

CCT Weekly Practice (Mathematics)

Unit:- Count the ways - I

Shalabh and his family of three – Anjali, son Mohit and daughter Kuhu are excited to take the first ride in the new car!

There are *five* seats in the car, two in front and three at the back.



Shalabh is sitting at the driver's seat, waiting for the family. Kuhu, the youngest child of the family hops into the car and takes a seat at the back of the car.

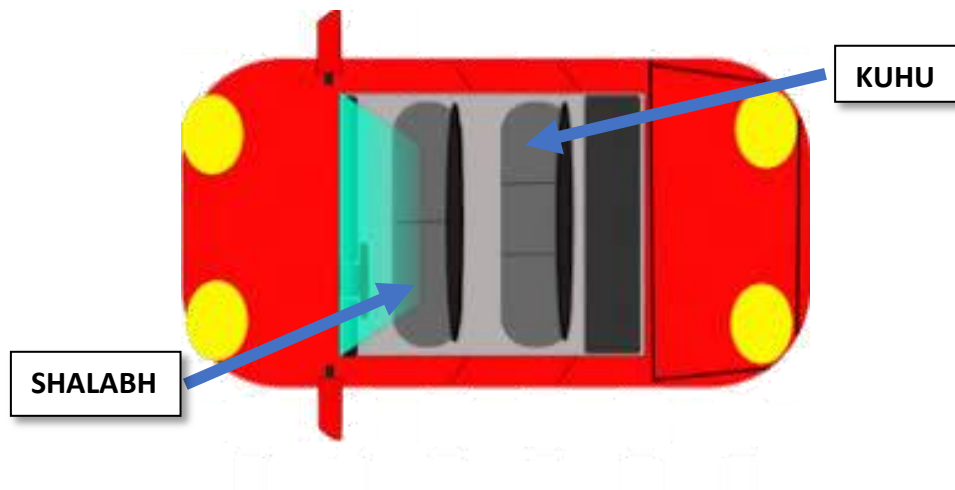
How many seats are vacant now?

Yes, three!

How many more people are yet to take a seat in the car?

Two!

This means that Anjali and Mohit get to sit in any of the three vacant seats.



In how many ways can they be seated in the three vacant seats?

Let us find out...

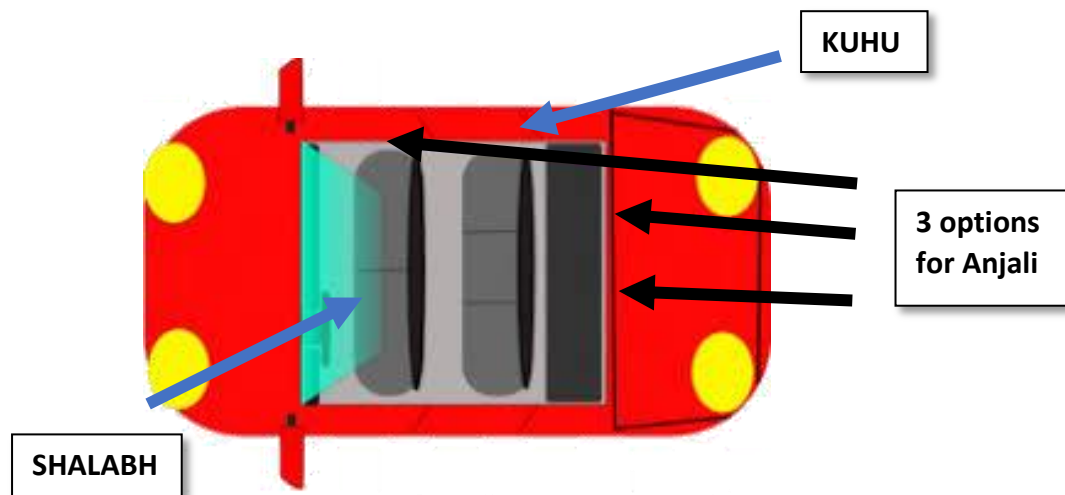
Fundamental Counting Principle of Multiplication says; if one event can occur in m number of ways followed by a second event, that can occur in n number of ways.

Then, the two events taken together can be performed in $m \times n$ ways.

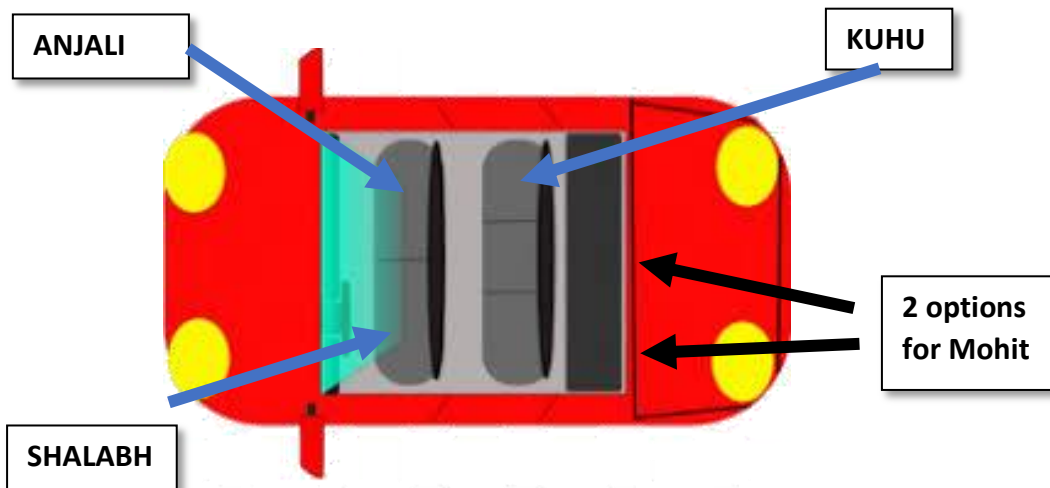
This concept can be extended to any *finite* number of events to occur together.

Let Anjali take one of the vacant seats in the car.

⇒ Total number of ways for Anjali to take a seat = **3 ways**



In how many ways can Mohit take a seat in the car now that Anjali is seated?



There are two vacant seats available for Mohit to choose from.

⇒ Total number of ways for Mohit to take a seat = **2 ways**

Therefore, according to the Fundamental Principle of Counting, the total number of ways Anjali and Mohit to sit in the car = $3 \times 2 = \mathbf{6 \text{ ways}}$

Question 1: Mohit is taking a MCQ class test consisting of five questions. Each question has two choices – True or False. What is the total number of ways Mohit can answer all five questions (irrespective of Correct or Incorrect answer)?

- a) 6 ways
- b) 32 ways
- c) 16 ways
- d) 8 ways

Question 2: Anna goes to the shop to purchase a scale, a pencil and a notebook. The shopkeeper shows her three types of scales, two types of pencils and five types of notebooks. In how many different ways can she make her purchase?

- a) 9 ways
- b) 12 ways
- c) 3 ways
- d) 30 ways

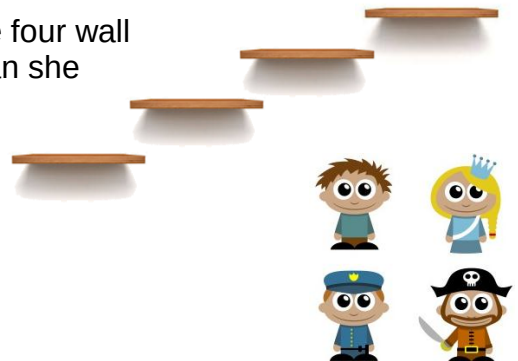
Question 3: In an award ceremony, the teacher In-charge has arranged 4 award trophies on the table. School Head boy, Rohit rushes past the trophy table and accidentally knocks down 2 trophies from the table. Seeing the teacher busy with another student, he quickly picks up one trophy at a time and places it back on the table. Can you find out the total number of ways Rohit can pick up the two trophies from the floor?



- a) 4 ways
- b) 1 way
- c) 2 ways
- d) 3 ways

Question 4: Zeba wants to place her four dolls on the four wall shelves, one doll on each shelf. In how many ways can she arrange all the dolls?

- a) 24 ways
- b) 256 ways
- c) 16 ways
- d) 12 ways



Question 5: On Zeba's birthday, her uncle gifts her two new dolls. In how many ways can Zeba arrange all her dolls on 6 shelves, placing one doll on each shelf?

- a) 720 ways
- b) 30 ways
- c) 360 ways
- d) 6 ways

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ANSWER KEY

Answer 1:

No. of ways to answer Qus1	No. of ways to answer Qus2	No. of ways to answer Qus3	No. of ways to answer Qus4	No. of ways to answer Qus5	No. of ways to answer all five Qus.	Answer (Option)
True/False = 2 ways	True/False = 2 ways	True/False = 2 ways	True/False = 2 ways	True/False = 2ways	$2 \times 2 \times 2 \times 2 \times 2$ = 32 ways	(b)

Answer 2 :

No. of options for buying a scale	No. of options for buying a pencil	No. of options for buying a notebook	No. of ways to buy a scale, a pencil and a notebook	Answer (Option)
3 ways	2 ways	5 ways	$3 \times 2 \times 5$ = 30 ways	(d)

Answer 3 :

Fill up the table below to find your answer

No. of ways Rohit picks up the first trophy from the floor	No. of ways Rohit picks up the second trophy from the floor	Total no. of ways Rohit picks up the two trophies from the floor	Answer (Option)
= 2 ways Since there are two trophies on the floor	= 1 way Since there is one trophy on the floor	$2 \times 1 = 2$ ways	(c)

Answer 4:

As Zeba has 4 dolls and 4 shelves, therefore to place one doll on each shelf -

No. of ways Zeba can place the first doll	No. of ways Zeba can place the second doll	No. of ways Zeba can place the third doll	No. of ways Zeba can place the fourth doll	Total no. of ways Zeba can place all the dolls	Answer (Option)
4 ways	3 ways	2 ways	1 way	$4 \times 3 \times 2 \times 1$ = 24 ways	(a)

Answer 5:

As Zeba has 6 dolls and 6 shelves, therefore to place one doll on each shelf -

Number of ways Zeba can arrange the first doll	Number of ways Zeba can arrange the second doll	Number of ways Zeba can arrange the third doll	Number of ways Zeba can arrange the fourth doll	Number of ways Zeba can arrange the fifth doll	Number of ways Zeba can arrange the sixth doll	Total number of ways Zeba can arrange four dolls	Answer (Option)
6 ways	5 ways	4ways	3way	2 ways	1 way	$6 \times 5 \times 4 \times 3 \times 2 \times 1$ = 720 ways	(a)

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