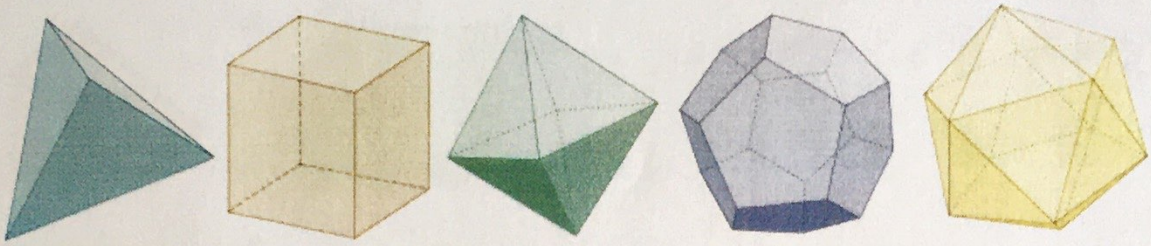
Investigating 3-D Shapes

There are five Plato's solids – the tetrahedron, cube, octahedron, dodecahedron and icosahedron. They all have faces which are regular shapes.



Tetrahedron Hexahedron Octahedron Dodecahedron Icosahedron

A 3-D shape has faces (surfaces), vertices (corners) and edges. Complete the table for the five 3-D shapes given.

3-D Shape	Shape of Face	No. of Faces	No. of Vertices	No. of Edges	Faces + Vertices
Tetrahedron	Equilateral Triangle	4	4	6	8
Cube	Square	6	8	12	14
Octahedron	Equilateral Triangle	8	6	12	14
Dodecahedron	Regular Pentagon	12	20	30	32
Icosahedron	Equilateral Triangle	20	12	30	32

What can patterns can you see in the table?

The number of faces + vertices is 2 more than the number of edges

EULER'S FORMULA

Faces + Vertices = Edges + 2

$F + V = E + 2$.

Investigate whether Euler's formula is true for other 3D shapes too.

Yes, it seems to be for all other 3D shapes with only flat faces.