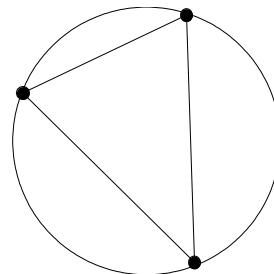
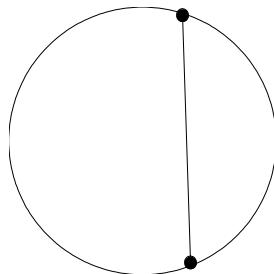


Dots round a circle



If we place two dots on the circumference of a circle, and join them with a line, we divide the circle into 2 regions.

If we use three dots, and join every pair of dots with a line, we divide the circle into 4 regions.

If we have one dot, there are no possible lines, so there is just one region (the whole circle).

1) Draw a diagram with four dots and join every pair of dots with a line. (For all the diagrams you draw, make the circle fairly big, and make sure the dots are irregularly spaced round the circle, so that the lines don't meet in the centre of the circle.)

Count how many regions there are. Now copy and fill in this table:

No of dots	No of regions
1	1
2	2
3	4
4	

2) Write down a possible rule about the sequence for the number of regions. Write down a prediction for the number of regions with 5 dots.

3) Draw a diagram with 5 dots, and count how many regions there are.
Is this what you expected? Does this prove that your rule is correct?

4) Draw a diagram with 6 dots, and count how many regions there are.
What does this tell you about your rule?

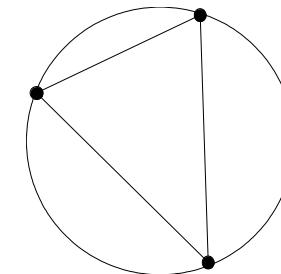
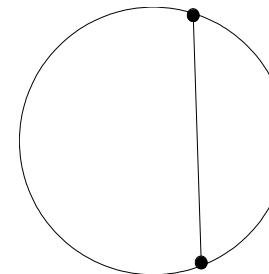
5) A rule which works for any number of dots is as follows:

$$\text{If there are } n \text{ dots, the number of regions is } \frac{n^4 - 6n^3 + 23n^2 - 18n + 24}{24}$$

(This rule is hard to find and to prove.)

Check that it gives the correct number of regions for 1 to 6 dots, and use it to find the number of regions for 7 dots.

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