APTITUDE PROBLEMS ON SETS THEORY

1. **In the Mindworkzz club all the members participate either in the Tambola or the Fete. 320 participate in the Fete, 350 participate in the Tambola and 220 participate in both. How many members does the club have?**
   - **A. 410**
   - **B. 450**
   - **C. 440**
   - **D. 380**

Answer:
To solve this problem, we can use the formula:
n(A U B) = n(A) + n(B) - n(A ∩ B)
Where:
n(A U B) represents the number of members participating in either Fete or Tambola or both.
n(A) represents the number of members participating in the Fete.
n(B) represents the number of members participating in the Tambola.
n(A ∩ B) represents the number of members participating in both Fete and Tambola.
Substituting the values given in the problem, we get:
n(A U B) = 320 + 350 - 220 n(A U B) = 450
Therefore, the number of members in the club is 450. So the answer is option B.

2. **There are 20000 people living in Defence Colony, Gurgaon. Out of them 9000 subscribe to Star TV Network and 12000 to Zee TV Network. If 4000 subscribe to both, how many do not subscribe to any of the two?**
   A. 5000
   B. 2000
   C. 3000

Answer:
To solve this problem, we can use the formula:
n(A U B) = n(A) + n(B) - n(A ∩ B)
Where:
n(A U B) represents the number of people who subscribe to either Star TV or Zee TV or both.
n(A) represents the number of people who subscribe to Star TV.
n(B) represents the number of people who subscribe to Zee TV.
n(A ∩ B) represents the number of people who subscribe to both Star TV and Zee TV.
Substituting the values given in the problem, we get:
n(A U B) = 9000 + 12000 - 4000 n(A U B) = 17000
Therefore, the number of people who do not subscribe to either Star TV or Zee TV is:
20000 - 17000 = 3000
So the answer is option C. 3000 people do not subscribe to any of the two networks.

3. **In the Indian athletic squad sent to the Olympics, 21 athletes were in the triathlon team; 26 were in the pentathlon team; and 29 were in the marathon team. 14 athletes can take part in triathlon and pentathlon; 12 can take part in marathon and triathlon; 15 can take part in pentathlon and marathon; and 8 can take part in all the three games. How many were in the marathon team only?**
   A.11
   B.10
   C.8
   D.9

Answer:

To solve this problem, we can use the principle of inclusion-exclusion. We start by adding the number of athletes in each team and then subtracting the athletes who are in multiple teams, to get the total number of athletes:

Total number of athletes = n(triathlon) + n(pentathlon) + n(marathon) - n(triathlon ∩ pentathlon) - n(triathlon ∩ marathon) - n(pentathlon ∩ marathon) + n(triathlon ∩ pentathlon ∩ marathon)

Substituting the given values, we get:
Total number of athletes = 21 + 26 + 29 - 14 - 12 - 15 + 8 Total number of athletes = 43
Therefore, there are 43 athletes in total.
Now, to find the number of athletes who are in the marathon team only, we need to subtract the athletes who are in multiple teams from the total number of athletes in the marathon team:
n(marathon only) = n(marathon) - n(triathlon ∩ marathon) - n(pentathlon ∩ marathon) + n(triathlon ∩ pentathlon ∩ marathon)
Substituting the given values, we get:
n(marathon only) = 29 - 12 - 15 + 8 n(marathon only) = 10
Therefore, the answer is option B. 10 athletes are in the marathon team only.

4. **5% of the passengers who boarded Guwahati- New Delhi Rajdhani Express on 20 th February, 2002 do not like coffee, tea and ice cream and 10% like all the three. 20% like coffee and tea, 25% like ice cream and coffee and 25% like ice cream and tea. 55% like coffee, 50% like tea and 50 % like ice cream. The number of passengers who like only coffee is greater than the passengers who like only ice cream by**

Answer:
To solve this problem, we can use the principle of inclusion-exclusion. We start by adding the number of passengers who like coffee, tea, and ice cream and then subtracting the passengers who like multiple items, to get the total number of passengers:

Total number of passengers = n(Coffee) + n(Tea) + n(Ice Cream) - n(Coffee ∩ Tea) - n(Coffee ∩ Ice Cream) - n(Tea ∩ Ice Cream) + n(Coffee ∩ Tea ∩ Ice Cream)
Substituting the given values, we get:

Total number of passengers = 55% + 50% + 50% - 20% - 25% - 25% + 10% Total number of passengers = 45%

Therefore, 45% of the passengers do like at least one of the three items.

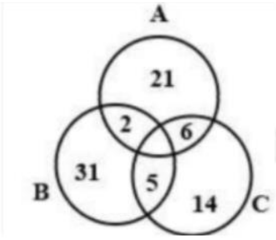
Now, we know that 5% of the passengers do not like any of the three items. So, the percentage of passengers who like at least one of the three items is 100% - 5% = 95%.

Therefore, 95% of the passengers like either coffee or tea or ice cream or a combination of these.
To find the number of passengers who like only coffee or only ice cream, we can subtract the passengers who like coffee and ice cream and those who like all three from the total number of passengers who like either coffee or ice cream:

n(Coffee only) = 55% - 25% - 10% = 20% n(Ice Cream only) = 50% - 25% - 10% = 15%

Therefore, the number of passengers who like only coffee is greater than the passengers who like only ice cream by n(Coffee only) - n(Ice Cream only) = 20% - 15% = 5%.

5. **In the given Venn diagram, A denotes mangoes, B denotes bananas, C denotes apples, and the numbers in each section represent the number of persons who like those fruits. How many persons like only bananas?**



Answer: 31

6. **In a group of 75 students,12 like only cabbage,15 like only cauliflower,21 like only carrot,12 like both carrot and cabbage,13 like only capsicum and 2 like both capsicum and 2 like both capsicum and cauliflower.**
   What is the percentage of students that do not like cabbage?
   16
   32
   24
   68

Answer:

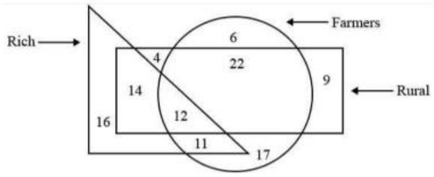
Let's use a Venn diagram to solve this problem.(done in the rough book)

First, we know that 12 students like only cabbage, 15 students like only cauliflower, 21 students like only carrot, 13 students like only capsicum, 12 students like both carrot and cabbage, and 2 students like both capsicum and cauliflower.

Now, to find the percentage of students who do not like cabbage, we need to add the number of students who like only cauliflower, only carrot, only capsicum, and both cauliflower and capsicum:

15 + 21 + 13 + 2 = 51
Therefore, the percentage of students who do not like cabbage is:
(51/75) x 100% = 68%
So, the answer is option D, 68%.

7. In the given diagram, the circle stands for ‘farmers’, the rectangle stands for ‘rural’, and the triangle stands for ‘rich’, The numbers given in the different segments represent the number of persons of that category.



How many rural people are either farmers or rich but NOT both?

Answer:

- no of Rural people are farmer : 22
- no of rural people are rich : 14

8. In a batch of 68 students, 23 students do not participate in any of the two games i.e. cricket and squash. 17 students participate in cricket only, 24 students participate in cricket and squash. How many students participate in squash only?

A.28 B.4 C.21 D.20

Answer:

Given,
In a batch of 68 students, 23 students do not participate in any of the two games i.e. cricket and squash, 17 students participate in cricket only, 24 students participate in cricket and squash.
Total student = 68
Students do not participate in any of the two games = 23
Those who participated = 68 - 23 = 45
Students participate in cricket only = 17
Students participate in cricket and squash = 24
Students participated in Squash only = those who participated - (Students participate in cricket only+ Students participate in cricket and squash) = 45 - (17+24) = 45 - 41 = 4
4 students participated in squash only.
Hence, the correct answer is 4.

9. Among 160 players in a tournament, 57 did not participate in any of the three games, i.e. Cricket, Hockey and Badminton. A total of 37 players participated in only one game,10 players participated in both Cricket and Hockey but not in Badminton, 9 players participated in both Hockey and Badminton but not in Cricket, and 13 players participated in both Cricket and Badminton but not in Hockey. How many students participated in all the three games

Answer:
Among 160 players in a tournament,
57 did not participate in any of the three games, i.e. Cricket, Hockey and Badminton.
No. of players who participated in the game = (160 – 57) = 103
10 players participated in both Cricket and Hockey but not in Badminton,
9 players participated in both Hockey and Badminton but not in Cricket,
And 13 players participated in both Cricket and Badminton but not in Hockey.
Number of players who participated in two games only = (10 + 9 + 13) = 32
Number of players who participated in all the three games = 103 – (32 + 37) = 34

Hence, '34' is the correct answer.

10. In a class of 100 students, every student has passed in one or more of the three subjects, i.e. History, Economics and English. Among all the students, 24 students have passed in English only, 14 students have passed in History only, 11 students have passed in both English and Economics only, and 12 students have passed in both English and History only. A total of 50 students have passed in History. If only 5 students have passed in all three subjects, then how many students have passed in Economics only?

Answer:

Total no. of students in the class = 100
No. of students passed in English only = 24
No. of students passed in History only = 14
No. of students passed in both English and Economics only = 11
No. of students passed in both English and History only = 12
No. of students passed in History = 50
No. of students passed in all three subjects = 5
No. of students who passed in Economics only = 100 - (50 + 24 + 11) = 100 - 85 = 15.
Hence, 15 is the correct answer.

11. Select the Venn diagram that best illustrates the relationship between the following classes.
Graduates, Teachers, Literates

Answer:

12. Find the solution set of the equation x2+x+2=0 in roster form

Answer:

To solve the quadratic equation x^2 + x + 2 = 0, we can use the quadratic formula:
Where a, b, and c are the coefficients of the quadratic equation. Substituting the values for this equation, we get:
The square root of a negative number is not a real number, so this equation has no real solutions. The solution set is the empty set:
{}

13. 60 students participated in one or more of the three competitions, i.e. Quiz, Extempore and Debate. A total of 22 students participated either in Quiz only or in Extempore only. 4 students participated in all three competitions. A total of14 students participated in any of the two competitions only. How many students participated in Debate only?

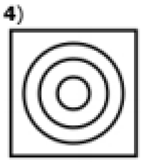
Answer:

60 students participated in one or more of the three competitions, i. e. Quiz, and Debate.
A total of 22 students participated either in Quiz only or in Extempore only.
4 students participated in all three competitions.
A total of 14 students participated in any of the two competitions only.
Number of students who participated in Debate only = 60 - (22 + 4 + 14) = 60 - 40 = 20

Hence, '20' students participated in debate only.

14. Identify the diagram that best represents the relationship among the given classes. Country, State, City

Answer:



15. Convert the A= {3,-3}into set-builder form
a. A= {x:x is a positive integer and is a divisor of 19}
b. A= {x:x is an integer and x2-9=0}
c. A= {x:x is an integer and x+1=1}
d. None of these

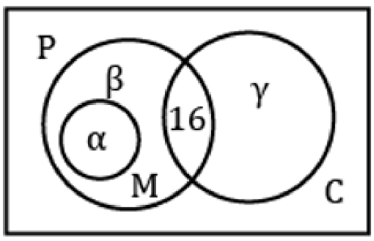
Answer:
d. None of these

16. Set P comprises all multiples of 4 less than 500. Set Q comprises all odd multiples of 7 less than 500, Set R comprises all multiples of 6 less than 500. How many elements are present in P∪Q∪R ?
A. 202
B. 243
C. 228
D. 186

Answer:
a.202

17. Of 60 students in a class, anyone who has chosen to study maths elects to do physics as well. But no one does maths and chemistry, 16 do physics and chemistry. All the students do at least one of the three subjects and the number of people who do exactly one of the three is more than the number who do more than one of the three. What are the maximum and minimum number of people who could have done Chemistry only?

Answer:



The correct option is B [0,44]
Who do Math also do physics $\Rightarrow M \subset P$
Let $M \cap P = \alpha$
Only $P = \beta$
Only $C = \gamma$, **then**

$\alpha+\beta+\gamma+16=60$
$\Rightarrow\alpha+\beta+\gamma=44$
Also $\beta+\gamma>\alpha+16$
Now, possibilities of $'\gamma'\rightarrow$(i)
If $\gamma=0$, **then** $\alpha+\beta=44$ **And** $\beta>\alpha+16$
Here, $(\alpha,\beta)=(1,43),(2,42),(3,41),\cdots,(13,31)$

(ii) **If** $\gamma=44$, **then** $\alpha+\beta=0$
$\Rightarrow\alpha=\beta=0$ **this is also possible**
$\therefore$ **Range of** $\gamma=[0,44]$

18. Of the members of three athletic teams in a school 21 are in the cricket team, 26 are in the hockey team and 29 are in the football team. Among them, 14 play hockey and cricket, 15 play hockey and football, and 12 play football and cricket. Eight play all the three games. The total number of members in the three athletic teams is
(a) 43
(b) 76
(c) 49
(d) None of these

Answer:

Correct answer is 43

19. The set of intelligent students in a class is
(a) A null set
(b) A singleton set
(c) A finite set
(d) Not a well-defined collection

Answer: D) Not a well-defined collection

20. In a class of 30 pupils, 12 take needle work, 16 take physics and 18 take history. If all the 30 students take at least one subject and no one takes all three then the number of pupils taking 2 subjects is
(a) 16
(b) 6
(c) 8
(d) 20

Answer: A) 16