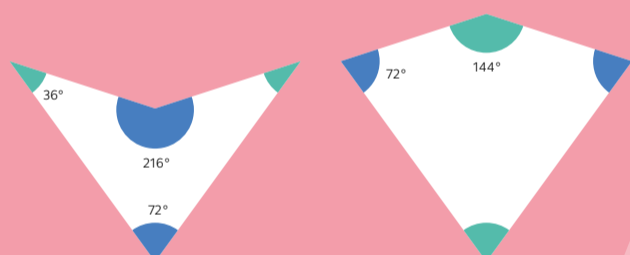


## A *is for* aperiodic tiles

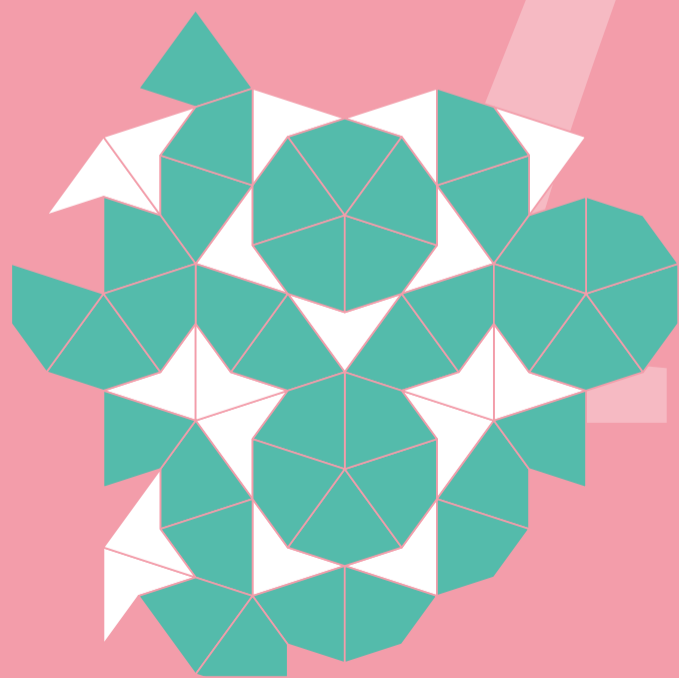
Outside the Andrew Wiles Building, the home of the Oxford Mathematical Institute, is a paved area.

There are just two shapes of tile involved. What makes these tiles special is that the resulting tilings are necessarily non-periodic: it is not possible to create the tiling by taking some (potentially very large) section and repeating it over and over again. A set of tiles with this property is called aperiodic.

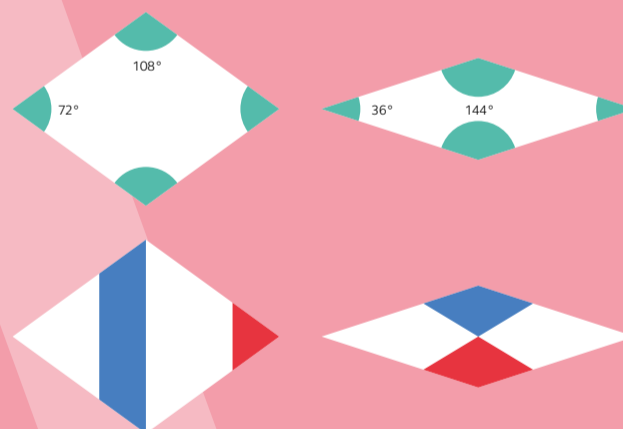
The first such pair of tiles that I found were called 'kites' and 'darts' by John Conway.



The colours of the vertices (corners) give matching rules: vertices of the same colour must be placed next to each other. This is to force the tilings to have the desired properties.



The paving outside the Andrew Wiles Building uses different tiles: a pair of rhombuses. This time the sides must be placed following the colouring as shown, and this colouring forces the resulting tilings to be non-periodic.



When I designed the paving for the Mathematical Institute I added an extra feature, the curved metal bands that link up to produce an overarching pattern, but there are still just two types of tile. Whether there is an aperiodic set consisting of just a single shape, subject to such adjacency matching rules, is an unsolved problem...



**Professor Roger Penrose**  
Emeritus Rouse Ball Professor  
of Mathematics

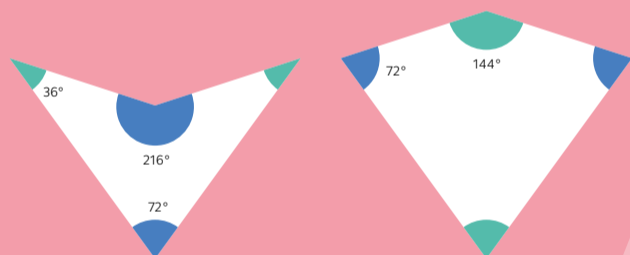


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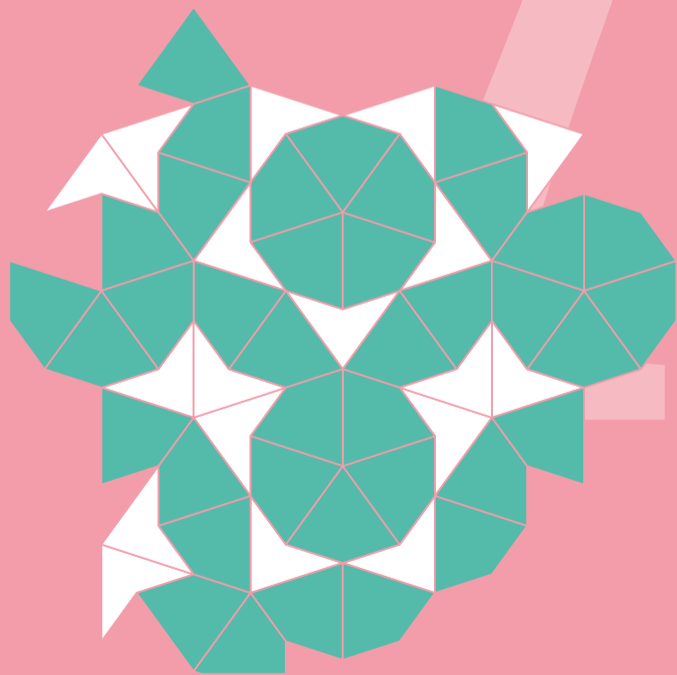
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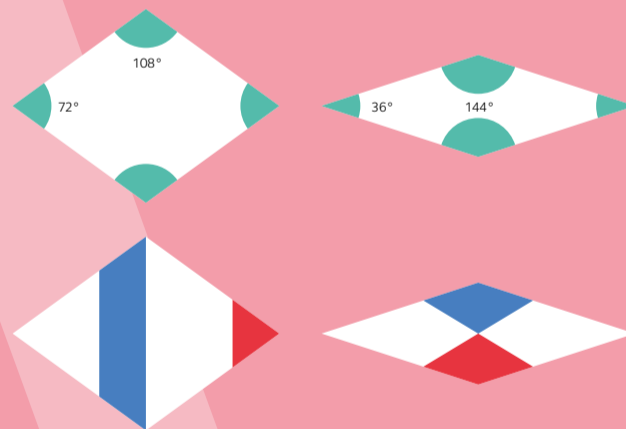
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