IB Math SL **Independent Events** DO AS UN-GUIDED NOTES

Topic 5, Part II – Day 2 Notes

1. **History Tid-Bit**

*In the late 17th century, English mathematicians compiled and analyzed mortality tables which showed the ages at which people died. From there, it could be estimated the probability that a person would be alive at a certain future date. This process led to the first life-insurance company which was established in 1699.*



1. **Independent Events**

This is when multiple events are happening independent of each other and the results of one event will not affect the results of the other event.

Consider: A coin and a die are tossed at the same time. The result of the coin toss will be A and the result of the die toss will be B.

1. Fill in the table:

|  |  |  |
| --- | --- | --- |
| $$P(A∩B)$$ | P(A) | P(B) |
| P(a head and a 4) |  |  |
| P(a head and an odd number) |  |  |
| P(a tail and a number >1) |  |  |
| P(a tail and a number <3) |  |  |

1. What is the connection between $P\left(A∩B\right), P\left(A\right), P\left(B\right)?$

Also, **Recall:** $P\left(A∪B\right)= P\left(A\right)+ P\left(B\right)-P(A∩B)$

**Ex 1:** A couple wants to have children. They really want the order to be boy, girl, boy, girl. Determine the probability that:

1. They will be happy with the order b) they will be disappointed with the order.

**Ex 2:** Broughton has 2 copy machines for the teachers to use. On any one day, machine A has an 8% chance of breaking down and machine B has a 12% chance of breaking down. Determine the probability that on any given day both machines will:

1. Break down b) work effectively

**Ex 3:** Suppose a bag contains 3 white marbles and 5 black marbles. A marble is randomly selected, its color noted, and then put back into the bag. A second marble is then selected. What is the probability that the second marble is black?

**Ex 4**: When two coins are tossed, A is the event “getting 2 heads”. When a die is rolled, B is the event, “getting a 5 or 6”. Prove that A and B are independent events. \*\* *Stress the importance of using the formula*

**Ex 6:** Given that $P\left(A\right)=\frac{1}{2}, P\left(B\right)=\frac{1}{3}, and P\left(A∪B\right)=p$, find p if:

1. A and B are mutually exclusive \*\* *What makes things mutually exclusive?? – show on a VENN*
2. A and B are independent

**Ex 8:** U = {1, 2, 3, …, 10}, A = {2, 5, 9}, B = {1, 4, 5, 7}

A number is randomly chosen from U. Find the probability that:

1. It belongs to A
2. it belongs to A and B
3. it belongs to neither A nor B

**Ex 9:** If $P\left(C∪D\right)=\frac{5}{6}, P\left(C\right)=\frac{2}{5} and P\left(D\right)=\frac{3}{4}, find P\left(C∩D\right).$

**Ex 10:** If $P\left(A\right)=0.6, P\left(A∪B\right)=0.7, and P\left(A∩B\right)=0.3, find P\left(B\right).$

**Ex 11:**  If $P\left(A∪B^{'}\right)=0.72 and P\left(B\right)=0.43, find P\left(A∩B\right).$

IB Math SL Homework unit 5, Day 4 Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_









