**Notes:** Binomial Distribution

### **Four conditions: (learn off by heart)**

1. **There are two possible outcomes for each trial/event (“success/failure”)**
2. **Trials are independent (the result of one trial doesn’t affect the result of any other one).**
3. **The probability of each outcome is fixed.**
4. **The number of trials is known/given.**

## **Parameters:**

**n=number of trials, p=probability of “success”**

**In a Binomial Distribution with number of trials, n, and probability of “success”, p, the probability that an event will occur x out of n times is given by:**



**P(X=*x*)=nCx px(1-p)n-x Or**

**P(X=*x*)= px (1-p)n-x**

***Where***



<https://www.youtube.com/watch?v=NaDZ0zVTyXQ>

**Example : A set of 3 coins is tossed 8 times.   
What is the probability that the outcome TTT occurs exactly 3 times:**



1. **At least once**



1. **More than 3 times**

1. **Less than 3 times**

**Example 2: a duck shooter has a probability of 0.4 of hitting any duck that he shoots during a morning.   
In a morning where fires 10 shots, find the probability that he:**

1. **Hits exactly 10 ducks.**
2. **Hits exactly 6 ducks.**
3. **Hits more ducks than he misses.**

Example 3: In an examination where 75% of the students are known to pass, 10 students’ scripts are selected at random and marked. Find the probability that:



* 1. Only 3 pass.
  2. No more than 6 pass.
  3. If a 2nd sample of 6 students’ scripts are selected at random and marked. Find the probability that at least one student passed from EACH sample.