**Course\_8**

**Sprint\_1**

**Task1:**

C(n, r) = n! / (r! \* (n - r)!)

1. There are 6 men and we need to choose 3, so C(6, 3) = 6! / (3! \* 3!) = 20. Similarly, there are 4 women and we need to choose 2, so C(4, 2) = 4! / (2! \* 2!) = 6. To find the total number of committees with 3 men and 2 women, we multiply the combinations: 20 \* 6 = 120.
2. If there are to be men only, we need to choose 5 men from the 6 available. So, C(6, 5) = 6! / (5! \* 1!) = 6.
3. For a majority of women, there can be either 3 women and 2 men, or 4 women and 1 man. We already calculated the number of committees with 3 women and 2 men (120). For 4 women and 1 man, we have C(4, 4) \* C(6, 1) = 1 \* 6 = 6. So, the total number of committees with a majority of women is 120 + 6 = 126.

**Task2:**

C(n, r) = n! / (r! \* (n - r)!)

here:

* C(n, r) is the number of combinations of r items from a set of n items
* n! is the factorial of n (n × (n-1) × (n-2) × ... × 1)

In this case, n = 52 (total cards) and r = 5 (cards to be dealt).

So, the number of distinct ways is:

C(52, 5) = 52! / (5! \* 47!) = 2,598,960

**Task3:**

The permutation formula is:

P(n, r) = n! / (n - r)!

* P(n, r) is the number of permutations of r items from a set of n items
* n! is the factorial of n (n × (n-1) × (n-2) × ... × 1)

In this case, n = 8 (total contestants) and r = 3 (number of prizes).

So, the number of ways to award the prizes is:

P(8, 3) = 8! / (8 - 3)! = 8! / 5! = 8 \* 7 \* 6 = 336

**Task4:**

total number of ways to arrange 15 students: 15!

Number of ways to arrange with Jenny and David together:

Consider Jenny and David as a single unit. There are now 14 units to arrange.

The number of ways to arrange these 14 units is 14!

Number of ways to arrange with Jenny and David not together:

Total arrangements - Arrangements with Jenny and David together

15! - 14!

Therefore, the number of ways to arrange the students so that Jenny and David are not together is:

15! - 14! = 11,00,31,77,85,600

**Task5:**

Total number of possible outcomes:

When two dice are rolled, there are 6 possible outcomes for each die. So, the total number of possible outcomes is 6 \* 6 = 36.

Favorable outcomes:

We need to find the number of cases where the number on one die is thrice the number on the other. The possible cases are:

* (1, 3)
* (2, 6)
* (3, 1)
* (6, 2)

There are 4 favorable outcomes.

Probability:

Probability = Favorable outcomes / Total possible outcomes = 4 / 36 = 1/9

**Task6:**

1. Arrange consonants: There are 7 consonants to choose from, and we need to select 3. This can be done in C(7, 3) ways.
2. Arrange vowels: There are 4 vowels to choose from, and we need to select 2. This can be done in C(4, 2) ways.
3. Arrange consonants and vowels together: Once we have selected the consonants and vowels, we need to arrange them in a word. This can be done in 5! ways (since there are 5 letters in total).

Therefore, the total number of words that can be formed is:

C(7, 3) \* C(4, 2) \* 5! = (7! / (3! \* 4!)) \* (4! / (2! \* 2!)) \* 5! = 210 \* 6 \* 120 = 151,200

**Task7:**

* A pack of 25 bulbs contains 25% defective bulbs.
* The first bulb drawn is non-defective and not replaced.

Calculation:

1. Number of non-defective bulbs: 25 bulbs \* (1 - 25%) = 25 \* 0.75 = 18.75
2. Total number of bulbs after removing one non-defective bulb: 25 - 1 = 24

Probability of the second bulb being non-defective:

Since one non-defective bulb has already been removed, there are now 18 non-defective bulbs remaining out of a total of 24 bulbs. Therefore, the probability of drawing another non-defective bulb is:

18 / 24

**Task8:**

Given:

* 46% of the U.S. labor force is female.
* 25% of females are part-time workers.
* 17.4% of all American laborers are part-time workers.

Let's define events:

* F: the event that a worker is female
* P: the event that a worker is part-time

We need to find P(F|P), which is the probability that the worker is female given that they are part-time.

Using Bayes' theorem:

P(F|P) = P(P|F) \* P(F) / P(P)

where:

* P(P|F) is the probability that a worker is part-time given that they are female (25%)
* P(F) is the probability that a worker is female (46%)
* P(P) is the probability that a worker is part-time (17.4%)

Substituting the values:

P(F|P) = 0.25 \* 0.46 / 0.174 ≈ 0.663

Therefore, the probability that a randomly selected part-time worker is female is approximately 0.663 or 66.3%.

**Task9:**

P(N) = 0.70

P(S) = 0.67

P(N and S) = 0.56

We need to find P(N or S), which is the probability that either reducing noise or increasing storage space (or both) will increase productivity.

We can use the formula:

P(N or S) = P(N) + P(S) - P(N and S)

Substituting the values:

P(N or S) = 0.70 + 0.67 - 0.56 = 0.81

Therefore, the probability that reducing noise or increasing storage space (or both) will increase productivity is 0.81 or 81%.