Roma's party

Roma is seating her guests like this:
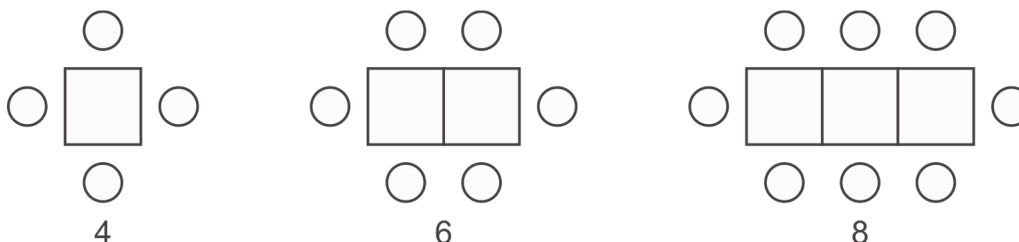
The question is: how do you find the number of tables she will need for a given number of guests?

It might be easier to work out first the maximum of guests that can be seated at a given number of tables. There are several ways of reasoning this out. One is the following:

- For each table, there are two positions that are not eliminated when the tables are put together (the ones at the top and the bottom in the picture above).

- There are also two positions at the ends of the row (the ones at the left and right above). These two positions do not change as the number of tables increases.

- So the number of people is 2 × number of tables + 2.

Now it should be easier to reverse the procedure and find the number of tables from the number of guests. Just answer these questions:

- Two guests can be seated at the ends of the row. How many guests remain to be seated?

- Each pair of the remaining guests can be seated opposite each other at one table (with one at the top and one at the bottom in the above figure). Assuming there is an even number of these guests, how many tables are needed for them?

- So how many tables are needed altogether?

- What do you do if there is an odd number of guests?

If you know algebra,

$$G = 2t + 2 \text{ and } t = \frac{1}{2}(g - 2),$$

where t represents the number of tables, G represents the maximum number of guests that can be seated at this number of tables, and g represents either the number of guests, if this number is even, or one more than the number of guests if it is odd.