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PRESTORMING™

Test Booklet Series

T.B.C: P-SIA-A-GS

EXPLANATION

Serial: GSPII-240526

GENERAL STUDIES - PAPER - II

CSAT

ALL INDIA MOCK TEST 1



Time Allowed: Two Hours

Maximum Marks: 200

I N S T R U C T I O N S

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES *NOT* HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS, ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. ENCODE CLEARLY THE TEST BOOK SERIES **A, B, C or D** AS THE CASE MAY BE IN THE APPROPRIATE PLACE IN THE ANSWER SHEET.
3. You have to enter your Roll Number on the Test Booklet in the Box.
Provided alongside. *DO NOT* write anything else on the Test Booklet.
4. This Test Booklet contains **80 items** (questions). Each item is printed in **English**. Each item comprises four responses (answers). You will select the response which you want to mark on the Answer Sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose **ONLY ONE** response for each item.
5. You have to mark all your responses **ONLY** on the separate Answer Sheet provided. See directions in the Answer Sheet.
6. All items carry equal marks.
7. Sooner than you proceed to mark in the Answer Sheet the response to various items in the Test Booklet, you have to fill in some particulars in the Answer Sheet as per instructions sent to you with your Admission Certificate.
8. After you have completed filling in all your responses on the Answer Sheet and the examination has concluded, you should hand over to the Invigilator *only the Answer Sheet*. You are permitted to take away with you the Test Booklet.
9. Sheets for rough work are appended in the Test Booklet at the end.
10. **Penalty for Wrong Answers**
THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY A CANDIDATE IN THE OBJECTIVE TYPE QUESTION PAPERS.
 - (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **one-third (0.83)** of the marks assigned to that question will be deducted as penalty.
 - (ii) If a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above to that question.
 - (iii) If a question is left blank, i.e., no answer is given by the candidate, there will be **no penalty** for that question.

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S.1) Direction for the following 1 (One) item: Read the following Passage and answer the items that follow. Your answers to these items should be based on the passages only.

PASSAGE 1

The art of storytelling has been central to human culture since ancient times. Whether it's through oral traditions passed down from generation to generation, written literature spanning centuries, or modern digital media platforms captivating audiences worldwide, stories have held a unique power. In today's fast-paced world, where information overload is common and attention spans are short, the ability of storytelling to convey complex ideas and evoke emotions remains unparalleled.

1. Which statement best reflects the central idea of the passage?
 - (a) Storytelling has been overshadowed by modern forms of communication.
 - (b) The power of storytelling lies in its ability to connect with audiences across time and space.**
 - (c) Digital media has replaced traditional storytelling methods.
 - (d) Written literature remains the most influential form of storytelling.

SOLUTION :

The power of storytelling lies in its ability to connect with audiences across time and space.

This choice best reflects the central idea of the passage, which emphasizes the enduring impact of storytelling across different mediums and eras.

S.2-3) Direction for the following 2 (two) items: Read the following Passage and answer the items that follow. Your answers to these items should be based on the passages only.

PASSAGE 2

Urbanization is a global phenomenon, with more people living in cities now than ever before. While cities offer opportunities for economic growth, cultural exchange, and social mobility, they also present challenges such as overcrowding, pollution, and inadequate infrastructure. Addressing these challenges requires innovative solutions and sustainable urban planning practices that prioritize environmental conservation, social equity, and economic development.

2. What is the main challenge associated with urbanization, as mentioned in the passage?
 - (a) Economic stagnation due to urbanization
 - (b) Cultural isolation within urban communities
 - (c) Environmental degradation caused by urban expansion**
 - (d) Technological advancements driving urban growth

SOLUTION :

Environmental degradation caused by urban expansion.

This choice directly addresses the main challenge associated with urbanization as mentioned in the passage, highlighting the negative environmental consequences of rapid urban growth.

3. Which one of the following statements best reflects the most logical and rational inference that can be drawn from the passage?
 - (a) Urbanization is solely responsible for economic growth and cultural exchange in cities.
 - (b) Cities face challenges such as overcrowding and pollution due to inadequate infrastructure.**

- (c) Sustainable urban planning practices prioritize economic development over environmental conservation.
- (d) **Sustainable urban planning practices are essential for addressing challenges and promoting balanced urban development.**

SOLUTION :

Sustainable urban planning practices are essential for addressing challenges and promoting balanced urban development.

The passage emphasizes the challenges associated with urbanization and highlights the need for sustainable urban planning practices to address these challenges and promote balanced urban development. Option (d) reflects this logical inference by acknowledging the importance of sustainable urban planning in addressing urban challenges and achieving balanced urban development.

S.4) Direction for the following 1 (One) item: Read the following Passage and answer the items that follow. Your answers to these items should be based on the passages only.

PASSAGE 3

The advent of artificial intelligence (AI) has sparked both excitement and concern among experts and the general public alike. While AI holds the promise of revolutionizing various industries and improving efficiency, there are also fears about job displacement, loss of privacy, and ethical implications. As AI continues to advance, society must grapple with these challenges and ensure that its benefits are shared equitably, while mitigating potential risks.

4. What is one of the concerns associated with the development of artificial intelligence, as mentioned in the passage?
- (a) Increased job opportunities due to AI advancements
- (b) Enhanced privacy protection with AI technologies
- (c) Ethical dilemmas arising from AI applications**
- (d) Decreased efficiency in industries adopting AI technologies

SOLUTION :

Ethical dilemmas arising from AI applications.

This choice accurately identifies one of the concerns associated with the development of artificial intelligence discussed in the passage, specifically the ethical implications of AI technologies.

S.5) Direction for the following 1 (One) item: Read the following Passage and answer the items that follow. Your answers to these items should be based on the passages only

PASSAGE 4

The concept of sustainable development emphasizes the need to meet the needs of the present without compromising the ability of future generations to meet their own needs. It requires balancing economic growth, environmental protection, and social equity through integrated policies and actions. Achieving sustainable development requires collective action at the local, national, and global levels, involving governments, businesses, communities, and individuals.

5. What is the primary goal of sustainable development, as described in the passage?
- (a) Maximizing short-term profits for businesses
- (b) Protecting natural resources for future generations**
- (c) Promoting social inequality in society
- (d) Exploiting environmental resources for economic gain

SOLUTION:

Protecting natural resources for future generations.

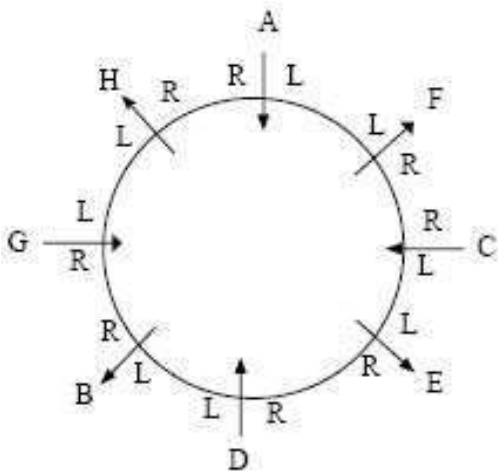
This choice aligns with the primary goal of sustainable development described in the passage, emphasizing the importance of preserving natural resources for the well-being of future generations.

Directions for Questions 6 – 7: Read the following information carefully and answer the questions that follows:

Eight students A, B, C, D, E, F, G and H are sitting around a circular table for playing a game. Four of them H, B, E and F are not facing the centre and none of them sits next to each other. Others are facing the centre. D is third to the left of H, who is fourth to the left of E. B sits to the next left of D and C is on the immediate left of E. A sits in between H and F.

6. How many persons sit between A and B (if the counting starts from B in CW direction)?
- (a) None
- (b) One
- (c) Two**
- (d) Three

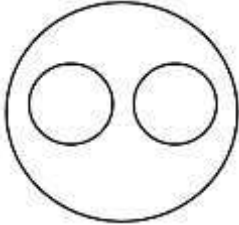
SOLUTION:



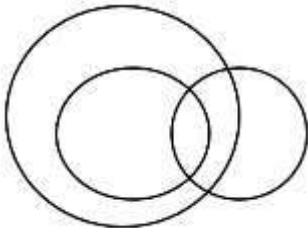
7. Who among the following sits third to the left of E?
- (a) G
- (b) A**
- (c) H
- (d) D

8. Which of the following diagram describes the best relationship between Staplers, Scissors and Stationeries?

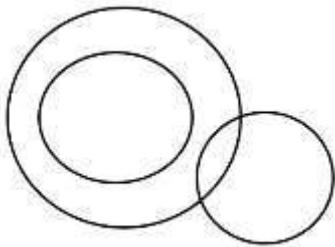
(a)



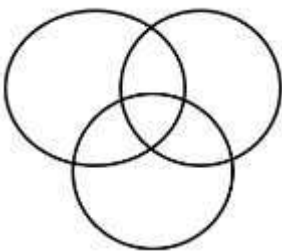
(b)



(c)



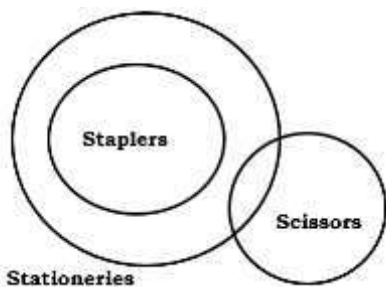
(d)



SOLUTION:

All Staplers will come under the category of Stationeries.

But all Scissors are not under the category of Stationeries. There are different type of Scissors for various other purposes.

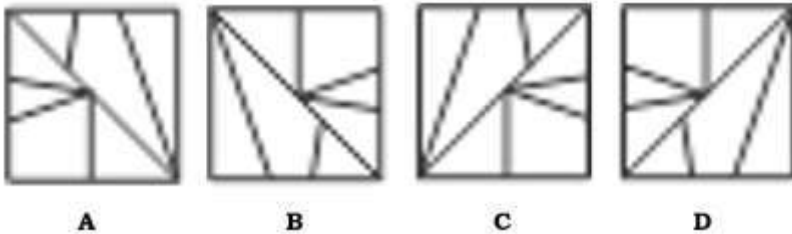


Directions for Question 9: Read the following information carefully and answer the question that follows:
In the following question, one figure 'X' is given as problem figure and four figures marked A, B, C and D are given. Study the figures carefully and find out which figure will complete the pattern of the figure X.

9. PROBLEM FIGURE(X)



ANSWER FIGURES



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

SOLUTION:

Figure A will complete the pattern of the given image.



Hence option (d) is correct.

Directions for Question 10: Read the following information carefully and answer the question that follows:

Given below are three statements and three conclusions. Take the statements to be true even if they are at variance with commonly known facts, and decide whether the conclusion/s follow/s the given statements.

10. **Statements:**

- All Hotel are Restaurant.
- All Cafe are Resort.
- All Resort are PG.
- No Restaurant are PG

Conclusions:

I. All Hotel are PG.

II. All Cafe are PG

III. Some PG are Resort.

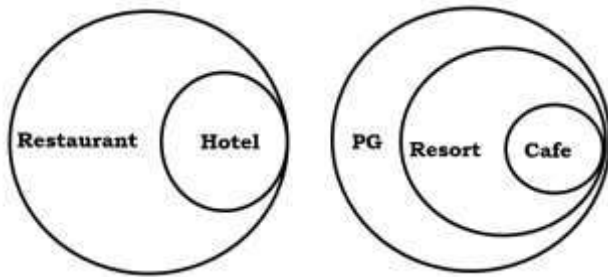
(a) Only conclusion III follows

(b) Only conclusion I follows

(c) All the conclusions follow

(d) Conclusions II and III follow

SOLUTION :



11. What is the remainder when $1241 \times 1243 \times 1245 \times 1247 \times 1249 \times 1251$ is divided by 13?

(a) 7

(b) 9

(c) 11

(d) None of the above

SOLUTION:

Using Remainder Theorem:

$$\begin{aligned} & \text{Re} \left[\frac{1241 \times 1243 \times 1245 \times 1247 \times 1249 \times 1251}{13} \right] \\ &= \text{Re} \left[\frac{6 \times 8 \times 10 \times 12 \times 1 \times 3}{13} \right] = \text{Re} \left[\frac{17280}{13} \right] = 3 \end{aligned}$$

12. A Private bus left Chennai to Trichy. Two hours later, a government bus left Chennai and arrived Trichy on the same time as the private bus. If the government bus and private bus left at the same time, from the opposite ends of the cities, towards each other, they would meet 1 hour 20 minutes after the start. What is the time taken by the private bus to travel from Chennai to Trichy?

(a) 2 hours

(b) 4 hours

(c) 6 hours

(d) 8 hours

SOLUTION :

Let,

Distance between Chennai and Trichy = 'D' km

Time taken by Private bus = 'T' hours

Speed of Private Bus = $\frac{D}{T}$ km/hr

Speed of Government Bus = $\frac{D}{T-2}$ km/hr

Time of meet = 1 hour 20 minutes = $\frac{4}{3}$ hours

Distance by Private bus in $\frac{4}{3}$ hours + Distance by Government Bus in $\frac{4}{3}$ hours = Total distance covered

$$\left(\frac{D}{T} \times \frac{4}{3}\right) + \left(\frac{D}{T-2} \times \frac{4}{3}\right) = D$$

$$\frac{1}{T} + \frac{1}{T-2} = \frac{3}{4}$$

$$\frac{T + T - 2}{T(T-2)} = \frac{3}{4}$$

$$\frac{2T - 2}{T(T-2)} = \frac{3}{4}$$

$$8T - 8 = 3T^2 - 6T$$

$$3T^2 - 14T + 8 = 0$$

$$3T^2 - 12T - 2T + 8 = 0$$

$$3T(T - 4) - 2(T - 4) = 0$$

$$(T - 4)(3T - 2) = 0$$

$$T = 4 \text{ hours, } T = \frac{2}{3} \text{ hours.}$$

13. If the LCM of 3^{12} , 8^8 and N is 12^{12} , then how many values are possible for N ?

(a) 310

(b) 315

(c) 320

(d) 325

SOLUTION :

$$12^{12} = (4 \times 3)^{12} = (2^2 \times 3)^{12} = 2^{24} \times 3^{12}$$

$$\text{According to the question, LCM}(3^{12}, 8^8, N) = 2^{24} \times 3^{12}$$

$$\text{Thus, possibility of } N = 2^a \times 3^b$$

Here, a can take values from 0 to 24. Number of possible powers of 2 is 25.

And, b can take values from 0 to 12. Number of possible powers of 3 is 13.

Hence, total possible values = $25 \times 13 = 325$.

14. In 2021, World Health Organization proposed RT PCR test for COVID – 19 pneumonia that has the following property: For any person suffering from COVID, there is a 90% chance of the test returning positive. For a person not suffering from COVID, there is an 80% chance of the test returning negative. It is known that 10% of people who go for testing have COVID. If a person who is tested gets a positive result for COVID (as in, the test result says they have got COVID), what is the probability that they actually have COVID?

(a) $\frac{7}{10}$

(b) $\frac{8}{11}$

(c) $\frac{1}{3}$

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

SOLUTION :

$$P(\text{patients having COVID}) = 0.9$$

$$P(\text{patients not having COVID}) = 0.1$$

Given that patient has COVID, P (test being positive) = 0.9

Given that patient has COVID, P (test being negative) = 0.1

Given that patient does not have COVID, P (test being negative) = 0.8

Given that patient does not have COVID, P (test being positive) = 0.2

Now, we are told that the test turns positive. This could happen under two scenarios:

1. The patient has COVID and the test turns positive.
2. The patient does not have COVID, but the test turns positive.

So, Probability of test turning positive = $(0.9 \times 0.1) + (0.9 \times 0.2) = 0.27$.

Probability of people who got COVID and tested positive = $0.9 \times 0.1 = 0.09$

So, the required probability = $0.09/0.27 = 1/3$.

15. Sameera attended a mock test for State Public Service Commission of Delhi in which she scored 23 marks. One mark is allotted for each correct answer, 0.25 marks and 0.125 marks are deducted as penalty for each wrong answer and unanswered question respectively. If the question paper had 90 questions in total, what is the minimum possible number of the questions she answered wrongly?
- (a) 6
(b) 4
(c) 5
(d) 7

SOLUTION:

Total Marks = 90

Marks scored by Sameera = 23

Sameera is losing a total of $90 - 23 = 67$ marks in the test (from all the correct answer situation).

Further, if she answers a question wrong, her score would drop by

= $1 + 0.25 = 1.25$ marks from maximum possible marks.

When she leaves a question unanswered, she is losing

= $1 + 0.125 = 1.125$ marks.

Now, we need to check whether zero wrong answer is possible or not.

In such a case, since the value for us to be an integer we can think of the following table to find the correct answer to question

No of wrong answers	Marks lost by wrong answer	Marks to be lost by unanswered question	Possibility
0	0	67	$67/1.125 \neq \text{Integer}$
1	1.25	65.75	$65.75/1.125 \neq \text{Integer}$
2	2.5	64.5	$64.5/1.125 \neq \text{Integer}$
3	3.75	63.25	$63.25/1.125 \neq \text{Integer}$
4	5	62	$62/1.125 \neq \text{Integer}$
5	6.25	60.75	$60.75/1.125 = 54 = \text{Integer}$

Therefore, the minimum number of wrong answers is 5.

S.16) Direction for the following 1 (One) item: Read the following Passage and answer the items that follow. Your answers to these items should be based on the passages only.

PASSAGE 1

The phenomenon of climate change poses significant challenges to ecosystems, economies, and human societies worldwide. Rising temperatures, extreme weather events, and sea-level rise are just some of the impacts attributed to human-induced climate change. Addressing climate change requires international cooperation, innovation, and concerted efforts to reduce greenhouse gas emissions, while also adapting to the changes already underway.

16. What is the main cause of climate change, as mentioned in the passage?

- (a) Natural fluctuations in the Earth's climate
- (b) Industrial pollution from factories
- (c) Volcanic activity and seismic shifts
- (d) Solar radiation fluctuations and solar flares**

SOLUTION:

Industrial pollution from factories.

This choice correctly identifies the main cause of climate change mentioned in the passage, highlighting the role of human-induced activities in contributing to global warming.

S.17) Direction for the following 1 (One) item: Read the following Passage and answer the items that follow. Your answers to these items should be based on the passages only.

PASSAGE 2

The rise of social media has revolutionized the way people communicate, interact, and share information. Platforms like Facebook, Twitter, and Instagram have connected billions of users around the globe, enabling real-time communication and virtual communities. However, social media also raises concerns about privacy, online harassment, and the spread of misinformation, highlighting the need for responsible usage and effective regulation.

17. What is one of the challenges associated with social media mentioned in the passage?

- (a) Enhanced privacy protection and data security measures
- (b) Promotion of online communities and social connections
- (c) Spread of misinformation and fake news**
- (d) Facilitation of real-time communication and information sharing

SOLUTION:

Spread of misinformation and fake news.

This choice accurately identifies one of the challenges associated with social media mentioned in the passage, specifically the proliferation of misinformation and fake news on online platforms.

S.18-19) Direction for the following 2 (two) items: Read the following Passage and answer the items that follow. Your answers to these items should be based on the passages only.

PASSAGE 3

The healthcare industry is undergoing rapid transformation due to advances in technology, research, and treatment modalities. From telemedicine and wearable devices to precision medicine and gene editing,

healthcare innovations are revolutionizing patient care and outcomes, offering new hope for those suffering from chronic illnesses. However, these advancements also raise ethical, legal, and accessibility concerns that must be addressed to ensure equitable access to quality healthcare for all.

18. What is one of the challenges associated with healthcare innovations mentioned in the passage?

- (a) Improved patient outcomes and healthcare delivery
- (b) Ethical dilemmas related to gene editing and biotechnology**
- (c) Reduced healthcare costs and increased affordability
- (d) Increased accessibility to healthcare services in remote areas

SOLUTION:

Ethical dilemmas related to gene editing and biotechnology.

This choice highlights one of the challenges associated with healthcare innovations discussed in the passage, specifically the ethical considerations surrounding gene editing and biotechnological advancements.

19. Which one of the following statements best reflects the crux of the passage?

- (a) Advances in healthcare technology are primarily focused on improving patient outcomes.
- (b) Ethical, legal, and accessibility concerns are overshadowing the benefits of healthcare innovations.
- (c) The healthcare industry is experiencing rapid transformation due to advances in technology and treatment modalities.
- (d) Balancing the benefits of healthcare innovations with ethical and accessibility concerns is crucial for ensuring equitable access to quality healthcare for all.**

SOLUTION:

Balancing the benefits of healthcare innovations with ethical and accessibility concerns is crucial for ensuring equitable access to quality healthcare for all.

The passage highlights the rapid transformation of the healthcare industry due to technological advances while acknowledging the ethical, legal, and accessibility concerns associated with these innovations. Option (d) reflects the crux of the passage by emphasizing the importance of balancing the benefits of healthcare innovations with ethical and accessibility concerns to ensure equitable access to quality healthcare for all.

S.20) Direction for the following 1 (One) item: Read the following Passage and answer the items that follow. Your answers to these items should be based on the passages only.

PASSAGE 4

Education plays a crucial role in shaping individuals' lives and society as a whole. Access to quality education empowers individuals, fosters critical thinking skills, and promotes social mobility, allowing individuals to reach their full potential regardless of their background. However, disparities in educational opportunities persist, particularly in marginalized communities and developing countries, highlighting the need for equitable funding, teacher training, and curriculum development initiatives.

20. What is one of the barriers to quality education mentioned in the passage?

- (a) Equitable funding for schools and educational programs
- (b) Teacher training and professional development opportunities
- (c) Curriculum development and educational reforms

(d) Social and economic disparities affecting educational access

SOLUTION:

Social and economic disparities affecting educational access.

This choice addresses one of the barriers to quality education mentioned in the passage, emphasizing the impact of social and economic inequalities on educational opportunities.

S.21) Direction for the following 1 (One) item: Read the following Passage and answer the items that follow. Your answers to these items should be based on the passages only.

PASSAGE 5

The concept of universal basic income (UBI) has gained traction as a potential solution to address economic inequality and automation-induced job loss. Under a UBI system, all citizens receive unconditional cash transfers from the government, regardless of their employment status, providing a safety net for those facing financial hardship. Proponents argue that UBI could alleviate poverty, enhance social welfare, and promote economic stability by ensuring that everyone has a basic level of income to meet their needs.

21. What is one of the potential benefits of universal basic income mentioned in the passage?

(a) Increased unemployment due to reduced incentive to work

(b) Poverty alleviation and reduction of income inequality

(c) Reduced government spending on social welfare programs

(d) Exacerbation of income inequality and social stratification

SOLUTION:

Answer: (b) Poverty alleviation and reduction of income inequality.

This choice identifies one of the potential benefits of universal basic income mentioned in the passage, specifically its role in alleviating poverty and reducing income inequality.

S.22-23) Direction for the following 2 (two) items: Read the following Passage and answer the items that follow. Your answers to these items should be based on the passages only.

PASSAGE 6

India's agricultural sector plays a vital role in the country's economy, employing a significant portion of the workforce and contributing to food security. However, agricultural productivity remains a concern due to factors such as small landholdings, water scarcity, and reliance on traditional farming methods. Embracing technological innovations, promoting sustainable practices, and enhancing access to markets are essential for revitalizing India's agriculture and ensuring the livelihoods of millions of farmers.

22. With reference to the above passage, which of the following assumptions have been made?

(a) The agricultural sector in India is solely responsible for food security.

(b) Technological innovations and sustainable practices are not effective solutions for improving agricultural productivity.

(c) Small landholdings and water scarcity are the primary reasons for the low productivity in India's agricultural sector.

(d) Revitalizing India's agriculture is essential for ensuring the livelihoods of millions of farmers.

SOLUTION:

Revitalizing India's agriculture is essential for ensuring the livelihoods of millions of farmers.

The passage emphasizes the importance of revitalizing India's agriculture for ensuring the livelihoods of millions of farmers. Option (d) reflects this assumption by stating that revitalizing India's agriculture is essential for the livelihoods of millions of farmers. This assumption aligns with the passage's focus on the significance of the agricultural sector in India's economy and the livelihoods of farmers.

23. What is the primary challenge faced by India's agricultural sector as mentioned in the passage?

- (a) Excessive government intervention in agricultural policies
- (b) Lack of skilled workforce in rural areas
- (c) Low agricultural productivity and sustainability**
- (d) Inadequate infrastructure for agricultural exports

SOLUTION:

Low agricultural productivity and sustainability.

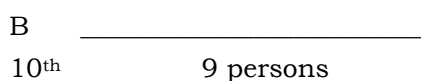
The passage highlights the concern of low agricultural productivity and sustainability as a primary challenge faced by India's agricultural sector due to various factors.

24. In a row of students, 'A' is in the 11th position from the left and 'B' is in the 10th position from then right. If 'A' and 'B' interchange, then 'A' becomes 18th from the left. How many persons are there in the row other than 'A' and 'B'?

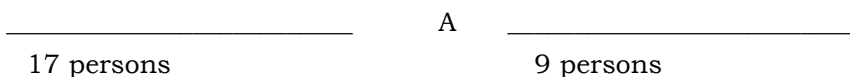
- (a) 27
- (b) 26
- (c) 25**
- (d) 24

SOLUTION:

10 persons



After Exchange



Total = 17 + 1 + 9 = 27

Excluding A & B there are 25 Persons.

Directions for Question 25: Read the following information carefully and answer the question that follows:

Each of the following consists of a question and some statements are given below it. You must decide whether the data provided in the statements are sufficient to answer the question:

25. How many days Rathna goes to temple in a year?

Statement 1: Rathna goes to temple only on Tuesdays without skipping any of the Tuesdays.

Statement 2: The particular year is starting on Tuesday but not ending on Tuesday.

Statement 3: The particular year has five Tuesdays in the month of April.

(a) All statement 1, 2 and 3 are sufficient.

(b) Statement 1 and 3 are sufficient whereas statement two is not sufficient

(c) Statement 1 and 2 are sufficient whereas statement 3 is not sufficient

(d) Statement 2 and 3 are sufficient whereas statement 1 is not sufficient

SOLUTION:

If a year starts on a day and does not end on the same day, it is a leap year.

No of Tuesdays in 12 months from January to December = 5 + 4 + 4 + 5 + 4 + 4 + 5 + 4 + 5 + 4 + 4 + 5 = 53 days

So, statement 1 and 2 are sufficient whereas statement 3 is not sufficient.

26. Consider the following series

C R * A Z M \$ B 2 I L # 7 E 3 &

If all the consonants become vowels which are to the nearest right in the alphabetical order, vowels become their respective number codes and the series is written in reverse order, what is the number which is second to the left of the leftmost vowel which is neither preceded nor followed by a symbol?

(a) 2

(b) 1

(c) 5

(d) 9

SOLUTION:

After making all the changes given in the question, the series becomes

& 3 5 7 # O 9 2 E \$ O A 1 * U E

Left most vowel without symbols nearby is A.

Number which is second to left of A is 9.

Hence the answer is option (d).

Directions for Question 27: Read the following information carefully and answer the question that follows:

In the following question below are given some statements followed by some conclusions based on those statements. Taking the given statements to be true even if they seem to be at variance from commonly known facts. Read all the conclusions and then decide which of the given conclusion logically follows the given statements.

27. **Statements:**

All keys are lock.

Some locks are doors.

Conclusion:

I. All doors are key.

II. Some locks are not key.

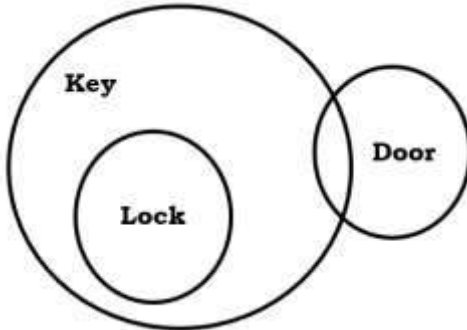
III. Some doors are not lock.

(a) None of the conclusion follows

(b) Only conclusion II follows

- (c) Both conclusions I and III follows
 (d) All conclusion follows

SOLUTION:



28. Consider the following statements:

1. Sum of digits of two-digit number can be equal to their product.
2. A three-digit number must be divisible by the sum of its digits.
3. Product of a two-digit prime numbers is definitely odd.

How many among the given above is / are true?

- (a) None
 (b) Only one
 (c) **Only two**
 (d) All the three

SOLUTION:

1. Eg: 22.
Here, $2 + 2 = 2 \times 2$. So, it's true.
2. Eg: 145.
Here, $1 + 4 + 5 = 10$. 145 is not divisible by 10.
3. Apart from 2, any other prime number is odd. Also, product of any two odd numbers is always odd. Hence product of any two prime numbers is always odd.

29. The unlimited Wi-Fi plan of ACT Fibernet gives 24% less data than the same price unlimited plan of Hathway broadband. The Booster data pack of ACT Fibernet is 12% more than its unlimited recharge, having the same price. Further, the booster data pack of same price of Hathway is 18% less than its unlimited data plan. How much per cent less/ more data can one get from the ACT booster data pack service compared to the booster data pack service of Hathway, for the same price?

- (a) **3.8% more**
 (b) 4.7% less
 (c) 4.7% more
 (d) 2.8% less

SOLUTION:

Let, Unlimited data plan for Hathway = Rs. 100,

Then, Unlimited data plan for ACT = $100 - 24 =$ Rs. 76.

So, the booster pack data for ACT = $76 + 12\% \text{ of } 76 = 76 * 1.12 =$ Rs. 85.12.

Also, booster pack data for Hathway = $100 - 18 =$ Rs. 82.

$$\% \text{ variation} = \frac{85.12 - 82}{82} \times 100 = 3.8\%$$

Thus, ACT booster data is 3.8% more than Hathway booster data.

30. In the parliamentary election 2024, the data of result was published, in which 16% of the total voters on the voting list were declared invalid from a turnout of 80%. What can be the reasonable percentage of votes obtained by the winner of the election if the candidate who came second obtained 20% of the total voters on the voting list, provided there were only three contestants, only one winner and the total number of voters on the voters' list was 2700000?

- (a) 44.2%
- (b) 44.9%
- (c) 45.2%

(d) None of these

SOLUTION:

Total % of votes = 100%

% of people voted = 80%

Invalid votes = 16%

% of votes for the second placed candidate = 20%

Thus, the maximum % of votes the winner can get = 80% - 16% - 20% = 44%.

Hence, the reasonable percentage of votes obtained by the winner could be more than 20% but lesser than 44%.

31. Five brothers M, N, O, P and Q have their wedding anniversaries on different months and on different dates. M remembers that his wedding anniversary is between 25th and 30th, of N it is between 20th and 25th, of O it is between 10th and 20th, of P it is between 5th and 10th and of Q it is between 1st and 5th of the month. The sum of the date of wedding anniversaries is defined as the addition of the date and the month, for example 12th January will be written as 12/1 and will add to a sum of the date of 13. What may be the maximum average of their sum of the dates of wedding?

- (a) 24.6
- (b) 15.2
- (c) 28**
- (d) 32

SOLUTION:

The maximum average will occur when the maximum possible values are used.

Thus, the anniversary of:

M = 30th, N = 25th, O = 20th, P = 10th and Q = 5th

Further, the months of anniversary in random order will have to be between August to December to maximize the average.

Hence, the maximum total = 30 + 25 + 20 + 10 + 5 + 12 + 11 + 10 + 9 + 8 = 140

The maximum average = 140/5 = 28.

32. A magician showed a container that contains balls of three colors – white, black and yellow. There are 8 black balls in the container. There are two additional statements of facts available:

- I. If we pick balls from the container at random, to guarantee that we have at least 3 yellow balls, we need to pick 17 balls.
- II. If we pick balls from the container at random, to guarantee that we have at least 2 white balls, we need to pick 19 balls.

Which of the two statements above, alone or in combination shall be sufficient to answer the question "how many yellow balls are there in the container"?

- (a) Statement 1 alone is sufficient, but statement 2 alone is not sufficient to answer the question.
- (b) Statement 2 alone is sufficient, but statement 1 alone is not sufficient to answer the question.**
- (c) Statements 1 and 2 together are not sufficient, and additional data is needed to answer the question.
- (d) Both statements taken together are sufficient to answer the question, but neither statement alone is sufficient.

SOLUTION:

From statement 1:

$$\text{White} + \text{Black} + \text{Yellow} = 17$$

Since, this ensures that there are at least 3 yellow balls, so, remaining balls must be white and black.

$$\text{White} + \text{Black} = 17 - 3 = 14$$

$$\text{Black} = 14 - \text{White} = 14 - 8 = 6$$

But this doesn't give us the total number of yellow balls. So, statement 1 alone is not sufficient.

From statement 2:

$$\text{White} + \text{Black} + \text{Yellow} = 19$$

Since, this ensures that there are at least 2 white balls, so, remaining balls must be black and yellow

$$\text{Black} + \text{Yellow} = 19 - 2 = 17$$

$$\text{Again, Yellow} = 17 - \text{Black} = 17 - 8 = 9.$$

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

33. How many triple digit numbers are neither divisible by 5 nor 11?

- (a) 244
- (b) 254
- (c) **656**
- (d) 646

SOLUTION:

Total number of triple digit numbers, $T = \{100 - 999\} = 900$

Triple digit numbers divisible by 5, $A = \{100, 105, 110, \dots, 995\}$

$$n(A) = 180$$

Triple digit numbers divisible by 11, $B = \{110, 121, 132, \dots, 990\}$

$$n(B) = 81$$

Triple digit numbers divisible by both 5 and 11, $A \cap B = \{110, 165, 220, \dots, 990\}$

$$n(A \cap B) = 17$$

$$n(A \cup B) = n(A) + n(B) - n(A \cap B)$$

$$n(A \cup B) = 180 + 81 - 17 = 244$$

$$\begin{aligned} \text{Number of triple digit numbers neither divisible by 5 nor 11} &= T - n(A \cup B) \\ &= 900 - 244 = 656. \end{aligned}$$

34. Shanthi, Rudra and Aparna start a bakery business together. Shanthi invests half of Aparna expecting a return of 10%. Rudra invests three-fourths of Aparna, expecting a return of 15% on it. Aparna invests ₹3000 and the profit of the firm is 25%. How much would Rudra's share of profit be more than that of Shanthi's share if Rudra gets an additional 8% for managing the business? (Assume that their expectations with respect to returns on capital invested are met before profit is divided in the ratio of capitals invested).

- (a) 219.17
- (b) 118.34
- (c) 236.67
- (d) 204.17**

SOLUTION :

Investment of Aparna = Rs. 3000

Investment of Shanthi = Half of Aparna = Rs. 1500

Investment of Rudra = Three fourth of Aparna = Rs. 2250

The total investment = Rs. 6750

Ratio of the investment, A : R : S = 3000 : 2250 : 1500 = 4 : 3 : 2

Returns to be given on their expectations:

Shanthi = 150, Rudra = 337.5 and Aparna = 0

The total profit to be divided = 1687.5 - 487.5 - 8% of 1687.5 = 1065.

This profit is to be divided in the ratio of 4: 3: 2

Shanthi = $(4/9) \times 1065 + 150 = 623.33$;

Rudra = $(3/9) \times 1065 + 337.5 + 135 = 827.5$.

Difference in share of profit = 204.166...

S.35) Direction for the following 1 (one) item: Read the following Passage and answer the items that follow. Your answers to these items should be based on the passages only

PASSAGE 1

India's healthcare system is characterized by a dual burden of communicable and non-communicable diseases, coupled with disparities in access and quality of care. While significant progress has been made in areas such as maternal and child health, challenges persist in addressing infectious diseases, malnutrition, and inadequate healthcare infrastructure, particularly in rural areas. Addressing these challenges requires comprehensive strategies focusing on prevention, early detection, and equitable healthcare delivery.

35. What is one of the challenges faced by India's healthcare system as mentioned in the passage?

- (a) Lack of government funding for healthcare initiatives
- (b) Overemphasis on curative rather than preventive healthcare measures
- (c) Inadequate healthcare infrastructure, especially in urban areas**
- (d) High prevalence of lifestyle-related diseases among the population

SOLUTION :

Inadequate healthcare infrastructure, especially in rural areas

The passage highlights inadequate healthcare infrastructure, particularly in rural areas, as one of the challenges faced by India's healthcare system.

S.36-37) Direction for the following 2 (two) items: Read the following Passage and answer the items that follow. Your answers to these items should be based on the passages only.

PASSAGE 2

India's education system is grappling with various challenges, including low enrollment rates, poor quality of education, and regional disparities in educational outcomes. While efforts have been made to improve access to education through initiatives such as the Right to Education Act, quality issues persist, affecting learning outcomes and employability. Addressing these challenges requires investments in infrastructure, teacher training, curriculum reforms, and innovative pedagogical approaches.

36. What is one of the challenges faced by India's education system as mentioned in the passage?

- (a) High enrollment rates leading to overcrowded classrooms
- (b) Insufficient government regulations in the education sector
- (c) Regional disparities in educational outcomes**
- (d) Lack of interest among students in pursuing higher education

SOLUTION :

Regional disparities in educational outcomes.

The passage highlights regional disparities in educational outcomes as one of the challenges faced by India's education system.

37. Which one of the following statements best reflects the most logical and practical message conveyed by the passage?

- (a) The Right to Education Act has successfully addressed the challenges in India's education system.
- (b) Quality issues in education have no significant impact on learning outcomes and employability.
- (c) Investments in infrastructure and teacher training are not necessary for improving India's education system.
- (d) Addressing challenges in India's education system requires a multi-faceted approach, including investments in infrastructure, teacher training, curriculum reforms, and innovative pedagogical approaches.**

SOLUTION :

Addressing challenges in India's education system requires a multi-faceted approach, including investments in infrastructure, teacher training, curriculum reforms, and innovative pedagogical approaches.

The passage highlights various challenges facing India's education system and emphasizes the need for a multi-faceted approach to address them. Option (d) reflects this logical and practical message by stating that addressing challenges in India's education system requires investments in infrastructure, teacher training, curriculum reforms, and innovative pedagogical approaches. This option aligns with the passage's focus on the complexity of issues in the education sector and the need for comprehensive solutions.

S.38-39) Direction for the following 2 (two) items: Read the following Passage and answer the items that follow. Your answers to these items should be based on the passages only.

PASSAGE 3

India's urbanization presents both opportunities and challenges, with rapid urban growth leading to issues such as overcrowding, inadequate infrastructure, and environmental degradation. While cities offer economic opportunities and access to better amenities, urban poverty, slums, and informal settlements are widespread, exacerbating social inequalities. Sustainable urban planning, investment in infrastructure, and inclusive policies are crucial for addressing the complex challenges of urbanization.

38. What is one of the challenges associated with urbanization in India as mentioned in the passage?

- (a) Limited economic opportunities in urban areas
- (b) Lack of access to basic amenities in rural areas
- (c) Environmental degradation due to industrial pollution
- (d) Social inequalities exacerbated by urban poverty and informal settlements**

SOLUTION:

Social inequalities exacerbated by urban poverty and informal settlements

The passage highlights social inequalities exacerbated by urban poverty and informal settlements as one of the challenges associated with urbanization in India.

39. Which one of the following statements best reflects the central theme of the passage?

- (a) Urbanization in India has primarily resulted in economic opportunities and better amenities.
- (b) The challenges of urbanization in India outweigh the opportunities presented by rapid urban growth.
- (c) Sustainable urban planning and inclusive policies are essential for addressing the challenges of urbanization in India.**
- (d) Social inequalities in urban areas are not exacerbated by issues such as urban poverty and inadequate infrastructure.

SOLUTION:

Sustainable urban planning and inclusive policies are essential for addressing the challenges of urbanization in India.

The passage discusses the opportunities and challenges of urbanization in India and emphasizes the importance of sustainable urban planning and inclusive policies in addressing these challenges. Option (c) reflects the central theme of the passage by stating that sustainable urban planning and inclusive policies are essential for addressing the challenges of urbanization in India. This option aligns with the passage's focus on the need for comprehensive approaches to address the complex challenges of urbanization.

S.40-41) Direction for the following 2 (two) items: Read the following Passage and answer the items that follow. Your answers to these items should be based on the passages only.

PASSAGE 4

India's energy sector is undergoing a transformation with a focus on renewable energy sources such as solar and wind power. While renewable energy offers sustainable solutions to India's growing energy needs, challenges such as intermittency, grid integration, and financing constraints remain. Enhancing

renewable energy infrastructure, promoting innovation, and creating an enabling policy environment are essential for accelerating India's transition towards a clean and sustainable energy future.

40. Based on the above passage, the following assumptions have been made:

1. Renewable energy sources like solar and wind power are sufficient to meet India's growing energy needs.
2. Overcoming challenges such as intermittency and financing constraints is essential for the successful transition towards renewable energy in India.

Which of the above assumptions are valid?

- (a) Both 1 and 2
- (b) Neither 1 nor 2
- (c) Only assumption 1

(d) Only assumption 2

SOLUTION :

Only assumption 2

Assumption 1 states that renewable energy sources like solar and wind power are sufficient to meet India's growing energy needs. However, the passage only mentions that renewable energy offers sustainable solutions to India's energy needs without explicitly stating that it is sufficient to meet all of them. Therefore, assumption 1 cannot be considered valid.

Assumption 2 states that overcoming challenges such as intermittency and financing constraints is essential for the successful transition towards renewable energy in India. This aligns with the passage, which highlights challenges such as intermittency and financing constraints that need to be addressed for the successful transition towards renewable energy. Therefore, assumption 2 is valid based on the information provided in the passage.

41. What is one of the challenges faced by India's renewable energy sector as mentioned in the passage?

- (a) Lack of public awareness about renewable energy technologies
- (b) Limited availability of renewable energy resources
- (c) Difficulty in integrating renewable energy into the existing grid infrastructure**
- (d) High costs associated with renewable energy projects

SOLUTION :

Difficulty in integrating renewable energy into the existing grid infrastructure

The passage highlights the difficulty in integrating renewable energy into the existing grid infrastructure as one of the challenges faced by India's renewable energy sector.

S.42-43) Direction for the following 2 (two) items: Read the following Passage and answer the items that follow. Your answers to these items should be based on the passages only.

PASSAGE 5

India's digital revolution has transformed the country's socio-economic landscape, with increasing internet penetration and smartphone usage. While digital technologies offer opportunities for economic growth, innovation, and connectivity, challenges such as digital divide, cybersecurity threats, and privacy concerns persist. Bridging the digital divide, enhancing cybersecurity measures, and promoting digital literacy are essential for harnessing the full potential of India's digital transformation.

42. What is the most rational and logical deduction that can be made from the passage?
- (a) India's digital revolution has eliminated all socio-economic challenges.
 (b) Digital technologies have no significant impact on economic growth and innovation.
 (c) **Challenges such as digital divide, cybersecurity threats, and privacy concerns continue to persist despite India's digital transformation.**
 (d) Bridging the digital divide is unnecessary for harnessing the full potential of India's digital transformation.

SOLUTION :

Challenges such as digital divide, cybersecurity threats, and privacy concerns continue to persist despite India's digital transformation.

The passage highlights the transformative impact of India's digital revolution while acknowledging the persistence of challenges such as the digital divide, cybersecurity threats, and privacy concerns. Option (c) reflects the most rational and logical deduction from the passage by stating that these challenges continue to persist despite India's digital transformation. This deduction aligns with the information provided in the passage, which emphasizes the importance of addressing these challenges for harnessing the full potential of India's digital transformation.

43. What is one of the challenges associated with India's digital revolution as mentioned in the passage?
- (a) Lack of government support for digital initiatives
 (b) **Insufficient internet infrastructure in rural areas**
 (c) Overreliance on digital technologies for everyday tasks
 (d) Limited awareness about cybersecurity risks among the population

SOLUTION :

Insufficient internet infrastructure in rural areas

Explanation: The passage highlights insufficient internet infrastructure in rural areas as one of the challenges associated with India's digital revolution.

Directions for Questions 44 and 45: Read the following information carefully and answer the questions that follows:

In a certain code, # denotes north, \$ denotes south, * denotes east, @ denotes west, % denotes turns 45 degree and & denotes turns 90 degrees.

(Note combination of symbols can be used to denote minor directions also)

At 7.00 AM for the morning cardio routine, Raj starts from #* and walks for 7 meters. To his left %, runs for 10 meters. Turning *, he then walks for 5 meters and towards \$, he runs for 8 meters. Then turning @ he ran continuously for 20 meters and turned #@. He took a slow walk for 3 meters and & in the left. He completes the routine by % on right and walking for 7 meters and & towards right and the time was 8.00 AM.

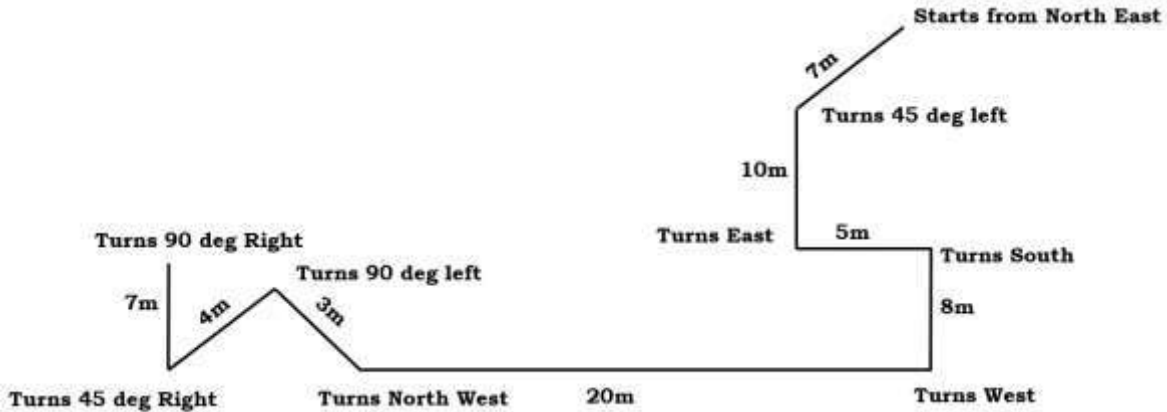
44. Which of the following statement is true according to the direction which Raj is facing after completing his routine?
- (a) Facing \$#
 (b) Facing @



(c) Facing #*

(d) Facing *

SOLUTION:



He faces in the East direction now.

45. From the direction which Raj is facing now, his shadow will be on which side?

(a) Right

(b) Front

(c) Back

(d) Left

SOLUTION:

When he faces east, his shadow will be on the backside due to the position of Sun in the east.

46. Find out the wrong term in the given number series

2, 9, 50, 243, 986

(a) 50

(b) 9

(c) 986

(d) 243

SOLUTION:

$$(2 \times 7) - 5 = 14 - 5 = 9$$

$$(9 \times 6) - 4 = 54 - 4 = 50$$

$$(50 \times 5) - 3 = 250 - 3 = 247(\text{Correct answer})$$

$$(247 \times 4) - 2 = 988 - 2 = 986.$$

Directions for Questions 47 to 49: Read the following information carefully and answer the questions that follows:

Eight car owners A, B, C, D, E, F, G and H took their cars M, N, O, P, Q, R, S and T to service showroom. The cars are Grey, Black, and White in colour. The cars are parked in a straight line and are facing the north direction. Same coloured cars are not adjacent to each other. N is an immediate neighbour of O and is not Grey coloured. Gray and Black cars are parked at the two ends. R and S are immediate neighbours. P and R are immediate neighbours of T. G owns R. Q is at one of the corners. T is parked fourth to the right of M and is Grey coloured. A does not own P. E owns the Black car. B's car is an

immediate neighbour of D's and F's car. T's immediate neighbours are of the same colour. O and only one other car is Black coloured. F and H own grey car. A owns a White car. O is fifth to the left of Q.

47. Which car is parked second to the left of T?

- (a) O
- (b) Q
- (c) S
- (d) P

SOLUTION:

CAR	M	N	O	P	T	R	S	Q
COLOUR	GREY	WHITE	BLACK	WHITE	GREY	WHITE	GREY	BLACK
OWNER	C/H	A	D	B	F	G	C/H	E

Following the arrangement, we have

O is seated second to the left of T.

Option A, is hence the correct answer.

48. Which one of the following cars is parked between M and O?

- (a) T
- (b) R
- (c) N
- (d) Q

SOLUTION:

Following the arrangement, we have

N is seated between M and O.

Option C, is hence the correct answer.

49. Who is owner of S?

- (a) D
- (b) B
- (c) E

(d) Can't be determined

SOLUTION:

Following the arrangement, we get "cannot be determined".

Option D, is hence the correct answer.

50. Find the last two digits of the number 79^{512} ?

- (a) 81
- (b) 61
- (c) 41
- (d) 01

SOLUTION:

The last two digits of $79^2 = 41$.

Since it is ending with 1, it would be easy to expand based on these last two digits instead.

So, the last two digits of $79^{512} =$ The last two digits of $(79^2)^{256}$

i.e., the last two digits of $(41)^{256}$.

The last two digits of 41^1 are 41.

The last two digits of 41^2 are 81.

The last two digits of 41^3 are 21.

The last two digits of 41^4 are 61.

The last two digits of 41^5 are 01.

The last two digits of 41^6 are 41.

The last two digits of 41^7 are 81.

The last two digits of 41^8 are 21.

The last two digits of 41^9 are 61.

The last two digits of 41^{10} are 01.

Here, after the exponent 5, the last two digits of the expression repeats in cycle.

Then, the last two digits of $41^{256} = 41^{255+1} = 41$.

51. A Park is in the shape of a right-angled triangle with three points P, Q and R. S and T are mid points of PQ and QR respectively. Read the following statements.

I. $PT = 19$

II. $RS = 22$

III. Angle Q is a right angle

Which of the following statements would be sufficient to determine the length of PR?

(a) Statements I and II

(b) Statements I and III

(c) Statements II and III

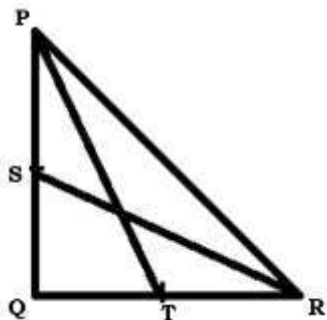
(d) All three statements

SOLUTION:

PQR is the right-angled triangle. S and T are mid points of PQ and QR respectively.

As it is not given that which angle is 90° .

So, we need statement (III) to find the value of PR.



Whereas using statement (I) & (II) alone, we cannot find the value of PR.

But using all the three statements.

We can find value of $(PQ)^2 + (QR)^2$.

Hence, the value of $PR = \sqrt{(PQ)^2 + (QR)^2}$ using Pythagoras Theorem.

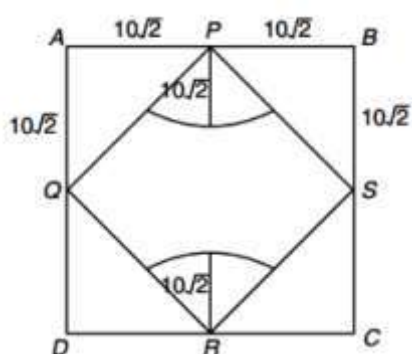
So, all statements are required.

52. Inside Sundarbans National Park, there is a square field with side $20\sqrt{2}$ meters. The mid points of the field are connected to form another fenced square and in which two Bengal tigers are tethered with a steel chain of length $10\sqrt{2}$ meters each on the diagonally opposite vertices. What can be the area in which the two tigers can move inside the second square alone?

- (a) $100\pi \text{ m}^2$
 (b) $50(\sqrt{2} - 1)\pi \text{ m}^2$
 (c) $100\pi(3 - 2\sqrt{2})\text{m}^2$
 (d) $200\pi(2 - \sqrt{2})\text{m}^2$

SOLUTION:

ABCD is the original square, the mid-points of whose sides are joined to give the square PQRS.



Let the tigers be tethered at points P and R or Q and S.

Then, the length of the rope = $10\sqrt{2}$ m.

Area covered by the tigers = 2 x Quadrant with radius of $10\sqrt{2}$ m.

$$\begin{aligned} \text{Total area covered} &= 2 \times \frac{\pi r^2}{4} \\ &= \frac{\pi * (10\sqrt{2})^2}{2} \\ &= 100\pi \text{ m}^2. \end{aligned}$$

Directions for Questions 53 and 54: Read the following information carefully and answer the questions that follows:

Two events namely Marathon and Triathlon were launched in three different districts of Tamil Nadu namely Chennai, Madurai and Salem. On Sunday, 4500 people participated in Marathon and 4000 people participated in Triathlon.

The following table shows the percentage distribution of the total participants in the three districts.

DISTRICT	MARATHON	TRIATHLON
CHENNAI	40%	35%
MADURAI	35%	25%
SALEM	25%	40%

The participants are classified on the basis of age as adults and children. The table below shows the percentage of children out of the total participants in each district for each events.

% of children in district	MARATHON	TRIATHLON
CHENNAI	15%	20%
MADURAI	16%	18%
SALEM	20%	17%

53. What is the ratio of the number of children who participated in Marathon in Madurai to the children who participated in Triathlon in Madurai?

- (a) 9 : 11
(b) 7 : 13
(c) 9 : 7

(d) 7 : 5

SOLUTION:

Marathon participants – 4500 and Triathlon participants - 4000

Marathon participants distribution in districts

Chennai – 40% = 1800, Madurai – 35% = 1575 and Salem – 25% = 1125

In Chennai, Children = 15% so, adults = 85%

Children = 15% (1800) = 270 and Adults = 85% (1800) = 1530

Similarly calculating for every theatre and each show, we get.

EVENTS	MARATHON			TRIATHLON			TOTAL
	DISTRICTS	PARTICIPANTS	ADULT	CHILDREN	PARTICIPANTS	ADULT	
CHENNAI	1800	1530	270	1400	1120	280	3200
MADURAI	1575	1323	252	1000	820	180	2575
SALEM	1125	900	225	1600	1328	272	2725
TOTAL	4500	3753	747	4000	3268	732	8500

Following the table, we get.

Number of children who participated in Marathon in Madurai = 252

Number of children who participated in Triathlon in Madurai = 180

Required ratio = 252 : 180 = 7 : 5.

54. What is the ratio of the sum of adults and children who participated in Triathlon in Chennai and Madurai respectively to the sum of adults and children who participated in Marathon in Salem and Chennai respectively?

- (a) 14 : 11
(b) 11 : 9
(c) 10 : 9
(d) 13 : 7

SOLUTION:

Following the table, we get

The sum of adults and children who participated in Triathlon in Chennai and Madurai respectively =
Adults from Chennai + Children from Madurai

$$= 1120 + 180 = 1300.$$

The sum of adults and children who participated in Marathon in Salem and Chennai respectively =
Adults from Salem + Children from Chennai

$$= 900 + 270 = 1170$$

$$\text{Required ratio} = 1300 : 1170 = 10 : 9.$$

Directions for Question 55: Read the following information carefully and answer the question that follows:

The following consists of a question and some statements are given below it. You must decide whether the data provided in the statements are sufficient to answer the question:

55. **Question:** p is a positive integer. If q is another positive integer and greater than p, is q divisible by p?

Statement 1: q is divisible by all the single digit positive integers.

Statement 2: p is never a multiple of any prime number.

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

- (a) **The question can be answered by using one of the statements alone, but cannot be answered using the other statement alone.**
- (b) The question can be answered by using either of the statement alone.
- (c) The question can be answered by using both the statements together, but cannot be answered using either statement alone.
- (d) The question cannot be answered even by using both the statements together.

SOLUTION:

Statement 1:

q is divisible by all the single digit positive integers.

$$\text{So, } q = 1 * 2 * 3 * 4 * 5 * 6 * 7 * 8 * 9 * K = 9! K$$

This cannot give any conclusion about divisibility of q by p.

So, Statement 1 alone is not sufficient to answer the question.

Statement 2:

p is never a multiple of any prime number.

So, p must be a non-prime number and also not a composite number.

$$\text{Thus, } p = 1$$

Hence, p is a factor of any value defined for q.

i.e., q is divisible by p.

Statement 2 alone is sufficient to find the answer.

56. P and Q are two – digit prime number such that Q is obtained from P by interchanging its digits. The difference between P and Q is 36. What is the value of product of P and Q?
- (a) 765
(b) **2701**
(c) 5605
(d) None of the above

SOLUTION:

Two – digit prime number, $P = 10x + y$

Reverse of the number P, $Q = 10y + x$

Given that, $P - Q = 36$

So, $(10x + y) - (10y + x) = 36$

$9x - 9y = 36$

$x - y = 4$

Thus, the two – digit numbers can be 95, 84, 73, 62, 51.

Among them, only 73 is prime.

Hence, $P = 73$ and $Q = 37$.

Then, $P \times Q = 73 \times 37 = 2701$.

57. Sharan, the Mathematics teacher wrote all the numbers from 1 to 100 on the board. If Heera, a naughty but intelligent student removed all the numbers which are having HCF of more than 1 with 100, how many numbers will be left on the board?
- (a) 36
(b) 39
(c) **40**
(d) 43

SOLUTION:

When a number is expressed as $N = a^p \times b^q \times c^r \times \dots$, where a, b and c be prime numbers while p, q and r be positive integers, then

Number of coprime numbers less than N = $N(1-1/a)(1-1/b)(1-1/c)\dots$

Heera has removed all the numbers which are having a HCF of more than 1 with 100. So only co-primes with 100 are left.

Thus, $100 = 2^2 \times 5^2$

So, number of numbers which are co-prime to 100 and less than 100

$= 100 \times (1/2) \times (1 - 1/5) = 40$.

So, only 40 numbers will be left.

S.58) Direction for the following 1 (one) item: Read the following Passage and answer the items that follow. Your answers to these items should be based on the passages only.

PASSAGE 1

India's environmental conservation efforts face numerous challenges, including deforestation, pollution, and habitat loss. While initiatives such as afforestation programs and wildlife conservation efforts are underway, rapid industrialization and urbanization continue to exert pressure on the environment. Balancing economic development with environmental sustainability, promoting eco-friendly practices,

and strengthening conservation policies are essential for safeguarding India's rich biodiversity and natural resources.

58. What is one of the challenges faced by India's environmental conservation efforts as mentioned in the passage?

- (a) Lack of public support for conservation initiatives
- (b) Overemphasis on economic development at the expense of environmental protection
- (c) Inadequate enforcement of environmental laws and regulations**
- (d) Limited scientific knowledge about India's biodiversity and ecosystems

SOLUTION:

Inadequate enforcement of environmental laws and regulations

The passage highlights inadequate enforcement of environmental laws and regulations as one of the challenges faced by India's environmental conservation efforts.

S.59-60) Direction for the following 2 (two) items: Read the following Passage and answer the items that follow. Your answers to these items should be based on the passages only.

PASSAGE 2

India's cultural heritage is a source of pride and identity, encompassing diverse traditions, languages, and art forms. While efforts have been made to preserve and promote India's cultural heritage through initiatives such as heritage conservation projects and cultural festivals, challenges such as urbanization, globalization, and cultural homogenization persist. Balancing modernization with cultural preservation, promoting cultural diversity, and fostering community engagement are essential for safeguarding India's rich cultural heritage.

59. What is one of the challenges faced by India's cultural heritage preservation efforts as mentioned in the passage?

- (a) Lack of government funding for cultural initiatives
- (b) Decline in interest among younger generations in traditional art forms
- (c) Threat of cultural homogenization due to globalization**
- (d) Limited documentation of India's cultural heritage sites

SOLUTION :

Threat of cultural homogenization due to globalization.

The passage highlights the threat of cultural homogenization due to globalization as one of the challenges faced by India's cultural heritage preservation efforts.

60. Based on the above passage, the following assumptions have been made:

1. Preservation and promotion efforts such as heritage conservation projects and cultural festivals are sufficient to safeguard India's cultural heritage.
2. Urbanization, globalization, and cultural homogenization have no significant impact on India's cultural heritage.

Which of the above assumptions are valid?

- (a) Both 1 and 2
- (b) Neither 1 nor 2**
- (c) Only assumption 1
- (d) Only assumption 2

SOLUTION :

Assumption 1 suggests that preservation and promotion efforts such as heritage conservation projects and cultural festivals are essential to safeguard India's cultural heritage. However, the passage highlights challenges such as urbanization, globalization, and cultural homogenization that persist despite these efforts. Therefore, it cannot be assumed that current efforts alone are sufficient to safeguard India's cultural heritage. Thus, assumption 1 is not valid.

Assumption 2 suggests that urbanization, globalization, and cultural homogenization have no significant impact on India's cultural heritage. However, the passage clearly mentions these challenges as persisting issues. Urbanization and globalization can lead to the loss of traditional practices and languages, while cultural homogenization can erode cultural diversity. Therefore, assumption 2 is not valid based on the information provided in the passage.

61. In a certain code, 'UPGRADE' is coded as 'FEEIAHA', in the same code, 'LIBERTY' is coded as

- (a) DIFAIDI
- (b) FIIEDAD
- (c) FIDAIDE**
- (d) DIIFAIDE

SOLUTION:

The logic is followed by substituting the number codes for previous and next letter of the given letter.

U	P	G	R	A	D	E	
↓	↓	↓	↓	↓	↓	↓	
20+22	15+17	6+8	17+19	26+2	3+5	4+6	
↓	↓	↓	↓	↓	↓	↓	ADDING THE NUMBERS
42	32	14	36	28	8	10	
↓	↓	↓	↓	↓	↓	↓	ADDING THE DIGITS TO SUM UPTO A SINGLE DIGIT
6	5	5	9	1	8	1	
↓	↓	↓	↓	↓	↓	↓	
F	E	E	I	A	H	A	

Similarly

L	I	B	E	R	T	Y	
↓	↓	↓	↓	↓	↓	↓	
11+13	8+10	1+3	4+6	17+19	19+21	24+26	
↓	↓	↓	↓	↓	↓	↓	ADDING THE NUMBERS
24	18	4	10	36	40	50	
↓	↓	↓	↓	↓	↓	↓	ADDING THE DIGITS TO SUM UPTO A SINGLE DIGIT
6	9	4	1	9	4	5	
↓	↓	↓	↓	↓	↓	↓	
F	I	D	A	I	D	E	

Directions for Questions 62 to 64: Read the following information carefully and answer the questions that follows:

In a newly constructed quarters for destitute army people family, there are a certain number of floors and no floor is vacant. Only one person of a family stays on each floor. Either person's age or person's name is given but not both among those who are living in the floors (Example: If A lives in third floor, his/her age is not given similarly the one whose age is 15 lives in fifth floor, his/her name is not given). Lowermost floor is numbered as one and above is two and so on.

- I. There are three floors between Mercy's floor and the floor of the one whose age is 20, lives.
- II. The one, whose age is 32, lives immediately below Mercy's floor.
- III. There are two floors between the one whose age is 20, lives and the one whose age 30, lives.
- IV. The one, whose age is 22, lives just above Anitha's floor.
- V. The one, whose age is 30, lives just above the Sona's floor.
- VI. The age of the person, who lives in the lowermost floor is not given.
- VII. Lakshmi lives on the floor which is three floors above the floor of the one, whose age is 22, lives.
- VIII. The one, whose age is 29, lives immediately below the Lakshmi's floor.

62. Four of the following five are alike in a certain way and hence form a group. Which of the following does not belong to the group?

- (a) The one whose age is 32
- (b) The one whose age is 29
- (c) The one whose age is 22
- (d) The one whose age is 20**

SOLUTION:

FLOORS	PERSON	AGE
9	MERCY	-
8	-	32
7	LAKSHMI	-
6	-	29
5	-	20
4	-	22
3	ANITHA	-
2	-	30
1	SONA	-

Following the table, we get "The, one whose age is 20, lives in the odd numbered (5th) floor".

Remaining 4 person given are living in even numbered floor.

Hence, option D is correct.

63. Whose age is 30?

- (a) The one who lives in 7th floor
- (b) The one who lives in 5th floor
- (c) The one who lives in 2nd floor**
- (d) The one who lives in 8th floor

SOLUTION :

Following the table, we get "The one who lives in 2nd floor".
Hence, option C is correct.

64. Who among the following lives on the floor that is second to the below of Mercy's floor?

(a) Lakshmi

- (b) The one whose age is 822
- (c) Anitha
- (d) The one whose age is 29

SOLUTION:

Following the table, we get "Lakshmi lives on the floor that is second to the below of Mercy's floor".
Hence, option A is correct.

65. What will come in the place of question mark?

15		2	9		7	13		16
	160			130			?	
5		6	4		6	11		8

- (a) 80
- (b) 96**
- (c) 100
- (d) 112

SOLUTION:

We have

$$(15 - 5) \times (2 + 6) = 80 \times 2 = 160,$$

$$(9 - 4) \times (7 + 6) = 65 \times 2 = 130,$$

$$\text{So, missing number} = (13 - 11) \times (16 + 8) = 48 \times 2 = 96.$$

66. Naren has a certain number of plants to distribute in his marriage, such that if he distributes them amongst ten people, he has nine left, if he distributes amongst nine people he has eight left, if he distributes amongst eight people he has seven left and so on until if he distributes amongst five people he should have four left. What is the second lowest number of plants he could have with him?

- (a) 2519
- (b) 7559
- (c) 8249
- (d) 5039**

SOLUTION:

Difference between the numbers and the remainder gives us a common difference

$$10 - 9 = 1$$

$$9 - 8 = 1$$

$$8 - 7 = 1 \text{ etc.,}$$

The least number would be (LCM of 10, 9, 8, 7, 6 and 5) - 1 = 2519.

The second least number = (2520 x 2) - 1 = 5039.

67. Mr. Peter noticed fifteen spiders running on the side wall of his bedroom. Exactly thirteen of them were black and two were white. He noticed that they were running on the wall in a random order such that no three of them were ever in the same straight line. Suddenly, three of the black spiders start following one of the white spiders such that, all four of them were in a single line. Then the maximum number of distinct straight lines that Peter can draw passing through any two spider is

- (a) 56
- (b) 44
- (c) 105
- (d) 100**

SOLUTION:

Initially there were $15C_2 = 105$ lines.

Now for the four spiders among themselves the number of lines decreased by

$$(4C_2 - 1) = 5 \text{ (decrease of 5 lines)}$$

Maximum distinct straight lines are $105 - 5 = 100$ possible lines.

68. A postman needs to deliver an urgent letter from the government office to Rakesh's house. He travels in cycle from government office to Rakesh's house at a constant speed. If he increases the speed of cycle by 6 kmph, it would take the him 4 hours less to cover that distance. And travelling with a speed 6 km/h lower than the initial speed, it would take him 10 hours more than the time he would have taken had he travelled at a speed 6 kmph higher than the initial speed. Find the distance between the government office and Rakesh's house.

- (a) 120 km
- (b) 600 km
- (c) 720 km**
- (d) 750 km

SOLUTION:

According to the question,

Let the Distance = D

Let the Speed = x

CASE 1

If the postman travels at an increased speed of 6 km/hr, it would take 4 hours less to cover the distance;

$$\frac{D}{x} - \frac{D}{x+6} = 4 \dots\dots(1)$$

CASE 2

If the postman travel at a speed lower than initial speed, it would take his 10 hours more than that of case 1:

$$\frac{D}{x-6} - \frac{D}{x+6} = 10 \dots\dots(2)$$

Solving (1) and (2), we get

$$6D = 5x^2 - 180 \dots\dots(3) \text{ and}$$

$$6D = 4x^2 + 24x \dots\dots(4)$$

(Subtracting Equation (3) from Equation (4) ,

$$x^2 - 24x - 180 = 0$$

$$x^2 - 30x + 6x - 180 = 0$$

$$x(x - 30) + 6(x - 30) = 0$$

$$x = 30$$

Using value of $x = 30$ in equation (4),

$$4(30)^2 + 24(30) = 6D$$

$$6D = 3600 + 720$$

$$6D = 4320,$$

$$D = 4320/6 = 720 \text{ km,}$$

The distance Between Government office to Rakesh's house is 720 km.

Directions for Questions 69: Read the following information carefully and answer the questions that follows:

The following consists of a question and some statements are given below it. You must decide whether the data provided in the statements are sufficient to answer the question:

69. What is the minimum possible LCM of two odd numbers if the power of any prime factor in these two numbers is not more than 3?

Statement 1: The HCF of two odd numbers is 225

Statement 2: Each of the odd number has 36 factors.

(a) The question can be answered by using one of the statements alone, but cannot be answered using the other statement alone.

(b) The question can be answered by using either of the statement alone.

(c) The question can be answered by using both the statements together.

(d) The question cannot be answered even by using both the statements together.

SOLUTION:

Since both the numbers are odd, there are no 2's in their prime factors.

Since, their HCF is 225, both these numbers would necessarily have $3^2 \times 5^2$ inside them.

From the information, that both these numbers have 36 factors, we can realise that 36 factors can only occur in cases where the prime factors of the numbers look as follows:

$$(p^8 \times q^3); (p^{11} \times q^2); (p^2 \times q^3 \times r^2) \text{ and } (p^2 \times q^2 \times r \times s)$$

Amongst these, the best strategy to make smaller numbers satisfying the criteria would obviously be to use the structures: $(p^2 \times q^3 \times r^2)$ and $(p^2 \times q^2 \times r \times s)$

Since, the third prime factor of the two numbers cannot be the same (else it would change the HCF), we would need to introduce 7 and 11.

Also, we would not try to increase the powers of 7 and 11 as they are comparatively larger as compared to 3 and 5.

Thus, we can visualize the numbers: $3^2 \times 5^2 \times 11 \times 13$ and $3^3 \times 5^2 \times 7^2$

The required smallest LCM would be $3^3 \times 5^2 \times 7^2 \times 11 \times 13$.

70. Rohini Silver screen cinemas in Chennai was renovated in which the present number of seats became 10% less than the previous number of seats. The number of rows was reduced by five but each row contains five seats more than before. How many rows and how many seats in a row were there initially in the hall if there were initially 500 seats?

(a) 20 rows and 25 seats

- (b) 20 rows and 20 seats
(c) 10 rows and 50 seats
(d) 50 rows and 10 seats

SOLUTION:

Let, us assume there are X rows and the number of seats in each row be Y. So, according to the question,

$$XY = 500 \dots (1)$$

Now, after the reconstruction of the theatre, the total number of seats became 10% less. So, total number of seats left

$$500 - 10\% \text{ of } 500$$

$$500 - 50 = 450$$

Now, according to question the number of rows was reduced by 5 and seats in each row now contained 5 seats more. So,

$$(X-5)(Y+5) = 450$$

$$XY + 5X - 5Y - 25 = 450$$

$$XY + 5(X - Y) = 475 \dots (2)$$

Now, putting the value of XY from eq. 1 in eq. 2, we get

$$500 + 5(X - Y) = 475$$

$$5(X - Y) = -25$$

$$X - Y = -5 \text{ (OR) } Y = X + 5 \dots (3)$$

Now, putting the value of Y from eq. 3 to eq. 1, we get

$$X(X + 5) = 500$$

$$X^2 + 5X - 500 = 0$$

$$X^2 + (25 - 20) * X - 500 = 0$$

$$X^2 + 25X - 20X - 500 = 0$$

$$(X + 25)(X - 20) = 0$$

$$X = 20, -25$$

Since, here X represents the number of rows, so can't be negative. Therefore X = 20. So, the number of seats in each row can be obtained by putting the value of X in eq. 1, we get

$$20Y = 500$$

$$Y = 25$$

Hence the total rows are 20 and seats in each row are 25.

71. There are three containers x, y, z. In container x, the ratio of milk and water is 2: 1, in container y the ratio of water and milk is 2: a. If container x and y are mixed in the ratio of 2:3, to get 100 litres of a mixture having milk and water in the ratio 3: 1. If after inspection, it was found that container x, is actually a mixture of milk and water in the 1:2 ratio, then the ratio of milk and water in the final mixture will be?

(a) 23/37

(b) 37/23

(c) 27/33

(d) 33/27

SOLUTION:

Quantity of x in the container of 100 litres = 40 litres.

Quantity of y in the container of 100 litres = 60 litres.

Quantity of milk in final mixture = $100 \times \frac{3}{4} = 75$ litres.

Quantity of water in final mixture = $100 - 75 = 25$ litres.

In container x, is actually a mixture of milk and water in the ratio 1: 2.

Thus, the quantity of milk in 40 litres of the mixture x would be = $40/3$ litres

Therefore, in the final mixture, the quantity of milk will get reduced by $40/3$ will be increased by $40/3$ litres and quantity of water litres.

This would mean that the required ratios would be:

$$\frac{75 - \frac{40}{3}}{25 + \frac{40}{3}}$$

$$= 185/115 = 37/23.$$

72. In an examination, Pinky's score was one-tenth of the sum of the scores of Meenakshi and Jaya. After a review, the score of each of them increased by 8 marks. The revised scores of Jaya, Meenakshi and Pinky were in the ratio 13:11: 4. Then Jaya's score exceeded Pinky's score by

(a) 44

(b) 40

(c) 36

(d) 32

SOLUTION :

Let the scores of Pinky, Meenakshi and Jaya be P, M and J.

We are given that, $P = (M + J)/10$

New scores for the three of them are $P + 8$, $J + 8$ and $M + 8$.

Also, we have $J + 8 = 13n$; $M + 8 = 11n$ and $P + 8 = 4n$

-> $J = 13n - 8$; $M = 11n - 8$ and $P = 4n - 8$

So, $P = (M + J)/10$

$4n - 8 = (11n - 8 + 13n - 8)/10$

$n = 4$

Hence, Jaya's original score = $13n - 8 = 44$,

Pinky's original score = $4n - 8 = 8$,

The required answer is $44 - 8 = 36$.

73. Before 20 years in Delhi when the price of diesel was Rs 30 per liter, Sunil Tiwari a cab driver was able to earn 20% profit for a trip if he carries 3 children. Find the percentage profit for the same journey if he goes for four children per trip and the price of diesel reduces by 20%. (Assume that revenue per passenger is the same in both the cases.)

(a) 33.33%

(b) 65.66

(c) 100%

(d) Data inadequate

SOLUTION :

3 passengers fare = $3x$

Diesel Expense = Rs. 30

Profit = 20% of 30 = Rs. 6

His total earning = Rs. 36

Each Passenger fare = Rs.12

4 passengers fare = $12 \times 4 = 48$

Diesel expense = Rs. 24 (20% of 30 = 6, $30 - 6 = 24$)

His profit = $48 - 24$ (Which is 100%)

ALTERNATE METHOD

The cost of the trip would be proportional to the price of Diesel.

So, if initially the cost is 100, the new cost would be 80.

Also, initially since his profit is 20%, his revenue would be 120.

When he takes 4 children instead of 3 his revenue would go up to 160 - and his profit would become 100% (cost 80 and revenue 160).

74. From a container full of cooking oil in a provision store, Shruthi steals 4 kg of it. She then fills it with crude oil to compensate the theft. Thinking that it would be insufficient for her to meet family demands, she steals 4 kg of the mixture again, and fills it with crude oil. When the cooking oil is checked by the owner it was found that there was 36 kg of cooking oil for every 13 kg of crude oil. What was the initial amount of the cooking oil in the container?

(a) 7 kg

(b) 14 kg

(c) 21 kg

(d) 28 kg

SOLUTION :

Let initial amount be x

Total ratio $\left(1 - \frac{\text{Repeated quantity}}{\text{Initial quantity}}\right)^2 = \text{Part of liquid ratio}$

$$49 \left(1 - \frac{4}{x}\right)^2 = 36$$

$$\left(1 - \frac{4}{x}\right)^2 = \frac{36}{49}$$

$$1 - \frac{4}{x} = \frac{6}{7}$$

$$\frac{4}{x} = \frac{1}{7}$$

$$x = 28 \text{ kg}$$

ALTERNATIVE METHOD

It can be seen from the ratio 36:13 that the proportion of cooking oil to crude oil is 36/49 after two mixings.

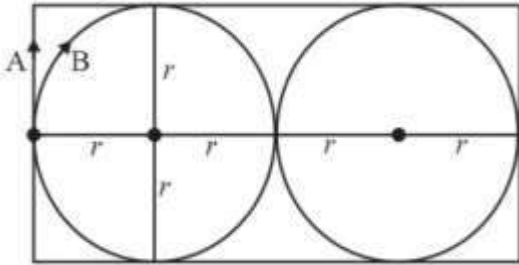
This means that $6/7^{\text{th}}$ of the cooking oil must have been allowed to remain in the container and hence $1/7^{\text{th}}$ of the container's original cooking oil, would have been drawn out by Shruthi.

Since she takes out 4 kg every time, there must have been 28 kg in the container. (as 4 is $1/7^{\text{th}}$ of 28).

75. Rahul and Chitra are school children who does regular skating practice in Nehru Stadium. The skating space inside the stadium has two identical circular tracks touching each other, and a rectangular track enclosing the two circles. The edges of the rectangles are tangential to the circles. Both started to skate simultaneously from the point where one of the circular tracks touches the smaller side of the rectangular track. Rahul skates along the rectangular track, while Chitra skates along the two circular tracks in a figure of eight. Approximately, how much faster than Rahul does Citra have to skate, so that they take the same time to return to their starting point?

- (a) 3.88%
- (b) 4.22%
- (c) 4.44%
- (d) 4.72%**

SOLUTION:



Distance covered by Rahul = $2r + 2r + 4r + 4r = 12r$

Distance covered by Chitra = $2\pi r + 2\pi r = 4\pi r$

The percentage difference in speed should be such that Chitra should be able to cover the extra distance in the same time. Since, time is constant, the percentage difference of speed would be equal to the percentage difference of distance. This, would be given by

$$\left(\frac{4\pi r - 12r}{12r}\right) \times 100$$

= 4.72% approximately.

76. Mr. X has a due payment of ₹12820 for his daughter’s school fees. The school gave him an option of part payment of this amount in three installments along with an interest rate of 10% in which the first instalment is 1/2 the second instalment and the second instalment is 2/3 of the third instalment. What is the first installment he paid?

- (a) 2400
- (b) 1800
- (c) 2000**
- (d) 2500

SOLUTION:

Instalments in the ratio 1:2:3.

So,

$$x(1 + 10/100)^2 + 2x(1 + 10/100) + 3x = 12820.$$

$$x(1.1)^2 + 2x * 1.1 + 3x = 12820.$$

$$1.21x + 2.2x + 3x = 12820$$

$$6.41x = 12820.$$

$$x = 12820/6.41 = \text{Rs. } 2000.$$

The Instalment would be Rs. 2000.

ALTERNATE SOLUTION

Solve using options.

Option (c) fits the situation as:

$12820 = 2000 + 2 \text{ years interest on } 2000 + 4000 + 1 \text{ year's interest on } 4000 + 6000$ (use 10% compound interest for calculation of interest)

$$\rightarrow 12820 = 2000 + 420 + 4000 + 400 + 6000$$

Thus, option (c) fits the situation perfectly.

77. It takes seven workers a total of ten hours to complete a painting task. The contractor entrusted with the job hired eight workers to do the job at 10AM. He added one extra worker per hour starting at 3.00PM. At what time will the painting job be completed?

(a) 5.00AM

(b) 6.00AM

(c) 5.00PM

(d) 6.00PM

SOLUTION :

The total work is $10 \times 7 = 70$ -man hours.

From 10AM to 3PM, the work done would be $8 \times 5 = 40$ manhours.

From 3PM to 4PM, 9 manhours would get done.

From 4PM to 5PM, 10 manhours would get done,

And from 5PM to 6PM, 11 manhours would get done.

Thus, $40 + 9 + 10 + 11 = 70$ and the job would get completed at 6PM.

78. An apartment has a metro water tank in the shape of an inverted cone and three pipes are connected in such a way two inlet pipes, P and Q, are connected to the top of the tank, and can fill the empty tank in 8 hours and 12 hours, respectively. The outlet pipe R, connected to the bottom, can empty a filled tank in 4 hours. When the tank is completely filled with water, all three pipes are opened. Two of the three pipes remain open for 20 hours continuously and the third pipe remains open for a lesser time. As a result, the height of the water inside the tank comes down to 50%. Which of the following options would be possible?

(a) Pipe P was open for 19 hours.

(b) Pipe P was open for 19 hours 30 minutes.

(c) Pipe Q was open for 19 hours 30 minutes.

(d) Pipe R was open for 19 hours 50 minutes

SOLUTION :

Height of cone comes down to 50%, => It becomes $1/2$

=> Volume would become $1/8$ as radius will also become half (by similar triangles) Let the capacity of cone = 24 litres

$$\text{Volume of water run-off} = 24 - \frac{1}{8} \times 24 = 21 \text{ litres}$$

$$\text{Volume of water left in the cone} = \frac{1}{8} \times 24 = 3 \text{ litres}$$

$$\text{Pipe P's efficiency} = 24/8 = 3 \text{ litres/hr}$$

Pipe Q's efficiency = $24/12 = 2$ litres/hr

Pipe R's efficiency = $24/-4 = -6$ litres/hr

All will run 19 hours simultaneously (going by the options)

=> Net effect = $(3+2-6) \times 19 = -19$ litres

This means that after 19 hours, 19 litres of water have been removed, we need to remove 2 more litres as per the requirement.

Thus, R will definitely run for another hour

If we run P and R together for the 20th hour, net effect = $(3 - 6) \times 1 = -3$ litres

Run Q for 30 minutes => $2 \times \frac{1}{2} = 1$ litres

Hence, Volume of water removed = $-19 - 3 + 1 = -21$ litres

Thus, Pipe Q was open for 19 hours 30 minutes.

79. Badri went to the Mumbai motor vehicle registration authority to register his new car and the number issued was MH-5S 2234. The authority announced that all the numbers and alphabets before this have been used up. How many vehicles have a registration number starting with MH-5?

(a) 1,92,234

(b) 1,82,235

(c) 1,72,227

(d) 1,63,229

SOLUTION:

The total number of registration numbers starting with MH-5A to MH-5R and the number of registration numbers starting with MH-5S that have also be counted,

MH-5_ _ _ _ _ can be filled as 1 place can be A-Z, next will be 0000-9999.

So up to S, 18 letters possible, 1000 number possible at after each letter,

Hence, from MH-5A0000 to MH-5R9999 = $18 \times 10000 = 180000$

MH-5S0000 to MH-5S2234 = $1 \times 2235 = 2235$

Number of vehicles have a registration number starting with MH-5 = 182235.

80. In the science 2024 expo, a man was having a lucky draw box containing 40 tickets, numbered with the integers from 1 to 40. No two tickets are numbered with the same integer. Likewise, there was a woman who had another box containing only five tickets that are numbered with the integers from 1 to 5, with no integer repeating. Srikanth randomly draws one ticket each from the man's and woman's box and notes down their respective numbers. If Srikanth divides the number obtained from the man's box by the number obtained from the woman's box, what is the probability that the remainder will not be greater than 2?

(a) 0.91

(b) 0.87

(c) 0.94

(d) 0.73

SOLUTION:

The number of ways of selecting one ticket from the man's box and other from The woman's box = $40C1 \times 5C1 = 200$ ways

Favorable cases:

Tickets 1 or 2 or 3: if ticket 1 or 2 or 3 is drawn from the woman's box remainder in each case will be less than or equal to 2.

Favorable cases = $40C1 \times 3C1 = 120$ ways

Ticket 4: If ticket 4 is drawn from the woman's box we need to eliminate those cases when the remainder will be 3.

We need to eliminate those Tickets from the man's box which have number of the form $4x + 3$.

Tickets of the form $4x + 3$ are 3, 7, 11, 39 ie, 10 Tickets.

Favorable cases $(40-10) \times 1 = 30$ ways.

Ticket 5: If ticket 5 is drawn from the woman's box we need to eliminate those cases when the remainder will be 3 or 4.

We need to eliminate those Tickets from the man's box which have number of the form $5x + 3$ or $5x + 4$

Tickets of the form $5x + 3$ are 3, 8, 13, 38 i.e., 8 Tickets.

Tickets of the form $5x + 4$ are 4, 9, 14, ..., 39 i.e., 8 Tickets.

Favorable cases = $(40-16) \times 1 = 24$ ways

Total Favorable cases = $120 + 30 + 24 = 174$ ways

Probability of remainder not greater than 2 = $174/200 = 0.87$

Hence, option (b) is correct.