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Directions for following 3 (three) items: Read the following **three passages** and answer the items that follow the passages. Your answers to these items should be based on the passages only.

PASSAGE-1

Regionalism in India has been both a boon and a bane for the country's development. The diverse cultures and languages of the different regions have contributed to India's rich cultural heritage. However, regionalism has also led to disparities in development, with some areas experiencing accelerated growth while others remain neglected. Regional political parties often cater to their respective constituencies, prioritizing regional interests over national concerns. It is crucial for India to strike a balance between preserving its cultural diversity and ensuring equitable development for all regions. The central government should collaborate with regional parties to create policies that benefit the nation as a whole, without compromising regional aspirations.

1. Which of the following can be the consequences of regionalism in India?

1. Rich cultural heritage.
2. Disparities in development.
3. Prioritization of regional interests over national concerns.

Select the correct answer using the code given below:

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

Answer: D

Explanation:

Regionalism in India has various consequences as mentioned in the passage. The diverse cultures and languages of the different regions contribute to India's rich cultural heritage (option 1). On the other hand, regionalism has led to disparities in development, with some areas experiencing accelerated growth while others remain neglected (option 2).

Furthermore, regional political parties often cater to their respective constituencies, prioritizing regional interests over national concerns (option 3).

Hence Option D is correct.

PASSAGE-2

Addressing poverty demands a holistic approach that takes into consideration the multiple dimensions of deprivation faced by individuals and communities. Focusing solely on income poverty overlooks crucial factors such as access to quality education, healthcare and basic infrastructure. To develop a more comprehensive understanding of poverty, it is essential to incorporate these aspects into the measurement process. By doing so, policymakers can better target resources and design interventions that address the root causes of poverty, rather than merely alleviating its symptoms.

2. What is the author's perspective on the need for a holistic approach to addressing poverty in this paragraph?

- (a) The author argues that a multidimensional approach is necessary for effective policy-making.

- (b) The author criticizes the current focus on income poverty as ineffective.
- (c) The author emphasizes the importance of education and healthcare in poverty reduction.
- (d) The author suggests that existing poverty measures are sufficient for designing interventions.

Answer: A

Explanation:

In this paragraph, the author emphasizes the importance of a holistic approach to addressing poverty by considering multiple dimensions of deprivation, such as education, healthcare, and basic infrastructure. The focus is on incorporating these aspects into the measurement process for a more comprehensive understanding of poverty. This understanding is essential for effective policymaking, as it enables policymakers to better target resources and design interventions that address the root causes of poverty, rather than merely alleviating its symptoms. The correct answer is (a) because the author argues that a multidimensional approach is necessary for effective policymaking.

PASSAGE-3

Water scarcity is becoming a growing concern in many regions across the globe, posing a significant threat to agricultural productivity. As the global population continues to increase, the demand for water for irrigation, household use, and industrial processes is expected to grow exponentially. However, freshwater resources are finite and under pressure from various factors, including climate change, pollution, and unsustainable use. Innovative solutions, such as water-saving technologies and practices, are crucial for addressing this challenge. Developed countries have made substantial progress in implementing water-efficient technologies, such as precision irrigation and drought-resistant crops. These advancements have the potential to transform agricultural practices in developing countries, where water scarcity is often a major constraint to food production. By adopting and adapting these technologies, developing countries can enhance their water use efficiency and secure food production for their growing populations.

3. The passage is based on the idea that:

- 1. Water scarcity is a global problem that affects agricultural productivity.
- 2. Developed countries are at the forefront of implementing water-efficient technologies.

Which of the above given statements is/are valid?

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

Answer: C

Explanation:

The passage discusses the growing concern of water scarcity and its impact on agricultural productivity around the world, validating statement 1. The text also highlights how developed countries have made significant progress in implementing water-efficient technologies, such as precision irrigation and drought-resistant crops, which supports statement 2. Therefore, both statements 1 and 2 are valid.

Hence Option C is correct.

4. Consider a set of numbers $N = \{1, 2, 3, \dots, 10\}$. A pair of numbers (a, b) is selected from the set such that their LCM is equal to their product ($ab = \text{LCM}(a, b)$). If we choose a number 'x' from the set at random, what is the probability that 'x' is a part of at least one such pair?
- (a) $1/2$
(b) $7/10$
(c) $2/5$
(d) $3/5$

Answer: B

Explanation:

The Least Common Multiple (LCM) of two numbers is the smallest multiple that is divisible by both numbers. In this problem, we need to find pairs of numbers such that their product (ab) is equal to their LCM.

Recall that for two numbers a and b , their product (ab) is equal to their LCM if and only if they are coprime, meaning they have no common divisors other than 1.

Now, let's find the number of coprime pairs in the set $N = \{1, 2, 3, \dots, 10\}$:

- 1 is coprime with all numbers (2, 3, 4, 5, 6, 7, 8, 9, 10): 9 pairs.
- 2 is coprime with (3, 5, 7, 9): 4 pairs.
- 3 is coprime with (4, 5, 7, 10): 4 pairs.
- 4 is coprime with (5, 7, 9): 3 pairs.
- 5 is coprime with (6, 7, 8, 9): 4 pairs.
- 6 is coprime with (7, 10): 2 pairs.
- 7 is coprime with (8, 9): 2 pairs.
- 8 is coprime with (9): 1 pair.
- 9 is coprime with (10): 1 pair.

To find the probability that 'x' is a part of at least one such pair, we need to find the total number of distinct numbers that appear in these pairs.

There are 7 such numbers: {1, 2, 3, 4, 5, 6, 7}. The number 8, 9, and 10 do not appear in any of these pairs.

Thus, the probability of a randomly chosen number 'x' being part of at least one such pair is:

(Number of distinct numbers in the coprime pairs) / (Total number of numbers in the set) = $7/10$

Hence Option B is correct.

5. In a school, there are a total of 80 students. The ratio of boys to girls is 3:5. If a group of students is selected randomly, what is the probability that the group has an equal number of boys and girls?
- (a) $3/8$
(b) $15/64$
(c) $27/80$
(d) $9/25$

Answer: C

Explanation:

Given that the ratio of boys to girls is 3:5, we can find the number of boys and girls in the school.

Total ratio parts = 3 + 5 = 8 Number of boys = $(3/8) * 80 = 30$ Number of girls = $(5/8) * 80 = 50$

Now, we need to find the probability of selecting a group with an equal number of boys and girls. To do this, we can use combinations to find the number of ways to select equal numbers of boys and girls and divide it by the total number of ways to select students.

Let's say we choose 2 boys and 2 girls. The number of ways to select 2 boys from 30 is $C(30,2)$ and the number of ways to select 2 girls from 50 is $C(50,2)$.

$$C(30, 2) = 30! / (2! * (30-2)!) = 435$$

$$C(50, 2) = 50! / (2! * (50-2)!) = 1225$$

The number of ways to select a group with 2 boys and 2 girls is $435 * 1225 = 532875$.

The total number of ways to select any 4 students from the 80 students is $C(80, 4)$.

$$C(80, 4) = 80! / (4! * (80-4)!) = 1581580$$

Now, we can find the probability of selecting a group with an equal number of boys and girls:

Probability = (Number of ways to select a group with equal boys and girls) / (Total number of ways to select students)

$$= 532875 / 1581580$$

$$= 27/80$$

Hence Option C is correct.

6. A store has three types of candies: A, B, and C. The ratio of the costs of candies A, B, and C is 3:4:5. If the cost of 4 candies A, 3 candies B, and 2 candies C is Rs6.80, what is the cost of each candy?

- (a) A: Rs0.50, B: Rs0.70, C: Rs0.90
 (b) A: Rs0.60, B: Rs0.80, C: Rs1.00
 (c) A: Rs0.40, B: Rs0.60, C: Rs0.80
 (d) A: Rs0.30, B: Rs0.50, C: Rs0.70

Answer: B

Explanation:

Explanation: Let the costs of candies A, B, and C be 3x, 4x, and 5x, respectively.

We have $4(3x) + 3(4x) + 2(5x) = 6.80$.

Solving for x, we get $x = 0.20$. Thus, the costs are A: Rs0.60, B: Rs0.80, C: Rs1.00.

7. In a factory, the efficiency of three machines A, B, and C is in the ratio 4:5:6. If machine A can complete a job in 20 hours, how long will it take for all three machines to complete the same job working together?
- (a) 6 hours
 (b) 8 hours
 (c) 10 hours
 (d) 12 hours

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Answer: C

Explanation: The efficiency of machines A, B, and C is in the ratio 4:5:6.

Let the efficiency of A be $4x$, B be $5x$, and C be $6x$.

Since machine A can complete the job in 20 hours, the work done by A in 1 hour is $1/20$. Thus, $4x = 1/20$, and $x = 1/80$.

Now, the efficiency of B is $5x = 5/80 = 1/16$, and the efficiency of C is $6x = 6/80 = 3/40$.

When all three machines work together, their combined efficiency is the sum of their individual efficiencies: $(1/20) + (1/16) + (3/40) = 1/10$.

Therefore, it will take them $1/(1/10) = 10$ hours to complete the job together.

Hence Option C is correct.

Directions for following three questions: Answer the following three questions based on the information given below:

Five Indian cities namely 'A', 'B', 'C', 'D', and 'E' are famous for their lovely gardens, fancy jewellery, educational institutes, blue pottery and scents, but not in the same order. Each city is famous for one of the five important features mentioned above.

- 'A' and 'C' are not famous for either educational institutes or gardens.
- 'B' and 'E' are neither famous for jewellery nor scents.
- Scents and jewellery have nothing to do with 'A'.
- 'D' and 'E' are not famous for gardens and jewellery.
- 'D' is not famous for educational institutes.

8. Which of the following cities is famous for lovely gardens?

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

Answer: B

Explanation:

Indian cities	Features
A	Blue Pottery
B	Garden
C	Jewellery
D	Scents
E	Education

9. Which city has become famous for blue pottery?

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

Answer: B

Explanation:

Indian cities	Features
A	Blue Pottery
B	Garden
C	Jewellery
D	Scents
E	Education

10. City 'E' is famous for which of the following?

- (a) Jewellery
- (b) Lovely Gardens
- (c) Scents
- (d) Educational Institutes

Answer: D

Explanation:

Indian cities	Features
A	Blue Pottery
B	Garden
C	Jewellery
D	Scents
E	Education

Directions for following 3 (three) items: Read the following **three passages** and answer the items that follow the passages. Your answers to these items should be based on the passages only.

PASSAGE-1

Urbanization is rapidly changing the face of our planet, with cities expanding at an unprecedented rate. This growth presents both challenges and opportunities for the environment and biodiversity. As cities expand, natural habitats are being replaced by concrete jungles, leading to a decline in biodiversity and an increase in pollution. However, urban areas also offer unique opportunities for

promoting environmental sustainability and conservation efforts. Green infrastructure, such as parks and green roofs, can provide vital habitats for various species and help mitigate the negative effects of urbanization on the environment. Furthermore, sustainable urban planning and design can help reduce the ecological footprint of cities and promote a more harmonious coexistence between humans and nature. Educating the public about the importance of biodiversity and environmental conservation is crucial for fostering a sense of responsibility and commitment to preserving our planet's fragile ecosystems.

11. Based on the passage, which of the following inferences can be drawn?

1. Urbanization contributes to the decline of biodiversity and an increase in pollution.
2. Green infrastructure can help mitigate the negative effects of urbanization on the environment.
3. Public education is an essential component of promoting environmental conservation in urban areas.

Select the correct answer from the code given below:

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

Answer: D

Explanation:

The passage highlights the challenges posed by urbanization, such as the decline of biodiversity and increase in pollution, validating statement 1. It also emphasizes the potential benefits of green infrastructure in mitigating the negative effects of urbanization on the environment, supporting statement 2. Lastly, the passage underlines the importance of public education in promoting environmental conservation, which confirms statement 3. **Hence Option D is correct.**

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PASSAGE-2

As digital technology continues to advance, its impact on our daily lives becomes increasingly pronounced. With the widespread availability of smartphones, tablets, and computers, people now have access to a vast array of information and services at their fingertips. This digital revolution has altered the way we communicate, work, and entertain ourselves, bringing about significant changes in our social and cultural behaviours. One notable consequence of this shift is the growing prevalence of online shopping, which has not only transformed the retail industry but also led to changes in consumer habits. As people become more comfortable purchasing goods and services online, there is an increased demand for efficient and sustainable delivery methods. To meet this need, innovations in transportation and logistics, such as drone deliveries and electric vehicles, are being developed and implemented. These advancements have the potential to reduce the environmental impact of shipping and contribute to a more sustainable future.

12. Which of the following statements best captures the main idea of the passage?

- (a) The digital revolution has led to changes in the way we communicate and work, necessitating innovations in transportation and logistics.

- (b) Online shopping has transformed the retail industry and led to the development of more sustainable delivery methods.
- (c) Digital technology has changed our social and cultural behaviours, leading to the increased demand for efficient and sustainable delivery methods.
- (d) Environmental concerns should drive the adoption of innovative transportation and logistics solutions in response to the growth of online shopping.

Answer: C

Explanation:

The passage primarily discusses how digital technology has altered our social and cultural behaviours, resulting in increased demand for efficient and sustainable delivery methods. This is best captured by option C, which highlights the connection between the changes brought about by digital technology and the need for sustainable delivery solutions.

PASSAGE-3

In today's fast-paced world, the pursuit of success and productivity has led to a growing emphasis on efficiency and time management. As a result, people are constantly seeking ways to optimize their daily routines, often at the expense of their personal well-being and mental health. This relentless focus on productivity has led to a decline in the importance of self-reflection and contemplation, as individuals prioritize work and achievement over personal growth and self-awareness. Consequently, the pursuit of leisure and relaxation has been reduced to mindless entertainment, such as binge-watching television shows or scrolling through social media feeds, rather than engaging in more meaningful activities that foster intellectual and emotional development. This shift in priorities has had a profound impact on the values and aspirations of modern society, with the pursuit of success overshadowing the pursuit of self-improvement and fulfilment.

13. According to the passage, the primary concern of modern society is:

- (a) The decline of intellectual and emotional development due to excessive focus on productivity.
- (b) The need for individuals to prioritize personal growth and self-awareness over work and achievement.
- (c) The negative impact of technology and social media on mental health and well-being.
- (d) The increasing dependence on mindless entertainment as a means of relaxation and leisure.

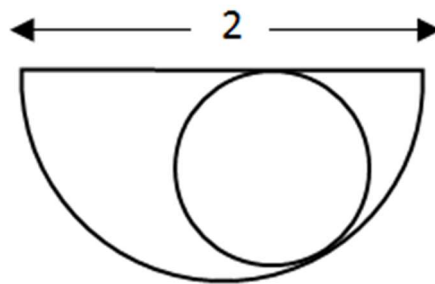
Answer: A

Explanation:

The passage mainly emphasizes the concern that modern society's excessive focus on productivity has led to a decline in intellectual and emotional development. This is best represented by option A, which highlights the consequences of prioritizing work and achievement over personal growth and self-awareness.

14. A circle is inscribed in another semi-circle. What could be the radius of the inscribed circle?

- (a) $1 - \sqrt{2}$
- (b) $\sqrt{2} - 1$
- (c) $(1 + \sqrt{2})/2$
- (d) $\sqrt{2} - 0.5$



Answer: B

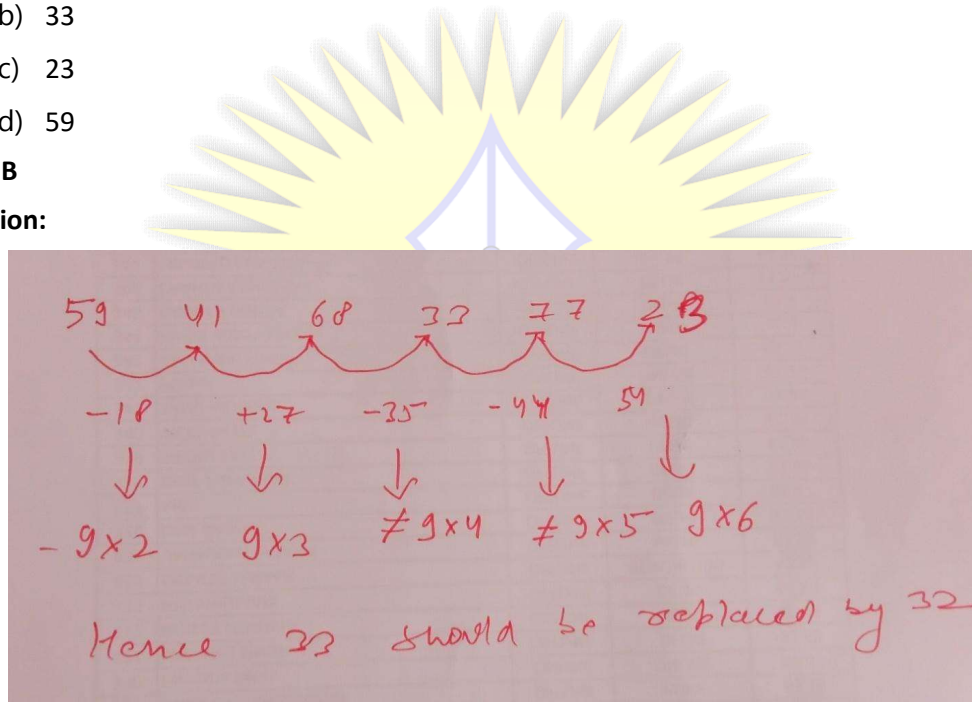
Explanation: Don't apply geometry formulas in such questions. You must observe that the diameter of the inscribed circle is less than 1. So, the radius should be less than .5. Now go to the options and observe that only $\sqrt{2} - 1$ is close to 0.5, but other options are not.

15. The odd number in the series 59, 41, 68, 33, 77, 23 is ?

- (a) 41
- (b) 33
- (c) 23
- (d) 59

Answer: B

Explanation:



16. The price of a car is P. The dealer raises its price by X% and then offers Y% discount on the raised price. The discounted price again becomes P. Also, given is that Y is the difference between X and Y. What would be X?

- (a) 75
- (b) 50
- (c) 100
- (d) 66.666

Answer: C

Explanation:

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Given $X - Y = Y$; So, $X = 2Y$

Also, you know that whenever the price of a commodity is increased by $1/N$, then, to get the original price, we must discount the increased price by $1/(N+1)$. By this logic, the increase in price ($X\%$) can be twice (i.e. $X = 2Y$) of the decrease in price, only when $N = 1$, i.e. increase in price is 100%, and decrease in price is 50% (i.e. $Y = 50\%$)

Another method: $P(1 + X\%)(1 - Y\%) = P$; therefore, $1 = (1 + X\%)(1 - X/2\%)$ {given that $X = 2Y$ }

Now use options to find the value of X ; You will observe that $1 = (1 + 1)(1 - .5)$; therefore $X = 100\%$

17. M litres of pure milk is available. Now one takes out P litres of milk and replaces with equal quantity of water, then after n such operations how much milk would remain?

- (a) $M(1 - P/M)^n$
- (b) $M(1/P - M/P)^n$
- (c) M/P
- (d) $(M/P)^{1 - N}$

Answer: A

Explanation:

After one operation the volume of milk left would be $M(M - P)/M$; after 2 operations $M(1 - P/M)^2$, and so on....

18. How many daughters does W have?

Statement 1: B and D are the sisters of M.

Statement 2: M's father T is the husband of W.

Statement 3: Out of the three children which T has, only one is a boy.

Select the correct answer from the Options given below:

- (a) 1 and 3 are sufficient to answer the question.
- (b) All 1, 2 and 3 are required to answer the question.
- (c) 2 and 3 are sufficient to answer the question.
- (d) The question cannot be answered even with all 1, 2 and 3.

Answer: C

Explanation:

From Statement II, T is the husband of W i.e., T and W are a married couple.

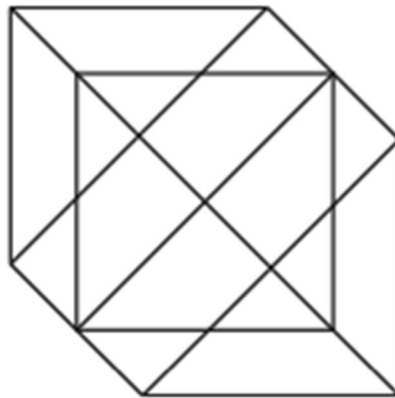
From Statement III, out of 3 children of T, one is a boy i.e., he has two daughters and one son.

By combining Statements II and III, W has two daughters.

So, Statements II and III are sufficient to answer the question.

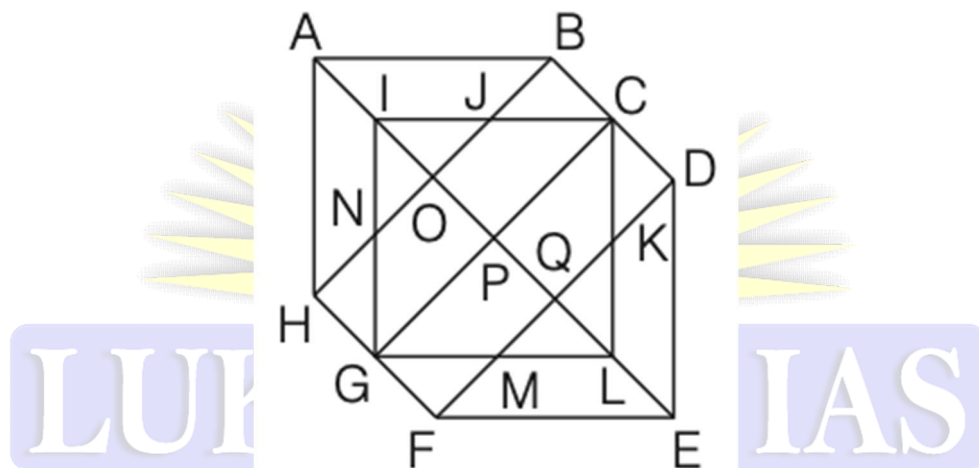
19. Find the number of triangles in the figure given below:

- (a) 18
- (b) 20
- (c) 24
- (d) 27



Answer: C

Explanation:



Single triangles are BCJ, CDK, KLO, LMO, FGM, GHN, NOI, IJO, AOB, DEQ, FEQ, AOH, GIP, CIP, CLP, GLP = 16

Triangles formed with two triangles KLM, NIJ = 2

Triangles formed with four or more triangles ABH, DEF, ICG, CLG, LGI, ICL = 6

\therefore Total number of triangles = $16 + 2 + 6 = 24$

20. A four-digit number is formed using only the digits 4, 5 and 6, such that both 5 and 6 appear at least once. The number of all such four-digit numbers is?

- (a) 60
- (b) 55
- (c) 50
- (d) 45

Answer: C

Explanation: 5 and 6 has to appear at least once, so the remaining two digits could be (4, 4), (4, 5), (5, 5), (6, 4), (6, 6), (5, 6)

Therefore the total counting ways of

$$\begin{array}{ccc} \underline{4} \underline{4} \underline{5} \underline{6} & = & \frac{4!}{2!} = 12 \\ \underline{4} \underline{5} \underline{6} \underline{5} & = & \frac{4!}{2!} = 12 \\ \underline{5} \underline{5} \underline{5} \underline{6} & = & \frac{4!}{3!} = 4 \\ \underline{6} \underline{4} \underline{5} \underline{6} & = & \frac{4!}{2!} = 12 \\ \underline{6} \underline{6} \underline{5} \underline{6} & = & \frac{4!}{3!} = 4 \\ \underline{6} \underline{5} \underline{5} \underline{6} & = & \frac{4!}{2!2!} = 6 \end{array}$$

$\therefore 12 + 12 + 4 + 12 + 4 + 6$
 $= 50 \text{ ways.}$

Directions for following 4 (four) items: Read the following **three passages** and answer the items that follow the passages. Your answers to these items should be based on the passages only.

PASSAGE-1

The rise of automation and artificial intelligence in the modern workplace has created a pressing need for individuals to adapt and acquire new skills to remain competitive in the job market. This rapid technological transformation is expected to continue for the foreseeable future, with numerous industries integrating advanced technologies into their daily operations. As a result, the emphasis on lifelong learning and continuous skill development is becoming increasingly important. Countries that invest in education and training programs for their working-age population can harness this opportunity to boost their economies and drive innovation. However, the success of these initiatives largely depends on the accessibility and quality of education and the willingness of individuals to embrace lifelong learning as a crucial component of their professional development.

21. What is the primary factor determining the success of harnessing the potential of a technologically advanced workforce?

- (a) The government's investment in advanced technology industries.
- (b) The availability and quality of education and training programs for the working-age population.
- (c) The ability of industries to adapt to the rapid technological transformation.
- (d) The rapid growth of the artificial intelligence and automation sectors.

Answer: B

Explanation:

The passage emphasizes that the success of harnessing the potential of a technologically advanced workforce is determined by the availability and quality of education and training programs for the working-age population. This highlights the importance of lifelong learning and continuous skill development in adapting to the rapidly changing job market due to technological advancements.

PASSAGE-2

As urbanization progresses and cities become more interconnected, the importance of effective public transportation systems cannot be overstated. With the increasing number of people residing in urban areas, the demand for reliable, efficient, and eco-friendly transportation options is at an all-time high. Cities that invest in the development and expansion of public transportation networks stand to reap significant benefits, including reduced traffic congestion, lower emissions, and an improved quality of life for their citizens. To achieve these outcomes, it is crucial for urban planners to prioritize the integration of various modes of transportation, such as buses, trains, and bicycles, to create a seamless commuting experience. Additionally, fostering a culture of public transportation usage requires public awareness campaigns and incentives that encourage citizens to choose sustainable alternatives to private vehicles.

22. According to the passage, what is essential for the cities to maximize the benefits of public transportation systems?

- (a) A strong focus on eco-friendly transportation options.
- (b) Increased investment in the development and expansion of public transportation networks.
- (c) The integration of various modes of transportation and promotion of public transportation usage.
- (d) The prioritization of urban planning to reduce traffic congestion and emissions.

Answer: C

Explanation:

The passage highlights the importance of integrating various modes of transportation and promoting public transportation usage in order to maximize the benefits of public transportation systems. This would lead to reduced traffic congestion, lower emissions, and an improved quality of life for citizens in urban areas.

PASSAGE-3

The innate curiosity and wonder of children often make them highly receptive to new experiences and moments of joy. As adults, it's easy to become preoccupied with the stresses and demands of daily life, causing us to lose touch with the simple pleasures that once captivated us. In order to reconnect with that sense of wonder, it's essential to nurture our own curiosity and be open to embracing new experiences. By engaging in activities that stimulate our minds and encourage growth, we can rediscover the joy of giving and receiving that characterized our childhood years.

23. According to the passage, what could help adults regain the sense of joy and wonder experienced during childhood?

- (a) Focusing exclusively on their professional lives.

- (b) Ignoring opportunities for growth and learning.
- (c) Engaging in activities that stimulate the mind and encourage personal development.
- (d) Avoiding new experiences and sticking to familiar routines

Answer: C

Explanation:

The passage emphasizes that adults can regain a sense of joy and wonder by engaging in activities that stimulate their minds and encourage personal growth. This allows them to reconnect with the excitement and curiosity of childhood and experience the happiness that comes from giving and receiving.

24. The passage suggests that adults may struggle to experience joy and wonder because they:

- (a) Are naturally less curious than children.
- (b) Are too focused on the past and future.
- (c) Become preoccupied with the stresses and demands of daily life.
- (d) Have lost the ability to experience happiness.

Answer: C

Explanation:

The passage states that adults tend to lose touch with the simple pleasures that once captivated them due to becoming preoccupied with the stresses and demands of daily life. This preoccupation can cause them to struggle with experiencing joy and wonder, as they may not be as open to new experiences and moments of happiness as they once were.

Directions for following three questions (25-27): Answer the following three questions based on the information given below:

A sports week was organized in an institute from 9th to 16th of a month, 9th being a Wednesday. During this period, various sports were organized like cricket, badminton, table-tennis, kabaddi, hockey and football and they were played, one game being played on each day. The following conditions had to be complied with.

- Hockey was not played on the closing day i.e. on 16th
- Table-tennis was played on the previous day of the cricket game.
- Football was not played either on Wednesday or Saturday.
- No game was played on Thursday and Sunday.
- Kabaddi was played on Monday.
- There was a gap of 2 days between cricket and football.

25. The sports week started with which game?

- (a) Table-tennis
- (b) Hockey
- (c) Cricket
- (d) Badminton

Answer: B

Explanation:

DATES	DAYS	SPORTS
9	Wednesday	Hockey
10	Thursday	--
11	Friday	Table-tennis
12	Saturday	Cricket
13	Sunday	--
14	Monday	Kabaddi
15	Tuesday	Football
16	Wednesday	Badminton

26. How many days of gap is there between the game of hockey and football?

- (a) Three
- (b) Four
- (c) Five
- (d) Two

Answer: C

Explanation:

27. Which pair of games was played on Wednesdays?

- (a) Cricket and tennis
- (b) Hockey and badminton
- (c) Football and cricket
- (d) Hockey and cricket

Answer: B

Explanation:

28. The rightmost non-zero digit of the number $(30)^{2716}$ is?

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

Answer: A

Explanation:

$$(30)^{2716} = (10)^{2716} \times (3)^{2716}$$

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I am grateful to Ansari Sir for his support and guidance throughout Civil Services preparation. GS Test Series at Lukmaan helped me significantly in improving answer writing, especially the discussions with Ansari Sir.

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CSE 2021

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I had enrolled for Lukmaan IAS Test Series program for GS 1-4. I found the feedback highly effective in helping me improve my answer writing which played a role in clearing the exam in my first attempt.

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Observe the 3's power cycle: $(3)^1 = 3$, $(3)^2 = 9$, $(3)^3 = 27$, $(3)^4 = 81$, $(3)^5 = 243$; hence, the cyclicity is 4 and the cycle of powers is 3, 9, 7, 1.

Also, $2716 = 4 \times 679$; therefore, the non-zero rightmost digit should be 1.

29. $X = 1 \cdot 1! + (2 \cdot 2!) + (3 \cdot 3!) + \dots + (10 \cdot 10!)$, then $X + 1$ when divided by $11!$ leaves a remainder of:

- (a) 0
- (b) 2
- (c) 1
- (d) 10

Answer: A

Explanation:

$$X = (1 \times 1!) + (2 \times 2!) + (3 \times 3!) + \dots + (10 \times 10!)$$

$$= (2-1)1! + (3-1)2! + (4-1)3! + \dots + (11-1)10!$$

$$= 2! - 1! + 3! - 2! + 4! - 3! + \dots + 11! - 10!$$

$$X = 11! - 1$$

Therefore, $X + 1 = 11!$; So, the remainder would be 0.

30. 3 liters of paint is required to paint a solid sphere. Now this solid sphere is sliced into 4 identical pieces. How many liters of paint would be required to paint all the surfaces of this sphere?

- (a) 4.5
- (b) 5
- (c) 6
- (d) 5.5

Answer: C

Explanation: sphere surface area is $4\pi r^2$. However, when we slice it into two hemispheres then the additional area is that of two circles i.e. $2\pi r^2$ (visualise it). Similarly, when we cut the sphere into four identical pieces then the additional area is that of 4 circles i.e. $4\pi r^2$. (Visualise it). Therefore 3 litres more paint would be required.

Directions for following 3 (three) items: Read the following **two passages** and answer the items that follow the passages. Your answers to these items should be based on the passages only.

PASSAGE-1

In today's fast-paced world, it is easy to become overwhelmed by the constant influx of information and opinions from various sources. This barrage of external voices can lead individuals to lose touch with their own inner wisdom and values, causing them to make decisions based on the opinions of others. To achieve true success and fulfillment, it is essential for individuals to cultivate a strong sense of self-awareness and trust in their own judgement. By learning to filter out external noise and focus on their unique perspectives, individuals can make more informed decisions and chart a path towards their goals.

31. How can individuals cultivate a strong sense of self-awareness and trust in their own judgement?

- (a) By accepting every opinion, they come across.
- (b) By disconnecting from all sources of information.
- (c) By learning to filter out the external noise and focus on their unique perspectives.
- (d) By only trusting the opinions of close friends and family

Answer: C

Explanation:

The passage suggests that individuals can cultivate a strong sense of self-awareness and trust in their own judgement by learning to filter out external noise and focusing on their unique perspectives. This approach allows them to make more informed decisions and chart a path towards their goals.

32. According to the passage, what is the effect of being easily influenced by the opinions of others?

- (a) Improved decision-making.
- (b) A higher likelihood of achieving personal goals.
- (c) Individuals can lose touch with their own inner wisdom and values.
- (d) Increased self-awareness and personal growth.

Answer: C

Explanation:

The passage states that the majority of people who fail to accumulate money sufficient for their needs are generally easily influenced by the opinions of others. This suggests that being easily influenced by external opinions can lead to negative consequences, such as an inability to secure financial stability.

PASSAGE-2

Navigating the complexities of international trade, countries may adopt protective tendencies to support domestic industries. Such measures, including tariffs, import quotas, and subsidies, aim to create a competitive advantage for local businesses. However, these policies can also lead to unexpected outcomes, which may be positive or negative in nature. As the global economy evolves, countries must strike a delicate balance between protectionism and free trade.

33. Based on the passage given above, which of the following are the potential consequences of protective tendencies in trade?

- 1. An increase in global trade.
- 2. A decrease in the demand for imported goods.
- 3. A boost to local businesses.

Select the correct answer using the code given below:

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

Answer: B

Explanation:

An increase in global trade: This option is not mentioned as a consequence of protective tendencies in the passage. Instead, protective measures like tariffs and quotas tend to limit international trade rather than promote it. These measures often result in a decrease in global trade as countries focus on protecting their domestic industries.

A decrease in the demand for imported goods: As countries adopt protective tendencies, they impose measures such as tariffs and import quotas that make imported goods more expensive or limited in quantity. This can lead to a decrease in the demand for imported goods as consumers and businesses turn to domestic products, which may be cheaper or more readily available due to protectionist policies.

A boost to local businesses: Protective tendencies aim to support domestic industries by creating a competitive advantage for local businesses. When countries implement measures like tariffs, import quotas, or subsidies, they can provide a favorable environment for local businesses to grow and thrive. This, in turn, can lead to a boost in local businesses as they benefit from the protectionist policies of their governments.

In conclusion, the passage suggests that protective tendencies in trade can lead to a decrease in the demand for imported goods and a boost to local businesses. These outcomes underline the need for countries to carefully weigh the benefits and drawbacks of protectionist policies in the context of their broader economic goals. **Hence Option B is correct.**

Directions for the following three (34-36) questions: Answer the questions on the basis of the information given below:

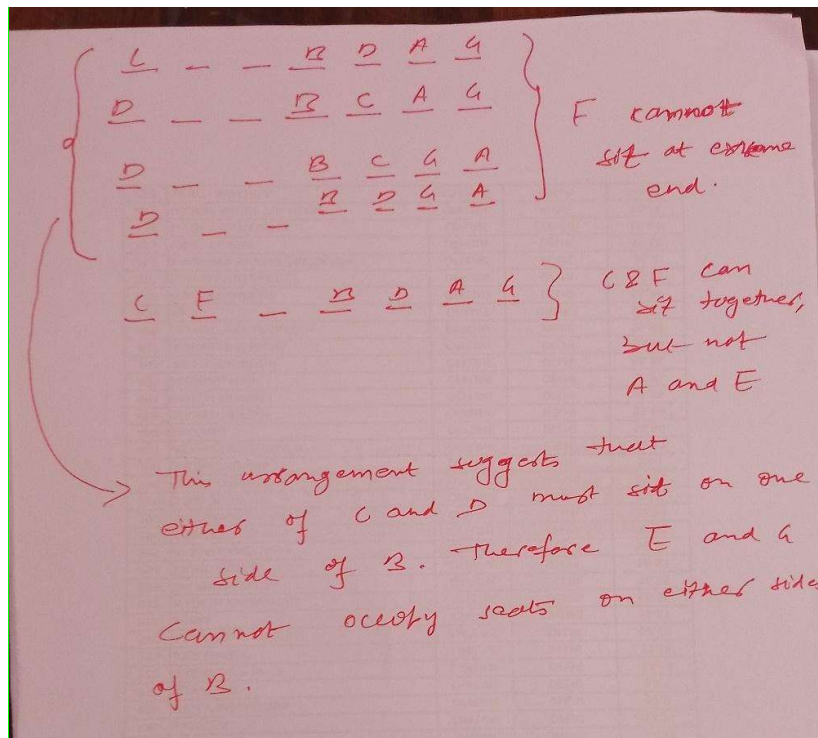
A, B, C, D, E, F and G are seven scholars who are to be seated in a row. A and G have the same subjects, so they must sit at the extreme right. B has to occupy the mid position. C and D are bitter rivals, therefore, must be seated as far as possible.

34. Who cannot sit at either end?

- (a) D
- (b) C
- (c) G
- (d) F

Answer: D

Explanation:



35. Which of the following pairs cannot be seated together?

- (a) C and F
- (b) B and D
- (c) E and A
- (d) D and G

Answer: C

Explanation:

Refer the explanation of the above question.

36. Which of the following pairs cannot occupy the seats on either side of B?

- a) E and G
- b) C and F
- c) F and D
- d) D and E

Answer: A

Explanation:

Refer to the explanation of the above question.

37. The letters from A to Z are numbered from 1 to 26 respectively. If BCD= 702 and EFG= 1701, then what is CDE equal to?

- (a) 1035
- (b) 1355
- (c) 1454
- (d) 1045

Answer: A

Explanation:

$BCD = 702 = 3 \times 234$ $EFG = 1701 = 3 \times 567$ Therefore, $CDE = 3 \times 345 = 1035$

38. If a number is increased by 14.2856%, then by how much percent should it be decreased to get the original number?

- (a) 16.666%
- (b) 8.25%
- (c) 14.2856%
- (d) 12.5%

Answer: D

Explanation:

Whenever a number is increased by $1/N\%$ then to get the original we should decrease it by $1/(N-1)$

39. The price of wheat increased by 25% but the expense on wheat increased by only 15%. What is the percentage change in consumption?

- (a) 8%
- (b) 9%
- (c) 7%
- (d) 8.333%

Answer: A

Explanation:

Expenses = Price * Consumption. Consumption = Expense / Price. New Consumption = $1.15/1.25$

Decrease in consumption = $(E/P - 1.15E/1.25P) / (E/P) = 1/12.5 = 0.08$

40. A shopkeeper mixes 200 ml water in 800 ml of juice. And he sells the final mixture at the cost price of the juice. What is the profit earned by him, if the cost price of water is 1/10th of the cost price of the Juice?

- (a) 21.95%
- (b) 25%
- (c) 33.333%
- (d) 20%

Answer: A

Explanation:

Let the cost price of 1000 ml of Juice be INR 1000. Therefore, Cost of 800 ml juice = INR 800. Cost of 200 ml water would be $200/10 = \text{INR } 20$. So, Profit = $(SP-CP)/CP = (1000 - 800 - 20)/820 = 21.95\%$

Directions for following 4 (four) items: Read the following **two passages** and answer the items that follow the passages. Your answers to these items should be based on the passages only.

PASSAGE-1

The role of universities in fostering innovation and discovery is multifaceted. While scientific research is widely acknowledged for its potential to yield valuable insights and breakthroughs, the significance

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I took GS Test Series and Essay Test Series from Lukmaan IAS. The quality of GS Tests and Essay checking really helped me to boost my final score. Thank you so much to Ansari Sir!

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of research in non-scientific fields is often underappreciated. It is crucial to recognize that in areas such as literature and history, the rearrangement and reinterpretation of existing materials can lead to new perspectives and understandings. In both scientific and non-scientific research, the collaboration between creative thinkers and diligent researchers can result in the formulation of innovative ideas and theories. As such, universities should continue to promote and support research endeavours across a diverse range of disciplines.

41. What is the author's stance on non-scientific research?

- (a) It is generally futile and should be discouraged.
- (b) It is as valuable as scientific research and should be equally supported.
- (c) It has the potential to yield new insights but is more likely to be futile than scientific research.
- (d) It should be promoted only in collaboration with scientific research.

Answer: B

Explanation:

The passage suggests that although non-scientific research may seem less impactful than scientific research, it still has the potential to yield valuable insights and new understandings. The author argues that universities should support research endeavours across a diverse range of disciplines, including non-scientific fields.

42. What is the potential benefit of collaboration between creative thinkers and diligent researchers, according to the passage?

- (a) The development of more efficient research methods.
- (b) The formulation of innovative ideas and theories.
- (c) The increased likelihood of securing research funding.
- (d) The reduction of research-related risks and challenges.

Answer: B

Explanation:

The passage emphasizes the potential for collaboration between creative thinkers and diligent researchers to result in the formulation of innovative ideas and theories. This collaboration can help bridge the gap between seemingly unrelated research efforts and lead to new discoveries in various disciplines.

PASSAGE-2

The challenge of managing seasonal water availability in India requires a comprehensive and sustainable approach. To minimize the impact of floods and droughts, it is crucial to effectively regulate water resources throughout the year. This can be achieved through a combination of strategies, including the construction of dams for water storage, recharging aquifers, promoting efficient agricultural practices, and implementing water conservation measures.

43. Which one of the following strategies is most likely to contribute to long-term water resource management?

- (a) Relying solely on the construction of large dams for water storage.

- (b) Implementing a combination of dams, aquifer recharging, efficient agriculture, and water conservation measures.
- (c) Focusing exclusively on changing agricultural practices.
- (d) Prioritizing the interlinking of rivers without considering other water management strategies.

Answer: B

Explanation:

The passage emphasizes the need for a comprehensive and sustainable approach to manage seasonal water availability. A combination of strategies, including dams, aquifer recharging, efficient agriculture, and water conservation measures, is likely to contribute to long-term water resource management.

44. According to the passage, what is the main challenge in managing water resources in India?

- (a) The lack of proper infrastructure for water storage and distribution.
- (b) The uneven distribution of water availability throughout the year.
- (c) The increasing demand for water due to population growth.
- (d) The negative impact of climate change on water resources.

Answer: B

Explanation:

The passage highlights the main challenge in managing water resources in India as the skewed water availability, and limited water supply. This uneven distribution must be addressed to ensure the system becomes resilient and able to cope with floods and droughts.

45. A Passport number consists of the digits PQRSTU, not necessarily in that order, where each letter represents a distinct digit (1, 2, 3, 4, 5, 6, 7 only). The number is divisible by 7. After deleting the first digit from the right, the resulting number is divisible by 6. After deleting two digits from the right of the original number, the resulting number is divisible by 5. After deleting three digits from the right of the original number, the resulting number is divisible by 4. After deleting four digits from the right of the original number, the resulting number is divisible by 3. Which of the following is a possible value for the sum of the middle two digits of the number?

- (a) 5
- (b) 6
- (c) 8
- (d) 9

Answer: C

Explanation:

Let's analyze the given conditions for the Passport number PQRSTU:

- The 6-digit number (PQRSTU) is divisible by 7.
- The 5-digit number (PQRST) is divisible by 6.
- The 4-digit number (PQRS) is divisible by 5.

- The 3-digit number (PQR) is divisible by 4.
- The 2-digit number (PQ) is divisible by 3.
 - ✓ From condition 3, we know that S is either 0 or 5. However, 0 is not among the allowed digits, so $S = 5$.
 - ✓ From condition 4, we know that QR is divisible by 4. The only possibilities for QR among the remaining digits are 12, 24, and 36.
 - ✓ From condition 5, we know that PQ is divisible by 3. If $QR = 12$, then $PQ = 36$. If $QR = 24$, then $PQ = 57$ or 63. If $QR = 36$, then $PQ = 42$.
 - ✓ From condition 2, we know that PQRST is divisible by 6. The only possibilities that satisfy this condition are $PQRST = 42135$ and $PQRST = 63125$.
 - ✓ Finally, from condition 1, we know that PQRSTU is divisible by 7. This means that $U = 7$ in both cases. So, the possible numbers are 421357 and 631257.
 - ✓ The sum of the middle two digits for each possible number is $2+1=3$ and $5+3=8$.
 - ✓ Since 3 is not among the options, **Option C is correct.**

46. A travel allowance (TA) bill of ₹2,000 is paid using ₹100, ₹50, and ₹20 notes. A total of 30 notes are used. Consider the following statements:

1. 10 notes of ₹100 are used, and the remaining are in the denominations of ₹50 and ₹20.
2. 15 notes of ₹50 are used, and the remaining are in the denominations of ₹100 and ₹20.
3. 10 notes of ₹20 are used, and the remaining are in the denominations of ₹100 and ₹50.

Which of the above statements are not correct?

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

Answer: D

Explanation:

Let the number of ₹100 notes used be x , the number of ₹50 notes used be y , and the number of ₹20 notes used be z . We have the following equations based on the given information:

$$x + y + z = 30 \text{ (Total number of notes)} \quad 100x + 50y + 20z = 2,000 \text{ (Total value of the TA bill)}$$

Now, let's check each statement:

1. If 10 notes of ₹100 are used, we have $x = 10$. Substituting this into the first equation, we get:
 $10 + y + z = 30$; $y + z = 20$
 Substituting $x = 10$ into the second equation, we get:
 $1000 + 50y + 20z = 2,000$; $50y + 20z = 1,000$
 This system of equations has no solution for y and z as integers, so statement 1 is not correct.
2. If 15 notes of ₹50 are used, we have $y = 15$. Substituting this into the first equation, we get:
 $x + 15 + z = 30$; $x + z = 15$
 Substituting $y = 15$ into the second equation, we get:

$$100x + 750 + 20z = 2,000; 100x + 20z = 1,250$$

This system of equations has no solution for x and z as integers, so statement 2 is not correct.

3. If 10 notes of ₹20 are used, we have $z = 10$. Substituting this into the first equation, we get:

$$x + y + 10 = 30; x + y = 20$$

Substituting $z = 10$ into the second equation, we get:

$$100x + 50y + 200 = 2,000; 100x + 50y = 1,800$$

This system of equations has a solution (16 notes of 100; 4 notes of 50; and 10 notes of 20) which gives total currency notes as 30 with a total value of 2000. statement 3 is correct.

Hence Option D is correct.

47. How many different 5- letter words (with or without meaning) can be constructed using all the letters of the word LUCKNOW so that each word has to start with N and end with L?

- (a) 24
- (b) 12
- (c) 60
- (d) 30

Answer: A

Explanation: Since all the 6 letters are distinct and N and D are fixed, so the remaining 4 places can be filled in $4 \times 3 \times 2 = 24$

48. Six friends noticed that the sum of their age is the square of a prime number. What is the average age of the group, subject to the two conditions given below?

Condition 1: All members are between 50 and 85 years of age.

Condition 2: The standard deviation of their age is 6

Select the correct answer from the code given below:

- (a) Condition 1 alone is sufficient to answer.
- (b) Condition 2 alone is sufficient to answer.
- (c) Either of the Conditions is sufficient to answer.
- (d) Both the Conditions are required to answer.

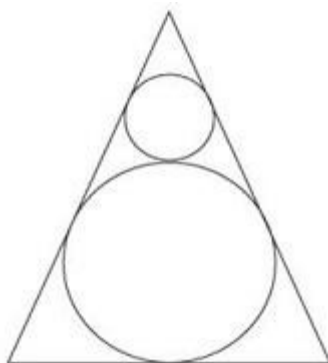
Answer: A

Explanation: Minimum value of their age sum = $50 \times 6 = 300$, and maximum value $85 \times 6 = 510$; Notice that the only squares between 300 and 510 are 324, 361, 400, 441, 484, and of these 361 is the square of a prime number 19. Hence, the sum of their age is 361 only.

Standard deviation involves Mean; but mean is not known, so this statement gives no additional information.

Directions for the following two questions (49-50):

Two circles are placed in an equilateral triangle as shown in the figure given below:



49. What is the ratio of the area of the smaller circle to that of the bigger circle?

- (a) $1/8$
- (b) $1/9$
- (c) $1/12$
- (d) $1/5$

Answer: B

Explanation:

You must know that an incircle has a radius equal to $1/3$ of the altitude of an equilateral triangle. Therefore, the diameter of the bigger circle is $2/3$ of the altitude of an equilateral triangle.

Now apply the same concept to the smaller circle (which itself is inscribed in an equilateral triangle of height $1/3$ of the height of the larger equilateral triangle, because $2/3$ distance was covered by the diameter of the bigger circle). Therefore, the radius of the smaller circle is $1/3$ of the bigger circle, and area ratio should be $1/9$.

50. What is the ratio of the altitude of the equilateral triangle and diameter of the bigger circle?

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

Answer: B

Explanation:

Since an incircle has radius equal to $1/3$ of the altitude of an equilateral triangle, so its diameter would be $2/3$ of the altitude; so asked ratio = 3:2

Directions for following 2 (two) items: Read the following **two passages** and answer the items that follow the passages. Your answers to these items should be based on the passages only.

PASSAGE -1

The issue of street dogs in India has been a long-standing one, with several complexities attached to it. Overpopulation of these dogs has resulted in severe problems such as the spread of diseases, increased dog bites, and overall public safety concerns. The reasons behind this overpopulation are often neglected, one of the major ones being irresponsible pet ownership and abandonment. Dogs that are not spayed or neutered can breed uncontrollably, exacerbating the issue. Additionally, street dogs are often malnourished and lack proper medical care, leading to a high mortality rate. The

management and care of street dogs have thus far been inadequate, with efforts focusing mainly on elimination rather than humane management. The sterilization and vaccination programs, though in place, are not implemented efficiently due to resource constraints and a lack of public awareness. In order to address this issue effectively, it is essential that the government, non-governmental organizations, and citizens collaborate on a comprehensive solution that includes education, sterilization, vaccination, and responsible pet ownership.

51. The overpopulation of street dogs in India can be attributed to which of the following?

1. Inadequate sterilization and vaccination programs.
2. Irresponsible pet ownership and abandonment.
3. Lack of public awareness.

Select the correct answer using the code given below:

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

Answer: D

Explanation:

The overpopulation of street dogs in India can be attributed to a combination of factors, as mentioned in the passage. These factors include:

1. Inadequate sterilization and vaccination programs: Sterilization and vaccination programs are essential to controlling the street dog population and preventing the spread of diseases like rabies. However, these programs have not been effectively implemented due to resource constraints and a lack of public awareness.
2. Irresponsible pet ownership and abandonment: Many people do not spay or neuter their pets and may end up abandoning them when they are unable or unwilling to care for them. This adds to the street dog population and exacerbates the problem.
3. Lack of public awareness: Many people are not aware of the importance of sterilization and vaccination for controlling the street dog population, leading to a lack of support for these programs and the continuation of the issue.

As all three factors play a significant role in the overpopulation of street dogs in India, **hence Option D is correct.**

PASSAGE-2

In this brave new world of ceaseless communication and digital facades, a strange breed has emerged from the depths of cyberspace: the social media influencer. These peculiar creatures, who owe their existence to the whims of the fickle masses, wield a power as intoxicating as it is transient. In our society's relentless pursuit of popularity, we have bestowed upon them a significance far beyond their true worth, elevating them to a pedestal once reserved for the truly deserving. But alas, what curious criteria do we employ when selecting these modern-day idols?

The social media influencer is oftentimes bereft of the expertise and knowledge one might expect from a figure of such influence. Their dominion is built on a foundation of superficial charm and fleeting trends, rather than the enduring qualities of wisdom and virtue. Yet we, the ever-hungry

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public, are complicit in this folly, choosing to elevate the loudest and most visually appealing voices above the quiet wisdom of true experts.

52. What does the passage imply about the criteria for choosing social media influencers?

- (a) They are chosen based on their wisdom and expertise in their respective fields.
- (b) Their popularity is determined by superficial charm and the ability to follow trends.
- (c) Influencers are selected because of their technical competence and knowledge.
- (d) Influencers are admired for their long-lasting impact on society.

Answer: B

Explanation:

The passage implies that social media influencers are often chosen based on superficial qualities such as charm and the ability to follow trends, rather than expertise or wisdom. The author likens the selection process of influencers to that of politicians, as mentioned in the original passage, where competency is not the primary criterion. The tone of the passage is critical and somewhat melancholic, emphasizing society's misplaced priorities in choosing influencers. Option (b) best captures this sentiment, making it the correct choice.

53. A, B, C, and D are four women working in a company. In two successive years, each of them got hikes in their salary as follows:

- A: $X\%$ and $(X+1)\%$
- B: $(X+2)\%$ and $(X-1)\%$
- C: $(X+3)\%$ and $(X-2)\%$
- D: $(X+4)\%$ and $(X-3)\%$

If all of these women have the same salary at the end of two years, who got the least hike in her salary?

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

Answer: C

Explanation:

We know that if two numbers have the same sum then their product is maximum when two numbers are closest. For instance, if $X + Y = 10$, then $5 \times 5 > 6 \times 4 > 7 \times 3 > \dots > 9 \times 1$;

Similarly, assume $X\%$ in the question is 5% , then the product in case of D ($9\% \times 2\%$) is least, and highest in case of A ($5\% \times 6\%$) given that the sum of two hikes in each case is $(2X + 1)\%$;

54. M and N are inversely proportional to each other. If M increases by 100%, then N decreases by:

- (a) 100%
- (b) 200%
- (c) 50%
- (d) 150%

Answer: C

Explanation:

$M \propto 1/N$; Therefore, $2M \propto 1/N(0.5)$

55. If $x^2+x+1=0$, then $x^{2018}+x^{2019}$ equals?

- (a) $-X$
- (b) X
- (c) $X+1$
- (d) $X-1$

Answer: A

Explanation:

In CSAT exam (or any other aptitude exam) whenever you see $(x^2 + x + 1 = 0)$ then you must use the equation: $(x^3 - 1) = (x - 1)(x^2 + x + 1)$; this implies that $x^3 = 1$, since $x^2 + x + 1 = 0$

So, $X^{2018}(1+X) = X^{2018}(-X^2) = -X^{2020} = -X^{3 \times 673} * X = -X$

56. A college offers 3 electives and 1 mandatory course. A student has to register for only 2 electives and 1 mandatory course. The college observes that the course registration in 3 of the 4 courses is 45, 55 and 70. Find out the number of students in the elective course with least registration.

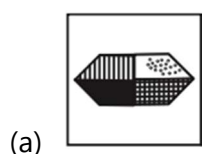
- (a) 45
- (b) 40
- (c) Either 40 or 45
- (d) 65

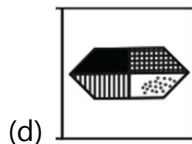
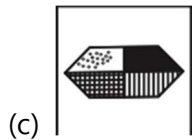
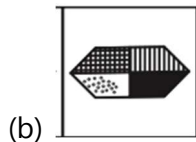
Answer: C

Explanation: Mandatory course is taken by all. If the mandatory course is taken by X students, then the total number of students in the three elective courses are $2X$ students. (This an important insight, think over it, i.e why total $2X$ students in three elective courses).

Now let us assume that 45, 55, 70 is the number of students who took 2 electives and 1 mandatory course. So, 70 should be the number of mandatory course takers (why 70, and not 45 and 55, in the mandatory course? because mandatory courses should have the highest number of students). Now $2 \times 70 = 140$ students should be in the three elective courses together. Given 45, 55 in two electives, we must have $140 - (45+55) = 40$ students in the third elective. Similarly, if 45, 55 and 70 is for three electives, then number of students in mandatory course should be $(45+55+70)/2 = 85$ students; therefore, the number of students with least registration in elective is 45.

57. Find the water image of the object given in the question figure denoted by (A) out of the figures given in the answer figures (a), (b), (c) and (d).





Answer: A

Direction for following 2 (58-59) items:

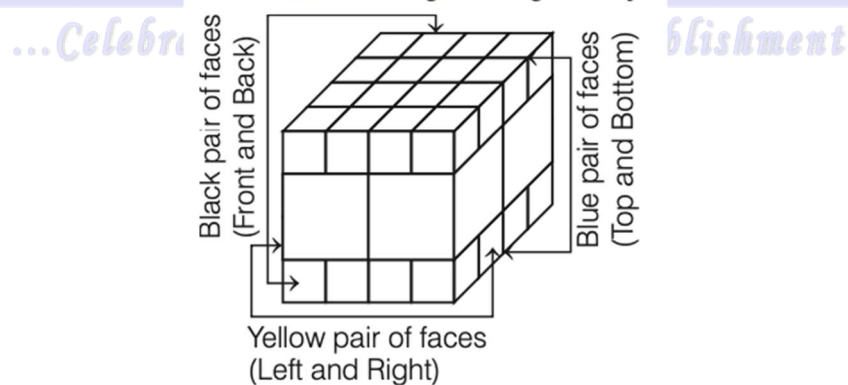
A solid cube has been painted yellow, blue and black on the pair of opposite surfaces. The cube is then cut into 36 smaller cubes such that 32 cubes are of the same size while 4 others are of bigger size. Also, no face of any of the bigger cubes is painted blue.

58. How many cubes have at least one face painted black?

- (a) 20
- (b) 8
- (c) 16
- (d) 32

Answer: A

Explanation:

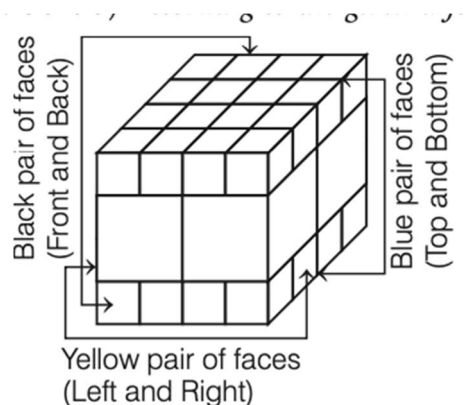


59. How many cubes have only one face painted?

- (a) 0
- (b) 4
- (c) 8
- (d) 12

Answer: C

Explanation:



60. In the question given below there are three statements followed by four conclusions. You have to take the given statements to be true even if they seem to be at variance with commonly known facts. Read all the conclusions and then decide which of the given conclusions logically follows/follow from the given statements, disregarding commonly known facts.

Statement 1: All bricks are flowers.

Statement 2: Some houses are flowers.

Statement 3: All pens are houses.

Conclusion 1: Some houses are bricks.

Conclusion 2: Some pens are flowers.

Conclusion 3: Some flowers are bricks.

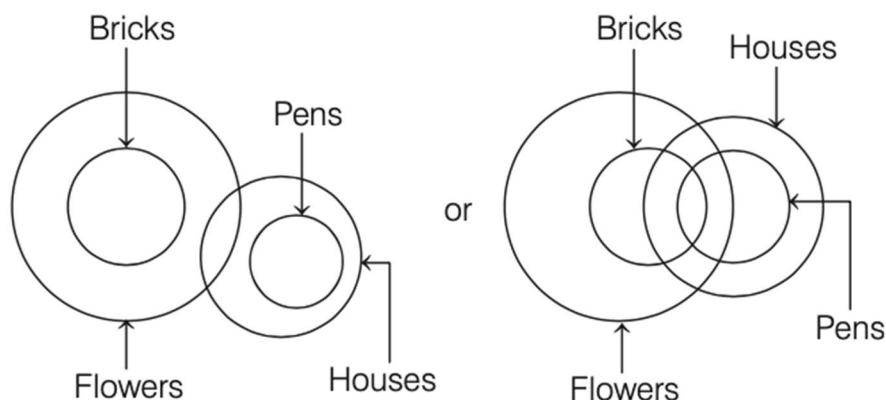
Conclusion 4: No pen is a flower.

Select the correct answer from the code given below:

- (a) Either 1 or 3 and 4 follow
 (b) Either 2 or 3 and 1 follow
 (c) Either 1 or 2 and 4 follow
 (d) only 3 follows.

Answer: D

Explanation:



Conclusion 1: Some houses are brick: doesn't follow.

Conclusion 2: some pens are flowers: doesn't follow.

Conclusion 3: some flowers are bricks: it follows.

Conclusion 4: No pen is flower: doesn't follow.

Directions for following 2 (two) items: Read the following **passage** and answer the items that follow the passage. Your answers to these items should be based on the passage only.

PASSAGE

In the grand tapestry of life, woven intricately by the forces of nature, natural selection stands as a guiding principle shaping the myriad of species that inhabit our planet. This complex process, driven by the ever-shifting sands of environmental challenges and the intricate dance of survival, has given rise to a diverse array of organisms, each uniquely adapted to thrive in their own ecological niches. As we delve deeper into the intricacies of natural selection, we are reminded of the inherent wisdom that governs the natural world and the delicate balance that exists between species and their environments.

The process of natural selection, as first proposed by Charles Darwin, is a continuous struggle for existence in which only those individuals best adapted to their environments are able to survive and reproduce. Through the gradual accumulation of advantageous traits over countless generations, populations evolve to better suit their surroundings, ensuring their continued survival in the face of adversity. This delicate interplay between organisms and their environments is the driving force behind the breathtaking diversity of life on Earth, a testament to the power of nature to shape the course of evolution.

61. What is the primary purpose of the passage?

- (a) To discuss the importance of natural selection in shaping the diversity of life.
- (b) To emphasize the role of human intervention in the process of natural selection.
- (c) To argue against the idea of a divine creator guiding the evolution of life on Earth.
- (d) To highlight the role of geographical barriers in the process of natural selection.

Answer: A

Explanation:

The primary purpose of the passage is to discuss the importance of natural selection in shaping the diversity of life on Earth. The author highlights the continuous struggle for existence and the gradual accumulation of advantageous traits that drive the process of natural selection, ultimately leading to the evolution of populations to better suit their environments. The passage emphasizes the intricate interplay between organisms and their environments, which is the driving force behind the breathtaking diversity of life on Earth. Therefore, option (a) is the correct answer. Options (b), (c), and (d) are incorrect because the passage does not discuss human intervention, argue against the idea of a divine creator, or highlight the role of geographical barriers in the process of natural selection.

62. According to the passage, how does natural selection ensure the survival of species?

- (a) By favouring individuals with traits that are advantageous for their environment.
- (b) By guiding the actions of species to ensure their survival.
- (c) By protecting species from environmental and biological assaults.
- (d) By creating a harmonious balance between all living organisms.

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AIR
03



MARKS
144

PRATIBHA VERMA

CSE-2019

AIR
11



MARKS
142

NUPUR GOEL

CSE-2019



BY S. ANSARI

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Answer: A

Explanation:

The passage states that natural selection is a continuous struggle for existence in which only those individuals best adapted to their environments are able to survive and reproduce. The process of natural selection ensures the survival of species by gradually accumulating advantageous traits over countless generations, allowing populations to evolve and better suit their surroundings. **Hence Option A is correct.**

63. You have a special key # in your calculator called Hash key:

Rule 1: If the display shows a one-digit number, pressing Hash key replaces the displayed number with twice its value.

Rule 2: If the display shows a two-digit number, pressing Hash key replaces the displayed number with the sum of the two digits.

Suppose you enter the value 1 and then press Hash key repeatedly. After pressing the Hash key for 67 times, what will be the displayed number?

- (a) 7
- (b) 16
- (c) 14
- (d) 5

Answer: B

Explanation:

Observe the pattern: Pressing the key for the first nine times give the following pattern "2, 4, 8, 16, 7, 14, 5, 10, 1". Hence, the pattern is repeated after 9 presses of the Hash keys. So, after 63 presses one will get "1" again. And at the 67 press we will get 16

64. An artist draws 36 equal squares of 1 square inch on a square canvas measuring 36 square inches. She chooses two squares (1 square inch each) randomly and then paints them. What is the probability that two painted squares have a common side?

- (a) $\frac{1}{3}$
- (b) $\frac{120}{(36 \times 35)}$
- (c) $\frac{120}{36}$
- (d) $\frac{1}{6}$

Answer: B

Explanation:

6x6

prob of sq.
 $\therefore 1+2+3$
 $= \frac{1+4+9}{36}$

Ans = $\frac{120}{36 \times 35}$

① Prob. of corner squares having common side = $4 \left(\frac{2}{36} \right)$

② Prob. of squares between two squares along a row having common side = $4 \times 4 \left(\frac{3}{36} \right)$

③ Prob. of fully enclosed 36 squares having common side painted = $\frac{16 \times 4}{36}$

65. Two circles X and Y, each of radius 2 cm, pass through each other's centres. They intersect at points A and B. Then a circle R is drawn with diameter AB. What is the area of circle R?

- (a) 4π
- (b) 5π
- (c) 3π
- (d) 3.5π

Answer: C

Explanation:

Area Circle X = $\pi \times 4$
 Area Circle Y = $\pi \times 4$
 $\frac{AB}{2} = AM = \sqrt{2}$
 \therefore Area of circle X
 $= \pi (\sqrt{2})^2$
 $= 3\pi$

Overlap area = $\left(\frac{1}{2} \text{ of circle R} \right) + \left(\text{area of sectors } (XAY + YBX) \right) - \left(\text{area of } \triangle CAB \right)$
 $= \frac{1}{2} (\pi \sqrt{2}^2) + \left(\frac{120}{360} \right) \pi 2^2 - \frac{1}{2} (2\sqrt{2})^2$
 $= \frac{3\pi}{2} + \frac{4\pi}{3} - \sqrt{2}$
 $= \frac{17}{6} \pi - \sqrt{2}$

Tip:

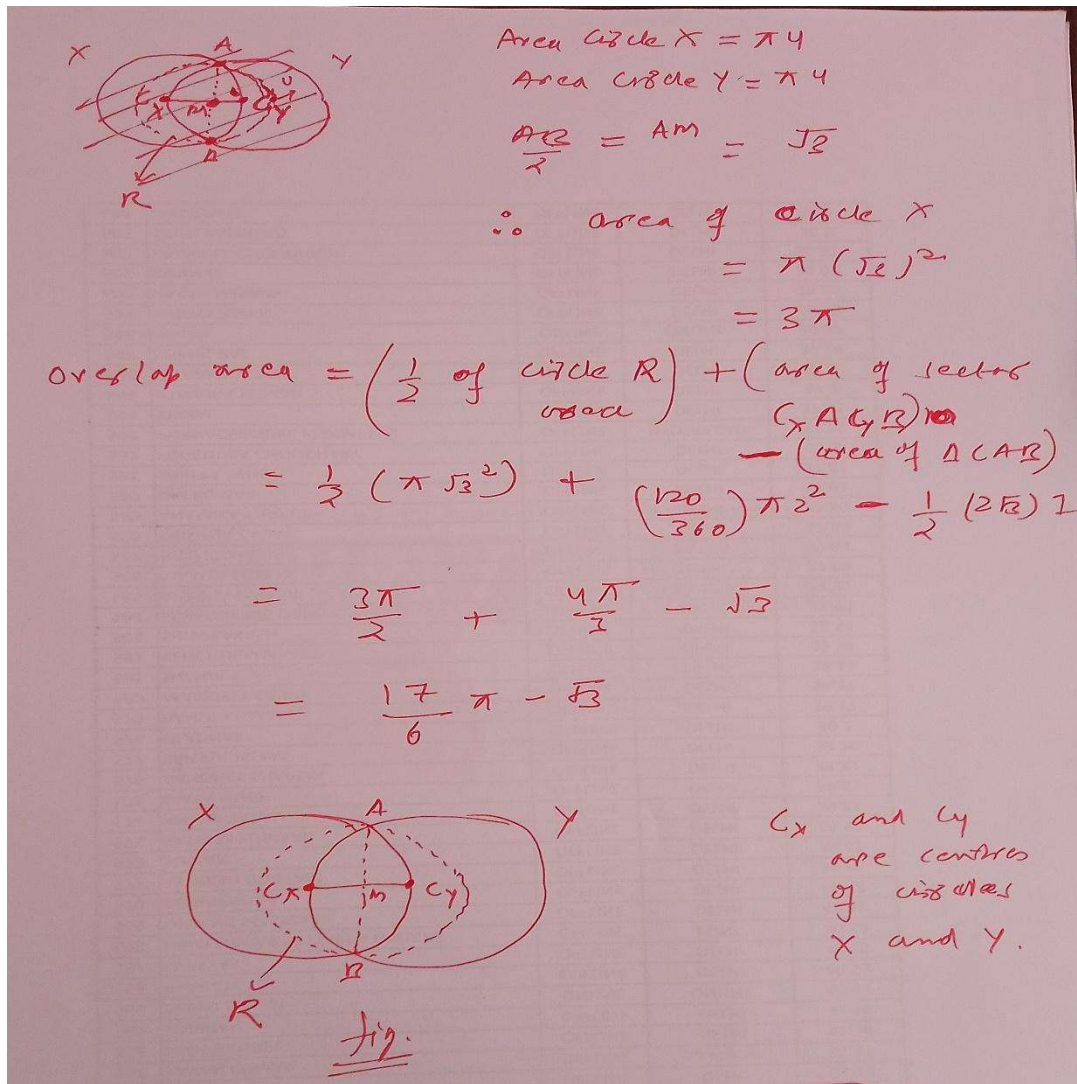
C_X and C_Y are centres of circles X and Y.

66. What is the area of overlap (in square cm) between the circles R and X?

- (a) $8\pi/3$
(b) $17\pi/6 - 3 - \sqrt{3}$
(c) $8\pi/3 - 23 - \sqrt{23}$
(d) $17\pi/6 - 23$

Answer: B

Explanation:



67. Six faces of a wooden cube of side 6 cm are labelled M, N, O, P, Q and R respectively. Three of these faces M, N, and O are each adjacent to the other two, and are painted Black. The other three faces are not painted. Then, the wooden cube is cut into 216 little cubes of equal size. How many of the little cubes have no sides painted?

- (a) $5 \times 6 \times 4$
(b) $5 \times 5 \times 5$
(c) $6 \times 5 \times 5$
(d) $6 \times 6 \times 6$

Answer: B

Explanation:

One approach is to count the cubes having 1 face black, 2 faces black and three faces black, and then subtract such cubes from 216 cubes to get the cubes with no side painted.

Another (and better) approach is to slice away the faces M, N, and O, and you would be left with a cube of dimension (Length=5, Breadth=5, Height=5), and this cube has no painted face. Therefore, $5 \times 5 \times 5 = 125$ cubes

68. XYZ is a triangle with integer-valued sides $XY=1$, $YZ>1$, and $ZX>1$. Also given that P is the mid-point of XY, then, which of the following options is the closest to the maximum possible value (in degrees) of the angle XZP?

- (a) 30 degrees
- (b) 60 degrees
- (c) 45 degrees
- (d) Less than 30 degrees

Answer: D

Explanation:

Don't do trigonometry in this question. Try to think why XYZ could only be an isosceles triangle. If you can think this then think why a triangle with sides 2,2, and 1 would have the largest angle XZP !

Let these sides be $1, a, b$; ' b ' being the largest side, and ' 1 ' smallest.

$\therefore 1+a > b$ and $b-a < 1$

But how could the difference of two integers ' b ' and ' a ' be less than one?

$\therefore b=a \Rightarrow \triangle XYZ$ is an isosceles \triangle

Now compare $\angle XZP$ of three isosceles \triangle

Since $XP = 0.5$ and $\sin \theta = \frac{P}{H} = \frac{XP}{XZ}$

This implies that $\sin \theta$ can have maximum value at $\frac{0.5}{2} = \frac{1}{4}$; Therefore θ is less than 30° .

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SOCIOLOGY

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By- Abhijit Nirja Jha

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69. Cat and Dog are 50 steps away. Cat starts running towards the dog, and at the same time the dog runs away from the cat. Both run on the same straight line. For every 5 steps that the cat takes the dog takes 6 steps. However, the cat takes only two steps to cover the distance that the dog covers in three steps. In how many steps can the cat catch the dog?

- (a) 250
- (b) 220
- (c) 360
- (d) 200

Answer: A

Explanation:

This question can be solved without using any Time-Speed-Distance formula. Try to think this way: Cat takes 5 steps while dog takes 6 steps, but the cat in 2 steps covers what the dog covers in 3 steps; so, 4 "effective" steps of cat = 6 steps of dog; or in other words, the cat gains 1 step in every five steps. Therefore, to cover 50 steps, the cat will need $50 \times 5 = 250$ steps

You can also think that 4 leaps of cat = 6 leaps of dog; so cat gains one leap every 5 leaps

70. In the question given below there are three statements followed by four conclusions. You have to take the given statements to be true even if they seem to be at variance with commonly known facts. Read all the conclusions and then decide which of the given conclusions logically follows/follow from the given statements, disregarding commonly known facts.

Statements:I: Some men are girls.

II: Some girls are foolish.

III: All foolish are mads.

IV: Some mads are bads.

Conclusions:I: Some girls are definitely mads.

II: Most of the mads are foolish.

III: At least some girls are men.

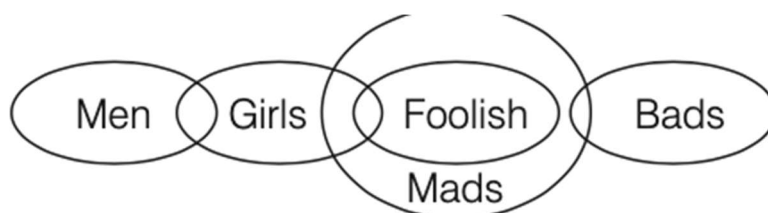
IV: All foolish except a few are girls.

Select the correct answer from the code given below:

- (a) None follows.
- (b) Only I follow.
- (c) Only II follows.
- (d) All follow

Answer: D

Explanation:



- I. Some girls are mad.
 II. Most of the mad people are girls.
 III. At least some girls are mad.
 IV. All foolish people are mad.

Directions for following 3 (three) items: Read the following **two passages** and answer the items that follow the passage. Your answers to these items should be based on the passages only.

PASSAGE-1

There is now ample reading material and evidence that inform us about the pros and cons of digital technology that form an integral part of the platform economy. It is needless to mention that the platform economy, of which the gig workers are the most crucial part, has been considered as one of the fastest-growing economic sectors both in terms of expansion and total financial turnover. The gig economy, arguably, acts as a buffer or a facilitator to the corporations by providing services that are considered necessary for the progress of the corporate businesses. Thus, one may argue that certain platforms that are service providers act as an auxiliary component, although the platform economy, in the process, does benefit as well. And its progress has been, at least for quite some time, quite spectacular.

Observers have also reflected on the precarity that such an economy has brought to the workers who are encapsulated in the destructive logic of digital technology that is considered as responsible for making gig workers vulnerable to unstable unemployment. One may need to immediately suggest that digital technology in itself does not possess the power to create precarious conditions for the workers, either in the gig economy or outside it. But precarity is the consequence of the competitive survival as well as the growth of businesses which involve multinational or global players at the moment. It is not just the precarity that happens at the global, and even at the local level; digital technology has also produced an adversarial impact on the rest of the workers.

71. Which of the following statements best reflects the message of the author of the passage?

- (a) Platform economy is necessary for the progress of the corporate business.
 (b) Digital technology platform acts as the auxiliary component of the business.

- (c) Instability and insecurity among local workers is not only due to the digital economy.
- (d) Gig workers in the platform economy are vulnerable to the uncertainties of unstable employment.

Answer: C

Explanation:

Option A is incorrect: Platform economy is NOT necessary for the progress of the corporate business rather acts as a buffer or facilitator by providing services that are considered necessary. Moreover, this is not the central idea that the author is trying to convey.

Option B is incorrect: Digital technology platform acts as the auxiliary component of the corporate business, meanwhile in the process they themselves also benefit.

Option C is correct: after reading the passage one may feel that digital technology possesses the power to create precarious conditions for the workers but precarity is the consequence of the competitive survival as well as the growth of businesses which involves multinational or global players which not only have adversarial impact on the gig workers but also on other workers who are outside the gig workforce.

Option D is incorrect: Even though the statement is correct, it does not reflect the message that the author of the passage wants to convey.

PASSAGE-2

One major factor that has hastened the internationalisation of the higher education sector is the expectation that the entry of foreign universities might spur the Indian universities to improve the quality of higher education closer to the global benchmarks. However, so far, apart from a handful, most Indian higher educational institutions have generally fared poorly in the global rankings. Consequently, more and more Indian students are migrating abroad in search of quality education.

In fact, it is the recent outbreak of the pandemic and the war in Ukraine that forced tens of thousands of Indian students to flee back home, which highlighted the stark shortages and the desperate need for larger higher education facilities here. Though the higher education facilities in India have been vastly expanded in the recent decades to meet the growing demand, the enrolment rate in higher education institutions still falls far short of the requirements.

The large-scale migration of Indian students is not only a heavy drain on the limited human resources available, especially since they attract some of the best talents, but also a costly proposition that can be normally afforded only by the most affluent students. Now with foreign universities opening up new campuses in India, these outflows are sure to accelerate. Unlimited outflow of India's limited skilled human resources can be detrimental as it deprives the country from the immediate gains of investing in human capital and helps the competition.

72. Which of the following statements best reflects the cause of the passage?

- (a) Author is appreciative of the talent that the Indian students have.
- (b) To evaluate the purpose foreign university campuses in India.
- (c) Only the rich and affluent can afford the foreign education.
- (d) Higher education facilities in India are challenging the global institutions.

Answer: B

Explanation:

Statement 2 is correct: The passage evaluates the purpose of foreign university campuses in India.

73. Which one of the following statements presents the most logical and rational inference from the passage?

- (a) The entry of foreign universities in India may not deliver the intended results.
- (b) The foreign universities will exclusively cater to the more affluent groups in India.
- (c) India needs to focus more on the higher education sector to meet the growing needs of a knowledge economy.
- (d) Foreign universities will accentuate the socio-economic discrimination in India.

Answer: C

Explanation:

Statement 3 is correct: It can be inferred from the passage that India needs to focus more on the higher education sector to meet the growing needs of a knowledge economy.

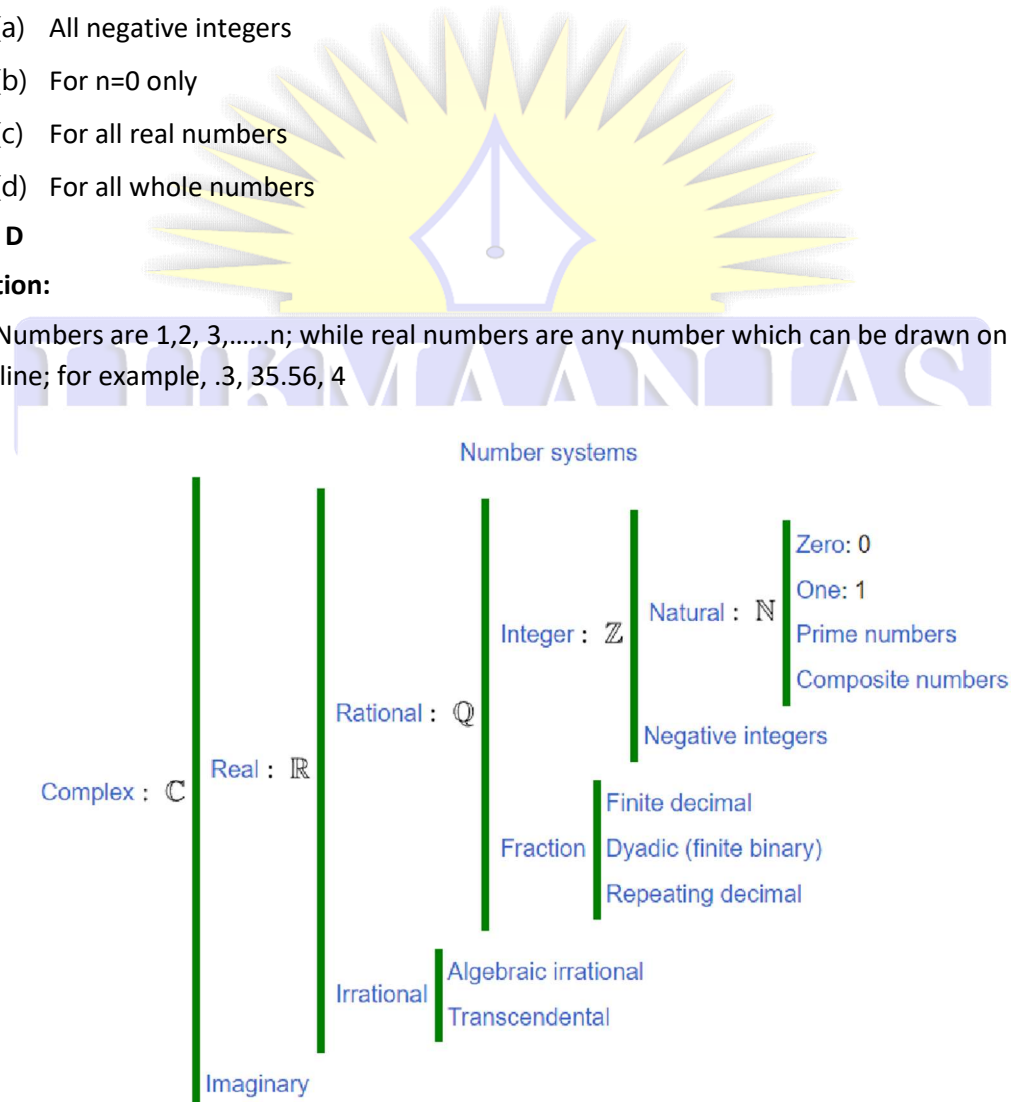
74. For what value of n , the sum of digits in the number $(10^n + 3)$ is 4?

- (a) All negative integers
- (b) For $n=0$ only
- (c) For all real numbers
- (d) For all whole numbers

Answer: D

Explanation:

Natural Numbers are 1, 2, 3, n ; while real numbers are any number which can be drawn on the number line; for example, .3, 35.56, 4



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Management Optional

BATCH STARTS FROM

13th June 2023

8:00 AM to 10:30 AM

By- Sudhir Kumar
(PGDM, IIM Lucknow)



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75. Consider the following statements:

1. If $P^2 + 3$ is a prime number, and given that P is a prime, then the only possible value of P is 2.
2. Every even natural number greater than 2 is the sum of two prime numbers.

Which of the above statements is/are correct?

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

Answer: C

Explanation: Except 2, every other prime number is an odd number; so P^2 would be odd as well; and when we add 3 to an odd number then it becomes Even; but 2 is the only even prime number.

This is a famous conjecture in Number Theory; it is called Goldbach conjecture; this conjecture is used widely in aptitude exams (including CSAT)

76. Deepa has forgotten her 4-digit locker key. But she recalls that all the keys are positive integers and are different from each other. She also remembers that the 4th digit is the smallest and the maximum value of the first digit is 3. She also remembers that if she divides the second digit by the third digit, she gets the first digit. How many different combinations Deepa has to unlock the door?

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

Answer: C

Explanation:

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→ 1st → 4th

A B C D

$\frac{B}{C} = A$

Given $A = 2, 3$

$\Rightarrow A$ could not be 1, because no two digits are same

$\therefore A = 2, 3$

$D = 1, 2$ (Smallest)

A	B	C	D
3	6	2	1
2	6	3	1
2	8	4	1

77. An insect (which cannot fly) wants to travel from the bottom corner to the diagonally opposite top corner of a cubical room. The side of the room is 3 meters. What will be the minimum distance that the insect has to travel?

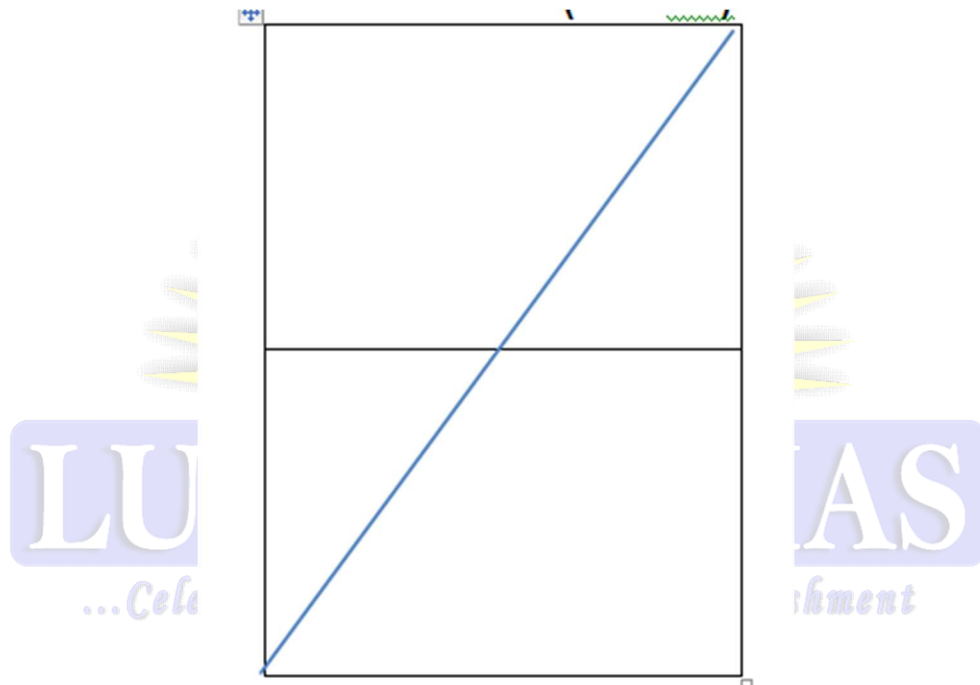
- (a) $3\sqrt{2} + 3$
- (b) $3\sqrt{3}$
- (c) $3\sqrt{6}$
- (d) $3\sqrt{5}$

Answer: D

Explanation:

Each side of the room is 3 meters. And when we unfold the room, we will get a figure as depicted below.

Diagonal is the distance the insect has to travel = $(3^2 + 6^2)^{1/2} = 3\sqrt{5}$



78. Mohan and Priya randomly chose 5 numbers each from numbers 1 to 10, subject to the two conditions given below. Who among Mohan and Priya chose the number 2?

Condition 1: Sum of numbers chosen by Mohan is 5 more than the sum of numbers chosen by Priya.

Condition 2: One chose exactly four even numbers, while the other chose exactly four odd numbers.

Select the correct answer from the options given below:

- (a) Statement 1 alone is sufficient to answer.
- (b) Statement 2 alone is sufficient to answer.
- (c) Either of the statements is sufficient to answer.
- (d) Both statements are required to answer.

Answer: D

Explanation:

This question involves many cases. You should start with option 2 (why option 2? This will come with practice). Let Mohan chose (4, 6, 8, 10 and one more number) and Priya chose (3, 5, 7, 9 and one more number), but now 2 can be assigned to either Mohan or Priya; However, if the sum of Mohan's numbers is 5 more than Priya's numbers then 2 should be assigned to Mohan only. Hence, both statements are required.

Directions for following 2 (two) items: Read the following **two passages** and answer the items that follow the passage. Your answers to these items should be based on the passage only.

PASSAGE-1

The framing of a syllabus for any subject is serious business. It involves extensive consultation and long hours of discussion about what might be absolutely essential for a subject to be taught meaningfully, what ought to be included, or what could be excluded. The architecture of a syllabus is undermined by piecemeal modifications.

One of the sources of critical thinking, arguably, is the study of humanities and social sciences through which one could meaningfully transact with multiple concepts. Social theory, for example, would help us discover the truth of caste embedded in the social reality and humanities would enable us to seek to amplify it through its simplification in narratives that form the part of such activities comprising music, painting, poetry, and autobiographies of the oppressed. Any forward-looking revisions of the syllabi have to promote critical thinking through their concepts, thus making the classroom into a hospitable space where ethical narratives can be candidly produced.

The act of storytelling in the classroom that connects students' experience with concepts becomes available only through the humanities and the social sciences. Storytelling is fundamentally an ethical practice. Its ethical appeal to justice and equality still has the power to awaken a moral imagination and motivate people to look at their society's bad practices more critically and ask how they can make society more decent. The merit of revisions thus emerges from the truth that is embodied in the discussion of inclusion and not exclusion of the reality such as caste, untouchability, and communalism. ...Celebrating 12 years of its establishment

79. Which of these is/are assumption/s based on the reading of the above passage?

1. Storytelling is a technique used for teaching a variety of subjects in the classrooms today.
2. Any revisions of the syllabi for any subject can be considered backward if the aim does not promote critical thinking.
3. The study of humanities and social sciences is one of the sources of critical thinking.
4. Without the inclusion of relevant chapters from humanities and the social sciences, the act of storytelling in the classroom may not get sufficiently covered in the syllabus meant to promote critical thinking.

Select the correct answer from the code given below:

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

Answer: C

Explanation: Statements 2, 3 and 4 are the assumptions that can be made from the passage.

Passage-2

There is no doubt that most history across the world has been written with a strong bias towards the victor and those in power. History of World War II is perhaps the best example where mainly British and Americans have been glorified and credited with achieving victory over Nazi Germany. Western historians fail to concede that perhaps the turning point of the second world war was the defeat of Nazi armies in Russia where they not only lost hundreds of thousands of soldiers but also a large part of their war machinery and equipment. Similarly, Nazi thrusts in Africa, Italy and along the borders of France were mainly blunted by hundreds of thousands of Indian soldiers drafted in the British army. Same was the case in South-East Asia against Japanese where Indian soldiers were sent to the front lines after British soldiers in Malay and other parts capitulated against the Japanese onslaught.

By definition history is a continuous, systematic narrative of past events relating to a particular people, country, period, person, etc. It is written in a chronological order. It is important that history per se must be a true and factual record of events as they happened. History must record all the good, bad or ugly that may be associated with any period of time, event or personality. Opinions, perceptions or commentary on history and historical events should not be construed as history as they will vary from individual to individual.

80. Which of the following statements best reflects the central idea of the passage?

- (a) Contribution of Russian and Indian war effort as partners of Allies has not been adequately represented in its correct perspective.
- (b) History across the world has been written with a strong bias towards the victor and those in power.
- (c) The British and the Americans achieved victory over the Nazi Germany and thus, they deserve a special mention in the history of the world.
- (d) Indian soldiers were successful because of the British soldiers intelligently leading them in Malay.

Answer: B

Explanation:

The passage gives examples where the History across the world has been written with a strong bias towards the victor and those in power.

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