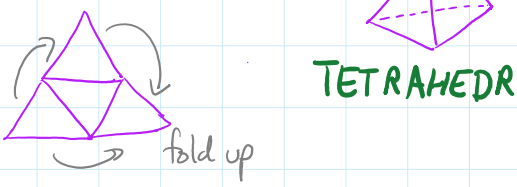
REGULAR POLYHEDRA

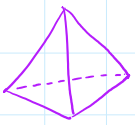
All faces are congruent regular polygons, and the same number of faces meet at the same angles at each vertex.

How many regular polyhedra are there?

- What type of faces are possible?

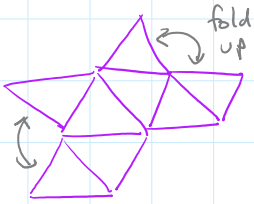
TRIANGLES: 3 triangles per vertex

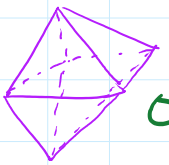




TETRAHEDRON

4 triangles per vertex





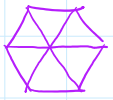
OCTAHEDRON

5 triangles per vertex

ICOSAHEDRON

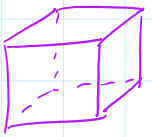
20 triangular faces

✗ 6 triangles per vertex?



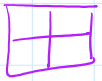
no room to fold!

SQUARES: 3 squares per vertex



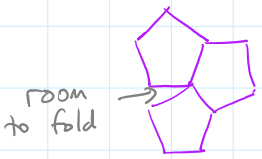
CUBE

✗ 4 squares per vertex?



no room to fold!

PENTAGONS: 3 pentagons per vertex

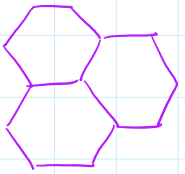


DODECAHEDRON

12 pentagonal faces

X 4 or more pentagons per vertex? No.

X HEXAGONS?



no room to fold!

Nothing else works.

PLATONIC SOLIDS:

The only regular polyhedra.

tetrahedron, octahedron, icosahedron, cube, dodecahedron

SEMI-REGULAR POLYHEDRA:

Suppose we allow faces to be more than 1 type of regular polygon.

Still require all edges to be the same length, and the same number of faces come together at each vertex.

What polyhedra are possible?

13 Archimedean solids

prisms and antiprisms