Innovators Assemble: The Iteration Rotation

A collaborative protocol for creating, testing, improving, and learning together

Teacher Guide	
Purpose	The Iteration Rotation is a collaborative making routine that encourages students to see their first attempt as a starting point rather than a finished product. Students create, test, revise, and build on one another's thinking as a project moves through several makers. The goal is to develop persistence, creativity, collaboration, and comfort with productive failure while giving students repeated opportunities to improve an idea.
The Routine **Create → Pass → Test → Iterate → Pass → Return → Reflect**	
Create **10 minutes**	Students begin their own creation, solution, design, or model. The goal is not perfection. It is to create a strong starting point for another maker. PASS - Students pass their creation to the next person in their rotation.
Test **2–3 minutes**	Before changing anything, the new maker explores the creation. What is already working? What do they think the original maker intended? What could be improved?
Iterate **5–10 minutes**	The new maker makes one or more thoughtful changes that build on the existing work. They should improve, extend, or solve a problem rather than simply replacing the original idea with their own. PASS & REPEAT - The creation moves to another maker, who repeats the Test → Iterate process. Continue for 2–3 rotations.
Return	The creation returns to its original maker. Students explore what changed and consider how other makers' ideas affected their original work.
Reflect **5–10 minutes**	Students reflect individually or collaboratively: • How did your creation change? • Which iteration made the biggest difference? • Did someone make a change you would not have considered? • What didn't work, and what did you learn from it? • If you had one more iteration, what would you try next?
Setup	
Group size	3–4 students

Total time	Approximately 40–60 minutes
Works well with	STEM challenges, models, writing, coding, art, math problem solving, and other open-ended creation tasks.

Iteration Rotation in Action: Makey Makey Invention Challenge

The Challenge	Use Makey Makey and everyday materials to create an interactive invention that solves a problem, teaches something, **or** makes an everyday experience more fun.
Stations	**Round 1: Create** Students begin an invention with Makey Makey, Scratch, and conductive materials. **Round 2: Test + Iterate** Pass it. The next maker has to figure out how it works, test the circuit/program, and make one purposeful improvement. **Round 3: Test + Iterate** Pass again. A new maker tests what exists and adds another thoughtful iteration. **Return** The original maker gets it back, tests the evolved invention, and decides what they would change next.
Reflect	Students answer questions: ● What changed? ● What failed? ● What did someone else notice that you didn't? ● Which iteration improved the invention? ● What would you try next?

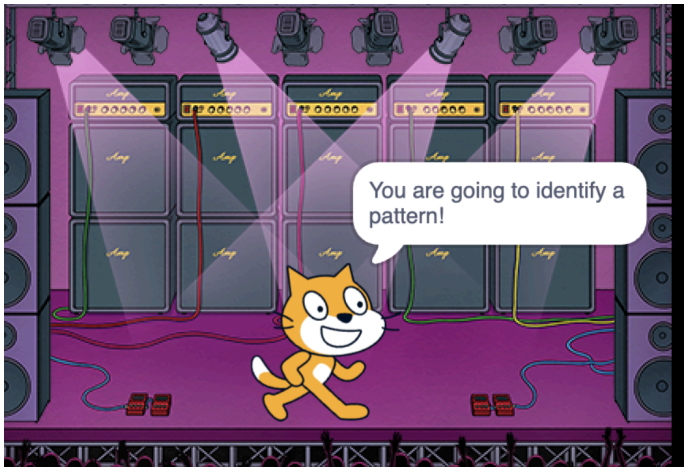
Student Guide

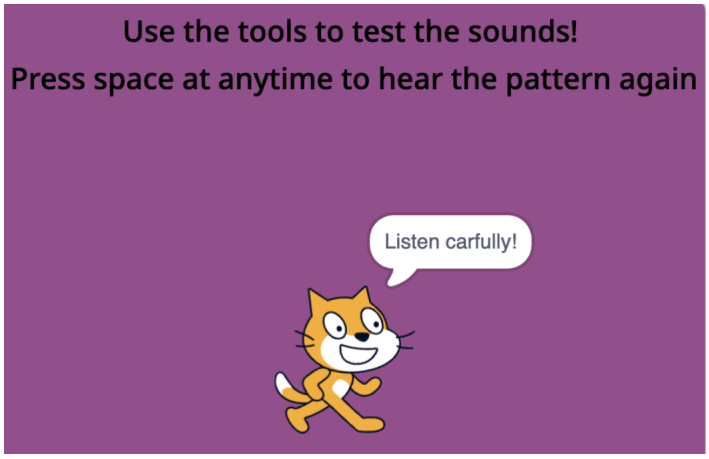
Materials	● The_Iteration_Rotation created with Notebooklm ● Iteration cards (at bottom of page)

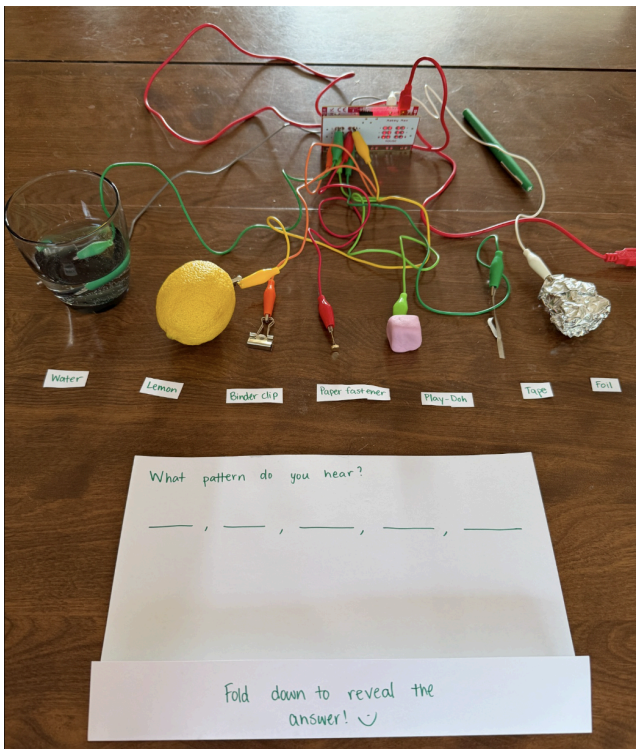
Teacher Example

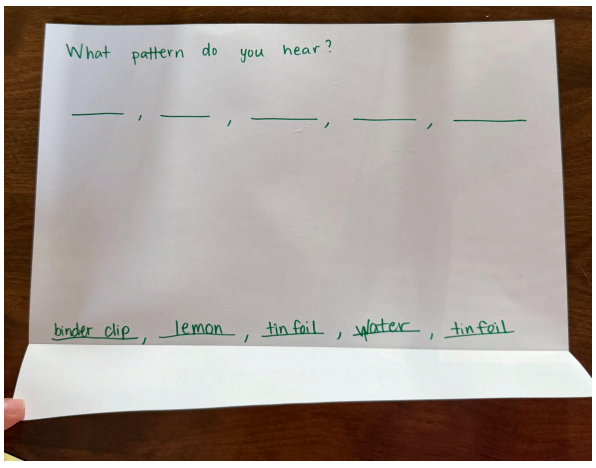
Iteration 1


when clicked
switch backdrop to Concert
say You are going to identify a pattern! for 5 seconds
say Press space to begin for 5 seconds
when space key pressed
switch backdrop to Concert2
say Listen carfully! for 2 seconds
play sound C Sax until done
play sound B Trumpet until done
play sound G Ukulele until done
play sound A Piano until done
play sound G Ukulele until done
when s key pressed
start sound C Sax
when w key pressed
start sound A Piano
when d key pressed
start sound D Trombone
when a key pressed
start sound B Trumpet
when g key pressed
start sound E Guitar
when f key pressed
start sound F Elec Bass
when up arrow key pressed
start sound G Ukulele

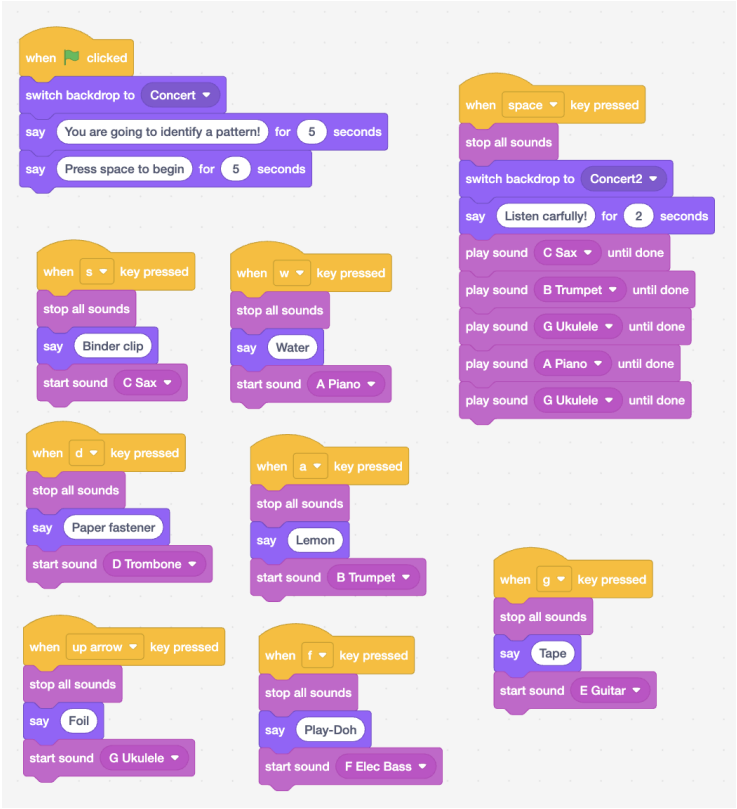
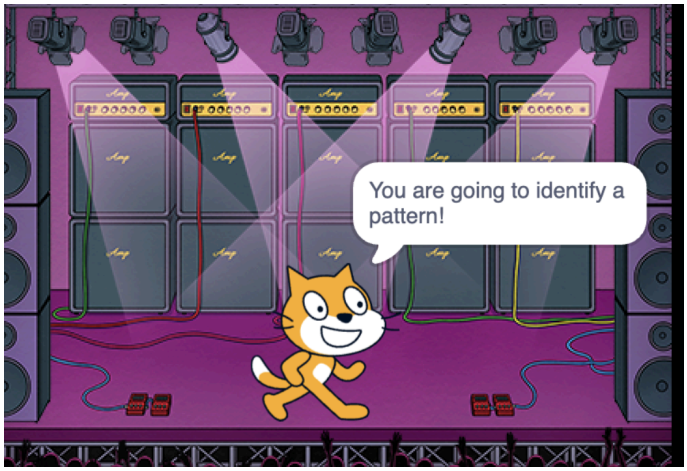

You are going to identify a pattern!

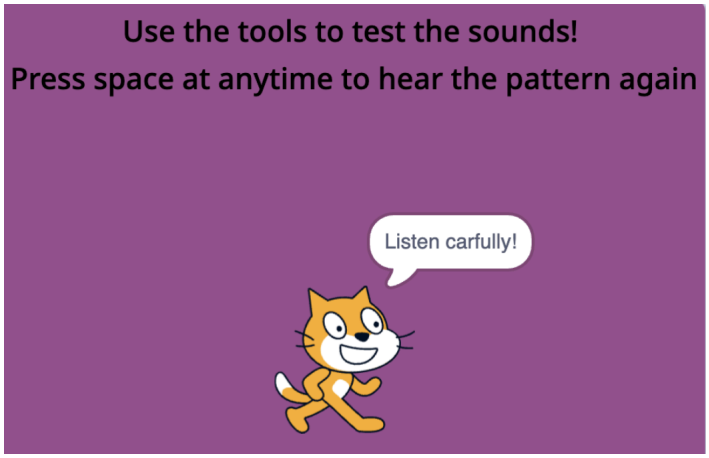


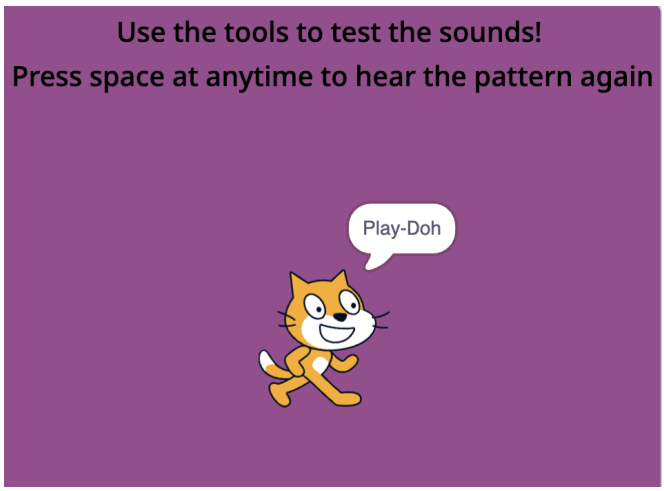


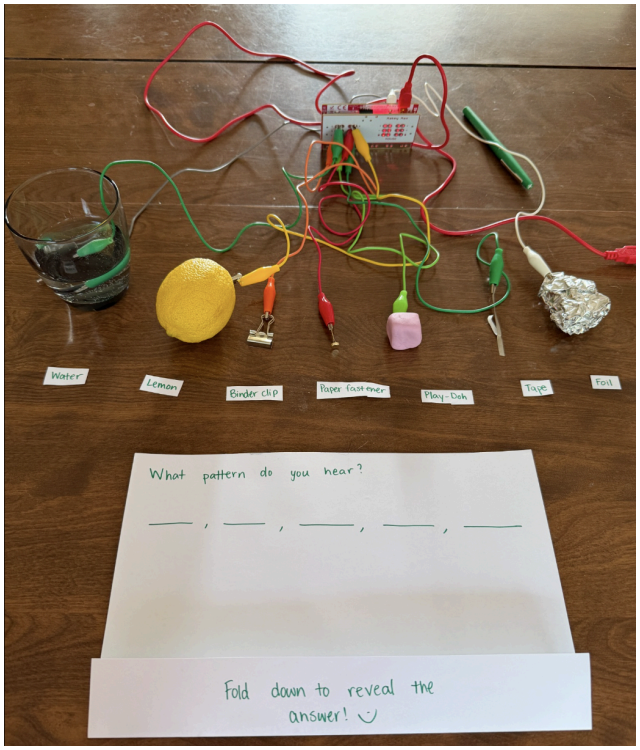


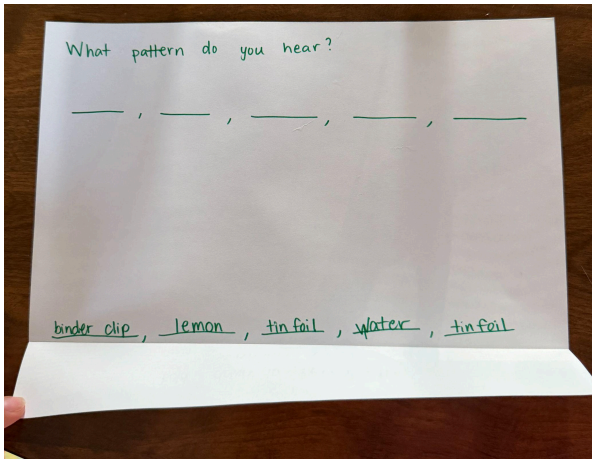
Original intention: I wanted to create an interactive math activity where students use Makey Makey to explore different conductive materials while identifying a musical pattern played through Scratch. Students can replay the pattern, test the connected materials to identify individual sounds, record their thinking, and reveal the answer when they are ready.

	What I created: A Scratch program plays a five-sound pattern and assigns individual sounds to seven different Makey Makey inputs. Each input is connected to a different conductive material for the learner to explore and test. A paper recording sheet allows the learner to record the pattern before revealing the answer.
Iteration 2	 


Use the tools to test the sounds!
Press space at anytime to hear the pattern again
Listen carfully!


Use the tools to test the sounds!
Press space at anytime to hear the pattern again
Play-Doh



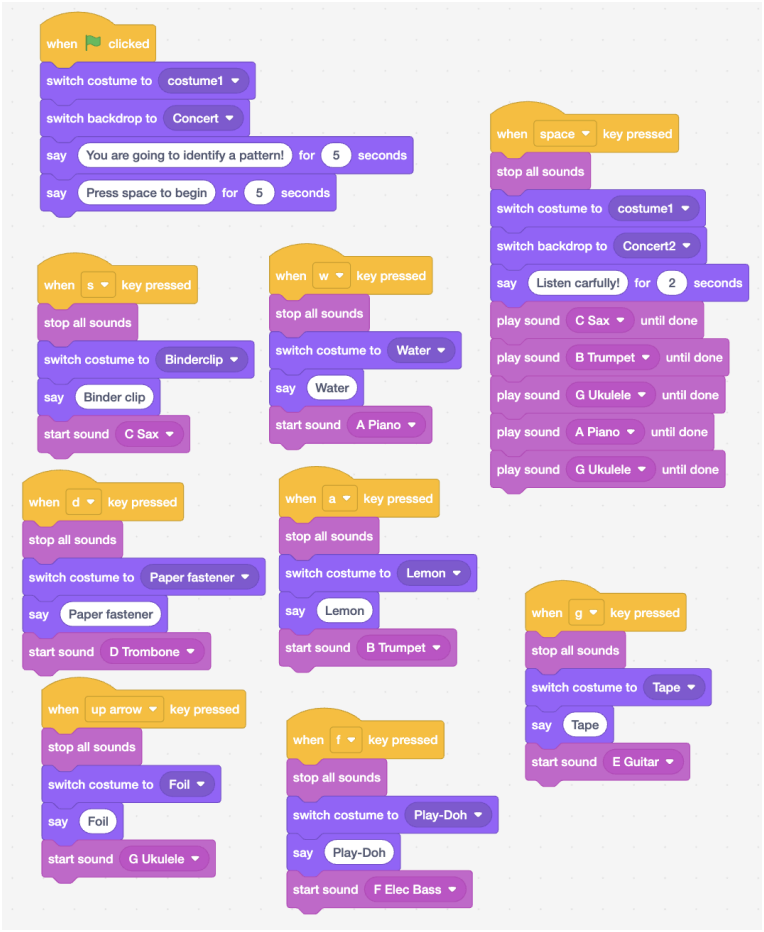


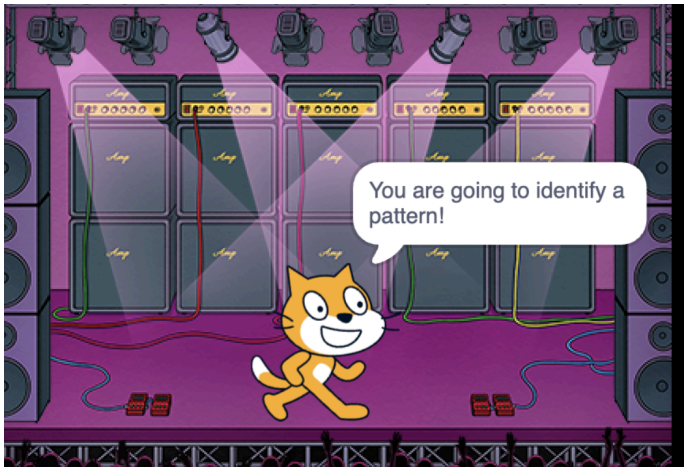
What I noticed: When I tested the first version, I noticed that sounds could overlap as I explored the different materials. This made it difficult to clearly hear the original pattern when I replayed it. I also realized that learners had to keep track of which physical material produced each sound without any feedback from Scratch.

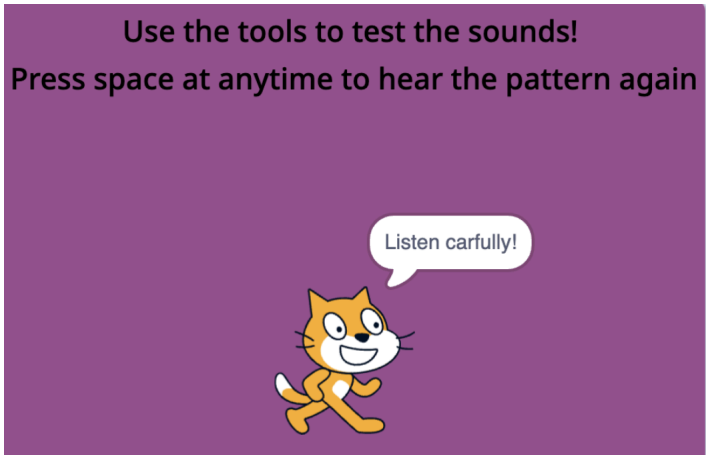
What I changed: I added a "stop all sounds" block before each sound so learners can hear one input at a time. I also programmed the sprite to say the name of the material being tested each time an input is activated.

Why I changed it: These changes make the activity easier to navigate without changing the challenge itself. Learners still have to listen, experiment, and identify the pattern, but they now receive clearer auditory and visual feedback while doing so.

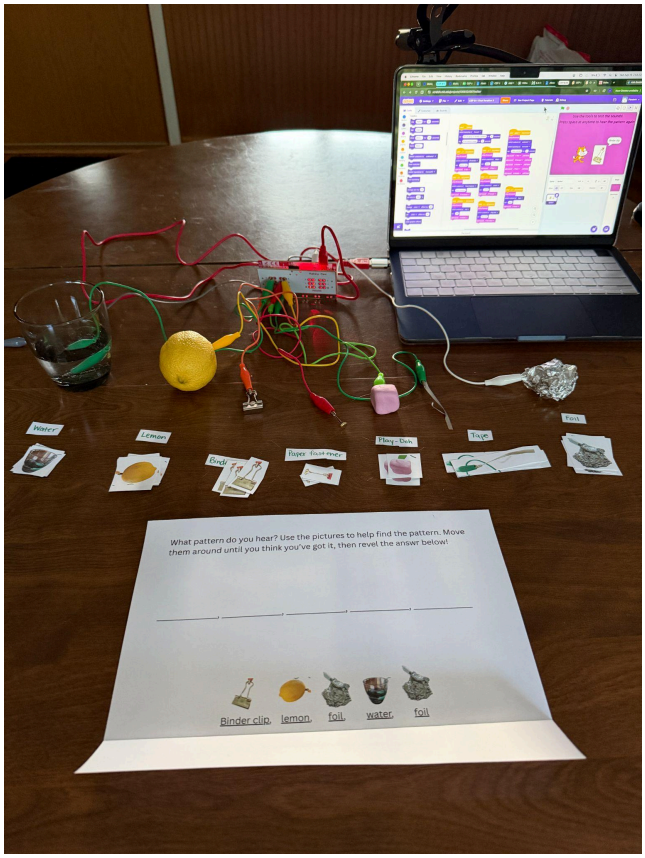
Iteration 3

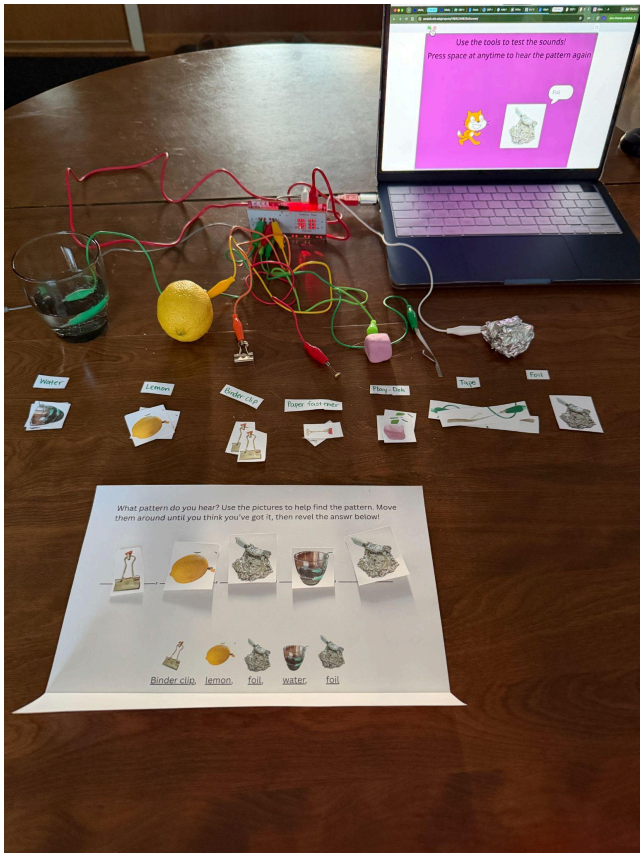

when clicked
switch costume to costume1
switch backdrop to Concert
say You are going to identify a pattern! for 5 seconds
say Press space to begin for 5 seconds
when space key pressed
stop all sounds
switch costume to costume1
switch backdrop to Concert2
say Listen carfully! for 2 seconds
play sound C Sax until done
play sound B Trumpet until done
play sound G Ukulele until done
play sound A Piano until done
play sound G Ukulele until done
when s key pressed
stop all sounds
switch costume to Binderclip
say Binder clip
start sound C Sax
when w key pressed
stop all sounds
switch costume to Water
say Water
start sound A Piano
when d key pressed
stop all sounds
switch costume to Paper fastener
say Paper fastener
start sound D Trombone
when a key pressed
stop all sounds
switch costume to Lemon
say Lemon
start sound B Trumpet
when g key pressed
stop all sounds
switch costume to Tape
say Tape
start sound E Guitar
when up arrow key pressed
stop all sounds
switch costume to Foil
say Foil
start sound G Ukulele
when f key pressed
stop all sounds
switch costume to Play-Doh
say Play-Doh
start sound F Elec Bass


You are going to identify a pattern!


Use the tools to test the sounds!
Press space at anytime to hear the pattern again
Listen carfully!

	Use the tools to test the sounds! Press space at anytime to hear the pattern again  


Water
Lemon
Binder clip
Paper fast-ener
Play-Doh
Tape
Foil
What pattern do you hear? Use the pictures to help find the pattern. Move them around until you think you've got it, then revel the answr below!
Binder clip, lemon, foil, water, foil


Use the tools to test the sounds!
Press space at anytime to hear the pattern again!
Water
Lemon
Binder clip
Paper fast-ener
Play-Doh
Tape
Foil
What pattern do you hear? Use the pictures to help find the pattern. Move them around until you think you've got it, then revel the answr below!
Binder clip, lemon, foil, water, foil

	What I noticed: After testing Version 2, I realized the activity still relied heavily on students remembering and translating auditory information. Students could hear each sound and see the name of the material, but they still had to hold that information in their heads while determining the pattern. What I changed: I added visual representations throughout the activity. Scratch now displays a picture of each material when it is tested. I also created movable picture cards students can physically arrange to represent the pattern they hear, and I added matching images to the answer reveal. Why I changed it: These additions give learners another way to access and represent the pattern. Instead of needing to remember the names or write each material immediately, students can manipulate the picture cards as they listen, test, revise, and build their answers.
Reflection	Testing the Iteration Rotation myself helped reinforce exactly why I wanted to create this protocol. My first version worked, but using it revealed opportunities I had not considered while designing it. In the second iteration, I added clearer auditory and written feedback. In the third, I incorporated images and manipulatives to make the activity more accessible and provide multiple ways for learners to process and represent the pattern. What stood out most was that none of the iterations required starting over. Each maker could preserve what was working while identifying one way to strengthen the existing creation. The process moved from creating, to testing, to improving, and ultimately resulted in something I would not have designed the same way on my first attempt. **Because I prototyped the rotation independently, I was missing one of its most important elements: different makers bringing different perspectives to the same creation. My next iteration will be using the protocol with students and allowing them to take the making process out of my hands and into theirs.
Designed for All Makers	
Learner Supports	● Providing visual and written directions for each stage of the rotation. ● Allowing students to explain their thinking verbally, visually, or in writing. ● Providing flexible roles or additional processing time when needed. ● Modeling how to give constructive feedback before beginning. ● Providing sentence stems and **Iteration Cards** to support decision-making. ● Allowing students to test and explore a creation before being expected to change it.

1

NOTICE IT

Understand before you change!

- What do you notice?
- What do you think the last maker was trying to do?
- What is already working well?

☐ Check when done

2

TEST IT

See what happens!

- Does it work the way you expected?
- What happens when you try it?
- Is there something that isn't working yet?

☐ Check when done

3

FIX IT

Find a problem you can solve!

- Is anything confusing or not working?
- What is one change you could try?
- Did your change help?

☐ Check when done

4

STRENGTHEN IT

Make something good even better!

- What part could be improved?
- Could anything be clearer, stronger, or more useful?
- What small change could make a big difference?

☐ Check when done

5

ADD TO IT

Build on the maker's idea.

- What could you add?
- Could you extend an idea that's already there?
- What would make the creation do even more?

☐ Check when done

6

TRY IT DIFFERENTLY

Explore another possibility!

- Is there another way this could work?
- What could you change without starting over?
- What happens if you try something unexpected?

☐ Check when done

7

HONOR THE MAKER

Remember whose idea you inherited.

Before making your change, ask:

- Am I building on their thinking?
- Am I changing something for a reason?
- Can someone still see the ideas that came before mine?

☐ Check when done

8

PASS IT ON

Before you rotate, be ready to explain:

I changed _____ because _____.

I think the next maker could explore _____.

☐ Check when done

⭐ **Maker Reminder:** Different isn't automatically better. A good iteration has a purpose!