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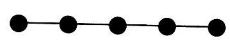
JOINING DOTS

I first met this problem in the 1970s in the seminal text *Starting Points* by Banwell, Saunders and Tahta. The idea is to see how many 'different' arrangements of a given number of dots are possible and how many joins exist for these arrangements. It connects ideas of geometric arrangements, with simple counting and some algebraic generalization, as such it would be suitable for students from a wide attainment range.

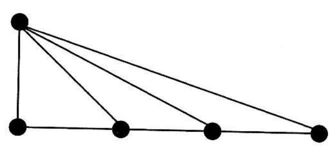
To see how many 'different' arrangements of a given number of dots can be made, I would ask students to draw a selection of arrangements for five dots on the board/screen. Having collected some examples, students can analyse them in terms of how many straight line joins are created.

The following more detailed description is one I offer to the reader, though not one I would give to students. This is because I want students to engage with some ambiguity to cause them to make their own decisions about how to arrange the dots and how many joins are possible.

For example, with five dots in a straight line we create four joins.



However, if the dots are arranged as in the diagram below, we gain seven joins.



These joins must be straight lines though clearly not of the same length. If all five dots are arranged in the shape of a pentagon, we can form ten joins, which is the maximum.

The problem is to find what other different arrangements/number of joins are possible. This can lead to students classifying the types of structures created, searching for number patterns and, where appropriate, trying to generalize sets of results formed for different numbers of dots and types of arrangements.