PROBABILITY: Events WITH Replacement

*When an item is chosen from a group and it IS REPLACED before the next item is chosen, there is THE SAME number of items in the jar in TOTAL. It is like starting over each time with the same amount of each item in the jar. Form a fraction for the probability of the first choice and then **multiply** by the fraction for the probability of the second choice. Ensure that the DENOMINATOR of the second fraction is **the same** as the first. When a third item is taken with replacement, the total stays the same and so on.*

*Eg. There are 8 white, 7 orange and 5 black marbles in a jar. What is the probability that, if two marbles are chosen at random with replacement, that they will be: **black then orange?***

There are 8 + 7 + 5 = 20 marbles in total.

- Before a black marble is chosen, there are 5 in the jar out of a total of 20. *Form that fraction.*
- After a marble is chosen AND REPLACED, there are 7 orange marbles in the jar and 20 marbles in ***total***. *Form the second fraction.* Multiply the two fractions.

P(black, orange) = $\frac{black}{total} \times \frac{blue}{total-1} = \frac{5}{20} \times \frac{7}{20} = \frac{7}{80} \approx 0.0875$

1. A jar consists of 20 candies. 12 are red and 8 are blue. David picked a sweet at random, replaced it and picked again. Find the probability that:

i) _____ both are red
ii) _____ the first is red and the second is blue
iii) _____ both are blue
iv) _____ the first is blue and the second is red
v) _____ both are different
vi) _____ neither are red

2. A bag contains 8 balls - 3 are blue and 5 are yellow. 2 balls are picked at random from the bag. The first ball is replaced before the second is picked. Calculate the probability that the balls chosen are:

i) _____ the same colour
ii) _____ different colours
iii) _____ not blue
iv) _____ red then blue
v) _____ not yellow
vi) _____ blue then yellow

3. I have a bag with 8 toffees, 4 white chocolates and 6 caramels. I pick one at random, replace it and then choose another. What is the probability I will pick:

i) _____ A toffee, then a caramel
ii) _____ Two caramels
iii) _____ A white chocolate, then a toffee
iv) _____ Different flavours

4. One ball is picked from a bag containing 2 blue, 3 pink, and 4 orange. What is the probability that you pick:

i) _____ A blue ball, then a pink ball
ii) _____ An orange ball, then a blue ball
iii) _____ Two orange balls
iv) _____ Two of the same colour
v) _____ Different colours
vi) _____ A pink ball, then an orange ball
vii) _____ A blue ball AND a pink ball
viii) _____ A orange ball AND a blue ball

5. A playing card is drawn from the pack of 52 cards. It is replaced, the pack shuffled and another card selected. What is the probability that:

i) _____ The two cards are both red cards
ii) _____ The two cards are both diamonds
iii) _____ The two cards are both Kings
iv) _____The two cards are both black Aces
v) _____ A red card then a King were chosen