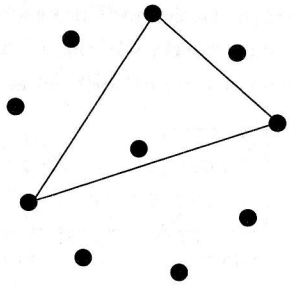
IDEA 63

CIRCULAR GEOBOARD 1



A circular geoboard is a piece of practical equipment with a certain number of equally spaced nails arranged on the circumference of a circle and one nail at the centre. There are, of course, an infinite number of circular geoboards depending upon how many pins there are around the circumference. Having a selection available with, say, 6, 7, 8, 9 and 10 pins around the circumference provides a rich vein of problems with opportunities to compare the different types of solutions for the problems described below.

Here I consider a circular geoboard with 9 equally spaced pins on the circumference (and one at the centre) and pose the problem of finding and recording as many 'different' (non-congruent) triangles whose vertices do not touch the centre pin.

If students are provided with ready marked-out grids on A4 paper this will save time when recording the shapes.

By asking a number of students to record one each of the shapes they have made on the board/screen there will be opportunities to:

- Classify the triangles.
- Discuss congruence.
- Describe the shapes.

One method I use to encourage students to give clear explanations is to ask them to describe the shape as 'over a telephone'. The reason for this is for students to use verbal instructions and to consider ways of coding the shapes made.

These discussion points can lead to students trying to prove they have found all the possible triangles.

IDEA 64

CIRCULAR GEOBOARD 2

Having tried to find, and prove they have found, all possible triangles on a 9-pin (plus one at the centre) geoboard, subsequent tasks can be:

1 What sizes are the angles of the triangles that have been produced?
   - Whether this problem is utilized as a context for students to measure angles with a protractor or whether it is for students to use and apply knowledge of angle is dependent upon the teacher's intentions in the first instance. Of course it is feasible and perhaps desirable for both outcomes to occur.
   - Seeking to solve this problem without using a protractor utilizes the centre pin; this is because we know that the angle size at the centre (between adjacent pins) is 40°. With this knowledge it is possible to work out angles of the triangles whose vertices lie on the circumference by drawing construction lines from the centre pin. The issue for the teacher is to decide whether (or when) to introduce the idea of using the centre pin as a way of calculating angles in the triangles.
2 How many triangles are there if we remove the condition of non-congruence?
3 How many non-congruent triangles can be made on geoboards with different numbers of pins at the circumference?
4 When triangles are made on geoboards with an even number of pins on the circumference, then right-angled triangles are going to appear in the set of solutions and this might be a preliminary stepping stone to angle in circle theorems.