Solving Playground Network Problems
Use cooperation and logical thinking to find solutions.

Materials
- playground with painted game courts or other paved surface (a four square court is an ideal network)
- chalk
- small ball or other object to toss
- blank stickers
- markers

Group Size
Depends on the network: It's simpler to solve your problem if the number of points in the network is two or three more than the number of people in your group. For example, since a four square court has nine points, a good group size is six or seven.

Related Activity
Traveling Networks 📄

Math Reminder
Networks are drawn with a series of *points* connected by lines called *edges*.
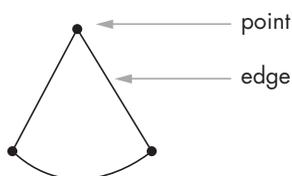

Background
Many networks have something traveling along them such as the cars on a network of roads. On the Internet, data such as e-mail, web pages, and videos of your clever cat move on devices such as copper wire and fiber-optic cables, as well as on radio waves. Specialized computers called *routers* communicate with each other to check out possible paths and to determine the most efficient way to get data to its destination. In this activity, the people in a group act both as routers, figuring out with each other how to effectively get data to the place it's being sent, *and* as the actual data, because they travel various edges of a network to get to their destination or "home" point.

Try This
1. Identify several networks such as a four square court or some portion of a larger court. You can also use chalk to draw your own large network.

2. Choose or draw a network that has two or three points more than the number of people in your group.

3. Use the chalk to label each point on the network with letters: A, B, C, and so on.
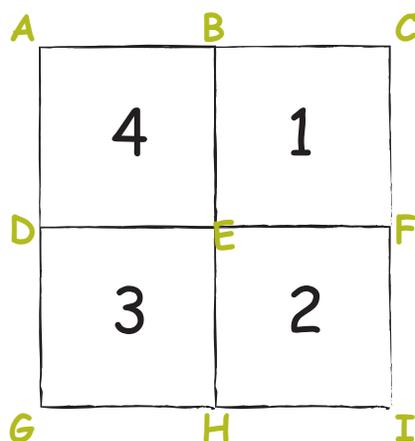
4. Use the stickers and markers to make labels for the people in your group, using the same letters as those labeling the points on the network.

5. Follow the rules below to travel the network.

6. When you've finished, discuss what the group did. Can you draw any conclusions about decisions or strategies that were successful or unsuccessful?

Solving Playground Network Problems (continued)

The Rules

- The object is for everyone to get to their "home" point—the point whose letter matches the label they're wearing.

- Everyone begins by standing on a point other than their home point, but they should notice the location of the point they're trying to reach.

- Play begins when everyone is in place and one person has the ball.

- If you're the person who's holding the ball, you can choose to run down an edge to an empty adjacent point and then throw the ball to someone else, or you can simply throw the ball to any other person. You need to think beyond just getting yourself home and think about how to get everyone home. Talk to each other as you try to solve the problem.

- A person can only run down an edge to an adjacent point if (1) the point is empty, and (2) he or she is holding the ball.

- Play continues until everyone gets home.

What's Going On?

Networks that are trying to deliver something—the Internet, telephone companies, the post office, and many others—try to determine the most efficient routes, but they also look at alternatives in case there's some problem with the shortest path. You may have found that in order to help other people get to their destinations, you had to take an indirect path yourself. In this activity, cooperation is key.

Extensions

- Did you learn some things about traveling a network that would let you do it more effectively a second time? Try it and see!

- Try the same network, with one more person in your group. The problem is harder to solve when the number of people is only one or two less than the number of points.

- Learn something about a real-world network: The next time your family has a tracking number for a package that's being sent some distance, go to the website of the organization that's handling the package and track it. After several days, you're likely to see the names of several cities where the package has been. These cities are points on that organization's network.

This activity was adapted from a collection of activities from the Los Alamos National Laboratory Mega-Math Program called "More Games on Graphs."