Name: _____   Date: _____

Student Exploration: Pattern Finder

Vocabulary: experiment, hypothesis, observe, prediction, theory

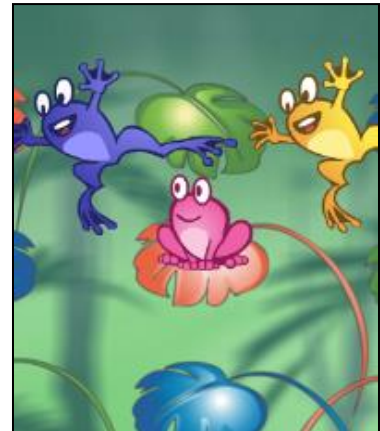**Prior Knowledge Questions** (Do these BEFORE using the Gizmo.)

1. What is the order of the seasons? _____

2. A traffic light is green. What color will it be next? _____

3. If today is Wednesday, what day will it be 9 days from now? _____

4. What do seasons, traffic lights, and days of the week all have in common? _____

   _____

   _____

Gizmo Warm-up
The *Pattern Finder* Gizmo lets you find and test patterns by observing frogs hop around a set of lily pads.

1. Grab the blue frog and drop it on any lily pad you want. **Observe** the frog. Describe a pattern you find.

   _____

2. Click **Catch all**. Grab the blue frog and put it on a few

   different pads. Does it follow the same pattern? _____

3. Predict what color lily pad it will go to if placed on the pad in the top-left corner. _____

4. Put the blue frog on the pad in the top-left corner. What color does it jump to? _____

5. You just ran an **experiment** to test a pattern. Was your **prediction** correct? _____

| **Activity A:**

Observing patterns | <u>Get the Gizmo ready</u>:

• Click **Catch all**. | |

Question: How do we find patterns?

1. <u>Collect data</u>: Place the brown frog on any blue lily pad. Record the colors of the lily pads it visits in order. Write **R** for red, **B** for blue, and **G** for green. Record the first 15 hops.

   _____

2. <u>Analyze</u>: Put the brown frog on other pads and watch. What pattern does it seem to follow?

   _____

3. <u>Observe</u>: Click **Catch all** and repeat the above steps with the pink frog.

   A. What pattern does the pink frog follow? _____

   B. Does its pattern depend on where it starts? Explain. _____

   _____

4. <u>Find the pattern</u>: What pattern does the yellow frog follow? _____

   _____

5. <u>Extend</u>: Describe the red frog's pattern. _____

   _____

   _____

6. <u>Challenge</u>: Compare the purple and red frogs. (Hint: Pay attention to more than just color.)

   A. How are their patterns similar? _____

   _____

   B. How are they different? _____

   _____

| **Activity B:**

Testing patterns | <u>Get the Gizmo ready</u>:

• Select **Advanced**.
• Click **Catch all**. | |

Question: How can we gain confidence in the patterns we see?

1. <u>Form hypothesis</u>: Put the yellow frog on any pad. Observe it carefully. Try it on other pads. When you think you understand the frog's behavior, write your belief, or **hypothesis**, below.

   _____

   _____

2. <u>Predict</u>: The true test of a hypothesis is if it predicts the results of experiments you have not yet tried. You should not trust a pattern until it correctly predicts the results of a test.

   Use your hypothesis to fill in the two sentences below.

   A. *From the blue pad at lower left, the yellow frog will next jump to a _____ pad.*

   B. *From the red pad at lower right, the yellow frog will next jump to a _____ pad.*

3. <u>Test</u>: Run experiments to test your predictions. Were you correct both times? _____
   • If one of your predictions was wrong, your hypothesis has been disproven.
   • If your predictions were correct, your tests support your hypothesis.
   • If enough experiments support a hypothesis, it can become a **theory**.

4. <u>Form hypothesis</u>: Now observe the pink frog carefully. What pattern does it repeat?

   _____

5. <u>Predict</u>: What are the next 10 colors the pink frog will visit if you start it at the bottom left?

   _____

6. <u>Test</u>: Test your hypothesis. What happened? _____

7. <u>Challenge</u>: Can you ever absolutely prove that a hypothesis is correct? Explain. _____

   _____

   _____

| Activity C:

Using patterns | <u>Get the Gizmo ready</u>:

• Select **Advanced**.
• Click **Catch all**. | |

Question: How can we use patterns to answer questions?

1. <u>Find a pattern</u>: Place the blue frog on any pad and observe it. What pattern does it follow?

   _____

2. <u>Analyze</u>: No matter where it starts, what color will it visit *least* in its first 20 jumps? Why?

   _____

   _____

3. <u>Observe</u>: Click **Catch all**. Observe the red frog. What rules does it appear to follow?

   _____

   _____

4. <u>Analyze</u>: Think about what will happen if you drop the red frog on a green pad.

   A. What color will it never hit? _____ Explain. _____

      _____

   B. Starting on green, what color will the red frog spend most of its time on? _____

   C. Explain. _____

5. <u>Observe</u>: Click **Catch all**. Observe the purple frog. What rules does it appear to follow?

   _____

   _____

6. <u>Challenge</u>: Suppose you drop the purple frog on a green lily pad. Will it be easier to predict the color it will be on after 1 jump or after 4 jumps? Explain.

   _____

   _____