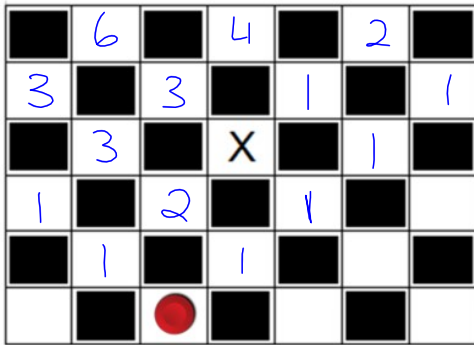


# Unit 5 - Condensed

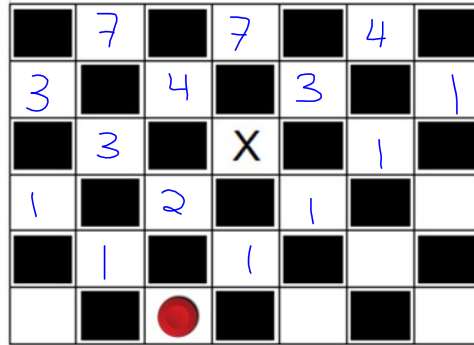
## EXAMPLE: CHECKERS

Checker pieces can only move diagonally upwards. Determine the number of paths to the top row if:

a) It cannot move through a square containing an X *12 paths*

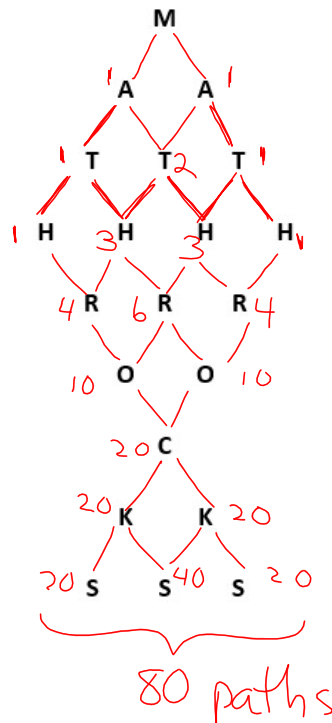


b) It can jump diagonally over a square containing an X *18 paths*



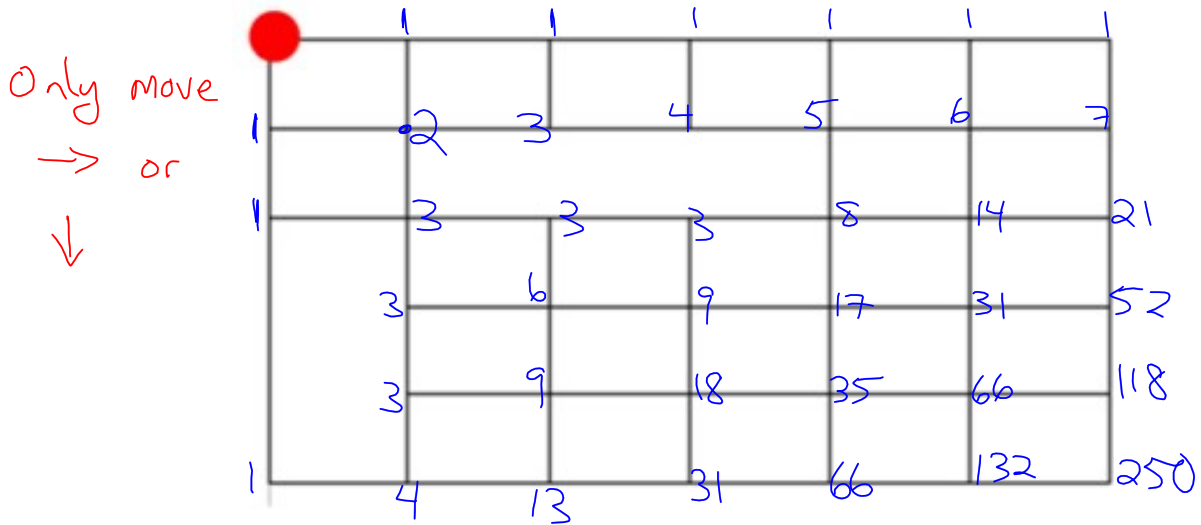
## EXAMPLE: COUNTING PATHWAYS

Determine the number of pathways that can be used to spell: MathRocks

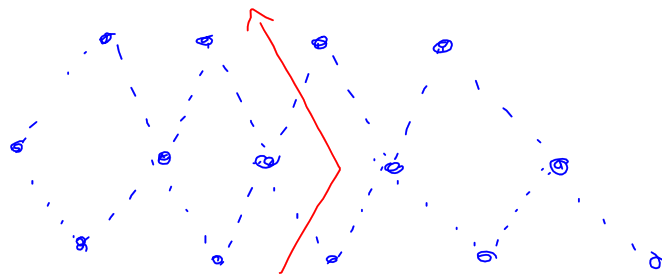


EXAMPLE: MANY WAYS HOME

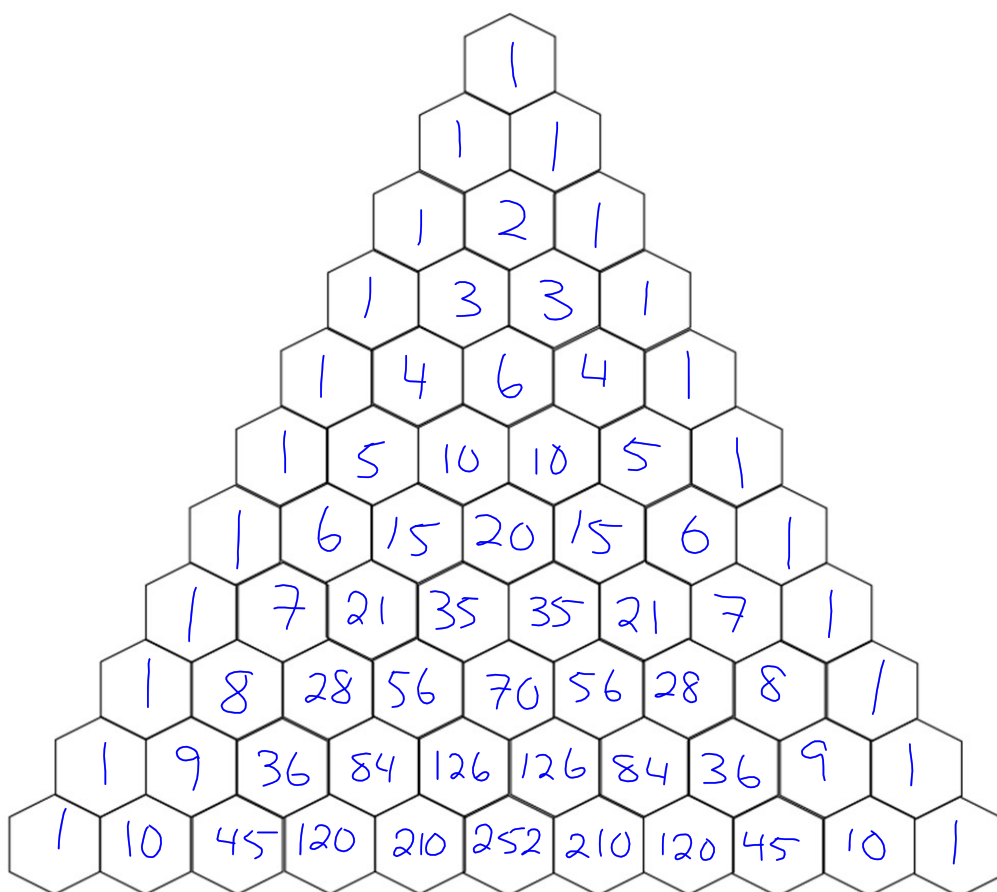
Calculate how many different routes you could take to travel from the top left corner to the bottom right corner.



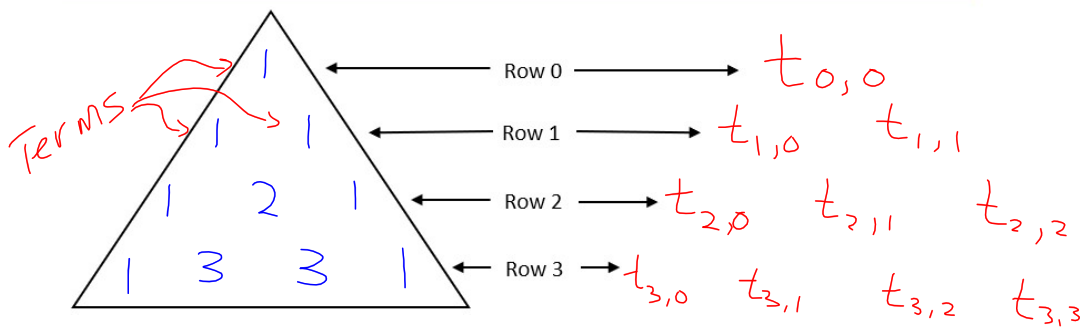
PLINKO



# PASCAL'S TRIANGLE



PASCAL'S TRIANGLE



**Key Characteristics of Pascal's Triangle:**

1. 1<sup>st</sup> and last term of each row is always 1
2.  $t_{n,r}$  refers to the term in row  $n$  and position  $r$  (starting at 0)
3. Each term is the sum of the two terms directly above it (see below equation)

$$t_{n,r} = t_{n-1,r-1} + t_{n-1,r}$$

The terms in Pascal's triangle directly correspond to calculations of combinations. In general:

$$t_{n,r} = {}_n C_r = \frac{n!}{(n-r)!r!}$$

**EXAMPLE 1: ROW CALCULATIONS**

For each of the following, complete the missing component of the equation:

a)  $t_{4,2} = \binom{4}{2} = 6$

b)  $t_{10,2} = \binom{10}{2} = 45$

c)  $t_{15,8} = \binom{15}{8} = 6435$

d)  $t_{14,4} + t_{14,5} = t_{15,5} = \binom{15}{5} = 3003$

e)  $t_{21,7} - t_{20,7} = t_{20,6} = \binom{20}{6} = 38760$

f)  $t_{15,10} - t_{14,9} = t_{14,10} = \binom{14}{10} = 1001$

**EXAMPLE 2: CALCULATING ANY TERM IN PASCAL'S TRIANGLE**

Determine  $t_{5,2}$  and  $t_{24,9}$  (use a different method for each).

$$t_{5,2} = \binom{5}{2} = 10$$

$$t_{24,9} = t_{23,8} + t_{23,9} = \binom{23}{8} + \binom{23}{9} = 1307504$$

Practice from your book

Chapter 5:

pg. 10 # 1,2,7

pg. 12 # 2, 3