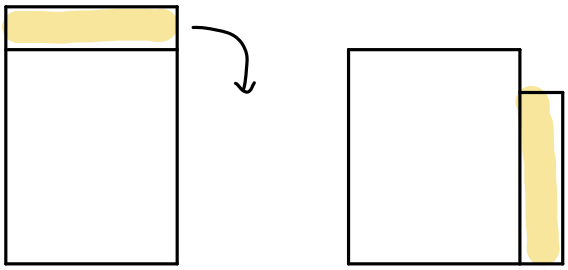
Products to Rectangles

① How would you draw the product 4×6?
How would you draw the product $5^2 - 1$?

② How can you "turn" the picture you have for 4×6 into $5^2 - 1$?

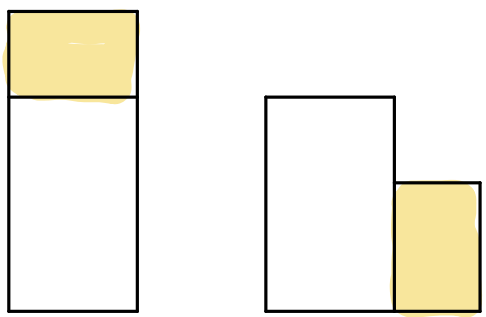


③ Try this out for 3×5 and $4^2 - 1$, 2×4 and $3^2 - 1$.

④ Can you predict what would happen for 50×52 and $51^2 - 1$? USE the PICTURES to make this prediction. DON'T ACTUALLY compute this!

Once they guess, reveal the two numbers.

⑤ Try comparing 3×7 and $5^2 - 4$ using these rectangle pictures. What do you notice?



⑥ Predict and verify 4×8 and $6^2 - 4$,
5×9 and $7^2 - 4$

A Return to Dominoes

① How many ways can you add 2's and 1's (order matters) and get 5?

② Repeat for 4, 3, 2

③ How do the number of sums for 2 and 3 contribute to the number of sums for 4?

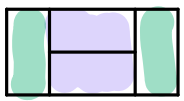
How can we turn a sum that equals 2 or a sum that equals 3 into a sum that equals 4?

1+1 +2 add 2 to a sum for 2

2+1 +1 add 1 to a sum for 3

④ Remember the dominoes!

Find a perfect pairing between domino tilings of a 2×4 grid and sums of 2's and 1's that equals 4.



1 + 2 + 1

1 + 1 + 2

⑤ What can we say about the number of ways to add 2's and 1's to get 377 and the number of domino tilings of a 2×377 grid?