

Regular Polyhedra (Platonic Solids)

1. Using only triangles, make a few different polyhedra. Find a relationship between the number of edges of a polyhedron and the number of original triangles used to make it. Try to explain the numbers that appear in your formula.
2. Make a polyhedron where every vertex has exactly 4 triangles meeting. Find a relationship between the number of vertices and the number of original triangles. Explain the formula.
3. Can I make a polyhedron with every vertex having exactly 4 triangles meeting using exactly 25 triangles? Explain carefully.
4. Do (2) for “5 triangles meeting” and “3 triangles meeting”.
5. A regular polyhedron (Platonic Solid) is a convex polyhedron whose faces are all the same regular polygon and whose corners all have the same number of faces meeting there. Take a few minutes to see how many different regular polyhedra can you make with the Polydrons.
6. I made a regular polyhedron from 12 pentagon polydrons.
 - a. Without building it, tell me how many edges it has.
 - b. Each vertex has three polydrons meeting there. Without building it, tell me how many vertices there are.
 - c. Check that it satisfies Euler’s Rule. Then build it!
 - d. I’ve been trying hard, but I can’t seem to make a regular polyhedron from 11 pentagons or 10. Explain why it’s impossible.
 - e. Systematically check which numbers of original pentagons can be used to make a regular polyhedron.
7. Use the strategy from (6e) to find all regular polyhedra made from squares.
8. Find all regular polyhedra made from triangles that meet three at each vertex. Do the same for four per vertex. Do the same for five per vertex.
9. List all possible regular polyhedra.