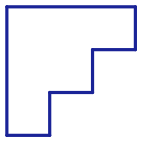
Young Diagrams

Question ①: How many ways can you use 6 squares to make a shape that fits into a NW corner and the # of squares increases bottom to top.

Ex: 

Clarification: This works 

Question ②: How many ways can you add whole numbers to get 6, if we don't care about ordering. Only the numbers used.

Question ③: Do this again for 5, 4.

Question ④: Can you pair the your sums and these "triangle-like" shapes perfectly?

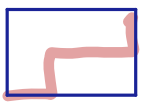
As in for every shape, can you provide exactly one sum?

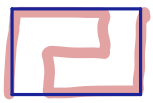
Lattice Paths

→ Let them draw the lattice paths on their own in groups.

→ Count the strings together

Question ①: How many ways can you go from the SW corner to the NE corner of a 2×3 grid, only traveling in N and E "steps."

Ex: 

Non-Ex:  

When we get to "n choose m," return to this exercise. Ask them to count the number of such paths.

Question ②: How long is each of these paths, in number of steps?

(secret followup question. Let them think about this first before divulging: How many of those steps were 1's? 0's?)

Question ③: How many "strings" of 0's and 1's are there, if we require 3 0's and 2 1's?

Clarification: A "string" is a list of 0's and and 1's, such as 01001 or 00110

To make this task somewhat faster, do like 3 examples together, so they only have to come up with 7.

Also consider doing this task as a larger group

Question ④: How long are these strings?

Question ⑤: Can you think of a pairing between paths and strings? Check your answer with a 2×2 grid.

Question ⑥: Make a prediction for 3×4. What would that pairing look like? (DO NOT COUNT)