Class Prep (prepare for Monday, January 29)

- Finish the Making PHiZZ Buckyballs handout.
- We need 60 PHiZZ units to make a soccer ball, so team up with some other people, choose a color scheme (3 colors), and divide up the work of making the PHiZZ units so that by next Wednesday (January 31) you have all 60 units made. Make sure as you're teaming up with people that everyone in the class is in a group of 3–4 people.

Problems (due Friday, February 2 at the beginning of class)

1. Let's prove Euler's formula ($v - e + r = 2$) for connected planar graphs. Here's an approach; you should fill in the details: suppose you have a connected planar graph that has v vertices, e edges, and r regions and contains at least one cycle. What happens to each of v, e, and r if you remove one of the edges from a cycle in the graph? What does this mean for $v - e + r$ after you've removed the edge? Continue this process until you have no more cycles in the graph. What happens to $v - e + r$ on each step? What do you have left when you don't have any more cycles? What does this all mean for $v - e + r$ for the graph you started with?
2. A *disconnected graph* is a graph in which at least two vertices have no path between them using edges from the graph. Disconnected graphs are made of connected subgraphs, each of which is called a *component* of the original graph. A graph in which each component is a tree is called a *forest* (yes, graph theorists are that cute). What would Euler's formula be for a planar graph with k components? Prove your answer.