

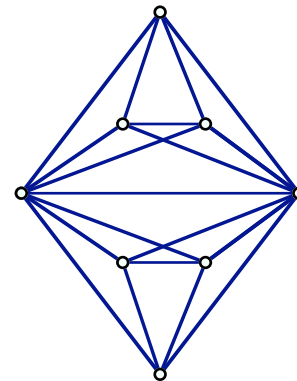
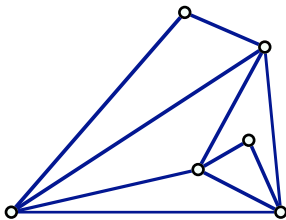
NAME: **ANSWERS**

1. Can you color this map of Mexico using just three colors? If so color it and explain why you cannot color it with two colors. If not, you do not need to color the entire map, just explain why you need more than three colors.



Show an odd wheel and say that means you need four colors. The map is difficult to see so I took your word for the fact that you found one.

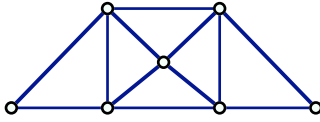
2. Find the chromatic number for each graph. Explain how you know that you are right.



The first contains a W_3 – an odd wheel that requires 4 colors. The graph needs to be colored with only four colors as well.

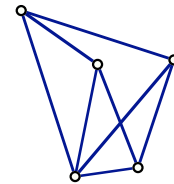
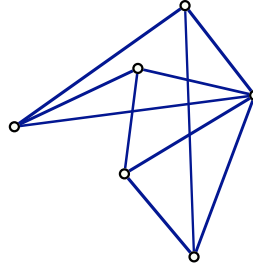
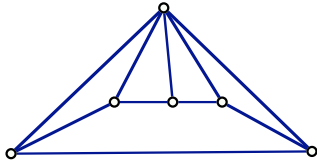
The second contains a K_5 which requires five colors. The graph must also be colored with five colors.

3. There is essentially only one way of coloring this graph with three colors. Explain why?



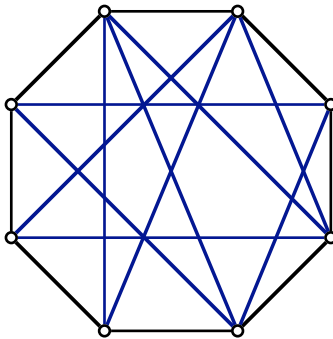
Start by color one triangle with the three colors. The coloring is then determined by coloring the missing vertex on adjacent triangles until done. Please note that being composed of triangles is not a strong enough criteria for a unique three coloring. Ask me for examples.

4. Wheels can sometimes appear in a very distorted fashion. Which of these graphs is a wheel? For each one that is a wheel, color the hub red and trace the cycle of vertices contained in the wheel.



Everyone could do this.

5. Find a subgraph of this graph that is W_4 — that is, a wheel with 4 spokes — in this graph



There are at least two.