indi™

Educator Guide Book

by ◉ sphero®

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This is indi

Rev up STEAM learning with the indi robot ("indi")--an entry level robot designed to introduce early learners to the fundamentals of computational thinking, STEAM, and computer science principles.

indi encourages open-ended, imaginative play-based learning with real-life scenarios as learners build custom mazes, solve puzzles, and drive.

indi offers an unplugged experience with an on-board color sensor. Students can also kick their programming skills into high gear with more learning options in the free Sphero Edu Jr app.

The Importance of Computational Thinking

Before young learners can begin to learn a programming language or assemble computer hardware, they need to learn how to think creatively to solve complex logical problems. The key to preparing young learners to grow up computer science literate is to reinforce computational thinking.

Computational thinking is the thought process involved in finding solutions for complex problems. Often

computational thinking is associated with computer science and programming but can be taught in the absence of any technology.

As young learners develop their computational thinking they are able to think more logically and articulate problems better. As students learn pattern recognition, creating and using algorithms, decomposition, and understanding abstraction they will become better thinkers and problem solvers.

Decomposition

- The process of breaking down something, like a complex problem, into smaller, more manageable parts.

- Understanding place value or being able to describe a story's arc requires the learner to break the bigger picture into smaller pieces. Everyday tasks like making a schedule or a shopping list are also examples of decomposition.

Pattern recognition

- The analysis of similar objects or ideas to extend or create patterns to better understand a problem.

- Early signs of pattern recognition include being able to sort objects by something like color, or learning to skip count. Realizing that most plants have green leaves or that the sun is seen during the day and the moon during the night are everyday examples too.

Abstraction

- The process of weeding out the important information and ignoring irrelevant details.

- Abstraction can be difficult for young learners because it generally only exists as an idea and requires the ability to make generalizations and draw conclusions. Examples include being able to identify the main idea of a story or formulate a hypothesis.

Algorithms

- The development of steps used to solve a problem, often a sequential set of rules that are followed.

- Solving a math problem or writing a computer program are examples of algorithmic thinking, but even everyday tasks like making a peanut butter and jelly sandwich or tying your shoes are examples of algorithmic thinking too.

Computer Science Teachers Association (CSTA) CS Standards

- **1A-CS-01** Select and operate appropriate software to perform a variety of tasks and recognize that users have different needs and preferences for the technology they use.

- **1A-CS-03** Describe basic hardware and software problems using accurate terminology.

- **1A-DA-05** Store, copy, search, retrieve, modify, and delete information using a computing device and define the information stored as data.

- **1A-DA-06** Collect and present the same data in various visual formats.

- **1A-DA-07** Identify and describe patterns in data visualizations, such as charts or graphs, to make predictions.

- **1A-AP-08** Model daily processes by creating and following algorithms (sets of step-by-step instructions) to complete tasks.

- **1A-AP-09** Model the way programs store and manipulate data by using numbers or other symbols to represent information.

- **1A-AP-10** Develop programs with sequences and simple loops, to express ideas or address a problem.

- **1A-AP-11** Decompose (break down) the steps needed to solve a problem into a precise sequence of instructions.

- **1A-AP-12** Develop plans that describe a program's sequence of events, goals, and expected outcomes.

- **1A-AP-14** Debug (identify and fix) errors in an algorithm or program that includes sequences and simple loops.

- **1A-AP-15** Using correct terminology, describe steps taken and choices made during the iterative process of program development.

Stages of Learning with indi

Exploration

All learners, especially young learners, benefit from being able to freely explore something new. Through the process, learners develop questions, find answers, and begin to generate new ideas.

Skills Building

Skills building highlights the skills used during this particular activity. These skills are developed or reinforced through focused practice.

Challenge

To demonstrate their level of learning during the activity, learners apply their skills and ideas to successfully complete a challenge.

Extended Challenge

An extended challenge is provided when there is a chance for students to demonstrate additional understanding and skills development.

Getting Started with indi

Understanding the Color Sensor

- Each color tile is pre-programmed to instruct indi how to move and operate.

- Some classroom floors may have colorful patterns that could interact with indi's color sensor. If you notice this happening, place the color tiles edge to edge to avoid any interference from other colors.

- Each Student Kit comes with 20 durable silicone tiles. The Class Pack comes with 8 sets of 20 durable silicone color tiles plus an additional 60 color cards for extended learning.

Charging

- Individual indi
    - Plug the included USB Micro B cable into indi and the other end into a USB port or wall adapter.
    - Make sure that you are using the USB cable provided with indi or a USB cable that provides power (rather than a cable that only transports data).
    - Make sure the USB port is providing enough power to properly charge indi. If you plug the USB cable into your laptop, please ensure your laptop is plugged in to provide enough power. Use a USB wall charger when possible.

- Class Pack
  - ◆ Plug the end of power cord into the class pack charging case. Then plug the other end of the power into an outlet.
  - ◆ Make sure each indi is seated properly in the charging case.
  - ◆ Be sure to check that the charging leads on the bottom of indi are clean and free of any debris.
 - ◆ Unplug the charging case for long-term storage.
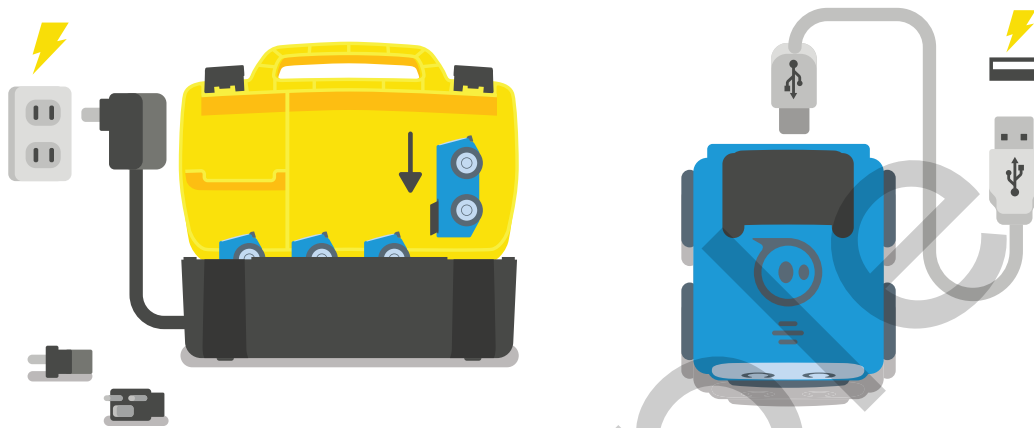
Cleaning

- indi
  - ◆ To clean indi, lightly spray a clean cloth or towel with your preferred disinfectant and wipe indi until clean.

- Color tiles
  - ◆ Do not leave color tiles or color cards in direct sunlight for extended periods of time. This will cause color fade and may affect indi's ability to correctly sense each color.
  - ◆ Wipe or shake color tiles to remove any dirt or debris.
  - ◆ To clear a durable silicone color tile, lightly spray it with your preferred disinfectant and wipe clean with a clean cloth or towel.
  - ◆ Gentle cycle with cold water is also an easy way to clean all color tiles at one time. DO NOT put color tiles in the dryer. Let the color tiles air dry.

Classroom Management

- Each Student Kit includes everything a small group of students will need to learn.

- Consider including only the necessary color tiles in each student kit for each lesson. This will help reduce distractions and any unnecessary loss of materials.

Beginner's Programming Challenge Cards

- Each Student Kit includes a set of 15 Beginner's Programming Challenge Cards.

- Beginner's Programming Challenge Cards are designed for independent learning and may require additional direction by the teacher before first use.

- Some of the Beginner's Programming Challenge Cards are used in lessons to provide additional scaffolding for learners.

- The grid on each challenge card is there to help students visualize color tile spacing.
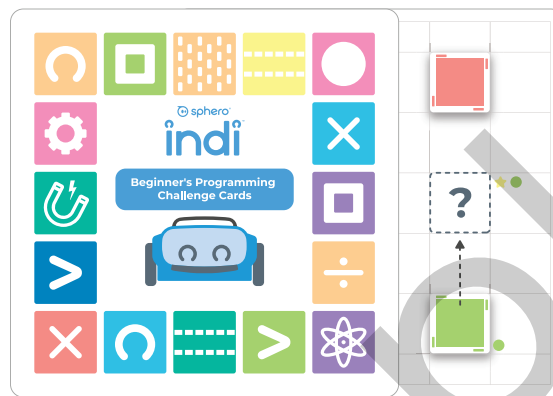
indi Sticker Sheets

- Each Student Kit includes two sheets of decorative stickers that can be used to customize each robot.
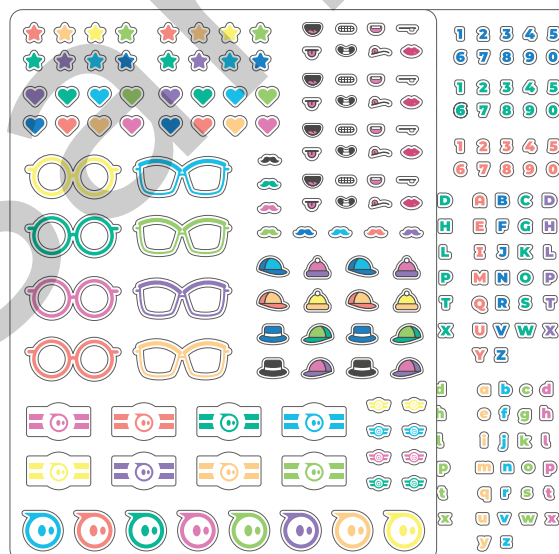
Meet Sphero indi

Lesson 1: Meet Sphero indi

Overview

Like most robots, indi has different parts and pieces that help it do all the amazing things it can do. Learn about the different parts that help indi see, move, and light up!

Objectives

(1) I can identify key parts of indi and explain what they do.

(2) I can teach someone else about indi and how it works.

Vocabulary

- **Electric motor** - a machine that uses electric energy to create mechanical energy (make something move).

- **LED light** - (L)ight (E)mitting (D)iode, a light source that emits (shines) light when electricity flows through it.

- **Color sensor** - a type of sensor that shines a bright light and detects the light (the color) reflected back.

- **Speaker** - a device that converts an electrical audio signal into a specific sound.

CS Practices

- **1A-CS-03** Describe basic hardware and software problems using accurate terminology.

- **1A-AP-09** Model the way programs store and manipulate data by using numbers or other symbols to represent information.

Content Connections

- Social-Emotional Learning

- Multisensory Learning

Color Tiles Needed

- Green x 3

- Yellow x2
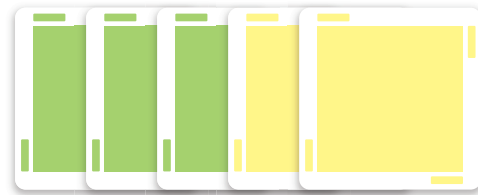
Preparation

- Each Student Kit needs to have a charged indi robot and the color tiles listed above.

- Students will need 20 or more feet of space to learn how far indi can travel.

Lesson Steps

🔍 Exploration 1

For many students, this may be their first time seeing or handling indi. Have students open their kits and use their senses to describe what they see, feel, smell, and hear. Have them share one-word descriptions of what they observe (blue, small, plastic, etc).

Introduce indi to them in a way that personifies their robot. For example:

"I want to introduce all of you to indi the robot. indi is new to our school and is going to be a part of our classroom this year. What are some ways we can welcome indi to our class?"

or

"Meet indi. indi is on a special trip from its home planet of Spheropa. indi is going to be a part of our class so it can learn what kids on Earth learn in school. What are some things indi should know about our school and classroom?

Everyone is new to school at some point in their lives. This is an opportunity to introduce empathy for others. Continue to ask students about different things they can do to make indi feel welcome and things that indi should know about school (routines, expectations, etc).

🔍 Exploration 2

Ask students what they see when they hold and look at indi. Do they notice the eyes (front LED lights)? The Sphero logo (top LED light)? The wheels? Is there a difference between the front and rear wheels? What do they see on the backside? Underneath?

If possible, project this image/diagram of indi for all to see.

Identify and discuss each of the following parts:

- Front wheels
- Rear wheels (connected to…)
- Electric motor
- Front LED lights

- Top LED light
- Color sensor
- Power button

Front LED

Power Button

Front Wheels

Top LED

Color Sensor

Rear Wheels

HG-####
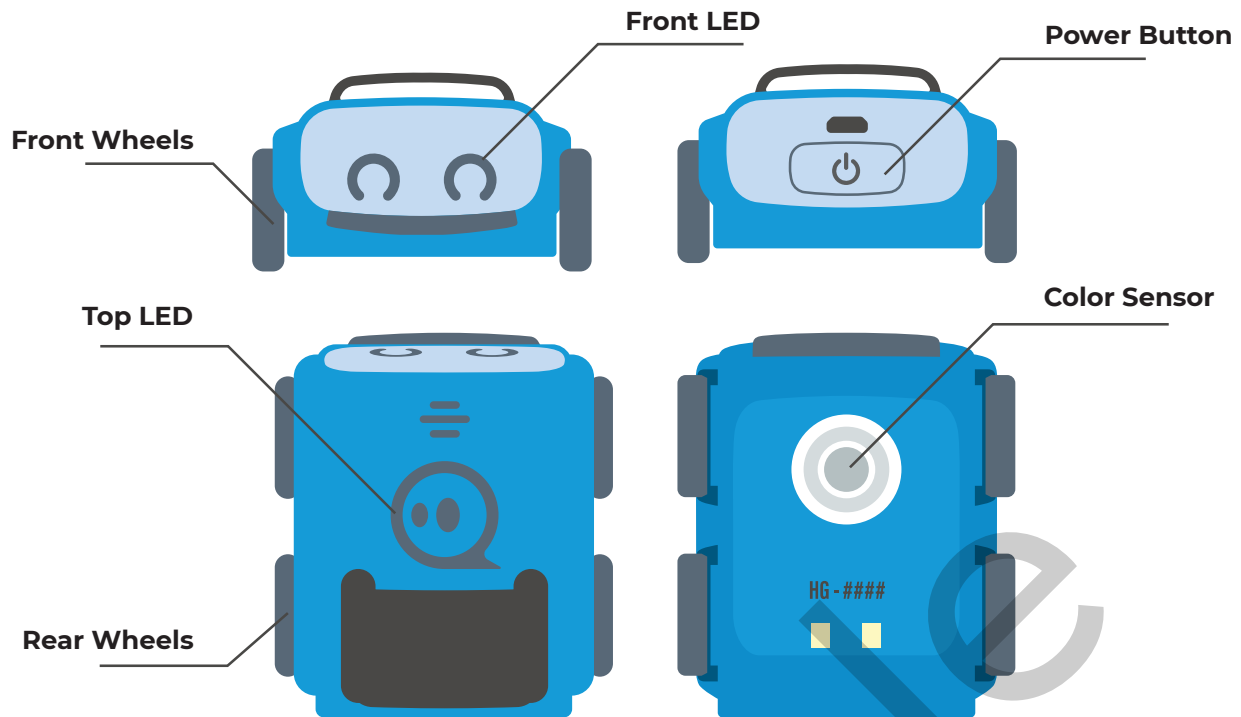
Describe the color sensor in terms of "how indi sees" or "how indi is programmed". The color sensor shines a bright light and then identifies the color that returns. Each color provides indi with different instructions (or code).

Skills Building 1

Have students place the green color tile on the floor. Show students how to power on indi and have them place the robot on the green tile. Again, have them observe using their senses.
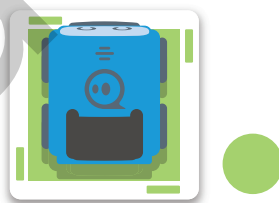
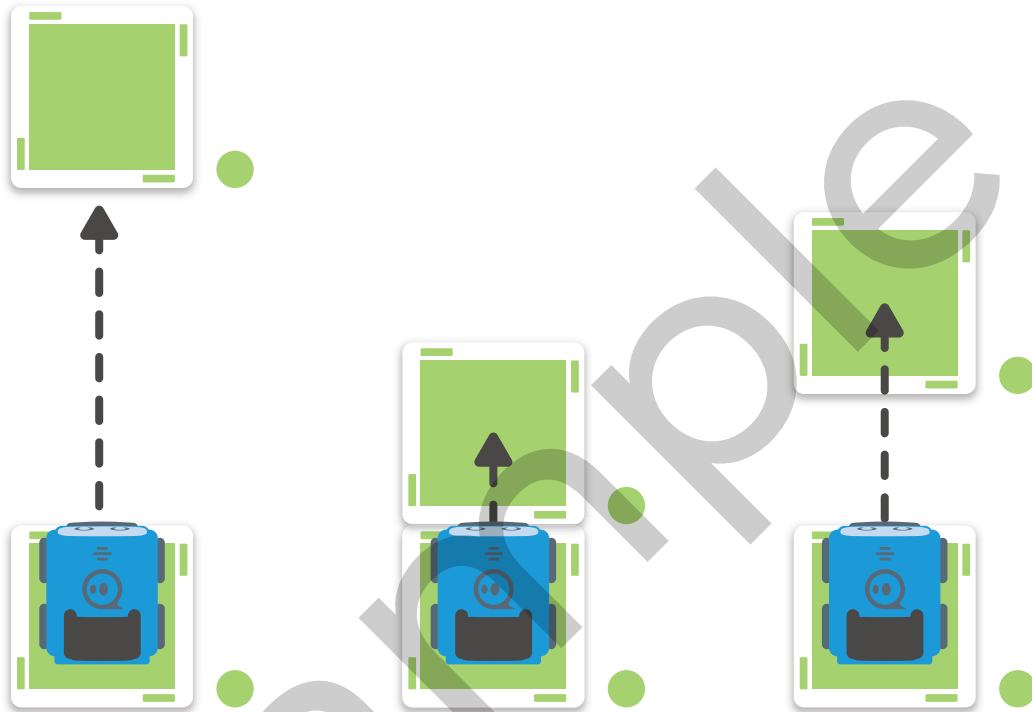### 👥 | Discuss with students:

- *How did indi react when placed on the green tile?*
        It moved. It beeped!

- *What did you hear?*
        I heard beeping sounds.

- *What did you see?*
        I saw a white light on top. It rolled away.

- *How does indi know how to do that?*

  The color tells it what to do.

![Skills Building icon] **Skills Building 2**

Ask students to place a second green color tile on the floor. Encourage them to place the green tiles at different distances apart to see what happens.
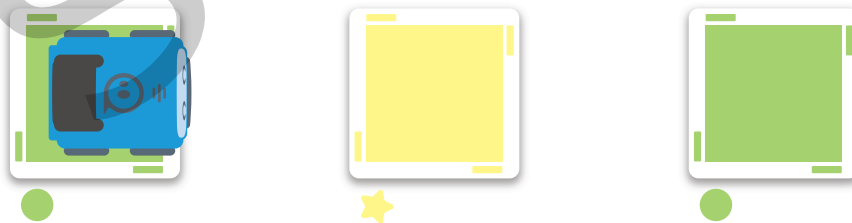
👥 | Discuss with students:

- *What happened when indi drove over the second green tile?*
  It went faster! It went farther!

- *What did you hear?*
  I heard beeping sounds. It beeped three times.

- *What did you see?*
  I saw a green light on top. It drove far away.

- *Did indi drive farther when the green tiles were close together or farther apart?*
  indi goes farther when the green tiles are far apart.

- *What happened when the second green tile was too far away?*
  indi stopped moving.

- *Did indi miss the second green tile? Why did that happen?*
  indi wasn't aimed right.

🔧 Skills Building 3

Tell students to place a yellow tile between the two green tiles. Place indi on the first tile and have them observe what happens.

👥 | Discuss with students:

- *What happened when indi drove over the yellow tile?*
  indi went slower.

- *What happened when indi drove over the second green tile AFTER driving over the yellow tile?*
  indi went faster again.

Challenge

Ask students how far they think they can get indi to drive using all the green color tiles. If students have trouble describing distance, have them measure with their own steps.

- ◆ Invite groups to test their guesses.
- ◆ Groups should have someone stand where they think indi will stop, and another stand where indi actually stopped.

Discuss how close each group was to correctly guess how far indi would travel.

> **TEACHER TIP:** If students space the green tiles so that indi crosses each tile just before it stops, indi should travel between 15 and 17 feet from where the first green tile was placed.

Extended Challenge:

If time permits or some students are in need of additional guidance, ask them how far they think indi can travel if they also use the two yellow tiles along with the three green tiles.

Have each participating group repeat the challenge as before, but this time include the two yellow tiles.

Directions
Lesson 1: Routines

Overview

indi wants to learn more about what being a student is all about at (your school name). Help indi learn about school and classroom routines.

Objectives

(1) I can help indi move through the classroom at different speeds.

(2) I can explain why we move in the classroom, the hallways, and the playground in different ways.

Vocabulary

- **Speed** - the rate at which something moves. (how fast or slow something moves)

- **Routine** - something you do regularly and often do it the same way.

CS Practices

- **1A-AP-08** Model daily processes by creating and following algorithms (sets of step-by-step instructions) to complete tasks.

- **1A-AP-09** Model the way programs store and manipulate data by using numbers or other symbols to represent information.

- **1A-AP-12** Develop plans that describe a program's sequence of events, goals, and expected outcomes.

Content Connections

- Classroom/School routines

Color Tiles Needed

- All 20 color tiles (Red x2, Orange x3, Yellow x2, Green x3, Teal x3, Blue x3, Purple x1, Pink x3)
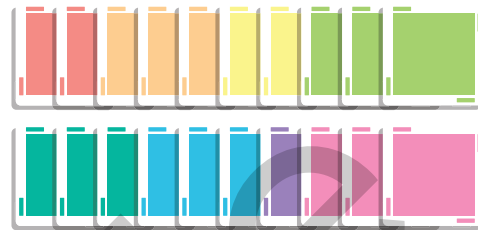
Additional Supplies

- Drawing paper and crayons

Preparation

- Each Student Kit needs to have a charged indi robot and the above color tiles.

- Groups will need eight to ten feet of space to work in.

Lesson Steps

🔍 Exploration 1

Start a whole-class discussion around routines.

- ◆ What is something you do every day, something you usually do the same way each time?
- ◆ Do you know what a routine is?
- ◆ What are some routines you have at home?
- ◆ What are some routines we have at school?
- ◆ Why do we have routines? Are they helpful?

Make a list of at least five routines. Make sure to identify a variety of routines that occur in the classroom and around the school.

- ◆ Examples: lining up, going to the bathroom, walking to the library, end of the day, etc.

🔍 Exploration 2

Routines are important, especially at school. Each routine has different expectations. Discuss with students the different behaviors that are expected when performing different routines.

- ◆ "Walk quietly"
- ◆ "Walk in line"
- ◆ "Raise your hand"
- ◆ "Ask a teacher first"
- ◆ "We can run around"

How we talk and move can depend on the routine or space we are in. We need to teach indi about these expectations.

👥 | Review with students by asking the following:

- • *Can someone explain the difference between the red and purple tiles?*
  Red is a simple stop with little noise.
  Purple is rowdy and noisy.

- *What happens when indi drives over a second or third green tile?*
  - *indi increases its speed.*

- *What about the yellow tile? What does it do?*
  - *Yellow slows indi down.*

These are all different ways indi talks and moves. We will need to use the right color tiles when teaching indi about classroom and school routines.

⚙️ Skills Building

Choose one of the simpler routines from the list on the board or one that was discussed as a class.

Walk groups through setting up the same or a similar path with the needed tiles. Keep it simple and easy to make.

- Example:

  - *Going to the library*
    - Start with a green tile (leaving the classroom)
    - Add a blue tile (turn right down the hallway)
    - Add a yellow tile (we should walk slowly and calmly into the library)
    - Add a pink tile (turn left into the library)
    - Add a red tile (stop in the library)
   - *Why did we not use a purple tile for the end?*
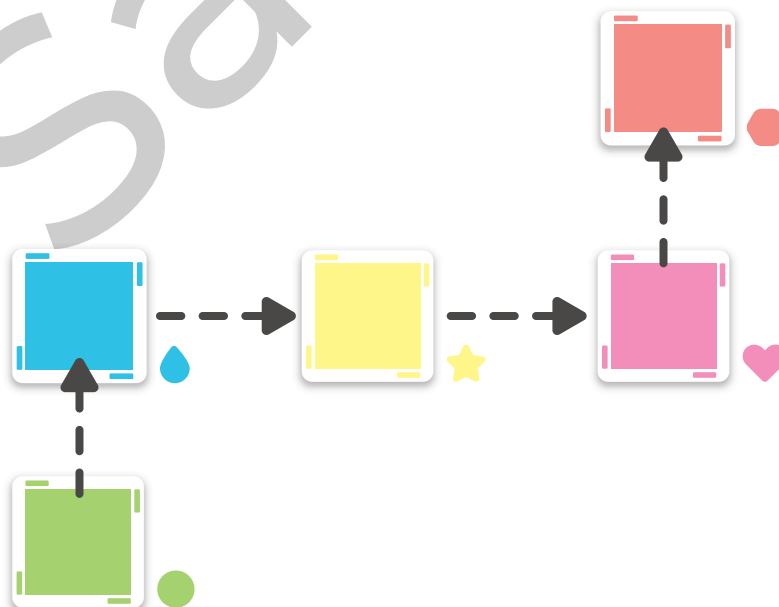
Challenge

Provide each group with a classroom or school routine that they are responsible for teaching indi.

Quickly talk about different ways they move or talk throughout the day to get them thinking about how they should teach indi to move.

Instruct some of the group members to begin building their path and the others to draw pictures of different places associated with their routine. Place these pictures along the path.

If time permits, allow each group to explain and demonstrate how they taught indi their routine.
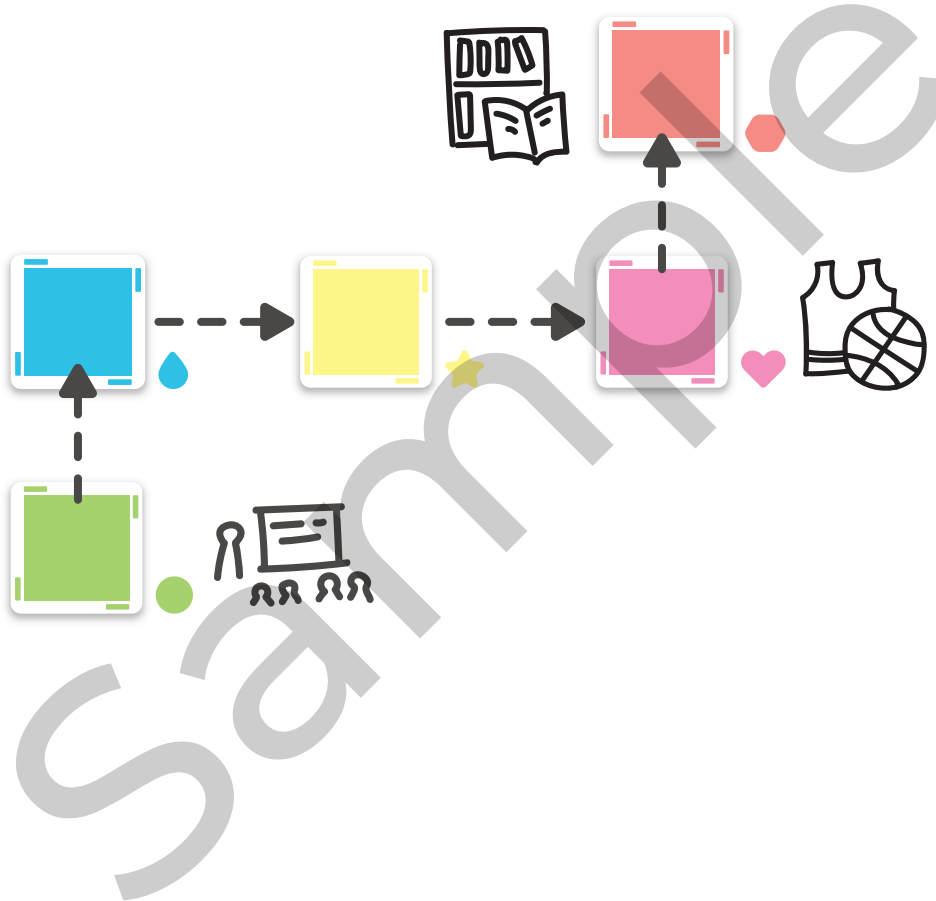
Patterns & Sequences
Lesson 1: Identifying Patterns

Overview

There are patterns all around us. Patterns add balance and beauty to our world. Sometimes we make the patterns ourselves and sometimes nature makes them for us. What patterns can you see? What patterns can you make for indi?

Objectives

(1) I can identify patterns around me.

(2) I can correctly identify what comes next in a pattern.

(3) I can complete a pattern to successfully guide indi.

Vocabulary

- **Pattern** - an idea or design that repeats itself

- **Repeat** - do something again

CS Practices

- **1A-DA-07** Identify and describe patterns in data visualizations, such as charts or graphs to make predictions.

- **1A-AP-09** Model the way programs store and manipulate data by using numbers or other symbols to represent information.

- **1A-AP-12** Develop plans that describe a program's sequence of events, goals, and expected outcomes.

Content Connections

- Pattern recognition

Color Tiles Needed

- All 20 color tiles (Red x2, Orange x3, Yellow x2, Green x3, Teal x3, Blue x3, Purple x1, Pink x3)
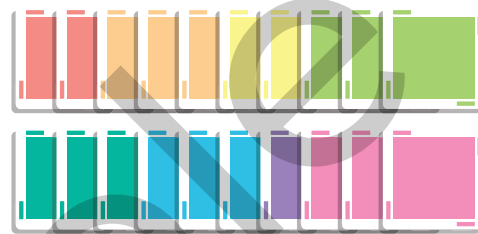
Additional Supplies

- Unifix cubes, colored popsicle sticks, tangram shapes, or any other multi-colored set of objects.

- Picture book on patterns. Consider one of the following:

    ◆ Beep Beep, Vroom Vroom! by Stuart J. Murphy

    ◆ A-B-A-B-A—a Book of Pattern Play by Brian P. Cleary

    ◆ Pattern Bugs by Trudy Harris

Preparation

- Each group will need a set of multi-colored objects to complete and create new patterns.

- Groups will need eight to ten feet of their own space and may need more when combining with another group.

Lesson Steps

Exploration 1

Read aloud a picture book on patterns.

- Highlight each pattern that is displayed in the book. Allow students to identify the patterns first before pointing them out.

- Can students identify similar patterns in the classrooms? On their clothes? On the floor/carpet? On the walls?
    - When students identify a pattern, be sure to have them "read" that pattern out loud. This will allow for any self-correcting or discussion from other students.

Exploration 2 (optional)

Consider taking students outside for this step. If not, make sure students have enough room to move around.

Introduce three simple movements to the students. Consider something like clap your hands once, stomp your foot twice and hop once.

Using the "I do. We do. You do." model, present a simple pattern using two of the movements -- for example, clap, hop, clap, hop.

- Demonstrate the pattern to your class.
- Have the whole class follow your lead.
- Have students do it on their own.

Ask students what would come next in the movement pattern. And then what comes next?

- Have students repeat the pattern indefinitely.

Create one or two more movement patterns with students and repeat the steps above.

Break students into groups and have each group create their own movement pattern. Consider allowing them to come up with their own set of three movements and patterns.

- Invite groups to present their movement pattern to the rest of the class. Have students predict what would come next in each pattern shared.
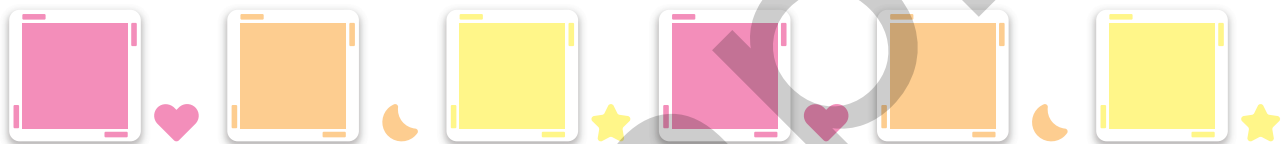
Skills Building 1

Back in the classroom or back with their groups, have students take out all of their color tiles.

Draw a color pattern on the board for students to recreate with their color tiles. Something like *blue, green, blue, green …*

Direct students to recreate the pattern with their color tiles and continue the pattern until they run out of those colors.

Now share a color pattern with three colors in the same manner. Draw something like pink, orange, yellow, pink, orange, yellow …


Have students recreate the pattern again.

Skills Building 2

Place a green, yellow, and blue color tile on the floor in a row.

Place indi on the green tile and have students observe what happens.

Have a discussion about what three color tiles would need to come next if they wanted to create a color pattern for indi to follow.

- Have a student place the color tiles down to extend the pattern for indi. Below you can see how some students may extend the pattern versus what it should look like if indi is to follow the path.
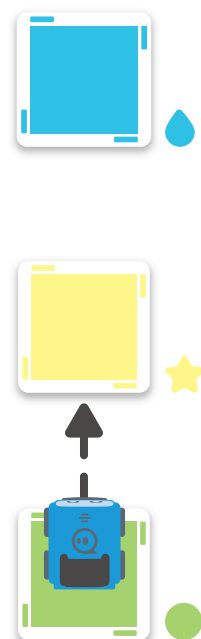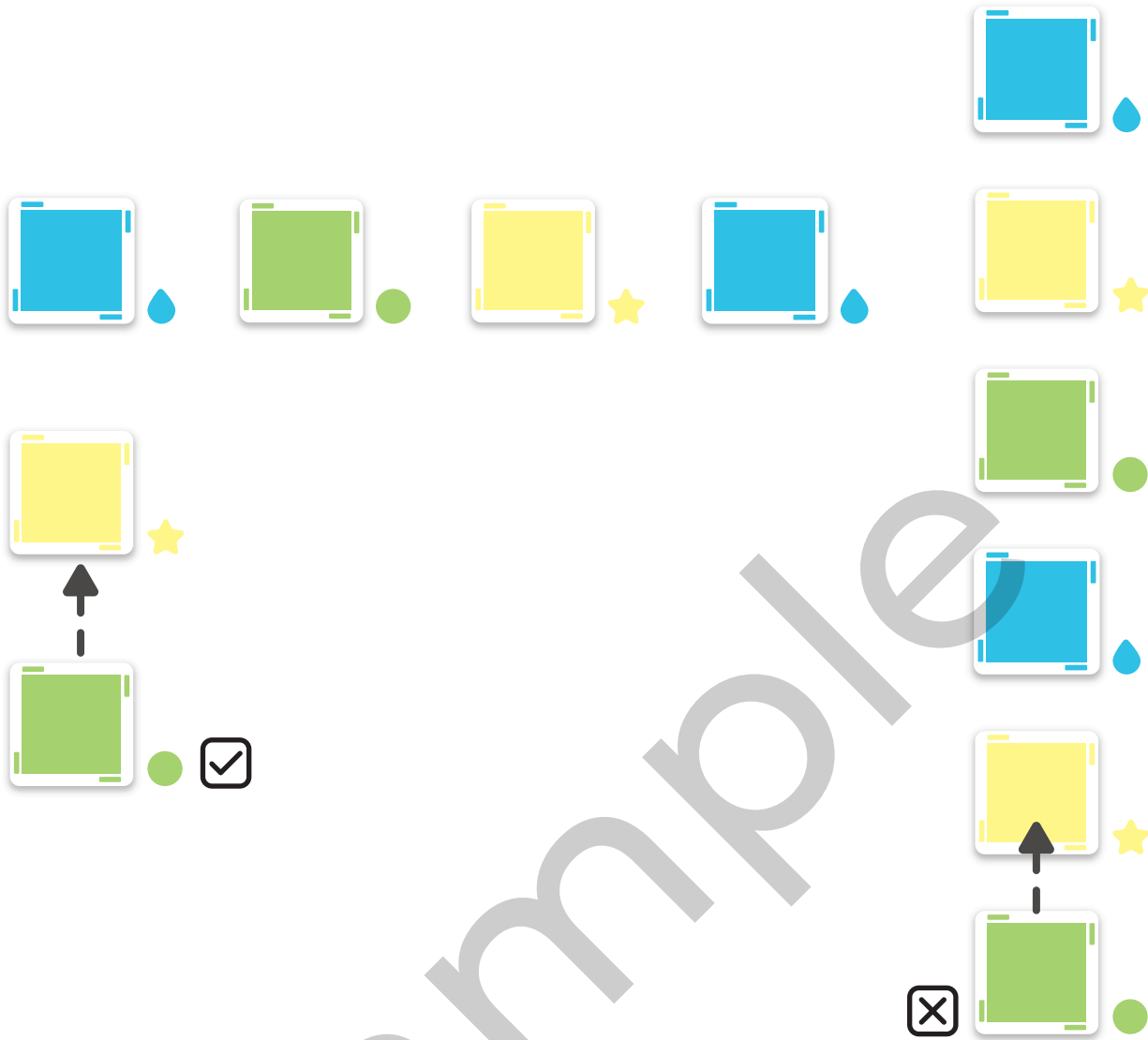
If the pattern was incorrectly extended, either due to incorrect colors or misplacement of tiles, have students share what can be done to correct it.

- In the end, students need to remember that to continue the pattern they have to take into account what each color instructs indi to do.
  - ◆ In the example above, students may think to put the next three tiles in line with the first three. But when indi gets to the blue tile it turns right and doesn't continue straight to the other tiles.

Repeat the steps above to reinforce the need to remember what indi does when it rolls over the different color tiles

Challenge

With only 20 color tiles, teams are limited to the length or range of a color pattern they can create for indi. Explain to students that they need to create a two-color pattern to start, using all the tiles they have of the two colors.

Walk the room to ensure students are successful.

Explain to groups that they are going to team up with another group to create another two color patterns using both groups' sets of color tiles.

As the combined groups work their way through a two-color pattern, allow students to expand their patterns to more than two colors.

Measuring
Lesson 1: Simple Distances

Overview

Understanding the various distances indi can travel is helpful when creating puzzles and paths for indi to follow. Flip over some color tiles and use them to help measure the distance indi travels before it comes to a stop.

Objectives

(1) I can measure distances using indi's color tiles.

(2) I can express distances in terms of color tiles.

(3) I can accurately predict how far indi will travel.

Vocabulary

- **Measure** - using an instrument to determine the size, amount, or degree of (something) or by comparing it with an object of known size.

CS Practices

- **1A-DA-07** Identify and describe patterns in data visualizations, such as charts or graphs, to make predictions.

- **1A-AP-12** Develop plans that describe a program's sequence of events, goals, and expected outcomes.

Content Connections

- Measuring

- Making predictions

Color Tiles Needed

- All 20 color tiles (Red x2, Orange x3, Yellow x2, Green x3, Teal x3, Blue x3, Purple x1, Pink x3)

- 20 extra color cards per group (Red x2, Orange x3, Yellow x2, Green x3, Teal x3, Blue x3, Purple x1, Pink x3)

Additional Supplies

- Different tools used to measure length, like:

- Ruler

- Yardstick

- Measuring tape

Preparation

- If you are unable to do this with students in an empty hallway or in the gym, consider moving desks, chairs, and tables to provide students with an open space. Groups will need 20+ linear feet of space for this activity.
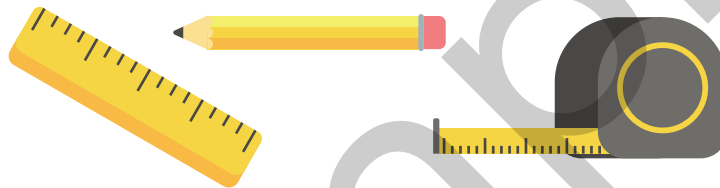
Lesson Steps

🔍 Exploration

Ask the class if they have ever measured anything?

- *What was it?*

- *Why did you need to measure it?*

- *What did you do with the measurement?*

- *What was used to measure?*

Show students the various tools that can be used to measure length or distance. Ask students if they know what they are and how they might be used.

Explain that today the class will be using something a little simpler to measure -- indi's color tiles.

- Demonstrate how to measure something by laying multiple color tiles down, right next to each other, to measure an object like a desk.
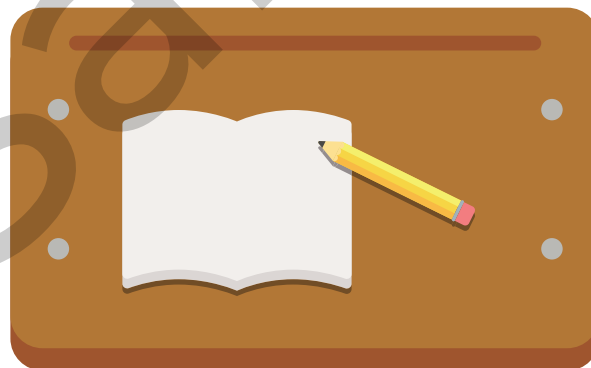
- Count the number of tiles that it takes to span the distance of the object measured and tell students that the object is "_ _ tiles long."

Divide the class into their groups and have them measure objects around the classroom using the color tiles from their indi Student Kits.

- Students may enjoy measuring their height with the tiles. Have students lay on their backs on the classroom floor and have another student place tiles along their side.

Skills Building 1

As mentioned in preparation, groups will need 20 or more feet of space to complete the rest of this activity. An empty hallway or gym is recommended.

For this part, instruct students to use the color cards (not the silicone color tiles) to measure. Show them that the back side of each card is blank. Have them place these after and between color tiles when measuring.

 VS

Instruct groups to place a green tile on the floor.

Have students predict how far indi will travel before stopping on its own.

Groups should now place as many flipped cards (blank side up) as they think they will need to reach the predicted stopping point.

TEACHER TIP: Remember to use the white tape to hold down the paper cards. If you do not have enough paper cards for this activity, cut out white pieces of paper the same size as the color tiles.

Place indi on the green tile and observe where indi comes to a stop.

- *Did your team place enough blank tiles down? Was it too many? Was it not enough?*

- *Before you run this again, what changes will you need to make to your prediction and path of blank tiles?*

Allow students to make changes and run indi again. All groups should get to the point where indi is stopping on the last blank card. If all groups are working on the same surface, they should all need the same number of blank cards, somewhere between eight and ten after the first green color tile.
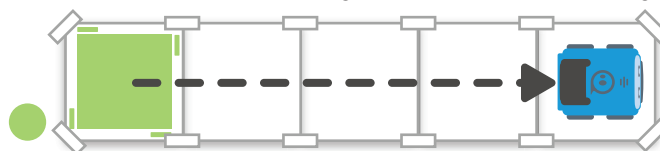
Skills Building 2

Instruct students to replace the last blank card with a yellow tile.

Groups should now predict how far they think indi will travel after the yellow tile. Groups should now place as many flipped cards as they think they will need to reach their predicted stopping point.

Place indi on the green tile and observe where indi comes to a stop.

- *Did your team place enough blank cards down? Was it too many? Was it not enough?*

- *Before you run this again, what changes will you need to make to your prediction and path of blank cards?*

Allow students to make changes and run indi again. All groups should get to the point where indi is stopping on the last blank card. If all groups are working on the same surface, they should all need the same number of blank cards. They should have seven or eight cards after the yellow tile.

Groups should now have an idea of how far indi travels in the sequence green ➞ yellow. They will need to call on this knowledge for the challenge.

Challenge

Using what they learned in both Skills Building steps, groups need to make two additional predictions:

1. *How far will indi travel if you replace the last blank card that comes after yellow with a green card?*

2. *Will indi travel farther, shorter, or the same distance if you change the order from Green ➝ Yellow ➝ Green to Green ➝ Green ➝ Yellow?*
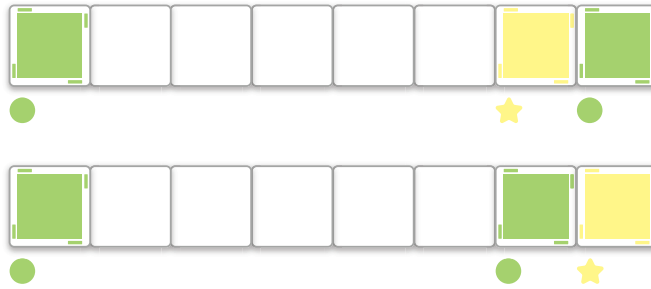
TEACHER TIP: Have younger students share their predictions with the class and record each group's predictions on the board

Older students should record their own predictions.

Following the same steps from Skills Building 1 and 2, groups need to test their predictions for the two questions.

- Groups will need to reuse the flipped cards (without moving the first green and yellow tiles) to show and test their predictions.

👥 | Have a discussion with younger students on what they learned.

- *Were your predictions correct? Why or why not?*

- *Does the order of the green, yellow, green tiles make a difference? How do you know this?*

Extended Challenge

For more advanced students, they should record what they observed. Have students explain why their predictions were correct or incorrect and whether the order of the green, yellow, green tiles matter.

Have students share their findings with the class.

Overview

Storytelling is a way that we share ideas, share our culture, and share experiences with others. What is your favorite story to listen to or to tell? Share a favorite story with indi through a well-thought-out path of color tiles and creative scenery.

Objectives

(1) I can create a path for indi that represents a story arc.

(2) I can represent the setting of a story with things I make.

(3) I can develop a plan to retell a story.

Vocabulary

- **Storytelling -** the interactive art of using words and actions to reveal the elements and images of a story while encouraging the listener's imagination. (National Storytelling Network)

CS Practices

- **1A-AP-11** Decompose (break down) the steps needed to solve a problem into a precise sequence of instructions.

- **1A-AP-12** Develop plans that describe a program's sequence of events, goals, and expected outcomes.

- **1A-AP-15** Using correct terminology, describe steps taken and choices made during the iterative process of program development.

Content Connections

- Literacy - Retelling

Color Tiles Needed

- All 20 color tiles (Red x2, Orange x3, Yellow x2, Green x3, Teal x3, Blue x3, Purple x1, Pink x3)

Additional Supplies

- Craft Supplies

- Recyclables

Preparation

- Consider integrating this lesson into a story or set of stories that students have read or listened to in class. This will help make sure all students are all starting at a similar place before even working with indi.

- If you are not having students prepare to retell a story from the classroom, be sure to brainstorm a list of popular stories for them to choose from.
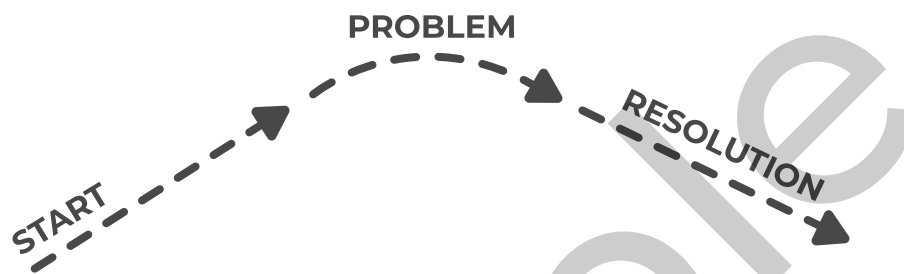
Lesson Steps

Exploration 1

Spend some time retelling or rereading a story that was recently read to the class (or allow students to reread a story they have read or have been reading in class). This will refresh students' memory and ability to retell the story later.

Share a simple version of the story arc, similar to the image below:

- Using the story you just read together as context, discuss each of the three parts of the story arc -- start, problem, resolution.

    - *For example, The Itsy Bitsy Spider:*
        - Start - the spider climbed up the water spout
        - Problem - it began to rain and the spider fell
        - Resolution - the spider waited for the rain to stop before climbing the spout again

Exploration 2

Provide students time to work on the story arc of their chosen story.

- Students can use drawings or their own words to describe the three core parts of their story.

Group students so that each group will have an indi to work with.

Instruct group members to take turns to briefly retell their story using the story arc they created.

Groups will need to decide on one story to retell together.

- If it is easier to manage, assign groups a story to retell.
- If the story is one that none of the group members has prepared, allow for the groups to complete Exploration 1 together.

Skills Building

Students will begin creating a story path using indi's color tiles.

Encourage groups to start with the simplest path that reflects their story arc:
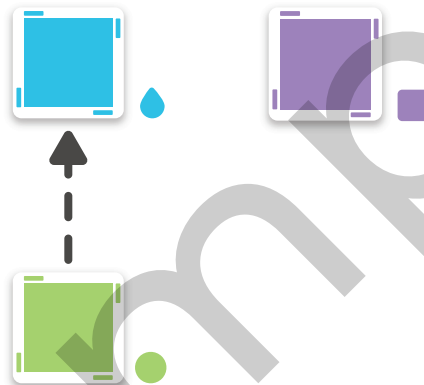
Have groups discuss their story together.

- *What are parts of the start, the problem, and the resolution that you could include in their story path?*
- *How can you add some of these details to your story path by adding more color tiles?*

Thoughtful iteration by groups will enrich the retelling of their story through indi.

Once groups have finalized their story path, have them practice retelling their story as indi moves its way through the path.

TEACHER TIP: Since indi moves more quickly through the path than the students can retell the story, have the students, retell the story, and select one or two words to represent each part of the story arc.

Challenge

What retelling of a story through a little blue robot is complete without some scenery?

Instruct groups to use the supplies provided to create the scenery for their story path.

- Scenery should:
    - Be related to the story
    - Help support the story arc
    - Not impede indi as it travels the story path

If students need a bit of a challenge, have groups build bridges to travel under or tunnels to travel through. They will need to make sure that the colors they use don't affect indi's movements.

Sphero Edu Jr
Lesson 1: Meet the App

Overview

It is time to take learning with indi to the next level. Sphero Edu Jr app is an all new block programming app that teaches some of the basics of code and computer science principles. In this activity, students will learn how to navigate Sphero Edu Jr app and begin programming indi.

Objectives

(1) I can connect indi to the Sphero Edu Jr app.

(2) I can drive indi in a controlled manner around the classroom.

(3) I can send a new program to indi.

Vocabulary

- **Program** - a series of instructions to control a computer or other machine.

- **Code** - program instructions.

CS Practices

- **1A-CS-01** Select and operate appropriate software to perform a variety of tasks, and recognize that users have different needs and preferences for the technology they use.

- **1A-DA-05** Store, copy, search, retrieve, modify, and delete information using a computing device and define the information stored as data.

Color Tiles Needed

- All 20 color tiles (Red x2, Orange x3, Yellow x2, Green x3, Teal x3, Blue x3, Purple x1, Pink x3)
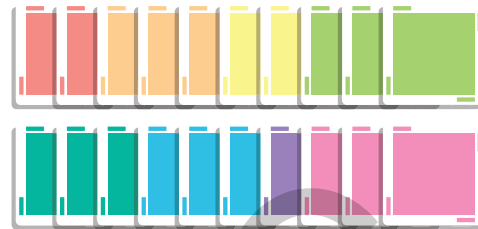
Additional Supplies

- Compatible programming device with latest version of the Sphero Edu Jr app installed

Preparation

- Ensure that each programming device's operating system is up to date and that the latest version of Sphero Edu Jr app is installed.

Lesson Steps

Exploration

indi is unique in that it doesn't need an app or device to work. It uses the colors it senses to help it navigate. But what if you could change what each color tells indi to do? What would you program indi to do?

A **program** is a set of instructions that are created to control a computer or even a robot. **Code** is the different instructions written in a specific programming language that the computer or robot understands.
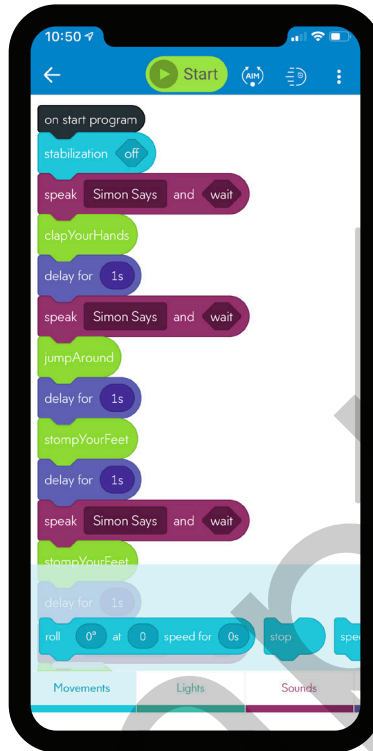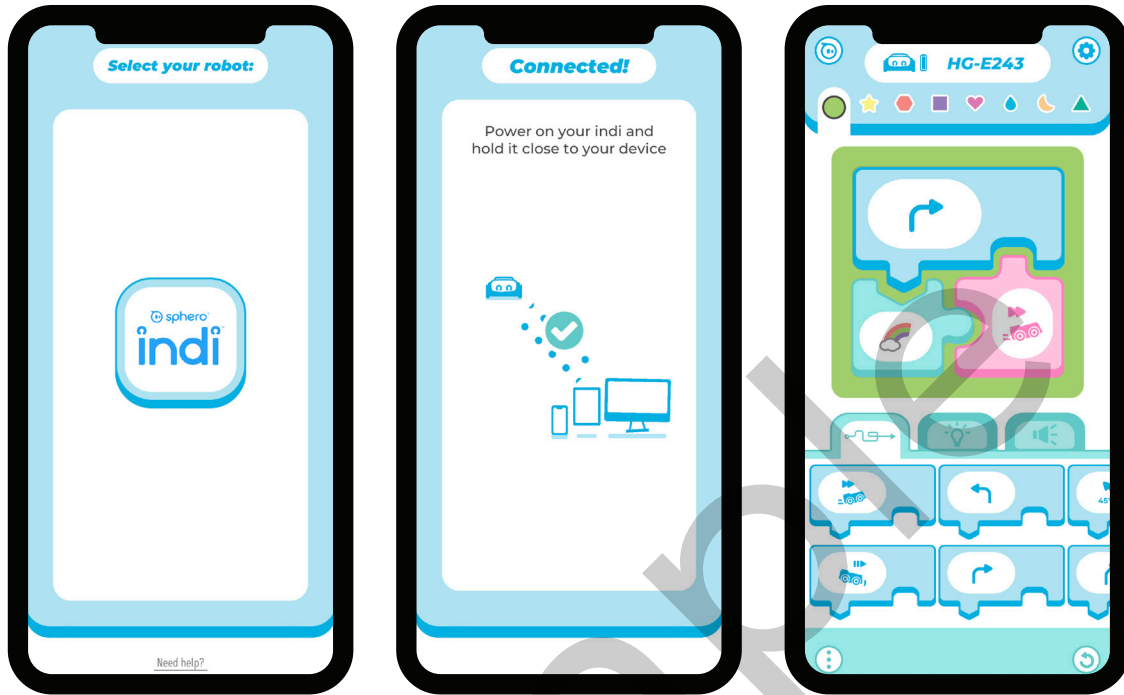

Sphero Edu Jr app allows you to reprogram indi's instructions each time it senses one of the colors tiles. The new program can be sent directly to indi, allowing you to disconnect from the app and continue using indi device-free.

Skills Building 1

The first step towards programming your own color instructions for indi is to connect it to the Sphero Edu Jr app.
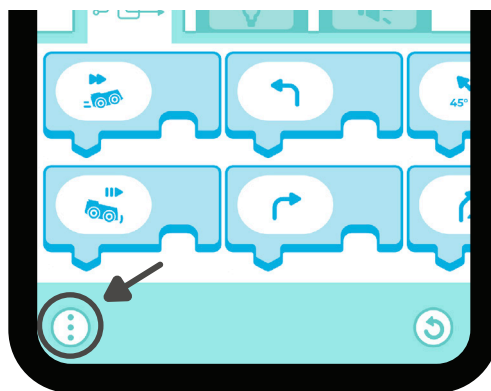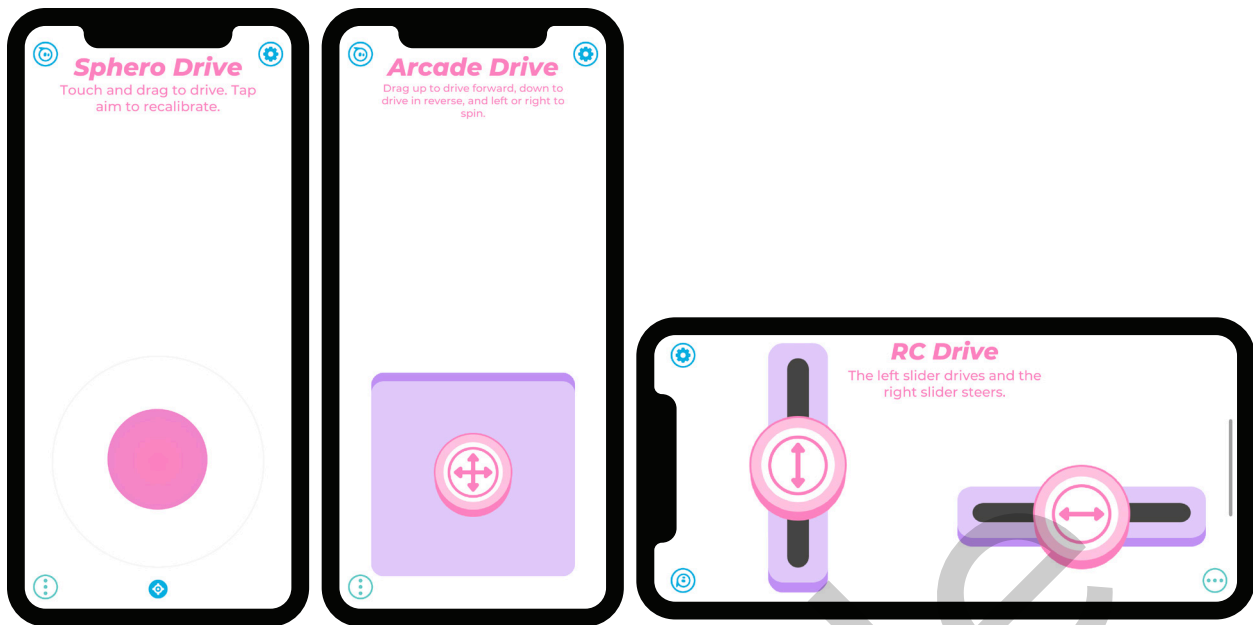

> **TEACHER TIP:** Recommend displaying your device so the students can see what you're doing with Edu Jr app. and they can follow along with their own device.

Skills Building 2

With indi connected, you can now take it for a drive! The different joystick modes allow you to drive indi without the need of color tiles.

Sphero Drive
Touch and drag to drive. Tap aim to recalibrate.

Arcade Drive
Drag up to drive forward, down to drive in reverse, and left or right to spin.

RC Drive
The left slider drives and the right slider steers.

Take indi for a drive around the classroom. Create a path for students to follow or race around.

You can adjust indi's drive speed by tapping the Settings icon in the upper right corner.

Use the Drive Speed slider to speed up or slow down indi when driving.

You can also change indi's eye color in addition to lowering the volume on indi or the app.
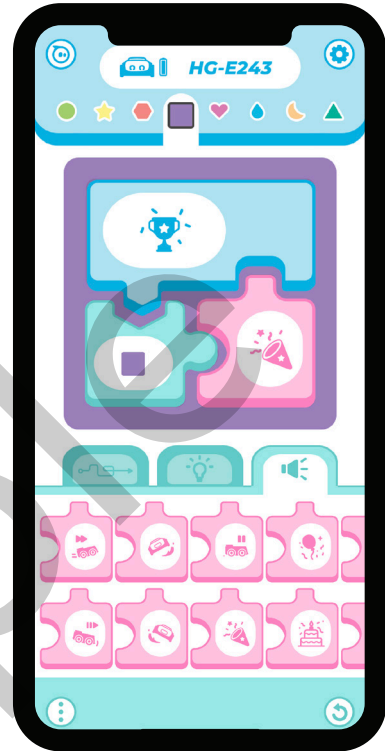
⚙️ Skills Building 3

There are three ways you can change the instructions for each color tile. By changing the blocks (seen below) you are changing the code and thus rewriting the program.

The large blue block controls indi's movement. This includes speeding up or slowing down, different turns, a pause, and even celebrations.

The teal block sets the color of the top LED when it pass over or stops on a color tile.

The pink block sets a specific sound effect or musical note for each color tile.

⚙️ Skills Building 4

Replacing a block is as simple as dragging and dropping a new block in its place. And if you don't want to use a movement, light, or sound for a specific color tile, simply drag the assigned block off the screen.

At the top of the screen you see each color tile's color and associated shape. Tap on a color to change it's code (or instructions).

The purple tile is generally a fun celebration at the end of a path. Practice by changing the movement, color, and sound for the purple tile.

- Locate the following blue movement block and use it to replace the current one.
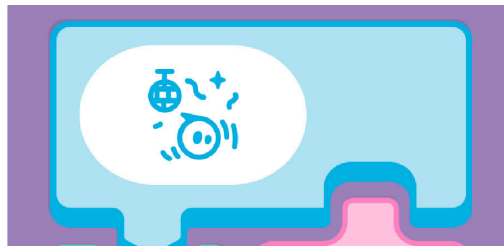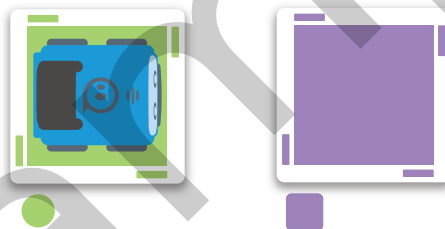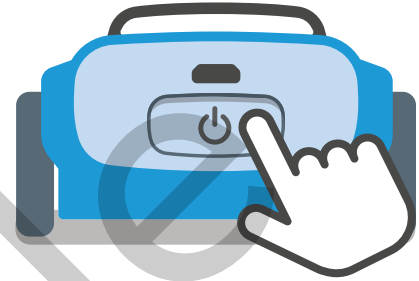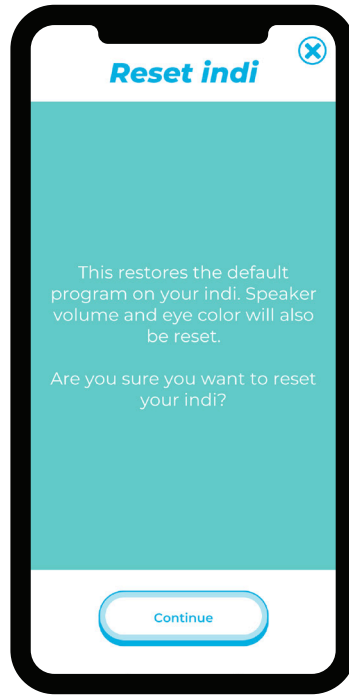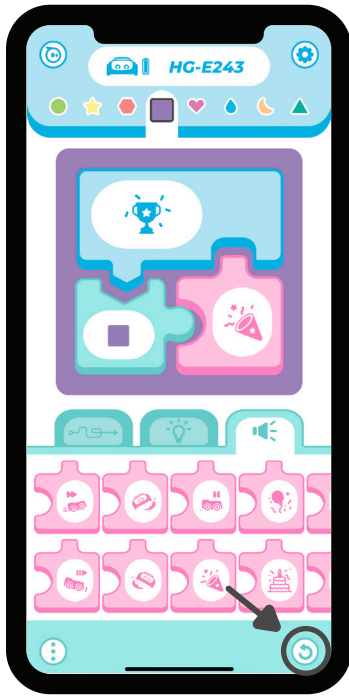

- Now do the same with the following teal and pink blocks.

Place a green and purple tile on the floor. Place indi on the green tile and watch what happens when it gets to the purple tile.

Each time you make a change to any of the blocks for any of the color tiles, indi automatically gets the new instructions. To reset the code back to its original, simply tap the refresh button in the lower right and tap Continue when prompted.

Another way to reset indi is to press and hold the power button on indi for 5 seconds.

Reset indi

This restores the default program on your indi. Speaker volume and eye color will also be reset.

Are you sure you want to reset your indi?

Continue

Challenge

TEACHER TIP: Ensure that students know how to reset indi back to its original set of instructions (configuration) before continuing.

Have each group select three different colors from their color tiles, as well as all the green tiles.

Using the tiles they chose and Sphero Edu Jr app, students can create their own set of instructions for each color.

- Be sure students have enough time to experiment with different combinations.

Discussion:

- *What was your favorite sound, light and movement block to use? Why?*