**Generate a Dot Density and Proportional Circle Maps of New Zealand Population**

In Topic 2, you created a choropleth map using the census meshblocks. In that map, each meshblock polygon was coloured in a graduated scale according to the population range. In this activity, we will use the same data, but instead of displaying population using polygon colouring, we will try two alternative ways of displaying the same information:

1. A dot density map.
2. A proportional circle map.

**Dot Density Map**

Since we don’t have actual dot locations of population groups, you first need to convert the polygon information into point form. You can do this as follows:

1. Using the field calculator that you used in Topic 2, generate an additional attribute that contains a count of how many groups of 10 people there are in each meshblock. You can use a formula population/10, and set the output as a whole number. This will round the population to the nearest group of 10.
2. Then you need to generate a points in each meshblock for each group of 10. Because we don’t know exactly where the groups are, we do this randomly. Use the ‘random points inside polygons’ tool (type it in in the bottom left text box in QGIS):
   1. Input layer = the meshblocks layer to which you added the new attribute.
   2. Sampling strategy = Points count (this lets you specify how many points).
   3. Expression = the new attribute that you created.
   4. Minimum distance between points = 1 (to avoid overlaps, which will make your dot density map less effective).
   5. Create a new layer (or a temporary layer is fine).
3. Run the process to create the new layer.
4. You can then change the styling to produce a map that shows density effectively, and avoid symbols that overwrite each other. Right click on new layer > Properties > Symbology.
5. Experiment with different dot styles, and try different numbers of people represented by a dot. The one dot = 10 people map creates quite a dense map, so try one dot = 20 people to see whether it gives a better display.

**Challenge: Add an additional variable to your map to colour code the dots**

There are many other data sets available that provide additional attributes for meshblocks (e.g. from the census from Statistics NZ). Download one of these files, and then you will need to perform an attribute join using the meshblock identifier to combine the meshblock geometry table that you used above to the new attribute table. You can then style the dots using the new attributes that you downloaded, so that dots are colour coded for some attribute.

You can try also this with the age by meshblock data set that I have added to Stream.

**Proportional Circle Map**

In this map, we will represent the population of each by the size of a single circle. To do this we first need to create a centroid for each meshblock, and then a circle that represents the population.

1. Right click on new layer > Properties > Symbology.
2. In the top box, select Graduated, then select the population column, select method size and experiment with different styles to produce an aesthetically pleasing map.

**Question:** You have now produced three (at least) different maps to display population in New Zealand using meshblocks. Which do you think is the most effective at visualising population levels around the country? What are the advantages of each method?