Exercise 7.3

1. **How many arrangements of the letters of the following words, taken all together can be made.**

i. **The word PAKPATAN contain letters = 9 letters**

Solution:

P comes = 2 times

A comes = 3 times

K comes = 1 times

T comes = 2 times

N comes = 1 times

So, the total number of words $= \frac{9!}{2!3!1!2!1!}$

$= \frac{9\times8\times7\times6\times5\times4\times3\times2\times1}{2\times1\times3\times2\times1\times1\times2\times1\times1}$

$= 1520$

Hence, the total number of words $= 1520$

ii. **The word PAKISTAN contain letters = 8 letters**

Solution:

P comes = 1 times

A comes = 2 times

K comes = 1 times

I comes = 1 times

S comes = 1 times

T comes = 1 times

N comes = 1 times

So, the total number of words $= \frac{8!}{1!2!1!1!1!1!1!}$

$= \frac{8\times7\times6\times5\times4\times3\times2\times1}{1\times2\times1\times1\times1\times1\times1}$

$= 20160$

Hence, the total number of words $= 20160$

iii. **The word MATHEMATICS contain letters = 11 letters**

Solution:

M comes = 2 times

A comes = 2 times

T comes = 2 times

H comes = 1 times

E comes = 1 times

T comes = 1 times

I comes = 1 times

C comes = 1 times

S comes = 1 times

So, the total number of words $= \frac{11!}{2!2!!2!1!1!1!1!1!}$

$= \frac{11\times10\times9\times8\times7\times6\times5\times4\times3\times2\times1}{2\times1\times2\times1\times2\times1\times1\times1\times1\times1}$

$= 4989600$

Hence, the total number of words $= 4989600$

iv. **The word ASSASSINATION contains letters = 11 letters**

Solution:

A comes = 3 times

S comes = 4 times

I comes = 2 times

N comes = 2 times

T comes = 1 times

O comes = 1 times

So, the total number of words $= \frac{11!}{3!4!2!2!1!1!1!}$

$= \frac{11\times10\times9\times8\times7\times6\times5\times4\times3\times2\times1}{3\times2\times1\times4\times3\times2\times1\times2\times1\times2\times1\times1\times1}$

$= 10810800$

Hence, the total number of words = 10810800

2. **How many permutations of the letters of the word PANAMA can be made, if P is to be the first letter in each arrangement**

Solution:

Let the arrangements of the letter

P *****.

Now the PANAMA contain letters = 8

If P is the fix then letter = 6

A comes = 3 times

M comes = 1 times

N comes = 1 times

So, the total number of words $= \frac{5!}{3!1!1!1!}$

$= \frac{5\times4\ 3!}{3!}$

Hence, the total number of words formed $= 20$ words

3. How many arrangements of the letters of the word ATTACKED can be made, if each arrangement begins with C and ends with K?

Solution:

Let the arrangements of the letter

C ****** K.

Now the ATTACKED contain letters $= 8$

If C and K are fixed $= 6$

A comes $= 3$ times

D comes $= 4$ times

E comes $= 2$ times

T comes $= 2$ times

So, the total number of words $= \frac{6!}{2!1!1!2!}$

$= \frac{6\times5\times4\times3\times2\times1}{2\times1\times1\times1\times2\times1}$

$= \frac{720}{2\times2} = 180$

Hence, the total number of words formed $= 180$

4. How many numbers greater than 1000,000 can be formed from the digits 0, 2, 2, 2, 3, 4, 4?

Solution:

No. of digits = 0 = 1

No. of digits = 2 = 3

No. of digits = 3 = 1

No. of digits = 4 = 2

Let the integer be

3 ******

$$= \frac{6!}{1!3!1!2!}$$

$$= \frac{6\times5\times4\times3!}{1\times1\times1\times2\times3} = \frac{6\times5\times4}{2}$$

$$= \frac{720}{2\times2} = 180$$

Let the integer be

4 ******

$$= \frac{6!}{1!3!1!1!}$$

$$= \frac{6\times5\times4\times3!}{1\times1\times1\times3!}$$

$$= 6 \times 5 \times 4 = 120$$

So, the integer $= 180 + 60 + 120 = 360$

Hence, the integer greater than 1000,000 can be formed $= 360$

5. How many 6- digit numbers can be formed from the digits 2, 2, 3, 3, 4, 4? How many of them will be between 400,000 and 430,000?

Solution:

No. of digits = 2 = 2

No. of digits = 3 = 2

No. of digits = 4 = 2

$$= \frac{6!}{2!2!2!}$$

$$= \frac{6\times5\times4\times3\times2\times1}{2\times1\times2\times1\times2\times1} = \frac{6\times5\times3}{2}$$

$$= 90$$

Fix 42at the left position.

So, the number

42 ****

Thus, number formed $= \frac{4!}{1!2!1!1!}$

$$= \frac{4\times3\times2!}{1\times1\times2!}$$

$$= 4\times3 = 12$$

6. **11 members of a club from 4 committees of 3, 4, 2, 2 members so that no member is a member of more than one committee. Find the number of committees.**

Solution:

Total numbers of members $= 11$

Thus, the required arrangements $= \frac{11!}{3!4!2!2!}$

$$= \frac{11\times10\times9\times8\times7\times6\times5\times4!}{3\times2\times1\times2\times1\times2\times1\times4!}$$

$$= 69300$$

Hence, the number of committees formed = 69300

7. **The D.C.Os of 11 distance meet to discuss the law and order situation in their district. In how many ways can they be seated a round table, when two particular D.C.Os insists on sitting together?**

Solution:

Total D.C.Os = 11

We take two D.C.Os as same = 10

So, the no of D.C.S.Os = 10

D.C.O's occupy their seats = 2!

Total no. of ways = $9! \times 2!$

$= 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 \times 2 \times 1$

$= 755760$

8. **The governor of the Punjab calls a meeting of 12 officers. In how many ways can they be seated at a round table?**

Solution:

Total number of officers = 12

These officers can be seat together = $(12 - 1)!$

$= 11!$

$= 11 \times 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$

$= 39916800$ ways

9. **Fatima invites 14 people to a dinner. There are 9 males and 5 females how are they seated at two different tables so that guests of one sex sit at one round table and the guests of other sex at the second table. Find the number of ways in which all guests are seated.**

Solution:

9 males can be seat together $= (9 - 1)!$ ways

$= 8!$

5 males can be seat together $= (5-1)!$ ways

$= 4!$

Both males and females can be set together

$= 8! \times 4!$

$= 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 \times 4 \times 3 \times 2 \times 1$

$= 967680$ ways.

Hence, all guests are seated in = 967680 ways.

10. Find the number of ways in which 5 men and 5 women can be seated at a round table in such a way that no two persons of the same sex sit together.

Solution:

5 men seated = (5-1)! = 4! Ways

5 women seated = (5-1)! = 4! Ways

They can seated together = 5× 4! × 4!

$= 5 \times 4 \times 3 \times 2 \times 1 \times 4 \times 3 \times 2 \times 1$

= 2880

Hence, they can sit together = 2880 ways

11. In how many ways can 4 keys be arranged on a circular key ring?

Solution:

No. of keys = 4

They can arrange either clockwise or anti clock ways

$= \frac{1}{2}(4-1)!$

$$= \frac{1}{2} \times 5 \times 4 \times 3 \times 2 \times 1$$

$$= 60 \text{ ways.}$$

Hence, the beads of different colour can be arranged

$$= 60 \textit{ ways.}$$

12. How many necklaces can be made from 6 beads of different colors?

Solution:

No. of beads = 6 beads

They either arrange clockwise or anti-clockwise

$$= 1/2 \times 5!$$

$$= 1/2 \times 5 \times 4 \times 3 \times 2 \times 1$$

$$= 60 \text{ ways}$$

Hence, the beads of different color can be arranged

$$= 60 \text{ ways}$$