

## Larger Significance of This Activity

This game is an example of a simple dynamical system. A dynamical system consists of a space and a rule. In our game, the “space” consists of people sitting in a circle. The “rule” describes how the people in the circle pass candy. Dynamical systems have many applications – anything that grows or moves according to a repeating rule can be described by a dynamical system. Some examples of dynamical systems include traffic patterns, the way neurons in the brain exchange electrical signals, and the way water flows.

## Materials List

- Wrapped candies
- Paper and pencils

## Leader Instructions

1. Have a group of people sit in a circle on the floor. A group of 3 to 10 people works best.
2. Explain how the game will work.
  - You will distribute candy among all the participants but the distribution will not necessarily be even. Everyone should place the candy on the floor in front of them. No eating candy until the end! Allow each participant to choose a piece of candy when they are done.
  - When the leader says “Share!”, everyone who has two or more pieces of candy in front of them gives one piece to the person on the right and one piece to the person on the left. (They should use both arms to do this at the same time.) People with one or zero pieces of candy do nothing.
  - After the appropriate people have shared candy, the leader will say “Share!” again. This process repeats until the group feels that they understand what is happening with the game.
  - Several things might happen with the game. The game might stop because no one is passing candy any more. The game might settle down so that even though everyone passes candy every time, the amount of candy that each person has is always the same. A repeating pattern might emerge in the way that the candy is being shared.
3. Play at least three or four games. Distributing candy unevenly is generally more interesting than distributing it evenly. Give some people no candy and some people lots of candy. For one of the games, give out fewer pieces of candy than there are participants. For another game give out more than twice as much candy as there are participants. For other games give an amount of candy between these two extremes.

## Challenge Questions

1. What starting conditions will cause the game to stop with no one passing candy any more?
2. What starting conditions will cause the game to settle down so that everyone passes candy but the amounts of candy do not change?
3. Try starting with as many pieces of candy as there are people in the circle. Can you find a way to distribute the candy initially that leads to a game that stops? Can you find a way to distribute the candy that causes a pattern of sharing that never stops?