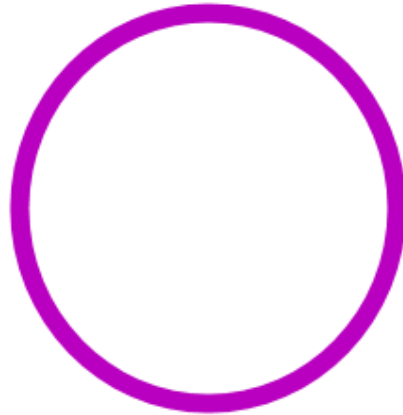


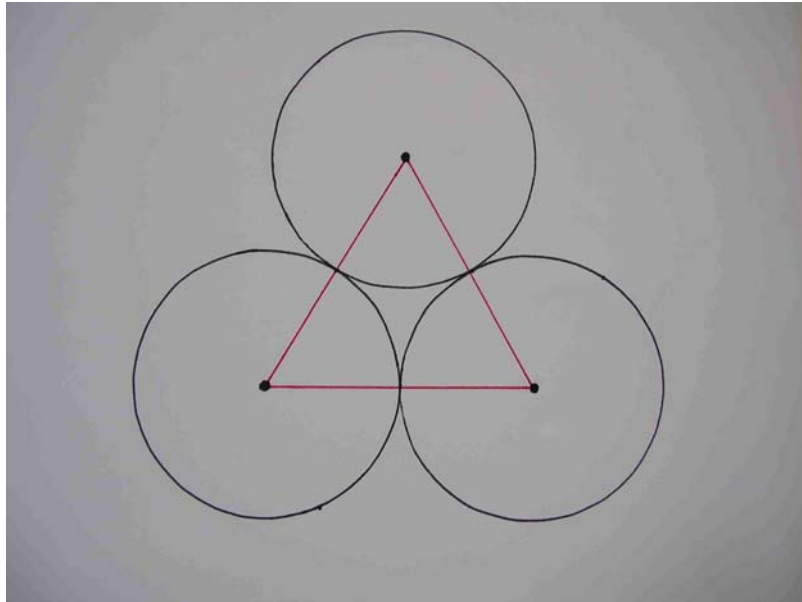
Geometric Drawing in Islam

The Circle

- Is an important shape in Islamic religion and Islamic geometric design. It symbolizes wholeness, unity and perfection.



Drawing a Triangle using Circles.

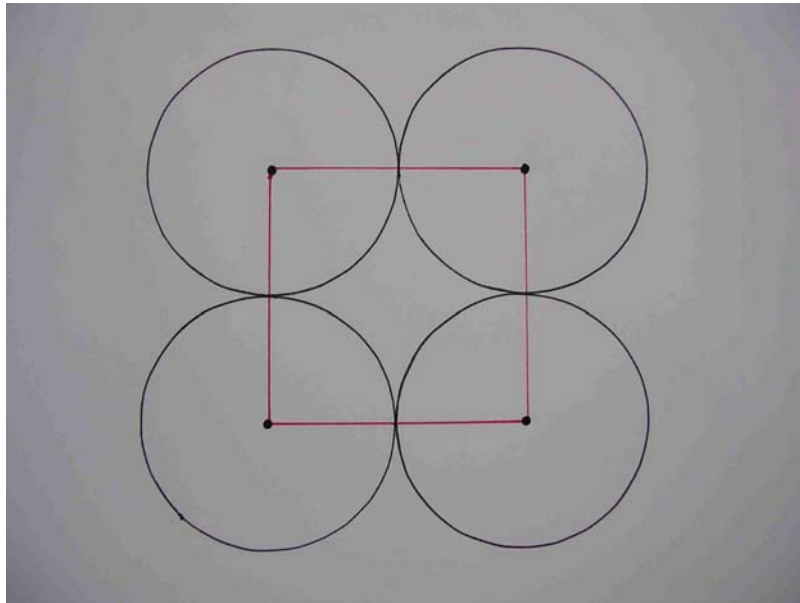


- Using a circle stencil with a hole pierced in the middle draw the outline of the circle and mark the centre with a dot. Join up the central dots to create an equilateral triangle.

The triangle is the Islamic symbol of consciousness.

The points symbolize the knower, the act of knowing and the known.

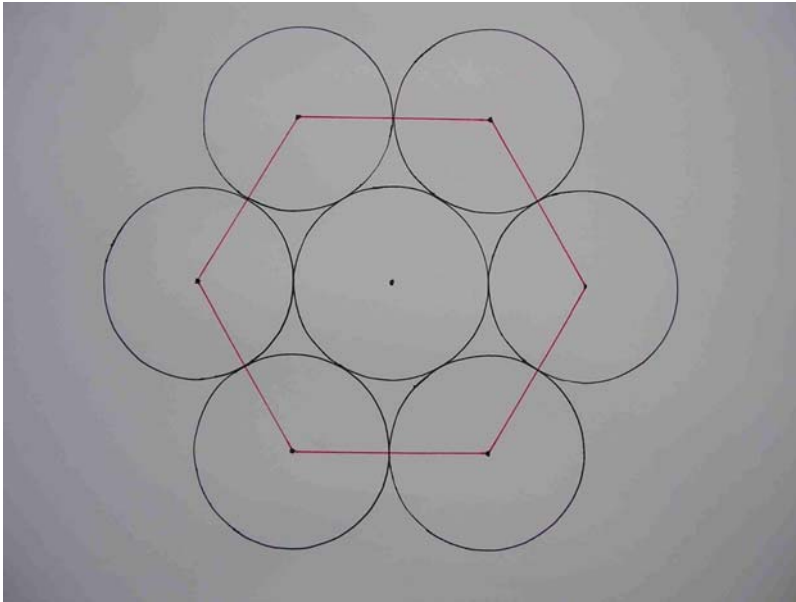
Drawing a Square Using Circles



- Again use the circle template to draw four circles and mark the centre of the circles. Join the centre points up to create a square.

The square symbolizes the four elements earth, air, fire and wind.

Creating a Hexagon using Circles

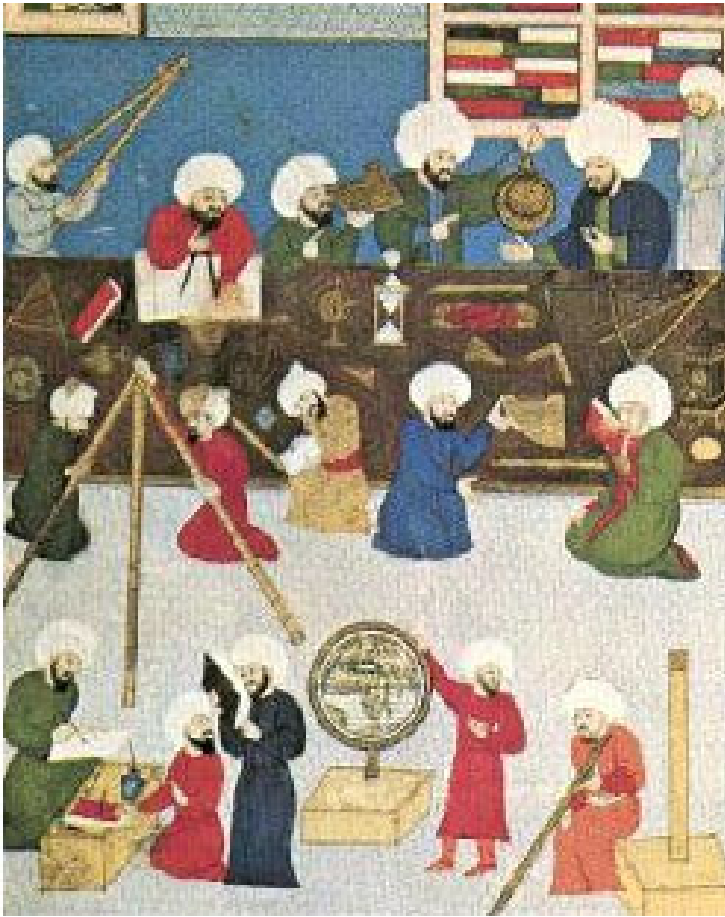


The hexagon is close in shape to the circle and is associated with the perfection of the circle.

It is therefore a symbol of heaven.

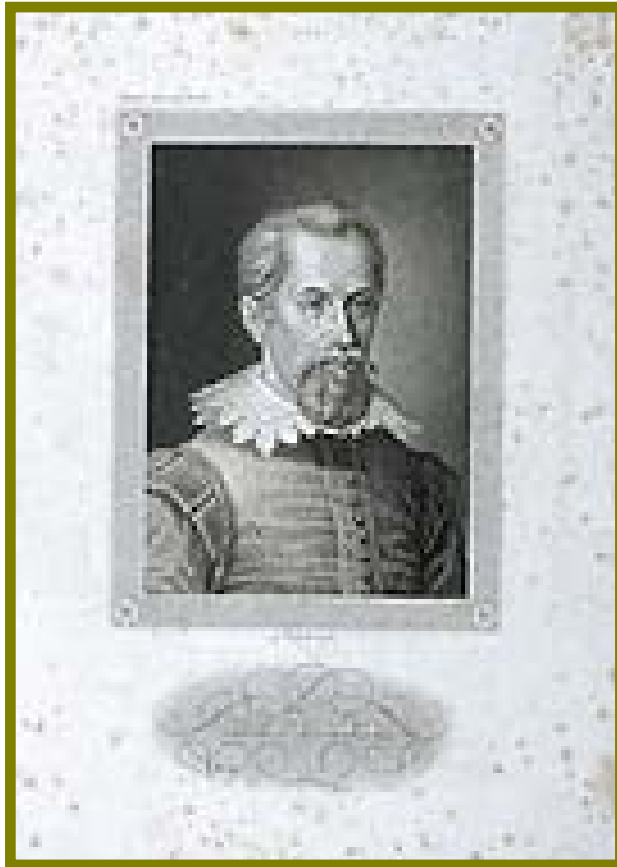
- Using the circle templates draw three circles as if creating a triangle then place two circles either side of the upper circle and two on the row above. Mark all the centre-points.
- Join all the points together in the outer circle to create a six sided hexagon

Islamic Geometry



- Islamic scholars studied and built on the mathematical ideas of the ancient Greeks
- Islamic mathematical and astrological ideas spread to Europe via the Moorish occupation of Spain.
- Islamic ideas about geometry and mathematics have been very influential on European scholars over many years.
- The picture opposite shows astronomers at an early observatory in Istanbul.

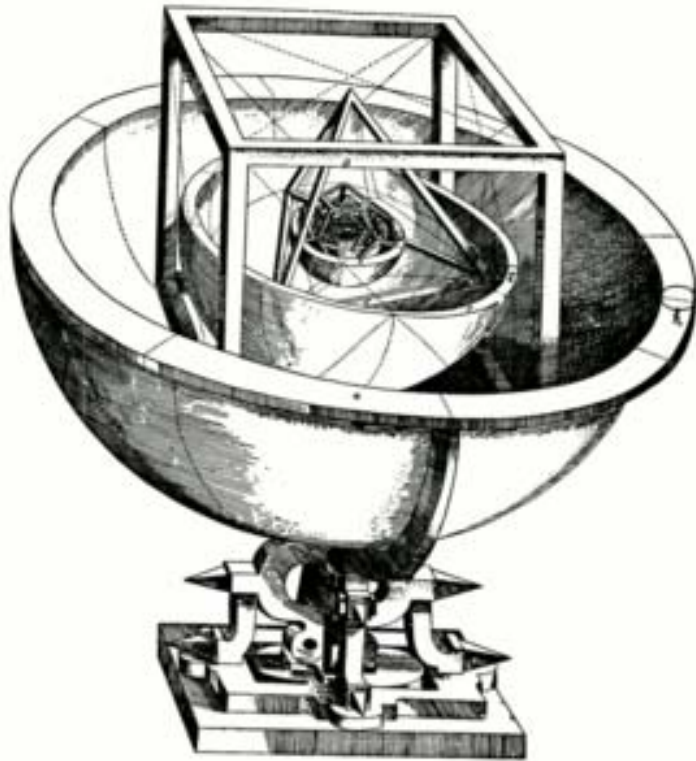
Johannes Kepler (1571-1630)



- German astrologer, mathematician and astronomer.
- He is best known for his laws of planetary motion.

Picture source: www.mhs.ox.ac.uk

What is Kepler's Platonic Solid?



- In 1596 Kepler created the Platonic Solid model of the solar system.
- The complex model showed 5 spheres with increasingly complex polyhedra nested inside each other.
- Each polyhedron represented a different planet and the size of each polyhedra represented the proportion of space each planet was thought to occupy.
- Although aesthetically pleasing, we now know that there are more than 6 planets in the solar system and we have proved Kepler's distance estimates were wrong.

Platonic solids are regular polyhedra.

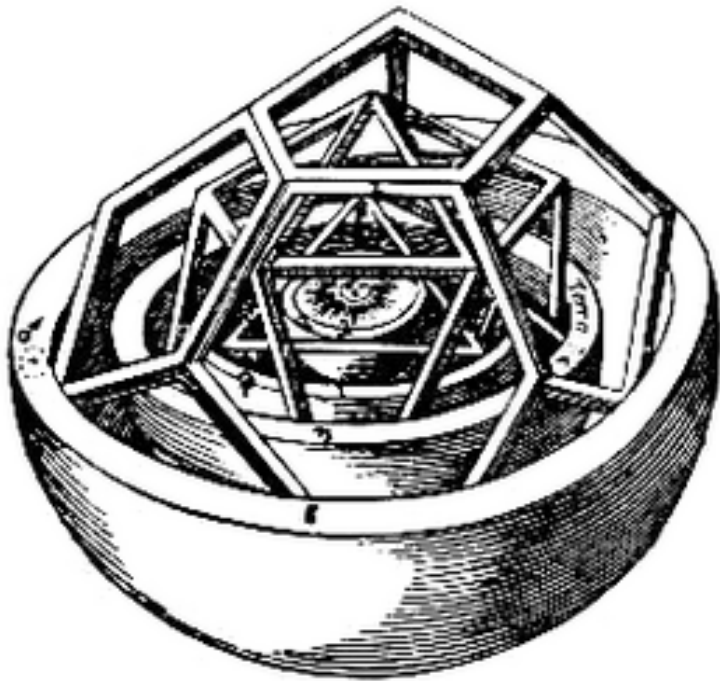


Image from: www.answers.com/topic/johannes-kepler

This picture shows a close up of Kepler's Polyhedra.

It contained the following polyhedrons:

- Tetrahedron (pyramid) 4 sides.
- Cube - 6 sides
- Octahedron - 8 sides
- Dodecahedron - 12 sides
- Icosahedron - 20 sides.

Keplerian solids at the Museum of the History of Science, Oxford.

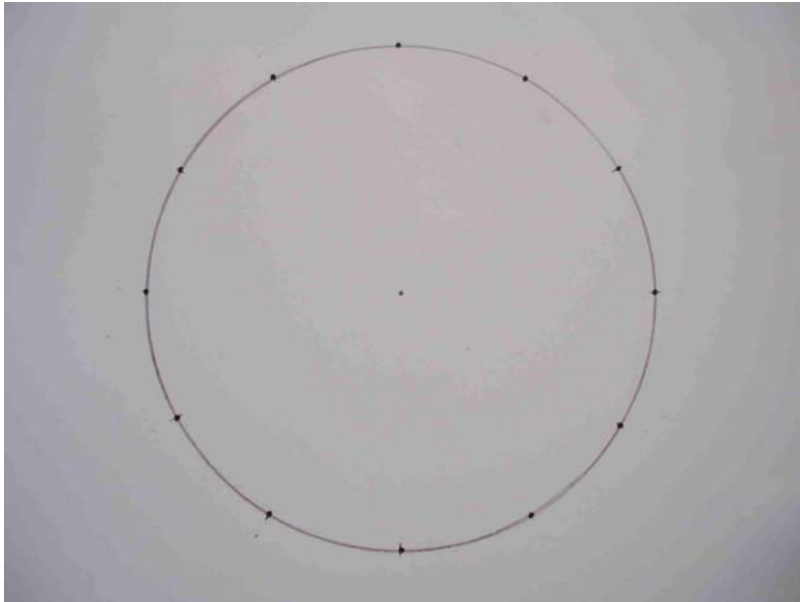


- This object is in the Museum of the History of Science Oxford.
- It is a curious monument to platonic solids and geometry
- Can you name the polyhedra?



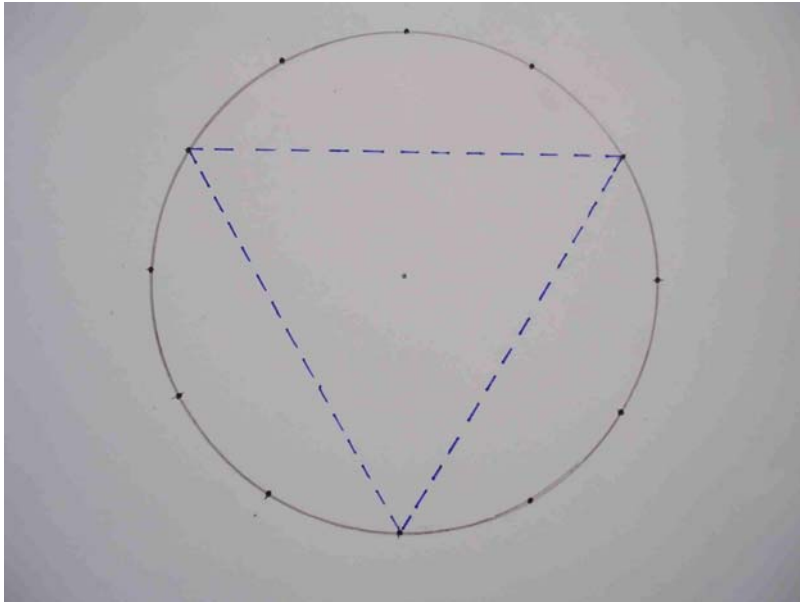
Constructing polyhedra

Step 1



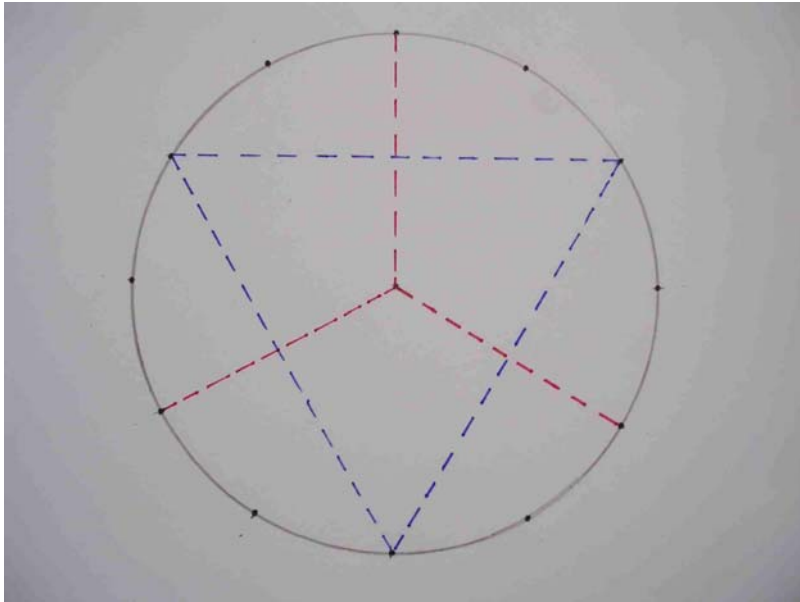
- Using a compass draw a circle and mark the centre point. Using a protractor divide the circle up into equal 30 degree sections mark each section with a dot. Make sure the top point is in line with the centre point.

Step 2



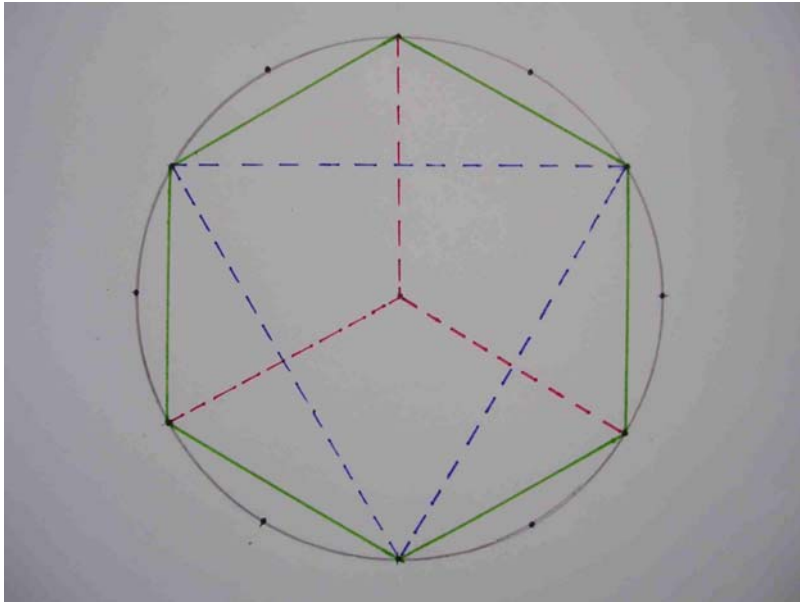
- Create an upside down equilateral triangle using a ruler and a dashed line by joining the points shown.

Step 3



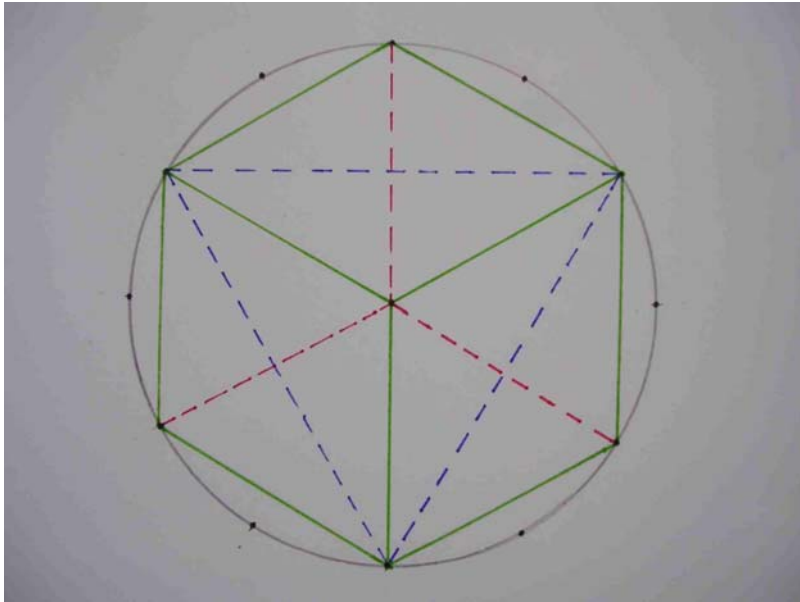
- Divide the circle into equal thirds using a dashed line as shown.

Step 4



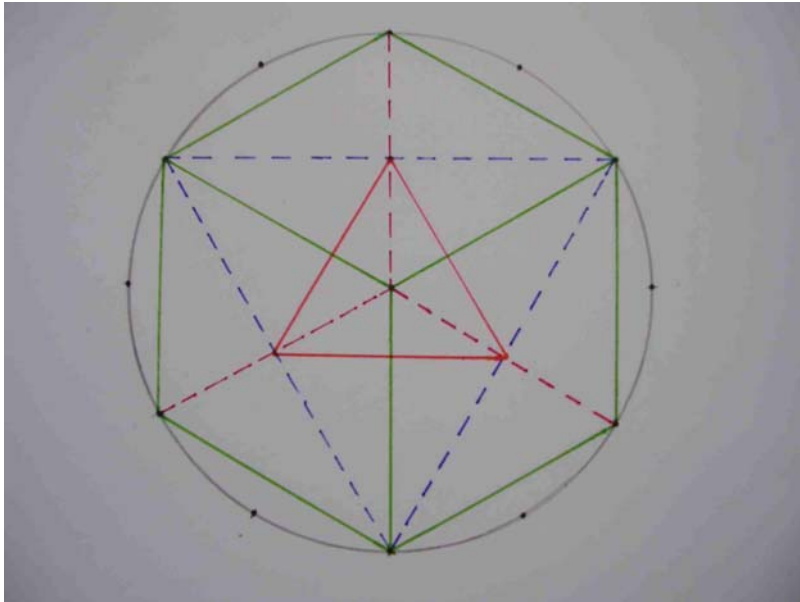
- Create a hexagon with a solid line by joining the points of the triangle with the points that are made by the division into thirds.

Step 5



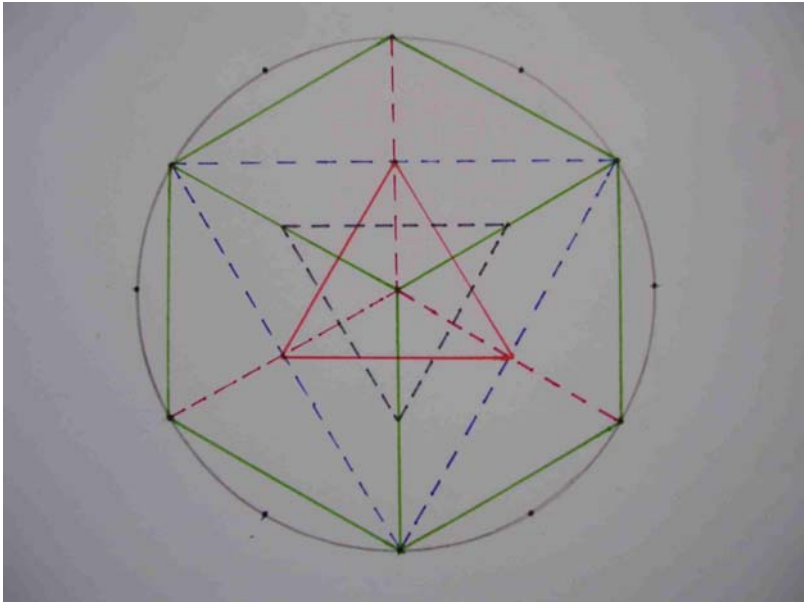
- Using the same colour as the hexagon outline join the points of the triangle to the centre point using a solid line. This will create a three dimensional cube shape.

Step 6



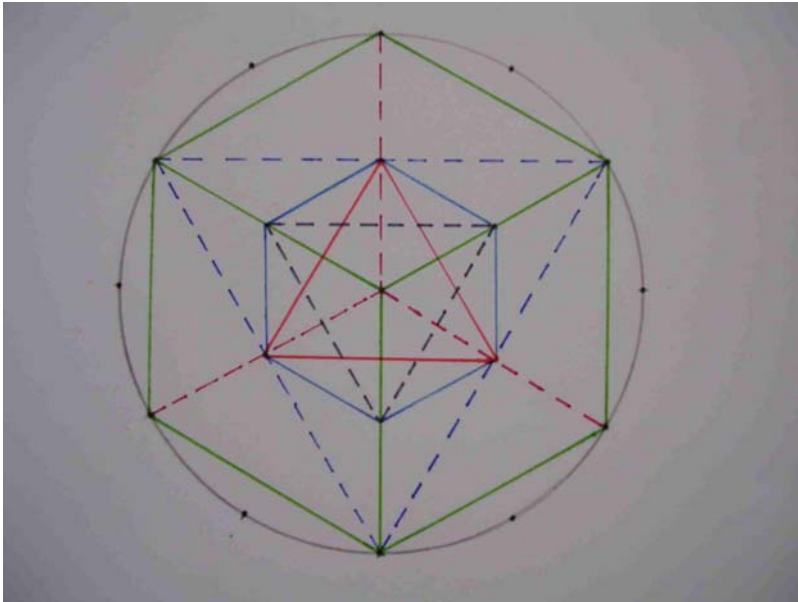
- Use a solid line to join the points where the dashed line of the triangle meets the dashed line of the division into thirds. This will create a triangle.

Step 7



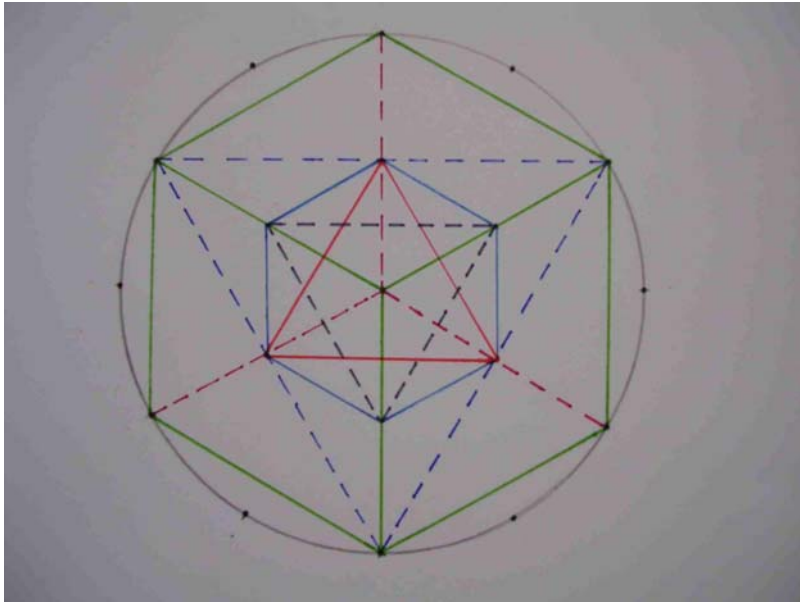
- Measure and find the half way point of the front three lines of the cube. Carefully join these points with a broken line. There should now be two overlapping equilateral triangles in the centre.

Step 8



- Join the points of the overlapping triangles using a solid line this will create a hexagon shape.

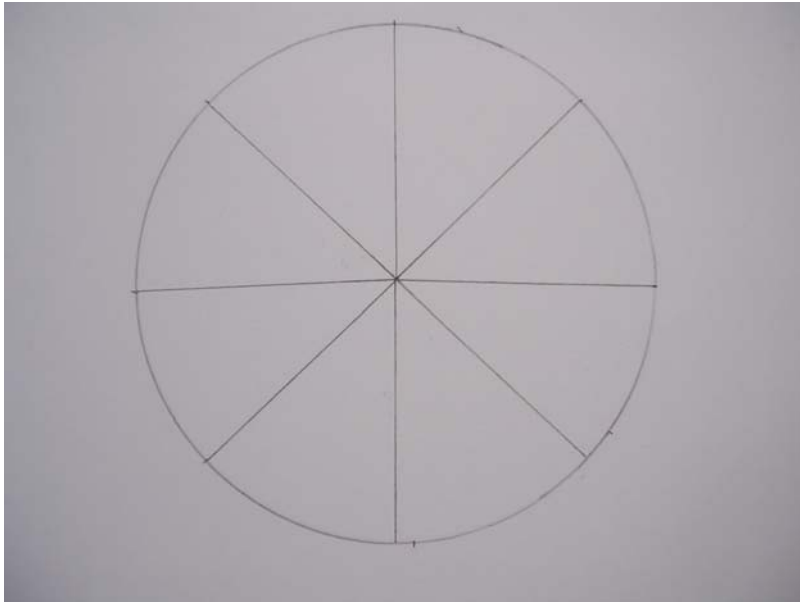
Shapes and Polygons...



- How many shapes and polygons (solid multi-sided shapes) can you see in your drawing?
- Can you find out the names of these shapes and polygons.

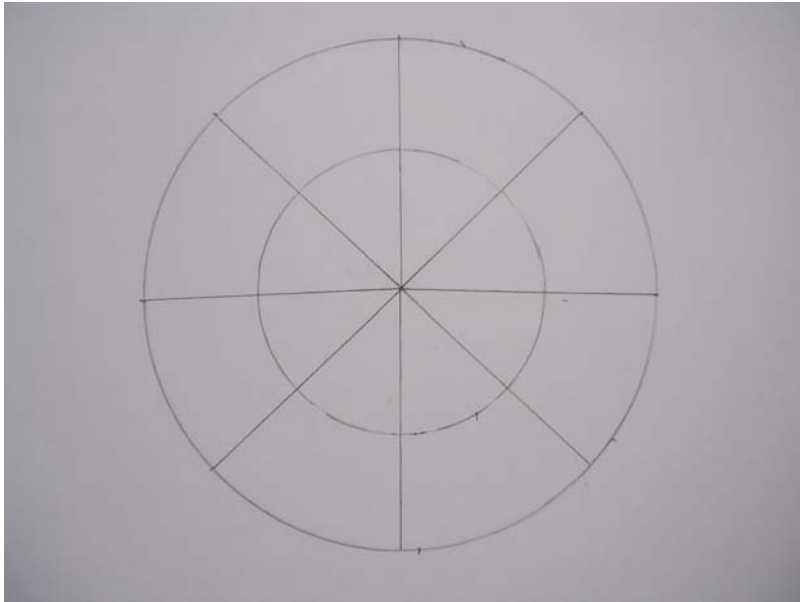
Extra Task -
Create a Star Shape using
Squares and Circles...

Step 1



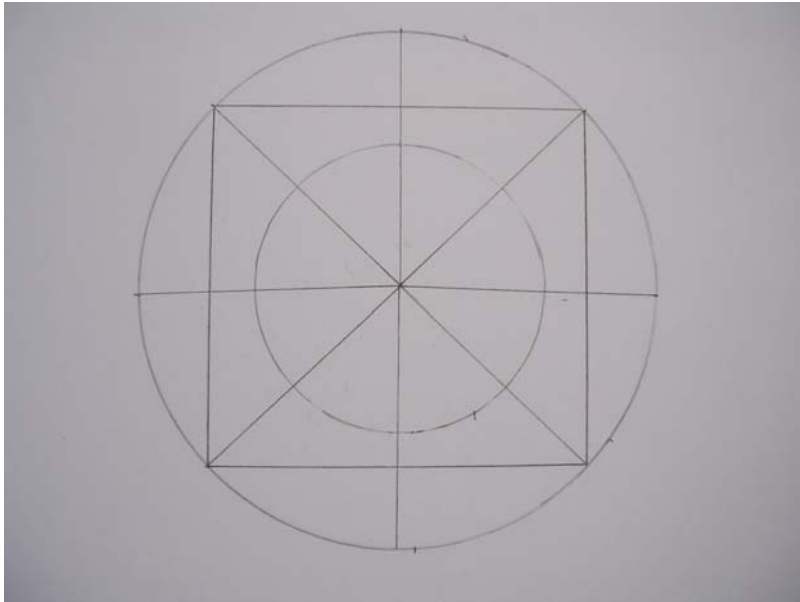
- Draw a circle using a compass. Divide the circle into 45 degree sections. You should end up with 8 equal sections.

Step 2



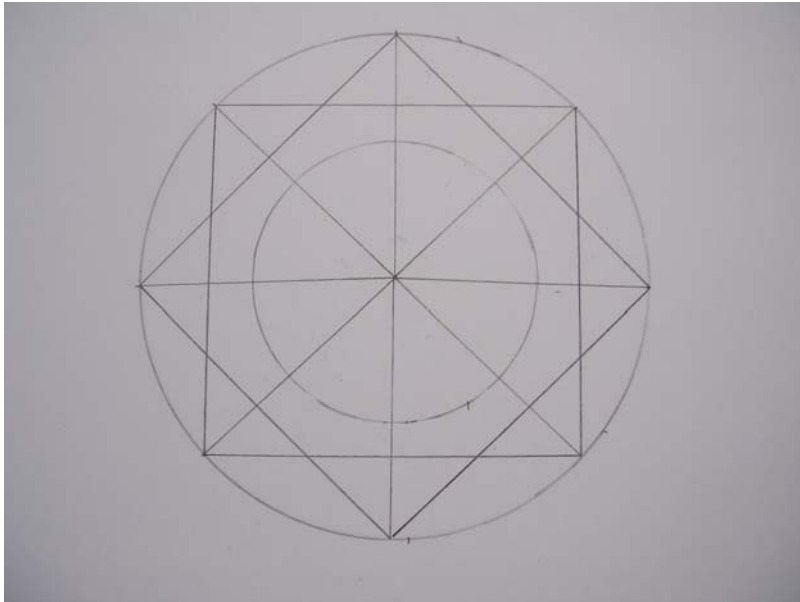
- Using a compass draw a smaller circle with about half the radius of the first.

Step 3



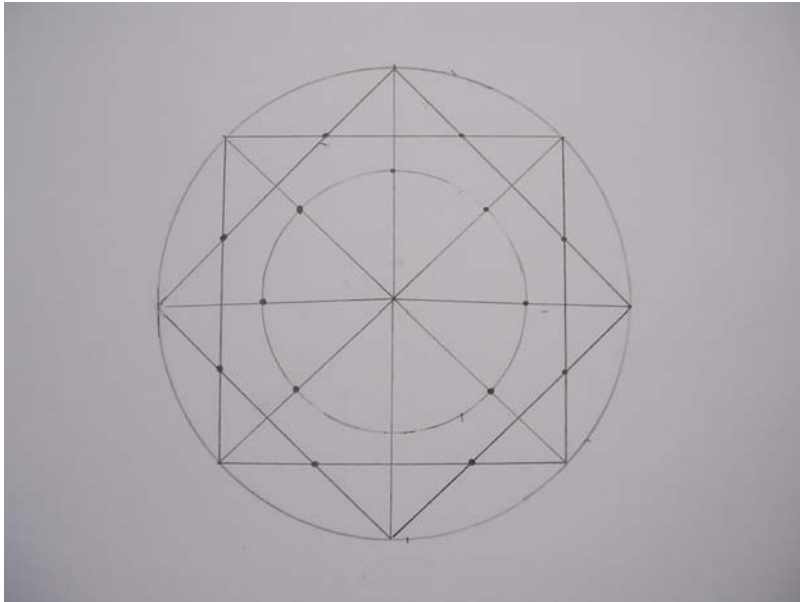
- Inside the larger circle draw a square joining the points shown.

Step 4



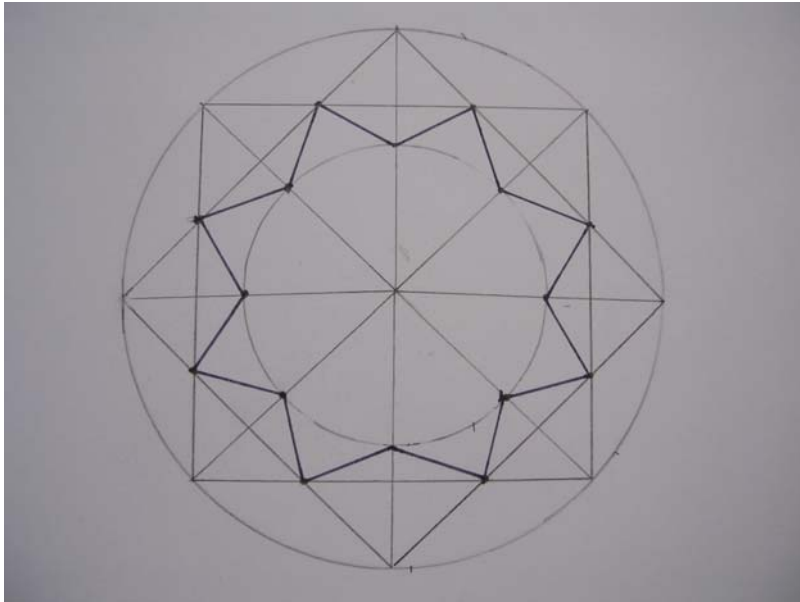
- Create a further square by joining the other points as shown.

Step 5



- Mark the points where the dividing lines meet the smaller circle. Also mark the points where the squares overlap.

Step 6



- Join the marked points to create an eight point star. You should have created two eight point stars inside each other.
- Can you use these star shapes to create a pattern of your own?