Div 2 — Triangular Numbers

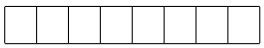
1. Find an expression for the sum of the first n even whole numbers:

$$2 + 4 + 6 + \ldots + 2n$$

(Hint: divide by 2)

2. If a room has 20 people and everyone shakes hands with every other person in the room, how many handshakes are there?

3. Consider a rectangle split into 8 boxes in a row. How many rectangles are there?



(Hint: count the number of rectangles of each size)

4. In a certain movie theater, each row has one more seat than the row in front. The front row has 12 seats, the second row has 13, and so forth, until the 20th row of seats. How many seats are there in total?

5. In an ordinary set of dominoes, each tile consists of two "faces", and each face has anywhere from 0 to 6 dots. No two tiles are the same, but every combination of dots exist. How many tiles are in an ordinary set of dominoes?

6. (*) The math lab has a box of ordinary dominos (each side has from 0 to 6 dots), but it is not a complete set. In fact, there are only 24 tiles in the set. Fortunately, we have an automatic dot counter, which tells us that the total number of dots is 125. Which domino tiles are we missing?