Photo: Peter Smith Associates

Square tiles are often used in **Islamic art** to make patterns with **8-fold** symmetry.

- Draw 3 lines in the outlined square.
- Reflect your lines in the leading diagonal.
- Now reflect your tile horizontally and vertically across the grid.

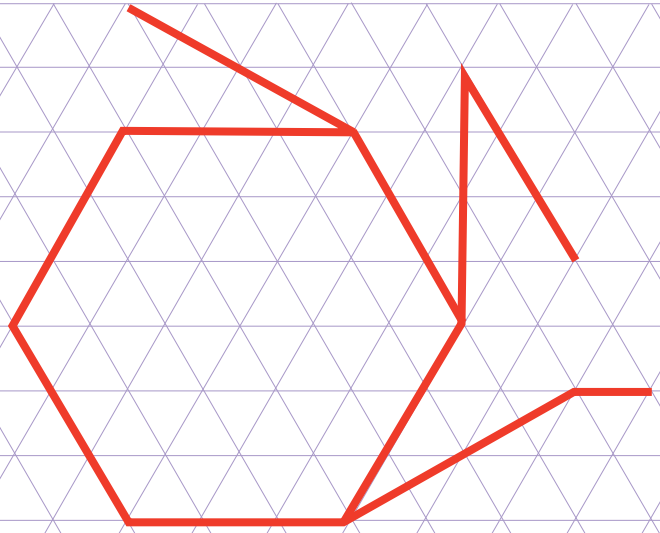
Adapt the design in your first square until you are pleased with the design overall.

Tiling patterns often occur in Islamic art.

working with others

Complete this tiling pattern.

Islamic architectural design makes extensive use of tiling patterns.



working with others

Choose a point to be the origin for your **triangular co-ordinates**.
Choose two grid lines through the origin to be your **axes**.
Label them. Plot points with the same co-ordinates on a square grid. **Describe your new pattern.**

What is the same and what is different?

This design is used on a glass door at a mosque.

create maths

working with others

Teacher notes

Working with others : Islamic design

Description

Working in the voluntary sector requires an understanding of cultural variety. These activities bring out the mathematics to be found in Islamic art – you may want to discuss with pupils why patterns like these are important in this context. The topic provides rich opportunities for cross curricular work and can also provide the focus for off site activities.

Activity 1: Four by four

Activity 2: Hexagons and stars

Activity 3: Tiles on grids

Designing nets encourages the pupils to explore reflecting patterns on a square grid – horizontally, vertically and diagonally. Sometimes these designs are aesthetically satisfying; sometimes not. Adapting the pattern requires visualising the impact of small changes as they are reflected across the grid. Some pupils may struggle with the first diagonal reflection – mirror cards may help here. You may want to use two mirrors and link this in with the diagonal effect. Initially, the pupils will use the resource as a worksheet but have plenty of 16 x 16 square grids available to allow further exploration.

An Islamic design found on a mosque door features in the next two activities.

This design is used on a glass door at a mosque.

The book which this image comes from is also a rich source of rewarding extension activities.

In completing the Hexagons and stars worksheet, the pupils use limited information to extend the tiling pattern. The task requires careful attention to detail and justifying how you know that the pattern will extend in a particular way. It is easy to make mistakes and pupils should be encouraged to use pencil and not to expect their first attempt to be a final 'fair copy'.

Resources

Squared paper, isometric paper, square dotty paper, tracing paper, mirror cards, rulers, colours.

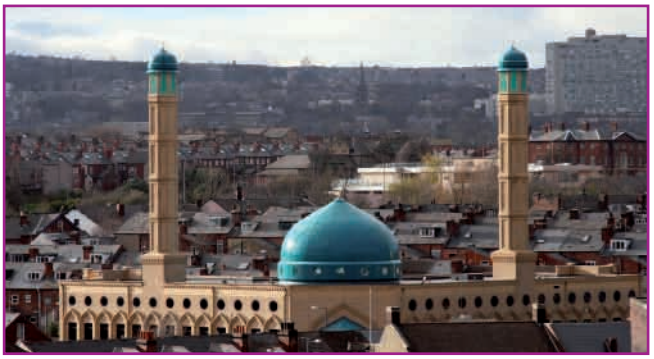


Photo: Peter Smith Associates

Subsequent attempts, or a final 'fair copy', can be produced on isometric paper. The symmetries of the final pattern can be discussed – it can be created by translation or by rotation. Some pupils will struggle with the abstract nature of the problem as set. Having a few stars and hexagons cut out and available for them to use will support these learners. The same pattern is reproduced on the Tiles on grids worksheet. Here the pupils explore working with co-ordinates in an original way: using a non-standard format will build pupils understanding of the nature of co-ordinate systems. You can expect that some pupils will choose an acute angle and others an obtuse angle for the first quadrant: this makes an interesting discussion point and results can be compared. To support the pupils' understanding of their results, they need to use 7mm squared paper so that more of the pattern is available to view. This can be downloaded free from *http://www.cleavebooks.co.uk/trol/index.htm*

The mathematics

Four by four focuses on reflection whilst Hexagons and stars requires thinking about translation or rotation. Tiles on grids uses co-ordinates to develop a non-standard transformation.