IB Math SL **Conditional Probability**

Unit 5 Notes – Day 3

1. **Conditional Probability**

Suppose we have two events A and B, then:

“ A|B ” or “A/B” is the notation used to represent that “A occurs *knowing that* B has occurred.”

**Ex:** In a class of 25 students, 14 like pizza and 16 like coffee. One student likes neither and 6 students like both. One student is randomly selected from the class. What is the probability that the student:

1. Likes pizza
2. Likes pizza given that he/she likes coffee?

**Ex 2:** In a class of 40, 34 like bananas, 22 like pineapples, and 2 dislike both fruits - kinda like this teacher 🡪 If a student is randomly selected, find the probability that the

 student:

1. Likes both fruits
2. Likes at least one fruit
3. Likes bananas given that he/she likes pineapples
4. Dislikes pineapples given that he/she likes bananas

Conclusion:



**Ex 3:** Given that $P\left(A\right)=\frac{2}{5}and P\left(A∩B\right)=\frac{1}{3}, find P\left(A\right). If P\left(B\right)=\frac{7}{8},find P\left(B\right).$

1. **Contingency Tables**

Contingency tables are another tool useful in solving conditional probability problems.

**Ex 4**: At an IB school there are 3 IB Math courses. The Studies class contains 20 boys and 15 girls, the SL class contains 16 boys and 19 girls, and the HL class contains 4 girls and 6 boys.

1. Make a table displaying the data. Include an additional row and column to display the total sum for each row and each column.
2. Find the probability that a randomly selected male is taking Math Studies.
3. Find the probability that a randomly selected HL student will be female.
4. **Probability Tree Diagrams**

We have already mentioned the use of tree diagrams. This type of tree diagram displays the actual probability of each event occurring – you label the branch with each probability.

***Successive Events:* represented by adjoining branches. The probability is found by multiplying the probabilities of the successive events.**

***Alternative Events:* represented by alternative branches. The probability is found by adding the probabilities of the alternative events.**

**Ex 5:** A bag contains 3 red marbles and 2 yellow marbles. A marble is removed at random and not replaced. A second marble is removed at random. Find the probability that:

1. The second marble is red, given the first is yellow.
2. A red marble is taken on the second removal.

**Ex 6:** A coin is tossed and a die thrown. Find the probability that a head and a six are obtained.

**Ex 7:** Find the number of times a die needs to be thrown in order that there is a 90% chance a six is obtained.

**Ex 8:** In arms negotiations between two countries, it is estimated that there is a 50% chance that agreement will be reached on limiting chemical weapons and a 70% chance that agreement will be reached on limiting nuclear weapons. There is a 20% chance that no agreement will be reached on either issue. Find the probability of reaching agreement on both issues.

**Ex 9:** A pair of fair dice is thrown.

1. Draw a tree diagram showing the probability of getting a four.
2. Let E be the event that EXACTLY one four occurs when the pair of dice is thrown. Calculate P(E).

The pair of dice is thrown three times.

1. Calculate the probability that event E occurs EXACTLY two times in the three throws.
2. Calculate the probability that event E occurs AT LEAST two times in the three throws.

IB Math SL Topic 5, Part II Homework Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_





