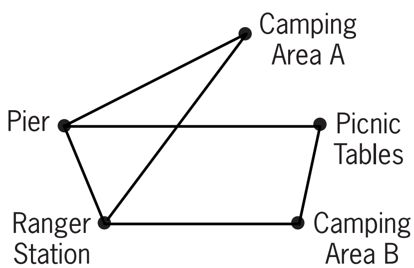
NAME ______________________________

Module 20 Solving Problems Using Probability, Statistics, and Discrete Math

Lesson 4 Solving Discrete Mathematics Problems

independent practice

Use the following graph for Questions 1–4. The graph represents different areas of interest at a campground.



1. Find the degree of each vertex.

   Camping Area A: 2; Camping Area B: 2; Picnic Tables: 2; Pier: 3; Ranger Station: 3

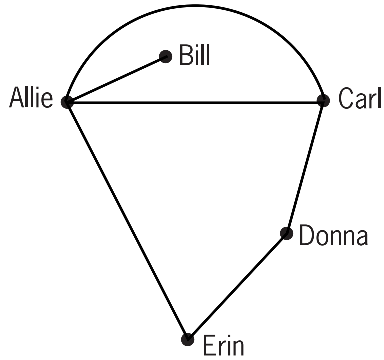
2. Find the sum of the degrees of the vertices in the graph. **12**

3. How many edges does the graph have? **Six**

   How does the sum of the degrees of the vertices compare with the number of edges of the graph? **Possible answer: The sum of the degrees of the vertices is twice the number of edges.**

4. If there is a traversable path, give the path. If not, give the reason there is not a traversable path. **If each vertex has an even degree or there are exactly two vertices with an odd degree, there is a traversable path. The Pier and the Ranger Station each have degree three, so there is a traversable path which begins and/or ends at the Pier and the Ranger Station. Possible path: Pier – Picnic Tables – Camping Area B – Ranger Station – Pier – Camping Area A – Ranger Station**

Use the following graph for Problems 5–9. The graph represents phone calls made by a group of people.



5. Bill talked to whom? **Allie**

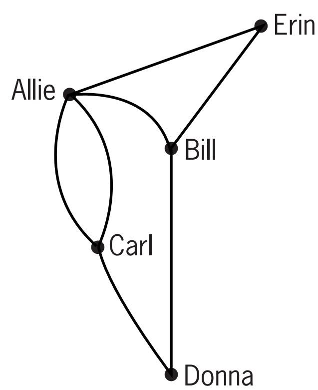
6. Allie talked to whom? **Erin, Bill, and Carl (twice).**

7. Erin threw a party and let people know by calling the people as shown on the graph. Was it possible that all of the people on the graph would find out about the party? Why or why not?

It is possible if other people call for Erin. Possible answer: Erin calls Donna and Allie. Allie calls Bill and Carl and tells them about the party.

8. Is this graph equivalent to the graph above? Explain why or why not.

The vertex Bill has three edges connected to it instead of one; they are not equivalent.

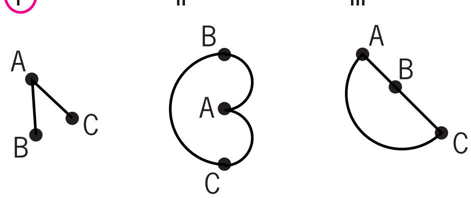


9. Draw a graph which is equivalent to the graph above Problem 5.

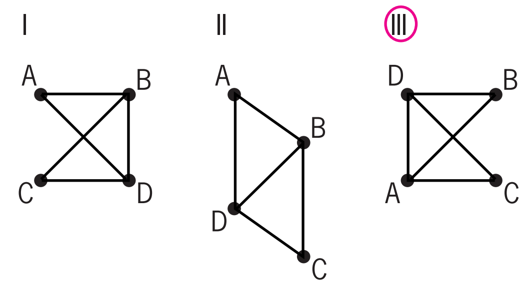
Student's graphs should connect Allie and Carl twice, Allie and Bill once, Allie and Erin once, Carl and Donna once, and Donna and Erin once.

10. Select the graph that is not equivalent to the other two.

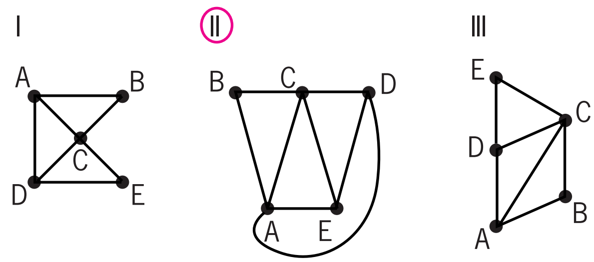
I II III



11. Select the graph that is not equivalent to the other two.



12. Select the graph that is not equivalent to the other two.



Journal

1. Explain to a friend why graphs that do not look alike can be equivalent graphs.
2. Draw a graph that is not traversable. Explain how you know it is not traversable.
3. Is it possible to have a graph with exactly two vertices that is *not* traversable? Explain the answer.
4. Sam says that you can find the degree of each of the vertices of a graph by dividing the number of edges by the number of degrees. Hanna disagrees. Who is correct? Why?

Cumulative Review

Identify the algebraic property illustrated in each problem.

1. $5 + 6 + (8 + 10) = 5 + 6 + (10 + 8)$

Commutative Property of Addition

2. $g = g$

Reflexive Property of Equality

3. If $p = r$ and $r = 7$, then $p = 7$.

Transitive Property of Equality

4. $9(k + m) = 9k + 9m$

Distributive Property

Solve each inequality for *b*. The solutions do not need to be graphed.

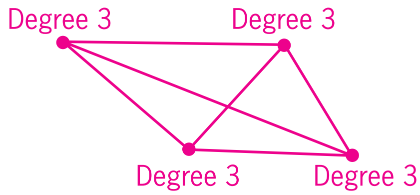
5. $b + 23 = 5$ $\mathbf{b \geq -18}$

6. $\frac{b}{5} < 3$ $\mathbf{b < 15}$

7. $-2b + 1 > 7$ $\mathbf{b < -3}$

8. $\frac{b}{-10} \leq \frac{1}{5}$ $\mathbf{b \geq -2}$

Possible Journal Answers

1. **Appearances do not make equivalent graphs. As long as the connections shown in each of the graphs are the same, the graphs are equivalent.**
2. 

   It is not traversable because more than two vertices have odd degrees.
3. **It is not possible for a graph with two vertices to be nontransversable. Each edge will connect the two vertices, so the vertices will have the same degree. Either the two vertices will both have even degrees, or the graph will contain exactly two vertices that have odd degrees.**
4. **Hanna is correct. Sam would be correct if he knew that each of the vertices in the graph had the same degree. Without that information, his method will not always be correct.**