

UPSC 2021- CSAT SOLUTION

Observations and Recommendations

1. OBSERVATIONS

1.1 Reading Comprehension

- The question pattern largely remained the same as previous year papers (last 5 years) in terms of **type/ pattern of the questions** (Logical inference/ Critical idea/ Valid assumptions/ Logical corollary etc), barring a new type of RC question which was based on missing preceding part of a given passage (For reference- Q43 of Set B).
- The framing of statements and language seemed difficult to decipher at first reading for many questions. This added to the anxiety and impeded the overall time-management of the paper.
- The diverse range and depth of topical themes based on which the passages were constructed posed a challenge. For instance, certain passages delved into depths of Religion, Science & Technology, International Relations, Law, and Philosophy which would need subject familiarity to answer them well.

1.2 Mathematics and Logical Reasoning

- Questions of mathematics were of medium difficulty level this year. However, in a few questions, interpretation was a bit tricky.
- The utility of shortcuts and direct formula based methods to arrive at answers diminished as the intended purpose of the paper was to check the problem-solving approach rather than the calculation speed of the candidates.
- One of the critical tools UPSC uses to trick candidates in exams is “language”. The same tool was extensively used in this year's UPSC CSAT exam. The language was on the difficult side. It was to check candidate comprehension skills not only in English but also in maths and reasoning questions.
- Though the paper wasn't lengthy as compared to the previous year's paper, few questions demanded better application of mind. (For reference Q-26 and 69 of Set-B)
- UPSC has again included the data interpretation questions this year to test the ability of candidates to comprehend the data and derive meaningful interpretations of data to solve the given questions on the same.

2. RECOMMENDATIONS

2.1. Recommendations for Improving Reading Comprehension solving skills

- **Inculcate Regular Habit of Active Reading:** It is pertinent to be consistent with reading topics from different areas as mentioned above. Regular and active reading of opinions, lead articles and op-eds of good newspapers like Indian Express, The Hindu, Live Mint etc are needed.
- **Alternative Sources of Reading:** Some other useful sources can include the magazine section and the Sunday edition of The Hindu Newspaper. This would improve comprehension and analytical skills, further enhance the thought process of students and consequently build familiarity with a diverse range of topics.
- **Clarity over Directive words:** Most of the questions require a clear understanding of directive words such as crux, logical and rational inference, assumption, etc. It is highly desirable that students are precisely aware of these meanings and also the difference among them. Not doing so can be fatal in Reading Comprehension questions by making answers incorrect.
- **Better Time Management:** Some questions in the RC are invariably tricky. Students should be mindful of this and should attempt questions where they are more comfortable. Staying agile and mindful of one's own strengths in this context is key to better time-management and eventually better scores.
- **Free from Prejudices/ Biases:** One of the common mistakes often committed by the candidate is using their GS knowledge to derive the answer for a given passage in RC. Hence the candidate has to attempt RC questions without any preconceptions or biases based on the GS knowledge.

2.2. Recommendation for improving Mathematics and Logical Reasoning

- **Conceptual Clarity of Fundamentals:** The first and foremost step is to have a thorough understanding and gain command over the basic concepts and its applications pertaining to all the topics like Number system, Percentages, Ratios etc. of the syllabus of mathematics.
- **Focus on Regular Practice:** Lack of practice is one of the key reasons for students failing to attempt the entire paper and securing the qualifying marks. With meticulous planning and proper practice of mocks students can better attempt the entire paper and would lead to higher chances of clearing the cut-off.
- **Sources for improving data interpretation skills:** Laying emphasis to data related sections of dailies and reading the Economic Survey can be a useful source as it contains the data and numbers with their meaningful interpretation in form of tables/ line graphs etc. This will help students to get familiar with numbers and improve their analytical skills.
- **Reasonable command over language:** To improve verbal reasoning, a candidate has to have basic to intermediate language skills including grammatical knowledge. Language and Grammar skills are mostly ignored by the candidates, however, these help us to identify the fallacy in a statement and guide us to the right answer.
- **Miscellaneous:** In addition to the above, students should develop substitution/ reverse engineering techniques of problem solving to arrive at the right solutions. It helps them to reduce the need for calculation for every option while solving problems.
- Also, for a quick reference and recall, students can also prepare a chapter/topic wise document of important formulae and innovative tips and tools.

Directions for the following 4 (four) items:

Read the following **four** passages and answer the items that follow. Your answer to these items should be based on the passages only.

Passage – 1

With respect to what are called denominations of religion, if everyone is left to be a judge of his own religion, there is no such things as religion that is wrong; but if they are to be a judge of each other's religion, there is no such thing as a religion that is right, and therefore all the world is right or all the world is wrong in the matter of religion.

Q.1. What is the **most logical assumption** that can be made from the passage given above?

- (a) No man can live without adhering to some religious denomination.
- (b) It is the duty of everyone to propagate one's religious denomination.
- (c) Religious denominations tend to ignore the unity of man.
- (d) Men do not understand their own religious denomination.

Ans. (c)

Explanation:

The passage is trying to understand how the meaning of religion changes based on the perspective of the looker. It contrasts how we tend to see one's religious denomination as the most correct one and tend to disregard the religious beliefs of others.

Option (a) is incorrect: As the passage does not assume that an individual cannot survive without following any religious denomination.

Option (b) is incorrect as the passage is concerned only with the interpretation of religion from different perspectives but not with the propagation of religion.

Option (c) is correct as when we consider our religion to be the correct one and all others as false, we are assuming that all men are not united by any shared common values or principles.

Option (d) is incorrect as people believe that they understand their own religion and on the basis of this understanding only they tend to discard and disapprove of the other denominations.

Passage – 2

It is certain, that seditions, wars, and contempt or breach of the laws are not so much to be imputed to the wickedness of the subjects, as to the bad state of a dominion. For men are not born fit for citizenship but must be made so. Besides, men's natural passions are everywhere the same; and if wickedness more prevails, and more offences are committed in one commonwealth than in another, it is certain that the former has neither enough pursued the end of unity, nor framed its laws with sufficient forethought; and that, therefore, it has failed in making quite good its right as a commonwealth.

Q.2. Which among the following is the **most logical and rational inference** that can be made from the passage given above?

- (a) Seditions, wars, and breach of the laws are inevitable in every dominion.
- (b) It is not the people, but the sovereign who is responsible for all the problems of any dominion.
- (c) That dominion is the best which pursues the aim of unity and has laws for good citizenship.
- (d) It is impossible for men to establish a good dominion.

Ans. (c)

Explanation:

Option (a) is incorrect: The option is an assumption that issues of sedition, wars, etc. are inevitable and they should not be attributed to the wickedness of the subjects. So, it can not be an inference drawn based on the passage.

Option (b) is incorrect. As it lays the responsibility for all the issues on the sovereign, which is not the most rational inference that can be drawn based on the information provided.

Option (c) is correct: It has been mentioned that if there are more crimes in dominion in comparison to another, it is due to laws which lack foresight, and the sovereign has not pursued unity. But if the State does so, it becomes the best State.

Option (d) is incorrect: This is not the most rational and logical inference as the ability of men or sovereign to establish good dominion is not being discussed and cannot be inferred as well.

Passage – 3

Inequality violates a basic democratic norm: the equal standing of citizens. Equality is a relation that obtains between persons in respect of some fundamental characteristic that they share in common. Equality is, morally speaking, a default principle. Therefore, persons should not be discriminated on grounds such as race, caste, gender, ethnicity, disability, or class. These features of human condition are morally irrelevant. The idea that one should treat persons with respect not only because some of these persons have some special features or talent, for example skilled cricketers, gifted musicians, or literary giants, but because persons are human beings, is by now part of commonsense morality.



Q.3. With reference to the above passage, the following assumptions have been made:

1. Equality is a prerequisite for people to participate in the multiple transactions of society from a position of confidence.
2. Occurrence of inequality is detrimental to the survival of democracy.
3. Equal standing of all citizens is an idea that cannot actually be realised even in a democracy.
4. Right to equality should be incorporated into our values and day-to-day political vocabulary.

Which of the above assumptions are valid?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 4 only
- (d) 3 and 4 only

Ans. (a)

Explanation:

Statement 1 is correct: Since the passage is talking about the removal of inequalities, we are assuming that equalities are prerequisites for people to participate in social transactions and interactions with confidence.

Statement 2 is Correct: Since the passage talks about the violation of democratic norms when inequality is present, it is being assumed that the occurrence of inequality can threaten the survival of democracy itself and therefore we should strive to remove it.

Statement 3 is incorrect: This is counterintuitive to the theme of the discussion of the passage. Also, the effort of the passage is the removal of inequalities.

Statement 4 is incorrect: This statement is more like a recommendation for the future and cannot be an assumption.

Hence, Option (a) is correct.

Passage – 4

Aristocratic government ruins itself by limiting too narrowly the circle within which power is confined; oligarchic government ruins itself by the incautious scramble for immediate wealth. But even democracy ruins itself by excess of democracy. Its basic principle is the equal right of all to hold office and determine public policy. This is, at first glance, a delightful arrangement; it becomes disastrous because the people are not properly equipped by education to select the best rulers and the wisest courses. The people have no understanding and only repeat what their rulers are pleased to tell them. Such a democracy is tyranny or autocracy. – Plato

Q.4. Which one of the following statements *best reflects the crux* of the passage given above?

- (a) Human societies experiment with different forms of governments.
- (b) Any form of government tends to deteriorate by excess of its basic principle.
- (c) Education of all citizens ensures a perfect, functional and sustainable democracy.
- (d) Having a government is a necessary evil because tyranny is inherent in any form of government.

Ans. (b)

Explanation:

Option (a) is incorrect: Although this is reflected in the passage, it is not the most important or decisive point or issue.

Option (b) is correct because two forms of government-oligarchies and democracy have been discussed and it has been shown how they can turn into tyrannies due to their excesses.

Option (c) is incorrect because the author is not advocating that democracy is more desirable and not providing any recommendations to achieve it. Although the author gives lack of proper education as one of the reasons as to why democracy does not serve its intended purpose, it is not the crux of the passage. The reason being that such a conclusion would ignore the first part of the discussion on oligarchy.

Option (d) is incorrect because although it has been posited that any form of government can be tyrannical, the author does not support the existence of any form of government.

- Q.5** In a group of 120 persons, 80 are Indians and rest are foreigners. Further, 70 persons in the group can speak English. The number of Indians who can speak English is
(a) 20
(b) 30
(c) 30 or less
(d) 30 or more

Ans. (d)

Explanation:

Out of 120 persons, 80 are Indians and 40 are foreigners.

Out of 120 persons, 70 can speak English, and the rest cannot.

The maximum possible number of Indians who can speak English is 70, i.e. if all the English-speaking people are Indians.

The minimum possible number of Indians who can speak English is 30, i.e. if all the foreigners speak English.

So, English-speaking Indians will fall in the range of 30 to 70.

- Q.6.** Consider all 3-digit numbers (without repetition of digits) obtained using three non-zero digits which are multiples of 3. Let S be their sum.

Which of the following is/are correct?

1. S is always divisible by 74.
2. S is always divisible by 9.

Select the correct answer using the code given below:

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Ans. (c)

Explanation:

Three non-zero digits which are multiples of 3 are: 3, 6, and 9.

Using these 3 digits, we can make $3!$, i.e. 6 three-digit numbers.

So their sum, $S = 369 + 396 + 639 + 693 + 936 + 963 = 3996$

We can see that, S is divisible by both 74 and 9.

- Q.7.** There are two Classes A and B having 25 and 30 students respectively. In Class-A the highest score is 21 and lowest score is 17. In Class-B the highest score is 30 and lowest score is 22. Four students are shifted from Class-A to Class-B.

Consider the following statements:

1. The average score of Class-B will definitely decrease.
2. The average score of Class-A will definitely increase.

Which of the above statements is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Ans. (a)

Explanation:

Average = Sum of observations / Number of observations

Since 4 students are moved from A to B, therefore average of class B will definitely decrease as range of marks for class A is less than range of marks for class B. That is, the new students must be having less marks than the previous minimum marks of Class B. Statement 1 is correct.

However, we cannot be sure regarding the marks of the 4 students that have been moved from class A. They may have marks close to 21, which will lead to decrease in the average marks of Class A. If they have marks close to 17, it will lead to increase in the average marks of Class A. Therefore, we cannot determine whether average of class A will increase or decrease. Statement 2 is incorrect.

Q.8. Consider two Statements and a Question:

Statement-1: Priya is 4 ranks below Seema and is 31st from the bottom.

Statement-2: Ena is 2 ranks above Seema and is 37th from the bottom.

Question: What is Seema's rank from the top in the class of 40 students?

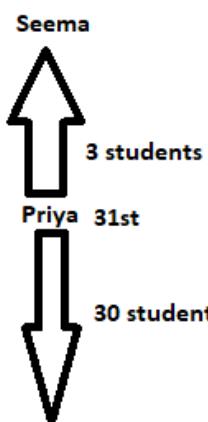
Which one of the following is correct in respect of the Statements and the Question?

- (a) Statement-1 alone is not sufficient to answer the Question
- (b) Statement-2 alone is not sufficient to answer the Question
- (c) Either Statement-1 alone or Statement-2 alone is sufficient to answer the Question
- (d) Both Statement-1 and Statement-2 are required to answer the Question

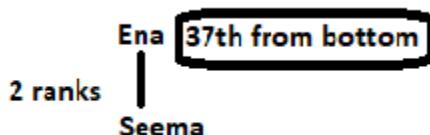
Ans. (c)

Explanation:

From Statement 1, we get:



From Statement 2, we get:



We know that, there are 40 students in the class.

Seema's rank from the top can be calculated using either of the statements. Hence, option (c) is correct.

Q.9. Consider two Statements and a Question:

Statement-1: Each of A and D is heavier than each of B, E and F, but none of them is the heaviest.

Statement-2: A is heavier than D, but is lighter than C.

Question: Who is the heaviest among A, B, C, D and E?

Which one of the following is correct in respect of the Statements and the Question?

- (a) Statement-1 alone is sufficient to answer the Question
- (b) Statement-2 alone is sufficient to answer the Question
- (c) Both Statement-1 and Statement-2 are required to answer the Question
- (d) Neither Statement-1 alone nor Statement-2 alone is sufficient to answer the Question

Ans. (a)

Explanation:

From statement 1, we get:

A & D > B, E & F

As none of them is the heaviest, we can conclude that C must be the heaviest. So, statement 1 alone is sufficient.

From Statement 2, we get:

C > A > D

Using statement 2 alone we cannot determine the heaviest item.

Q.10. In the English alphabet, the first 4 letters are written in opposite order, and the next 4 letters are written in opposite order and so on; and at the end Y and Z are interchanged. Which will be the fourth letter to the right of the 13th letter?

- (a) N
- (b) T
- (c) H
- (d) I

Ans. (b)

Explanation:

The English alphabet is: ABCD EFGH IJKL MNOP QRST UVWX YZ

As per the question, the letters are arranged as follows:

DCBA HGFE LKJI PONM TSRQ XWVU ZY

13th letter in this arrangement is P.

And the 4th letter to its right is T.

Directions for the following 4 (four) items :

Read the following four passages and answer the items that follow. Your answers to these items should be based on the passages only.

Passage – 1

India faces a challenging immediate future in energy and climate policy-making. The problems are multiple : sputtering fossil fuel production capability; limited access to electricity and modern cooking fuel for the poorest; rising fuel imports in an unstable global energy context; continued electricity pricing and governance challenges leading to its costly deficits or surplus supply; and not least, growing environmental contestation around land, water and air. But all is not bleak: growing energy efficiency programmes; integrated urbanisation and transport policy discussions; inroads to enhancing energy access and security; and bold renewable energy initiatives, even if not fully conceptualized, suggest the promise of transformation.

Q.11. Which one of the following statements *best reflects the critical message* conveyed by the passage given above?

- (a) India's energy decision-making process is ever more complex and interconnected.
- (b) India's energy and climate policy is heavily tuned to sustainable development goals.
- (c) India's energy and climate actions are not compatible with its broader social, economic and environmental goals.
- (d) India's energy decision-making process is straightforward supply-oriented and ignores the demand side.

Ans. (a)

Explanation:

Option (a) is correct- As the passage talks about the challenges and prospects of energy and climate policy. The problems are multiple & the mention of myriad factors like sputtering fossil fuel production capabilities, unstable global market, etc. illustrates how the energy decision-making process is complex and interconnected.

Option (b) is an incorrect- The statement only talks about India's energy policy tuned to sustainable development goals. It does not talk about the variety of functions that are involved in energy and climate policymaking.

Option (c) is an incorrect- This option only talks about how climate actions are not compatible with social and economic goals. Thus, it does not reflect the critical message of the passage which deals with the complexities of policymaking in the energy sector and the few bright spots we have.

Option (d) is incorrect- As the passage considers demand-side fluctuations as well by mentioning rising fuel imports. In addition, it is very much evident in the passage that the policy and decision-making process is complex due to several factors like import deficit, saturated production capabilities, etc.

The advertisement features a large tree graphic on the left and a background image of a map of India. The text "You are as strong as your Foundation" is at the top. The main title is "FOUNDATION COURSE GENERAL STUDIES PRELIMS CUM MAINS 2022 & 2023". Below the title, it says "Approach is to build fundamental concepts and analytical ability in students to enable them to answer questions of Preliminary as well as Mains examination". A bulleted list includes: "Includes comprehensive coverage of all the topics for all the four papers of GS Mains, GS Prelims & Essay", "Access to LIVE as well as Recorded Classes on your personal student platform", "Includes All India GS Mains, GS Prelims, CSAT & Essay Test Series", and "Our Comprehensive Current Affairs classes of PT 365 and Mains 365 of year 2022". For "ONLINE Students", it notes that students can watch LIVE video classes on their ONLINE PLATFORM at their homes, ask doubts, and convey them to classroom mentors. Dates and locations listed are DELHI (Regular Batch: 13 OCT 9 AM, 5 OCT 1 PM), AHMEDABAD | HYDERABAD (8 OCT), PUNE (18 OCT), JAIPUR (6 OCT), and CHANDIGARH (25 NOV). The bottom banner also lists LUCKNOW (11 Jan).

Passage – 2

There are reports that some of the antibiotics sold in the market are fed to poultry and other livestock as growth promoters. Overusing these substances can create superbugs, pathogens that are resistant to multiple drugs and could be passed along humans. Mindful of that, some farming companies have stopped using the drugs to make chickens gain weight faster. Since Denmark banned antibiotic growth promoters in the 1990s, the major pork exporters say it is producing more pigs – and the animals get fewer diseases.

- Q.12.** Which one of the following statements *best reflects the critical message* conveyed by the passage given above ?
- (a) People should avoid consuming the products of animal farming.
 - (b) Foods of animal origin should be replaced with foods of plant origin.
 - (c) Using antibiotics on animals should be banned.
 - (d) Antibiotics should only be used to treat diseases.

Ans. (d)

Explanation:

Option (a) is incorrect- Passage suggests nothing about what and what not to be consumed by the people.

Option (b) is incorrect- Passage nowhere talks about replacing animal origin foods with plant origin foods. It merely reflects the side effects of using antibiotics for other purposes than treating disease.

Option (c) is incorrect- Passage nowhere talks about banning antibiotics on animals. It only mentions the trend of minimizing the use of antibiotics on animals given their ill effects on human health.

Option (d) is correct- Passage mentions the ill effects of antibiotics as growth promoters and how some farming companies and also, Denmark -a major pork exporter, banned antibiotic growth promoters but not its use as a drug to treat diseases.

Passage – 3

Policy makers and media have placed the blame for skyrocketing food prices on a variety of factors, including high fuel prices, bad weather in key food producing countries, and the diversion of land to non-food production. Increased emphasis, however, has been placed on a surge in demand for food from the most populous emerging economies. It seems highly probable that mass consumption in these countries could be well poised to create a food crisis.

- Q.13.** With reference to the above passage, the following assumptions have been made:
- 1. Oil producing countries are one of the reasons for high food prices.
 - 2. If there is a food crisis in the world in the near future, it will be in the emerging economies.
- Which of the above statements is/are valid?
- (a) 1 only
 - (b) 2 only
 - (c) Both 1 and 2
 - (d) Neither 1 nor 2

Ans. (d)

Explanation:

Statement 1 is incorrect- As the passage only mentions that high fuel prices are leading to increasing food prices, it nowhere explicitly mentions oil-producing countries being one of the reasons for high fuel prices.

Statement 2 is incorrect- As the passage mentions that food crisis will be caused due to emerging economies' tendency of mass consumption. However, the passage only mentions emerging economies

as a causative agent rather than resultant aspect. And it cannot be derived the passage that the food crisis will occur in Emerging economies. The given option is more suitable for inference of the passage rather than assumption.

Hence, option (d) is correct.

Passage – 4

A central message of modern development economics is the importance of income growth, by which is meant growth in Gross Domestic Product (GDP). In theory, rising GDP creates employment and investment opportunities. As incomes grow in a country where the level of GDP was once low, households, communities, and governments are increasingly able to set aside some funds for the production of things that make for a good life. Today GDP has assumed such a significant place in the development lexicon, that if someone mentions “economic growth”, we know they mean growth in GDP.

Q.14. With reference to the above passage, the following assumptions have been made:

1. Rising GDP is essential for a country to be a developed country.
2. Rising GDP guarantees a reasonable distribution of income to all households.

Which of the above assumptions is/are valid ?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Ans. (d)

Explanation:

Statement 1 is incorrect- Passage mentions that in theory, rising GDP creates employment and investment opportunities, and this, in turn, sets aside funds necessary for the good life. Thus assuming only rising GDP cannot be said as essential criteria for a developed country but income redistribution also plays a critical role as mentioned in the passage.

Statement 2 is incorrect- As the passage nowhere mentions that rising GDP guarantees reasonable distribution to all households.

Hence, option (d) is correct.

Q.15. Seven books P, Q, R, S, T, U and V are placed side by side. R, Q and T have blue covers and other books have red covers. Only S and U are new books and the rest are old. P, R and S are law reports; the rest are Gazetteers. Books of old Gazetteers with blue covers are

- (a) Q and R
- (b) Q and U
- (c) Q and T
- (d) T and U

Ans. (c)

Explanation:

The following table represents the information given in the question:

	P	Q	R	S	T	U	V
Colour	Red	Blue	Blue	Red	Blue	Red	Red
Old/New	Old	Old	Old	New	Old	New	Old
Law/Gazetteers	Law	Gazetteer	Law	Law	Gazetteer	Gazetteer	Gazetteer

Since we have been asked about the books which are old gazetteers with blue cover, therefore option (c) is the correct answer.

Q.16. Replace the incorrect term by the correct term in the given sequence
 3, 2, 7, 4, 13, 10, 21, 18, 31, 28, 43, 40
 where odd terms and even terms follow the same pattern.

- (a) 0
- (b) 1
- (c) 3
- (d) 6

Ans. (a)

Explanation:

On separating the Odd and the Even Series, we observe the following pattern:

ODD SERIES **EVEN SERIES**

3	2
$3 + 4 = 7$	$0 + 4 = 4$
$7 + 6 = 13$	$4 + 6 = 10$
$13 + 8 = 21$	$10 + 8 = 18$
$21 + 10 = 31$	$18 + 10 = 28$
$31 + 12 = 43$	$28 + 12 = 40$

On observing the given two series, we observe that the first term in **EVEN SERIES** should be replaced by **0**, therefore option (a) is the correct answer.

Q.17. Following is a matrix of certain entries. The entries follow a certain trend row-wise. Choose the missing entry (?) accordingly.

7B	10A	3C
3C	9B	6A
10A	13C	?

- (a) 9B
- (b) 3A
- (c) 3B
- (d) 3C

Ans. (c)

Explanation:

From one row to another, the letters shift in a cyclic manner, i.e. BAC to CBA to ACB.

As far as the numbers are concerned, the pattern has been depicted below:

7B	10A	3C	$\rightarrow 10 - 7 = 3$
3C	9B	6A	$\rightarrow 9 - 3 = 6$
10A	13C	?	$\rightarrow 13 - 10 = 3$

So, the required alpha-numeric term is 3B.

Q.18. You are given two identical sequences in two rows:

Sequence-I:	8	4	6	15	52.5	236.5
Sequence-II:	5	A	B	C	D	E

What is the entry in the place of C for the Sequence-II?

- (a) 2.5
- (b) 5
- (c) 9.375
- (d) 32.8125

Ans. (c)

Explanation:

The inherent pattern in the two sequences has been represented below.

Sequence I	Sequence II
$8 \times 0.5 = 4$	$5 \times 0.5 = 2.5$ (A)
$4 \times 1.5 = 6$	$2.5 \times 1.5 = 3.75$ (B)
$6 \times 2.5 = 15$	$3.75 \times 2.5 = 9.375$ (C)
$15 \times 3.5 = 52.5$	
$52.5 \times 4.5 = 236.25$	

Q.19. A person X from a place A and another person Y from a place B set out at the same time to walk towards each other. The places are separated by a distance of 15 km. X walks with a uniform speed of 1.5 km/hr and Y walks with a uniform speed of 1 km/hr in the first hour, with a uniform speed of 1.25 km/hr in the second hour and with a uniform speed of 1.5 km/hr in the third hour and so on.

Which of the following is/are correct?

- 1. They take 5 hours to meet.
- 2. They meet midway between A and B.

Select the correct answer using the code given below:

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Ans. (c)

Explanation:

Distance between places A and B = 15 km

Speed of X = 1.5 km/hr

So, Distance covered by X in 5 hours = 7.5 km

Speed of Y in 1st hour = 1 km/hr

So, Distance covered by Y in 1st hour = 1 km

Similarly, Distance covered by Y in 2nd hour = 1.25 km

Distance covered by Y in 3rd hour = 1.5 km

Distance covered by Y in 4th hour = 1.75 km

Distance covered by Y in 5th hour = 2 km

So, the total distance covered by Y in 5 hours = $1 + 1.25 + 1.5 + 1.75 + 2 = 7.5$ km

Hence, both the given statements are true.

Q.20. A student appeared in 6 papers. The maximum marks are the same for each paper. His marks in these papers are in the proportion 5 : 6 : 7 : 8 : 9 : 10. Overall he scored 60%. In how many number of papers did he score less than 60% of the maximum marks?

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

Ans. (b)

Explanation:

Let total marks in each subject be 100.

Therefore, total marks for all 6 subjects = 600

Overall marks scored = 60% of 600 = 360

According to the question,

$$5x + 6x + 7x + 8x + 9x + 10x = 360$$

$$\text{or } 45x = 360$$

$$\text{or } x = 8$$

So, marks in the given 6 subjects must be:

$$5 \times 8 = 40$$

$$6 \times 8 = 48$$

$$7 \times 8 = 56$$

$$8 \times 8 = 64$$

$$9 \times 8 = 72$$

$$10 \times 8 = 80$$

Hence, in 3 subjects the student has scored less than 60% marks.

The advertisement features a large tree graphic on the left and a collage of documents and maps in the background. At the top right, the text reads "फाउंडेशन कोर्स सामान्य अध्ययन प्रारंभिक एवं मुख्य परीक्षा 2022 & 2023". Below this, a box contains the text "इनोवेटिव कलासरूम प्रोग्राम". To the right, there is a vertical column of text in Hindi and English, followed by a QR code and download instructions for the VISION IAS app. The bottom right corner contains the text "28 SEPTEMBER, 1 PM" and "2023 फाउंडेशन कोर्स: 15 DECEMBER".

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28 SEPTEMBER, 1 PM

2023 फाउंडेशन कोर्स: 15 DECEMBER

Passage – 1

Fig trees (genus *Ficus*) are considered sacred in India, East Asia and Africa and are common in agricultural and urban landscapes where other large trees are absent. In natural forests, fig trees provide food for wildlife when other resources are scarce and support a high density and diversity of frugivores (fruit-eating animals). If frugivorous birds and bats continue to visit to fig trees located in sites with high human disturbances, sacred fig trees may promote frugivore abundance. Under favourable microclimate, plenty of seedlings of other tree species would grow around fig trees.

Q.21. On the basis of the passage given above, the following assumption have been made:

1. Fig trees can often be keystone species in natural forests.
 2. Fig trees can grow where other large woody species cannot grow.
 3. Sacred trees can have a role in biodiversity conservation.
 4. Fig trees have a role in the seed dispersal of other tree species.
- Which of the above assumptions is/are valid?
- (a) 1 and 2 only
(b) 3 only
(c) 2 and 4 only
(d) 1, 3 and 4 only

Ans. (d)

Explanation:

Option (a) is incorrect- The passage mentions fig trees providing food for wildlife species and supporting a density and diversity of frugivores where resources are scarce and absent. That is essentially what a keystone species signifies for an ecosystem. However, the passage is devoid of any affirmative mention of large 'woody' species giving way for the growth of fig trees in their absence. Hence, statement 2 particularly of woody species can't be inferred/ established from the passage.

Option (b) is incorrect- The passage mentions biodiversity prevailing around fig trees in the form of frugivores, bats, animals, and humans living in co-existence. Hence, the third statement holds as a valid assumption. However, it is not the only valid assumption.

Option (c) is incorrect- The passage mentions that plenty of seedlings of other tree species are found to grow around fig trees due to the visit of frugivorous birds and bats. Hence, under favorable micro-climatic conditions, it can be directly inferred that fig trees can have a role in the seed dispersal of the same. Hence, Statement 4 is correct.

Option (d) is correct- Based on the above deductions, this is the most appropriate answer.

Passage – 2

At the heart of agroecology is the idea that agroecosystems should mimic the biodiversity levels and functioning of natural ecosystems. Such agricultural mimics, like their natural models, can be productive, pest-resistant, nutrient conserving, and resilient to shocks and stresses. In ecosystems there is no 'waste', nutrients are recycled indefinitely. Agroecology aims at closing nutrient loops, i.e., returning all nutrients that come out of the soil back to the soil such as through application of farmyard manure. It also harnesses natural processes to control pests and build soil fertility i.e., through intercropping. Agroecological practices include integrating trees with livestock and crops.

Q.22. Consider the following:

1. Cover crops
2. Fertigation
3. Hydroponics
4. Mixed farming
5. Polyculture
6. Vertical farming

Which of the above farming practices can be compatible with agroecology, as implied by the passage?

- (a) 1, 4 and 5 only
- (b) 2, 3, 4 and 5 only
- (c) 1, 2, 3 and 6 only
- (d) 4 and 6 only

Ans. (a)

Explanation:

Option (a) is correct: The passage mentions that the farming practices compatible with agroecology include the integration of trees with livestock and crops. This boils down to practices of Cover cropping, Mixed farming, and Polyculture.

Option (b) is incorrect: The farming practices of Fertigation and Hydroponics are artificial methods and are not compatible with agroecological systems mentioned in the passage.

Hence, these can be eliminated.

Option (c) is incorrect: Applying based on the above argument, this option can be eliminated too.

Option (d) is incorrect: The passage mentions agroecology aiming at closing nutrient loops which means returning nutrients that come out of soil back to the soil. Vertical farming akin to hydroponics is soil-less farming and hence not compatible with agroecology.

Passage – 3

Computers increasingly deal not just with abstract data like credit card details and databases, but also with the real world of physical objects and vulnerable human bodies. A modern car is a computer on wheels; an aeroplane is a computer on wings. The arrival of the “Internet of Things” will see computers baked into everything from road signs and MRI scanners to prosthetics and insulin pumps. There is little evidence that these gadgets will be any more trustworthy than their desktop counterparts. Hackers have already proved that they can take remote control of internet connected cars and pacemakers.

- Q.23.** Which one of the following statements *best reflects the most critical inference* that can be made from the passage given above?
- (a) Computers are not completely safe.
 - (b) Companies producing the software do not take cyber security seriously.
 - (c) Stringent data security laws are needed.
 - (d) The present trend of communication technologies will affect our lives in future.

Ans. (d)

Explanation:

Statement 1 is incorrect: The computers though are vulnerable to risks or threats of intrusion; the passage does not establish the fact that they are not completely safe. This is an extreme statement.

Statement 2 is incorrect: Though the passage mentions security breaches by hackers but does not sufficiently establish the information that companies building software are not taking cyber security seriously.

Statement 3 is incorrect: Due to the rising vulnerabilities and threats of data breaches in case of hackers taking over, the need for stringent data security laws can be indirectly inferred. However, it is a fallout of the recent trends of communication technologies and their complexities which is the more critical inference of the passage.

Statement 4 is correct: This is the most appropriate critical inference of the passage where the new trends in various communication technologies have infused visible complexities through the integration of computers in various fields of life and further mentions of the arrival of the Internet of things bound to affect lives going forward.

Hence Option (d) is correct.

Passage – 4

A social and physical environment riddled with poverty, inequities, unhygienic and insanitary conditions generates the risk of infectious diseases. Hygiene has different levels: personal, domestic and community hygiene. There is no doubt that personal cleanliness brings down the rate of infectious diseases. But the entry of the market into this domain has created a false sense of security that gets conditioned and reinforced by the onslaught of advertisements. Experience in Western Europe shows that along with personal hygiene, general improvements in environmental conditions and components like clean water, sanitation and food security have brought down infant/child death/infections rates considerably. The obsession with hand hygiene also brings in the persisting influence of the market on personal health, overriding or marginalizing the negative impact on ecology and the emergence of resistant germs.

- Q.24.** On the basis of the passage given above, the following assumptions have been made:
1. People who are obsessed with personal hygiene tend to ignore the community hygiene.
 2. Emergence of multi-drug resistant germs can be prevented by personal cleanliness.
 3. Entry of the market in the domain of hygiene increases the risk of infectious diseases.
 4. Scientific and micro-level interventions are not sufficient to bring down the burden of infectious diseases.
 5. It is community hygiene implemented through public health measures that is really effective in the battle against infectious diseases.
- Which of the above assumptions are valid?
- (a) 1 and 2 only
 - (b) 3 and 4 only
 - (c) 4 and 5 only
 - (d) 1, 2 and 4 only

Ans. (c)

Explanation:

Option (a) is incorrect- Statement 1 is an extreme statement and the passage does not establish the fact that the people obsessed with personal hygiene tend to ignore community hygiene. Further, there is no mention of multi-drug resistant germs rather resistant germs which cannot be prevented from just personal hygiene. Thus Statement 2 stands an invalid assumption.

Option (b) is incorrect- It can be inferred from the passage that personal hygiene undoubtedly reduces the rate of infectious diseases. Further, the entry of the market in this domain has created a false sense of security; it cannot be established that it increases the risk of infectious diseases per se. Hence, statement 3 stands as an invalid assumption.

Option (c) is correct- Experiences from western Europe have established the direct role of community hygiene through public measures effective in reducing infectious diseases and death rates. Hence Statement 5 stands a valid assumption. Scientific and micro-level interventions referring to personal and domestic hygiene not sufficient to bring down the burden of diseases can be directly inferred from the essence of the passage. Thus statement 4 stands a valid assumption.

Option (d) is incorrect- Based on the above deductions, statements 1 and 2 stand eliminated leading to this option being incorrect though statement 4 stands as a valid assumption.

- Q.25.** A Statement followed by Conclusion-I and Conclusion-II is given below. You have to take the Statement to be true even if it seems to be at variance from the commonly known facts. Read all Conclusions and then decide which of the given Conclusion(s) logically follows/follow from the Statement, disregarding the commonly known facts.

Statement: Some cats are almirahs. Some almirahs are chairs. All chairs are tables.

Conclusion-I: Certainly some almirahs are tables.

Conclusion-II: Some cats may not be chairs.

Which one of the following is correct?

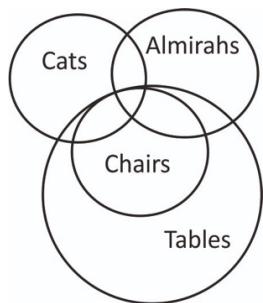
- (a) Only Conclusion-I
- (b) Only Conclusion-II
- (c) Both Conclusion-I and Conclusion-II
- (d) Neither Conclusion-I nor Conclusion-II

Ans. (c)

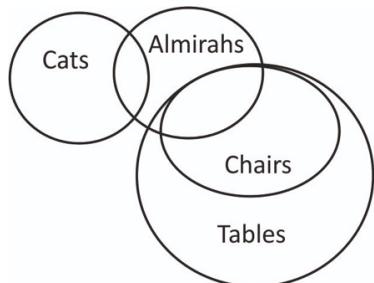
Explanation:

Based on the statements, we can have these scenarios:

Case I :



Case II :



Conclusion-I : From both diagrams, we can conclude that “Some almirahs are tables” is definitely true. Hence, Conclusion-I follows.

Conclusion-II : From both diagrams, we can say that “Some cats may not be chairs”. Hence, Conclusion-II also follows.

Hence, option (c) is the correct answer.

Q.26. A boy plays with a ball, and he drops it from a height of 1.5 m. Every time the ball hits the ground, it bounces back to attain a height $\frac{4}{5}$ th of the previous height. The ball does not bounce further if the previous height is less than 50 cm. What is the number of times the ball hits the ground before the ball stops bouncing?

- (a) 4
- (b) 5
- (c) 6
- (d) 7

Ans. (c)

Explanation:

Given Height = 1.5 m = 1.5×100 cm = 150 cm

When ball hits the ground for the 1st time, its height = $(\frac{4}{5}) \times 150 = 120$ cm

When ball hits the ground for the 2nd time, its height = $(\frac{4}{5}) \times 120 = 96$ cm

When ball hits the ground for the 3rd time, its height = $(\frac{4}{5}) \times 96 = 76.8$ cm

When ball hist the ground for the 4th time, its height = $(4/5) \times 76.8 = 61.44$ cm

When ball hits the ground for the 5th time, its height = $(4/5) \times 61.44 = 49.15$ cm

Since, it is given that if the previous height is less than 50 cm, the ball does not bounce further. So we can say that after the ball hits the ground for the 6th time, it doesn't bounce back.

Hence, option (c) is the correct answer.

Q.27. Images of consonants of the English alphabet (Capitals) are observed in a mirror. What is the number of images of these which do **not** look like their original shapes?

- (a) 13
- (b) 14
- (c) 15
- (d) 16

Ans. (b)

Explanation:

All the consonants of the english alphabet are:

B, C, D, F, G, H, J, K, L, M, N, P, Q, R, S, T, V, W, X, Y, Z

So. there are a total of 21 consonants.

The number of consonants whose images look like them are:

H, M, T, V, W, X and Y

Therefore, there are a total of 7 such consonants.

Hence, the number of consonants whose images do not look like them = $21 - 7 = 14$

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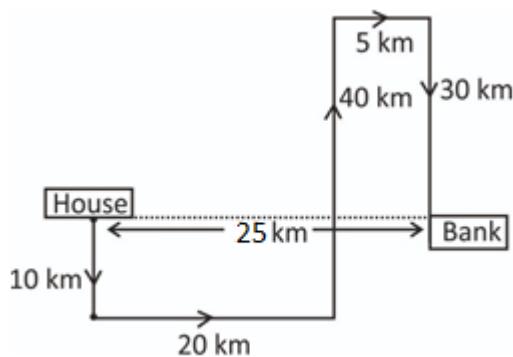
Q.28. A bank employee drives 10 km towards South from her house and turns to her left and drives another 20 km. She again turns left and drives 40 km, then she turns to her right and drives for another 5 km. She again turns to her right and drives another 30 km to reach her bank where she works. What is the shortest distance between her bank and her house?

- (a) 20 km
- (b) 25 km
- (c) 30 km
- (d) 35 km

Ans. (b)

Explanation:

The route taken by the bank employee has been depicted below:



From the diagram, the shortest distance between her house and her bank is 25 km.

Hence, option (b) is the correct answer.

Q.29. Integers are listed from 700 to 1000. In how many integers is the sum of the digits 10?

- (e) 6
- (f) 7
- (g) 8
- (h) 9

Ans. (d)

Explanation:

Here we have to find out all the integers between 700 to 1000, in which sum of the digits is 10, e.g. 703
→ $7 + 0 + 3 = 10$

These numbers have been listed below:

703, 712, 721, 730, 802, 811, 820, 901 and 910

Hence, there are 9 such integers in which the sum of the digits is 10.

Hence, option (d) is the correct answer.

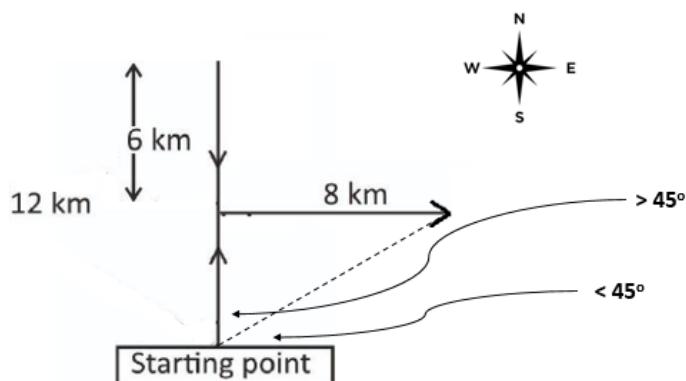
Q.30. A woman runs 12 km towards her North, then 6 km towards her South and then 8 km towards her East. In which direction is she from her starting point?

- (a) An angle less than 45° South of East
- (b) An angle less than 45° North of East
- (c) An angle more than 45° South of East
- (d) An angle more than 45° North of East

Ans. (b)

Explanation:

The path taken by the woman has been depicted below:



We know that, the angle opposite to the larger side is always greater.

Therefore, by looking at the diagram we can conclude that the woman must be “At an angle less than 45° North of East”.

Hence, option (b) is the correct answer.

Directions for the following 4 (four) items :

Read the following four passages and answer the items that follow. Your answers to these items should be based on the passage only.

Passage – 1

Researchers simulated street lighting on artificial grassland plots containing pea-aphids, sap-sucking insects, at night. These were exposed to two different types of light – a white light similar to newer commercial LED lights and an amber light similar to sodium street lamps. The low intensity amber light was shown to inhibit, rather than induce, flowering in a wild plant of the pea family which is a source of food for the pea-aphids in grasslands. The number of aphids was also significantly suppressed under the light treatment due to the limited amount of food available.

Q.31. Which one of the following statements ***best reflects the most critical inference*** that can be made from the passage given above?

- (a) Low intensity light has more adverse effect on the plants as compared to high intensity light.
- (b) Light pollution can have a permanent adverse impact on an ecosystem.
- (c) White light is better for the flowering of plants as compared to the light of other colours.
- (d) Proper intensity of light in an ecosystem is important not only for plants but for animals too.

Ans. (d)

Explanation:

Statement 1 is incorrect: The passage mentions that low-intensity light inhibits the flowering of a wildflower. However, it cannot be inferred that Low-intensity light has more adverse effects vis-vis High-intensity light.

Statement 2 is incorrect: This is an extreme statement, and it cannot be inferred from the passage that light pollution can have permanent adverse effects on the ecosystem. Further, light pollution is not explicitly mentioned in the passage, so cannot be inferred.

Statement 3 is incorrect: The passage does not mention that white color is good for the flowering of the plants. With this information, we cannot sufficiently infer that White light is better for the flowering of the plants vis-a-vis all the other lights of all the other colors.

Statement 4 is correct: The passage mentions that low-intensity light inhibits the flowering of plants. Further, it highlights that the number of aphids was also significantly suppressed under the light treatment due to the limited amount of food available. So, it can be inferred from the passage that the proper intensity of light in an ecosystem is important not only for plants (for flowering) but also for animals like aphids.

Hence, Option (d) is correct

Passage – 2

Approximately 80 percent of all flowering plant species are pollinated by animals, including birds and mammals, but the main pollinators are insects. Pollination is responsible for providing us with a wide variety of food, as well as many plant-derived medicines. At least one-third of the world's agricultural crops depend upon pollination. Bees are the most dominant taxa when it comes to pollination and they are crucial to more than four hundred crops. Pollination is an essential service that is the result of intricate relationship between plants and animals, and the reduction or loss of either affects the survival of both. Effective pollination requires resources, such as refuges of pristine natural vegetation.

- Q.32.** On the basis of the passage given above, the following assumptions have been made:
1. Sustainable production of India's cereal food grains is impossible without the diversity of pollinating animals.
 2. Monoculture of horticultural crops hampers the survival of insects.
 3. Pollinators become scarce in cultivated areas devoid of natural vegetation.
 4. Diversity in insects induces diversity of plants.
- Which of the above assumptions is/are valid?
- (a) 1 only
 - (b) 2, 3 and 4 only
 - (c) 1 and 2 only
 - (d) 3 and 4 only

Ans. (d)

Explanation:

Statement 1 is incorrect: It is an extreme statement. Though the diversity of pollinating animals is important for the Sustainable production of India's cereal food grains and can be a valid assumption from the passage the word impossible is making this statement incorrect.

Statement 2 is incorrect: It cannot be explicitly assumed from the passage that the Monoculture of horticultural crops hampers the survival of insects. Also, the passage does not talk about hampering agricultural diversity due to monoculture practices leading to a reduction in pollinators.

Statement 3 is correct: From the following lines of the passage " Pollination is an essential service that is the result of an intricate relationship between plants and animals, and the reduction or loss of either affects the survival of both. Effective pollination requires resources, such as refuges of pristine natural vegetation" it can be assumed that the pollinators become scarce in cultivated areas devoid of natural vegetation.

Statement 4 is correct: From the following lines of the passage " Pollination is an essential service that is the result of an intricate relationship between plants and animals, and the reduction or loss of either affects the survival of both", it can be assumed that diversity in insects induces diversity of plants.

Hence Option (d) is correct.

Passage – 3

A study conducted on the impacts of climate change over the Cauvery basin of Tamil Nadu using regional climate models showed an increasing trend for maximum and minimum temperatures, and a decrease in the number of rainy days. These climatic shifts will have an impact on the hydrological cycles in the region, lead to more run-off and less recharge, and affect the groundwater tables. Further, there has been an increase in the frequency of droughts in the State. This has driven farmers to increase dependency on groundwater resources to secure their crops.

- Q.33.** Which one of the following statements *best reflects the crux* of the passage given above?
- (a) Development of regional climate models helps in choosing climate-smart agricultural practices.
 - (b) Heavy dependence on groundwater resources can be reduced by adopting dry-land cropping systems.
 - (c) Climate changes increase the criticality of water resources while simultaneously threatening it.
 - (d) Climate changes cause the farmers to adopt unsustainable livelihoods and risky coping strategies.

Ans. (c)

Explanation:

Statement 1 is incorrect: It is not the main crux of the passage. The passage does not mention anything about climate-smart agricultural practices.

Statement 2 is incorrect: This is also not the main crux of the passage. Though it mentions the heavy dependence on groundwater resources by the farmers due to the impact of climate change, it doesn't talk about the use of sustainable agriculture practices or adopting dry-land cropping systems.

Statement 3 is Correct: This is the main crux of the passage. From the following lines of the passage "These climatic shifts will have an impact on the hydrological cycles in the region, lead to more run-off and less recharge, and affect the groundwater tables.", it can be stated that the climate changes increase the criticality of water resources while simultaneously threatening it is the main crux of the passage.

Statement 4 is incorrect: This is also not the crux of the passage, as it does not explicitly talk about adopting unsustainable livelihoods and risky coping strategies by the farmers.

Hence Option (c) is correct.

Passage – 4

Researchers were able to use stem cells to gauge the neurotoxic effects of the environmental pollutant Bisphenol A (BPA). They used a combination of biochemical and cell-based assays to examines the gene expression profile during the differentiation of mouse embryonic stem cells upon treatment with BPA, a compound known to cause heart diseases, diabetes, and developmental abnormalities in humans. They were able to detect and measure BPA toxicity towards the proper specification of primary germ layers, such as endoderm and ectoderm, and the establishment of neural progenitor cells.

- Q.34.** On the basis of the passage given above, the following assumptions have been made:
1. BPA may alter embryonic development *in vivo*.
 2. Biochemical and cell-based assays are useful in finding out treatments for pollution-induced diseases.
 3. Embryonic stem cells could serve as a model to evaluate the physiological effects of environmental pollutants.

Which of the above assumptions are valid?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Ans. (c)

Explanation:

Statement 1 is correct: It can be assumed from the passage that the Bisphenol A (BPA), may alter embryonic development in vivo from the line " mouse embryonic stem cells upon treatment with BPA, a compound known to cause heart diseases, diabetes, and developmental abnormalities in humans".

Statement 2 is incorrect: Though Biochemical and cell-based assays are useful in examining the gene expression profile in embryonic stem cells upon treatment with Bisphenol A (BPA), it cannot be explicitly assumed that they are useful in finding out treatments for pollution-induced diseases.

Statement 3 is correct: It can be assumed from the passage that Embryonic stem cells could serve as a model to evaluate the physiological effects of environmental pollutants.

Hence Option (c) is correct.

Q.35. If 3^{2019} is divided by 10, then what is the remainder?

- (a) 1
- (b) 3
- (c) 7
- (d) 9

Ans. (c)

Explanation:

It's given that: 3^{2019} is divided by 10.

Now, $3^1 = 3$

$$3^2 = 9$$

$$3^3 = 27$$

$$3^4 = 81$$

$$3^5 = 243$$

$$3^6 = 729$$

Since, unit place of the power of 3 repeats after every 4 steps (i.e. it has a cyclicity of 4).

Now, on dividing 2019 by 4 we get a remainder of 3.

Hence, 3^{2019} will have the same last digit as that of 3^3 , i.e. 7.

$$(3^3)/10 = 27/10$$

Hence, the remainder will be 7.

Q.36. The number 3798125P369 is divisible by 7. What is the value of the digit P?

- (a) 1
- (b) 6
- (c) 7
- (d) 9

Ans. (b)

Explanation:

Given: 3798125P369 is divisible by 7

Let's express the given number in terms of triplets of digits, starting from the right, as follows.

(37) (981) (25P) (369)

$$\text{Now, } 369 - 25P + 981 - 37 = 1350 - 25P - 37 = 1313 - 25P$$

By dividing 1313 by 7 we get 4 as remainder.

25P in the above equation should be in between 250 to 259. Now, 252 and 259 are divisible by 7. So, the number must be $252 + 4 = 256$. Hence, value of P = 6

Let's double check it:

$$1313 - 256 = 1057$$

It is divisible by 7.

Hence, option (b) is the correct answer.

Q.37. From January 1, 2021, the price of petrol (in Rupees per litre) on m^{th} day of the year is $80 + 0.1m$, where $m = 1, 2, 3, \dots, 100$ and thereafter remains constant. On the other hand, the price of diesel (in Rupees per litre) on n^{th} day of 2021 is $69 + 0.15n$ for any n. On which date in the year 2021 are the prices of these two fuels equal?

- (a) 21st May
- (b) 20th May
- (c) 19th May
- (d) 18th May

Ans. (b)

Explanation:

Price of the diesel on n^{th} day of the year = $69 + 0.15n$

Price of the petrol on m^{th} day of the year = $80 + 0.1m$

Where $m = 1$ to 100. After which it remains constant.

∴ Price of the petrol on and after 100th day = $80 + 0.1 \times 100 = 80 + 10 = \text{Rs. 90}$

Now, total number of days till 30th April = $31 + 28 + 31 + 30 = 120$ days

Let's consider the options.

Option (a):

21st May means $120 + 21 = 141$ days

∴ Price of the diesel = $69 + 0.15 \times 141 = 90.15$

Therefore, we can say that on 21st May 2021 price of these two fuels is **not equal**.

Option (b):

20th May means $120 + 20 = 140$ days

∴ Price of the diesel = $69 + 0.15 \times 140 = 90$

Therefore, we can say that on 20th May 2021, price of these two fuels will be **equal**.

Hence, option (b) is the correct answer.

Q.38. A biology class at high school predicted that a local population of animals will double in size every 12 years. The population at the beginning of the year 2021 was estimated to be 50 animals. If P represents the population after n years, then which one of the following equations represents the model of the class for the population?

- (a) $P = 12 + 50n$
- (b) $P = 50 + 12n$
- (c) $P = 50 (2)^{12n}$
- (d) $P = 50 (2)^{n/12}$

Ans. (d)

Explanation:

Population is getting doubled every 12 years, and population in the year 2021 is 50 animals.

So, after 12 years it will get doubled to 100 animals.

Now, let's check the options, where n stands for the number of years.

Option (d):

$$P = 50 \times 2^{n/12} = 50 \times 2^{12/12} = 50 \times 2 = 100 \text{ animals.}$$

For all other options, this value comes out to be way above 100.

Hence, option (d) is the correct answer.

Q.39. In a class, 60% of students are from India and 50% of the students are girls. If 30% of the Indian students are girls, then what percentage of foreign students are boys?

- (a) 45%
- (b) 40%
- (c) 30%
- (d) 20%

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Ans. (d)

Explanation:

Let total number of students in the class be 100.

Indian students = 60% of 100 = 60

So, foreign students = $100 - 60 = 40$ students

Total number of girls students = 50% of 100 = 50

According to the question,

Total number of Indian girl students = 30% of 60 = 18 students

So, foreign girl students = $50 - 18 = 32$

As total foreign students = 40

So, foreign boy students = $40 - 32 = 8$

So, percentage of boys among foreign students = $(8/40) \times 100 = 20\%$

Hence, option (d) is the correct answer.

Q.40. A Statement followed by Conclusion-I and Conclusion-II is given below. You have to take the Statement to be true even if it seems to be at variance from the commonly known facts. Read all Conclusions and then decide which of the given Conclusion(s) logically follows/follow from the Statement, disregarding the commonly known facts.

Statement: Some radios are mobiles. All mobiles are computers. Some computers are watches.

Conclusion-I: Certainly some radios are watches.

Conclusion-II: Certainly some mobiles are watches.

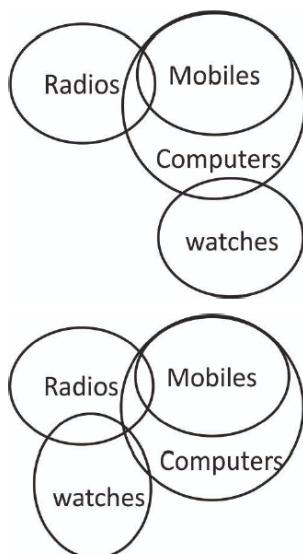
Which one of the following is correct?

- (a) Only Conclusion-I
- (b) Only Conclusion-II
- (c) Both Conclusion-I and Conclusion-II
- (d) Neither Conclusion-I nor Conclusion-II

Ans. (d)

Explanation:

Based on the statements, we can have these scenarios:



By looking at the 1st diagram, we can conclude that Conclusion-I definitely does not follow.

By looking at the above diagrams, we can conclude that Conclusion-II also definitely does not follow.

Directions for the following 3 (three) items:

Read the following two passages and answer the items that follow. Your answers to these items should be based on the passages only.

Passage-1

Medieval merchants risked the hazards of the Silk Road to reach the markets of China; Portuguese caravels in the 15th century sailed beyond the bounds of the known world, searching less for knowledge than for gold and spices. Historically, the driver for opening frontiers has always been the search for resources. Science and curiosity are weaker drivers. The only way to open up space, whether the space of solar system or interstellar space is to create an economic engine and that engine is resource extraction.

Q.41. Which one of the following statements **best sums up** the passage given above?

- (a) Wealth generation is the primary motive for any human endeavour.
- (b) Space, whether space in solar system or interstellar space, will govern our future economy.
- (c) Human beings are motivated to explore new frontiers principally by economic considerations.
- (d) Wealth generation is based on the risk-taking behaviour of some men.

Ans. (c)

Explanation:

Option (a) is incorrect - The passage talks about the wealth generation as a strong motive for exploration but not the primary motive for any endeavor. They can have other motives, like science and curiosity though they are weak.

Option (b) is incorrect - The passage only talks about the possibility of initial exploration based on the economy. It does not give any hint on the future.

Option (c) is correct - The passage talks about the economic consideration as principal for exploration like exploration for gold, spice, and Chinese market.

Option (d) is incorrect - The passage does talk about explorations that involve risk, but it will be incorrect to assume that wealth generation is always based on risk-taking behavior. Wealth generation may or may not involve risk-taking behavior.

Passage-2

"..... most people would agree that telling deliberate lies is wrong, except perhaps in certain special situations where more harm will be done by telling the truth. Even the most truthful people probably tell a good many more lies that might be regarded as semantic lies; their use of words contains some measure of falsehood, more or less deliberate."

Q.42. The idea which the first part of the passage mention is

- (a) agreement about telling lies.
- (b) disagreement about telling lies.
- (c) disagreement about telling the truth.
- (d) disagreement about the harm in telling the truth.

Ans. (a)

Explanation:

Option (a) is correct - The question is asking for ideas from the first part of the passage. But the first part is missing, and the given passage is a continuation of the first part. Hence, we need to imply the idea. From the passage, we can imply that the first part is discussing the idea of agreement in telling lies while in the second part they disagree in truth in every situation. Hence this option is correct.

Option (b) is incorrect - The first part agrees on telling lies as telling the truth is not possible in every situation.

Option (c) is incorrect - Like option (b) the first option is more focused on the agreement.

Option (d) is incorrect - The passage talks about harm in telling the truth in the second part and it agrees that in certain cases telling the truth can harm people which is opposite to the given option.

Q.43. Which one of the following habits is found more often in good people ?

- (a) Mixing up the true and false
- (b) Intentional mixing up of truth with the false.
- (c) Falsification of facts
- (d) Complete concealment of truth

Ans. (b)

Explanation:

Option (a) is correct - The passage talks about people telling lies to reduce the harm from telling the truth. That's why all people mix truth with false. However, it cannot be said in terms of good people habits.

Option (b) is incorrect - The passage specifically highlights in the last line "their use of falsehood, more or less deliberate". Good people use lies more or less deliberately to reduce the harm from the truth. Hence it's their habit of intentionally mixing the truth with false. Hence this option is correct.

Option (c) is incorrect - The passage does not argue for falsification of facts. It merely focuses on the inclusion of lies in truth occasionally.

Option (d) is incorrect - The passage does not argue for concealing the truth. The phrase "measure of falsehood" reflects that concealing truth will only be to some extent rather than complete concealment of truth.

Q.44. A pie diagram shows the percentage distribution of proteins, water and other dry elements in the human body. Given that proteins correspond to 16% and water corresponds to 70%. If both proteins and the other dry elements correspond to p%, then what is the central angle of the sector representing p on the pie diagram?

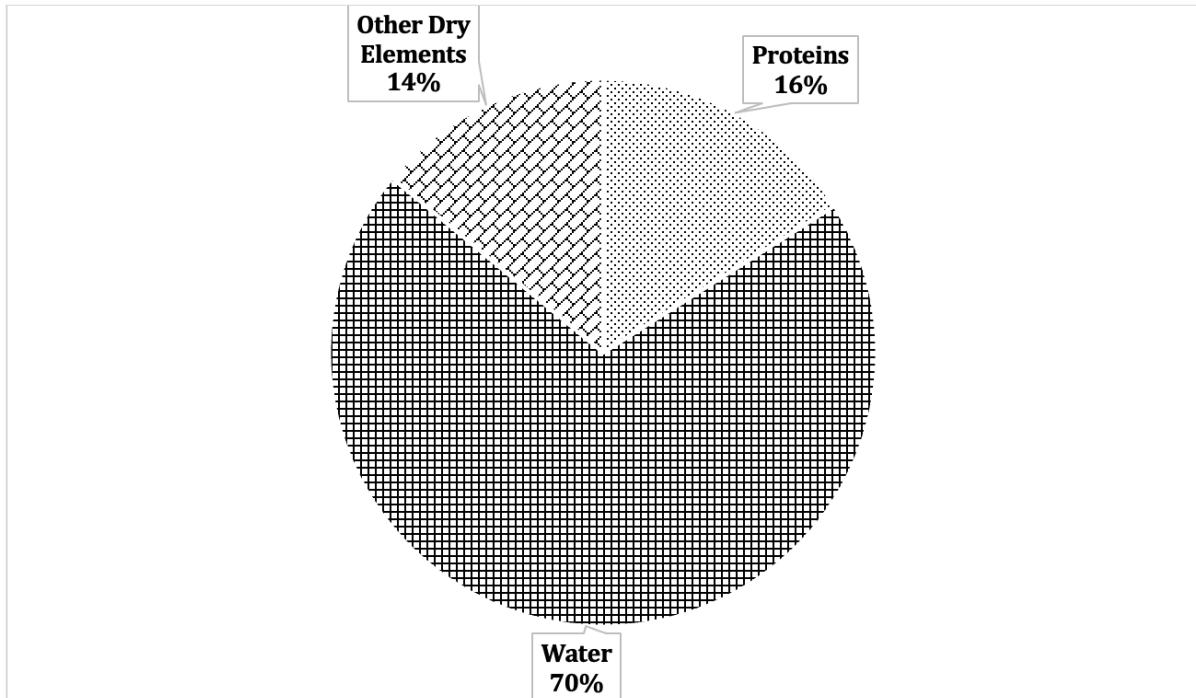
- (a) 54°
- (b) 96°
- (c) 108°
- (d) 120°

Ans. (c)

Explanation:

Percentage of Other Dry Elements in the human body = $100 - (\text{Percentage of Proteins} + \text{Percentage of Water}) = 100 - (16 + 70) = 100 - 86 = 14\%$

The following pie-chart represents the scenario described in the question.



So, percentage of both Proteins and Other Dry Elements, i.e. $p = 16 + 14 = 30\%$

In a pie diagram, 100% corresponds to 360° .

So, 30% will correspond to $(360/100) \times 30 = 108^\circ$

That is, the central angle of the sector representing p on the pie diagram = 108°

- Q.45.** Joseph visits the club on every 5th day, Harsh visits on every 24th day, while Sumit visits on every 9th day. If all three of them met at the club on a Sunday, then on which day will all three of them meet again ?

- (a) Monday
- (b) Wednesday
- (c) Thursday
- (d) Sunday

Ans. (b)

Explanation:

Joseph visits the club every 5th day.

Harsh visits the club every 24th day.

Sumit visits the club every 9th day.

The next time they will meet again will be the LCM of these time-periods.

$$\text{LCM}(5, 24, 9) = 360$$

So, all the three will meet 360 days after Sunday. Now, we need not count 360 days. Rather we will use the concept of odd days.

Odd number of days in 360 = Remainder when 360 is divided by 7 = 3

So, they will meet again on Sunday + 3 = Wednesday

Q.46. The difference between a 2-digit number and the number obtained by interchanging the positions of the digits is 54.

Consider the following statements:

1. The sum of the two digits of the number can be determined only if the product of the two digits is known.
2. The difference between the two digits of the number can be determined.

Which of the above statements is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Ans. (c)

Explanation:

Let the number be xy , i.e. $10x + y$

The number obtained on interchanging the positions of the digits will be yx , i.e. $10y + x$

Difference between these two numbers = $(10x + y) - (10y + x) = 9x - 9y = 9(x - y) = 54$

So, $9(x - y) = 54$

Or $x - y = 6$

So, statement 2 is correct.

The possible pair of such two-digit numbers are: (17, 71), (28, 82), (39, 93)

Respective product of their digits are: $1 \times 7 = 7$; $2 \times 8 = 16$; $3 \times 9 = 27$

So, we can determine the exact number-pair and hence the sum of their digits, if we know the product of their digits.

So, statement 1 is also correct.

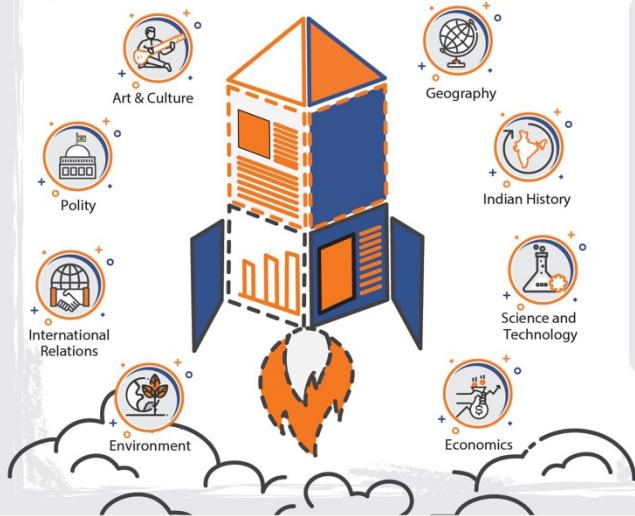
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Q.47. X said to Y, "At the time of your birth I was twice as old as you are at present." If the present age of X is 42 years, then consider the following statements:

1. 8 years ago, the age of X was five times the age of Y.
2. After 14 years, the age of X would be two times the age of Y.

Which of the above statements is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Ans. (b)

Explanation:

Present age of X is 42 years. Let the present age of Y be y years.

As per the question, $42 - y = 2y$

Or $3y = 42$

Or $y = 14$ years

So, at present the ages of X and Y are 42 and 14 respectively.

Statement 1:

Eight years ago, the ages of X and Y must have been 34 and 6 respectively.

We can see that the age of X was not 5 times the age of Y. Hence, this statement is incorrect.

Statement 2:

After fourteen years, the ages of X and Y will be 56 and 28 respectively.

We can see that the age of X would indeed be two times the age of Y. Hence, this statement is correct.

Q.48. If the price of an article is decreased by 20% and then the new price is increased by 25%, then what is the net change in the price?

- (a) 0%
- (b) 5% increase
- (c) 5% decrease
- (d) Cannot be determined due to insufficient data

Ans. (a)

Explanation:

Let the initial price be Rs. 100

New price on decreasing the original price by 20% = $100 - 20\% \text{ of } 100 = 100 - 20 = \text{Rs. } 80$

Now, the final price on increasing the previous price by 25% = $80 + 25\% \text{ of } 80 = 80 + 20 = \text{Rs. } 100$

So, there is no net change in price.

Q.49. When a certain number is multiplied by 7, the product entirely comprises ones only (1111...). What is the smallest such number?

- (a) 15713
- (b) 15723
- (c) 15783
- (d) 15873

Ans. (d)

Explanation:

Method I:

As the number comprising of all 1's is obtained on multiplication by 7, so it means that 7 is the factor of that number.

Our answer will be the smallest number comprising of all 1's that will be divisible by 7. So, let's check.

Is 1 divisible by 7? – No

Is 11 divisible by 7? – No

Is 111 divisible by 7? – No

Is 1111 divisible by 7? – No

Is 11111 divisible by 7? – No

Is 111111 divisible by 7? – Yes

So, $111111/7 = 15,873$

Method II:

Multiply the numbers given in the options by 7, and see which multiplication gives you a resultant comprising of all 1's.

Checking option (d):

$$15873 \times 7 = 111111$$

- Q.50.** A man completes $\frac{7}{8}$ of a job in 21 days. How many more days will it take him to finish the job if quantum of work is further increased by 50%
- (a) 24
 - (b) 21
 - (c) 18
 - (d) 15

Ans. (d)

Explanation:

Initial units of work = 8 units

Out of which, 7 units are completed in 21 days.

So, the number of days that man takes in completing one unit of work = $21/7 = 3$ days

Now, amount of new work = $8 + 50\% \text{ of } 8 = 8 + 4 = 12$ units

Work remaining = $12 - 7 = 5$ units

So, the time taken by the man to complete the rest of the work = $5 \times 3 = 15$ days

Directions for the following 2 (two) items:

Read the following two passages and answer the items that follow. Your answers to these items should be based on the passages only.

Passage-1

Can a democracy avoid being a welfare state for long? Why cannot mass welfare be left entirely to the markets? There is a built-in tension between markets and democracy. Markets do not work on a one-person-one-vote principle as democracies do. What one gets out of the market place depends on one's endowments, skills, purchasing power and the forces of demand and supply. Markets reward individual

initiative and skill, and may also lift many from the bottom rungs of society, but some people never get the opportunity to develop skills that markets demand; they are simply too poor and too handicapped; or skill formation takes too long. By creating jobs, markets may be able to help even unskilled people, but capitalism has always witnessed bursts of unemployment.

Q.51. With reference to the above passage, the following assumptions have been made:

1. Modern democracies rely on the market forces to enable them to be welfare states.
2. Markets ensure sufficient economic growth necessary for democracies to be effective.
3. Government programmes are needed for those left behind in economic growth.

Which of the above assumptions is/are valid ?

- (a) 1 and 3 only
- (b) 3 only
- (c) 2 and 3 only
- (d) 1, 2 and 3

Ans. (b)

Explanation:

Statement 1 is incorrect: The passage mentions that "there is a built-in tension between markets and democracy." The passage further goes on to elaborate, how. Here "built-in" refers to the systemic aspects of each.

Statement 2 is incorrect: The last few lines of the passage invalidate the claim made in statement 2. The passage mentions that "some people never get the opportunity to develop skills that markets demand" and that "capitalism has always witnessed bursts of unemployment". Therefore, we can assume that democracies are not efficient if the market runs strong.

Statement 3 is correct: As the markets cannot ensure equity (as understood from the various lines of the passage), government programs are needed to complement the market outcomes, to help those who have not benefited by the "efficient distribution of resources" of the markets.

Hence, Option (b) is correct.

Passage-2

In our schools, we teach our children all that is there to know about Physics, maths and history and what-have you. But do we teach them about the bitter caste divide that plagues the country, about the spectre of famine that stalks large part of our land, about gender sensitivity, about the possibility of atheism as a choice, etc.? Equally important, do we teach them to ask question, or do we teach them only to passively receive our wisdom? From the cocooned world of school, suddenly, the adolescent finds himself/herself in the unfettered world of university. Here he/she is swept up in a turmoil of ideas and influences and ideologies. For someone who has been discouraged from asking questions and forming an opinion, this transition can be painful.

Q.52. Which one of the following *best reflects the central idea* of the passage given above ?

- (a) School curriculum is not compatible with the expectations of children and parents.
- (b) Emphasis on academic achievements does give time for development of personality and skills.
- (c) Preparing the children to be better citizens should be the responsibility of the education system.
- (d) To be a better citizen, the present world order demands societal and life-coping skills in addition to academic content.

Ans. (d)

Explanation:

Option (a) is incorrect: The passage makes no mention of the expectations of either parents or children. Hence it is beyond the scope of the passage.

Option (b) is incorrect: The time factor, i.e., allocation of time between academics and skill development activities, is not discussed in the passage.

Option (c) is close but incorrect: The passage does not discuss the aspect of holistic education of children in terms of whose responsibility it should be. Though it asserts that the schools do not fulfill this important role and it is important that these values and such education are not received straightaway at the time of college, but also at the time of school, the author does not make any conclusive judgments about where the ultimate responsibility should lie.

Option (d) is the best answer: The passage explicitly mentions, both the present world order demands, as well as the societal and life-coping skills in addition to academic content. The present world order is mentioned in the lines, "But do we teach them about the bitter caste divide that plagues the country, about the specter of famine that stalks large parts of our land, about gender sensitivity, about the possibility of atheism as a choice, etc.?". Societal and life coping skills are discussed as "Equally important, do we teach them to ask questions, or do we teach them only to passively receive our wisdom?". Further, the author asserts "From the cocooned world of school", making the assertion made in the statement a valid one.

Q.53. There are three points P, Q and R on a straight line such that $PQ:QR = 3:5$. If n is the number of possible values of $PQ:PR$, then what is n equal to ?

- (a) 1
- (b) 2
- (c) 3
- (d) 4

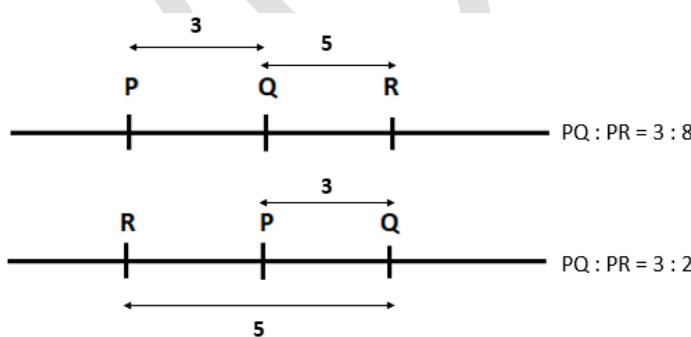
Ans. (b)

Explanation:

We have to arrange three points P, Q, and R on a straight line, such that $PQ : QR = 3 : 5$

Three points can be arranged in $3!$, i.e. 6 ways.

However, the number of possible values of $PQ : PR$ will be only 2, i.e. $n = 2$. They have been represented below.



Q.54. On a chess board, in how many different ways can 6 consecutive squares be chosen on the diagonals along a straight path ?

- (a) 4
- (b) 6
- (c) 8
- (d) 12

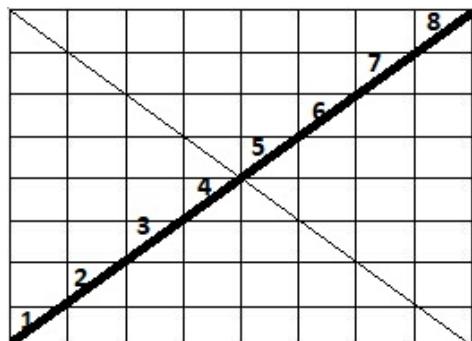
Ans. (b)

Explanation:

Here's a typical 8×8 chess board:



There are two diagonals, each having 8 squares.



On one diagonal, 6 consecutive squares can be chosen in 3 ways.

So, total number of ways of choosing 6 consecutive squares on the diagonals along a straight path = $3 + 3 = 6$

- Q.55.** In the series _b_a_ba_b_abab_aab; fill in the six blanks (_) using one of the following given four choices such that the series follows a specific order.
- (a) bababa
 - (b) baabba
 - (c) bbaabb
 - (d) ababab

Ans. (d)

Explanation:

The given series is: _b_a_ba_b_abab_aab

The pattern being followed in the above series is: abb, then aab. Again abb, and then aab, and so on.

The blanks have been highlighted below:

a b b / a a b / a b b / a ab / ab b / aab

- Q.56.** Using 2, 2, 3, 3, 3 as digits, how many distinct numbers greater than 30000 can be formed?
- (a) 3
 - (b) 6
 - (c) 9
 - (d) 12

Ans. (b)

Explanation:

For the number to be greater than 30000, it must start with the digit 3. Also, as only 5 digits are given to us, all must be used.

3 _____

The 4 blanks have to be filled by two 2's and two 3's.

Number of ways to do so = $4!/(2! 2!) = 6$

These numbers are: 33322, 33232, 33223, 32332, 32323, and 32233.

- Q.57.** Consider the following statements :

- 1. The sum of 5 consecutive integers can be 100.
- 2. The product of three consecutive natural numbers can be equal to their sum.

Which of the above statements is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

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Ans. (c)

Explanation:

Considering statement 1:

Let the 5 consecutive numbers be $x-2, x-1, x, x+1, x+2$

Their sum = $5x = 100$

Or $x = 20$

So, the numbers are 18, 19, 20, 21, and 22. Statement 1 is correct.

Considering statement 2:

We know that, $1 + 2 + 3 = 6$

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

So, Statement 2 is correct too.

Q.58. A cubical vessel of side 1 m is filled completely with water. How many millilitres of water is contained in it (neglect thickness of the vessel) ?

- (a) 1000
- (b) 10000
- (c) 100000
- (d) 1000000

Ans. (d)

Explanation:

Volume of the cube = Side \times Side \times Side = $1 \times 1 \times 1 = 1$ cubic meter

Now, 1 cubic meter = 1000000 milliliters

Q.59. There are 6 persons arranged in a row. Another person has to shake hands with 3 of them so that he should not shake hands with two consecutive persons. In how many distinct possible combinations can the handshakes take place?

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

Ans. (b)

Explanation:

Method I:

We just need to choose 3 persons out of 6, such that no two of them are together.

Number of ways to choose 3 out of 6 people, without any constraints = ${}^6C_3 = (6 \times 5 \times 4)/(3 \times 2 \times 1) = 20$

Number of ways to choose 3 out of 6 people, such that all of them are together = 4

Number of ways to choose 3 out of 6 people, such that two of them are together = $3 + 2 + 2 + 2 + 3 = 12$

So, required answer = $20 - (4 + 12) = 4$

Method II:

Let the six individuals be numbered 1, 2, 3, 4, 5, and 6.

So, another person can shake hands with:

1, 3, 5

1, 4, 6

1, 3, 6

2, 4, 6

Hence, he can shake hands in 4 ways.

- Q.60.** An amount of money was distributed among A, B and C in the ratio $p : q : r$.

Consider the following statements :

1. A gets the maximum share if p is greater than $(q+r)$.
2. C gets the minimum share if r is less than $(p+q)$.

Which of the above statements is/are correct ?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Ans. (a)

Explanation:

Ratio of distribution of money among A, B and C is $p : q : r$.

Considering statement 1:

If $p > (q + r)$, then p is definitely the largest number.

So, A must have got the maximum share. Hence, statement 1 is correct.

Considering statement 2:

If $r < (p + q)$, then r may or may not be the smallest number.

For example, $5 < (2 + 4)$

So, C may or may not have got the minimum share. Hence, statement 2 is incorrect.

Directions for the following 2 (two) items :

Read the following two passages and answer the items that follow. Your answers to these items should be based on the passages only.

Passage-1

The best universities like Harvard and MIT, despite having the luxury of having some truly excellent teachers on their payroll, are increasingly embracing the "flipped classroom" format, where students listen to video lectures at home, and spend class time applying their knowledge, solving problems, discussing examples, etc. Professors guide that discussion and fill in wherever necessary, explaining those bits that seem to be eluding the students and throwing in advanced ideas that happen to be topical. These universities have made their video lectures available free for anyone in the world. They are also encouraging colleges and universities all over the world to integrate these online courses into their own pedagogy, picking the pieces that are appropriate for their needs and building a package around them.

- Q.61.** Which one of the following statements *best reflects the central idea* of the passage given above?

- (a) Efficacy of universities would be better in online mode of conducting classroom tuition as compared conventional method.
- (b) Availability of higher education can be made easier and cheaper without diluting the content.
- (c) We need not invest much in infrastructure related to higher education and yet develop better human and social capital.
- (d) Private sector institutions in higher education as well as coaching institutes can take advantage of this opportunity and thrive well.

Ans. (c)

Explanation:

Option (a) is incorrect - The passage talks about the luxury of universities that are choosing the online mode of education. However, the passage does not talk about any inferiority of the conventional medium of pedagogy. Hence option (a) is incorrect.

Option (b) is incorrect - The passage nowhere talks about the pricing of the education or problem of access to the education hence Option (b) is incorrect.

Option (c) is correct - The passage does emphasize restricting much expenditure on infrastructure. It focuses on supplementing the existing education infrastructure and creating a pool of knowledge along with other universities. Hence Option (c) is correct.

Option (d) is incorrect - The passage does not specify public or private, universities or coaching institutions. It only focuses on the betterment of the education system with an online medium of pedagogy. Hence Option (d) is incorrect.

Passage-2

Our cities are extremely vulnerable to climate change because of large concentrations of populations and poor infrastructure. Moreover, population densities are increasing in them but we have not yet developed the systems to address climate change impacts. Our cities contribute to 65 percent of the GDP, but there are not enough facilities to cater to the needs of the people. It is important to address the issues of air quality, transport, etc., that are vital to identifying sustainable solutions. We need to involve citizens in city planning and create an ecosystem that meets the needs of people.

- Q.62.** Which among the following is the *most logical and rational inference* that can be made from the passage given above ?
- (a) Our cities need to have well-defined administrative set-up with sufficient autonomy.
 - (b) Ever increasing population densities is a hindrance in our efforts to achieve sustainable development.
 - (c) To maintain and develop our cities we need to adopt sustainability related interventions.
 - (d) Public-Private Partnership mode of development is the viable long-term solution for the infrastructure and sustainability problems of India.

Ans. (c)

Explanation:

Option (a) is incorrect - The passage does not mention any administrative problem which is caused due to lack of autonomy. The passage mostly talks about the problem of climate change due to increasing population density and lack of infrastructure. Hence option (a) is incorrect.

Option (b) is incorrect - Though the passage talks about the increasing population density, the core aspect of the passage focuses on climate change, and in inference, we need to have a holistic perspective which is absent in option (b) hence it is incorrect.

Option (c) is correct - The passage talks about the different problems for climate change caused due to increasing population density and infrastructure. Hence to solve the problem we need to adopt sustainable intervention. hence the option (c) is correct.

Option (d) is incorrect - Though the passage talks about the involvement of the public in decision making the passage does not highlight the role of the private sector. Hence Public-private partnership can be not argued as an inference of the passage. Hence option (d) is incorrect.

- Q.63.** Jay and Vijay spent an equal amount of money to buy some pens and special pencils of the same quality from the same store. If Jay bought 3 pens and 5 pencils, and Vijay bought 2 pens and 7 pencils, then which one of the following is correct ?
- (a) A pencil costs more than a pen.
 - (b) The price of a pencil is equal to that of a pen
 - (c) The price of a pen is two times the price of a pencil
 - (d) The price of a pen is three times the price of a pencil

Ans. (c)

Explanation:

Let the price of a pen and a pencil be Rs. a, and Rs. b respectively.

As per the question,

$$3a + 5b = 2a + 7b$$

$$\text{Or } a = 2b$$

So, price of a pen is twice as that of a pencil.

- Q.64.** P scored 40 marks more than Q in an examination. If Q scored 10% less marks than P, then how much did Q score.
- (a) 360
 - (b) 380
 - (c) 400
 - (d) 420

Ans. (a)

Explanation:

P scored 40 marks more than Q. So, marks of Q are q, then the marks of P will be $q + 40$.

Q scored 10% less marks than P. That is, marks of Q are 90% of the marks of P.

$$\text{So, } q = 90\% \text{ of } (q + 40)$$

$$\text{Or } 10q = 9q + 360$$

$$\text{Or } q = 360$$

So, Q scored 360 marks.

- Q.65.** A person P asks one of his three friends X as to how much money he had. X replied, "If Y gives me Rs. 40, then Y will have half of as much as Z, but if Z gives me Rs. 40, then three of us will have equal amount." What is the total amount of money that X, Y and Z have ?
- (a) Rs. 420
 - (b) Rs. 360
 - (c) Rs. 300
 - (d) Rs. 270

Ans. (b)

Explanation:

Let the amount of money with X, Y and Z be x, y and z.

As per the question,

If Y gives me Rs. 40, then Y will have half of as much as Z.

$$\text{That is, } y - 40 = z/2$$

$$\text{Or } z = 2y - 80 \quad \dots\dots(i)$$

If Z gives me Rs. 40, then three of us will have equal amount.

That is, $x + 40 = y = z - 40$

So, $x = y - 40$

And $z = y + 40 \dots \text{(ii)}$

Using statements (i) and (ii), we get:

$$2y - 80 = y + 40$$

Or $y = 120$

So, $x = y - 40 = 120 - 40 = 80$

And $z = y + 40 = 120 + 40 = 160$

So, money with X, Y and Z will be Rs. 80, Rs. 120, and Rs. 160.

Total amount of money with X, Y and Z = $x + y + z = 80 + 120 + 160 = \text{Rs. } 360$

Q.66. In a code language 'MATHEMATICS' is written as 'LBSIDNZUHDR'. How is CHEMISTRY' written in that code language?

- (a) DIDLHRSSX
- (b) BIDNHTSSX
- (c) BIDLHTSSX
- (d) DGFLIRUQZ

Ans. (b)

Explanation:

In a code language 'MATHEMATICS' is written as 'LBSIDNZUHDR'.

The pattern used in the above coding is as follows:

M (13) \rightarrow L (12), i.e. reduction of 1

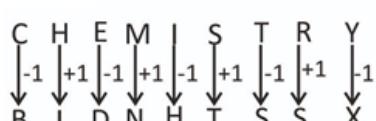
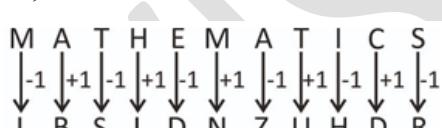
A (1) \rightarrow B (2), i.e. increase of 1

T (20) \rightarrow S (19), i.e. reduction of 1

H (8) \rightarrow I (9), i.e. increase of 1

And so on.

So, the code of CHEMISTRY will be: BIDNHTSSX



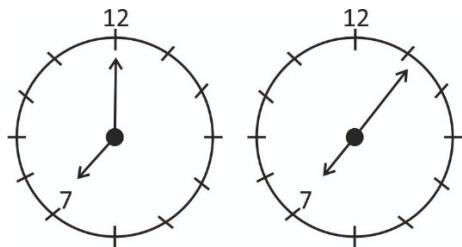
Q.67. At which one of the following times, do the hour hand and the minute hand of the clock make an angle of 180° with each other?

- (a) At 7:00 hours
- (b) Between 7:00 hours and 7:05 hours
- (c) At 7:05 hours
- (d) Between 7:05 hours and 7:10 hours

Ans. (d)

Angle of 180° means that they must be directly opposite to each other.

This will happen a little time after 7:05 hours.



Q.68. In an objective type test of 90 questions, 5 marks are allotted for every correct answer and 2 marks are deducted for every wrong answer. After attempting all the 90 questions, a student got a total of 387 marks. What is the number of incorrect responses ?

- (a) 9
- (b) 13
- (c) 27
- (d) 43

Ans. (a)

Explanation:

Total number of questions are 90, and 5 marks are given for every correct answer.

So, maximum marks possible = $90 \times 5 = 450$

Now, 2 marks are deducted for every wrong answer. Essentially, it means that every incorrect answer will decrease the maximum score by $5 + 2 = 7$ marks.

We know that, the student got 387 marks.

So, reduction from maximum marks = $450 - 387 = 63$

Hence, the number of incorrect responses = $63/7 = 9$

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ADMISSION OPEN

Q.69. Consider the following addition problem : $3P+4P+PP+PP = RQ2$; where P, Q and R are different digits.

What is the arithmetic mean of all such possible sums?

- (a) 102
- (b) 120
- (c) 202
- (d) 220

Ans. (c)

Explanation:

$$3P + 4P + PP + PP = RQ2$$

$$\text{Or } 30 + P + 40 + P + 10P + P + 10P + P = 100R + 10Q + 2$$

$$\text{Or } 24P + 70 = 100R + 10Q + 2$$

$$\text{Or } 20P + 70 + 4P = 100R + 10Q + 2$$

The unit digit of the resultant is 2. It will be obtained when 4 is multiplied by P. So, P must be 3, or 8.

If P = 3, then:

$$24P + 70 = 24 \times 3 + 70 = 72 + 70 = 142$$

If P = 8, then:

$$24P + 70 = 24 \times 8 + 70 = 192 + 70 = 262$$

$$\text{Arithmetic sum of 142 and 262} = (142 + 262)/2 = 202$$

Q.70. Consider the following multiplication problem :

$(PQ) \times 3 = RQQ$, where P, Q and R are different digits and R $\neq 0$.

What is the value of $(P+R)/Q$?

- (a) 1
- (b) 2
- (c) 5
- (d) Cannot be determined due to insufficient data

Ans. (b)

Explanation:

$$PQ \times 3 = RQQ$$

$$\text{Or } (10P + Q) \times 3 = 100R + 10Q + Q$$

$$\text{Or } 30P + 3Q = 100R + 11Q$$

$$\text{Or } 30P = 100R + 8Q$$

The last digit of 30P will be 0, as well as that of 100R. So, the last digit of 8Q must also be 0.

So, the value of Q must be 5.

$$\text{Hence, } 30P = 100R + 8Q = 100R + 40$$

$$\text{Or } 3P = 10R + 4$$

If R = 1, then P = 14/3 (not an integer)

If R = 2, then P = 24/3 = 8

If R = 3, then P = 34/3 (not an integer, and in double digits)

So, P = 8, Q = 5, and R = 2

That is, $85 \times 3 = 255$

$$\text{So, } (P + R)/Q = (8 + 2)/5 = 10/5 = 2$$

Directions for the following 4 (four) items :

Read the following four passages and answer the items that follow. Your answers to these items should be based on the passages only.

Passage -1

Nothing can exist in a natural state which can be called good or bad by common assent, since every man who is in natural state consults only his own advantage, and determines what is good or bad according to his own fancy and insofar as he has regard for his own advantage alone, and holds himself responsible to no one save himself by any law; and therefore sin cannot be conceived in a natural state, but only a civil state, which is decreed by common consent what is good or bad, and each one holds himself responsible to the state.

Q.71. Which one of the following statements **best reflects the central idea** of the passage given above?

- (a) The conceptions of what is right or wrong exist due to the formation of a state.
- (b) Unless a ruling authority decides as to what is right or wrong, no man would be morally right.
- (c) Man is inherently immoral and selfish in a natural state.
- (d) The idea of what is right or wrong is necessary for the survival of human species.

Ans. (a)

Explanation:

Option (a) is correct: That the conceptions of what is right or wrong exist due to the formation of a state. is justified from the lines, "sin cannot be conceived in a natural state, but only a civil state, which is decreed by common consent what is good or bad, and each one holds himself responsible to the state."

Option (b) is incorrect. The author, in the lines, "sin cannot be conceived in a natural state, but only a civil state, which is decreed by common consent what is good or bad, and each one holds himself responsible to the state", refers to a state, which is civil, and not necessarily a "ruling authority" per se.

Option (c) is incorrect: The passage does strongly hint towards the fact that man is inherently selfish per se, but it does not refer to him being immoral.

Option (d) is incorrect: The passage mentions that "every man who is in natural state consults only his advantage and determines what is good or bad according to his fancy and insofar as he has regard for his advantage alone and holds himself responsible to no one save himself by any law". However, it does not connect this trait to survival. S/he connects it to the concept of sin and a civil state.

Passage-2

In the immediate future, we will see the increasing commodification of many new technologies – artificial intelligence and robotics, 3D manufacturing, custom made biological and pharmaceutical products, lethal autonomous weapons and driverless cars. This will pose conundrums. The moral question of how a driverless car will decide between hitting jaywalker and swerving and damaging the car has often been debated. The answer is both simple- save the human life- and complex. At which angle should the car swerve- just enough to save the jaywalker or more than enough? If the driverless car is in Dublin, who would take the decision ? The Irish Government, or the car's original code writer in California, or a software programmer in Hyderabad to whom maintenance is outsourced ? If different national jurisdictions have different fine print on prioritizing a human life, how will it affect insurance and investment decisions, including transnational ones?

Q.72. Which of the following statements best reflect the *rational, plausible, and practical implications* that can be derived from the passage given above?

1. Too much globalization is not in the best interests of any country.
2. Modern technologies are increasingly blurring the economic borders.
3. Innovation and capital have impinged on the domain of the state.
4. Public policy of every country should focus on developing its own supply chains.
5. Geopolitics will have to reconcile to many ambiguities and uncertainties.

Select the correct answer using the code given below:

- (a) 1, 4 and 5 only
(b) 1, 2, 3 and 4 only
(c) 2, 3 and 5 only
(d) 1, 2, 3, 4 and 5

Ans. (c)

Statement 1 is incorrect: The assertion made in this statement goes beyond the scope of this passage. The author refers to the conundrums posed by modern technology, rather than globalization per se. Also, it is a rather extreme statement and can be eliminated based on the understanding of the correct intent of the author.

Statement 2 is correct: This is validated through the lines, "If the driverless car is in Dublin, who would make the decision? The Irish Government, or the car's original code writer in California, or a software programmer in Hyderabad to whom maintenance is outsourced? If different national jurisdictions have different fine print on prioritizing human life, how will it affect insurance and investment decisions, including transnational ones?"

Statement 3 is correct- The lines, "If the driverless car is in Dublin, who would make the decision? The Irish Government, or the car's original code writer in California, or a software programmer in Hyderabad to whom maintenance is outsourced? If different national jurisdictions have different fine print on prioritizing human life, how will it affect insurance and investment decisions, including transnational ones?", point to the same.

Statement 4 is incorrect: The author makes no such reference in the passage. The author only poses a conundrum without providing any solutions for it at all.

Statement 5 is correct: The entire passage refers to and discusses these ambiguities and uncertainties, such as, "If different national jurisdictions have different fine print on prioritizing a human life, how will it affect insurance and investment decisions, including transnational ones? "moral questions like "how a driverless car will decide between hitting a jaywalker and swerving and damaging the car", at which angle should the car swerve- just enough to save the jaywalker or more than enough? Etc.

Hence Option (c) is correct.

Passage-3

The resolution of bankruptcy cases of Indian banks under the Insolvency and Bankruptcy Code should help bring non-performing assets (NPA) situation under some control. Despite the slow pace of resolution by the National Company Law Tribunal, the Code can be helpful in cleaning up bank books in future credit cycles. The recapitalization of public sector banks too can help increase the capital cushion of banks and induce them to lend more and boost economic activity. But bad debt resolution and recapitalization are only a part of the solution as they, by themselves, can do very little to rein in reckless lending that has pushed the Indian banking system to its current sorry state. Unless there are systemic reforms that address the problem of unsustainable lending, future credit cycles will continue to stress the banking system.

Q.73. Which one of the following statements best reflects the *most logical, rational and practical suggestion implied* by the passage given above?

- (a) Lending by the banks should be closely monitored and regulated by the central Government.
- (b) Interest rates should be kept low so as to induce banks to lend more, promote credit growth and thereby boost economic activity.
- (c) Merger of many banks into a few large banks alone in the long-term solution to make them viable and prevent their bad performance.
- (d) Indian banking system requires structural reforms as a long-term solution for bad loans problem.

Ans. (d)

Explanation:

Option (a) is close but incorrect: The author refers to the need for systemic reforms for addressing the problem of unsustainable lending. Systemic reforms go much beyond the measure of simple monitoring or regulation.

Option (b) is incorrect: The author states that "Unless there are systemic reforms that address the problem of unsustainable lending, future credit cycles will continue to stress the banking system." Now, changing interest rates is a short-term measure and not a systemic improvement. Also, the author mentions recapitalization of public sector banks specifically, and not interest rate lowering, as a measure for providing capital to banks to lend. So, this measure goes beyond the scope of the passage.

Option (c) is incorrect: It is not mentioned or referred to anywhere in the passage, and hence goes beyond its scope.

Option (d) is correct: The author clearly states the need for the same in the lines, "Unless there are systemic reforms that address the problem of unsustainable lending, future credit cycles will continue to stress the banking system."

Passage-4

In India, the objective of macroeconomics policy is to enhance the economic welfare of the people, and any one wing of such macro policy, monetary or fiscal, cannot independently work without active support of another.

Q.74. Which one of the following statements *best reflects the corollary* to the passage given above?

- (a) The central bank cannot work independently of the Government.
- (b) Government should regulate financial markets and institutions closely.
- (c) Market economy is not compatible with the socialist policies of the Government.
- (d) Financial sector reforms are required for enhancing the economic welfare of the people.

Ans. (a)

Explanation:

Option (a) is correct: The passage states (read concludes) that "anyone wing of such macro policy, monetary or fiscal, cannot independently work without the active support of another." Now, the Central Bank deals with the monetary policy, while the government looks after the fiscal policy of the country. Therefore, the statement in option (a) flows as a natural corollary to the conclusion provided in the passage.

Option (b) is incorrect: Though the statement might be right in its own sphere, but it is beyond the scope of this passage.

Option (c) is incorrect: Not only is the statement in this option beyond the scope of the passage, but it is also incorrect in its own right and a very extreme one. India, which follows a mixed economy, is a classic counterexample to the assertion made in this option.

Option (d) is incorrect: To quote a standard definition, "The financial sector is a section of the economy made up of firms and institutions that provide financial services to commercial and retail customers. This sector comprises a broad range of industries including banks, investment companies, insurance companies, and real estate firms." The passage does not discuss financial sector reforms. Rather, it deals with the macroeconomic framework of monetary and fiscal policies, of which, the financial sector is just one (relatively) small aspect.

Q.75. Consider the following Table :

Player	Runs scored in the First Innings	Balls faced in the First Innings	Runs scored in the Second Innings	Balls faced in the Second Innings
A	61	99	14	76
B	05	12	50	85
C	15	75	20	50
D	13	55	12	50

Who is the fastest run scorer in the Test Match ?

- (a) A
- (b) B
- (c) C
- (d) D

Ans. (b)

Explanation:

Fastest run scorer means the batsman that has the best runs scored : balls faced ratio.

Player	Runs Scored in two innings	Balls Faced in two innings	Strike Rate
A	$61 + 14 = 75$	$99 + 76 = 175$	0.43
B	$5 + 50 = 55$	$12 + 85 = 97$	0.57
C	$15 + 20 = 35$	$75 + 50 = 125$	0.28
D	$13 + 12 = 25$	$55 + 50 = 105$	0.24

For batsman A:

$$\text{Runs scored : Balls faced} = 75/175 = 0.43$$

For batsman B:

$$\text{Runs scored : Balls faced} = 55/97 = 0.57$$

For batsman C:

$$\text{Runs scored : Balls faced} = 35/125 = 0.28$$

For batsman D:

$$\text{Runs scored : Balls faced} = 25/105 = 0.24$$

The best ratio is that of batsman B.

Q.76. Half of the villagers of a certain village have their own houses. One-fifth of the villagers cultivate paddy. One-third of the villagers are literate. Four-fifth of the villagers are under 25 years of age. Which one of the following statements is certainly correct?

- (a) All the villagers who have their own houses are literate.
- (b) Some villagers under 25 years of age are literate.
- (c) Only half of the villagers who cultivate paddy are literate.
- (d) No villager under 25 years of age has his own house.

Ans. (b)

Explanation:

50% of the villagers have their own house.

20% of the villagers cultivate paddy.

33.33% of the villagers are literate.

80% of the villagers are under 25 years of age.

Now, as 80% of the villagers are under 25 years of age, and 33.33% of the villagers are literate, so at least some of the villagers under 25 years of age must be literate.

Q.77. Consider two Statements and a Question :

Statement-1 : The last day of the month is a Wednesday.

Statement-2 : The third Saturday of the month was the seventeenth day.

Question : What day is the fourteenth of the given month?

Which one of the following is correct in respect of the Statements and the Question ?

- (a) Statement-1 alone is sufficient to the answer of the Question
- (b) Statement-2 alone is sufficient to answer the Question
- (c) Both Statement-1 and Statement-2 are required to answer the Question
- (d) Neither Statement-1 alone nor Statement-2 alone is sufficient to answer the Question

Ans. (b)

Explanation:

Considering statement 1:

The last day of the month is a Wednesday. However, we do not know the number of days in the month, so we cannot find the day on the 14th of that month.

Hence, statement 1 alone is not sufficient to answer the question.

Considering statement 2:

17th of that month is the third Saturday. So, 14th of that month must be a Wednesday.

Hence, statement 2 alone is sufficient to answer the question.

Q.78. Which day is 10th October, 2027 ?

- (a) Sunday
- (b) Monday
- (c) Tuesday
- (d) Saturday

Ans. (a)

Explanation:

We know that, 10th October 2021 is a Sunday. (The day of UPSC CSE, 2021 Preliminary exam)

So, 10th October 2022 will be Sunday + 1, i.e. Monday.

10th October 2023 will be Monday + 1, i.e. Tuesday.

10th October 2024 will be Tuesday + 2, i.e. Thursday. We added 2, as 2024 is a leap year.

10th October 2025 will be Thursday + 1, i.e. Friday.

10th October 2026 will be Friday + 1, i.e. Saturday.

10th October 2027 will be Saturday + 1, i.e. Sunday.

- Q.79.** Consider two Statements and four Conclusions given below. You have to take the Statements to be true even if they seem to be at variance from the commonly known facts. Read all Conclusions and then decide which of the given Conclusion(s) logically follows/follow from the Statements, disregarding the commonly known facts.

Statement-1 : Some greens are blues.

Statements-2 : Some blues are blacks.

Conclusion-1 : Some greens are blacks.

Conclusion-2 : No green is black.

Conclusion-3 : All greens are blacks.

Conclusion-4 : All blacks are greens.

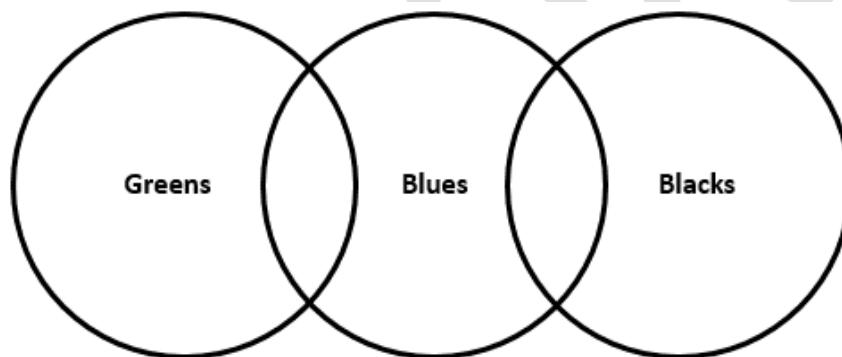
Which one of the following is correct?

- (a) Conclusion-1 and Conclusion-2 only
- (b) Conclusion-2 and Conclusion-3 only
- (c) Conclusion-3 and Conclusion-4 only
- (d) Neither Conclusion 1 nor 2 nor 3 nor 4

Ans. (d)

Explanation:

The statements can be represented in the form of Venn diagrams, as follows:



Conclusion 1: Some greens are blacks - Not necessary. So, this conclusion is incorrect.

Conclusion 2: No green is black - Not necessary. So, this conclusion is incorrect.

Conclusion 3: All greens are blacks - Not necessary. So, this conclusion is incorrect.

Conclusion 4: All blacks are greens - Not necessary. So, this conclusion is incorrect.

So, none of the conclusions is correct.

- Q.80.** What is the value of 'X' in the sequence 2, 7, 22, 67, 202, X, 1822?

- (a) 603
- (b) 605
- (c) 607
- (d) 608

Ans. (c)

Explanation:

The given sequence is 2, 7, 22, 67, 202, X, 1822

The pattern being followed here is given below:

$$2 \times 3 + 1 = 7$$

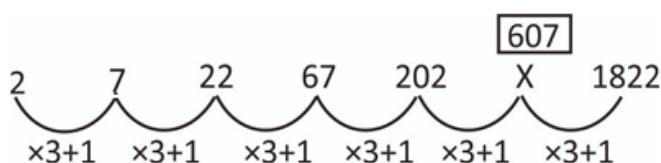
$$7 \times 3 + 1 = 22$$

$$22 \times 3 + 1 = 67$$

$$67 \times 3 + 1 = 202$$

$$202 \times 3 + 1 = 607$$

$$607 \times 3 + 1 = 1822$$



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