Angles in a circle

The following notes are not intended to be in any way prescriptive. All I offer is a sequence of ideas based upon circular geoboards over six, 1-hour lessons.

I am sure the ideas can be developed and improved upon.

Lessons 1 and 2 Angles on a 9 and/or 10-dot circular grid

This is an exploration about finding all the different triangles on either a 9-dot and/or a 10-dot circular grid which have 9 or 10 pins equally spaced around the circumference and one pin at the centre. The centre pin can used as a vertex of a triangle. My preference would be to use circular geoboards, however, this depends upon availability.

In the first lesson students can:

- Explore how many different (non-congruent) triangles there are on either a 9-dot or a 10-dot circular grid.
- Find a way of classifying the triangles produced.
- Try to prove all possible triangles have been found.
- Try to calculate the angles within each triangle without using a protractor.
- In groups of 4's create presentations about what they have been doing, what they have understood and how they know their answers, in terms of how many triangles and what the angles are for each shape are correct.

One or two groups might be asked to present their findings either towards the end of lesson 1, at the beginning of lesson 2 or part way through lesson 2. The exact timing will depend upon a variety of factors, some of which cannot easily be anticipated.

Not being able to predict what or when 'things' might happen in a lesson underpins my pedagogy and is one aspect of responding, in different moments to what happens, there and then in classrooms. I rarely ever get to the end of a lesson plan because I can always continue on in other lessons.

Lessons 3 and 4

Using the ideas from lessons 1 and 2 the intention is for pupils to continue their work by finding all possible triangles this time on 12-dot circular grids. Presentations, as above, can be given by two groups.

Discussion about the different ways students classified their results and how they calculated the angles.

Students can be asked to explore the sizes of the 'opposite' angles of triangles which have a common base length. In effect they will be formulating the 'angle subtended by a common chord' theorem. Students' conjectures need to be recorded.

Students can also be asked to consider those triangles which have one side as a diameter of the circle

Lessons 5 and 6 Quadrilaterals on 9, 10 and 12-dot circular grids

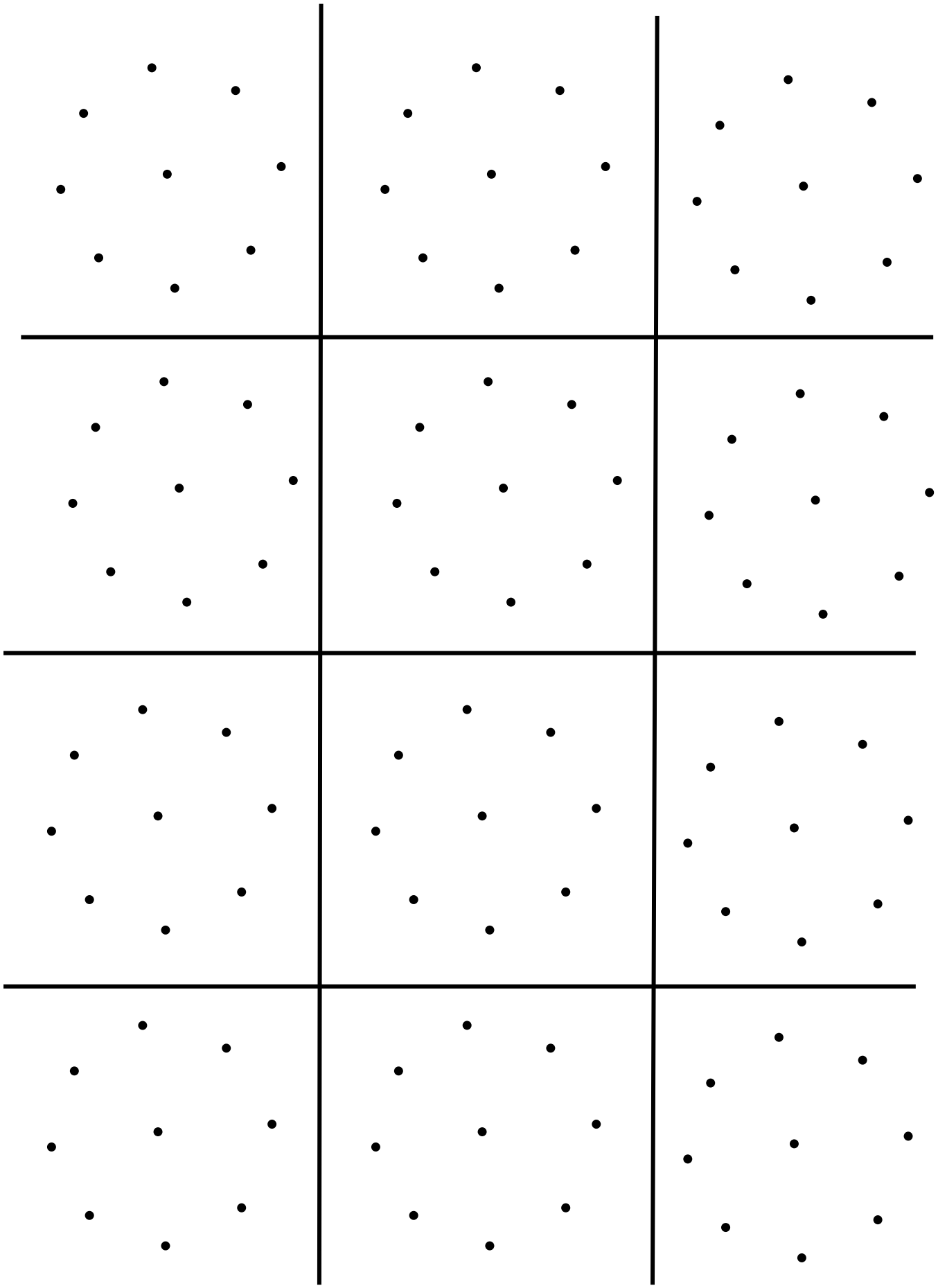
The next stage is to find all the quadrilaterals and their angles, again on 9, 10 and 12-dot grids. This time they are allowed to use the centre pin as a vertex; this, in turn, will enable them to gather data about 'the angle at the centre being twice the angle at the circumference, particularly when they draw arrowheads (chevrons).

I would also expect some students to recognise the theorem about opposite angles summing to 180°.

As with lessons 1 and 2 students can record their findings, make conjectures and formulate generalities. Two groups can be identified to present their work to the rest of the class.

Below are circular geoboard 9 (+1),10 (+1) and 12 (+1) grids

9 (+1)-dot Circular Geoboard grids



10 (+1)-dot Circular Geoboard grids