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I. Permutations

Cards Draw:

Ace of Spades (AS)

5 of Hearts (5H)

Queen of Diamonds (QD)

9 of Clubs (9C)

Possibilities:

1. AS, 5H, QD, 9C
2. AS, 5H, 9C, QD
3. AS, QD, 5H, 9C
4. AS, QD, 9C, 5H
5. AS, 9C, 5H, QD
6. AS, 9C, QD, 5H
7. 5H, AS, QD, 9C
8. 5H, AS, 9C, QD
9. 5H, QD, AS, 9C
10. 5H, QD, 9C, AS
11. 5H, 9C, AS, QD
12. 5H, 9C, QD, AS
13. QD, AS, 5H, 9C
14. QD, AS, 9C, 5H
15. QD, 5H, AS, 9C
16. QD, 5H, 9C, AS
17. QD, 9C, AS, 5H
18. QD, 9C, 5H, AS
19. 9C, AS, 5H, QD
20. 9C, AS, QD, 5H
21. 9C, 5H, AS, QD
22. 9C, 5H, QD, AS
23. 9C, QD, AS, 5H
24. 9C, QD, 5H, AS

II. Combinations

Cards Draw:

King of Hearts (KH)

7 OF Clubs (7C)

Ace of Spades (AS)

Possibilities:

1. KH
2. 7C
3. AS
4. KH, 7C
5. KH, AS
6. 7C, AS
7. KH, 7C, AS

III. Discussion

Two concepts of combinatorial mathematics include permutations and combinations, each differing in the importance assigned to order. **Permutations** refer to the arrangements of a set of items where the order is important; this means that changing the order of the items creates another permutation. For instance, the permutations of AS, 5H, QD, 9C are AS, 5H, QD, 9C and AS, 5H, 9C, QD are different. The formula for calculating permutations of n items taken r at a time is given by $P(n,r) = \frac{n!}{(n-r)!}$. In contrast, **combinations** are selection of objects from a set where the order does not matter; thus, KH, 7C and 7C, KH would be the same combination. For instance, out of the cards selected are KH, 7C, and AS, the available combinations are: (1) KH, 7C, (2) KH, AS, and (3) 7C, AS, without any considerations to arrangement. The formula for combinations is $C(n,r) = \frac{n!}{r!(n-r)!}$. In essence, use permutations when the sequence is significant and combinations when it is not.