

I'm not robot!



Q21. For all sets A and B, $(A \cup B) - B = A - B$.

Sol. L.H.S. $(A \cup B) - B = (A \cup B) \cap B'$ [$\because A - B = A \cap B'$]
 $= (A \cap B') \cup (B \cap B')$ [$\because A \cap A' = \emptyset$]
 $= (A - B) \cup \emptyset$
 $= A - B$ R.H.S.

L.H.S. = R.H.S. Hence proved.

Q22. Let $T = \left\{ x \mid \frac{x+5}{x-7} - 5 = \frac{4x-40}{13-x} \right\}$. Is T is an empty set? Justify your answer.

Sol. Given that: $T = \left\{ x \mid \frac{x+5}{x-7} - 5 = \frac{4x-40}{13-x} \right\}$

$$\Rightarrow \frac{x+5}{x-7} - 5 = \frac{4x-40}{13-x}$$

$$\Rightarrow \frac{x+5}{x-7} - \frac{4x-40}{13-x} = 5$$

$$\Rightarrow \frac{(x+5)(13-x) - (x-7)(4x-40)}{(x-7)(13-x)} = 5$$

$$\Rightarrow \frac{13x - x^2 + 65 - 5x - 4x^2 + 40x + 28x - 280}{13x - x^2 - 91 + 7x} = 5$$

$$\Rightarrow \frac{-5x^2 + 76x - 215}{-x^2 + 20x - 78} = 5$$

$$\Rightarrow \frac{-5x^2 + 76x - 215}{-x^2 + 20x - 78} = \frac{5(-x^2 + 20x - 78)}{-x^2 + 20x - 78}$$

$$\Rightarrow \frac{-5x^2 + 76x - 215}{-x^2 + 20x - 78} = \frac{-5x^2 + 100x - 390}{-x^2 + 20x - 78}$$

$$\Rightarrow \frac{76x - 100x}{-x^2 + 20x - 78} = \frac{-45x - 390}{-x^2 + 20x - 78}$$

$$\Rightarrow \frac{-24x}{-x^2 + 20x - 78} = \frac{-45x - 390}{-x^2 + 20x - 78}$$

$$\Rightarrow -24x = -45x - 390$$

$$\Rightarrow 21x = -390$$

$$\Rightarrow x = \frac{-390}{21} = -\frac{130}{7}$$

$\therefore T = \left\{ -\frac{130}{7} \right\}$
Hence, T is not an empty set.

LONG ANSWER TYPE QUESTIONS

Q23. Let A, B and C be sets. Then show that $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

Sol. Let $x \in A \cap (B \cup C)$
 $\Rightarrow x \in A$ and $x \in (B \cup C)$
 $\Rightarrow x \in A$ and $(x \in B$ or $x \in C)$
 $\Rightarrow (x \in A$ and $x \in B)$ or $(x \in A$ and $x \in C)$
 $\Rightarrow (x \in A \cap B)$ or $(x \in A \cap C)$
 $\Rightarrow x \in (A \cap B) \cup (A \cap C)$... (i)
Now let $y \in (A \cap B) \cup (A \cap C)$
 $\Rightarrow y \in (A \cap B)$ or $y \in (A \cap C)$
 $\Rightarrow (y \in A$ and $y \in B)$ or $(y \in A$ and $y \in C)$
 $\Rightarrow y \in A$ and $(y \in B$ or $y \in C)$

Permutations and Combinations

1. How many ways are there for Arun, Bob, and Carl, to line up at the box office at the movies?
2. How many different committees of 8 people can be formed from a freshman class of 28 students?
3. How many different ice-cream cones of three flavors can be formed at Baskin Robbins, where they claim to have 28 flavors? A cone that was made with vanilla, then chocolate and finally strawberry is different from a cone that was made in the reverse order.
4. How many different ice-cream cones of four flavors can be formed at Baskin Robbins, where they claim to have 28 flavors? A cone that was made with vanilla, then chocolate, then black walnut and finally strawberry is same no matter what order the flavors are placed on the cone.
5. How many ways are there to arrange the four letters in the word MARK?
6. If 8 people are running in a race, how many possible ways can they come in if there are no ties and everyone finishes the race?
7. At a restaurant, how many ways can you select three different side dishes from eight possibilities?
8. Some plates have rounded plates with five numbers. If these plates do not want to use the number 0 on their license plates because it is confused with the letter O, how many different plates are possible?
9. You are packing a suitcase for vacation. You have 12 shirts to choose from. How many different groupings of 4 shirts can you make from the 12 shirts?
10. A five digit number of the form $abcde$ has a (thousands) digit a , (hundreds) digit b , and (tens) digit c . How many different numbers can be made if no duplicate digits in the number?
11. Pam has one copy of each of the six Harry Potter books. Each book is clearly different from each of the other books because they have a volume number and name. How many different ways can Pam place these six books on her book shelf?
12. Pam has one copy of each of the six Harry Potter books. Each book is clearly different from each of the other books because they have a volume number and name. How many different ways can Pam package these books into 3 bags?
13. A prize of two different CDs has been announced. In a class of 25 students how many different pairs of students can be receive these two CDs?

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