# CSIR NET General Aptitude Questions Answers With Solutions

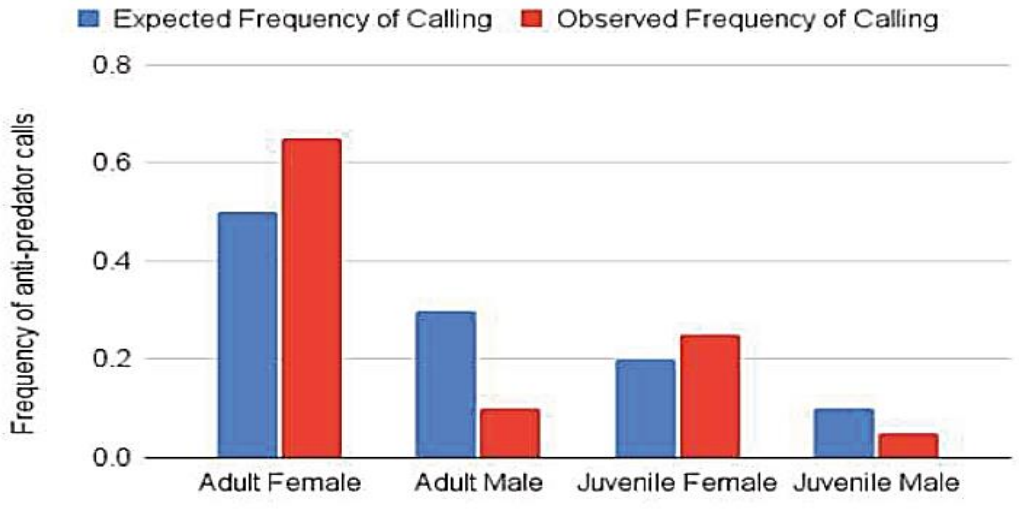
**Q1. Two chords of a circle meeting at an angle 60° bisect each other. If the length of one chord is 10 cm, the length of the other chord (in cm) is**
(a) $5\sqrt{3}$
(b) $10/\sqrt{2}$
(c) $10/\sqrt{3}$
(d) 10

**Q2. BOTANY is to PLANTS as PHILOSOPHY is to _____**
(a) REGULATIONS
(b) RELIGIONS
(c) IDEAS
(d) POLITICS

**Q3. An ecologist catches 25 fish tags them and releases them back in the pond. She catches 30 fish on the next day, of which 10 carry the tag. Assuming that the fish in the pond remain unchanged and each fish has equal probability of being caught, what is the estimated number of fish in the pond?**
(a) 30
(b) 75
(c) 150
(d) 300

**Q4. An eagle is sitting at the top of a 100 m high vertical cliff and a mouse is at the base of the cliff. The mouse starts running away from the cliff on a level ground in a straight line at a speed 10 m/s. The eagle spots the mouse and dives at 45 to the ground at a speed of 20 m/s and captures the mouse. The time at which the eagle started the dive is**
(a) around 3 s after the mouse started running.
(b) around 5 s after the mouse started running.
(c) around 7 s after the mouse started running.
(d) the same at which the mouse started running.

**Q5. The graph depicts anti-predator calling behaviour in squirrels. Which one of the following conclusions can be drawn from the graph?**



(a) Adult males are less likely to see a predator than adult females.
(b) Adult females make higher than expected anti-predator calls.
(c) There are more adult females than adult males.
(d) Juvenile males do not make anti-predator calls.

**Q6. In a family, A is the son of P and brother of V. N is the sister of V. S is the nephew of V and B is the daughter-in-law of A. M is the mother of N. B is realted to M as the**
(a) Granddaughter.
(b) Daughter-in-law.
(c) Grandson's wife.
(d) Mother

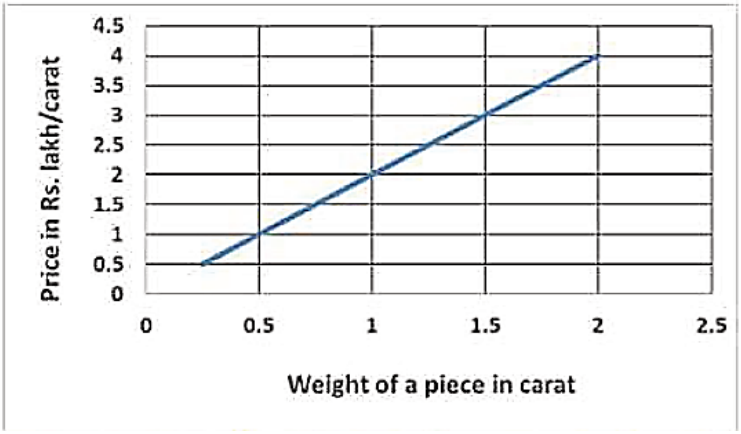
**Q7. A boy taking about his age said "The day before yesterday I was 15, now I am 16 and next year I shall turn 18". Then**
(a) he must have lied.
(b) he was making the assertion on 29th February.
(c) his birthday is on 29 February and he was making the assertion on 1st March.
(d) his birthday is on 31st December and he was making the assertion on 1st January.

**Q8. A referndum on a proposal involved 3500 participants. Among the participants 1700 were men and the rest were women. 1450 participants, of whom 800 were men, voted against while 1500 participants voted in favour. 200 women abstained. How many women voted for the propsal?**
(a) 800
(b) 650
(c) 950
(d) 550

**Q9. Two vessels contain 3/8 L and 2/7 L of alcohol. Water is added to both vessels to make each solution measure 1L. When these solutions are mixed, the alcohol to water ratio would be approximately**
(a) 16:21
(b) 1:4
(c) 1:2
(d) 1:3

**Q10. In a five-floor building, a lawyer, a doctor, a teacher, an artist and an engineer occupy different floors. The artist has to go up three floors to meet the engineer, whereas the engineer has to come down four floors to visit the doctor. The lawyer lives just a floor above the teacher. The floors are occupied from the lowest to the topmost by**
(a) artist, doctor, teacher, lawyer, engineer.
(b) Artist, doctor, teacher, engineer, lawyer.
(c) Doctor, artist, teacher, lawyer, engineer.
(d) Doctor, artist, lawyer, teacher, engineer.

**Q11. The variation in the per carat price of diamond by caratage is shown in the graph.**




**A person wants to buy 4 identical sized diamonds for Rs. 4.5 lakh. What is the largest size of one such diamond (in carat)?**

(a) 0.5
(b) 0.75
(c) 1.125
(d) 0.625

**Q12. In a leap year that began on a Tuesday, the third Saturday of March would fall on**

(a) March 14
(b) March 15
(c) March 16
(d) March 21

**Q13. The following dishes are offered in a restaurant.**
**Starter: Tomato Soup or Vegetable Salad or Chicken Soup**
**Main course: Chicken Biryani or Fish Biryani or Veg Biryani**
**Dessert: Gulabjamun or Rasagulla**
**A meal is prepared selecting one item from each category. What is the probability that a randomly drawn up menu is vegetarian?**

(a) 1/3
(b) 5/8
(c) 2/9
(d) 1/2

**Q14. Which of the following can be a perfect square if X and Y are decimal digits?**

(a) 93XY215
(b) 7XY0625
(c) 613XY45
(d) XY21375

**Q15. Two children A and B counted the number of chairs placed around a round table in the same direction, but starting at different chairs. A's 5th chair was B's 9th, while B's 3rd was A's 12th. The number of chairs was**

(a) 13
(b) 14
(c) 15
(d) 21

**Q16. Statistics of a certain test conducted to determine a disease are given in the table.**

| Category | Number of persons |
|---|---|
| True positive | 8 |
| False negative | 3 |
| False positive | 2 |
| True negative | 12 |

**The number of persons actually having the disease are**

(a) 11
(b) 8
(c) 20
(d) 3

**Q17. A wholesale shopkeeper purchased 200 identical watches and sold the first 50 at 10% profit, the next 50 at 20% profit, the next 50 at 25% profit and the last 50 at 40% profit. If his total profit was Rs 19000, at what total cost did he buy the watches?**

(a) Rs 76000
(b) Rs 80000
(c) Rs 86000
(d) Rs 98000

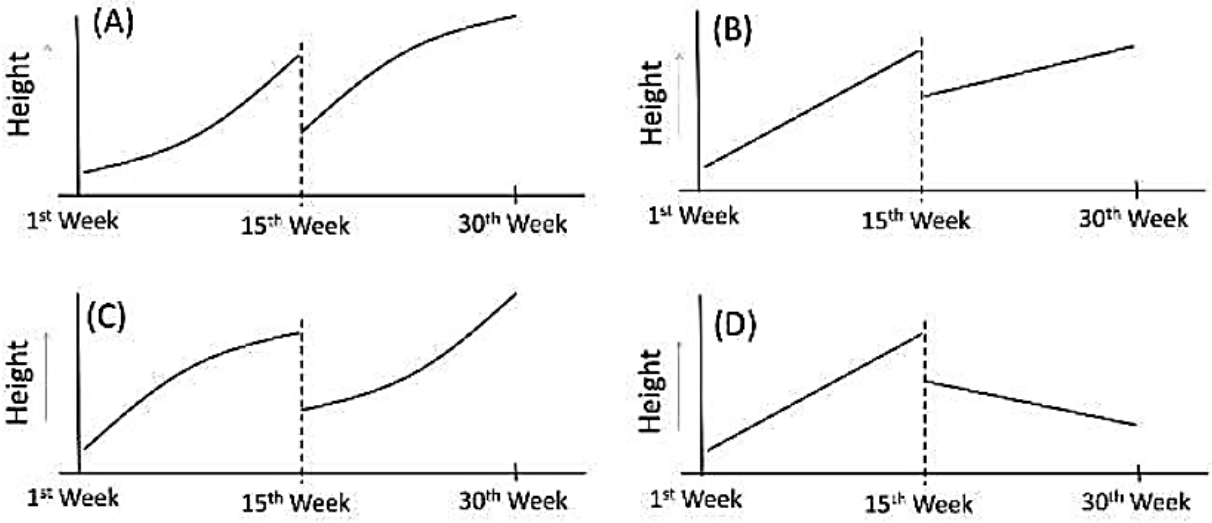
**Q18. The addition of a three-digit number and the number with the same digits in reverse order, is 1089. The middle digit of that number must be**

(a) 9
(b) 8
(c) 0
(d) 4

**Q19. Equality of which of the following quandtities in two data sets of the same size will ensure equality of their standard deviations?**

(a) Their means.
(b) The sums of positive and negative deviations from the respective means.
(c) The averages of squares of all terms.
(d) The averages of squares of all terms and their means.

**Q20. Beginning from April of a year, the rate of which a tree became taller increased linearly for 15 weeks when it was trimmed down. From then on, the rate decreased linearly for the next 15 weeks.**




**Which graph correctly shows the height of the tree against time during this period?**

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

## Solutions

**S1. Ans.(d)**
**Sol. Solution:**
**Step 1: Understanding the Problem**
Two chords of a circle bisect each other at an angle of 60°.
One chord has a length of 10 cm.
We need to determine the length of the other chord.
**Step 2: Identifying the Property**
When two chords of a circle bisect each other, they follow a specific geometric rule:
If two chords bisect each other at an angle θ, their lengths remain equal when the angle is 60°.
This is because, in a circle, if two chords are divided into equal halves and they intersect at an angle of 60°, the bisected parts are symmetric. Thus, their total lengths remain the same.
**Step 3: Applying the Rule**
Given that one chord has a total length of 10 cm, and both chords bisect each other at 60°, the second chord must also have the same length as the first chord.
Therefore, the second chord also measures 10 cm.
**Final Answer:**
**The correct answer is (d) 10 cm.**
**Key Takeaways:**
When two chords bisect each other at 60°, they always have equal lengths.
Since the given chord length is 10 cm, the second chord must also be 10 cm.
This is a fundamental property of intersecting chords in a circle when bisected at 60°.
Correct Answer: (d) 10

**S2. Ans.(c)**
**Sol. Solution:**
**Botany** deals with plants, focusing on their classification, structure, and functions.
**Philosophy** focuses on exploring fundamental concepts, beliefs, and **ideas** regarding existence, knowledge, and ethics.
**Important Key Points:**
1. **BOTANY** specifically relates to the scientific study of plants.
2. **PHILOSOPHY** relates to the study of abstract and fundamental **ideas** about life, reality, and knowledge.
**Knowledge Booster:**
**REGULATIONS:** These refer to rules or directives, not directly associated with philosophy.
**RELIGIONS:** While philosophy may sometimes address religion, it is not limited to religious topics.
**POLITICS:** Politics deals with governance and societal rules, which is a distinct domain from philosophy.

**S3. Ans.(b)**
**Sol. Given:**
First catch: 25 fish tagged.
Second catch: 30 fish.
Tagged fish in the second catch: 10.
We need to estimate the total number of fish in the pond (N).
**Concept:** The proportion of tagged fish in the second catch is equal to the proportion of tagged fish in the total population:
(Tagged fish in second catch) / (Total fish in second catch) = (Tagged fish in the population) / (Total fish in the population)
This gives us:
10 / 30 = 25 / N
**Solution:** Rearranging the equation to find N:
N = (25 × 30) / 10
N = 75
**Answer:** The estimated number of fish in the pond is **75**.
**Correct Option:** (b) 75

**S4. Ans.(a)**
**Sol.** Solution:
Step 1: Key observations
- Height of the cliff: 100 m.
- Speed of the mouse: 10 m/s.
- Speed of the eagle: 20 m/s, diving at an angle of 45° to the ground.
- The eagle's velocity can be broken into two components:
  - Horizontal velocity = 20 / $\sqrt{2}$ ≈ 14.14 m/s.
  - Vertical velocity = 20 / $\sqrt{2}$ ≈ 14.14 m/s.

Step 2: Time for the eagle to descend
The eagle takes time to cover the vertical height of 100 m. Time is calculated as:
Time = height / vertical velocity = 100 / 14.14 ≈ 7.07 seconds.
Step 3: Distance traveled by the mouse in this time
The mouse runs on level ground at a speed of 10 m/s. In 7.07 seconds, the mouse travels:
Distance = speed × time = 10 × 7.07 ≈ 70.7 meters.
Step 4: Matching the eagle's horizontal distance
The eagle must also cover the horizontal distance traveled by the mouse.
The horizontal distance covered by the eagle in 7.07 seconds is:
Distance = horizontal velocity × time = 14.14 × 7.07 ≈ 100 meters.
Step 5: Delay in the eagle's dive
If the eagle starts its dive immediately, it will overshoot the mouse. The eagle needs to delay its dive.
The required delay time is calculated as:
Delay = (distance difference) / mouse's speed.Delay = (100 - 70.7) / 10 ≈ 3 seconds.
Final Answer:
The eagle starts its dive approximately **3 seconds after the mouse starts running**.
Answer: **(a)**

**S5. Ans.(b)**
**Sol. Analysis:**
**Step 1: Understanding the Graph**
The graph presents the expected vs. observed frequency of anti-predator calls among different groups of squirrels:
Adult Female
Adult Male
Juvenile Female
Juvenile Male
Blue bars represent the expected frequency of calling.
Red bars represent the observed frequency of calling.
**Step 2: Observing Trends in the Graph**
Adult Females: The observed frequency (red bar) is higher than the expected frequency (blue bar), indicating they call more than expected.
Adult Males: The observed frequency is much lower than expected.
Juvenile Females: The observed frequency is slightly higher than expected.
Juvenile Males: The observed frequency is lower than expected but not zero.
**Step 3: Evaluating the Answer Choices**
(a) Adult males are less likely to see a predator than adult females.
The graph does not provide direct evidence of predator visibility for different groups, only their calling behavior.
Incorrect
(b) Adult females make higher than expected anti-predator calls.
The red bar (observed frequency) for adult females is significantly higher than the blue bar (expected frequency).

Correct Answer
(c) There are more adult females than adult males.
The graph does not show population numbers, only calling behavior.
Incorrect
(d) Juvenile males do not make anti-predator calls.
The observed frequency for juvenile males is low, but not zero, meaning they do call, just less frequently than expected.
Incorrect
**Final Answer:**
(b) Adult females make higher than expected anti-predator calls.

**S6. Ans.(c)**
**Sol. Step 1: Analyzing Given Information**
1. **A is the son of P** and **brother of V** → A and V are siblings.
2. **N is the sister of V** → So, **A, V, and N** are siblings.
3. **S is the nephew of V** → Since S is the nephew of V, **S must be the son of A or N**.
4. **B is the daughter-in-law of A** → This means **B is the wife of A's son**.
5. **M is the mother of N** → So, **M is the mother of A, V, and N**.
6. **We need to find how B is related to M**.

**Step 2: Understanding the Relationship**
- A, V, and N are siblings.
- M is the mother of A.
- A has a son (since B is his daughter-in-law).
- B is the wife of A's son, meaning she is **A's son's wife**.
- A is the son of M.
- This means **B is the wife of M's grandson**.

Thus, **B is the Grandson's wife of M**.
**Final Answer:**
**(c) Grandson's wife.**

**S7. Ans.(d)**
**Sol. Solution:**
The boy states:
1. **"The day before yesterday, I was 15."**
2. **"Now I am 16."**
3. **"Next year, I shall turn 18."**

This means that his birthday must have just occurred **yesterday**, allowing him to change his age from **15 to 16**.
Additionally, he claims that **next year he will turn 18**, meaning his birthday must be at the very end of the year. The only possible date that fits this condition is **31st December**.
**Step-by-Step Verification:**
- Suppose **today is 1st January**.
- His **birthday was yesterday (31st December)**.
- On **30th December**, he was **still 15**.
- On **31st December**, he turned **16**.
- On **next 31st December**, he will turn **17**.
- On **the following 31st December (next year), he will turn 18**.

Thus, his **birthday is on 31st December**, and he is making the statement on **1st January**.
**Final Answer:**
**(d) His birthday is on 31st December and he was making the assertion on 1st January.**

**S8. Ans.(c)**
**Sol. Solution:**
**Step 1: Given Data**
- **Total participants = 3500**
- **Men = 1700**
- **Women = 3500 - 1700 = 1800**
- **Participants who voted against = 1450** (of whom **800 were men**)
- **Participants who voted in favour = 1500**
- **Women who abstained = 200**

**Step 2: Find Women Who Voted Against**
- Total **participants who voted against = 1450**.
- Out of these, **800 were men**.
- So, **women who voted against = 1450 - 800 = 650**.

**Step 3: Find Women Who Voted for the Proposal**
- **Total women = 1800**.
- **Women who abstained = 200**.
- **Women who voted against = 650**.
- So, **women who voted in favour = Total women - (Women against + Women abstained)**.

**= 1800 - (650 + 200)**
**= 1800 - 850**
**= 950**.
**Final Answer: (c) 950**

**S9. Ans.(c)**
**Sol. Solution:**
**Problem Restatement:**
We have two vessels:
1. **First vessel** contains **3/8 L of alcohol** and water is added to make the total volume **1 L**.
2. **Second vessel** contains **2/7 L of alcohol** and water is added to make the total volume **1 L**. The question asks us to find the **alcohol to water ratio** when both solutions are mixed.
**Step 1: Alcohol and water in each vessel**
**First vessel:**
Alcohol = 3/8 L.
Water added = 1 - 3/8 = 5/8 L.
So, the first vessel contains:
Alcohol = 3/8 L
Water = 5/8 L

**Second vessel:**
Alcohol = 2/7 L.
Water added = 1 - 2/7 = 5/7 L.
So, the second vessel contains:
Alcohol = 2/7 L
Water = 5/7 L
**Step 2: Total alcohol and total water in the mixed solution**
When the two solutions are mixed, the total alcohol and total water are the sum of the alcohol and water from both vessels.
**Total alcohol:**
Total alcohol = 3/8 + 2/7
To add these, we need to find the least common denominator (LCD), which is 56:
3/8 = 21/56
2/7 = 16/56
Total alcohol = 21/56 + 16/56 = 37/56 L.
**Total water:**
Total water = 5/8 + 5/7
Again, we find the LCD, which is 56:
5/8 = 35/56
5/7 = 40/56
Total water = 35/56 + 40/56 = 75/56 L.
**Step 3: Alcohol-to-water ratio**
Now, we find the ratio of alcohol to water: Alcohol to water ratio = (37/56) / (75/56)
Simplifying: Alcohol to water ratio = 37/75.
This simplifies to approximately 1:2.
**Conclusion:**
The alcohol-to-water ratio in the mixed solution is approximately **1:2**.

**S10. Ans.(c)**
**Sol. Solution:**
Step 1: Analyze the given clues.
1. The **artist** has to go up **three floors** to meet the **engineer**.
   This means the engineer is **three floors above** the artist.
2. The **engineer** has to come down **four floors** to visit the **doctor**.
   This means the doctor is **four floors below** the engineer.
3. The **lawyer** lives **just one floor above** the **teacher**.
   Step 2: Arrange based on the clues.
   - Since the building has **five floors**, let us assume the floors are numbered from **1 to 5** (from bottom to top).
   - Start with the engineer's position since it determines the others:
     - If the **engineer** is on the 5th floor, the **artist** (three floors below) must be on the 2nd floor.
     - The **doctor** (four floors below the engineer) must be on the 1st floor.

- The remaining positions (3rd and 4th floors) are occupied by the **teacher** and **lawyer**, respectively.
  - Since the **lawyer** is one floor above the **teacher**, the **teacher** must be on the 3rd floor and the **lawyer** on the 4th floor.

Step 3: Final arrangement.
From the lowest to the topmost floor:

1. **1st floor:** Doctor
2. **2nd floor:** Artist
3. **3rd floor:** Teacher
4. **4th floor:** Lawyer
5. **5th floor:** Engineer

**S11. Ans.(b)**
**Sol. Solution:**
**Step 1: Understanding the Graph**
The graph shows the price per carat of diamonds on the y-axis and the weight of a diamond in carats on the x-axis.
**Observations from the graph:**
A 1-carat diamond costs 2 lakh per carat.
A 2-carat diamond costs 4 lakh per carat.
The price per carat increases linearly with weight.
From this, we derive the price per carat formula:
Price per Carat = 2 × Weight (in carat).
**Step 2: Determining the Maximum Possible Size**
The person has 4.5 lakh to buy 4 identical diamonds.
The budget per diamond is 4.5 lakh ÷ 4 = 1.125 lakh per diamond.
Using the price formula:
Total Price of a Diamond = (Weight) × (Price per Carat).
Since Price per Carat = 2 × Weight, we set up the equation:
1.125 = Weight × (2 × Weight)
$1.125 = 2 \times \text{Weight}^2$
$\text{Weight}^2 = 1.125/2$
$\text{Weight}^2 = 0.5625$
Taking the square root:
Weight = 0.75 carat.
**Step 3: Selecting the Correct Option**
The largest possible diamond size is 0.75 carat, which corresponds to option (b).

**S12. Ans.(b)**
**Sol. Solution:**
**Step 1: Starting Day of the Year**

- A **leap year** starts on a **Tuesday**.
- **January 1 is a Tuesday**.

**Step 2: Days in January and February**

- **January has 31 days**.
  - January 1 is a **Tuesday**.
  - January 31 will then be a **Thursday** (because 31 days mean the 31st is 3 days ahead of Tuesday).
- **February has 29 days** in a leap year.
  - Since January 31 is **Thursday**, February 1 will be a **Friday**.
  - **February 29 will fall on a Friday**.

**Step 3: Day of March 1**

- Since **February 29 is a Friday**, **March 1 will be a Saturday**.

**Step 4: Finding the Third Saturday in March**

- **March 1 is a Saturday**.
  - The first Saturday in March will be **March 1**.
  - The second Saturday in March will be **March 8**.
  - The third Saturday in March will be **March 15**.

**Final Answer:**

The third Saturday of March falls on **March 15**, so the correct answer is:

**(b) March 15**.

**S13. Ans.(c)**

**Sol. Given:**

A meal is prepared by selecting one item from each category: starter, main course, and dessert.

We need to calculate the probability that the selected meal is vegetarian.

**Step 1: Total possible meal combinations**

**Starters:** 3 options (Tomato Soup, Vegetable Salad, Chicken Soup)

**Main Course:** 3 options (Chicken Biryani, Fish Biryani, Veg Biryani)

**Desserts:** 2 options (Gulabjamun, Rasagulla)

Total meal combinations = 3 × 3 × 2 = 18

**Step 2: Vegetarian combinations**

A vegetarian meal consists of a vegetarian starter, veg biryani as the main course, and any dessert.

**Vegetarian starter options:**

Tomato Soup

Vegetable Salad

Count: 2

**Vegetarian main course options:**

Veg Biryani

Count: 1

**Dessert options:**

Gulabjamun

Rasagulla

Count: 2

**Total vegetarian combinations** = (2 vegetarian starters)×(1 vegetarian main course)×(2 desserts) = 4

**Step 3: Probability of a vegetarian meal**

Probability = (Number of vegetarian combinations) / (Total combinations)

= 4 / 18

= 2 / 9

**Answer:**

The probability that a randomly drawn menu is vegetarian is 2/9.

**S14. Ans.(b)**
**Sol. Solution:**
**Step 1: Understanding Perfect Squares**
A number is a perfect square if:
Its last digit must be one of 0, 1, 4, 5, 6, or 9.
If it ends in 5, it must end in 25.
If it ends in 6, it must have an even digit before it.
If it ends in 00, it must be divisible by 400.
**Step 2: Checking the Last Digits**
Let's analyze the last few digits of each given option.
**Option (a) 93XY215**
Ends in 215, which does not follow the rule for a perfect square.
Not a perfect square.
**Option (b) 7XY0625**
Ends in 0625, which is a common ending for a perfect square, like $25^2 = 625$, $75^2 = 5625$, etc.
Possible perfect square.
**Option (c) 613XY45**
Ends in 45, which is not a valid ending for a perfect square.
Not a perfect square.
**Option (d) XY21375**
Ends in 375, which is not a valid ending for a perfect square.
Not a perfect square.
**Step 3: Confirming Option (b)**
0625 is a valid ending for a perfect square.
Some known perfect squares that end in 0625 include:
$25^2 = 625$
$75^2 = 5625$
$125^2 = 15625$
$175^2 = 30625$
$225^2 = 50625$
$275^2 = 75625$
Since 7XY0625 follows this pattern, it can be a perfect square.
**Final Answer:**
(b) 7XY0625

**S15. Ans.(a)**
**Sol. Understanding the Problem**
Two children, **A and B**, count the number of chairs around a **round table**, but they start counting from different chairs.
- **A's 5th chair is B's 9th chair**, meaning **B started counting 4 places ahead of A**.
- **B's 3rd chair is A's 12th chair**, meaning **A started counting 9 places ahead of B**.

We need to determine the total number of chairs around the table.

**Step 1: Express the Relationship**

Since the counting is in a **circular pattern**, the difference in their counting positions must be **consistent modulo N**, where **N is the total number of chairs**.

- **A's 5th chair is B's 9th chair**, meaning B is **4 steps ahead of A**.
  - Mathematically, the difference is **9 - 5 = 4**.
- **B's 3rd chair is A's 12th chair**, meaning A is **9 steps ahead of B**.
  - Mathematically, the difference is **12 - 3 = 9**.

Since the counting repeats after **N** chairs, the total number of chairs must be the **smallest number that satisfies this pattern**.

**Step 2: Finding the Smallest Valid N**

We now find **N**, the total number of chairs, by determining the **smallest number that is a multiple of both 4 and 9 but allows cyclic repetition**.

The simplest way is to check the sum of these shifts:

N = 4 + 9 = 13, which is a valid solution.

**Step 3: Verifying the Answer**

For **N = 13**, let's check if both conditions hold:

1. **A's 5th chair = B's 9th chair**
   - Since **B is 4 places ahead of A**, after 4 more positions, B reaches A's 5th chair, which is correct.
2. **B's 3rd chair = A's 12th chair**
   - Since **A is 9 places ahead of B**, moving 9 places forward from **B's 3rd chair** leads to A's **12th chair**, which is also correct.

Since **N = 13** satisfies both conditions, this is the correct answer.

**Final Answer: (a) 13**

**S16. Ans.(a)**

**Sol. Solution:**

To determine the number of persons who actually have the disease, we need to consider:

**True Positives (TP):** People who actually have the disease and tested positive → 8

**False Negatives (FN):** People who actually have the disease but tested negative → 3

Since these two categories represent all people who actually have the disease, the total number of such persons is:

Total actual disease cases = True Positives + False Negatives

= 8 + 3 = 11

**Final Answer:** (a) 11

**S17. Ans.(b)**

**Sol. Given:**

Total number of watches = 200.

**Selling details:**

First 50 sold at 10% profit.

Next 50 sold at 20% profit.

Next 50 sold at 25% profit.

Last 50 sold at 40% profit.

Total profit = Rs 19,000.

**Solution:**
Step 1: Represent the cost price of one watch.
Let the cost price (C.P.) of one watch be Rs x.
Then, the total cost price of 200 watches = 200x.
Step 2: Calculate the selling price (S.P.) of each batch of 50 watches.
First 50 watches at 10% profit:
Selling price for 50 watches = 50 × x × 1.10 = 55x.
Next 50 watches at 20% profit:
Selling price for 50 watches = 50 × x × 1.20 = 60x.
Next 50 watches at 25% profit:
Selling price for 50 watches = 50 × x × 1.25 = 62.5x.
Last 50 watches at 40% profit:
Selling price for 50 watches = 50 × x × 1.40 = 70x.
Step 3: Total selling price of 200 watches.
Total selling price = 55x + 60x + 62.5x + 70x = 247.5x.
Step 4: Calculate the total profit.
Total profit = Total selling price - Total cost price.
Given that the total profit is Rs 19000:
247.5x - 200x = 19000.
47.5x = 19000.
x = 19000 / 47.5 = 400.
Step 5: Calculate the total cost price of the watches.
Total cost price = 200x = 200 × 400 = 80000.
**Final Answer:** (b) Rs 80000

**S18. Ans.(a)**
**Sol. Solution:**
**Step 1: Define the Number**
Let the three-digit number be represented as **xyz**, where:
- x is the hundreds digit,
- y is the tens digit,
- z is the units digit.

The number in numeric form is: **100x + 10y + z**.
The reverse of the number is: **100z + 10y + x**.
According to the problem: (100x + 10y + z) + (100z + 10y + x) = 1089.
**Step 2: Simplify the Equation**
Expanding the sum: 100x + 10y + z + 100z + 10y + x = 1089.
Combining like terms: (100x + x) + (100z + z) + (10y + 10y) = 1089.
This simplifies to: 101x + 101z + 20y = 1089.
Factoring out 101 from the first two terms: 101(x + z) + 20y = 1089.
**Step 3: Solve for x + z**
Since 101(x + z) must be a multiple of 101, dividing 1089 by 101 gives:
1089 ÷ 101 = 10.79.
Since this is not an integer, we check integer values for x + z that make the sum a multiple of 101.
From estimation: x + z = 9.

Now, substituting x + z = 9 into the equation:
101(9) + 20y = 1089.
909 + 20y = 1089.
20y = 180.
y = 9.

**Step 4: Verify the Answer**

- The middle digit of the number is y.
- We found y = 9.

Thus, the correct answer is:

**Final Answer: (a) 9**

**S19. Ans.(d)**

**Sol. Solution:**

The **standard deviation** of a data set is influenced by both the **mean** and the **deviations from the mean**, specifically how the values are spread around it. Standard deviation is computed using the variance, which takes into account the average of the squared differences between each data point and the mean.

**Formula for Standard Deviation:**

The standard deviation (σ) is calculated as:

Standard Deviation:σ=1n∑i=1n(xi−μ)2Standard Deviation:σ=n1i=1∑n(xi−μ)2

where:

- xix_ixi are the individual data points,
- μ\muμ is the mean of the data set,
- nnn is the number of data points.

The **variance** is the average of the squared differences from the mean.

**Step 1: Understanding the Components**

- The **mean** of a data set affects the squared deviations (the distance of data points from the mean).
- The **average of the squares of all terms** tells us about the spread or dispersion of the data points around the mean.

Thus, both the **mean** and the **average of the squares of all terms** (which is related to the variance) are needed to determine the standard deviation.

**Step 2: Analyzing the Options**

- **Option (a): Their means**
  If the means are equal, it does **not** guarantee that the standard deviations are equal. The spread of data could still be different.

**Incorrect**.

- **Option (b): The sums of positive and negative deviations from the respective means**
  The sum of the deviations from the mean is always **zero**, so this does not affect the standard deviation.

**Incorrect**.

- **Option (c): The averages of squares of all terms**
  The **average of the squares of the terms** is directly related to the variance. However, **the mean** is also a crucial factor in calculating the standard deviation.

**Incorrect by itself**.

- **Option (d): The averages of squares of all terms and their means**
  This is correct because both the **mean** and the **average of the squares of the terms** (which is related to the variance) are necessary to determine the standard deviation. If these two quantities are equal between two data sets, their standard deviations will be equal.

**Correct**.

**Final Answer:**

**(d) The averages of squares of all terms and their means.**

**S20. Ans.(a)**

**Sol. Solution:**

The problem describes how a tree's height changes over **30 weeks**:

1. **First 15 weeks:**
   - The **growth rate increases linearly**, meaning the tree grows at an **accelerating** pace.
   - This suggests a **curved upward** pattern in the graph.
2. **At the 15th week:**
   - The tree is **trimmed down**, causing a **sudden drop in height**.
3. **After trimming (next 15 weeks):**
   - The tree continues growing, but the **growth rate again increases linearly**, meaning it starts slow and picks up speed gradually.

**Step-by-Step Analysis of the Graphs:**

- **Graph (A):**
  - **First 15 weeks:** Shows **accelerating growth** (curved upward).
  - **At 15 weeks:** A **sudden drop in height** due to trimming.
  - **Next 15 weeks:** Growth resumes with an **increasing rate** (curved upward).
  - **Correct representation of the tree's growth.**
- **Graph (B):**
  - Shows a **steady growth rate after trimming**, but does not show an increasing rate afterward.
- **Graph (C):**
  - Shows the correct **initial acceleration** and trimming, but the second phase **does not show accelerating growth** correctly.
- **Graph (D):**
  - Shows a **decreasing growth rate after trimming**, which is incorrect.

**Final Answer: (a) A**