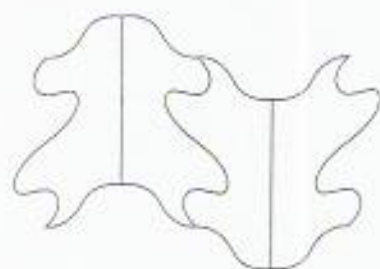
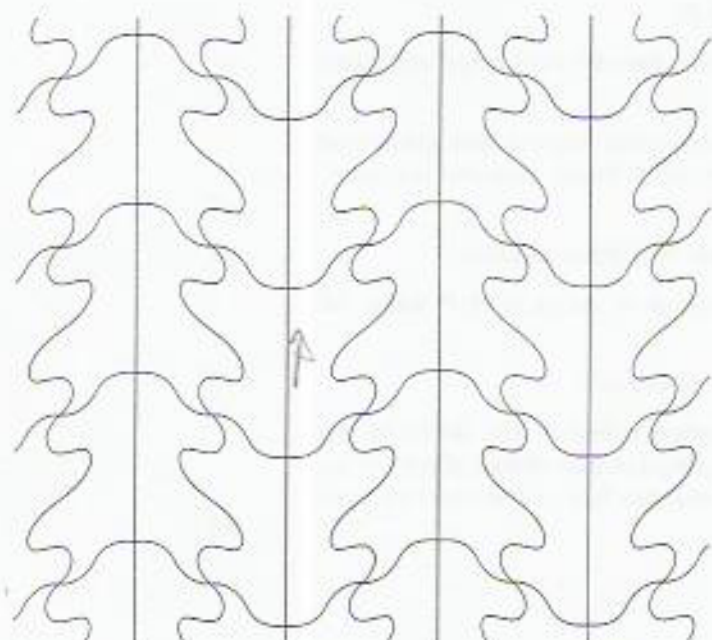


Then the pair is juxtaposed with another pair, differently oriented, as follows:



Finally, translated copies of this configuration cover the plane:



- (a) (i) Does \mathcal{T} have any indirect symmetries? Either describe one or say why none exists.
- (ii) Does \mathcal{T} have any rotational symmetries? Either describe one or say why none exists.
- (iii) Write down $n_t(\mathcal{T})$, the number of translational tile orbits. [5]
- (b) (i) Use appropriate theorems from Section 3 of *Unit GE2* to calculate $n_e(\mathcal{T})$ and $n_v(\mathcal{T})$.
- (ii) Find the incidence symbol of \mathcal{T} , and hence its IH number. [9]
- (c) Indicate the translational tile and vertex orbits on the *first* of the two magnified portions of \mathcal{T} given on page 11 of this booklet (or on a copy of it, if you prefer). Place *circled* numbers at the centres of the tiles to indicate which orbit they belong to, and *uncircled* numbers at the vertices to indicate the translational vertex orbits. [4]
- (d) Draw the tile-vertex diagram for \mathcal{T} . [2]
- (e) Using the *second* of the magnified portions of \mathcal{T} on the back of this booklet (or a copy of it), construct the edge side orbits of \mathcal{T} under the action of the full symmetry group $\Gamma(\mathcal{T})$. [5]

(REMEMBER TO DETACH OR COPY PAGES 9 AND 11 AND SUBMIT THEM WITH YOUR ASSIGNMENT.)