Problem 1: Kouji covered a wall with four overlapping rectangular sheets of wallpaper as shown. Each sheet of wallpaper is designed using a different image in a repeating pattern. In what order did Kouji place the wallpaper sheets on the wall?

Solution:
The four wallpaper sheets were placed in the following order, from first to last:

To see why this is true, first observe that the wallpaper with the green star-like squares is the only wallpaper that is entirely visible, so it must have been placed last. It remains to justify the order in which the other three sheets were placed. The wallpaper with the red rounded squares is cut off by the blue spirals, so it must have been placed before the blue spirals. The wallpaper with the yellow pentagons is cut off by the red rounded squares, so it must have been placed before the red rounded squares. In order from first to last, the first three sheets to be placed must have been the yellow pentagons, the red rounded squares, and the blue spirals.

Problem 2: Tanu covered a wall with six overlapping rectangular sheets of wallpaper as shown. Each sheet of wallpaper is designed using a different image in a repeating pattern.

(a) Give possible dimensions for the six sheets of wallpaper Tanu used.
(b) Determine in what order Tanu placed the wallpaper sheets on the wall.

Solution:
(a) Since each sheet is rectangular, we can see enough to determine that four of the sheets have the dimensions shown below:
We cannot be sure of the dimensions of the remaining two sheets. Here are the different possibilities for these sheets:

(b) The wallpaper sheets were placed in the following order, from first to last:

The wallpaper with the blue squares is the only wallpaper that is entirely visible, so it must have been placed last. The wallpaper with the green circles is cut off by the blue squares, so it must have been placed before the blue squares. By similar reasoning, the red hearts were placed before the green circles, the yellow stars were placed before the red hearts, the purple triangles were placed before the yellow stars, and the orange diamonds were placed before the purple triangles. Therefore, the sheets must have been placed in the order indicated above.

Note that we do not need to know the dimensions of all six wallpaper sheets to determine the order in which they must have been placed. For example, we cannot be sure whether the orange sheet and the green sheet overlap or are placed side-by-side, but this does not stop us from figuring out in which order they were placed.

**Problem 3:** Tanu changes her mind and decides she wants to place the six sheets of wallpaper (from Problem 2) on the wall so that you cannot tell that the wallpaper is overlapping. Each sheet of wallpaper should be visible, but the visible piece should be in the shape of a rectangle so that it looks like the wallpaper pieces were cut to fit right next to each other. Draw one way that Tanu could cover the wall.

**Solution:**
Your solution may depend on the dimensions you chose for the wallpapers with yellow stars and orange diamonds. Here are two possible solutions. Can you find others?