Polyhedra Project

Purpose:

- To gain a better "feel" for regular and semi-regular polyhedra.

- To experience the process of creating and assembling a polyhedra.

- To create tools for future use in similar figures, surface area, and volume lessons.

Assignment:

Your group will randomly select one of the "polyhedra packages" listed below and assemble the appropriate polyhedra. Your package will include the patterns that you will need and a list of the number of each pattern that will be needed to create your polyhedra. You will use the given patterns, adding tabs where you feel they are needed, to create the necessary number of faces (polygonal regions.) I strongly suggest you use poster board to add durability to your polyhedra. You will then use whatever means you think is best and neatest to assemble the polyhedra.

Your group will also submit a journal describing when you met, what work you did each time you met together, what work you did individually, and any observations you may have about the face making process and the assembly process. (If you have packages 3, 6, 7, or 8 be sure that a definition and explanation of "truncated" is included in your comments. If you have packages 16 or 17 be sure that you include an explanation of "dual".)

The Packages:

1. Great rhombicuboctahedron

2. Icosidodecahedron

3. Truncated icosahedron

4. Rhombicuboctahedron

5. Cuboctahedron and Cube

6. Truncated octahedron and Octahedron

7. Truncated cube and Cube

8. Truncated tetrahedron and Tetrahedron

9. Square prism, Hexagonal prism, and Heptagonal prism (with square lateral faces)

10. Triangular prism, Pentagonal prism, and Octagonal prism (with square lateral faces)

11. Dodecahedron and Octahedron

12. Icosahedron and Tetrahedron

13. Pentagonal Pyramid and Icosahedron

14. Square Pyramid and 12 inch Cube

15. Hexagonal Pyramid and Dodecahedron

16. Cube and its dual Octahedron

17. Octahedron and its dual Cube

18. Heptagonal Pyramid and Cube

Schedule:

- Monday, September 1: Set up: choose group members, randomly draw project assignment

- Thursday, September 11: Projects due, bring to my office

Grading:

- Journal (11 points): neatness 2 pts; clarity, spelling, general English 3 pts; correctness (did not say anything incorrect, followed instructions) 2 pts; depth (analysis comments, said more than what you did when) 4 pts.

- Polyheda (19 points): correctness (followed instructions) 3 pts; neatness (no smudges, no tape showing, no pen/pencil markings, etc.) 5 pts; precision (edges & vertices meet well; faces regular, no holes or gaps) 6 pts; general appearance (good color scheme, decorative, creativity) 5 pts.

Points in each area will be based on ability to follow directions.

Points for the Journal will be based on clarity, neatness, correctness, and "depth" of your comments.

Points for the polyhedra will be based on neatness, precision, correctness, and appearance. Creativity factors into appearance.

Hints:

The size of the patterns you have been given has been specifically formulated for future use in the classroom. Please be sure you stick to the patterns you are given.

Realize that your traced polygonal regions must be exactly the same size. If not, your polyhedra will not fit together well.

Realize that we don't want to see the lines you used to trace the patterns.

Realize the you can save paper and make your polyhedra neater if you can design a pattern with the polygonal regions touching which can be folded to make the polyhedra or at least part of it. Thus you need less tabs and less means of connecting faces.

For the journals, typewritten papers are not required, but remember you are being graded on neatness. It might be a good idea to type your work. There are several points for depth of your comments.

I am more than willing to help on any instructions you do not understand or if you simply want to have your work checked along the way. However, I will not do so in class. Feel free to see me in my office. My office hours are listed in your syllabus. I am there more than that - you can call ahead to see if I am available or check the board outside my office for notes concerning my whereabouts.
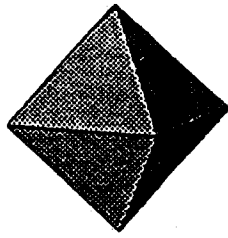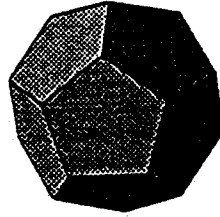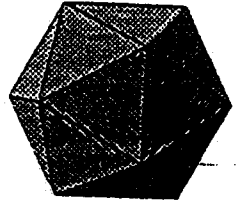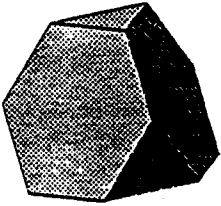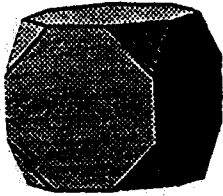
The Platonic Solids
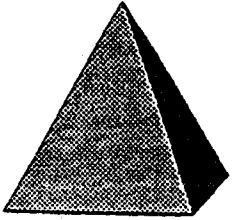
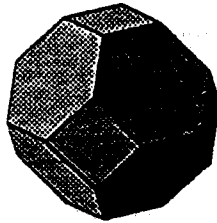Tetrahedron
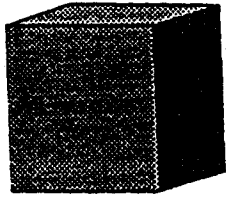
Cube

Octahedron

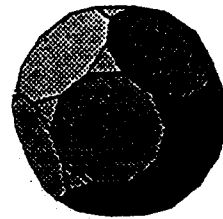Dodecahedron

Icosahedron

The Archimedean Solids
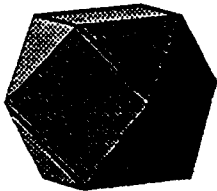
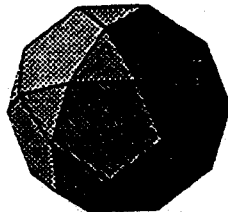Truncated tetrahedron

Truncated cube

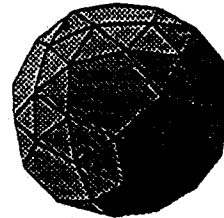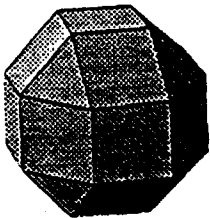Truncated octahedron

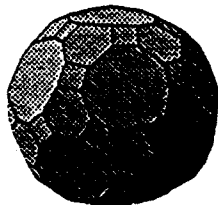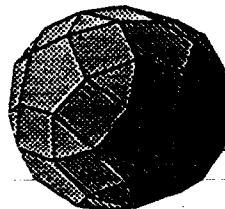Truncated dodecahedron

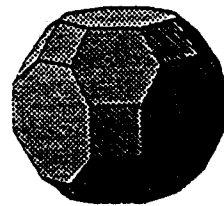Truncated icosahedron

Cuboctahedron

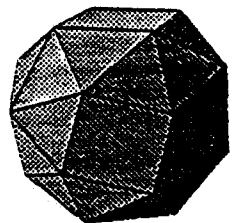Icosidodecahedron

Snub dodecahedron

Rhombicuboctahedron

Great rhombicosidodecahedron

Rhombicosidodecahedron

Great rhombicuboctahedron

Snub cube