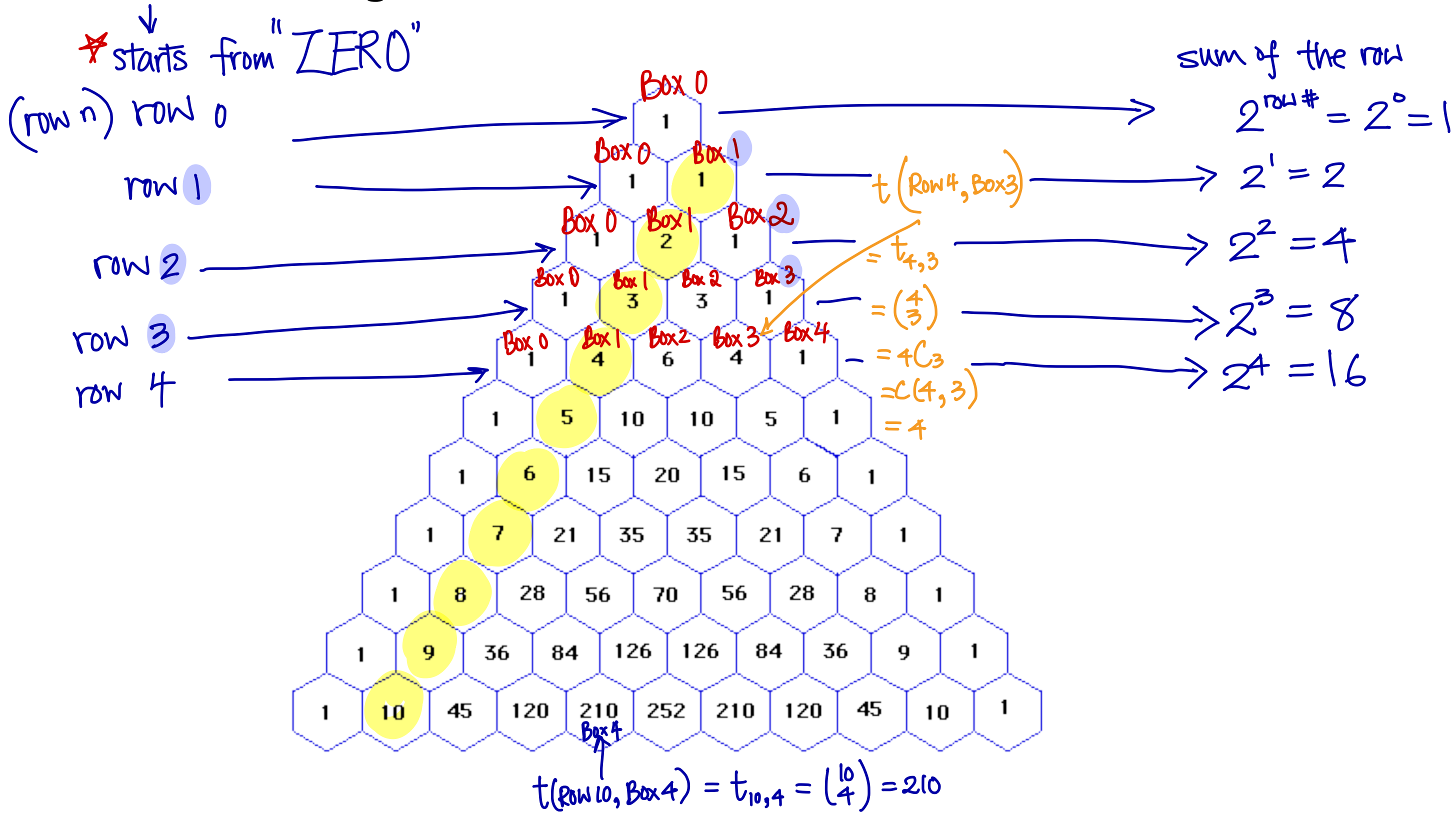
Lesson: Pascal's Triangle



Ex: a) Fill in the blank for row 25 and row 26 of Pascal's triangle below:

1	$25 = \binom{25}{1}$	$t_{25,2} = \binom{25}{2} = 300$	$\binom{25}{3}$ 2 300	12 650	53 130	
1	26	$\binom{26}{2} = 325$	$\binom{26}{3} = 2600$	$\binom{26}{4} = 14950$	$\binom{26}{5} = 65780$	

$\binom{26}{2} = t(\text{row } 26, \text{box } 2) = t_{26,2} = \binom{25}{1} + \binom{25}{2} = t_{25,1} + t_{25,2}$

If $t_{n,r}$ represents the term in row n, position r, then $t_{n,r} = t_{n-1,r-1} + t_{n-1,r}$

$$\boxed{\text{equivalent to } \binom{n}{r} = \binom{n-1}{r} + \binom{n-1}{r-1}}$$

Examples: $t_{6,2} = t_{5,1} + t_{5,2}$

$t_{7,3} = t_{6,2} + t_{6,3}$

$t_{4,1} = t_{3,0} + t_{3,1}$

= combination calculation = answer

b) Use Pascal's method to write a formula for each of the following terms:

$t_{12,5} = \binom{12}{5} = t_{11,4} + t_{11,5} = 792$ ✓

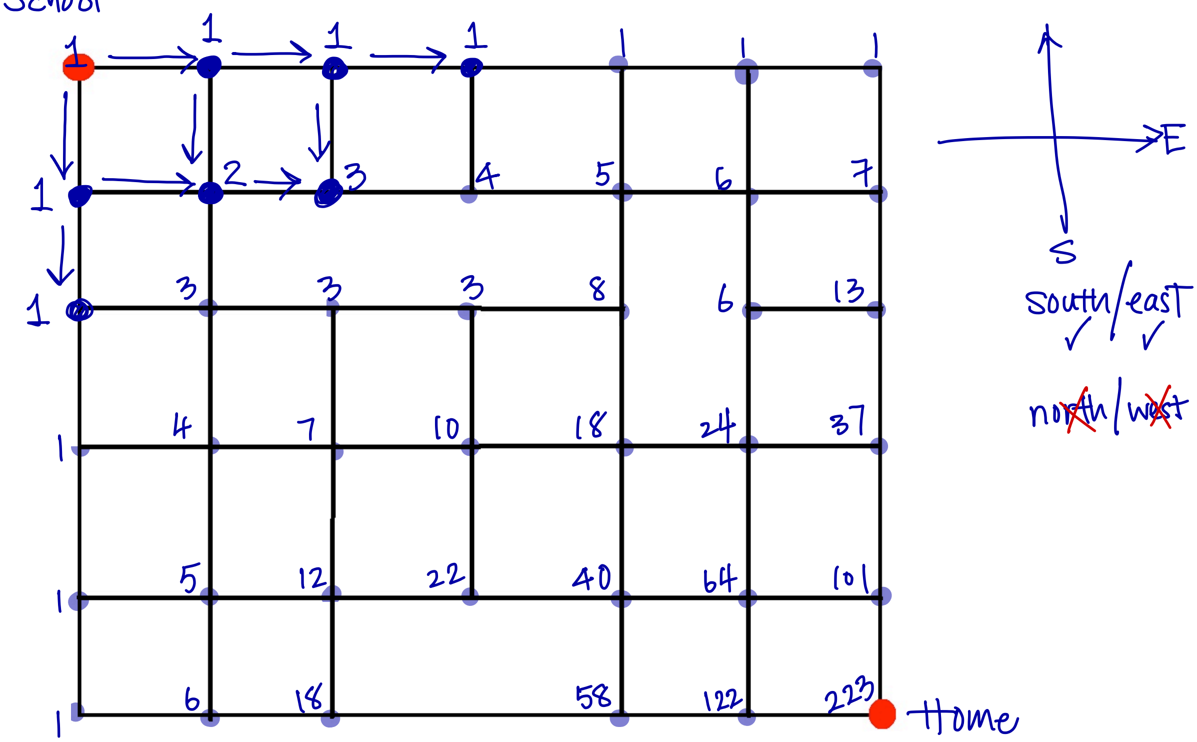
$t_{40,32} = \binom{40}{32} = t_{39,31} + t_{39,32} = 76\ 904\ 685$

$t_{n+1,r+1} = \binom{n+1}{r+1} = t_{(n+1)-1,(r+1)-1} + t_{(n+1)-1,r+1}$

$= t_{n,r} + t_{n,r+1}$ ✓

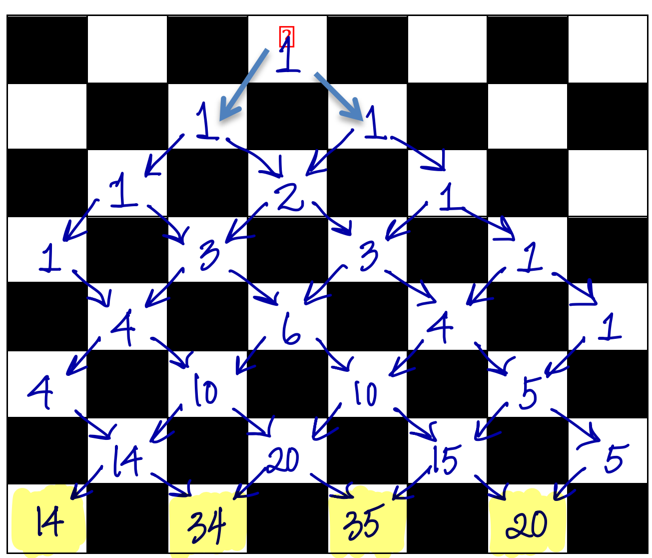
Application of Pascal's Triangle on paths

The iterative process that generates the terms in Pascal's triangle can also be applied to counting paths of route between two points. School



Application of Pascal's Triangle on checkerboard

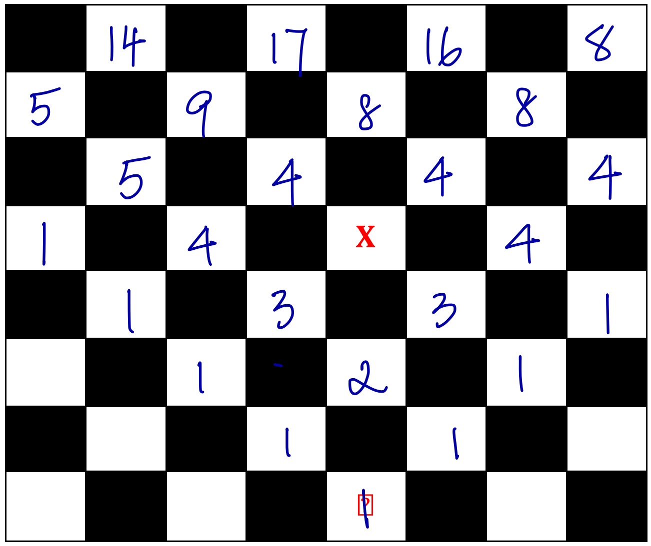
A checker is placed o a game board as shown. Determine the number of paths the checker may take to get to the opposite side of the board if it can move only diagonally forward one square at a time.



14 + 34 + 35 + 20 = 103 ways ✓

Example 2: p. 255.

On the checkerboard shown, the checker can travel only diagonally upward. It cannot move through a square containing an X. Determine the number of paths from the checker's current position to the top of the board.



55 ways

Example 3

A checker is placed on a checkerboard as shown. The checker may move diagonally upward. Although it cannot move into the square with an X, the checker may jump over the X into the diagonally opposite square. Determine the number of paths on the top of the board.

79 ways