Permutations and Combinations

Q.1 Distinguish between permutations and Combinations.

1. Six students are running for student government president, vice-president, and treasurer. The student with the greatest number of votes becomes the president, the second highest vote-getter becomes vice-president, and the student who gets the third largest number of votes will be treasurer. How many different outcomes are possible for these three positions?

Permutations and Combinations

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2. Six people are on the board of supervisors for your neighborhood park. A three-person committee is needed to study the possibility of expanding the park. How many different committees could be formed from the six people?

Permutations and Combinations

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3. Baskin-Robbins offers 31 different flavors of ice cream. One of their items is a bowl consisting of three scoops of ice cream, each a different flavor. How many such bowls are possible?

Permutations and Combinations

Q.1 Distinguish between permutations and Combinations.

Answer:

1.Students are choosing three student government officers from six candidates. The order in which the officers are chosen makes a difference because each of the offices (president, vice-president, treasurer) is different. Order matters. This is a problem involving permutations

2. A three-person committee is to be formed from the six-person board of supervisors. The order in which the three people are selected does not matter because they are not filling different roles on the committee. Because order makes no difference, this is a problem involving combinations.

3. A three-scoop bowl of three different flavors is to be formed from Baskin Robbins's 31 flavors. The order in which the three scoops of ice cream are put into the bowl is irrelevant. A bowl with chocolate, vanilla, and strawberry is exactly the same as a bowl with vanilla, strawberry, and chocolate. Different orderings do not change things, and so this is a problem involving combinations.

Permutations and Combinations

Q.2

There are four bus routes between A and B; and three bus routes between B and C. A man can travel round-trip in number of ways by bus from A to C via B. If he does not want to use a bus route more than once, in how many ways can he make round trip?

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Answer: 72

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Q.3

suppose a small law firm has 16 employees and three are to be selected randomly to represent the company at the annual meeting of the Indian Bar Association. How many different combinations of lawyers could be sent to the meeting?

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Answer: $^{16}C_3 = 560$

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Q.4

The number of signals that can be sent by 6 flags of different colors taking one or more at a time is

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Answer:

- Number of signals using one flag = ${}_6P_1 = 6$

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Answer:

- Number of signals using one flag = ${}_6P_1 = 6$
- Number of signals using two flags = ${}_6P_2 = 30$
- Number of signals using three flags = ${}_6P_3 = 120$
- Number of signals using four flags = ${}_6P_4 = 360$
- Number of signals using five flags = ${}_6P_5 = 720$
- Number of signals using all six flags = ${}_6P_6 = 720$
- Therefore, the total number of signals using one or more flags at a time is
- $6 + 30 + 120 + 360 + 720 + 720 = 1956$ (Using addition principle)

Probability

Q.5

A 4 digit PIN is selected (Using numbers 0 to 9). What is the probability that there are no repeated digits?

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Answer: $\frac{{}^{10}P_4}{10^4} = 0.504$

Probability

Q.6

Compute the probability of randomly drawing five cards from a deck and getting exactly one Ace.

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Answer: $$p(One\ Ace) = \frac{{}^{4}C_{1} \times {}^{48}C_{4}}{{}^{52}C_{5}} = 0.299$$

Probability

Q.7

Compute the probability of randomly drawing five cards from a deck of cards and getting three Aces and two Kings.

Probability

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Answer: $$\frac{{}^{4}C_{3} \times {}^{4}C_{2}}{{}^{52}C_{5}}$$

Probability

Q.8

A yearbook editor has selected 14 photos, including one of you and one of your friend, to use in a collage for the yearbook. The photos are placed at random. There is room for 2 photos at the top of the page. What is the probability that your photo and your friend's photo are the two placed at the top of the page?

Probability

Q.8

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Answer: $\frac{1}{{}^{14}C_2}$