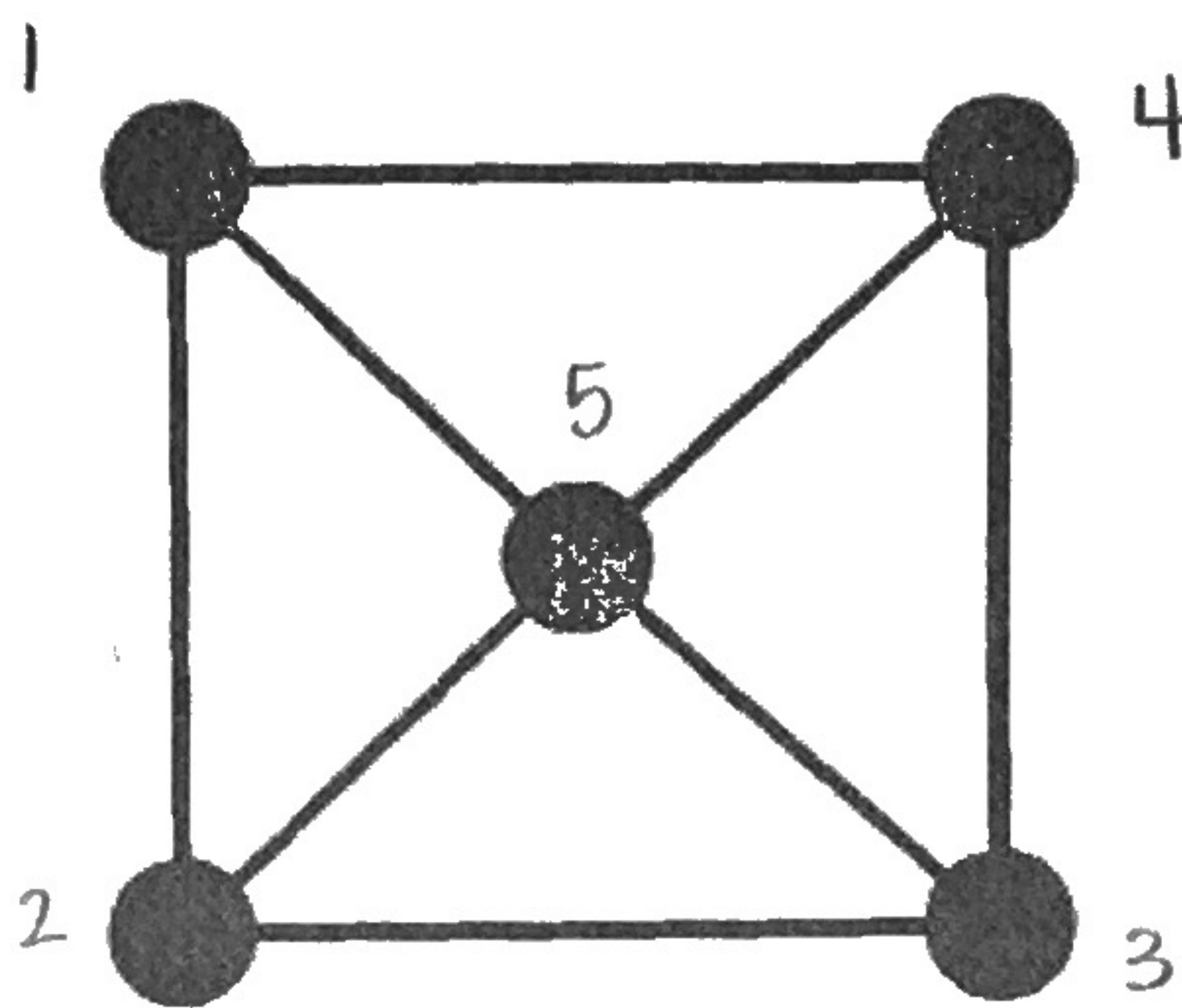


Your company must run Ethernet cables to five different offices so that all five offices have high-speed Internet access. For each computer to be on the office network, there must be a way to get from each computer to the other computers by following the cable.

1. One worker proposed running cable between the five offices as illustrated in the following diagram. The vertices represent the offices, and the edges represent segments of cable.



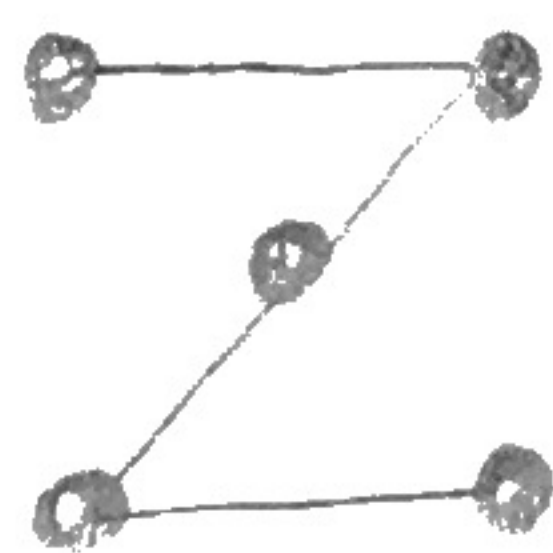
How many lengths of cable (edges) are used? Explain why this inefficient way to run the cable.

8 edges. It's inefficient because some offices have multiple connections. For example, office 1 connects to office 3

2. Design a more efficient network and indicate how many lengths of cable are used.

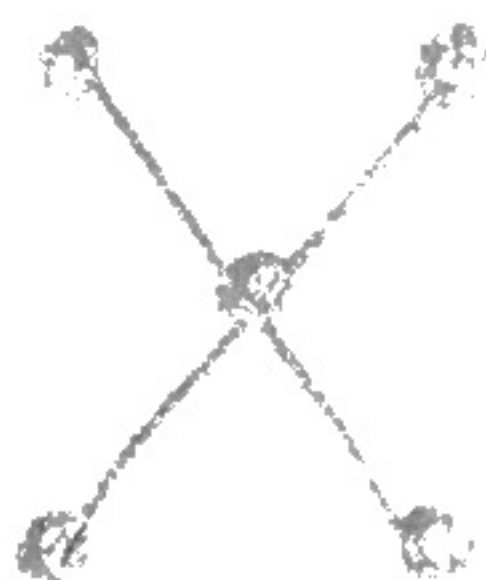
in multiple ways.

solution 1



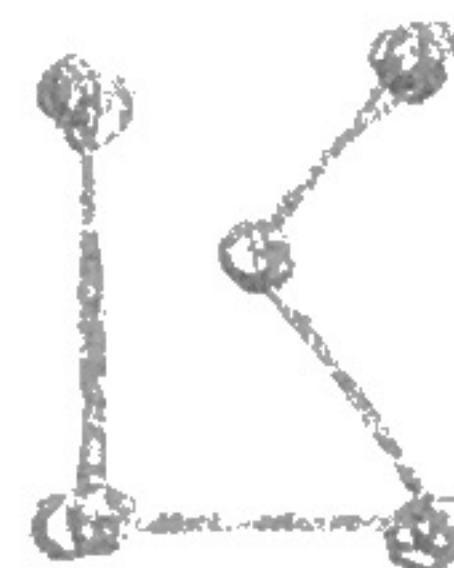
4 cables

solution 2



4 cables

solution 3



4 cables

3. Compare your efficient network with others in the class.

a. Did everyone use the same number of cable lengths?

yes - every efficient network uses 4 cables.

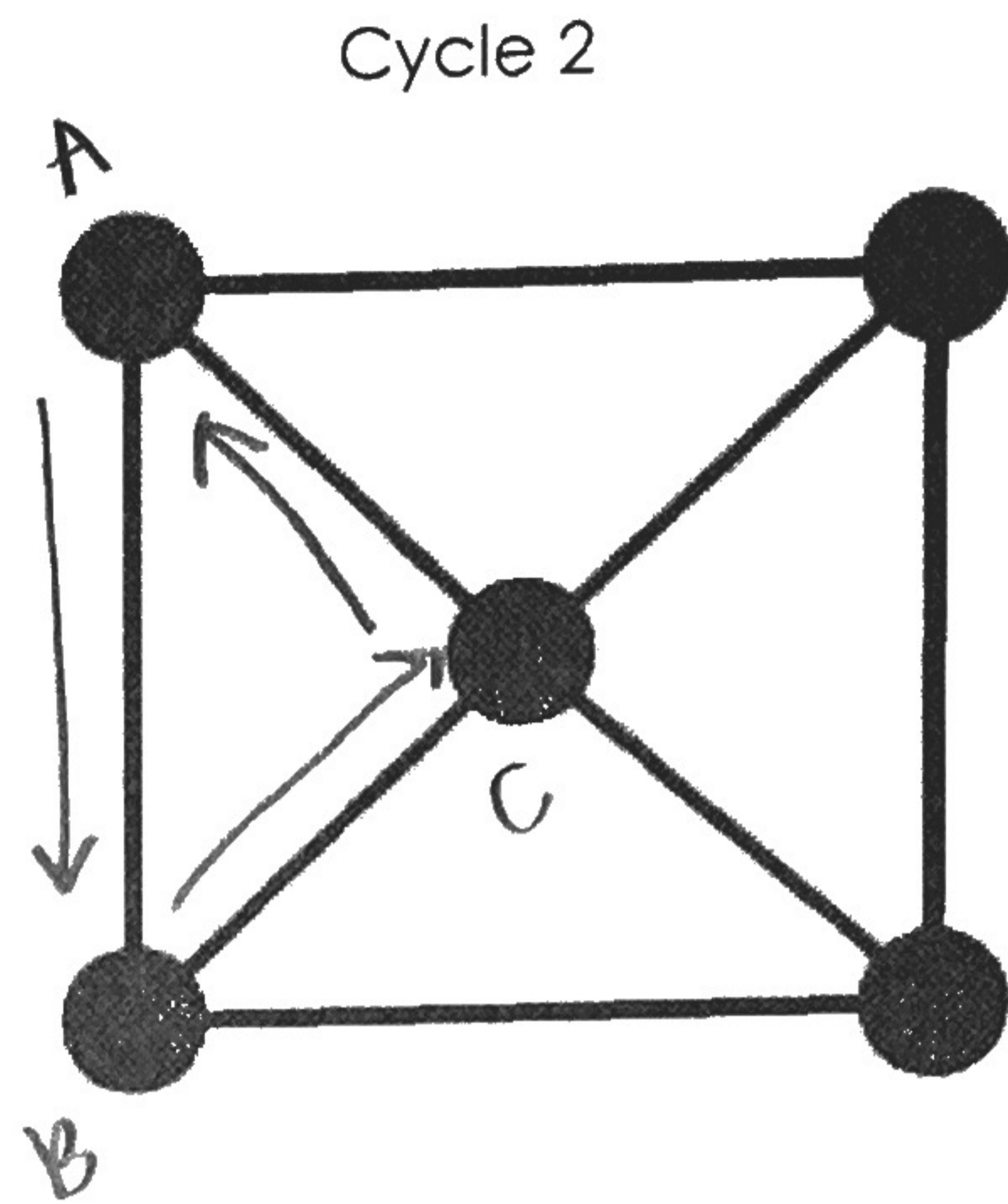
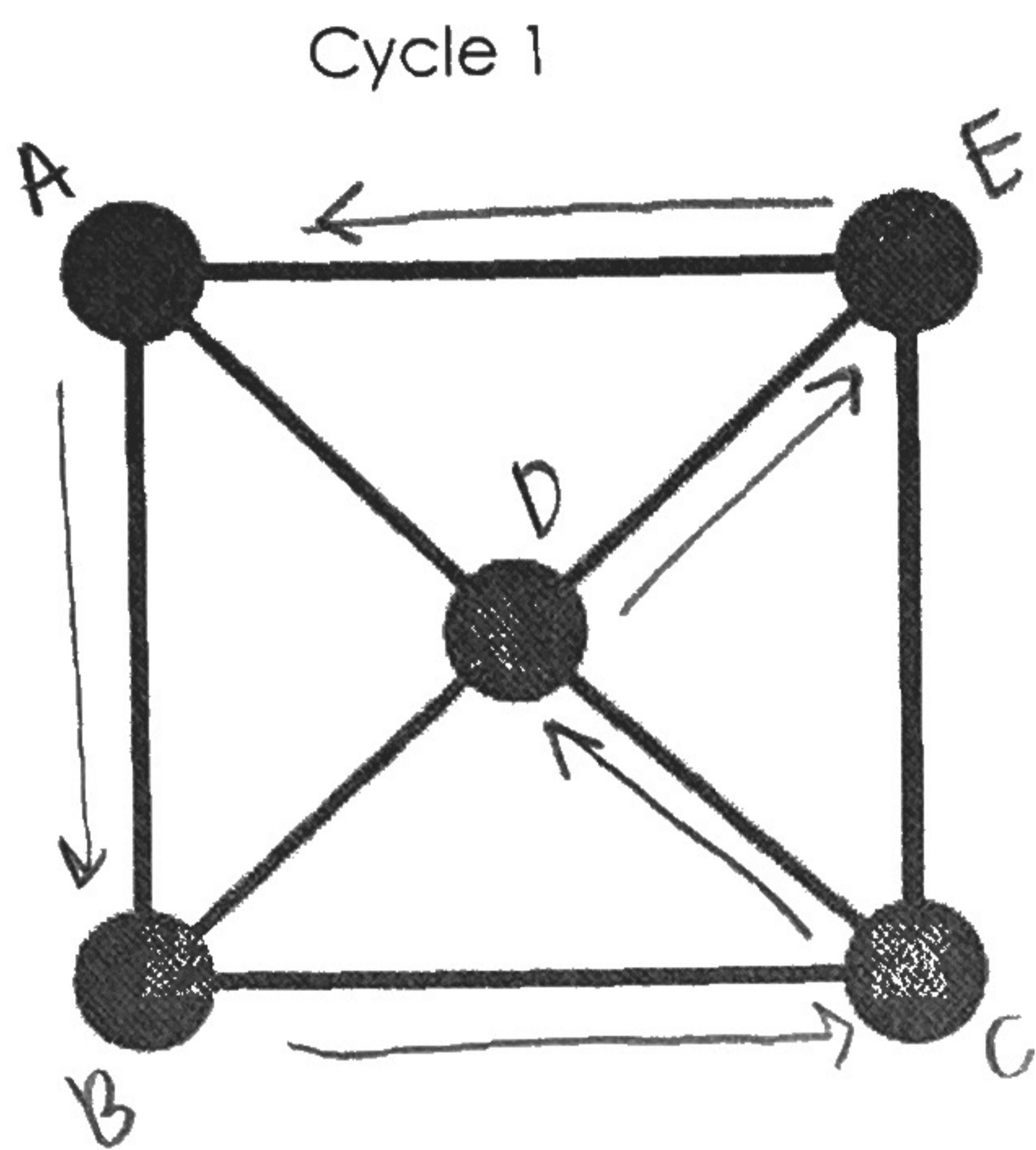
if you used +4, meet with a partner to discuss why

b. Did everyone's network have the same shape? only 4 are needed.

NO - there are multiple solutions.

4. A **cycle** in a graph is a path that starts and ends at the same vertex and does not use any edge more than once. * don't need to use all edges.

Identify two cycles in the graph from Question 1.



- b. Does your network from Question 2 have any cycles? Should it?
NO. there were no cycles since the paths were efficient. if a cycle existed, at least 1 edge could be removed. An "extra" path.
- c. What does the existence of cycles tell you about the efficiency of a network?
if a cycle exists, there is at least one extra path that isn't needed.

5. REFLECTION: Describe how a cycle is similar to an Euler circuit.

A cycle requires that a path begins & ends at the same vertex, similar to Euler circuits and requires that no edge is used more than once. However, Euler circuits require every edge be crossed where as a cycle does not.