austria		6
Japan	Beck	3
Germany	Daniel	1/7
Denmark		7/1

Country	Name	Medal
India		4
China	Christ	2
USA		9
Brazil		6
Russia	Beck	5
Austria		8
Japan	Dmitri	3
Germany	Daniel	1
Denmark	Blake	7

In condition 8 it was mentioned that Arturo won 4 medals and in condition 9 Michel is an Austrian.

As Usain cannot be from USA due to the same starting letters. Neeraj must be from USA.

Hence the final tables looks like :

Country	Name	Medal
India	Dmitri	2
China	Christ	8
USA	Neeraj	9
Brazil	Arturo	4
Russia	Blake	5
Austria	Michel	6
Japan	Beck	3
Germany	Daniel	1/7
Denmark	Usain	7/1

Country	Name	Medal
India	Arturo	4
China	Christ	2
USA	Neeraj	9
Brazil	Usain	6
Russia	Beck	5
Austria	Michel	8
Japan	Dmitri	3
Germany	Daniel	1
Denmark	Blake	7

Usain can have medals of 1 and 7 in case 1 and 6 in case 2. Hence 2 is the only number of medals which Usain cannot have.

27. If the rank of Blake is 3 what is the number of medals with Michel ?

A.7

B. 8

C.6

D.3

Sol. The medals of flag bearers from India, Brazil, Austria were in an Arithmetic progression and since the difference between any pair is at least 2 this hints that the common difference was at least 2.

The possible cases are : (India, Brazil, Austria) : (1,3,5), (2,4,6), (3,5,7), (4,6,8), (5,7,9), (1,4,7), (2,5,8), (3,6,9), (1,5,9).

In condition 7 it was given that the flag bearer from Russia was at the center of the parade and hence must have had 5 medals.

Given in condition 2 that the Indian sports men was followed by at least one person. Hence Indian sports men was not the one who secured 1 medal.

Since India cannot have 1 medal and Russia has 5 medals. None of the three countries can have 5 medals.

Hence the possible cases are (2,4,6), (4,6,8), (3,6,9).

In condition 4 it was mentioned that the flag bearer of USA was ahead of the Austrian flag bearer.Hence the Austrian flag bearer did not win 9 medals. The final possibilities are two cases

(India, Brazil, Austria) : (2,4,6), (4,6,8)

Given that Christ and the country he belonged had the same starting letters. Hence he must belong to China.

Drawing a table for Country, Sportsman and Number of Medals we have two cases.

Case 1 and Case 2:

Country	Name	Medal
India		2
China	Christ	
USA		
Brazil		4
Russia		5
Austria		6
Japan		
Germany		
Denmark		

Country	Name	Medal
India		4
China	Christ	
USA		
Brazil		6
Russia		5
Austria		8
Japan		
Germany		
Denmark		

Now going further we were mentioned :
For case 1 :
Daniel is a German sportsmen.
Since Christ secured an even numbered rank this must be 8. As other even numbered medals are already fixed.
Since in condition 4 it was mentioned that the USA flag bearer is ahead of the Australian flag bearer hence the USA flag bearer can have 7 or 9 medals.
The following cases 1A and 1B are possible :

Country	Name	Medal
India		2
China	Christ	8
USA		7
Brazil		4
Russia		5
Austria		6
Japan		3
Germany	Daniel	1/9
Denmark		9/1

Country	Name	Medal
India		2
China	Christ	8
USA		9
Brazil		4
Russia		5
Austria		6
Japan		3
Germany	Daniel	1/7
Denmark		7/1

Case 1A fails because there must be at least 2 people between Russian and American flag bearers and this condition fails.

Case 2 :

Since Christ secured an even number of medals the medals must be 8 because there are no other possibilities.

Daniel is a German sportsmen.

Since in condition 4 it was given the flag bearer of USA was ahead of Australian flag bearer.The Australian flag bearer must have 9 medals.

Country	Name	Medal
India		4
China	Christ	2
USA		9
Brazil		6
Russia		5
Austria		8
Japan		3
Germany	Daniel	1/7
Denmark		7/1

Since in condition 3 it was mentioned that Japanese sportsmen scored medals in multiples of 3.

Since 6 and 9 medals have already been fixed. Japanese sportsmen must have won 3 medals .

In condition 3 it was mentioned that Blake was followed by the athlete from Brazil and he was followed by Beck

Hence Blake must have scored one medal more than the sportsmen from Brazil and the sportsmen from Brazil must have scored one medal more than beck.

For case 1B this gives :

Blake : 5medals, Brazil : 4 medals, Beck : 3 medals.

In condition 9 it was mentioned Dmitri medals were a prime number and hence must have 2 medals.

For case 2 this gives :

Blake: 7 medals, Brazil : 6 medals, Beck : 5 medals.

In condition 9 it was mentioned Dmitri medals were a prime number and hence must have 3 medals.

The tables for case 1B and 2 the tables are given by :

Country	Name	Medal
India	Dmitri	2
China	Christ	8
USA		9
Brazil		4
Russia	Blake	5
Austria		6
Japan	Beck	3
Germany	Daniel	1/7
Denmark		7/1

Country	Name	Medal
India		4
China	Christ	2
USA		9
Brazil		6
Russia	Beck	5
Austria		8
Japan	Dmitri	3
Germany	Daniel	1
Denmark	Blake	7

In condition 8 it was mentioned that Arturo won 4 medals and in condition 9 Michel is an Austrian.

As Usain cannot be from USA due to the same starting letters. Neeraj must be from USA.

Hence the final tables looks like :

Country	Name	Medal
India	Dmitri	2
China	Christ	8
USA	Neeraj	9
Brazil	Arturo	4
Russia	Blake	5
Austria	Michel	6
Japan	Beck	3
Germany	Daniel	1/7
Denmark	Usain	7/1

Country	Name	Medal
India	Arturo	4
China	Christ	2
USA	Neeraj	9
Brazil	Usain	6
Russia	Beck	5
Austria	Michel	8
Japan	Dmitri	3
Germany	Daniel	1
Denmark	Blake	7

If the Rank of Blake is 3 so he won 7 medals
Therefore number of medals with Michel is 8.

28. If an additional condition is given that Daniel won only 1 medal. How many unique possible ways can we arrange the sportsmen, country and medals ?

A. 4

B. 1

C. 3

D. 2

Sol. The medals of flag bearers from India, Brazil, Austria were in an Arithmetic progression and since the difference between any pair is at least 2 this hints that the common difference was at least 2.

The possible cases are : (India, Brazil, Austria) : (1,3,5), (2,4,6), (3,5,7), (4,6,8), (5,7,9), (1,4,7), (2,5,8), (3,6,9), (1,5,9).

In condition 7 it was given that the flag bearer from Russia was at the center of the parade and hence must have had 5 medals.

Given in condition 2 that the Indian sports men was followed by at least one person. Hence Indian sports men was not the one who secured 1 medal.

Since India cannot have 1 medal and Russia has 5 medals. None of the three countries can have 5 medals.

Hence the possible cases are (2,4,6), (4,6,8), (3,6,9).

In condition 4 it was mentioned that the flag bearer of USA was ahead of the Austrian flag bearer.Hence the Austrian flag bearer did not win 9 medals. The final possibilities are two cases

(India, Brazil, Austria) : (2,4,6), (4,6,8)

Given that Christ and the country he belonged had the same starting letters. Hence he must belong to China.

Drawing a table for Country, Sportsman and Number of Medals we have two cases.

Case 1 and Case 2:

Country	Name	Medal
India		2
China	Christ	
USA		
Brazil		4
Russia		5
Austria		6
Japan		
Germany		
Denmark		

Country	Name	Medal
India		4
China	Christ	
USA		
Brazil		6
Russia		5
Austria		8
Japan		
Germany		
Denmark		

Now going further we were mentioned :
For case 1 :
Daniel is a German sportsmen.

Since Christ secured an even numbered rank this must be 8. As other even numbered medals are already fixed.
Since in condition 4 it was mentioned that the USA flag bearer is ahead of the Australian flag bearer hence the USA flag bearer can have 7 or 9 medals.
The following cases 1A and 1B are possible :

Country	Name	Medal
India		2
China	Christ	8
USA		7
Brazil		4
Russia		5
Austria		6
Japan		3
Germany	Daniel	1/9
Denmark		9/1

Country	Name	Medal
India		2
China	Christ	8
USA		9
Brazil		4
Russia		5
Austria		6
Japan		3
Germany	Daniel	1/7
Denmark		7/1

Case 1A fails because there must be at least 2 people between Russian and American flag bearers and this condition fails.

Case 2 :

Since Christ secured an even number of medals the medals must be 8 because there are no other possibilities.

Daniel is a German sportsmen.

Since in condition 4 it was given the flag bearer of USA was ahead of Australian flag bearer.The Australian flag bearer must have 9 medals.

Country	Name	Medal
India		4
China	Christ	2
USA		9
Brazil		6
Russia		5
Austria		8
Japan		3
Germany	Daniel	1/7
Denmark		7/1

Since in condition 3 it was mentioned that Japanese sportsmen scored medals in multiples of 3.

Since 6 and 9 medals have already been fixed. Japanese sportsmen must have won 3 medals .

In condition 3 it was mentioned that Blake was followed by the athlete from Brazil and he was followed by Beck

Hence Blake must have scored one medal more than the sportsmen from Brazil and the sportsmen from Brazil must have scored one medal more than beck.

For case 1B this gives :

Blake : 5medals, Brazil : 4 medals, Beck : 3 medals.

In condition 9 it was mentioned Dmitri medals were a prime number and hence must have 2 medals.

For case 2 this gives :

Blake: 7 medals, Brazil : 6 medals, Beck : 5 medals.

In condition 9 it was mentioned Dmitri medals were a prime number and hence must have 3 medals.

The tables for case 1B and 2 the tables are given by :

Country	Name	Medal
India	Dmitri	2
China	Christ	8
USA		9
Brazil		4
Russia	Blake	5
Austria		6
Japan	Beck	3
Germany	Daniel	1/7
Denmark		7/1

Country	Name	Medal
India		4
China	Christ	2
USA		9
Brazil		6
Russia	Beck	5
Austria		8
Japan	Dmitri	3
Germany	Daniel	1
Denmark	Blake	7

In condition 8 it was mentioned that Arturo won 4 medals and in condition 9 Michel is an Austrian.

As Usain cannot be from USA due to the same starting letters. Neeraj must be from USA.

Hence the final tables looks like :

Country	Name	Medal
India	Dmitri	2
China	Christ	8
USA	Neeraj	9
Brazil	Arturo	4
Russia	Blake	5
Austria	Michel	6
Japan	Beck	3
Germany	Daniel	1/7
Denmark	Usain	7/1

Country	Name	Medal
India	Arturo	4
China	Christ	2
USA	Neeraj	9
Brazil	Usain	6
Russia	Beck	5
Austria	Michel	8
Japan	Dmitri	3
Germany	Daniel	1
Denmark	Blake	7

Given that the rank of Daniel must have only 1 medal then one case where Daniel having 7 medals fails. Hence only two cases are possible.

29. If Dmitri has 3 medals what is the sum of the medals of Arturo, Christ and Neeraj combined ?

A. 11

B. 13

C. 15

D. 17

Sol. The medals of flag bearers from India, Brazil, Austria were in an Arithmetic progression and since the difference between any pair is at least 2 this hints that the common difference was at least 2.

The possible cases are : (India, Brazil, Austria) : (1,3,5), (2,4,6), (3,5,7), (4,6,8), (5,7,9), (1,4,7), (2,5,8), (3,6,9), (1,5,9).

In condition 7 it was given that the flag bearer from Russia was at the center of the parade and hence must have had 5 medals.

Given in condition 2 that the Indian sports men was followed by at least one person. Hence Indian sports men was not the one who secured 1 medal.

Since India cannot have 1 medal and Russia has 5 medals. None of the three countries can have 5 medals.

Hence the possible cases are (2,4,6), (4,6,8), (3,6,9).

In condition 4 it was mentioned that the flag bearer of USA was ahead of the Austrian flag bearer.Hence the Austrian flag bearer did not win 9 medals. The final possibilities are two cases

(India, Brazil, Austria) : (2,4,6), (4,6,8)

Given that Christ and the country he belonged had the same starting letters. Hence he must belong to China.

Drawing a table for Country, Sportsman and Number of Medals we have two cases.

Case 1 and Case 2:

Country	Name	Medal
India		2
China	Christ	
USA		
Brazil		4
Russia		5
Austria		6
Japan		
Germany		
Denmark		

Country	Name	Medal
India		4
China	Christ	
USA		
Brazil		6
Russia		5
Austria		8
Japan		
Germany		
Denmark		

Now going further we were mentioned :
For case 1 :
Daniel is a German sportsmen.
Since Christ secured an even numbered rank this must be 8. As other even numbered medals are already fixed.
Since in condition 4 it was mentioned that the USA flag bearer is ahead of the Australian flag bearer hence the USA flag bearer can have 7 or 9 medals.
The following cases 1A and 1B are possible :

Country	Name	Medal
India		2
China	Christ	8
USA		7
Brazil		4
Russia		5
Austria		6
Japan		3
Germany	Daniel	1/9
Denmark		9/1

Country	Name	Medal
India		2
China	Christ	8
USA		9
Brazil		4
Russia		5
Austria		6
Japan		3
Germany	Daniel	1/7
Denmark		7/1

Case 1A fails because there must be at least 2 people between Russian and American flag bearers and this condition fails.

Case 2 :

Since Christ secured an even number of medals the medals must be 8 because there are no other possibilities.

Daniel is a German sportsmen.

Since in condition 4 it was given the flag bearer of USA was ahead of Australian flag bearer.The Australian flag bearer must have 9 medals.

Country	Name	Medal
India		4
China	Christ	2
USA		9
Brazil		6
Russia		5
Austria		8
Japan		3
Germany	Daniel	1/7
Denmark		7/1

Since in condition 3 it was mentioned that Japanese sportsmen scored medals in multiples of 3.

Since 6 and 9 medals have already been fixed. Japanese sportsmen must have won 3 medals .

In condition 3 it was mentioned that Blake was followed by the athlete from Brazil and he was followed by Beck

Hence Blake must have scored one medal more than the sportsmen from Brazil and the sportsmen from Brazil must have scored one medal more than beck.

For case 1B this gives :

Blake : 5medals, Brazil : 4 medals, Beck : 3 medals.

In condition 9 it was mentioned Dmitri medals were a prime number and hence must have 2 medals.

For case 2 this gives :

Blake: 7 medals, Brazil : 6 medals, Beck : 5 medals.

In condition 9 it was mentioned Dmitri medals were a prime number and hence must have 3 medals.

The tables for case 1B and 2 the tables are given by :

Country	Name	Medal
India	Dmitri	2
China	Christ	8
USA		9
Brazil		4
Russia	Blake	5
Austria		6
Japan	Beck	3
Germany	Daniel	1/7
Denmark		7/1

Country	Name	Medal
India		4
China	Christ	2
USA		9
Brazil		6
Russia	Beck	5
Austria		8
Japan	Dmitri	3
Germany	Daniel	1
Denmark	Blake	7

In condition 8 it was mentioned that Arturo won 4 medals and in condition 9 Michel is an Austrian.

As Usain cannot be from USA due to the same starting letters. Neeraj must be from USA.

Hence the final tables looks like :

Country	Name	Medal
India	Dmitri	2
China	Christ	8
USA	Neeraj	9
Brazil	Arturo	4
Russia	Blake	5
Austria	Michel	6
Japan	Beck	3
Germany	Daniel	1/7
Denmark	Usain	7/1

Country	Name	Medal
India	Arturo	4
China	Christ	2
USA	Neeraj	9
Brazil	Usain	6
Russia	Beck	5
Austria	Michel	8
Japan	Dmitri	3
Germany	Daniel	1
Denmark	Blake	7

If the number of medals of Dmitri is 3.
Arturo has 4 medals, Christ 2 medals and and Neeraj 9 medals and hence a possibility of 9+4+2 = 15 medals.

30. Sports person from which of the following countries do not have a chance of walking in the first three places in the parade ?

A. Denmark

B. Germany

C. China

D. Japan

Sol. The medals of flag bearers from India, Brazil, Austria were in an Arithmetic progression and since the difference between any pair is at least 2 this hints that the common difference was at least 2.

The possible cases are : (India, Brazil, Austria) : (1,3,5), (2,4,6), (3,5,7), (4,6,8), (5,7,9), (1,4,7), (2,5,8), (3,6,9), (1,5,9).

In condition 7 it was given that the flag bearer from Russia was at the center of the parade and hence must have had 5 medals.

Given in condition 2 that the Indian sports men was followed by at least one person. Hence Indian sports men was not the one who secured 1 medal.

Since India cannot have 1 medal and Russia has 5 medals. None of the three countries can have 5 medals.

Hence the possible cases are (2,4,6), (4,6,8), (3,6,9).

In condition 4 it was mentioned that the flag bearer of USA was ahead of the Austrian flag bearer.Hence the Austrian flag bearer did not win 9 medals. The final possibilities are two cases

(India, Brazil, Austria) : (2,4,6), (4,6,8)

Given that Christ and the country he belonged had the same starting letters. Hence he must belong to China.

Drawing a table for Country, Sportsman and Number of Medals we have two cases.

Case 1 and Case 2:

Country	Name	Medal
India		2
China	Christ	
USA		
Brazil		4
Russia		5
Austria		6
Japan		
Germany		
Denmark		

Country	Name	Medal
India		4
China	Christ	
USA		
Brazil		6
Russia		5
Austria		8
Japan		
Germany		
Denmark		

Now going further we were mentioned :
For case 1 :
Daniel is a German sportsmen.
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The following cases 1A and 1B are possible :

Country	Name	Medal
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Austria		6
Japan		3
Germany	Daniel	1/9
Denmark		9/1

Country	Name	Medal
India		2
China	Christ	8
USA		9
Brazil		4
Russia		5
Austria		6
Japan		3
Germany	Daniel	1/7
Denmark		7/1

Case 1A fails because there must be at least 2 people between Russian and American flag bearers and this condition fails.

Case 2 :

Since Christ secured an even number of medals the medals must be 8 because there are no other possibilities.

Daniel is a German sportsmen.

Since in condition 4 it was given the flag bearer of USA was ahead of Australian flag bearer.The Australian flag bearer must have 9 medals.

Country	Name	Medal
India		4
China	Christ	2
USA		9
Brazil		6
Russia		5
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Japan		3
Germany	Daniel	1/7
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Since in condition 3 it was mentioned that Japanese sportsmen scored medals in multiples of 3.

Since 6 and 9 medals have already been fixed. Japanese sportsmen must have won 3 medals .

In condition 3 it was mentioned that Blake was followed by the athlete from Brazil and he was followed by Beck

Hence Blake must have scored one medal more than the sportsmen from Brazil and the sportsmen from Brazil must have scored one medal more than beck.

For case 1B this gives :

Blake : 5medals, Brazil : 4 medals, Beck : 3 medals.

In condition 9 it was mentioned Dmitri medals were a prime number and hence must have 2 medals.

For case 2 this gives :

Blake: 7 medals, Brazil : 6 medals, Beck : 5 medals.

In condition 9 it was mentioned Dmitri medals were a prime number and hence must have 3 medals.

The tables for case 1B and 2 the tables are given by :

Country	Name	Medal
India	Dmitri	2
China	Christ	8
USA		9
Brazil		4
Russia	Blake	5
Austria		6
Japan	Beck	3
Germany	Daniel	1/7
Denmark		7/1

Country	Name	Medal
India		4
China	Christ	2
USA		9
Brazil		6
Russia	Beck	5
Austria		8
Japan	Dmitri	3
Germany	Daniel	1
Denmark	Blake	7

In condition 8 it was mentioned that Arturo won 4 medals and in condition 9 Michel is an Austrian.

As Usain cannot be from USA due to the same starting letters. Neeraj must be from USA.

Hence the final tables looks like :

Country	Name	Medal
India	Dmitri	2
China	Christ	8
USA	Neeraj	9
Brazil	Arturo	4
Russia	Blake	5
Austria	Michel	6
Japan	Beck	3
Germany	Daniel	1/7
Denmark	Usain	7/1

Country	Name	Medal
India	Arturo	4
China	Christ	2
USA	Neeraj	9
Brazil	Usain	6
Russia	Beck	5
Austria	Michel	8
Japan	Dmitri	3
Germany	Daniel	1
Denmark	Blake	7

In any of the possible cases Japan did not score more than 3 medals. Hence Japanese sports person cannot walk in the first three places.

Instructions

4 Chess tournaments were held all over the world last year and in each tournament 128 chess players participated. Players who participated in the 1st tournament are same for other tournaments. At the end of these four tournaments, world championship is held that consists of 32 players. These 32 players are selected on the basis of total number of wins the 128 players got in the four tournaments. Each of the games in the tournaments (including the world championship) is a knockout game i.e. a person who loses a game will not play in that tournament again. The person who wins the last round in any tournament is called the winner of that tournament. If 31 slots of the 32 slots in the world championship tournament are filled and to fill the 32nd spot there is a tie between few players, exactly one of those players is selected based on certain criteria (like coin toss).

31. Which of the following is the least number of wins that the winner of the world championship can have?

A. 11

B. 10

C. 9

D. 7

Sol. To win the world championship, a player must win all the five matches in that tournament.

In the four preceding tournaments there are 128 players.

So in an individual tournament.

64 will win 0 match.

32 will win 1 match.

16 will win 2 matches.

8 will win 3 matches.

4 will win 4 matches

2 will win 5 matches.

1 (finalist) will win 6 matches.

1 (champion) will win 7 matches.

There are 31 places which are already confirmed and 97 players are for the 32nd position. We must maximize the number of matches won by the other 31 players => remaining 97 players must win least number of matches.

In the first tounament

Thus for 97 players, 64 will win 0 matches 32 will win 1 match and the remaining 1 player will win 2 matches.

In the first tournament total number of matches won by these 97 players= 64x0+32x1+1x2= 34 wins

In all the 4 tournaments total number of wins will be 4x34=136

There are 97 players, so they will distribute victories among themselves. As 136/97=1.402 some players can have 2 wins and others will have 1 win.

Suppose X players win 2 matches and Y win only 1 match.

So X+Y=97

2X+Y=136

X= 39
Y=58

So 39 players have 2 wins, and 58 players will have 1 win.

Among these players one will be selected for the world championship based on certain criteria. Hence minimum number of wins required = 5 + 2 = 7

32. Which of the following is the maximum number of wins that a player could have had and still not be selected for the world championship tournament?

A. 10

B. 11

C. 12

D. 13

Sol. To get the maximum number, we need to take the case where 33 players won maximum number of matches, of which exactly 32 were selected for the World Championship based on certain criteria.

Consider these 33 players. Say each of them won at least n matches each.

In every tournament, 64 players win at least one match. Suppose the same set of 64 win the first round of each tournament. Our set of 33 goes on to win more than one match on average in the 4 tournaments.

Hence, 64 - 33 = 31 players win exactly one match.

Hence, players 1-33 win >= n matches, 34 - 64 win exactly one match and 65-128 win no matches.

Total number of wins in 4 tournaments = 4 * 127 = 508

Wins accounted for by players 34-64 = 31 * 4 = 124

Wins remaining = 508 - 124 = 384. These 384 wins need to be distributed over the remaining 33 players in the most equal way possible i.e difference in wins of player 1 and player 33 is the minimum possible.

The largest multiple of 33 <=384 is 33*11 i.e. 363. Suppose the first 33 players have 11 wins each. This accounts for 33*11 = 363 wins.

Hence, number of wins left = 384 - 363 = 21. Let these 21 wins go to the first 21 players.

Hence, players 1-21 win 12 matches, 22 - 33 win 11 matches, 34-64 win 1 match and 65 -128 win 0 matches.

Thus, the maximum number of wins a player can have and still not be selected is 11 wins.

33. Which of the following is the least number of wins one needs to enter the world championship?

A. 1

B. 2

C. 3

D. 4

Sol. To minimize the number of matches won by that player, we must maximize the number of matches won by the other 31 players => remaining 97 players must win least number of matches In every round, 64 players win at least one match and 64 players win 0 matches.

Let the person who entered the world championship with least number of wins be X.

In the first tournament, of the 64 members who win at least one match, 32 players win exactly 1 match, 31 players win more than won match and X wins 2 matches.

From the second tournament to the fourth tournament, different 32 players win exactly 1 match and X won 0 matches.

From this we can say that after all the four tournaments, 31 players won maximum number of matches, and a few others, along with X, won exactly 2 matches.

Of these people who won exactly 2 matches, X was selected for the world championship based on certain criteria.

34. After all the five tournaments, a table was made of the players in the descending order of their wins in all the five tournaments combined. What is the maximum number of wins the top four players could have got if no player among the 128 participants won more than one tournament?

A. 92

B. 104

C. 107

D. 112

Sol. Maximum number of wins is possible if these four players are the semifinalists in all the four tournaments and each of them won exactly one tournament.
Wins in each tournament = 5 + 5 + 6 + 7 = 23
Wins in all four tournaments = 23 * 4 = 92

So, none of these four players can win the World Championship.
=> All four are quarterfinalists, 3 are semifinalists and 1 is a finalist
=> Matches won in World Championship = 2 + 3 + 3 + 4 = 12
Total wins = 92 + 12 = 104

Instructions

In the Indian national swimming competition . There were different kinds of races. The racing streams were divided into 200 meter and 400 meter.

In 200 meters there were two distinct streams Regular and Relay. Further in Regular and Relay there were two sub categories each Freestyle and Butterfly.

Similarly for the 400 hundred meters also there were two distinct streams Regular and Relay. Further in Regular and Relay there were two sub categories Freestyle and Butterfly.

There were a total of 8 distinct modes where a swimmer could participate.

There were a total of 300 swimmers and each of them participated in exactly one mode.

The additional instructions provided are :

1) The mean of the number of swimmers of regular and relay is equal to the difference between the number of regular and relay swimmers. There are more regular swimmers than relay swimmers.

2) The difference between the number of of swimmers in 200 m and 400 m is equal to the number of swimmers in 400 meters.

3) The sum of swimmers participating in 200 meter regular and 400 meter relay is 1.4 times the sum of swimmers in 400 meter regular and 200 meters relay.

4) The number of swimmers participating in Free style is 48 more than the total participants of 400 meter race.

5) The number of regular 400 meter swimmers is 16 less than the number of swimmers who take part in the 200 meter butterfly stroke.

35. For how many modes can we exactly determine the number of participants in the mode?

A. 0

B. 2

C. 4

D. 6

Sol. Assuming all possible participants as variables and different possible participants and drawing a table for all the events :

Total Swimmers							
o							
200 meter				400meters			
m				n			
Regular		Relay		Regular		Relay	
i		j		k		l	
F.S	B.F	F.S	B.F	F.S	B.F	F.S	BF
a	b	c	d	e	f	g	h

In the question it was mentioned that total number of swimmers is 300. Hence o is 300.

Taking into the first condition we have the mean of regular and relay is equal to the difference between regular and relay.

Hence ((i+k)+(j+l))/2 = (i+k)-(j+l)

i+k = 3(j+l).

Since the total number of swimmers is 300 and (i+k) + (j+l) = 300.

i+k = 225, j+l = 75.

In condition 2 it was mentioned that the difference between the swimmers in 200 m and 400 m is equal to the number of swimmers participating in 400 meter swimming.

As per the variables this is given as m-n = n.

m =2*n.

m+n = 300.

m = 200, n = 100.

m = i+j = 200, n= k+l = 100.

Assuming i = x, k = 225-x since i+k = 225

Assuming j = y, l = 75-y since j+l = 75

In condition 3 it was mentioned that the sum of 200 meter regular swimmers and 400 meter relay swimmers is 1.4 times the 400 meter regular and 200 meter relay.

This in equation form is written by :

i+l = (7/5)(j+k).

5*i+5*l = 7*j+7*k.

5(x)+5(75-y) = 7(y)+7(225-x).

5*x+375-5*y = 7*y+1575- 7*x.

12*x- 12*y =1200.

x-y = 100.

i-j = 100.

I+j = 200.

i=150, j = 50.

Since i = x, k = 225-x and x = 150 , k = 75.

Since j = y, l = 75-y and y = 50, l = 25.

Substituting these values in the table we have :

Total Swimmers							
300							
200 meter				400meters			
200				100			
Regular		Relay		Regular		Relay	
150		50		75		25	
F.S	B.F	F.S	B.F	F.S	B.F	F.S	BF
a	b	c	d	e	f	g	h

We are left with following conditions :

a+b = 150 (1)

c+d = 50 (2)

e+f = 75 (3)

g+h = 25 (4)

After taking condition 4 we have that the number of participants in free style is 48 more than the total number of swimmers in 400 meters.

Since the total number of 400 meter swimmers are 100 .

We have a+c+e+g = 48+(e+f+g+h) (5)

a+c = 48+f+h.

a+c+e+g = 148 (6)

Since a+b+c+d+e+f+g+h = 300. (7)

b+d+f+h = 152 (8)

In condition 5 it was mentioned that the number of regular 400 meter swimmers are 16 less than the number of swimmers who took part in 200 meter swimming competition.

e+f = b+d-16

e+f = 75

b+d = 91 (9)

Since b+d+f+h = 152.

b+d = 91 using (9)

f+h = 61 (10)

a+c = 48+f+h = 48+(61) = 109 (11)

a+c+e+g = 148 and a+c = 109 using (11)

e+g = 39 (12)

Now we have the following conditions after using all the conditions :

Since none of a, b, c, d, e, f, g, h can have negative values :

a+b = 150 (1), $a \leq 150$, $b \leq 150$

c+d = 50 (2), $c \leq 50$, $d \leq 50$

e+f = 75 (3), $e \leq 75$, $f \leq 75$

g+h = 25 (4), $g \leq 25$, $h \leq 25$

a+c = 109 (11), $a \leq 109$, $c \leq 109$

b+d = 91 (9), $b \leq 91$, $d \leq 91$

e+g = 39 (12), $e \leq 39$, $g \leq 39$

f+h = 61 (10), $f \leq 61$, $h \leq 61$

The final ranges for a,b,c,d,e,f,g,h can be written as :

$59 \leq a \leq 109$

$41 \leq b \leq 91$

$c \leq 50$

$d \leq 50$

$14 \leq e \leq 39$

$36 \leq f \leq 61$

$g \leq 25$

$h \leq 25$.

Hence for none of the modes can we exactly determine the number of participants

36. Which of the following modes cannot have 46 contenders ?

A. 200 meter free style in regular

B. 200 meter butterfly in regular

C. 200 meters free style in relay

D. 200 meters butterfly in relay

Sol. Assuming all possible participants as variables and different possible participants and drawing a table for all the events :

<table>
<tr><td colspan="8">Total Swimmers</td></tr>
<tr><td colspan="8">o</td></tr>
<tr><td colspan="4">200 meter</td><td colspan="4">400meters</td></tr>
<tr><td colspan="4">m</td><td colspan="4">n</td></tr>
<tr><td colspan="2">Regular</td><td colspan="2">Relay</td><td colspan="2">Regular</td><td colspan="2">Relay</td></tr>
<tr><td colspan="2">i</td><td colspan="2">j</td><td colspan="2">k</td><td colspan="2">l</td></tr>
<tr><td>F.S</td><td>B.F</td><td>F.S</td><td>B.F</td><td>F.S</td><td>B.F</td><td>F.S</td><td>BF</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td></tr>
</table>

In the question it was mentioned that total number of swimmers is 300. Hence o is 300.

Taking into the first condition we have the mean of regular and relay is equal to the difference between regular and relay.

Hence ((i+k)+(j+l))/2 = (i+k)-(j+l)

i+k = 3(j+l).

Since the total number of swimmers is 300 and (i+k) + (j+l) = 300.

i+k = 225, j+l = 75.

In condition 2 it was mentioned that the difference between the swimmers in 200 m and 400 m is equal to the number of swimmers participating in 400 meter swimming.

As per the variables this is given as m-n = n.

m =2*n.

m+n = 300.

m = 200, n = 100.

m = i+j = 200, n= k+l = 100.

Assuming i = x, k = 225-x since i+k = 225

Assuming j = y, l = 75-y since j+l = 75

In condition 3 it was mentioned that the sum of 200 meter regular swimmers and 400 meter relay swimmers is 1.4 times the 400 meter regular and 200 meter relay.

This in equation form is written by :

i+l = (7/5)(j+k).

5*i+5*l = 7*j+7*k.

5(x)+5(75-y) = 7(y)+7(225-x).

5*x+375-5*y = 7*y+1575- 7*x.

12*x- 12*y =1200.

x-y = 100.

i-j = 100.

I+j = 200.

i=150, j = 50.

Since i = x, k = 225-x and x = 150 , k = 75.

Since j = y, l = 75-y and y = 50, l = 25.

Substituting these values in the table we have :

Total Swimmers							
300							
200 meter				400meters			
200				100			
Regular		Relay		Regular		Relay	
150		50		75		25	
F.S	B.F	F.S	B.F	F.S	B.F	F.S	BF
a	b	c	d	e	f	g	h

We are left with following conditions :

a+b = 150 (1)

c+d = 50 (2)

e+f = 75 (3)

g+h = 25 (4)

After taking condition 4 we have that the number of participants in free style is 48 more than the total number of swimmers in 400 meters.

Since the total number of 400 meter swimmers are 100 .

We have a+c+e+g = 48+(e+f+g+h) (5)

a+c = 48+f+h.

a+c+e+g = 148 (6)

Since a+b+c+d+e+f+g+h = 300. (7)

b+d+f+h = 152 (8)

In condition 5 it was mentioned that the number of regular 400 meter swimmers are 16 less than the number of swimmers who took part in 200 meter swimming competition.

e+f = b+d-16

e+f = 75

b+d = 91 (9)

Since b+d+f+h = 152.

b+d = 91 using (9)

f+h = 61 (10)

a+c = 48+f+h = 48+(61) = 109 (11)

a+c+e+g = 148 and a+c = 109 using (11)

e+g = 39 (12)

Now we have the following conditions after using all the conditions :

Since none of a, b, c, d, e, f, g, h can have negative values :

a+b = 150 (1), $a \leq 150$, $b \leq 150$

c+d = 50 (2), $c \leq 50$, $d \leq 50$

e+f = 75 (3), $e \leq 75$, $f \leq 75$

g+h = 25 (4), $g \leq 25$, $h \leq 25$

a+c = 109 (11), $a \leq 109$, $c \leq 109$

b+d = 91 (9), $b \leq 91$, $d \leq 91$

e+g = 39 (12), $e \leq 39$, $g \leq 39$

f+h = 61 (10), $f \leq 61$, $h \leq 61$

The final ranges for a,b,c,d,e,f,g,h can be written as :

$59 \leq a \leq 109$

$41 \leq b \leq 91$

$c \leq 50$

$d \leq 50$

$14 \leq e \leq 39$

$36 \leq f \leq 61$

$g \leq 25$

$h \leq 25$.

Among a,b,c,d options

Only option A cannot take value of 46 because it must have a (200 meter free style in regular) minimum of 59 participants.

37. What can be the maximum possible contenders in 400 meters butterfly in regular mode ?

A. 57

B. 59

C. 61

D. 63

Sol. Assuming all possible participants as variables and different possible participants and drawing a table for all the events :

<table>
<tr><td colspan="8">Total Swimmers</td></tr>
<tr><td colspan="8">o</td></tr>
<tr><td colspan="4">200 meter</td><td colspan="4">400meters</td></tr>
<tr><td colspan="4">m</td><td colspan="4">n</td></tr>
<tr><td colspan="2">Regular</td><td colspan="2">Relay</td><td colspan="2">Regular</td><td colspan="2">Relay</td></tr>
<tr><td colspan="2">i</td><td colspan="2">j</td><td colspan="2">k</td><td colspan="2">l</td></tr>
<tr><td>F.S</td><td>B.F</td><td>F.S</td><td>B.F</td><td>F.S</td><td>B.F</td><td>F.S</td><td>BF</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td></tr>
</table>

In the question it was mentioned that total number of swimmers is 300. Hence o is 300.

Taking into the first condition we have the mean of regular and relay is equal to the difference between regular and relay.

Hence ((i+k)+(j+l))/2 = (i+k)-(j+l)

i+k = 3(j+l).

Since the total number of swimmers is 300 and (i+k) + (j+l) = 300.

i+k = 225, j+l = 75.

In condition 2 it was mentioned that the difference between the swimmers in 200 m and 400 m is equal to the number of swimmers participating in 400 meter swimming.

As per the variables this is given as m-n = n.

m =2*n.

m+n = 300.

m = 200, n = 100.

m = i+j = 200, n= k+l = 100.

Assuming i = x, k = 225-x since i+k = 225

Assuming j = y, l = 75-y since j+l = 75

In condition 3 it was mentioned that the sum of 200 meter regular swimmers and 400 meter relay swimmers is 1.4 times the 400 meter regular and 200 meter relay.

This in equation form is written by :

i+l = (7/5)(j+k).

5*i+5*l = 7*j+7*k.

5(x)+5(75-y) = 7(y)+7(225-x).

5*x+375-5*y = 7*y+1575- 7*x.

12*x- 12*y =1200.

x-y = 100.

i-j = 100.

I+j = 200.

i=150, j = 50.

Since i = x, k = 225-x and x = 150 , k = 75.

Since j = y, l = 75-y and y = 50, l = 25.

Substituting these values in the table we have :

Total Swimmers							
300							
200 meter				400meters			
200				100			
Regular		Relay		Regular		Relay	
150		50		75		25	
F.S	B.F	F.S	B.F	F.S	B.F	F.S	BF
a	b	c	d	e	f	g	h

We are left with following conditions :

a+b = 150 (1)

c+d = 50 (2)

e+f = 75 (3)

g+h = 25 (4)

After taking condition 4 we have that the number of participants in free style is 48 more than the total number of swimmers in 400 meters.

Since the total number of 400 meter swimmers are 100 .

We have a+c+e+g = 48+(e+f+g+h) (5)

a+c = 48+f+h.

a+c+e+g = 148 (6)

Since a+b+c+d+e+f+g+h = 300. (7)

b+d+f+h = 152 (8)

In condition 5 it was mentioned that the number of regular 400 meter swimmers are 16 less than the number of swimmers who took part in 200 meter swimming competition.

e+f = b+d-16

e+f = 75

b+d = 91 (9)

Since b+d+f+h = 152.

b+d = 91 using (9)

f+h = 61 (10)

a+c = 48+f+h = 48+(61) = 109 (11)

a+c+e+g = 148 and a+c = 109 using (11)

e+g = 39 (12)

Now we have the following conditions after using all the conditions :

Since none of a, b, c, d, e, f, g, h can have negative values :

a+b = 150 (1), $a \leq 150$, $b \leq 150$

c+d = 50 (2), $c \leq 50$, $d \leq 50$

e+f = 75 (3), $e \leq 75$, $f \leq 75$

g+h = 25 (4), $g \leq 25$, $h \leq 25$

a+c = 109 (11), $a \leq 109$, $c \leq 109$

b+d = 91 (9), $b \leq 91$, $d \leq 91$

e+g = 39 (12), $e \leq 39$, $g \leq 39$

f+h = 61 (10), $f \leq 61$, $h \leq 61$

The final ranges for a,b,c,d,e,f,g,h can be written as :

$59 \leq a \leq 109$

$41 \leq b \leq 91$

$c \leq 50$

$d \leq 50$

$14 \leq e \leq 39$

$36 \leq f \leq 61$

$g \leq 25$

$h \leq 25$.

The 400 meters butterfly in regular mode is given by f which can take a maximum value of 61

38. If the number of participants in 200 meter freestyle in regular mode is 68. What is the number of participants in 400 meter freestyle in regular mode ?

A. 32

B. 52

C. 70

D. Cannot be determined

Sol. Assuming all possible participants as variables and different possible participants and drawing a table for all the events :

<table>
<tr><td colspan="8">Total Swimmers</td></tr>
<tr><td colspan="8">o</td></tr>
<tr><td colspan="4">200 meter</td><td colspan="4">400meters</td></tr>
<tr><td colspan="4">m</td><td colspan="4">n</td></tr>
<tr><td colspan="2">Regular</td><td colspan="2">Relay</td><td colspan="2">Regular</td><td colspan="2">Relay</td></tr>
<tr><td colspan="2">i</td><td colspan="2">j</td><td colspan="2">k</td><td colspan="2">l</td></tr>
<tr><td>F.S</td><td>B.F</td><td>F.S</td><td>B.F</td><td>F.S</td><td>B.F</td><td>F.S</td><td>BF</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td></tr>
</table>

In the question it was mentioned that total number of swimmers is 300. Hence o is 300.

Taking into the first condition we have the mean of regular and relay is equal to the difference between regular and relay.

Hence $((i+k)+(j+l))/2 = (i+k)-(j+l)$

$i+k = 3(j+l)$.

Since the total number of swimmers is 300 and $(i+k) + (j+l) = 300$.

$i+k = 225$, $j+l = 75$.

In condition 2 it was mentioned that the difference between the swimmers in 200 m and 400 m is equal to the number of swimmers participating in 400 meter swimming.

As per the variables this is given as $m-n = n$.

$m = 2*n$.

m+n = 300.

m = 200, n = 100.

m = i+j = 200, n= k+l = 100.

Assuming i = x, k = 225-x since i+k = 225

Assuming j = y, l = 75-y since j+l = 75

In condition 3 it was mentioned that the sum of 200 meter regular swimmers and 400 meter relay swimmers is 1.4 times the 400 meter regular and 200 meter relay.

This in equation form is written by :

i+l = (7/5)(j+k).

5*i+5*l = 7*j+7*k.

5(x)+5(75-y) = 7(y)+7(225-x).

5*x+375-5*y = 7*y+1575- 7*x.

12*x- 12*y =1200.

x-y = 100.

i-j = 100.

I+j = 200.

i=150, j = 50.

Since i = x, k = 225-x and x = 150 , k = 75.

Since j = y, l = 75-y and y = 50, l = 25.

Substituting these values in the table we have :

Total Swimmers							
300							
200 meter				400meters			
200				100			
Regular		Relay		Regular		Relay	
150		50		75		25	
F.S	B.F	F.S	B.F	F.S	B.F	F.S	BF
a	b	c	d	e	f	g	h

We are left with following conditions :

a+b = 150 (1)

c+d = 50 (2)

e+f = 75 (3)

g+h = 25 (4)

After taking condition 4 we have that the number of participants in free style is 48 more than the total number of swimmers in 400 meters.

Since the total number of 400 meter swimmers are 100 .

We have a+c+e+g = 48+(e+f+g+h) (5)

a+c = 48+f+h.

a+c+e+g = 148 (6)

Since a+b+c+d+e+f+g+h = 300. (7)

b+d+f+h = 152 (8)

In condition 5 it was mentioned that the number of regular 400 meter swimmers are 16 less than the number of swimmers who took part in 200 meter swimming competition.

e+f = b+d-16

e+f = 75

b+d = 91 (9)

Since b+d+f+h = 152.

b+d = 91 using (9)

f+h = 61 (10)

a+c = 48+f+h = 48+(61) = 109 (11)

a+c+e+g = 148 and a+c = 109 using (11)

e+g = 39 (12)

Now we have the following conditions after using all the conditions :

Since none of a, b, c, d, e, f, g, h can have negative values :

a+b = 150 (1), $a \leq 150$, $b \leq 150$

c+d = 50 (2), $c \leq 50$, $d \leq 50$

e+f = 75 (3), $e \leq 75$, $f \leq 75$

g+h = 25 (4), $g \leq 25$, $h \leq 25$

a+c = 109 (11), $a \leq 109$, $c \leq 109$

b+d = 91 (9), $b \leq 91$, $d \leq 91$

e+g = 39 (12), $e \leq 39$, $g \leq 39$

f+h = 61 (10), $f \leq 61$, $h \leq 61$

The final ranges for a,b,c,d,e,f,g,h can be written as :

$59 \leq a \leq 109$

$41 \leq b \leq 91$

$c \leq 50$

$d \leq 50$

$14 \leq e \leq 39$

$36 \leq f \leq 61$

$g \leq 25$

$h \leq 25$.

In the question we were provided the value of 200 meter freestyle in regular as 68 and asked for 400 meter freestyle in regular.

There is no correlation between the two of them and hence cannot be determined.

39. Which of the following mode can have maximum number of contenders ?

A. 400 meter free style in regular mode

B. 400 meter butterfly in regular mode

C. 400 meter freestyle in relay mode

D. 400 meter butterfly in relay mode

Sol. Assuming all possible participants as variables and different possible participants and drawing a table for all the events :

<table>
<tr><td colspan="8">Total Swimmers</td></tr>
<tr><td colspan="8">o</td></tr>
<tr><td colspan="4">200 meter</td><td colspan="4">400meters</td></tr>
<tr><td colspan="4">m</td><td colspan="4">n</td></tr>
<tr><td colspan="2">Regular</td><td colspan="2">Relay</td><td colspan="2">Regular</td><td colspan="2">Relay</td></tr>
<tr><td colspan="2">i</td><td colspan="2">j</td><td colspan="2">k</td><td colspan="2">l</td></tr>
<tr><td>F.S</td><td>B.F</td><td>F.S</td><td>B.F</td><td>F.S</td><td>B.F</td><td>F.S</td><td>BF</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td></tr>
</table>

In the question it was mentioned that total number of swimmers is 300. Hence o is 300.

Taking into the first condition we have the mean of regular and relay is equal to the difference between regular and relay.

Hence ((i+k)+(j+l))/2 = (i+k)-(j+l)

i+k = 3(j+l).

Since the total number of swimmers is 300 and (i+k) + (j+l) = 300.

i+k = 225, j+l = 75.

In condition 2 it was mentioned that the difference between the swimmers in 200 m and 400 m is equal to the number of swimmers participating in 400 meter swimming.

As per the variables this is given as m-n = n.

m =2*n.

m+n = 300.

m = 200, n = 100.

m = i+j = 200, n= k+l = 100.

Assuming i = x, k = 225-x since i+k = 225

Assuming j = y, l = 75-y since j+l = 75

In condition 3 it was mentioned that the sum of 200 meter regular swimmers and 400 meter relay swimmers is 1.4 times the 400 meter regular and 200 meter relay.

This in equation form is written by :

i+l = (7/5)(j+k).

5*i+5*l = 7*j+7*k.

5(x)+5(75-y) = 7(y)+7(225-x).

5*x+375-5*y = 7*y+1575- 7*x.

12*x- 12*y =1200.

x-y = 100.

i-j = 100.

I+j = 200.

i=150, j = 50.

Since i = x, k = 225-x and x = 150 , k = 75.

Since j = y, l = 75-y and y = 50, l = 25.

Substituting these values in the table we have :

Total Swimmers							
300							
200 meter				400meters			
200				100			
Regular		Relay		Regular		Relay	
150		50		75		25	
F.S	B.F	F.S	B.F	F.S	B.F	F.S	BF
a	b	c	d	e	f	g	h

We are left with following conditions :

a+b = 150 (1)

c+d = 50 (2)

e+f = 75 (3)

g+h = 25 (4)

After taking condition 4 we have that the number of participants in free style is 48 more than the total number of swimmers in 400 meters.

Since the total number of 400 meter swimmers are 100 .

We have a+c+e+g = 48+(e+f+g+h) (5)

a+c = 48+f+h.

a+c+e+g = 148 (6)

Since a+b+c+d+e+f+g+h = 300. (7)

b+d+f+h = 152 (8)

In condition 5 it was mentioned that the number of regular 400 meter swimmers are 16 less than the number of swimmers who took part in 200 meter swimming competition.

e+f = b+d-16

e+f = 75

b+d = 91 (9)

Since b+d+f+h = 152.

b+d = 91 using (9)

f+h = 61 (10)

a+c = 48+f+h = 48+(61) = 109 (11)

a+c+e+g = 148 and a+c = 109 using (11)

e+g = 39 (12)

Now we have the following conditions after using all the conditions :

Since none of a, b, c, d, e, f, g, h can have negative values :

a+b = 150 (1), $a \leq 150$, $b \leq 150$

c+d = 50 (2), $c \leq 50$, $d \leq 50$

e+f = 75 (3), $e \leq 75$, $f \leq 75$

g+h = 25 (4), $g \leq 25$, $h \leq 25$

a+c = 109 (11), $a \leq 109$, $c \leq 109$

b+d = 91 (9), $b \leq 91$, $d \leq 91$

e+g = 39 (12), $e \leq 39$, $g \leq 39$

f+h = 61 (10), $f \leq 61$, $h \leq 61$

The final ranges for a,b,c,d,e,f,g,h can be written as :

$59 \leq a \leq 109$

$41 \leq b \leq 91$

$c \leq 50$

$d \leq 50$

$14 \leq e \leq 39$

$36 \leq f \leq 61$

$g \leq 25$

$h \leq 25$.

The following options have been denoted by e, f, g, h in the solution among them f can have a maximum value of 61 which is higher than other cases and f is 400 meter butterfly in regular.

40. If the number of contenders in 200 meter butterfly in regular mode is greater than 50 which of the following can be the possible number of contenders in 200 meter freestyle in relay mode ?

A. 49

B. 59

C. 5

D. 9

Sol. Assuming all possible participants as variables and different possible participants and drawing a table for all the events :

Total Swimmers							
o							
200 meter				400meters			
m				n			
Regular		Relay		Regular		Relay	
i		j		k		l	
F.S	B.F	F.S	B.F	F.S	B.F	F.S	BF
a	b	c	d	e	f	g	h

In the question it was mentioned that total number of swimmers is 300. Hence o is 300.

Taking into the first condition we have the mean of regular and relay is equal to the difference between regular and relay.

Hence ((i+k)+(j+l))/2 = (i+k)-(j+l)

i+k = 3(j+l).

Since the total number of swimmers is 300 and (i+k) + (j+l) = 300.

i+k = 225, j+l = 75.

In condition 2 it was mentioned that the difference between the swimmers in 200 m and 400 m is equal to the number of swimmers participating in 400 meter swimming.

As per the variables this is given as m-n = n.

m =2*n.

m+n = 300.

m = 200, n = 100.

m = i+j = 200, n= k+l = 100.

Assuming i = x, k = 225-x since i+k = 225

Assuming j = y, l = 75-y since j+l = 75

In condition 3 it was mentioned that the sum of 200 meter regular swimmers and 400 meter relay swimmers is 1.4 times the 400 meter regular and 200 meter relay.

This in equation form is written by :

i+l = (7/5)(j+k).

5*i+5*l = 7*j+7*k.

5(x)+5(75-y) = 7(y)+7(225-x).

5*x+375-5*y = 7*y+1575- 7*x.

12*x- 12*y =1200.

x-y = 100.

i-j = 100.

I+j = 200.

i=150, j = 50.

Since i = x, k = 225-x and x = 150 , k = 75.

Since j = y, l = 75-y and y = 50, l = 25.

Substituting these values in the table we have :

Total Swimmers							
300							
200 meter				400meters			
200				100			
Regular		Relay		Regular		Relay	
150		50		75		25	
F.S	B.F	F.S	B.F	F.S	B.F	F.S	BF
a	b	c	d	e	f	g	h

We are left with following conditions :

a+b = 150 (1)

c+d = 50 (2)

e+f = 75 (3)

g+h = 25 (4)

After taking condition 4 we have that the number of participants in free style is 48 more than the total number of swimmers in 400 meters.

Since the total number of 400 meter swimmers are 100 .

We have a+c+e+g = 48+(e+f+g+h) (5)

a+c = 48+f+h.

a+c+e+g = 148 (6)

Since a+b+c+d+e+f+g+h = 300. (7)

b+d+f+h = 152 (8)

In condition 5 it was mentioned that the number of regular 400 meter swimmers are 16 less than the number of swimmers who took part in 200 meter swimming competition.

e+f = b+d-16

e+f = 75

b+d = 91 (9)

Since b+d+f+h = 152.

b+d = 91 using (9)

f+h = 61 (10)

a+c = 48+f+h = 48+(61) = 109 (11)

a+c+e+g = 148 and a+c = 109 using (11)

e+g = 39 (12)

Now we have the following conditions after using all the conditions :

Since none of a, b, c, d, e, f, g, h can have negative values :

a+b = 150 (1), $a \leq 150$, $b \leq 150$

c+d = 50 (2), $c \leq 50$, $d \leq 50$

e+f = 75 (3), $e \leq 75$, $f \leq 75$

g+h = 25 (4), $g \leq 25$, $h \leq 25$

a+c = 109 (11), $a \leq 109$, $c \leq 109$

b+d = 91 (9), $b \leq 91$, $d \leq 91$

e+g = 39 (12), $e \leq 39$, $g \leq 39$

f+h = 61 (10), $f \leq 61$, $h \leq 61$

The final ranges for a,b,c,d,e,f,g,h can be written as :

$59 \leq a \leq 109$

$41 \leq b \leq 91$

$c \leq 50$

$d \leq 50$

$14 \leq e \leq 39$

$36 \leq f \leq 61$

$g \leq 25$

$h \leq 25$.

If the contenders in 200 meter butterfly in regular mode is greater than 50 we were asked for the contenders who can fit in the range of 200 meter freestyle in relay mode.

If b is greater than 50 we were asked for c.

If b>50 b can have from 51 to 91.

If b = 51, d =40 and c = 10.

If b = 91, d =0 and c = 50.

49 is the only value that fits the range and hence the answer.

Instructions

A toy-producing factory has a setup that requires 3 stages stage 1, stage 2, stage 3 and the manufacturing of toys must take place in the order of stage 1, stage 2, and stage 3. There is one machine each for every stage and the following things are known about the factory

1) Production happens in batches and 1 batch contains 50,000 toys

2) Machine for stage 1 takes 25 minutes to process 1 batch. Time taken for stage 2 and stage 3 is 40 minutes and 30 minutes respectively.

3) Stage 1 machine is stopped for maintenance for 15 minutes after completing every 3 batches.

4) Stage 2 machine is stopped for 10 minutes for maintenance after completing every 4 batches. Stage 3 machine is stopped for 20 minutes for maintenance after completing every 4 batches.

5) Even if the machine is idle between the batches, the maintenance has to happen only after the defined number of batches have been produced.

6) There is no time delay in switching to other batches or maintenance.

7) The factory is operating from 9 am to 5 pm. No machine is supposed to be running after 5 pm.

8) The production is carried out in such a way that all the stages are completed on the same day.

41. How many batches are made in 1 day?

A. 8

B. 9

C. 10

D. 11

Sol. Let us start by manufacturing the first batch.

First machine will take 25 minutes and finish at 09:25. the other 2 stages happen after that and the table for batch 1 will look as follows:

	Batch 1
Stage 1	9:00 to 09:25
Stage 2	09:25 to 10:05
Stage 3	10:05 to 10:35

Thus Batch 2 will start at 09:25 and finish at 09:50. Stage 2 can start only after 10:05 and will go till 10:45. Stage 3 will start from 10:45 and go till 11:15

	Batch 2
Stage 1	09:25 to 09:50
Stage 2	10:05 to 10:45
Stage 3	10:45 to 11:15

For Batch 3, stage 1 will start at 09:50 to 10:15. Stage 2 can start after 10:45 and go till 11:25. Stage 3 can start at 11:25 and go till 11:55

	Batch 3
Stage 1	09:50 to 10:15
Stage 2	10:45 to 11:25
Stage 3	11:25 to 11:55

For Batch 4, stage 1 will start at 10:30 to 10:55 as there is 15-minute maintenance. Stage 2 can start after 11:25 and go till 12:05.

Stage 3 can start at 11:25 and go till 11:55

	Batch 4
Stage 1	10:30 to 10:55
Stage 2	11:25 to 12:05
Stage 3	12:05 to 12:35

Now for batch 5, stage 1 will start at 10:55 and go till 11:20. Stage 2 machine will undergo maintenance for 10 minutes as it manufactured 4 batches and can only start from 12:15 and will go till 12:55. Stage 3 will also undergo maintenance but it will be done from 12:35 to 12:50

	Batch 5
Stage 1	10:55 to 11:20
Stage 2	12:15 to 12:55
Stage 3	12:55 to 13:25

Now for batch 6, stage 1 will start at 11:20 and go till 11:45. Stage 2 machine will available after 12:55 and will go till 13:35. Stage 3 will start from 13:35 and go till 14:05

	Batch 6
Stage 1	11:20 to 11:45
Stage 2	12:55 to 13:35
Stage 3	13:35 to 14:05

Now for batch 7, stage 1 will start at 12:00 as it underwent 15 minutes maintenance and go till 12:25. Stage 2 machine will available after 13:35 and will go till 14:15. Stage 3 will start from 14:15 and go till 14:45

	Batch 7
Stage 1	12:00 to 12:25
Stage 2	13:35 to 14:15
Stage 3	14:15 to 14:45

Now for batch 8, stage 1 will start at 12:25 and go till 12:50. Stage 2 machine will available after 14:15 and will go till 14:55. Stage 3 will start from 14:55 and go till 15:25

	Batch 8
Stage 1	12:25 to 12:50
Stage 2	14:15 to 14:55
Stage 3	14:55 to 15:25

Since stage 2 and stage 3 machine has manufactured 4 batches each they will undergo maintenance. Stage 2 will be available from 15:05 and stage 3 will be available from 15:40.

For batch 9, stage 1 will go from12:50 to 13:15. Stage 2 will start from 15:05 and go till 15:45. Stage 3 will start from 15:45 to 16:15

	Batch 9
Stage 1	12:50 to 13:15
Stage 2	15:05 to 15:45
Stage 3	15:45 to 16:15

For batch 10, stage 1 will go from 13:30 to 13:55. as it went maintenance for 15 minutes. Stage 2 will start from 15:45 and go till 16:25. Stage 3 will start from 16:25 to 16:55

	Batch 10
Stage 1	13:30 to 13:55
Stage 2	15:45 to 16:25
Stage 3	16:25 to 16:55

We see that Batch 10 ends at 16:55. Any more batch will lead to completion after 17:00. Thus total 10 batches are made.

42. By what time would 350,000 toys be fully manufactured in a day?

A. 3:00 PM

B. 2:45 PM

C. 2:25 PM

D. 2:05 PM

Sol. Let us start by manufacturing the first batch.

The first machine will take 25 minutes and finish at 09:25. the other 2 stages happen after that and the table for batch 1 will look as follows:

	Batch 1
Stage 1	9:00 to 09:25
Stage 2	09:25 to 10:05
Stage 3	10:05 to 10:35

Thus Batch 2 will start at 09:25 and finish at 09:50. Stage 2 can start only after 10:05 and will go till 10:45. Stage 3 will start from 10:45 and go till 11:15

	Batch 2
Stage 1	09:25 to 09:50
Stage 2	10:05 to 10:45
Stage 3	10:45 to 11:15

For Batch 3, stage 1 will start at 09:50 to 10:15. Stage 2 can start after 10:45 and go till 11:25. Stage 3 can start at 11:25 and go till 11:55

	Batch 3
Stage 1	09:50 to 10:15
Stage 2	10:45 to 11:25
Stage 3	11:25 to 11:55

For Batch 4, stage 1 will start at 10:30 to 10:55 as there is 15-minute maintenance. Stage 2 can start after 11:25 and go till 12:05.

Stage 3 can start at 11:25 and go till 11:55

	Batch 4
Stage 1	10:30 to 10:55
Stage 2	11:25 to 12:05
Stage 3	12:05 to 12:35

Now for batch 5, stage 1 will start at 10:55 and go till 11:20. Stage 2 machine will undergo maintenance for 10 minutes as it manufactured 4 batches and can only start from 12:15 and will go till 12:55. Stage 3 will also undergo maintenance but it will be done from 12:35 to 12:50

	Batch 5
Stage 1	10:55 to 11:20
Stage 2	12:15 to 12:55
Stage 3	12:55 to 13:25

Now for batch 6, stage 1 will start at 11:20 and go till 11:45. Stage 2 machine will available after 12:55 and will go till 13:35. Stage 3 will start from 13:35 and go till 14:05

	Batch 6
Stage 1	11:20 to 11:45
Stage 2	12:55 to 13:35
Stage 3	13:35 to 14:05

Now for batch 7, stage 1 will start at 12:00 as it underwent 15 minutes maintenance and go till 12:25. Stage 2 machine will available after 13:35 and will go till 14:15. Stage 3 will start from 14:15 and go till 14:45

	Batch 7
Stage 1	12:00 to 12:25
Stage 2	13:35 to 14:15
Stage 3	14:15 to 14:45

Now for batch 8, stage 1 will start at 12:25 and go till 12:50. Stage 2 machine will available after 14:15 and will go till 14:55. Stage 3 will start from 14:55 and go till 15:25

	Batch 8
Stage 1	12:25 to 12:50
Stage 2	14:15 to 14:55
Stage 3	14:55 to 15:25

Since stage 2 and stage 3 machine has manufactured 4 batches each they will undergo maintenance. Stage 2 will be available from 15:05 and stage 3 will be available from 15:40.

For batch 9, stage 1 will go from12:50 to 13:15. Stage 2 will start from 15:05 and go till 15:45. Stage 3 will start from 15:45 to 16:15

	Batch 9
Stage 1	12:50 to 13:15
Stage 2	15:05 to 15:45
Stage 3	15:45 to 16:15

For batch 10, stage 1 will go from 13:30 to 13:55. as it went maintenance for 5 minutes. Stage 2 will start from 15:45 and go till 16:25. Stage 3 will start from 16:25 to 16:55

	Batch 10
Stage 1	13:30 to 13:55
Stage 2	15:45 to 16:25
Stage 3	16:25 to 16:55

We see that Batch 10 ends at 16:55. Any more batch will lead to completion after 17:00. Thus total 10 batches are made.

For 350,000 toys we need 7 complete batches. It is completed by 14:45

43. What is the absolute difference (in minutes) in time when batch 6 was completed and when the factory began operating?

Sol. Let us start by manufacturing the first batch.

First machine will take 25 minutes and finish at 09:25. the other 2 stages happen after that and the table for batch 1 will look as follows:

	Batch 1
Stage 1	9:00 to 09:25
Stage 2	09:25 to 10:05
Stage 3	10:05 to 10:35

Thus Batch 2 will start at 09:25 and finish at 09:50. Stage 2 can start only after 10:05 and will go till 10:45. Stage 3 will start from 10:45 and go till 11:15

	Batch 2
Stage 1	09:25 to 09:50
Stage 2	10:05 to 10:45
Stage 3	10:45 to 11:15

For Batch 3, stage 1 will start at 09:50 to 10:15. Stage 2 can start after 10:45 and go till 11:25. Stage 3 can start at 11:25 and go till 11:55

	Batch 3
Stage 1	09:50 to 10:15
Stage 2	10:45 to 11:25
Stage 3	11:25 to 11:55

For Batch 4, stage 1 will start at 10:30 to 10:55 as there is 15-minute maintenance. Stage 2 can start after 11:25 and go till 12:05.

Stage 3 can start at 11:25 and go till 11:55

	Batch 4
Stage 1	10:30 to 10:55
Stage 2	11:25 to 12:05
Stage 3	12:05 to 12:35

Now for batch 5, stage 1 will start at 10:55 and go till 11:20. Stage 2 machine will undergo maintenance for 10 minutes as it manufactured 4 batches and can only start from 12:15 and will go till 12:55. Stage 3 will also undergo maintenance but it will be done from 12:35 to 12:50

	Batch 5
Stage 1	10:55 to 11:20
Stage 2	12:15 to 12:55
Stage 3	12:55 to 13:25

Now for batch 6, stage 1 will start at 11:20 and go till 11:45. Stage 2 machine will available after 12:55 and will go till 13:35. Stage 3 will start from 13:35 and go till 14:05

	Batch 6
Stage 1	11:20 to 11:45
Stage 2	12:55 to 13:35
Stage 3	13:35 to 14:05

Now for batch 7, stage 1 will start at 12:00 as it underwent 15 minutes maintenance and go till 12:25. Stage 2 machine will available after 13:35 and will go till 14:15. Stage 3 will start from 14:15 and go till 14:45

	Batch 7
Stage 1	12:00 to 12:25
Stage 2	13:35 to 14:15
Stage 3	14:15 to 14:45

Now for batch 8, stage 1 will start at 12:25 and go till 12:50. Stage 2 machine will available after 14:15 and will go till 14:55. Stage 3 will start from 14:55 and go till 15:25

	Batch 8
Stage 1	12:25 to 12:50
Stage 2	14:15 to 14:55
Stage 3	14:55 to 15:25

Since stage 2 and stage 3 machine has manufactured 4 batches each they will undergo maintenance. Stage 2 will be available from 15:05 and stage 3 will be available from 15:40.

For batch 9, stage 1 will go from12:50 to 13:15. Stage 2 will start from 15:05 and go till 15:45. Stage 3 will start from 15:45 to 16:15

	Batch 9
Stage 1	12:50 to 13:15
Stage 2	15:05 to 15:45
Stage 3	15:45 to 16:15

For batch 10, stage 1 will go from 13:30 to 13:55. as it went maintenance for 5 minutes. Stage 2 will start at 15:45 and go till 16:25. Stage 3 will start from 16:25 to 16:55

	Batch 10
Stage 1	13:30 to 13:55
Stage 2	15:45 to 16:25
Stage 3	16:25 to 16:55

We see that Batch 10 ends at 16:55. Any more batch will lead to completion after 17:00. Thus total of 10 batches are made.

Batch 6 starts from 11:20 and ends at 14:05 which is 165 minutes

44. How much time was taken for the last batch of the day for its completion from its starting time?

A. 1 hour 35 minutes

B. 2 hours 45 minutes

C. 3 hours 10 minutes

D. 3 hours 25 minutes

Sol. Let us start by manufacturing the first batch.

First machine will take 25 minutes and finish at 09:25. the other 2 stages happen after that and the table for batch 1 will look as follows:

	Batch 1
Stage 1	9:00 to 09:25
Stage 2	09:25 to 10:05
Stage 3	10:05 to 10:35

Thus Batch 2 will start at 09:25 and finish at 09:50. Stage 2 can start only after 10:05 and will go till 10:45. Stage 3 will start from 10:45 and go till 11:15

	Batch 2
Stage 1	09:25 to 09:50
Stage 2	10:05 to 10:45
Stage 3	10:45 to 11:15

For Batch 3, stage 1 will start at 09:50 to 10:15. Stage 2 can start after 10:45 and go till 11:25. Stage 3 can start at 11:25 and go till 11:55

	Batch 3
Stage 1	09:50 to 10:15
Stage 2	10:45 to 11:25
Stage 3	11:25 to 11:55

For Batch 4, stage 1 will start at 10:30 to 10:55 as there is 15-minute maintenance. Stage 2 can start after 11:25 and go till 12:05.

Stage 3 can start at 11:25 and go till 11:55

	Batch 4
Stage 1	10:30 to 10:55
Stage 2	11:25 to 12:05
Stage 3	12:05 to 12:35

Now for batch 5, stage 1 will start at 10:55 and go till 11:20. Stage 2 machine will undergo maintenance for 10 minutes as it manufactured 4 batches and can only start from 12:15 and will go till 12:55. Stage 3 will also undergo maintenance but it will be done from 12:35 to 12:50

	Batch 5
Stage 1	10:55 to 11:20
Stage 2	12:15 to 12:55
Stage 3	12:55 to 13:25

Now for batch 6, stage 1 will start at 11:20 and go till 11:45. Stage 2 machine will available after 12:55 and will go till 13:35. Stage 3 will start from 13:35 and go till 14:05

	Batch 6
Stage 1	11:20 to 11:45
Stage 2	12:55 to 13:35
Stage 3	13:35 to 14:05

Now for batch 7, stage 1 will start at 12:00 as it underwent 15 minutes maintenance and go till 12:25. Stage 2 machine will available after 13:35 and will go till 14:15. Stage 3 will start from 14:15 and go till 14:45

	Batch 7
Stage 1	12:00 to 12:25
Stage 2	13:35 to 14:15
Stage 3	14:15 to 14:45

Now for batch 8, stage 1 will start at 12:25 and go till 12:50. Stage 2 machine will available after 14:15 and will go till 14:55. Stage 3 will start from 14:55 and go till 15:25

	Batch 8
Stage 1	12:25 to 12:50
Stage 2	14:15 to 14:55
Stage 3	14:55 to 15:25

Since stage 2 and stage 3 machine has manufactured 4 batches each they will undergo maintenance. Stage 2 will be available from 15:05 and stage 3 will be available from 15:40.

For batch 9, stage 1 will go from12:50 to 13:15. Stage 2 will start from 15:05 and go till 15:45. Stage 3 will start from 15:45 to 16:15

	Batch 9
Stage 1	12:50 to 13:15
Stage 2	15:05 to 15:45
Stage 3	15:45 to 16:15

For batch 10, stage 1 will go from 13:30 to 13:55. as it went maintenance for 5 minutes. Stage 2 will start from 15:45 and go till 16:25. Stage 3 will start from 16:25 to 16:55

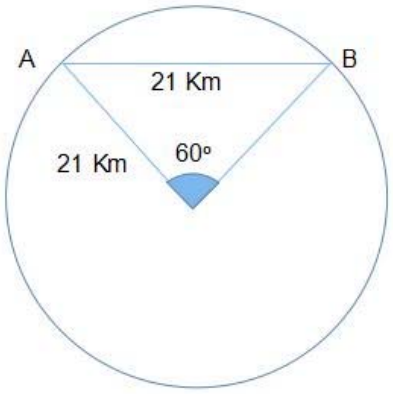
	Batch 10
Stage 1	13:30 to 13:55
Stage 2	15:45 to 16:25
Stage 3	16:25 to 16:55

We see that Batch 10 ends at 16:55. Any more batch will lead to completion after 17:00. Thus total 10 batches are made.

Batch 10 started from 13:30 to 16:55. Total time is 3 hours 25 minutes

45. Hyderabad ring road is in the form of a perfect circle of diameter 42 km. 2 points A and B lie on the ring road. There is another expressway that connects point A directly to point B. The length of the expressway that connects A and B is the same as the radius of the ring road. A person starts from point A and travels to point B through the ring road by taking the shortest route and immediately returns to A from B through the expressway. If the person completes the journey in half an hour, what is his speed (in kmph)?

Sol. The road AB (expressway) is a chord. We have been given that the length of the expressway is equal to the radius of the circle. Therefore, on joining the points A and B with the centre of the circle, we will get an equilateral triangle.



=> Angle subtended by the expressway at the centre = 60 ^\circ60∘.

Length of the arc AB = $\frac{60}{360} \times 2 \times \pi \times 21$

= 22 km.

Length of the expressway AB = 21 km.

We know that the person covers 22+21 = 43 km in half an hour.

Therefore, the speed of the person is 86 kmph.

86 is the correct answer.

46. Kriti's, Karishma's, Kajol's and Kareena's number of movie roles is in the ratio $\frac{1}{2}:\frac{1}{9}:\frac{1}{7}:\frac{1}{23}$ and for each movie they are paid in the ratio $\frac{1}{11}:\frac{1}{13}:\frac{1}{15}:\frac{1}{17}$ If the earnings of all 4 actors is a natural number, what is the minimum amount of money Kajol would have earned? (Enter 0 if the answer cannot be determined)

Sol. The ratio of movie roles of Kriti, Karishma, Kajol and Kareena are given in fractions. To convert the ratio into non-fractions we must take the LCM of the denominators. This is 2*9*7*23=2898

Their movie roles will be in the ratio of $\frac{2898}{2}:\frac{2898}{9}:\frac{2898}{7}:\frac{2898}{23}$ = 1449:322:414:126

(The number of movie roles for any heroine can never be negative.)

Similarly, for incomes, the LCM is 11*13*15*17=36465

Their incomes from each movie will be in the ratio of $\frac{36465}{11}:\frac{36465}{13}:\frac{36465}{15}:\frac{36465}{17}$ = 3315:2805:2431:2145.

It is given in the question that the earnings are all a natural number, all the ratios calculated above are in their lowest form.

So, the least amount Kajol could have earned is 414*2431=1006434

47. How many natural number solutions exist for the equation 1/X + 5/Y = 1/10 if Y < 70

A. 2

B. 3

C. 4

D. 5

Sol. $\frac{1}{X}+\frac{5}{Y}=\frac{1}{10}$

$\frac{1}{X}=\frac{1}{10}-\frac{5}{Y}$

$\frac{1}{X}=\frac{Y-50}{10Y}$

$X=\frac{10Y}{Y-50}$

Now, since both X and Y are positive, Y has to be > 50.

Y = 50 + K, K > 0, K < 20

$X = \frac{10Y-500}{Y-50} + \frac{500}{Y-50}$

$X = 10 + \frac{500}{Y-50}$

X = 10 + 500/K

K has to be a factor of 500.

K = 1, 2, 4, 5, 10

Y = 51, 52, 54, 55, 60

48. A fruit seller sells oranges using a unique pricing strategy: if the number of oranges you buy is less than or equal to 100, you will have to pay Rs.10 per orange. However, the shopkeeper offers a discount such that for every additional orange above 100, a discount of Rs. (1/40) per orange is levied on the entire bunch. If the seller plans to put a box for sale having 'n' oranges, what should be the value of 'n' such that the revenue from this box is maximized?

Sol. Revenue from the sale of 100 oranges = 100*10 = 1000

=> Let the revenue be maximum for *k* additional oranges sold.

Hence the new revenue would be $(100 + k)\left(10 - \frac{k}{40}\right) = -\frac{k^2}{40} + \frac{30}{4}k + 1000$

=> The value will be maximum at the point where this function is differentiated and then equated to zero.

$\frac{d}{dk}\left(-\frac{k^2}{40} + \frac{30}{4}k + 1000\right) = 0$

$-\frac{2}{40}k + \frac{30}{4} = 0$

On solving, we get k = 150

Thus, the value of the function would be maximum at k = 150

Therefore, the value of 'n' for which the revenue would be maximum is given by (100 + 150) = 250

Hence, the required answer is 250.

49. PQRS is a quadrilateral such that PQ=4√3,QR=3√3 RS=6√3, angle PQR is equal to angle SRQ which in turn equals 120 degrees. Find the approximate area of quadrilateral PQRS.

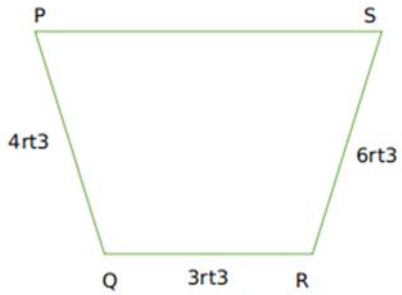
A. 70

B. 65

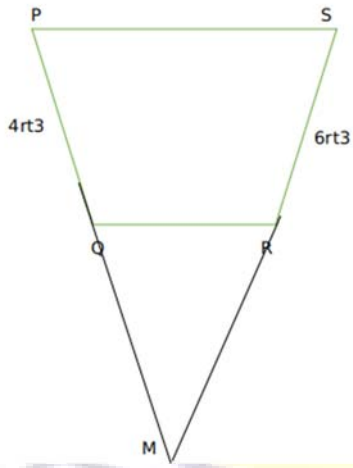
C. 75

D. 60

Sol. We are given that :



Now angle Q=angle R =120
Now if we intersect PQ and SR to intersect at a point M
then Triangle QRM will be an equilateral triangl with side= 3rt3
Now area of quadrilateral will be
Area of triangle MPS-Area of triangle MQR



Area of quadrilateral = $\frac{1}{2} \times 7\sqrt{3} \times 9\sqrt{3} \times sin\ 60 - \frac{\sqrt{3}}{4} \times 3\sqrt{3} \times 3\sqrt{3}$

Therefore area of quadrilateral = $\frac{81\sqrt{3}}{2}$

= 70.14
Therefore option A is the correct answer.

50. A toddler is positioned at (0, 0) in x-y plane. He can move by either 1 unit or 3 units at a time in any of x and y directions. If a toy is stationed at (5, 5), then in how many ways he can reach to the toy given that he moves closer to the toy in each step that he takes.

Sol. The toddler is placed at (0, 0) Hence, we can say that he has to travel 5 units in the x-direction and 5 units in the y-direction.
Possible cases of 5 units that have to be covered by the toddler = 5 steps of 1 unit each (1+1+1+1+1) or 2 steps of 1 unit each and 1 step of 3 units (3+1+1).

Case 1: When the toddler moves by (1+1+1+1+1) in both x and y directions. The number of ways in which the toddler can reach to the toy = $\frac{10!}{(5! \times 5!)} = 252$.

Case 2: When toddler moves by (1+1+1+1+1) in any one of x and y-direction and by (3+1+1) in the other direction.

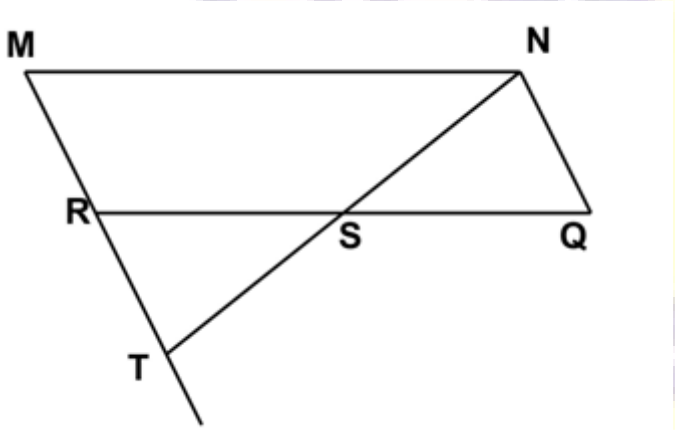
The number of ways in which the toddler can reach to the toy = $= 2 \times \frac{8!}{(5! \times 2!)} = 336$

Case 3: When the toddler moves by (3+1+1) in both x and y directions.

The number of ways in which the toddler can reach to the toy = $= \frac{6!}{(2! \times 2!)} = 180$

Hence, the total number of ways in which the toddler can reach the toy = 252+336+180 = 768.

51. In given figure parallelogram MNQR has area 74 sq. m. If S is the midpoint of RQ, find the area of NTQ?



A. 49 sq. m

B. 42 sq. m

C. 37 sq. m

D. 21 sq. m

Sol. Let MR=NQ=x and height=y

So, area of the parallelogram=xy=74.

Consider triangle RTS and NSQ. These triangles are congruent since angle RST=angle NSQ (opposite angles), angle TRS=angle NQS (alternate angles), and RS=SQ (s is the midpoint). Thus, area triangle RTS = NSQ.

=> MR=RT=x

=> Area of parallelogram= area of triangle MTN.

Now the figure MNQT is a trapezium whose area is 1/2 X (x+2x) X y= 3/2 xy= 3 X 37.

Area of triangle NTQ= area of MNQT-area of MTN= 37X3-37X2=37 sq units.

52. a, b and c are real numbers such that

a + 7b + 3c > 193

3a + b + 2c > 53

The value of 24a + 28b + 23c is definitely greater than X, where X is an integer.

Find the maximum possible value of X.

A. 906

B. 950

C. 806

D. Cannot be determined

Sol. a + 7b + 3c > 193 -> a + 7b + 3c = 193 + m

3a + b + 2c > 53 -> 3a + b + 2c = 53 + n

m and n are real numbers >0

Multiplying them by 3 and 7 individually and then adding them, we get

24a + 28b + 23c = 950 + 3m + 7n

Hence, the final expression is greater than 950.

53. If $(3x+y+z+2)^2 + (2x+3y+3z-22)^2+(x-4y+2z+14)^2 = 0$, Find x-y+z if x,y,z are real?

A. 2

B. -1

C. -4

D. 6

Sol. As per the given condition all the individual elements are in the powers of 2

An even numbered for a real number is always greater than 0 or equal to zero.

Since the sum of the three individual elements is zero.

This is only possible when all three of them are equal to 0.

Hence 3x+y+z+2 = 0

= 3x+y+z = -2 (1)

2x+3y+3z -22 = 0

= 2x+3y+3z = 22 (2)

x-4y+2z+14 = 0

= x-4y+ 2z = -14 (3)

Multiplying (1) with 2 and subtracting (2)- (1)

= (2x+3y+3z = 22) - (9x+3y+3z = -6)

= -7x = 28.

x = -4.

Substituting this in equation (1) = 3(-4)+y+z = -2.

y+z = 10. (4)

Substituting in equation 3 :

-4-4y+2z = -14

2z-4y = -10.

z-2y = -5. (5)

= 2y-z = 5

y+z = 10.

Hence y, z = 5

x-y+z = -4-5+5 = -4

54. Uday and Nikunj, who work at a sculpture park, build pillars together of varying lengths on each day such that the height (in m) of the pillar is as follows:

$$H_n = \begin{cases} n^2; 1 \leq n \leq 4 \\ 3n; 5 \leq n \leq 7 \\ \frac{3n}{2}; n \geq 8 \end{cases}$$

where n = day on which the pillar is made.

It is known that Nikunj is twice as efficient as Uday and both together work for 12 days. The owner of the park decides to pay them in a strange manner such that Rs. 150 per meter will be paid to each. This ensures that the person who contributed more gets compensated better. How much money does Nikunj earn in the process?

A. 7,950

B. 31,800

C. 23,850

D. 15,900

Sol. The height of the pillar varies based on the day on which it is built. The amount will be distributed based on the work done by each person. Since Nikunj is twice as efficient as Uday, the ratio of their individual contribution will be 2:1. Given that the compensation is dependent on the total work, i.e the sum of heights (in meters) of the pillar, we need to calculate this total sum. Both Nikunj and Uday built pillars for 12 days, and the following is the sum of heights :

For $1 \leq n \leq 4$, the sum can be represented as $\sum_1^4 n^2$ = (1+4+9+16) = 30 meters in total

For $5 \leq n \leq 7$, the sum can be represented as $3 \sum_5^7 n$ = 3(5+6+7) = 54 meters in total

For $n \geq 8$ till 1212, the sum can be represented as $\frac{3}{2}\sum_{8}^{12} n = (3/2)(8+9+10+11+12) = 75$ meters in total

The total sum of heights = 30+54+75 = 159 meters; Contibution by Nikunj

$= \frac{2}{3} \times 159 = 106$ meters

Amount earned by Nikunj = Rs. 150 × 106 = Rs. 15900

Hence, Option D is the correct answer.

55. If m,n are the roots of the equation $12x^2 + 13x - 4$, then find the equation that has the roots $\frac{m}{m-5}$ and $\frac{n}{n-5}$.

A. $19y^2 - 3y - \frac{4}{19} = 0$

B. $20y^2 - 3y - \frac{1}{5} = 0$

C. $365y^2 - 57y - 4 = 0$

D. $18y^2 - 3y - \frac{2}{9} = 0$

Sol. Let $y = \frac{x}{x-5}$. Then $yx - 5y = x$ and $x = 5y/(y-1)$.

Putting the value of x in the quadratic equation:

$\frac{300y^2}{(y-1)^2} + \frac{65y}{y} - 1 - 4 = 0$

$300y^2 + 65(y^2 - y) - 4(y^2 - 2y - 1) = 0$

$300y^2 + 65y^2 - 65y - 4y^2 + 8y - 4 = 0$

$361y^2 - 57y - 4 = 0$

$19y^2 - 3y - \frac{4}{19} = 0$

Hence the answer is Option A.

56. The smallest altitude of a right-angled triangle of area 216 cm^22 is 14.4 cm. What is the perimeter of the triangle?

A. 60 cm

B. 56 cm

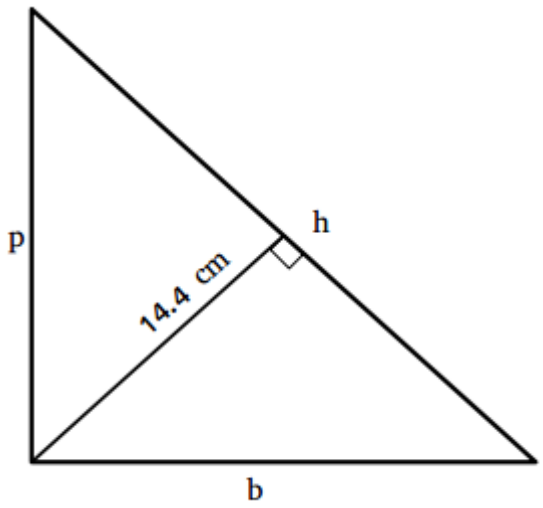
C. 72 cm

D. 84 cm

Sol. We know that the length of an altitude in a triangle is inversely proportional to the length of the side on which it is drawn.

So, the smallest altitude in a right-angled triangle must be drawn on its hypotenuse.

Let the base of the triangle be '*b*', perpendicular be '*p*' and the hypotenuse be '*h*'



Area of the triangle = 216 cm^2

or, $\frac{1}{2} \times b \times p = 216$

or, bp = 432.....(i)

Also, the length of the altitude drawn on the hypotenuse is 14.4 cm

So, area of the triangle can be written as

$\frac{1}{2} \times h \times 14.4 = 216$

=> *h* = 30 cm

We also know that in a right angled triangle

$b^2 + p^2 = h^2$ [Pythagoras Theorem]

or, $b^2 + p^2 = 30^2 = 900$

Adding '2bp' to both the sides, we get

$b^2 + p^2 + 2bp = 900 + 2bp$

Putting the value of bp from (i), we get

$(b + p)^2 = 900 + 2 \times 432 = 1764$

or, $(b + p) = \sqrt{1764} = 42$

Thus, the perimeter of the triangle = (b + p + h) = (42 + 30) = 72 cm

Hence, option C is the correct answer.

57. Two varieties of rice A and B, are mixed in the ratio 2:3. The mixture is sold at Rs 100 per kg at 100% profit. If variety A costs Rs 10 more per kg than variety B, what is the cost of variety B per kg?

A. 56

B. 46

C. 64

D. 65

Sol. Let the cost price of B per kg be Rs x => cost price of A per kg = Rs (x+10)

GIven SP per kg = Rs 100 with 100% profit => CP of the mixture per kg = Rs 50

Using allegations ,

$\frac{2}{3} = \frac{50-x}{x-40}$

Upon solving, x = 46

58. x + y = 8 and $P = 5x^2 + 11y^2$. What is the minimum possible value of P?

A. 310

B. 237.31

C. 110

D. 220

Sol. We have, x+y=8

x=8-y

Now, $P = 5x^2 + 11y^2$

$= 5(8-y)^2 + 11y^2$

$= 320+5y^2-80y+11y^2$

$= (4y-10)^2 +220$

At y = 2.5, $(4y-10)^2 +220$

Hence minimum value = 220

59. If the selling price of the article is reduced by 40% and the cost price remains the same, the profit reduces by 50%. Find the original profit% of the article?

Sol. Let the SP be x and the CP be y.
(x-y) = 2(0.6x-y)
0.2x = y
x = 5y
Original profit% = $\frac{x-y}{y} \times 100 = \frac{5y-y}{y} \times 100 = 400\%$

60. Find the domain of the function f(x) = $\frac{log(x2-8)}{|x-5|}$ if f(x) is a real function

A. $(-\infty, -2\sqrt{2})\ U\ (2\sqrt{2}, \infty)$

B. $\left(-\infty, -2\sqrt{2}\right)\ U\ \left(2\sqrt{2}, 5\right)\ U(5, \infty)$

C. $\left(-\infty, -2\sqrt{2}\right)\ U\ \left(2\sqrt{2}, \infty\right) - [-5, 5]$

D. $\left(-\infty, -2\sqrt{2}\right) U\ (5, \infty)$

Sol. For the function to be a real function, the log value should be > 0 i.e. $X^2 - 8 > 0$ => x > $2\sqrt{2}$ and x < -$2\sqrt{2}$. As the denominator cannot be zero, x!= 5. Hence, using these two conditions we get option B

61. Alok bought 180kg of sugar at Rs2000 and sold it at a loss equal to the selling price of 20kg sugar.What is the selling price per kg of sugar?

A. 10

B. 20

C. 15

D. 12.5

Sol. Selling price of 180kg = Cost price of 180kg - Selling price of 20kg
=> Selling price of 200kg = 2000
∴ S.P of 1kg sugar = Rs10

62. The average of twenty distinct natural numbers is 150 and the minimum number amongst them is 108. What is the maximum possible value of the largest of the twenty numbers?

A. 948

B. 777

C. 192

D. 347

Sol. The sum of the twenty numbers is 20*150=3000 and the least possible sum of the 19 numbers (excluding the maximum) is 108+109+110+...+126=2223 So, the maximum possible value of the largest of the twenty numbers is 3000-2223=777

63. Rakesh went to buy some apples and oranges. The cost of 1 apple is Rs.10 and the cost of 1 orange is Rs.15. He bought *x* apples and *y* oranges. Had he bought 1.5*y* apples and $\frac{4}{3}$ x oranges, he would have spent 40% more than he did. Which of the following can be the amount of money he spent?

A. Rs. 2870

B. Rs. 2950

C. Rs. 3000

D. Rs. 2880

Sol. Let N be the amount of money he spent in buying x apples and y oranges.
Thus, 10x+15y = N ……(i)
Also, it has been given that, had he bought 1.5y apples and $\frac{4}{3}$ x oranges, he would have spent 40% more than he did.
Thus,
1.5y × 10 + $\frac{4}{3}$ x ×15 = 1.4N…….(ii)

Dividing ii by i, we get,
$\frac{15y+20x}{10x+15y} = 1.4$

=> 15y+20x = 14x+21y

Thus, x = y

Thus, 10y+15y = N

or, 25y = N

So, N must be a multiple of 25.
Also, as $\frac{4}{3}$ x and 1.5y are natural numbers, it implies that *x* is a multiple of 3 and y is a multiple of 2.
So, N must be a multiple of 25×6=150
Hence, option C is the correct answer.

64. Mr. Vinay walks up on a moving up escalator to save time. He takes 100 steps while going up. On one particular day, due to a power failure for 20 seconds, he took 18 seconds more than his usual time to reach the top of the escalator. How many steps are there on the escalator?

A. 190 steps

B. 1100 steps

C. 900 steps

D. 1000 steps

Sol. There is a certain amount of work to be done for the man to reach the top of the escalator. A part of this work is done by the man and the remaining part is done by the escalator.
Let the number of steps on the escalator be L.
Number of steps covered by the man = 100
So, number of steps covered by the escalator = L - 100
Let the time taken for this be t.
So, speed of the man = 100/t
Speed of the escalator = (L-100)/t

In the second case, number of steps covered by the escalator = (L-100)/t * (t - 20 + 18) = (L-100)/t * (t-2)

Number of steps covered by the man = 100/t * (t + 18) = 100 * (t + 18)/t

The sum of the numbers of steps covered by the man and escalator is L.
So, (L-100)/t * (t-2) + 100 * (t+18)/t = L

=> (Lt - 2L - 100t + 200 + 100t + 1800)/t = L
=> 2000 - 2L + Lt = Lt
=> 2L = 2000
=> L = 1000

So, the number of steps on the escalator is 1000.

65. Triangle ABC has a perimeter of 20 units. Which of the following can be the area of the triangle (in square units)?

A. $\frac{32}{\sqrt{3}}$

B. $\frac{110}{3\sqrt{3}}$

C. $20\sqrt{3}$

D. More than one of the above

Sol. The least possible area that a triangle can have is close to 0 (By nearly making the height equal to zero).
Therefore, the maximum possible area will be the limiting condition.
For a given perimeter, an equilateral triangle will have the maximum possible area.
Side of an equilateral triangle = 20/3 cm.
Area of the equilateral triangle with side 20/3 cm = $\frac{\sqrt{3}}{4} \times \left(\frac{20}{3}\right)^2$

Area = $\frac{100\sqrt{3}}{9}$

= $11.11\sqrt{3}$

Let us evaluate the options.

Option B $\left(\frac{110}{3\sqrt{3}}\right)$ is greater than the greatest possible area.$\left(\frac{110}{3\sqrt{3}}\right)$.

We can eliminate option C as well since $20\sqrt{3}$ is greater than $11.11\sqrt{3}$.
Option A:
$\frac{32}{\sqrt{3}} = \frac{32\sqrt{3}}{3} = 10.67\sqrt{3}$
As we can see, only option A is less than $11.11\sqrt{3}$ and hence, option A is the right answer.

66. A,B,C and D work in a firm which operates for 6 days in a week from monday to saturday. B is 20% less efficient than A, C is 20% more efficient than A and D is 25% more efficient than C. A new project has been assigned to them in such a way that on any day only two of them can work on it and everyone works on the project for equal number of days in a week. Find the day of the week on which the project will be finished if they start the project on monday and they want to finish the project as quickly as possible. It is also known that if everyone works on the project on each day then the project will be finished in 8 days.

A. Friday

B. Saturday

C. Thursday

D. Wednesday

Sol. Let A do x units of work per day
Therefore B will do 0.8x units of work per day
similarly C will do 1.2x units of work per day
and D will do 1.2*1.25=1.5x units of work per day.
Now total units of work will be: 8(0.8x+x+1.2x+1.5x)=8(4.5x)
=36x
Now we know that firm operates for 6 days in a week and everyone works for same number of days in a week
so we can say each of them works for $\frac{(6\times2)}{4} = 3$ days in a week
Now to finish the project as early as possible
In every week we can say that
on day 1 C&D will work, on day 2 A&D will work on day 3 D&B will work , on day 4 A&C will work on day 5 B&C will work and on day6 A&B will work together.
Therefore units of work completed in a week =2.7x+2.5x+2.3x+2.2x+2x+1.8x=13.5x
similarly in 2nd week total 13.5x units of work will be completed
Therefore work remaining at the start of week 3 =9x
Now on day 1- 2.7x more will be completed, on day 2- 2.5x more will be completed ,on day 3- 2.3x more will be completed
so till Wednesday 7.5x units more of work will be completed.
Therefore 1.5x units of work will be remaining which will be completed on 4th day of week 3 by A&C.
Hence Work will be completed on Thursday.