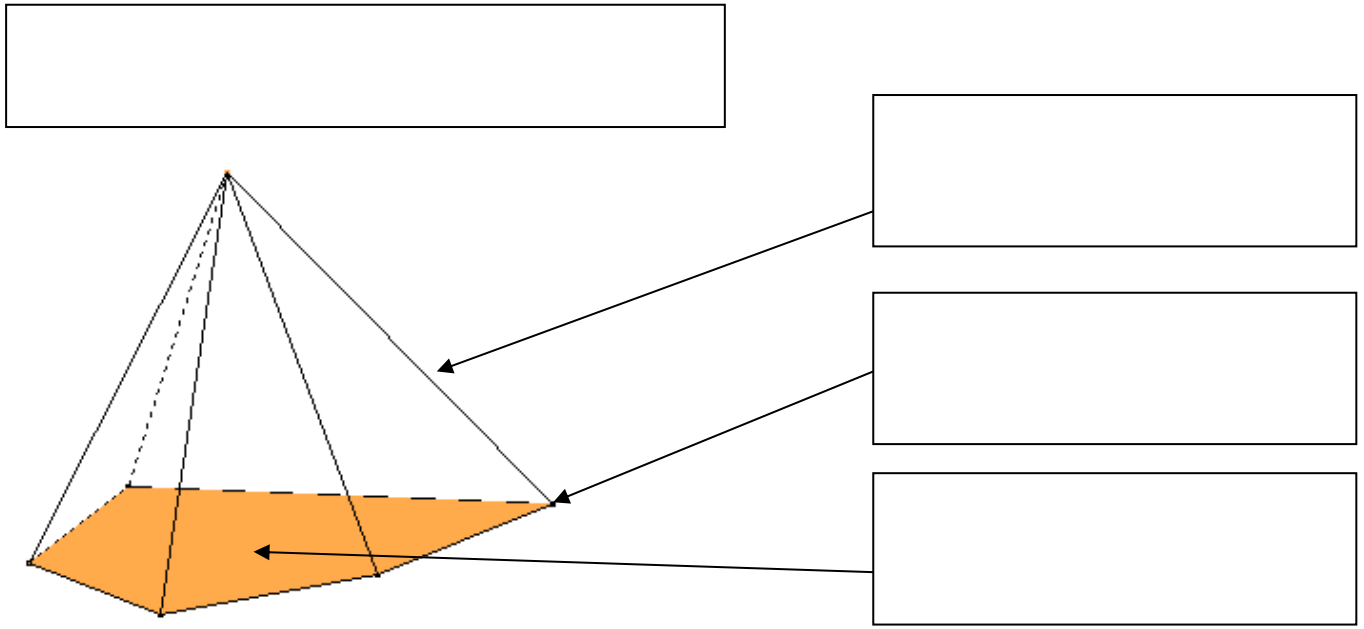
# 3D GEOMETRY

**Task 1:** Stick the shapes in the corresponding box (pairwork)

| POLYHEDRA | NOT POLYHEDRA |
| --- | --- |
| | |

**Task 2:** Label the figure



**Task 3 :** Use polydron® to construct regular polyhedrons (group workshop)

**Task 4**: Fill in the blanks using the words in the box

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| regular | vertex | flat | angle | polygon | same | edges | polyhedron |

A _ _ _ _ _ _ _ _ _ _ is a solid with _ _ _ _ faces. A _ _ _ _ _ _ _ polyhedron is a polyhedron such that:

- Every face is a regular _ _ _ _ _ _ _ .
- On each _ _ _ _ _ _, the same number of _ _ _ _ _ _ concur.
- The _ _ _ _ _ between any two faces is always the _ _ _ _.

**Task 5:** Complete the **first five** lines in the following table by observing your construction.

| 1 | **Figure (labels)** | | | | | |
|---|---|---|---|---|---|---|
| **2** | **Shape of the faces** | | | | | |
| **3** | **Number of faces F** | | | | | |
| **4** | **Number of vertices V** | | | | | |
| **5** | **Number of edges E** | | | | | |
| **6** | **Name** | | | | | |
| **7** | **Symbol** | | | | | |

**Task 6**: Find a **law** involving F, V and E.

This law is called Euler's law. The constant 2 is called Euler's characteristic, and this characteristic is equal to 2 for any convex polyhedron.

**Task 7 (video):** Complete the last two lines (6 and 7) of the previous table.

**Task 8:** Complete the text below

Plato (IV$^{th}$ century BC) was a _____ philosopher who was a student and follower of Socrates. He founded the _____ School in Athens. This school is considered as the very first university in the world. Plato considered Mathematics as the _____ of knowledge, and advocated the "quadrivium" (the four math fields of study in the liberal arts), which starts with arithmetic, then progresses to plane geometry, solid geometry, and finally astronomy and harmonics.

In his work _____ ca 350 BC, he presented his cosmology, which consisted of forms, particular objects. Plato believed all substances to be composed of air, earth, fire, and water (the four elements). He described the five regular solids, now known as the Platonic solids. He equated the tetrahedron with the _____, the cube with _____, the icosahedron with _____, the octahedron with _____, and the _____ with the stuff of which the constellations and heavens were made.

**Task 9:** Give the reason of the choice of those symbols by Plato.

**Task 10**: Stick a picture representing Plato:

Plato (IV$^{th}$ century BC) :

**Task 11**: Complete the table

| Singular | Polyhedron | Formula | | Radius | | Vertex | | Zero |
|---|---|---|---|---|---|---|---|---|
| Plural | *or* | *or* | Feet | | Leaves | | Parentheses | *or* |

**Task 12: Pairwork**

Each student finds a different net for a tetrahedron of edge 4 cm and then dictates the other the protocol of construction, so that each student has two different nets.

Stick them below.

**Task 13:**

1) Draw a **cavalier perspective** of a **cube** of side 5 cm (angle : 30° ; coefficient : 0.7)

2) Draw the **centre** of each face. Connect those points. What's the name of the 3-D shape formed?

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**The cube and the _____ are said to be DUALS.**

Find the relation between the **number of faces** and the **numbers of vertices** of the cube and the octahedron. What about the number of edges?

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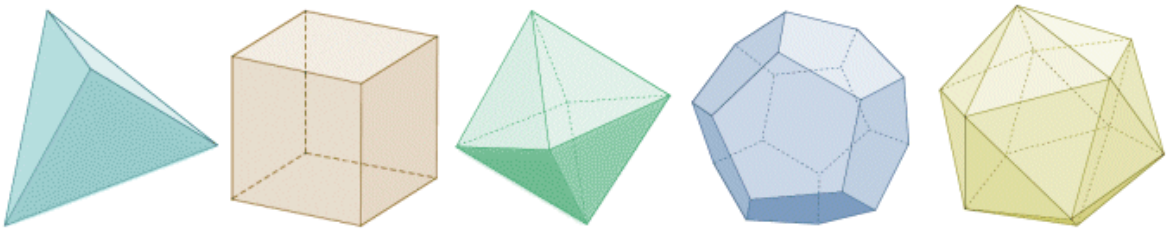
3) Connect the centres of each face of the first three solids.



Tetrahedron Hexahedron Octahedron Dodecahedron Icosahedron

4) Conjecture the duals of the last two ones.

5) Complete the following table:

| **Solid** | Tetrahedron | Cube | Octahedron | Dodecahedron | Icosahedron |
|---|---|---|---|---|---|
| **Dual** | | | | | |