Patio **patterns**

This tiling pattern is made from two different tile shapes. Both are regular polygons.

Image courtesy: www.stonemarket.co.uk

Explore other tilings like this one which you can make using more than one regular polygon.

Record each one you find.

Tilings

where the sequence of shapes at every corner is the same are called

semi-regular.

create
maths

This patio tiling uses just **triangles** and **hexagons**.

If you just use triangles, squares and hexagons you can make five different **semi-regular tiling patterns**.
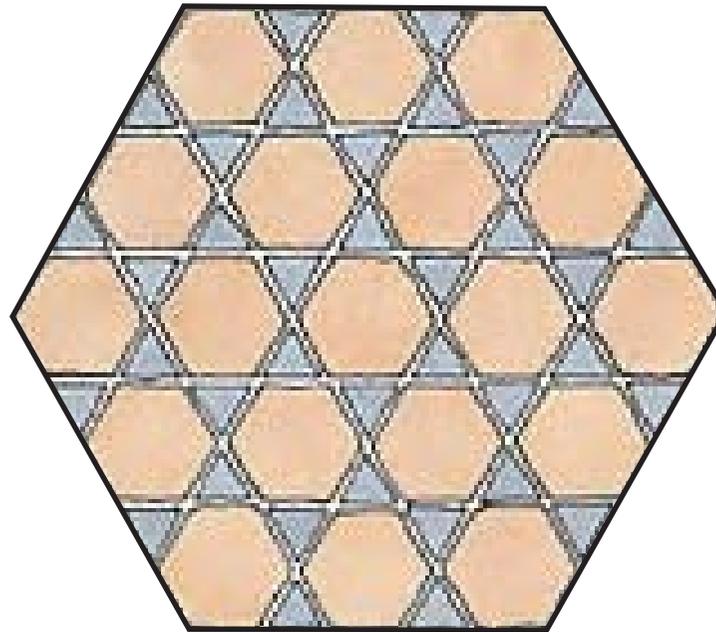
Try to find them all.

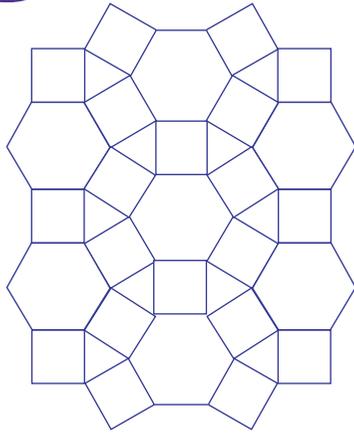Image courtesy: www.stonemarket.co.uk

Are you convinced there are only five?

A shopping centre is to be floored using **triangle, square** and **hexagon** tiles in this pattern.
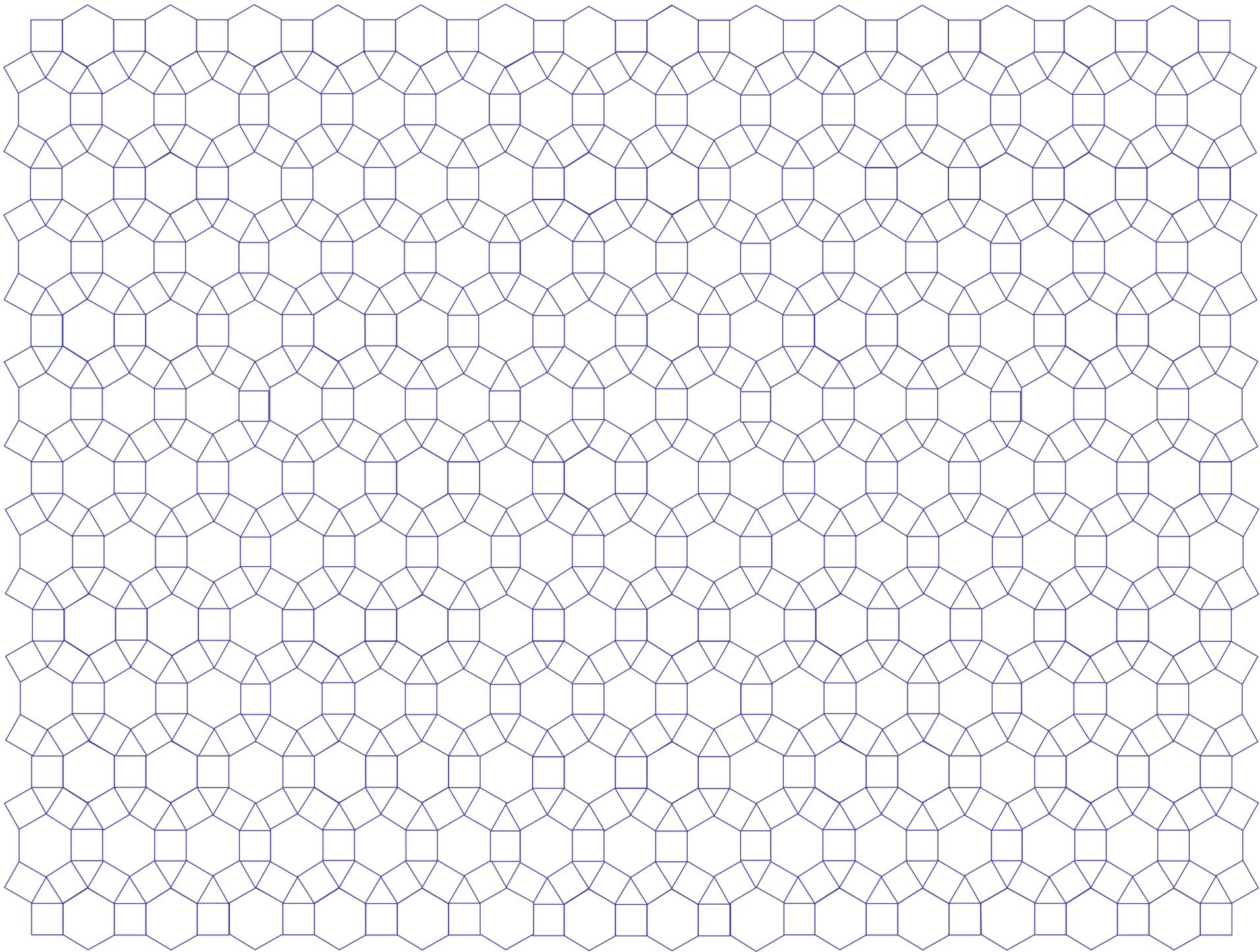

Do you need more **triangles** than **squares**?

What is the ratio of **triangles**, **squares** and **hexagons** needed?

building for the future

Building for the future : Tiling patterns

Description

This topic takes the context of patio and floor tiling to investigate how regular polygons fit together.

Activity 1: Patio patterns
Activity 2: Semi-regular tilings
Activity 3: More triangles than squares?

Resources

Regular polygon beer mats are available from ATM.

http://www.atm.org.uk/buyonline/products/mat015.html

Simple tiling properties of regular polygons are explored in Patio patterns. You will probably want to start by looking at the names of regular polygons and discussing which ones tile on their own if the pupils are new to this activity.

The image given on the pupil sheet gives only a very small part of the tiling pattern. This gives you the opportunity to relate the real context (which involves using half squares) with the mathematical tiling which covers the infinite plane.

When they are making their tilings they will need to be reminded to make enough of each design to be confident that the pattern could continue indefinitely in any direction without any gaps in between the tiles. Often pupils just fit a small number of polygons together and assume that this means that they have 'proved' that they have found a tiling. Encourage children to explain why their pattern could go on forever in any direction.

Patio patterns gives frequent opportunities for discussion relating to interior angles of regular polygons and the sum of the angles in one complete turn.

Semi-regular tilings asks the pupils to begin to classify and analyse regular polygon tiling patterns. It can be helpful to discuss a tiling pattern that is not semi-regular, for example, this tiling of hexagons and triangles.

They will have to find appropriate ways to work methodically in order to find the set of five tilings.
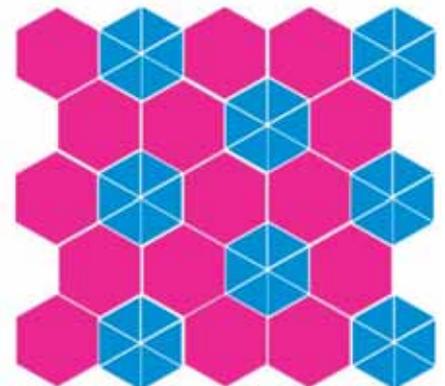
The full set of semi-regular tessellations are shown below. You will also find them on the Wolfram web site at http://mathworld.wolfram.com/SemiregularTessellation.html
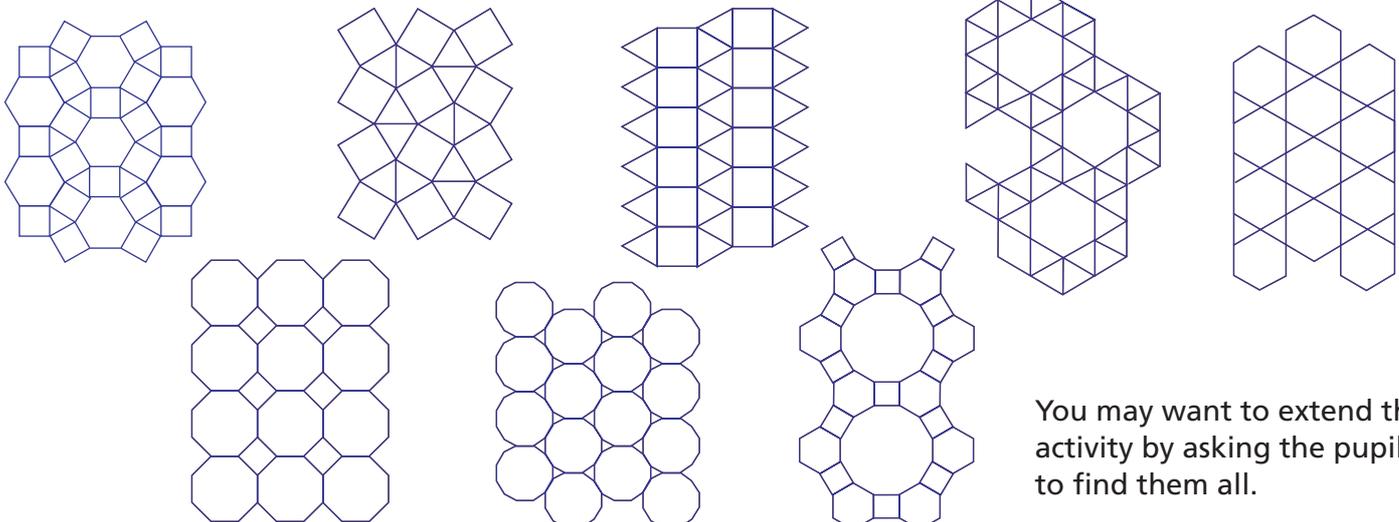
You may want to extend the activity by asking the pupils to find them all.

Building for the future : Tiling patterns

One of the semi-regular tiling patterns is the focus of More squares than triangles? There are a wide range of approaches to the problem and most pupils will probably want to start by counting the tiles to get a 'feel' for the solution. Some may want to look at concentric number patterns, some at rows of tiles and some for a repeating 'super tile'. Encourage as many approaches as possible to help the pupils begin to understand how mathematicians work.

This activity is most effective when pupils work in groups and are encouraged to both experiment, and to discuss their ideas.

The mathematics

These activities will develop the process skills involved in solving problems: recording, systematic experimentation, justifying and proving.

Patio patterns will involve the use of the mathematical vocabulary of polygons and provides an opportunity for work on the interior angles of polygons.

Semi-regular tilings develops the work on interior angles.

More triangles than squares? involves the pupils in both geometric problem solving and thinking about ratio and equivalency.