

Permutations 2-45

Suppose that we have the grid shown below. We want to find the number of paths moving right (R) or down (D) from point A to point B. We can solve the problem in two ways. We can use the permutation formula (fast) or we can count the number of pathways to each node (intersection).

Example:

Use both methods to find the number of paths from A to B.

A	1	1	1	1
			P	
1	2	3	4	5
		Q	R	
1	3	6	10	15
1	4	10	20	35
			B	

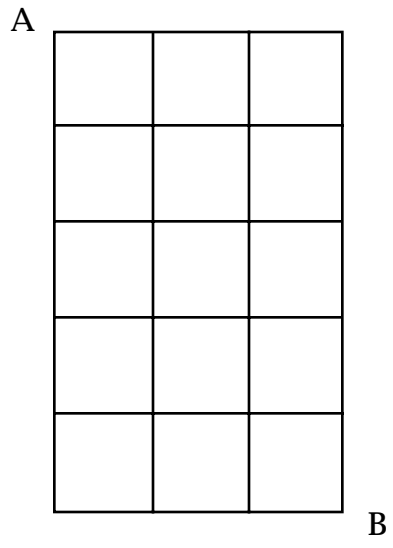
We can calculate the number of paths to each node. The number of paths is equal to the sum of the number of paths to the two nodes above and to the left ($R = P + Q$). We find that the number of paths from A to B is 35. We could also use the permutation formula. Number of paths = $7!/(4! \times 3!) = 35$.

Problems: Find the number of paths from A to B using the two methods shown above.

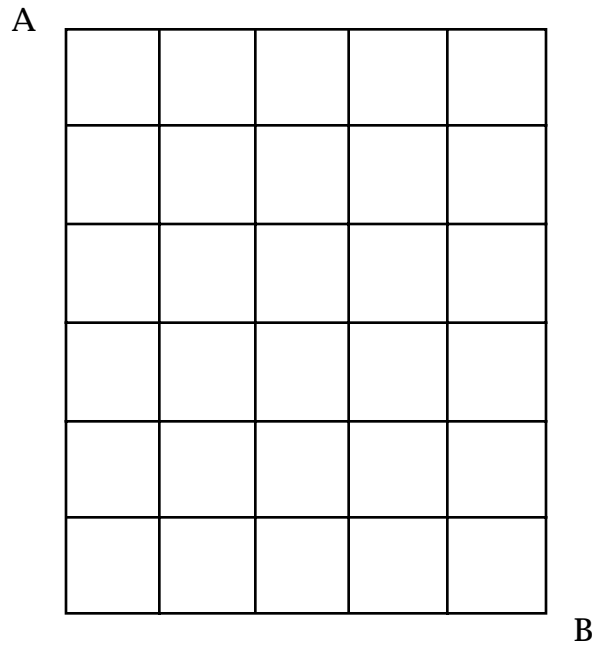
1)

A				
			B	

2)

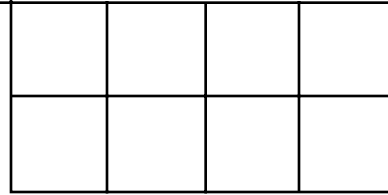
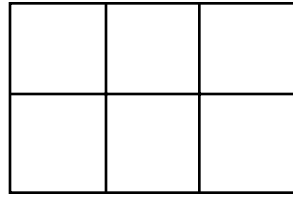


3)



4)

A



B

Answers: 1) $6!/(2! \times 4!) = 15$, 2) $8!/(3! \times 5!) = 56$, 3) $11!/(5! \times 6!) = 462$, 4) $(5!/(2! \times 3!)) \times (6!/(2! \times 4!)) = 150$.