Pick a point, add points coming to it.

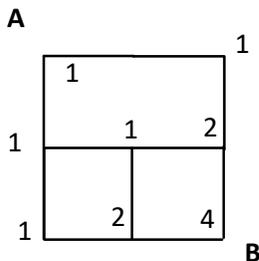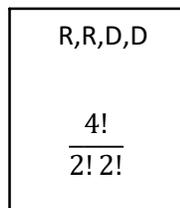**Paths in squares formula:** $\dfrac{(l + w)!}{l!\,w!}$

A 1 → 1

1 ↓   ↓

1   2 **B** →
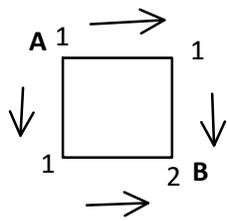
Add numbers coming to it.

How many different paths can you follow from A to B if you only move down or to the right?

A   1   1
1
2
1   3
6
1   3   **B**
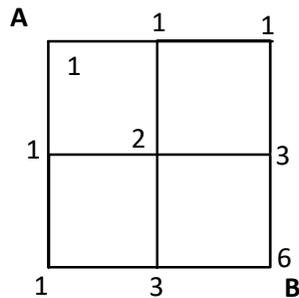
$$\frac{(2 + 2)!}{2!\,2!} = \frac{4!}{2!\,2!} = \frac{(4 \times 3 \times 2!)}{2!\,2!} = \frac{4 \times 3}{2 \times 1} = \frac{12}{2} = 6$$

R,R,D,D

$$\frac{4!}{2!\,2!}$$

A
1
1
1   2
1
2   4
B

You want to ask yourself, how many lines are coming towards that point from the direction they can come and add the numbers.

A
1   1   1
2
1   3
3   6   6   6
6   12   18
6   18   36
B
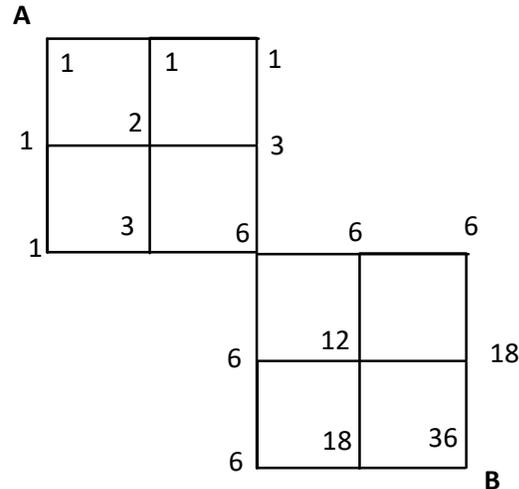
We can only use these formulas if they are perfect rectangles or squares. No Gaps

$$\frac{(2 + 2)!}{2!\,2!} \times \frac{(2 + 2)!}{2!\,2!} = 6 \times 6 = 36$$

How many ways can you get from one comer of a 3 sided rubix cube to the opposite comer if you never backtrack.

Paths in rectangular prisms formula: $\dfrac{(l + w + h)!}{l!\,w!\,h!}$ $= \dfrac{(3 + 3 + 3)!}{3!\,3!\,3!} = \dfrac{9!}{216} = 1680$