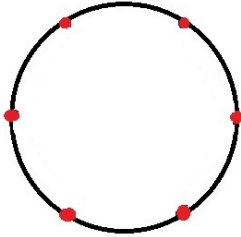
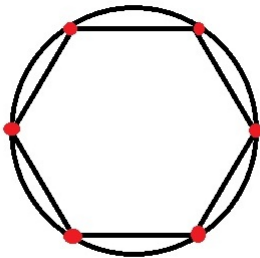


# The Six-Point Circle

You are given a circle with six equidistant points around it:



Connecting these six points with straight lines will create a pattern within the circle. For example, one pattern that can be made by connecting the six points is a hexagon:



Your challenge for this puzzle is to find a two-part answer. First, using the six points on the circle, find the **TOTAL NUMBER OF POSSIBLE UNIQUE PATTERNS** that may be created within the circle.

Use the following guidelines to create patterns:

- 1) Start at one of the six points on the circle and draw a straight line to a second point.
- 2) From there, draw another straight line to a third point.
- 3) Continue in this way until your final line ends at the same point where you began.
- 4) If a circle with a completed pattern is able to be rotated, flipped, inverted, or otherwise manipulated in such a way that it matches another circle's completed pattern, these are the same pattern and do NOT count as two unique patterns.

Second, find the **TOTAL NUMBER OF UNIQUE PATTERNS HAVING BILATERAL OR "MIRROR IMAGE" SYMMETRY**. Use a straight line passing through the exact center of your circle as an axis. If you can position this axis in such a way that the pattern in your circle is bisected into two "mirror image" portions, this pattern has bilateral symmetry. The hexagon above is an example of this symmetry. There are many possible axis lines that could successfully bisect the hexagon into two "mirror" portions. For other patterns, there may be several, or just one, or none at all.

You must answer both questions correctly to receive credit for solving this puzzle. Good luck!

1. What is the total number of possible unique patterns that can be made in the six-point circle? \_\_\_\_\_
2. How many of these patterns have bilateral, or "mirror-image" symmetry? \_\_\_\_\_

ERRATA: You must use ALL SIX POINTS. Each point will have one line drawn from it, and another line drawn to it, ending at your original starting point, for a total of SIX LINES making up each pattern. To those at the party who included patterns made using fewer than all six points, sorry for the confusion!