

WORKING WITH GRAPHS, IV

You should work in a group of 3 or 4 people on the following questions. (You'll probably need extra paper.)

1) Draw at least 3 connected, planar graphs of each of the following types. You should try to make them not isomorphic to each other. For each graph, count how many faces it has (remember to count the “outside” face).

- a) 7 vertices, 6 edges.
- b) 7 vertices, 9 edges.
- c) 7 vertices, 12 edges.
- d) 7 vertices, 15 edges.

2) Draw a 7-vertex planar graph with as many edges as you can. How many edges does it have, and how many faces?

3) Now try looking at connected planar graphs with 8 vertices and 9 edges, 8 vertices and 12 edges, and 10 vertices and 12 edges. Again, count how many faces each of these graphs has.

Using your data from (1) and from this question, can you find a formula expressing f , the number of faces, in terms of the numbers v and e of edges?

4) For several of the polyhedra going around the room, count the numbers of vertices, edges, and faces.

Do the polyhedra satisfy your formula from question (3)?