Euler's formula

- **What relationship exists between the number of faces, vertices, and edges of a convex polyhedron?**

Consider the models of the geometric solids represented in Figure 1.

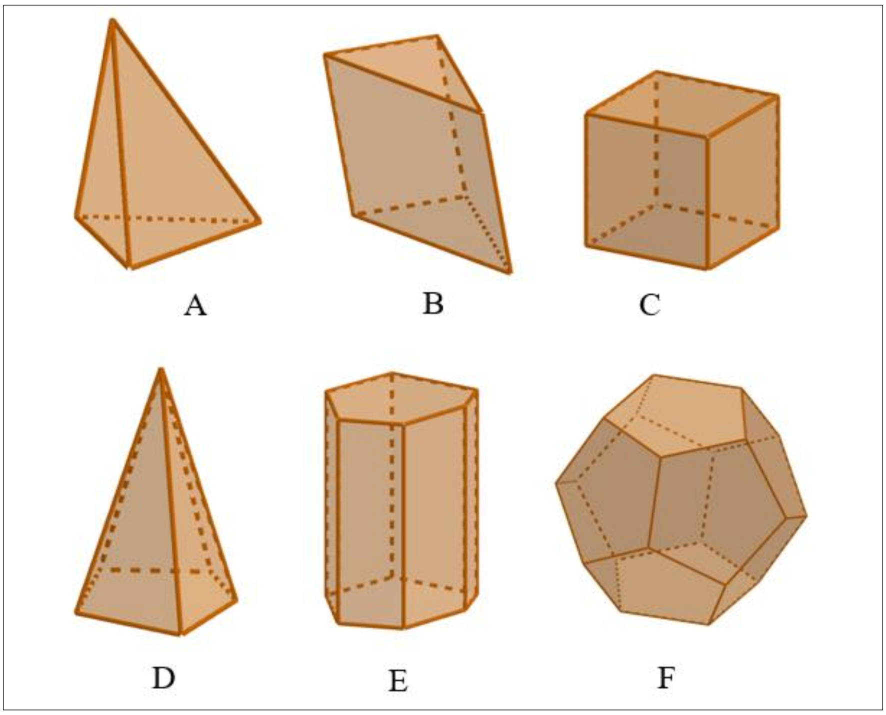

Figure 1

Count the number of faces, vertices, and edges of each of these solids.

Confirm that your results match those in the Table 1.

Geometric solid	Number of faces (F)	Number of vertices (V)	Number of edges (E)
A	4	4	6
B	5	6	9
C	6	8	12
D	6	6	10
E	8	12	18
F	12	20	30

Table 1

Sum the number of faces with the number of vertices, $F + V$, and record again the number of edges.

Check if you get the same results as those recorded in Table 2.

Geometric solid	$F + V$	Number of edges (E)
A	**8**	**6**
B	**11**	**9**
C	**14**	**12**
D	**12**	**10**
E	**20**	**18**
F	**32**	**30**

Table 2

What can you observe?

The number of edges (last column) differs by 2 values from the sum of the number of faces and the number of vertices, that is, from $F + V$ (middle column).

This happens because the **Euler´s formula** is valid for **any convex polyhedron.**

Euler´s formula

$$F + V = E + 2$$

Where:

F – number of faces

V – number of vertices

E – number of edges