Rock, Paper, Life Cycle

Materials:
- Flat, open space

Overview & Objective
Monarchs are a much-anticipation visitor to the garden each year. Monarch butterflies are a great jumping off point to learn more about life cycles and species diversity. This lesson ideally follows the Monarch Migration lesson and exploration of monarchs in the garden. This game builds upon monarch observations and students will make connections about resource competition and survival.

Students will:
- Model the life cycle of a monarch butterfly;
- Predict why some individuals survive and reproduce and others do not.

Pre-Activity Questions:
- Do humans look the same during their entire life?
- Share with a partner how you think butterflies change during their life.
- Do you think all monarch caterpillars in the garden will turn into butterflies?
- What do plant do butterflies need to lay their eggs (milkweed)? What do you think happens if milkweed is not available?

Egg → Caterpillar → Chrysalis → Butterfly

Standards and Curricular Connections:
Next Generation Science Standards
3-LS1-1 Develop models to describe that organisms have unique and diverse life cycles.
3-LS4-1 Use evidence to construct an explanation for how variations in characteristics among individuals of the same species may provide advantages.
4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival.
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Strategies for Engagement:

- The Rock, Paper, Life Cycle Game can be adapted for almost any life cycle you encounter in the garden, from birds to peas. Just get creative and change the motions.
- Add in silly categories at the end like "Super Butterfly" to lengthen the game.
- Have students demonstrate the game before beginning.

Resources:
Gateway Greening's Lending Library

- The Life Cycles of Butterflies, by Judy Burris and Wayne Richards
- Monarch and Milkweed, By Helen Frost
- A Butterfly is Patient, By Dianna Hutts Aston
- Where Butterflies Grow, by Joanne Ryder
- Butterflies Abound! by Beaty/Fountas

Activity

- Bring the class together and act out the monarch life cycle.
  - First, squat and form a ball to act out the egg. Butterflies lay eggs on specific plants, like milkweed for monarchs. Monarch butterfly eggs are very tiny, about the size of a pencil tip.
  - Next, stand up and open and close your hands in front of your face to mimic a large mouth. You are now caterpillars (larva) and eat constantly to grow quickly.
  - Then put your hands down and spin slowly. You are a chrysalis spun from silk thread. Butterflies average about 2 weeks in the chrysalis.
  - Lastly, gently move your arms up and down to mimic flapping wings - you are now a mature butterfly.

- Once students know the four stages of a butterfly's life cycle and their corresponding actions, they are ready to play.
- Tell the students they are going to act out the life cycle of a butterfly but with a twist! Verify that all students know how to play Rock, Paper, Scissors. Review the rules (see sidebar) and when to "shoot" if needed.
- Everyone starts as an egg. You must make your egg action (squat) until you find another egg to play against. Play Rock, Paper, Scissors. The winner moves onto the next stage of the life cycle - caterpillar.
- Continue playing the rock, paper, scissors against someone else who is in the same stage of the life cycle as you. Make sure you make the corresponding motion for your life cycle stage and say it aloud.
- If you win, you move up to the next stage until you are turned into a butterfly and stand to the side. If you lose, go back a level (caterpillar to egg, chrysalis to caterpillar). Eggs stay an egg.
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- It is impossible for all students to turn into butterflies. Stop the game when the majority of students are butterflies.
- Debrief the game. What was unrealistic about the game (butterflies going backward in their life cycle)? What was realistic? What could the students who did not turn into butterflies during the game represent? Why do some butterflies not survive? What could we do to help butterflies at the school?

Additional Activities & Follow Up
- Research specific plants that butterflies need to lay their eggs. Determine if those plants would do well in the school garden. Design and plant a butterfly garden. Compare the number of butterfly sightings the year before and after the installation of the butterfly garden.
- Illustrate a human life cycle. Compare and contrast it to the butterfly's life cycle.
- Investigate camouflage. How could certain colorings and marking help a butterfly survive? Design a butterfly or animal would be well camouflaged in the garden. Older students can research how the pollution of the Industrial Revolution affected the natural selection of the Peppered Moth.