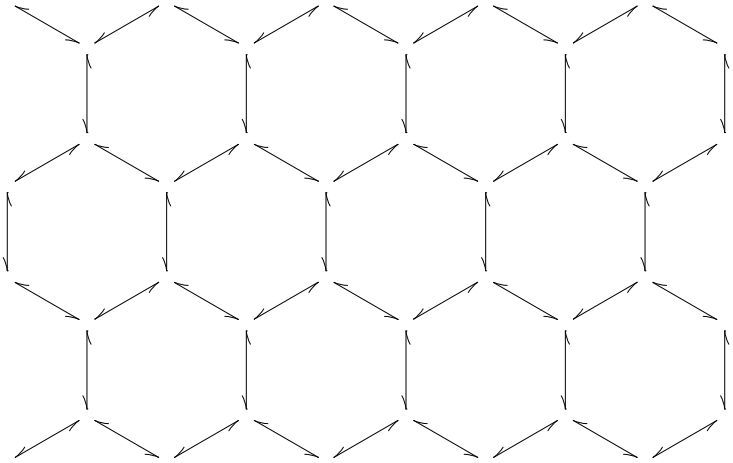
Math 331 **Examples** **Spring '10**

The following are wallpaper patterns. On each one, indicate the following with colored ink:

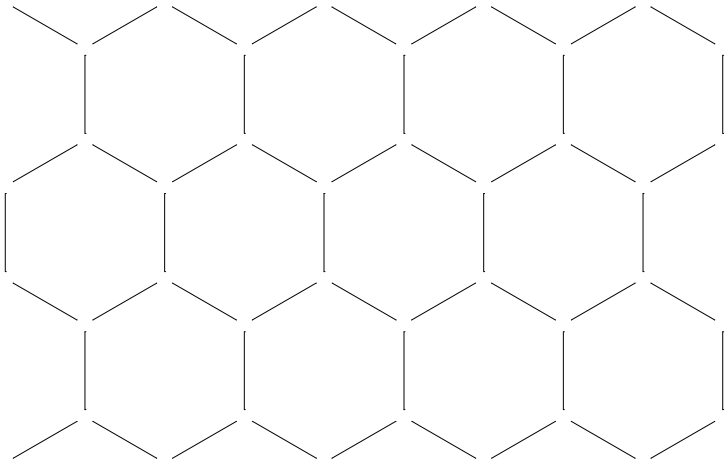
- Shortest translations, τ_x and τ_y, in two different directions, that preserve the pattern and form the boundary of a fundamental region R for $\mathcal{T}$.
- All n-centers for each possible n.
- All lines of symmetry.
- A fundamental region, R, for $\mathcal{T}$. If $\mathcal{W}$ is a W_3-group that contains lines of symmetry, base it at a 3-center on a line of symmetry. Otherwise base it at an n-center for the largest possible n.
- A fundamental region, S for $\mathcal{W}$.

1.



a) How many $\mathcal{T}$-orbits are there of n-centers for each possible n?
b) What is the isotropy subgroup of each orbit of n-centers?
c) Which wallpaper group is $\mathcal{W}$?

2.



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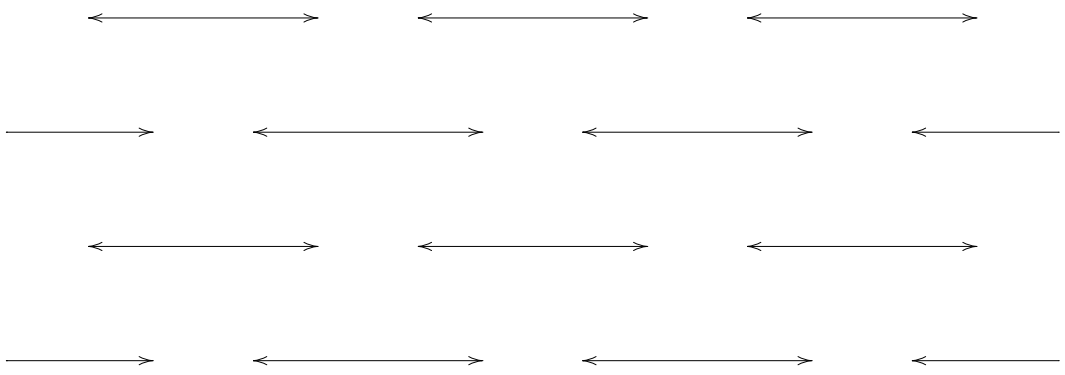

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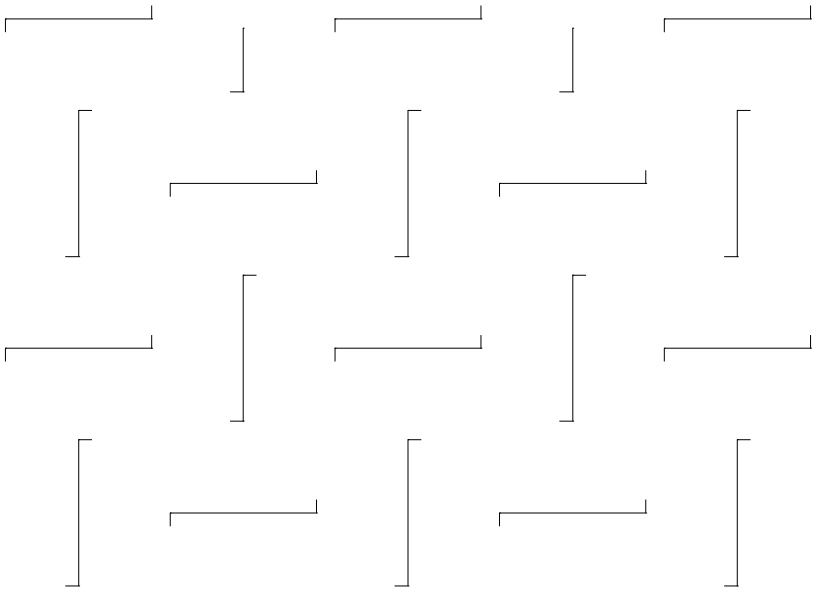

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