

Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Student Exploration: Pattern Finder

**Vocabulary:** experiment, hypothesis, observe, prediction, theory

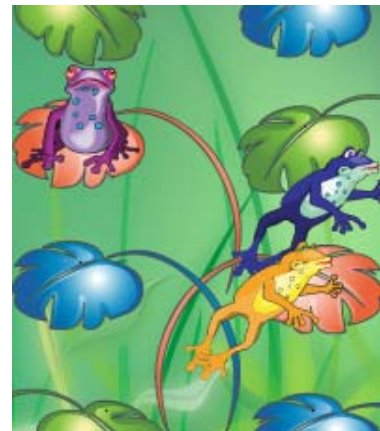
**Prior Knowledge Questions** (Do these BEFORE using the Gizmo.)


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? \_\_\_\_\_



<b>Activity A:</b> <b>Observing patterns</b>	<u>Get the Gizmo ready:</u> <ul style="list-style-type: none"> <li>Click <b>Catch all</b>.</li> </ul>	
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**Question: How do we find patterns?**

1. Collect data: 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. Analyze: Put the **brown frog** on other pads and watch. What pattern does it seem to follow?

\_\_\_\_\_

3. Observe: 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. Find the pattern: What pattern does the **yellow frog** follow? \_\_\_\_\_

\_\_\_\_\_

5. Extend: Describe the **red frog's** pattern. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_


6. Challenge: 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? \_\_\_\_\_

\_\_\_\_\_

<b>Activity B:</b> <b>Testing patterns</b>	<u>Get the Gizmo ready:</u> <ul style="list-style-type: none"> <li>• Select <b>Advanced</b>.</li> <li>• Click <b>Catch all</b>.</li> </ul>	
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**Question: How can we gain confidence in the patterns we see?**

1. Form hypothesis: 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.

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2. Predict: 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. Test: 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. Form hypothesis: Now observe the **pink frog** carefully. What pattern does it repeat?

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

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6. Test: Test your hypothesis. What happened? \_\_\_\_\_

7. Challenge: Can you ever absolutely prove that a hypothesis is correct? Explain. \_\_\_\_\_

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<p><b>Activity C:</b> <b>Using patterns</b></p>	<p><u>Get the Gizmo ready:</u></p> <ul style="list-style-type: none"> <li>• Select <b>Advanced</b>.</li> <li>• Click <b>Catch all</b>.</li> </ul>	
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**Question: How can we use patterns to answer questions?**

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

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

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

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4. Analyze: Think about what will happen if you drop the **red frog** on a green pad.

A. What color will it never hit? \_\_\_\_\_ Explain. \_\_\_\_\_

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

C. Explain. \_\_\_\_\_

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

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6. Challenge: 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.

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