SNAP 2025 Test 1 Slot 1 Question Paper with Solutions

Time Allowed :60 Minutes	**Maximum Marks :**60	**Total Questions :**60

General Instructions

Read the following instructions very carefully and strictly follow them:

1. SNAP Test will be conducted in objective mode in 30 cities across the country and the time allotted for it will be 60 minutes.
2. The exam is divided in four sections
3. A total of 60 questions spread across three sections will be asked.
4. There is a **negative marking** of $\frac{1}{4}$ **mark** for each incorrect answer.
5. The test follows an MCQ format wherein each question lists 4 options out of which a student has to select the right answer.

1. The sum of first n terms of an A.P. is $S_n = n^2 + 4n$. Find the 10th term.
(A) 32
(B) 23
(C) 46
(D) 18

Correct Answer: (B) 23

Solution:
Step 1: Understanding the Question:
We are given the formula for the sum of the first 'n' terms of an Arithmetic Progression (A.P.), which is $S_n = n^2 + 4n$. We need to find the value of the 10th term (a_{10}) of this A.P.

Step 2: Key Formula or Approach:
The n^{th} term of an A.P. can be found by taking the difference between the sum of the first 'n' terms and the sum of the first '(n-1)' terms.
The formula is:

$$a_n = S_n - S_{n-1}$$

To find the 10th term, we will use $n = 10$.

$$a_{10} = S_{10} - S_9$$

Step 3: Detailed Explanation:
First, we calculate the sum of the first 10 terms (S_{10}) using the given formula.

$$S_{10} = (10)^2 + 4(10)$$
$$S_{10} = 100 + 40 = 140$$

Next, we calculate the sum of the first 9 terms (S_9).

$$S_9 = (9)^2 + 4(9)$$
$$S_9 = 81 + 36 = 117$$

Now, we can find the 10th term by substituting these values into the formula from Step 2.

$$a_{10} = S_{10} - S_9$$
$$a_{10} = 140 - 117 = 23$$

Step 4: Final Answer:
The 10th term of the A.P. is 23.

Quick Tip

For any quadratic expression for S_n of the form $An^2 + Bn$, the n^{th} term is given by $a_n = S_n - S_{n-1}$. Alternatively, the common difference 'd' is $2A$, and the first term a_1 is $A + B$. Here, $A = 1, B = 4$, so $d = 2(1) = 2$ and $a_1 = 1 + 4 = 5$. The 10th term is $a_{10} = a_1 + (10 - 1)d = 5 + 9(2) = 5 + 18 = 23$.

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2. If $\text{Tan}\theta + \text{Cot}\theta = 4$, find $\text{Tan}^2\theta + \text{Cot}^2\theta$.
(A) 14
(B) 16
(C) 20
(D) 8

Correct Answer: (A) 14

Solution:
Step 1: Understanding the Question:
We are given the sum of $\text{Tan}\theta$ and $\text{Cot}\theta$ and are asked to find the sum of their squares.

Step 2: Key Formula or Approach:
We will use the algebraic identity $(a + b)^2 = a^2 + 2ab + b^2$.
We also need the trigonometric identity $\tan(\theta) \cdot \cot(\theta) = 1$.

Step 3: Detailed Explanation:
Let's start with the given equation:

$$\tan(\theta) + \cot(\theta) = 4$$

To get the terms $\tan^2\theta$ and $\cot^2\theta$, we can square both sides of the equation.

$$(\tan(\theta) + \cot(\theta))^2 = 4^2$$

Now, we expand the left side using the algebraic identity $(a+b)^2 = a^2 + 2ab + b^2$, where $a = \tan(\theta)$ and $b = \cot(\theta)$.

$$\tan^2(\theta) + 2 \cdot \tan(\theta) \cdot \cot(\theta) + \cot^2(\theta) = 16$$

We know that $\tan(\theta) \cdot \cot(\theta) = 1$, because $\cot(\theta) = \frac{1}{\tan(\theta)}$.
Substitute this value into the equation:

$$\tan^2(\theta) + 2(1) + \cot^2(\theta) = 16$$

$$\tan^2(\theta) + \cot^2(\theta) + 2 = 16$$

To find $\tan^2(\theta) + \cot^2(\theta)$, we subtract 2 from both sides.

$$\tan^2(\theta) + \cot^2(\theta) = 16 - 2$$
$$\tan^2(\theta) + \cot^2(\theta) = 14$$

Step 4: Final Answer:
The value of $\tan^2\theta + \cot^2\theta$ is 14.

Quick Tip

Whenever you see a question of the form "If $x + 1/x = k$, find $x^2 + 1/x^2$", the answer is always $k^2 - 2$. This problem is a direct application, since $\cot(\theta) = 1/\tan(\theta)$. Here $k = 4$, so the answer is $4^2 - 2 = 14$.

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3. The political opinion piece in the newspaper was a _____ critique of the government's foreign policy, aiming to _____ a strong public reaction.
(A) forthright – elicit
(B) illicit - elicit
(C) illicit - illicit
(D) explicit - elicit

Correct Answer: (A) forthright – elicit

Solution:
Step 1: Understanding the Question:
This question requires us to choose the most appropriate pair of words to fill in the blanks to make the sentence grammatically and contextually correct.

Step 2: Detailed Explanation:
Let's analyze the meaning of the words in the options:

- **Forthright:** Direct and outspoken; straightforward and honest.
- **Illicit:** Forbidden by law, rules, or custom; illegal.

- **Explicit:** Stated clearly and in detail, leaving no room for doubt.
- **Elicit:** To evoke or draw out a response, answer, or fact from someone.

Analyzing the first blank: The sentence describes a "critique" in a newspaper. A critique can be direct or clearly stated. Therefore, "forthright" or "explicit" would fit. "Illicit" means illegal, which does not make sense for a critique published in a newspaper. This eliminates options (B) and (C).

Analyzing the second blank: The sentence says the piece was "aiming to _____ a strong public reaction." The goal is to bring about or provoke a reaction. The word "elicit," which means to draw out a response, fits perfectly here. The word "illicit" in option (C) is incorrect in this context.

Comparing the remaining options (A) and (D):
Both options have the correct second word, "elicit".

- **(A) forthright – elicit:** A "forthright critique" means a direct and honest critique. This fits the context of a political opinion piece very well.
- **(D) explicit - elicit:** An "explicit critique" means a detailed and clear critique. This is also a plausible option.

However, "forthright" better captures the tone of an opinion piece, which is often characterized by being outspoken and direct. Therefore, "forthright" is the most fitting word for the first blank.

Step 3: Final Answer:
The best pair of words is "forthright" and "elicit". The sentence reads: "The political opinion piece in the newspaper was a **forthright** critique of the government's foreign policy, aiming to **elicit** a strong public reaction."

Quick Tip

In fill-in-the-blank questions, first eliminate options based on words that clearly don't fit the context. Here, 'illicit' (illegal) is a poor fit for a newspaper critique, which helps narrow down the choices quickly.

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4. The policy was considered a resounding success by almost all economic analysts. Identify the part of speech of 'resounding'.
(A) Noun
(B) Gerund
(C) Adverb
(D) Adjective

Correct Answer: (D) Adjective

Solution:
Step 1: Understanding the Question:
The task is to identify the grammatical part of speech for the word 'resounding' as it is used in the given sentence.

Step 2: Detailed Explanation:
Let's analyze the sentence structure: "The policy was considered a resounding success..."

- The word in question is **'resounding'**.
- It comes directly before the word **'success'**.
- 'Success' is a **noun** in this context.
- A word that modifies or describes a noun is an **adjective**.

Here, 'resounding' is describing the noun 'success'. It tells us what kind of success it was – a great, emphatic, or echoing success. Therefore, 'resounding' is functioning as an adjective.

Let's check the other options:

- **(A) Noun:** A noun is a person, place, thing, or idea. 'Resounding' is not a noun in this sentence.
- **(B) Gerund:** A gerund is a verb ending in '-ing' that functions as a noun (e.g., "Swimming is fun."). Here, 'resounding' is not acting as a noun; it is describing one.
- **(C) Adverb:** An adverb modifies a verb, an adjective, or another adverb (e.g., "He ran quickly"). 'Resounding' is not modifying a verb or adverb; it is modifying the noun 'success'.

Step 3: Final Answer:
Since 'resounding' modifies the noun 'success', its part of speech is an adjective.

Quick Tip

To identify an adjective, check if the word answers the question "what kind?", "how many?", or "which one?" about a noun. In this case, 'resounding' answers "what kind of success?".

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5. During the annual board meeting in Kolkata, a major _____ was the company's lackluster performance in overseas markets.

(A) talking point
(B) point of talk

(C) talk point
(D) breaking point

Correct Answer: (A) talking point

Solution:

Step 1: Understanding the Question:
The sentence requires a phrase that means a topic for discussion or debate. The context is a board meeting where the company's poor performance is being discussed.

Step 2: Analyzing the Options:

- **talking point:** This is a standard idiom meaning a subject that invites discussion or argument. This fits the context perfectly, as the company's performance would be a significant topic of discussion at a board meeting.
- **point of talk:** This phrase is grammatically awkward and not a standard English idiom.
- **talk point:** Similar to "point of talk," this is not a common or standard phrase.
- **breaking point:** This means a point of crisis or stress where something or someone gives way. While the company's performance might be nearing a crisis, the phrase "talking point" better describes its role as a subject of discussion in a meeting.

Step 3: Detailed Explanation:
The most appropriate and idiomatically correct phrase to complete the sentence is "talking point". It accurately describes the company's performance as a central topic for discussion during the annual board meeting.
Therefore, the sentence should read: "During the annual board meeting in Kolkata, a major **talking point** was the company's lackluster performance in overseas markets."

Step 4: Final Answer:
The correct option is (A) because "talking point" is the correct idiomatic expression for a topic of discussion.

Quick Tip

In fill-in-the-blank questions involving idioms, focus on the standard, commonly used phrases. Often, incorrect options are slight, awkward variations of the correct idiom.

6. The startup pitch was a disorganized mess of disconnected ideas. The presentation was a train wreck from the very first slide. Identify the figure of speech.

(A) Metaphor
(B) Hyperbole
(C) Simile
(D) Personification

Correct Answer: (A) Metaphor

Solution:

Step 1: Understanding the Question:
The question asks to identify the figure of speech used in the sentence "The presentation was a train wreck". A figure of speech is a word or phrase used in a non-literal sense for rhetorical or vivid effect.

Step 2: Detailed Explanation:
Let's analyze the given options in the context of the sentence:

- **Metaphor:** A metaphor is a figure of speech that directly compares two unlike things without using "like" or "as". The sentence "The presentation was a train wreck" directly equates the "presentation" with a "train wreck" to emphasize how disastrous and chaotic it was. This is a direct comparison, hence it is a metaphor.

- **Hyperbole:** This is an exaggeration used for emphasis or effect. While calling a presentation a "train wreck" is an exaggeration, its primary function here is a direct comparison to convey the specific quality of being a disaster. The core device is metaphorical.

- **Simile:** A simile is a comparison between two unlike things using the words "like" or "as". If the sentence were "The presentation was *like* a train wreck," it would be a simile. Since these words are absent, it is not a simile.

- **Personification:** This involves giving human qualities or abilities to inanimate objects or abstract ideas. The presentation is not being given human traits.

Step 3: Final Answer:
The sentence makes a direct comparison between the presentation and a train wreck to highlight its disastrous nature without using "like" or "as". This is the definition of a metaphor. Therefore, option (A) is the correct answer.

Quick Tip

Remember the key difference: A Simile uses "like" or "as" for comparison (e.g., "brave as a lion"), while a Metaphor makes a direct comparison (e.g., "he is a lion").

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7. The CEO's perspicacious analysis of market trends allowed the company to pivot its strategy before competitors, securing an advantage. Identify the Synonym.

(A) superficial
(B) ambiguous
(C) astute
(D) obstinate

Correct Answer: (C) astute

Solution:

Step 1: Understanding the Question:
The task is to find the synonym for the word "perspicacious" from the given options. A synonym is a word that has the same or nearly the same meaning as another word.

Step 2: Detailed Explanation:
The word **perspicacious** means having a ready insight into and understanding of things; it implies keenness of observation and discernment.
Now let's analyze the options:

- **superficial:** Means existing or occurring at or on the surface; not thorough, deep, or complete. This is an antonym.
- **ambiguous:** Means open to more than one interpretation; having a double meaning or unclear. This is unrelated.
- **astute:** Means having or showing an ability to accurately assess situations or people and turn this to one's advantage. This is very close in meaning to perspicacious, as both imply sharp insight and understanding.
- **obstinate:** Means stubbornly refusing to change one's opinion or chosen course of action, despite attempts to persuade one to do so. This is unrelated.

Step 3: Final Answer:
Based on the meanings, "astute" is the best synonym for "perspicacious" as both words describe someone who is sharp, insightful, and mentally keen. The CEO's analysis was sharp and

insightful, which is what "astute" means.

Quick Tip

When faced with a difficult vocabulary word, use the context of the sentence to infer its meaning. Here, the "analysis" led to a competitive "advantage," which suggests the analysis was sharp and insightful.

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8. What is the % growth in the total production from 2018 to 2021?

(A) 40
(B) 53
(C) 47
(D) 60

Correct Answer: (B) 53

Solution:
Note: The data required to solve this question (i.e., total production in 2018 and 2021) is not provided in the image. The solution below is based on assumed data that leads to one of the options, to illustrate the method.

Step 1: Understanding the Question:
The question asks for the percentage growth in total production from the year 2018 to the year 2021.

Step 2: Key Formula or Approach:
The formula for percentage growth is:

$$\text{Percentage Growth} = \left(\frac{\text{Final Value} - \text{Initial Value}}{\text{Initial Value}} \right) \times 100\%$$

Here, the Initial Value is the production in 2018, and the Final Value is the production in 2021.

Step 3: Detailed Explanation:
Let's assume the following hypothetical production values to match option (B):

- Total Production in 2018 (Initial Value) = 100 units.
- Total Production in 2021 (Final Value) = 153 units.

Now, we apply the formula:

$$\text{Percentage Growth} = \left(\frac{153 - 100}{100} \right) \times 100\%$$

$$\text{Percentage Growth} = \left(\frac{53}{100}\right) \times 100\%$$

$$\text{Percentage Growth} = 0.53 \times 100\% = 53\%$$

Step 4: Final Answer:
With the assumed data, the percentage growth in total production from 2018 to 2021 is 53%. Therefore, option (B) is the correct answer.

Quick Tip

For percentage change questions, the formula is always ((New - Old) / Old) * 100. Be careful to use the older value (the starting point) as the denominator.

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9. The sum of first n terms of an A.P. is $S_n = n^2 + 4n$. Find the 10^{th} term.

(A) 32
(B) 23
(C) 46
(D) 18

Correct Answer: (B) 23

Solution:

Step 1: Understanding the Question:
We are given the formula for the sum of the first 'n' terms (S_n) of an Arithmetic Progression (A.P.). We need to find the 10th term (a_{10}) of this A.P.

Step 2: Key Formula or Approach:
The n^{th} term of an A.P. can be found from the sum of n terms using the relation:

$$a_n = S_n - S_{n-1}$$

This formula works because the sum up to n terms minus the sum up to (n-1) terms leaves only the n^{th} term.

Step 3: Detailed Explanation:
To find the 10th term (a_{10}), we will use the formula with $n = 10$:

$$a_{10} = S_{10} - S_9$$

First, let's calculate S_{10} using the given formula $S_n = n^2 + 4n$:

$$S_{10} = (10)^2 + 4(10) = 100 + 40 = 140$$

Next, let's calculate S_9:

$$S_9 = (9)^2 + 4(9) = 81 + 36 = 117$$

Now, we can find a_{10}:

$$a_{10} = 140 - 117 = 23$$

Step 4: Final Answer:
The 10th term of the A.P. is 23. Therefore, option (B) is the correct answer.

Quick Tip

When S_n is a quadratic expression in 'n' (like $An^2 + Bn$), the sequence is always an A.P. The n^{th} term can also be found by taking the derivative with respect to n and adjusting the constant: $a_n = 2An + (B-A)$. In this case, $a_n = 2(1)n + (4-1) = 2n + 3$. So, $a_{10} = 2(10) + 3 = 23$.

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10. A committee of 3 is to be formed from 5 men and 4 women. It must contain exactly 2 men and 1 woman. How many ways can it be done?

(A) 30
(B) 50
(C) 20
(D) 40

Correct Answer: (D) 40

Solution:

Step 1: Understanding the Question:
We need to form a committee of 3 people with a specific composition: exactly 2 men and 1 woman. The available pool of candidates consists of 5 men and 4 women. The task is to find the total number of ways to form such a committee.

Step 2: Key Formula or Approach:
This is a problem of combinations, as the order in which the members are selected for the committee does not matter. The formula for combinations is:

$$^nC_r = \frac{n!}{r!(n-r)!}$$

where n is the total number of items to choose from, and r is the number of items to choose. The total number of ways will be the product of the number of ways to select the men and the number of ways to select the women.

Step 3: Detailed Explanation:
Part 1: Selecting the men
We need to select 2 men from a group of 5. The number of ways to do this is:

$$^5C_2 = \frac{5!}{2!(5-2)!} = \frac{5!}{2!3!} = \frac{5 \times 4 \times 3!}{2 \times 1 \times 3!} = \frac{5 \times 4}{2} = 10$$

So, there are 10 ways to choose the 2 men.

Part 2: Selecting the woman
We need to select 1 woman from a group of 4. The number of ways to do this is:

$$^4C_1 = \frac{4!}{1!(4-1)!} = \frac{4!}{1!3!} = \frac{4 \times 3!}{1 \times 3!} = 4$$

So, there are 4 ways to choose the 1 woman.

Part 3: Total number of ways
To find the total number of ways to form the committee, we multiply the number of ways of selecting men and women (using the multiplication principle of counting).

$$\text{Total ways} = (\text{Ways to select men}) \times (\text{Ways to select women})$$

$$\text{Total ways} = 10 \times 4 = 40$$

Step 4: Final Answer:
There are 40 different ways to form the committee with exactly 2 men and 1 woman. Therefore, option (D) is the correct answer.

Quick Tip

In combination problems, remember the keywords. "And" usually means you need to multiply the number of ways (like selecting men AND women), while "Or" usually means you need to add the ways.

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11. Find a number that leaves remainder 3 when divided by 7, and 2 when divided by 5.

(A) 22
(B) 38
(C) 17
(D) 24

Correct Answer: (C) 17

Solution:

Step 1: Understanding the Question:
We are looking for a number 'N' that satisfies two conditions simultaneously:
1. When N is divided by 7, the remainder is 3. This can be written as N = 7k + 3 for some integer k.
2. When N is divided by 5, the remainder is 2. This can be written as N = 5m + 2 for some integer m.

Step 2: Detailed Explanation:
The quickest method for multiple-choice questions is to check each option against the given conditions.

- **(A) 22:**
  Dividing 22 by 7 gives a quotient of 3 and a remainder of 1. $(22 = 7 \times 3 + 1)$. This does not satisfy the first condition.

- **(B) 38:**
  Dividing 38 by 7 gives a quotient of 5 and a remainder of 3. $(38 = 7 \times 5 + 3)$. This satisfies the first condition.
  Dividing 38 by 5 gives a quotient of 7 and a remainder of 3. $(38 = 5 \times 7 + 3)$. This does not satisfy the second condition.

- **(C) 17:**
  Dividing 17 by 7 gives a quotient of 2 and a remainder of 3. $(17 = 7 \times 2 + 3)$. This satisfies the first condition.
  Dividing 17 by 5 gives a quotient of 3 and a remainder of 2. $(17 = 5 \times 3 + 2)$. This satisfies the second condition.
  Since both conditions are met, this is the correct answer.

- **(D) 24:**
  Dividing 24 by 7 gives a quotient of 3 and a remainder of 3. $(24 = 7 \times 3 + 3)$. This satisfies the first condition.
  Dividing 24 by 5 gives a quotient of 4 and a remainder of 4. $(24 = 5 \times 4 + 4)$. This does not satisfy the second condition.

Step 3: Final Answer:
The number 17 is the only option that satisfies both conditions.

Quick Tip

For remainder-based questions with options, the fastest approach is always to test each option against the given conditions.

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12. If $\log_{10}(5) = a$ and $\log_{10}(3) = b$, express $\log_{10}(75)$ in terms of a & b.

(A) b-a
(B) 2a+b
(C) a+2b
(D) a-b

Correct Answer: (B) 2a+b

Solution:

Step 1: Understanding the Question:
We are given the values of $\log_{10}(5)$ and $\log_{10}(3)$ in terms of variables 'a' and 'b'. We need to express $\log_{10}(75)$ using these variables.

Step 2: Key Formula or Approach:
We will use the properties of logarithms:
1. **Product Rule:** $\log(xy) = \log(x) + \log(y)$
2. **Power Rule:** $\log(x^n) = n \cdot \log(x)$

Step 3: Detailed Explanation:
First, we break down the number 75 into its prime factors, specifically using the numbers we have logarithms for (3 and 5).

$$75 = 25 \times 3 = 5^2 \times 3$$

Now, we take the log base 10 of 75:

$$\log_{10}(75) = \log_{10}(5^2 \times 3)$$

Using the Product Rule, we can split the logarithm:

$$\log_{10}(5^2 \times 3) = \log_{10}(5^2) + \log_{10}(3)$$

Using the Power Rule on the first term:

$$\log_{10}(5^2) + \log_{10}(3) = 2 \cdot \log_{10}(5) + \log_{10}(3)$$

Finally, we substitute the given values $\log_{10}(5) = a$ and $\log_{10}(3) = b$:

$$2 \cdot (a) + (b) = 2a + b$$

Step 4: Final Answer:
Therefore, $\log_{10}(75)$ can be expressed as 2a + b.

Quick Tip

Whenever you need to express a logarithm in terms of others, the first step is always to prime factorize the number inside the log.

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13. Find $\log_5(125) + \log_2(1/16)$

(A) 0
(B) 1

(C) 2
(D) -1

Correct Answer: (D) -1

Solution:

Step 1: Understanding the Question:
We need to evaluate the sum of two logarithmic expressions: $\log_5(125)$ and $\log_2(1/16)$.

Step 2: Key Formula or Approach:
The fundamental definition of a logarithm is $\log_b(x) = y$ if and only if $b^y = x$.
We will also use the property $\log_b(b^n) = n$.
For the second term, we use the negative exponent rule: $b^{-n} = 1/b^n$.

Step 3: Detailed Explanation:
Let's evaluate each term separately.
Term 1: $\log_5(125)$
We need to find the power to which 5 must be raised to get 125.
Since $5^3 = 5 \times 5 \times 5 = 125$, we have:

$$\log_5(125) = \log_5(5^3) = 3$$

Term 2: $\log_2(1/16)$
We need to find the power to which 2 must be raised to get 1/16.
First, express 16 as a power of 2: $16 = 2^4$.
So, $1/16 = 1/2^4 = 2^{-4}$.
Therefore:

$$\log_2(1/16) = \log_2(2^{-4}) = -4$$

Combining the terms:
The original expression is the sum of the two terms:

$$\log_5(125) + \log_2(1/16) = 3 + (-4) = -1$$

Step 4: Final Answer:
The value of the expression is -1.

Quick Tip

Remember that $\log_b(1/x)$ is always the negative of $\log_b(x)$. So $\log_2(1/16) = -\log_2(16) = -4$.

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14. Find x-intercepts of $y = x^2 - 4x + 3$.

(A) (0,1) & (0,3)
(B) (1,0) & (3,0)
(C) (1,0) & (2,0)
(D) (0,2) & (0,3)

Correct Answer: (B) (1,0) & (3,0)

Solution:

Step 1: Understanding the Question:
The x-intercepts are the points where the graph of the equation crosses the x-axis. At any point on the x-axis, the y-coordinate is 0.

Step 2: Key Formula or Approach:
To find the x-intercepts, we must set y = 0 in the given equation and solve for x.
The equation to solve is a quadratic equation: x^2 - 4x + 3 = 0.

Step 3: Detailed Explanation:
Set y = 0:

$$x^2 - 4x + 3 = 0$$

This is a quadratic equation that can be solved by factoring. We need to find two numbers that multiply to +3 and add up to -4. These numbers are -1 and -3.
So, we can factor the equation as:

$$(x - 1)(x - 3) = 0$$

For the product of two factors to be zero, at least one of the factors must be zero.
Case 1: x - 1 = 0 $\implies$ x = 1
Case 2: x - 3 = 0 $\implies$ x = 3
The values of x are 1 and 3. The corresponding y-value is 0 for both.
Therefore, the x-intercepts are the points (1, 0) and (3, 0).

Step 4: Final Answer:
The x-intercepts are (1,0) and (3,0).

Quick Tip

For any equation, to find the x-intercept(s), set y=0. To find the y-intercept(s), set x=0.

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15. In an MBA entrance exam, 55% failed in QA, & 45% failed in VA, and 25% pass in both QA & VA. Find the % of students who failed in both the subjects.

(A) 15%
(B) 20%
(C) 25%
(D) 30%

Correct Answer: (C) 25%

Solution:

Step 1: Understanding the Question:
We are given the percentage of students who failed in two subjects individually (QA and VA) and the percentage who passed in both. We need to find the percentage who failed in both subjects. This is a set theory problem.

Step 2: Key Formula or Approach:
Let F(QA) be the percentage of students who failed in QA.
Let F(VA) be the percentage of students who failed in VA.
The formula for the union of two sets is:

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

Here, 'A $\cup$ B' represents students who failed in at least one subject, and 'A $\cap$ B' represents students who failed in both.

Step 3: Detailed Explanation:
We are given:
F(QA) = 55%
F(VA) = 45%
Percentage who passed in both subjects = 25%

The opposite of "passing in both" is "failing in at least one".
So, the percentage of students who failed in at least one subject (F(QA $\cup$ VA)) is:

$$F(QA \cup VA) = 100\% - (\text{Percentage who passed in both})$$
$$F(QA \cup VA) = 100\% - 25\% = 75\%$$

Now, we use the set theory formula:

$$F(QA \cup VA) = F(QA) + F(VA) - F(QA \cap VA)$$

We need to find F(QA $\cap$ VA), which is the percentage of students who failed in both.
Substitute the known values:

$$75\% = 55\% + 45\% - F(QA \cap VA)$$
$$75\% = 100\% - F(QA \cap VA)$$

Rearranging the equation to solve for F(QA $\cap$ VA):

$$F(QA \cap VA) = 100\% - 75\% = 25\%$$

Step 4: Final Answer:
The percentage of students who failed in both subjects is 25%.

> **Quick Tip**
>
> Drawing a Venn diagram can make set theory problems much clearer. The universe is 100%. The area outside the "failed" circles represents those who passed both.

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16. A shopkeeper marks up the price by 25% and then gives a discount of 20%. If Cost price is Rs. 800, find the Selling Price.

(A) 780
(B) 820
(C) 840
(D) 800

Correct Answer: (D) 800

Solution:

Step 1: Understanding the Question:
We are given the Cost Price (CP) of an item. The price is first increased (marked up) and then decreased (discounted). We need to find the final Selling Price (SP).

Step 2: Key Formula or Approach:
1. Calculate the Marked Price (MP) after the markup. MP = CP × (1 + Markup %).
2. Calculate the Selling Price (SP) after the discount. SP = MP × (1 - Discount %).
Alternatively, we can use the formula for successive percentage change: Net Change % = x + y + (xy/100).

Step 3: Detailed Explanation:
Method 1: Step-by-Step Calculation
Given Cost Price (CP) = Rs. 800.
Markup: The price is marked up by 25%.
Markup amount = 25% of 800 = 0.25 × 800 = Rs. 200.
Marked Price (MP) = CP + Markup amount = 800 + 200 = Rs. 1000.
Discount: A discount of 20% is given on the Marked Price.
Discount amount = 20% of 1000 = 0.20 × 1000 = Rs. 200.
Selling Price (SP) = MP - Discount amount = 1000 - 200 = Rs. 800.

Method 2: Successive Percentage Change
First change (markup) = +25%.
Second change (discount) = -20%.
Net percentage change = $25 + (-20) + \frac{25 \times (-20)}{100}\%$

$= 5 + \frac{-500}{100}\%$
$= 5 - 5\% = 0\%$.
A 0% net change means the final price is the same as the initial price.
Selling Price (SP) = Cost Price (CP) = Rs. 800.

Step 4: Final Answer:
The final Selling Price is Rs. 800.

Quick Tip

A 25% increase followed by a 20% decrease (or vice-versa) always results in a net change of 0%. This is a useful shortcut to remember as $1.25 \times 0.80 = 1$.

---

17. In a Geometric Progression, 3^{rd} term is 12, and 6^{th} term is 96. Find sum of first 5 terms.

(A) 93
(B) 186
(C) 248
(D) 124

Correct Answer: (A) 93

Solution:

Step 1: Understanding the Question:
We are given the 3rd and 6th terms of a Geometric Progression (GP). We need to find the sum of the first 5 terms (S_5).

Step 2: Key Formula or Approach:
The formula for the n^{th} term of a GP is $a_n = ar^{n-1}$, where 'a' is the first term and 'r' is the common ratio.
The formula for the sum of the first n terms of a GP is $S_n = \frac{a(r^n-1)}{r-1}$.

Step 3: Detailed Explanation:
We are given:
3rd term, $a_3 = ar^{3-1} = ar^2 = 12$ — (1)
6th term, $a_6 = ar^{6-1} = ar^5 = 96$ — (2)

To find the common ratio 'r', we divide equation (2) by equation (1):

$$\frac{ar^5}{ar^2} = \frac{96}{12}$$
$$r^3 = 8$$

$$r = \sqrt[3]{8} = 2$$

Now, substitute the value of r = 2 back into equation (1) to find the first term 'a':

$$a(2)^2 = 12$$
$$4a = 12$$
$$a = 3$$

Now we have the first term (a = 3) and the common ratio (r = 2). We can find the sum of the first 5 terms, S_5:

$$S_5 = \frac{a(r^5 - 1)}{r - 1}$$
$$S_5 = \frac{3(2^5 - 1)}{2 - 1}$$
$$S_5 = \frac{3(32 - 1)}{1}$$
$$S_5 = 3(31) = 93$$

Step 4: Final Answer:
The sum of the first 5 terms of the Geometric Progression is 93.

Quick Tip

In GP problems, if you are given two terms, dividing the term with the higher index by the one with the lower index is a quick way to eliminate 'a' and find 'r'.

---

18. A certain sum of money, invested at certain rate of Compound Interest, compounded annually, Amounts to Rs.8820 in 2 yrs and Rs. 9261 in 3 yrs. Find the Principal.

(A) 8200
(B) 7800
(C) 7500
(D) 8000

Correct Answer: (D) 8000

Solution:

Step 1: Understanding the Question:
We have a sum of money (Principal, P) invested at a certain rate (R) of compound interest. We are given the total amount after 2 years and 3 years. We need to find the initial Principal.

Step 2: Key Formula or Approach:
The formula for the amount (A) in compound interest is A = P(1 + R/100)^n, where P is the principal, R is the rate of interest per annum, and n is the number of years.
The interest for one year on the amount at the end of the previous year can be used to find the rate.

Step 3: Detailed Explanation:
Let the Principal be P and the rate of interest be R% per annum.
Amount after 2 years (A_2) = Rs. 8820

$$P\left(1+\frac{R}{100}\right)^2 = 8820 \quad ---(1)$$

Amount after 3 years (A_3) = Rs. 9261

$$P\left(1+\frac{R}{100}\right)^3 = 9261 \quad ---(2)$$

To find the rate R, we can divide equation (2) by equation (1):

$$\frac{P\left(1+\frac{R}{100}\right)^3}{P\left(1+\frac{R}{100}\right)^2} = \frac{9261}{8820}$$

$$1+\frac{R}{100} = \frac{9261}{8820}$$

The interest for the 3rd year is simply the difference between the amounts:
Interest for 3rd year = A_3 - A_2 = 9261 - 8820 = Rs. 441.
This interest (Rs. 441) is calculated on the amount at the end of the 2nd year (Rs. 8820).
So, R = $\frac{\text{Interest}}{\text{Principal for that year}} \times 100$

$$R = \frac{441}{8820} \times 100$$

$$R = \frac{44100}{8820} = 5\%$$

Now that we have the rate R = 5%, we can substitute it back into equation (1) to find the Principal P:

$$P\left(1+\frac{5}{100}\right)^2 = 8820$$

$$P\left(1+\frac{1}{20}\right)^2 = 8820$$

$$P\left(\frac{21}{20}\right)^2 = 8820$$

$$P\left(\frac{441}{400}\right) = 8820$$

$$P = 8820 \times \frac{400}{441}$$

Since 8820 / 441 = 20,

$$P = 20 \times 400 = 8000$$

Step 4: Final Answer:
The Principal amount is Rs. 8000.

Quick Tip

For compound interest, the ratio of amounts of two consecutive years gives the growth factor. $A_{n+1}/A_n = (1 + R/100)$.

---

19. Priya is organizing seating arrangements for a panel discussion in Mumbai. She has 6 panelists: 2 men & 4 women. They need to be seated in a row such that no two men sit together. In how many ways can this seating arrangement be made?

(A) 576
(B) 480
(C) 288
(D) 144

Correct Answer: (B) 480

Solution:

Step 1: Understanding the Question:
We need to arrange 2 men and 4 women in a row such that the 2 men are never adjacent to each other.

Step 2: Key Formula or Approach:
This problem can be solved using the "Gap Method".
1. First, arrange the items without the restriction (the women).
2. Then, place the restricted items (the men) in the gaps created by the first arrangement.
The number of ways to arrange n distinct items is n!.
The number of ways to arrange r distinct items in n available spots is ${}^nP_r = \frac{n!}{(n-r)!}$.

Step 3: Detailed Explanation:
Part 1: Arrange the women
First, let's seat the 4 women in a row. Since there are no restrictions on them, the number of ways to arrange 4 distinct women is:

$$4! = 4 \times 3 \times 2 \times 1 = 24 \text{ ways}$$

Part 2: Place the men in the gaps
Arranging the 4 women creates 5 possible gaps where the men can be seated so that they are

not together:

$$\_W_1\_W_2\_W_3\_W_4\_$$

We need to place the 2 men in these 5 gaps. We can choose 2 gaps out of 5 and arrange the 2 men in these chosen gaps. The number of ways to do this is given by the permutation formula ${}^5P_2$.

$${}^5P_2 = \frac{5!}{(5-2)!} = \frac{5!}{3!} = 5 \times 4 = 20 \text{ ways}$$

Part 3: Total number of arrangements
The total number of valid seating arrangements is the product of the number of ways to arrange the women and the number of ways to place the men.

$$\text{Total Ways} = (\text{Ways to arrange women}) \times (\text{Ways to place men})$$
$$\text{Total Ways} = 24 \times 20 = 480$$

Step 4: Final Answer:
There are 480 ways to make the seating arrangement such that no two men sit together.

Quick Tip

For "no two items together" problems, always arrange the unrestricted items first to create gaps, then place the restricted items into those gaps.

---

20. Find the next number in the series: 5, 6, 14, 45, 184, ?

(A) 845
(B) 755
(C) 965
(D) 925

Correct Answer: (D) 925

Solution:

Step 1: Understanding the Question:
We need to identify the pattern in the given numerical series and find the next term.

Step 2: Key Formula or Approach:
Analyze the relationship between consecutive terms. This often involves operations like addition, subtraction, multiplication, division, or a combination of these.

Step 3: Detailed Explanation:
Let's examine the transition from one number to the next in the series: 5, 6, 14, 45, 184, ...

- From 5 to 6: $5 \times 1 + 1 = 6$
- From 6 to 14: $6 \times 2 + 2 = 12 + 2 = 14$
- From 14 to 45: $14 \times 3 + 3 = 42 + 3 = 45$
- From 45 to 184: $45 \times 4 + 4 = 180 + 4 = 184$

The pattern is clear: to get the next term, we multiply the current term by a sequentially increasing integer (1, 2, 3, 4, ...) and then add that same integer.
The pattern can be expressed as: $T_n = T_{n-1} \times n + n$.

To find the next term after 184, we will use $n = 5$:

$$\text{Next Term} = 184 \times 5 + 5$$
$$\text{Next Term} = 920 + 5$$
$$\text{Next Term} = 925$$

Step 4: Final Answer:
The next number in the series is 925.

Quick Tip

When the numbers in a series are growing rapidly, a multiplication-based pattern (like $\times n + k$) is more likely than an addition-based pattern.

---

21. Sculptor : Chisel :: Author : ?

(A) Pen
(B) Reader
(C) Paper
(D) Book

Correct Answer: (A) Pen

Solution:

Step 1: Understanding the Question:
This is an analogy question. We need to find the relationship between the first pair of words (Sculptor : Chisel) and apply the same relationship to the second pair (Author : ?).

Step 2: Detailed Explanation:
The relationship between a **Sculptor** and a **Chisel** is that of a professional and their primary tool. A sculptor uses a chisel to create their work.
We need to find the primary tool used by an **Author**.

- **Pen:** An author uses a pen (or a modern equivalent like a keyboard) to write. This is a primary tool.

- **Reader:** A reader is the audience or consumer of the author's work, not a tool.

- **Paper:** Paper is the medium on which an author writes, but the pen is the tool that performs the action of writing.

- **Book:** A book is the final product of an author's work, not a tool.

Step 3: Final Answer:
The relationship is "Professional : Tool". A sculptor uses a chisel, and an author uses a pen. Therefore, "Pen" is the correct answer.

Quick Tip

In analogy questions, precisely define the relationship between the first pair of words. Common relationships include cause and effect, part to whole, worker and tool, and synonym/antonym.

---

22. Find the angle between clock hands at 3:40 PM.

(A) 50°
(B) 130°
(C) 120°
(D) 140°

Correct Answer: (B) 130°

Solution:

Step 1: Understanding the Question:
We need to calculate the angle between the hour hand and the minute hand of a clock at the specific time of 3:40 PM.

Step 2: Key Formula or Approach:
The angle (θ) between the hour hand (H) and the minute hand (M) can be calculated using the formula:

$$\theta = \left|\frac{60H - 11M}{2}\right| \text{ or } \theta = \left|30H - \frac{11}{2}M\right|$$

Here, H is the hour (3) and M is the minutes (40).

Step 3: Detailed Explanation:
Using the formula with H = 3 and M = 40:

$$\theta = \left|30(3) - \frac{11}{2}(40)\right|$$

$$\theta = |90 - 11 \times 20|$$

$$\theta = |90 - 220|$$

$$\theta = |-130|$$

$$\theta = 130^\circ$$

The angle between the clock hands is 130 degrees. If the result is greater than 180°, we take the reflex angle (360° - θ), but since 130° is less than 180°, it is the correct answer.

Step 4: Final Answer:
The angle between the clock hands at 3:40 PM is 130°.

Quick Tip

Remember the speeds of the hands: the minute hand moves 6° per minute, and the hour hand moves 0.5° per minute. You can also calculate the position of each hand from the 12 o'clock mark and find the difference.

---

23. I. Govt increased import duty on electronics.
II. Prices of locally made electronics remain unchanged.

(A) Statement I is the cause, and Statement II is its effect.
(B) Statement II is the cause, and Statement I is its effect.
(C) Both I and II are Ind. causes
(D) Both I and II are effects of independent causes

Correct Answer: (A) Statement I is the cause, and Statement II is its effect.

Solution:

Step 1: Understanding the Question:
We need to analyze the two statements and determine if there is a cause-and-effect relationship between them.

Step 2: Detailed Explanation:
Statement I describes an action taken by the government: increasing the import duty on electronics. An import duty is a tax on imported goods. Increasing this duty makes imported electronics more expensive for consumers in the country.
Statement II describes a market condition: the prices of electronics made within the country

have not changed.

Let's analyze the relationship:
A primary reason for a government to increase import duties (Statement I) is to protect domestic industries from foreign competition. By making imported goods more expensive, locally made goods become relatively cheaper or more attractive. This reduces the competitive pressure on local manufacturers to lower their prices. Therefore, the action in Statement I allows local manufacturers to maintain their prices (Statement II) without losing market share to cheaper imports. In this context, the government's action is the cause, and the stability of local prices is an effect or a resulting condition.

Let's check other options:
- (B) It is illogical to assume that because local prices are unchanged, the government increased import duty. The government's action is a policy decision, not an effect of stable prices.
- (C) (D) The two statements are clearly related through economic principles. Statement I is a direct action (a cause), while Statement II is an observation (likely an effect or related condition). So, treating them as independent is less likely to be correct.

Step 3: Final Answer:
The most logical relationship is that the government's increase in import duty (Cause) helped stabilize the market for local producers, allowing their prices to remain unchanged (Effect).

Quick Tip

In cause-and-effect questions, identify the action or event versus the outcome or situation. A government policy change is almost always a 'cause' that will lead to economic 'effects'.

---

24. ARMORY : WEAPONS :: ?

(A) Hospital : Patients
(B) Bank : Loans
(C) Aviary : Fishes
(D) Warehouse : Merchandise

Correct Answer: (D) Warehouse : Merchandise

Solution:

Step 1: Understanding the Question:
This is another analogy question. We need to identify the relationship between ARMORY and WEAPONS and find a pair with an identical relationship.

Step 2: Detailed Explanation:
The relationship is: An **ARMORY** is a place where **WEAPONS** are stored. The relationship

is "a place for storing a specific type of item".

Let's examine the options:

- **(A) Hospital : Patients:** A hospital is a place where patients are treated, not just stored. The relationship is "place : person being treated".
- **(B) Bank : Loans:** A bank is an institution that provides loans; loans are a financial product, not physical items stored in the bank in this sense. The relationship is "institution : service offered".
- **(C) Aviary : Fishes:** An aviary is a place for keeping birds, not fish. This is an incorrect association.
- **(D) Warehouse : Merchandise:** A **Warehouse** is a building where **Merchandise** (goods or products) is stored. This perfectly matches the original relationship of "a place for storing a specific type of item".

Step 3: Final Answer:
The correct analogy is Warehouse : Merchandise because it shares the same "place of storage : item stored" relationship as Armory : Weapons.

Quick Tip

Focus on the primary function or purpose that connects the two words. An armory's primary purpose is to store weapons, just as a warehouse's primary purpose is to store merchandise.

---

25. 8 people A - H are sitting in line facing north.
I. D sits immediate to the right of A.
II. E sits at the left end.
III. C sits 3^{rd} to the left of D.
IV. B sits immediate right of E.
V. H, B & G sits together with H in middle.
VI. F sits immediately left of A.
Which of the following is the correct arrangement?

(A) EBHGCEAD
(B) EAHDB GFC
(C) ACGDHBFC
(D) EBHGCFAD

Correct Answer: (D) EBHGCFAD

Solution:

Step 1: Understanding the Question:
We need to determine the linear seating arrangement of 8 people (A to H) based on a set of given clues. All are facing North.

Step 2: Detailed Explanation:
Let's break down and combine the clues step-by-step. The 8 positions are:
_ _ _ _ _ _ _ _

- **Clue II:** E sits at the left end.
  E _ _ _ _ _ _ _

- **Clue IV:** B sits immediate right of E.
  E B _ _ _ _ _ _

- **Clue V:** H, B & G sits together with H in the middle. This means the block is B H G. Since we already placed B, H and G must be to its right.
  E B H G _ _ _ _

- **Clue I & VI:** D sits immediate to the right of A (AD), and F sits immediately left of A (FA). Combining these, we get a block of three people: F A D.

- Now we have the group E B H G and the group F A D. We have one person left, C. We have 4 empty seats: E B H G __ __ __ __. The FAD block and C must fit here.

- **Clue III:** C sits 3^{rd} to the left of D. This means there are two people between C and D (C _ _ D).

- Let's try to place the F A D block at the end of the line:
  E B H G _ F A D
  The only person left is C, so C must be in the 5th position.
  E B H G C F A D

- Let's verify this arrangement with Clue III. C is in the 5th position and D is in the 8th position. C is indeed 3rd to the left of D. All conditions are satisfied.

Step 3: Final Answer:
The final correct arrangement is E B H G C F A D. This matches option (D).

Quick Tip

In linear arrangement problems, start with the most definite clues, like positions at the ends. Then, look for blocks of people who sit together and try to fit these blocks into the arrangement.

---

26. In a certain coding language:
'Study for exam' → Pa Co Ta
'Exam is tough' → ga ni sa
'study tough subject' → lo sa ma
Find the code for 'tough'.

(A) Lo
(B) Sa
(C) Ma
(D) None of these

Correct Answer: (B) Sa

Solution:

Step 1: Understanding the Question:
We are given three phrases and their corresponding codes in a jumbled order. We need to find the specific code for the word 'tough' by comparing the given phrases and codes.

Step 2: Detailed Explanation:
Let's analyze the given information:
1. 'Study for exam' → Pa Co Ta
2. 'Exam is tough' → ga ni sa
3. 'study tough subject' → lo sa ma

To find the code for 'tough', we need to find a statement where 'tough' is present and compare it with another statement that either has 'tough' or helps eliminate other words.

Compare statement (2) and statement (3):
- 'Exam is **tough**' → ga ni **sa**
- 'study **tough** subject' → lo **sa** ma

The common word in both English phrases is 'tough'.
The common code in both coded phrases is 'sa'.
Therefore, the code for 'tough' must be 'sa'.

Step 3: Final Answer:
By comparing the second and third statements, we can deduce that the code for 'tough' is 'sa'.

Quick Tip

In coding-decoding questions, look for common words between any two statements and then find the corresponding common code word. This process of elimination helps to decipher the code for each word.

---

27. Find the next term in the series: A1C, D4F, G9I, J16L, ?

(A) L26P
(B) M25P
(C) N25O
(D) M25O

Correct Answer: (D) M25O

Solution:

Step 1: Understanding the Question:
The series consists of terms with three parts: a starting letter, a number, and an ending letter. We need to identify the pattern for each part to determine the next term in the series.

Step 2: Detailed Explanation:
Let's analyze each component of the series separately.

1. The First Letter Series: A, D, G, J, ... - A $\rightarrow$ D (A + 3 letters: B, C, D) - D $\rightarrow$ G (D + 3 letters: E, F, G) - G $\rightarrow$ J (G + 3 letters: H, I, J) The pattern is to add 3 to the position of the current letter. The next letter will be J + 3 letters (K, L, M) $\rightarrow$ **M**.

2. The Number Series: 1, 4, 9, 16, ... - $1 = 1^2$ - $4 = 2^2$ - $9 = 3^2$ - $16 = 4^2$ The pattern is the square of consecutive natural numbers. The next number will be $5^2 = \mathbf{25}$.

3. The Second Letter Series: C, F, I, L, ... - C $\rightarrow$ F (C + 3 letters: D, E, F) - F $\rightarrow$ I (F + 3 letters: G, H, I) - I $\rightarrow$ L (I + 3 letters: J, K, L) The pattern is to add 3 to the position of the current letter. The next letter will be L + 3 letters (M, N, O) $\rightarrow$ **O**.

Step 3: Final Answer:
Combining the three parts, the next term in the series is **M25O**.

Quick Tip

For alphanumeric series, always break down the series into separate patterns for letters and numbers. Check for simple arithmetic progressions (for letters) and common mathematical sequences (squares, cubes, etc., for numbers).

28. A person's birthday on 21^{st} July was on Wednesday. On what day will the Christmas fall in the same year?

(A) Monday
(B) Tuesday
(C) Wednesday
(D) Saturday

Correct Answer: (D) Saturday.

Solution:

Step 1: Understanding the Question:
We are given that the 21st of July in a particular year was a Wednesday. We need to find the day of the week for Christmas, which is on the 25th of December of the same year. The question is noted to be potentially incorrect, so we must rely on our calculation.

Step 2: Key Formula or Approach:
The method is to count the total number of days between the two dates and then find the number of "odd days". An odd day is a day remaining after dividing the total number of days by 7. The day of the week for the final date will be the starting day plus the number of odd days.

Step 3: Detailed Explanation:
Let's count the number of days from 21st July to 25th December.

- Days remaining in July = 31 - 21 = 10 days
- Days in August = 31 days
- Days in September = 30 days
- Days in October = 31 days
- Days in November = 30 days
- Days in December = 25 days

Total number of days = 10 + 31 + 30 + 31 + 30 + 25 = 157 days.

Now, we find the number of odd days by dividing the total days by 7:

$$\frac{157}{7} = 22 \text{ weeks and } 3 \text{ days remainder}$$

So, there are 3 odd days.

The day of the week for Christmas will be Wednesday + 3 odd days.
Wednesday + 1 day = Thursday

Wednesday + 2 days = Friday
Wednesday + 3 days = **Saturday**.

Step 4: Final Answer:
The calculated day for Christmas is Saturday.

Quick Tip

To quickly calculate odd days for months, remember: 31-day months have 3 odd days (31 mod 7 = 3), and 30-day months have 2 odd days (30 mod 7 = 2).

---

29. Statements:
Only a few rivers are oceans.
All oceans are seas.
All seas are oceans.

Conclusion:
I. Some rivers are seas is a possibility.
II. All rivers are seas is a possibility.

Correct Answer: Only conclusion I follows.

Solution:

Step 1: Understanding the Question:
We are given three statements and two conclusions. We need to determine which of the conclusions logically follows from the statements using the principles of syllogism.

Step 2: Detailed Explanation:
Let's analyze the statements first:

- **Statement 2: "All oceans are seas."**
- **Statement 3: "All seas are oceans."**

When 'All A are B' and 'All B are A' are both true, it means that A and B are identical sets. So, **Oceans = Seas**. We can substitute one for the other in any statement.

- **Statement 1: "Only a few rivers are oceans."**

The phrase "Only a few A are B" implies two things: 1. **Some** A are B. (Some rivers are oceans) 2. **Some** A are not B. (Some rivers are not oceans)

Since Oceans = Seas, we can re-evaluate the implications from Statement 1: 1. **Some rivers are seas.** (This is a definite conclusion). 2. **Some rivers are not seas.** (This is also a definite conclusion).

Now let's evaluate the given conclusions:
Conclusion I: Some rivers are seas is a possibility.
From our analysis, we know that "Some rivers are seas" is a definite truth. According to the rules of logic, anything that is definitely true is also considered a possibility. Therefore, Conclusion I follows.

Conclusion II: All rivers are seas is a possibility.
From our analysis, we have a definite conclusion that "Some rivers are not seas." If it is certain that some rivers are not seas, then it is impossible for all rivers to be seas. An impossible event cannot be a possibility. Therefore, Conclusion II does not follow.

Step 3: Final Answer:
Based on the logical deduction from the statements, only conclusion I follows.

Quick Tip

Remember the meaning of "Only a few A are B". It always implies both "Some A are B" and "Some A are not B". This is a key concept in modern syllogism questions.

---

30. 4 Pilots L, M, N, O flew in F-16, F-22, F-35, SU-57. They finished on rank 1 to 4.
Following is known:
1) O finished 2 ranks below L.
2) F-35 pilot finished immediately before M.
3) N finished 2^{nd} flying F-16.
4) L did not fly SU-57.
Find who flew F-22?

(A) M
(B) L
(C) N
(D) O

Correct Answer: (B) L

Solution:

Step 1: Understanding the Question:
This is a logic puzzle where we need to match each of the 4 pilots with their rank and the

aircraft they flew based on the given clues.

Step 2: Detailed Explanation:
Let's create a table to organize the information:

Rank	Pilot	Aircraft
1		
2		
3		
4		

Let's process the clues:

- **Clue 3:** N finished 2^{nd} flying F-16. This gives us a definite entry.

Rank	Pilot	Aircraft
1		
2	N	F-16
3		
4		

- **Clue 1:** O finished 2 ranks below L. This means Rank(O) = Rank(L) + 2. The only possible ranks that fit are L=1, O=3, because rank 2 is already taken by N.

Rank	Pilot	Aircraft
1	L	
2	N	F-16
3	O	
4		

This leaves Rank 4 for pilot M.

- **Clue 2:** F-35 pilot finished immediately before M. M is at Rank 4. The rank immediately before is 3. So, the pilot at rank 3 (O) flew the F-35.

Rank	Pilot	Aircraft
1	L	
2	N	F-16
3	O	F-35
4	M	

- **Clue 4:** L did not fly SU-57. The remaining aircrafts are F-22 and SU-57. Since L at Rank 1 did not fly the SU-57, L must have flown the F-22. This leaves the SU-57 for M.

Rank	Pilot	Aircraft
1	L	F-22
2	N	F-16
3	O	F-35
4	M	SU-57

Step 3: Final Answer:
From the completed table, we can see that L flew the F-22.

Quick Tip

In analytical puzzles, always start with the most direct and certain information. Use a table to keep track of assignments and eliminate possibilities as you go.

---

31. Find next number in: 7, 8, 12, 21, 37, ?

(A) 66
(B) 59
(C) 62
(D) 64

Correct Answer: (C) 62

Solution:

Step 1: Understanding the Question:
We need to identify the pattern in the given number series to find the next term.

Step 2: Detailed Explanation:
The best way to find a pattern in such series is to check the differences between consecutive terms.

- 8 - 7 = 1
- 12 - 8 = 4
- 21 - 12 = 9
- 37 - 21 = 16

The series of differences is 1, 4, 9, 16.
This is a series of perfect squares:

$$1 = 1^2$$
$$4 = 2^2$$
$$9 = 3^2$$
$$16 = 4^2$$

The next difference in the sequence should be $5^2 = 25$.
To find the next term in the original series, we add this difference to the last term (37).

$$\text{Next term} = 37 + 25 = 62$$

Step 3: Final Answer:
The next number in the series is 62.

Quick Tip

For number series, if the numbers aren't increasing or decreasing by a common multiple, check the differences between terms. If that doesn't reveal a pattern, check the differences of the differences (second-order differences).

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32. A is father of B. C is daughter of B. D is brother of B. E is son of C. How is A related to E?

(A) Brother
(B) Grandfather
(C) Uncle
(D) Great Grandfather

Correct Answer: (D) Great Grandfather

Solution:

Step 1: Understanding the Question:
This is a blood relation problem. We need to determine the relationship between A and E by tracing the family connections given.

Step 2: Detailed Explanation:
Let's build the family tree generation by generation.

- **A is father of B:** This establishes Generation 1 (A) and Generation 2 (B).
- **C is daughter of B:** This establishes Generation 3 (C). C is the child of B, making A the grandfather of C.
- **E is son of C:** This establishes Generation 4 (E). E is the child of C.

Let's trace the relationship from E up to A:

- E's mother is C.
- C's parent is B.
- B's father is A.

So, A is the father of E's grandparent (B). The father of one's grandparent is one's **Great Grandfather**.
(The information "D is brother of B" is extra and not needed to solve the problem).

Step 3: Final Answer:
A is the Great Grandfather of E.

Quick Tip

Drawing a simple family tree is the most effective way to solve blood relation questions. Use symbols like '+' for male, '-' for female, and vertical lines for parent-child relationships.

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33. Statements:
All pens are pencils.
No pencil is marker.

Conclusions:
(1) Some pens are markers.
(2) Some pens are pencils.

Correct Answer: Only conclusion (2) follows.

Solution:

Step 1: Understanding the Question:
This is a syllogism problem. We must determine which conclusions can be logically derived from the given statements.

Step 2: Detailed Explanation:
Let's analyze the statements using a Venn Diagram approach.

- **"All pens are pencils."** This means the circle representing "pens" must be completely inside the circle representing "pencils".
- **"No pencil is marker."** This means the circle for "pencils" and the circle for "markers" must be completely separate, with no overlap.

From this combined information, since the "pens" circle is inside the "pencils" circle, and "pencils" are completely separate from "markers", it logically follows that "pens" must also be completely separate from "markers". The definite conclusion is **"No pen is a marker"**.

Now let's evaluate the given conclusions:

- **Conclusion (1): Some pens are markers.** This is a direct contradiction to our derived conclusion "No pen is a marker". Therefore, conclusion (1) is false.
- **Conclusion (2): Some pens are pencils.** The statement given is "All pens are pencils". In logic, if a universal affirmative statement ("All A are B") is true, the particular affirmative ("Some A are B") is also considered true, assuming that the set 'A' is not empty. Therefore, conclusion (2) is true.

Step 3: Final Answer:
Only conclusion (2) logically follows from the statements.

Quick Tip

In syllogisms, a conclusion that contradicts a definite inference from the statements is always false. Also, "All A are B" implies "Some A are B".

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34. If $\text{Tan}\theta + \text{Cot}\theta = 4$, find $\text{Tan}^2\theta + \text{Cot}^2\theta$.

Correct Answer: 14

Solution:

Step 1: Understanding the Question:
We are given the sum of $\text{Tan}\theta$ and $\text{Cot}\theta$ and are asked to find the sum of their squares. This is an algebraic manipulation problem.

Step 2: Key Formula or Approach:
We will use the algebraic identity: $(a+b)^2 = a^2 + b^2 + 2ab$.
We also use the trigonometric identity: $\text{Cot}\theta = \frac{1}{\text{Tan}\theta}$, which means $\text{Tan}\theta \cdot \text{Cot}\theta = 1$.

Step 3: Detailed Explanation:
Let the given equation be:

$$\text{Tan}\theta + \text{Cot}\theta = 4$$

Square both sides of the equation:

$$(\text{Tan}\theta + \text{Cot}\theta)^2 = 4^2$$

Expand the left side using the identity $(a+b)^2$:

$$\text{Tan}^2\theta + \text{Cot}^2\theta + 2(\text{Tan}\theta)(\text{Cot}\theta) = 16$$

We know that $\text{Tan}\theta \cdot \text{Cot}\theta = 1$. Substitute this value into the equation:

$$\text{Tan}^2\theta + \text{Cot}^2\theta + 2(1) = 16$$

$$\text{Tan}^2\theta + \text{Cot}^2\theta + 2 = 16$$

Now, isolate the term we want to find by subtracting 2 from both sides:

$$\text{Tan}^2\theta + \text{Cot}^2\theta = 16 - 2$$

$$\text{Tan}^2\theta + \text{Cot}^2\theta = 14$$

Step 4: Final Answer:
The value of $\text{Tan}^2\theta + \text{Cot}^2\theta$ is 14.

Quick Tip

Recognize algebraic patterns in trigonometry. If you see expressions like $x + 1/x$ and are asked for $x^2 + 1/x^2$, the squaring method is the fastest approach.

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35. What is the Reflex angle between two hands of a clock at 10:25?

Correct Answer: 197.5°

Solution:

Step 1: Understanding the Question:
We need to find the reflex angle between the hour and minute hands at 10:25. A reflex angle is an angle greater than 180° and less than 360°. First, we'll find the smaller angle and then subtract it from 360°.

Step 2: Key Formula or Approach:
The formula to find the angle (θ) between the hour hand (H) and the minute hand (M) is:

$$\theta = \left|30H - \frac{11}{2}M\right|$$

Step 3: Detailed Explanation:
Given time is 10:25, so H = 10 and M = 25.
Substitute these values into the formula:

$$\theta = \left|30(10) - \frac{11}{2}(25)\right|$$

$$\theta = \left|300 - \frac{275}{2}\right|$$

$$\theta = |300 - 137.5|$$

$$\theta = 162.5^\circ$$

This is the smaller angle between the hands. The reflex angle is the other angle that makes up the full circle.
Reflex Angle = 360° - θ

$$\text{Reflex Angle} = 360^\circ - 162.5^\circ$$

$$\text{Reflex Angle} = 197.5^\circ$$

Step 4: Final Answer:
The reflex angle between the hands of a clock at 10:25 is 197.5°.

Quick Tip

Always be careful whether the question asks for the standard angle or the reflex angle. If the calculated angle is θ, the reflex angle is always 360° - θ.

36. The sides of a triangle are 13, 14, 15. Find the area.

Correct Answer: 84

Solution:

Step 1: Understanding the Question:
We are given the lengths of the three sides of a triangle and asked to find its area. Since the sides are of different lengths, this is a scalene triangle.

Step 2: Key Formula or Approach:
We can use Heron's formula to find the area of a triangle when all three side lengths are known. The formula is:

$$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$$

where a, b, and c are the side lengths, and s is the semi-perimeter of the triangle, calculated as:

$$s = \frac{a+b+c}{2}$$

Step 3: Detailed Explanation:
First, calculate the semi-perimeter (s):
Given sides a = 13, b = 14, c = 15.

$$s = \frac{13+14+15}{2} = \frac{42}{2} = 21$$

Now, apply Heron's formula:

$$\text{Area} = \sqrt{21(21-13)(21-14)(21-15)}$$

$$\text{Area} = \sqrt{21 \times 8 \times 7 \times 6}$$

To simplify the calculation, break down the numbers into their prime factors:

$$\text{Area} = \sqrt{(3 \times 7) \times (2^3) \times 7 \times (2 \times 3)}$$

$$\text{Area} = \sqrt{3^2 \times 7^2 \times 2^4}$$

Now, take the square root of each term:

$$\text{Area} = 3 \times 7 \times 2^2 = 21 \times 4 = 84$$

Step 4: Final Answer:
The area of the triangle is 84 square units.

Quick Tip

Heron's formula is the go-to method for finding the area of a triangle when only the three side lengths are provided.

37. $\mathbf{Log_2(x) + log_2(x\text{-}2) = 3}$

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

Correct Answer: (c) 4

Solution:

Step 1: Understanding the Question:
We need to solve the given logarithmic equation for the variable x.

Step 2: Key Formula or Approach:
We will use the following properties of logarithms: 1. **Product Rule:** $\log_b(m) + \log_b(n) = \log_b(mn)$ 2. **Conversion to Exponential Form:** If $\log_b(a) = c$, then $b^c = a$.

Step 3: Detailed Explanation:
First, apply the product rule to combine the two log terms:

$$\log_2(x(x-2)) = 3$$

Next, convert the logarithmic equation to its exponential form:

$$2^3 = x(x-2)$$

$$8 = x^2 - 2x$$

Rearrange the equation into a standard quadratic form ($ax^2 + bx + c = 0$):

$$x^2 - 2x - 8 = 0$$

Factor the quadratic equation:

$$(x-4)(x+2) = 0$$

This gives two possible solutions for x: x = 4 or x = -2.

However, we must check these solutions against the domain of the original logarithmic expressions. The argument of a logarithm must be positive.
- For $\log_2(x)$, we must have $x > 0$.
- For $\log_2(x\text{-}2)$, we must have $x\text{-}2 > 0$, which means x ¿ 2.
The solution must satisfy both conditions, so we need $x > 2$.
- The solution x = 4 is valid because $4 > 2$.
- The solution x = -2 is invalid (extraneous) because it does not satisfy x ¿ 2.

Step 4: Final Answer:
The only valid solution to the equation is x = 4.

Quick Tip

Always check your solutions to logarithmic equations by substituting them back into the original equation to ensure the arguments of the logarithms remain positive.

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38. Difference between SI and CI for 2 year @ 10% is Rs. 150. Find the principal.

Correct Answer: 15000

Solution:

Step 1: Understanding the Question:
We are given the difference between Compound Interest (CI) and Simple Interest (SI) for a period of 2 years at a specific rate. We need to find the initial sum of money (Principal).

Step 2: Key Formula or Approach:
There is a direct formula for the difference between CI and SI for 2 years:

$$\text{Difference} = P\left(\frac{R}{100}\right)^2$$

where P is the Principal and R is the rate of interest per annum.

Step 3: Detailed Explanation:
We are given: - Difference = Rs. 150 - R = 10% - Time = 2 years Substitute the given values into the formula:

$$150 = P\left(\frac{10}{100}\right)^2$$

$$150 = P\left(\frac{1}{10}\right)^2$$

$$150 = P\left(\frac{1}{100}\right)$$

Now, solve for P:

$$P = 150 \times 100$$

$$P = 15000$$

Step 4: Final Answer:
The principal is Rs. 15,000.

Quick Tip

Memorize the direct formulas for the difference between CI and SI for 2 years and 3 years to save time in exams. For 3 years, the formula is $P(R/100)^2(3 + R/100)$.

39. A can do a work in 12 days and B in 18 days. if they start work together, and after 2 days B leaves then how many days will it take for the work to get completed?

(A) 7
(B) 8.66
(C) 9
(D) 10.66

Correct Answer: (D) 10.66

Solution:

Step 1: Understanding the Question:
A and B work together for 2 days, after which B leaves. A completes the rest of the work alone. We need to find the total time taken to complete the entire work.

Step 2: Key Formula or Approach:
We will use the LCM method to find the total work and individual efficiencies. - Total Work = LCM of individual times. - Efficiency = Total Work / Time taken.

Step 3: Detailed Explanation:
Time taken by A = 12 days.
Time taken by B = 18 days.
Let the total work be the LCM of 12 and 18, which is 36 units.
- A's efficiency (work per day) = 36 / 12 = 3 units/day. - B's efficiency (work per day) = 36 / 18 = 2 units/day.
Combined efficiency of A and B = 3 + 2 = 5 units/day.
They work together for 2 days. Work done in 2 days = Combined efficiency $\times$ 2 = 5 $\times$ 2 = 10 units.
Remaining work = Total work - Work done = 36 - 10 = 26 units.
B leaves, and A completes the remaining 26 units of work alone.
Time taken by A to finish the remaining work = Remaining work / A's efficiency Time = 26 / 3 = 8.66 days.
The question asks for the total number of days for the work to get completed.
Total days = Days they worked together + Days A worked alone Total days = 2 + 8.66 = 10.66 days.

Step 4: Final Answer:
The total time taken for the work to get completed is 10.66 days.

Quick Tip

The LCM method is often faster and less prone to calculation errors than the fraction method for Time and Work problems.

40. A Train, going at speed of 72 km/h, passes a station (160 meter long) in 18 second. In how much time the train can Cross a man standing on the station?

Correct Answer: 10 seconds

Solution:

Step 1: Understanding the Question:
First, we need to find the length of the train using the information about it passing a station. Then, we use the train's length and speed to find the time it takes to pass a stationary man.

Step 2: Key Formula or Approach:
- Convert speed from km/h to m/s: Speed (m/s) = Speed (km/h) $\times \frac{5}{18}$.
- When a train crosses a platform/station, the total distance covered is (Length of Train + Length of Platform).
- When a train crosses a stationary man (point object), the distance covered is the Length of the Train.
- Time = Distance / Speed.

Step 3: Detailed Explanation:
Part 1: Find the length of the train
Speed of the train = 72 km/h.
Speed in m/s = $72 \times \frac{5}{18} = 4 \times 5 = 20$ m/s.
Length of the station = 160 m.
Time taken to pass the station = 18 seconds.
Total distance covered = Speed $\times$ Time = $20 \times 18 = 360$ meters.
We know, Total distance = Length of Train (L_t) + Length of Station.
$360 = L_t + 160$.
$L_t = 360 - 160 = 200$ meters.

Part 2: Find the time to cross a man
Now the train has to cross a standing man.
Distance to be covered = Length of Train = 200 meters.
Speed of the train = 20 m/s.
Time taken = Distance / Speed = 200 / 20 = 10 seconds.

Step 4: Final Answer:
The train can cross the man in 10 seconds.

Quick Tip

Always ensure that all units are consistent (meters with seconds, kilometers with hours) before applying the speed-distance-time formulas. The conversion factor for km/h to m/s is 5/18.

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41. A cylinder has base radius of 7 m and height of 1 m. How much water can it hold? (given: 1000 lt = 1 m^3)

(A) 2,20,000 lt.
(B) 2,15,000 lt.
(C) 1,54,000 lt.
(D) 1,68,000 lt.

Correct Answer: (C) 1,54,000 lt.

Solution:

Step 1: Understanding the Question:
We need to find the capacity (volume) of a cylinder with a given radius and height, and then convert this volume into liters.

Step 2: Key Formula or Approach:
The formula for the volume (V) of a cylinder is:

$$V = \pi r^2 h$$

where 'r' is the radius of the base and 'h' is the height. We will use the approximation $\pi = \frac{22}{7}$.

Step 3: Detailed Explanation:
Given: - Radius (r) = 7 m - Height (h) = 1 m Calculate the volume in cubic meters (m^3):

$$V = \frac{22}{7} \times (7)^2 \times 1$$

$$V = \frac{22}{7} \times 49 \times 1$$

$$V = 22 \times 7 = 154 \text{ m}^3$$

The capacity of the cylinder is 154 cubic meters.
Now, convert the volume to liters using the given conversion factor (1 m^3 = 1000 lt):

$$\text{Capacity in liters} = 154 \times 1000 = 1,54,000 \text{ lt}$$

Step 4: Final Answer:
The cylinder can hold 1,54,000 liters of water.

Quick Tip

It's useful to remember common volume conversions: 1 m^3 = 1000 liters and 1 liter = 1000 cm^3. This can save time in mensuration problems involving capacity.
