1) For the following garden, is it possible to end and start at the same point and to travel all the walkways (edges) without backtracking.

In the Eastern garden, a path exists, but the entry and exits points are different.

2) Does an Euler circuit or an Euler Path exist for the garden? If so, which one? An Euler Path, because you cannot start and end on the same vertex without backtracking.

3) What is the degree of a vertex? The number of edges that connect to that vertex

4) List the degrees of the upper left vertex and the lower left vertex in the picture to the right. Upper Left is 2, Lower left is 3

5) How do you know a graph shows an Euler circuit without actually finding the Euler Circuit? If any of the vertices have an odd degree, there is no Euler Circuit.

6) Circle the figures below that have Euler Circuits? None of them have Euler Circuits.

7) For the figure to the right. Find the shortest route that allows you to cover all edges at least once and still end up where you started. 45 hours

8) For the edges you used to backtrack, draw an extra edge. See picture

9) What is a Hamiltonian Path? A path that covers every vertex exactly once

10) What is a Hamiltonian Circuit? It is a path that covers every vertex exactly once and ends where it started.

11) Label the graphs below as Hamiltonian Paths, Hamiltonian Circuits, or Neither.
12) What is a cycle? A path that starts and ends in on the same vertex, but covers every edge of the path only once.

13) How is a cycle different from a Euler Circuit? A circuit has to cover all the paths on a graph exactly once, but a cycle does not have to cover EVERY edge of the graph.

14) How many cycles does the graph to the right contain? 3

15) If you are designing a network where every computer has to be connected at least once to the network, how many cycles can you have to make the network as efficient as possible? None.

16) How many edges are necessary for the network to the right? (What is the minimum number of edges needed to connect all the vertices once or more to the network?) 5

17) What are the weights of the minimal spanning trees for the graph below?

18) What is the maximum number of colors NEEDED to color any map so that no adjacent countries are the same color? 4 colors

19) What is the minimum number of colors needed to color the graphs below so that no vertices of the same color share an edge?

20) Draw a map that needs 3 colors and then draw a graph to model the map. Have another student check your work. Individual work