Counting

***Exercise* 1**:

An urn contains four green balls numbered from 0 *to* 3, *six blue balls numbered from* 1 *to* 6 *and two red balls numbered* 1 *and* 2. *We draw randomly and* ***successively*** *three balls* ***without replacement*** *from the urn. What is the possible number of drawings*?

Find the number of drawings in each of the following cases:

1) *drawing three green balls*
2) *drawing three blue balls*
3) *drawing three red balls*
4) *drawing three balls that are of the same color*
5) *three balls that are of different colors*
6) *drawing three balls that are not of the same color .*
7) *only two of the drawn balls have the same color .*
8) *among the three drawn balls only two balls are green .*
9) *among the three drawn balls only one ball is red .*
10) *drawing three non green balls .*
11) *among the three drawn balls there is at least one green ball .*
12) *among the three drawn balls there is at least two blue balls .*
13) *among the three drawn balls there is at most two green balls .*
14) *among the three drawn balls there is at most three red balls .*
15) *the first ball is red , the second is blue and the third is green .*
16) *drawing a red ball , a blue ball and a green ball .*
17) *drawing a green ball , a green ball and a blue ball in this order .*
18) *the third drawn ball is red.*
19) *the third drawn ball is the only red ball .*
20) *the second drawn ball is not blue .*
21) *the first drawn ball is blue .*
22) *the first drawn ball is the only blue ball*
23) *the first two drawn balls are green but the third is not .*
24) *the first ball is green and the last ball is red .*
25) *drawing two red balls followed by a non red ball .*
26) *the first ball is numbered* 3 , *the second is numbered* 2 *and the third is numbered* 6 .
27) *only two of the drawn balls hold an odd number .*
28) *among the three drawn balls only two hold the number* 1 .
29) *the product of the numbers appearing on the three drawn balls is* 0 .
30) *the sum of the numbers appearing on the three drawn balls is* 3 .
31) *the sum of the numbers appearing on the three drawn balls is* 15 .
32) *the sum of the numbers appearing on the three drawn balls is greater than* 15 .
33) *the three drawn balls are blue and even .*
34) *the three drawn balls are either blue or even .*
35) *the three drawn balls are neither even nor blue .*
36) *the three drawn balls are even or odd*

Exercise 2:

An urn contains 7 *balls* : 3 *are red* , 2 *are white and* 2 *are black* .

The red balls are numbered 1 , 2 *and* 3 , *the white balls are numbered* 4 *and* 5 , *and the black balls are numbered* 6 *and* 7 . *We draw* ***<u>with replacement</u>*** *and* ***<u>successively</u>*** *three balls from the urn* .

In how many ways can this be done?

In how many ways can the following conditions happen?

1) *draw three red balls* .
2) *draw three white balls* .
3) *draw three black balls* .
4) *draw three balls that are of the same color* .
5) *draw three balls that are of different colors* .
6) *draw three balls that are not of the same color* .
7) *only two of the drawn balls have the same color* .
8) *among the three drawn balls only two balls are white* .
9) *among the three drawn balls only one ball is red* .
10) *none of the drawn balls are red* .
11) *among the three drawn balls there is at least one white ball* .
12) *among the three drawn balls there is at least two red balls* .
13) *among the three drawn balls there is at most two red balls* .
14) *among the three drawn balls there is at most three red balls* .
15) *the first ball is red , the second is black and the third is white* .
16) *draw a red ball , a black ball and a white ball* .
17) *the third drawn ball is red* .
18) *the third drawn ball is the only red ball* .
19) *the second drawn ball is not black* .
20) *the first drawn ball is black* .
21) *the first drawn ball is the only blue ball* .
22) *the first two drawn balls are white but the third is not* .
23) *the first ball is white and the last ball is red* .
24) *draw two red balls followed by a non red ball* .
25) *the first ball is numbered* 3 , *the second is numbered* 2 *and the third is numbered* 6 .
26) *only two of the drawn balls hold an odd number* .
27) *among the three drawn balls only two hold the number* 1 .
28) *the product of the numbers appearing on the three drawn balls is* 0 .
29) *the product of the numbers appearing on the three drawn balls is not* 0 .
30) *the sum of the numbers appearing on the three drawn balls is* 3 .
31) *the sum of the numbers appearing on the three drawn balls is* 6 .
32) *the sum of the numbers appearing on the three drawn balls is greater than* 20

***Exercise* 3**: *An urn contains* 6 *red* , 5 *white* , 4 *blue and* 3 *yellow balls* .
We draw randomly and ***simultaneously*** *four balls from the urn* .
What is the total number of drawings?
Find the number of drawings in each of the following cases:
1) *drawing four red balls* .
2) *drawing four blue balls* .
3) *drawing four yellow balls* .
4) *drawing four balls that are of the same color* .
5) *drawing four balls that are of different colors* .
6) *drawing four balls that are not of the same color* .
7) *only two of the drawn balls have the same color* .
8) *among the four drawn balls only two balls are yellow* .
9) *among the four drawn balls only one ball is red* .
10) *no yellow ball is drawn* .
11) *among the four drawn balls there is at least one yellow ball* .
12) *among the four drawn balls there is at least two blue balls* .
13) *among the four drawn balls there is at most two white balls* .
14) *among the four drawn balls there is at most four red balls* .
15) *the four drawn balls are red knowing that they are not yellow*

***Exercise* 4** : *A jeweler has in his safe* 30 *identical boxes each containing either a necklace or a watch or a bracelet, made of either gold or platinum. These articles are distributed as shown in the following table* :

	Necklace	*Watch*	*Bracelet*
Platinum	5	2	6
Gold	3	6	8

Part A : *A customer wants to buy* 3 *gifts* . *Suppose that he selects simultaneously* 3 *boxes from this safe* . *In how many ways can this be done*?
Find the number of ways in each of the following cases:
1) *this client obtains three golden jewels* ?
2) *this client obtains two golden jewels and one platinum jewel* ?
3) *this client obtains two bracelets and one necklace* ?
4) *this client obtains a golden necklace , a platinum watch and a golden bracelet* ?
5) *this client obtains at least one golden jewel* ?
6) *this client obtains at most two platinum jewels* ?
7) *this client obtains only one golden necklace* ?
Part B: *Another client wants to buy* 3 *gifts* . *Suppose that he selects successively and without replacement* 3 *boxes* .
In how many ways can this be done?
In how many ways can
1) *this client obtains two bracelets and a necklace in this order* ?
2) *this client obtains a golden necklace and two platinum bracelets* ?
3) *mthis client obtains a golden necklace , a platinum watch and a golden bracelet* ?
4) *this client does not obtain any golden jewels* ?
5) *this client obtains at least one golden jewel* ?
6) *this client obtains at most three golden jewels* ?
7) *this client obtains only one golden necklace* ?