**Patterns and Logic**

**The title page appears on screen. Upbeat music plays in the background throughout the video.**

**Text on screen: Ontario Science Centre; An Agency of the Government of Ontario**

**Animated graphics swipe away the title page and are replaced with small, colourful shapes on a light background. The shapes twist and pulse in place.**

**Text on screen: Patterns and Logic**

**Animated graphics sweep away again to reveal Jessica. She is standing in a craft room. There is a whiteboard on an easel beside her. On the whiteboard is a drawing of a plant, showing it both above and below ground, with the sun shining in one corner and a bee flying towards the plant. On a table in front of Jessica is a big box of markers, a pile of coloured wooden craft sticks, and a set of flashcards with numbers on them.**

**Overlaid text on screen: Jessica (she/her); Early Childhood Programming Specialist, Ontario Science Centre.**

**Jessica:** Hello, I'm Jessica Shearer, Early Childhood Programming Specialist with the Ontario Science Centre.

**The screen splits to show Jessica on one side, and a video of children in an educational setting. An educator encourages a child as she puts together building blocks.**

**Jessica:** In our previous video, we focused on developing foundational math knowledge through the mathematical processes.

**Split screen with Jessica and text on screen appearing as she reads it.**

**Jessica:** In this video, we will discuss introducing fundamental knowledge for early coding skills.

**Animated graphics sweep away to reveal small, colourful shapes on a light background.**

**Text on screen: Minds-on / Guiding Questions**

**Animated graphics sweep away to reveal Jessica full screen.**

**Jessica:** Take a moment to think about how this simple question can introduce students into the world of coding:

**A 6-square grid appears. The bottom right square contains a smiley face and is the starting point. The top left square is the ending point. To the left of the grid, four triangles shaped in a diamond pattern form a directional cursor to move the smiley face.**

**Jessica: "**How will you get the smiley face to the end?"

**The smiley face looks toward the cursors, seems to think for a moment, then moves up and across the grid to the end point and then smiles widely. Directional arrows appear below the cursors as each move through the squares is made.**

**Jessica:** There are multiple ways to answer this question. That is the benefit of open-ended invitations to learning and to coding!

**Jessica:** Allowing for multiple entry points and interpretations is a way to make learning accessible to all students.

**Jessica:** It's a technique that can be applied to any content or skill, including coding.

**Animated graphics sweep away to reveal text appearing as Jessica reads it.**

**Jessica:** The Kindergarten curriculum defines coding as "the process of creating a set of instructions that can be performed, often by a computer or other device."

**A child is standing at an easel. On the easel is a grid, with removable drawings of a happy chicken at the bottom right corner, and trees and houses in random squares on the grid. The child places directional arrows on the path she is choosing for the chicken to follow.**

**Jessica:** The 2026 Kindergarten curriculum overview specifies that by developing foundational coding knowledge,

**A group of children work at a desk with sorting puzzles. One child inserts a peg in the top slot of the puzzle, then slides the peg along the puzzle to get the peg to its proper slot below.**

**Jessica:** students will be able to problem-solve and think in different ways. These are part of the mathematical processes.

**Two teenaged students work together at a laptop. A colourful device with many wires attached to it sits beside it.**

**Jessica:** They provide transferable skills that will serve students throughout their academic careers and beyond,

**A young woman adjusts a robotic arm in a lab.**

**Jessica:** as coding can provide many different learning and career opportunities.

**Animated graphics sweep away to reveal a split screen with Jessica, and text appearing on screen as she reads it.**

**Jessica:** In the Early Years, exposure to coding often begins with unplugged coding. These are hands-on, or kinesthetic learning experiences. Although we may think of coding as a computer-based activity, here students create instructions to be performed outside of a digital environment. It's a way to introduce the structure and logic of code in a tangible way.

Let’s take time to reflect: What do you think coding looks like, sounds like and feels like in kindergarten? How do you integrate patterning and spatial reasoning through play and inquiry?

**Animated graphics sweep away to reveal text.**

**Text on screen: Patterning and Spatial Reasoning**

**Animated graphics sweep away to reveal Jessica full screen.**

**Jessica:** In order to prepare students for future opportunities, patterning and spatial sense are needed to support coding proficiency.

**Split screen with Jessica and text on screen appearing as she reads it.**

**Jessica:** Patterns are everywhere: at home, at school and outside. Identifying repeating patterns in everyday life is an important first step. Begin a pattern inquiry by going for a community walk. Take photos of repeated patterns found in the neighbourhood.
Then, print or project the photos.

**Overlaid text on screen: A7.1 identify, describe, and create patterns**

**Jessica:** As a class or in small groups, students can begin to identify and describe repeating patterns. Create a print or digital book of this pattern exploration to support families with recognizing patterns at home.

**Animated graphics sweep away to reveal children seated at a table threading coloured beads onto pipe cleaners.**

**Overlaid text on screen: A7.2 identify the core of a pattern and describe why it is important**

**Jessica:** The Arts are a great way for students to deepen their understanding of patterns. At a creative centre, like a makerspace or visual art, students can use loose parts and materials like beads, pegs and paint to create their own patterns.

**A child forms his completed pipe cleaner of beads into a bracelet on his wrist. The other children do the same and each child places their own bracelet on the table in front of them.**

**Jessica:** For instance, create a pattern bracelet using beads. Students can then have their peers identify the pattern core and predict which beads are needed to extend the pattern.

**Split screen with Jessica and text on screen appearing as she reads it.**

**Jessica:** Stomp-clap-clap! Name the pattern core for students, in this case, A B B. Ask students to extend the musical pattern using the same musical actions.

**Overlaid text on screen: A7.4 extend patterns in both directions and identify any missing elements**

**Jessica:** After extending the music, miss a beat. Have students problem-solve for the missing element. Students can lead a pattern song by sharing their own pattern core for their peers to repeat. You can also incorporate instruments, like shakers, to further engage learners.

**Jessica appears full screen. She demonstrates the dance moves as they are spoken.**

**Overlaid text on screen: A7.3 show that patterns can be represented in different ways because the core remains the same**

**Jessica:** The same pattern core can be represented in different ways, even by dancing. Step to the left, hop, hop, repeat! It's still an A B B pattern. These comparisons help students become flexible with their thinking and representation of a pattern core.

**The screen shows text on the left as Jessica reads it, and 6 question marks in boxes divided vertically by a line – 4 boxes on the left, 2 boxes on the right.**

**Jessica:** Identifying and naming pattern cores are skills applicable to coding.

**Overlaid text on screen: B11.3 communicate and record step-by-step instructions using symbols, words, or pictures**

**Jessica:** Students can write more efficient code when they recognize repeated instructions.

**The boxes with question marks in them flip over to show the corresponding directions as Jessica speaks.**

**Jessica:** For example, instead of "Up, up, right, right" students can eventually use arrows and numbers to write the code as "2 up, 2 right."

**Jessica appears full screen.**

**Jessica:** Whether it's music or dance steps, it all reinforces the development of spatial reasoning.

**Split screen with Jessica and text appearing as she reads it.**

**Jessica:** Explicit instruction and intentional opportunities for students to understand positional and directional vocabulary is also needed to deepen spatial reasoning skills.

**Jessica appears full screen.**

**Jessica:** Searching for "treasure" is one engaging way for students to do this.

**5 children are working together on the floor. Obstacles are created by large building blocks. They place directional arrows on the floor as they create their path around the obstacles to a goal marked by an X.**

**Jessica:** Pair students up and have them all begin from the same starting point. Have two sets of instructions using arrows, one having an error.

**Overlaid text on screen: A9.7 give and follow directions for moving from one location to another**

**Jessica:** Provide pairs of students a clipboard and a set of instructions. Keep the instructions to under five steps. After students find the location, discuss as a class which instructions were easier or harder to follow and why.

**Split screen with Jessica and text, as spoken by Jessica.**

**Overlaid text on screen: A9.6 describe basic spatial relationships and movements, and visualize objects from different perspectives**

**Jessica:** You can extend this activity by encouraging students to work in pairs to create their own treasure search. Provide them with large arrows that they can use to create a path to a specific location. Annotate the path on a whiteboard or chart paper and inform students that these instructions are called code.

**A 25-square grid appears, with the starting point at the top right corner. Random squares contain images of palm trees, islands, and a treasure chest.**

**Jessica:** After some practice, you can apply the same instructions, reflective of the activity, to a grid.

**Directional arrows appear in the squares, marking a path to the treasure chest.**

**Jessica:** Model the same steps students took to the treasure by placing arrows on the grid line and then moving a counter or game piece to the spaces in the grid. The introduction of the grid and arrows helps to bridge into unplugged coding.

Coding is a collaborative process. At a centre, invite pairs of students to explore the grid and show different coded paths. Offer different sized grids, like 2x3 or 5x5, to provide various entry points and extensions for learning. Model for students how to write their path as code either vertically or horizontally.

**Animated graphics sweep away to reveal text.**

**Text on screen: Leveraging Literacy to Code**

**Split screen with Jessica and text appearing as she reads it.**

**Jessica:** Coding can even be used as a way for students to communicate their understanding about a narrative.

**A 9-square grid appears. The bottom right square contains a smiling face and is the starting point. To the left of the grid, four triangles shaped in a diamond pattern form a directional cursor to move the face.**
**Text on screen: Leveraging Literacy to Code**

**Jessica:** Start simple, with no objects on the grid except for the main character at the start. Represent the main character with a wooden peg person or game piece as a sprite.

**Overlaid text on screen: B11.1 use directional and positional language to create and follow instructions involving movement**

**Directional arrows appear as the smiling face makes its way through the grid to the ending point at the top left.**

**Jessica:** Then, have students create instructions to get the main character to the end of the grid. This can represent a specific location, person or object at the end of the story.

**Jessica appears full screen.**

**Overlaid text on screen: A9.6 describe basic spatial relationships and movements, and visualize objects from different perspectives**

**Jessica:** An extension of this activity can be to collect objects on a grid.

**A 9-square grid appears. The bottom right square contains a smiling face and is the starting point. To the left of the grid, four triangles shaped in a diamond pattern form a directional cursor to move the face.**

**Jessica:** For example, create a coding grid for the story Goldilocks and the Three Bears:

**A bowl of porridge, a chair, and a bed appear in random squares on the grid. Directional arrows appear as the face moves through the grid. As the face moves through the spaces and collects each object, the object appears to the right of the grid.**

**Jessica:** Draw or place images of a bowl of porridge, a chair and a bed on the grid. As a class, find different paths to collect the objects in chronological order. As students share their instructions aloud, model how to draw the sequential code using arrows. Another extension could be that the objects on the grid represent problems, like the three bears, which Goldilocks would have to avoid.

**Animated graphics sweep away to reveal text.**

**Text on screen: Critical Thinking: Debugging, Efficiency**

**Animated graphics sweep away to reveal Jessica full screen.**

**Jessica:** As important as it is for students to create code, it's equally essential for students to develop critical thinking when coding.

**Split screen with Jessica and text appearing as she reads it..**

**Overlaid text on screen: B11.2 test and refine instructions**

**Jessica:** Start with a community building activity once a week, like Wonder Word Wednesday.

**An animated tablet appears. It shows a grid with "start" in the top left square; a letter in each of the other squares except the bottom right 3 squares, of which one shows a "dash" and the other two are blank. To the left of the tablet are four rows of numbers, and**

**boxes containing a question marks. The top row shows “4 ? 1 ?”; The second row shows “1 ? 1 ?”; The third row shows “4 ? 3 ?”; and the bottom row shows “2 ?”.**

**Jessica:** Create a large grid with all the alphabet letters on chart paper, a whiteboard or as a digital version that can be projected. Then, select a word and create the code for it.

**The question marks flip over to reveal directional arrows for each number. The arrows point the way through the grid to a letter for each row, i.e. Row 1 is “4 down”, 1 across. The letters on the grid highlight briefly as the student makes their way to the correct letter. As each letter is found, it changes colour on the grid and appears beside its corresponding row. Row 1 is C; Row 2 is O; Row 3 is D; Row 4 is V.**

**Jessica:** Students can follow the code to find out what the word is. Maybe it’s a name, sight-word or high-frequency word. Students can even have mini versions of the grid to follow along with a partner.

**The bottom row containing the wrong instructions is corrected to show 3 across. The letter revealed becomes E.**

**Jessica:** When sharing examples of code, make intentional errors, like writing the wrong direction or number of steps.

**Split screen with Jessica and text appearing as she reads it.**

**Jessica:** These errors provide students with an opportunity to develop their problem-solving skills by debugging the code.

**Overlaid text on screen: B11.2 test and refine instructions**

**Jessica:** Empower students to lead this activity by trying to trick their peers with coding errors. This activity helps students to develop metacognition within coding.

**Animated graphics sweep away to reveal text.**

**Text on screen: Educator Considerations and Consolidation**

**Animated graphics sweep away to reveal a split screen with Jessica, and a slide showing the Kindergarten - Grade 3 Mathematics Continuum.**

**Jessica:** Remember to review the Kindergarten to Grade 3 Mathematics Continuum for all strands, but specifically to see how knowledge and skills developed in Kindergarten are the foundations of coding skills in older grades.

**Jessica appears full screen.**

**Jessica:** When integrating coding in Kindergarten, take these key ideas into consideration:

**Split screen with Jessica and text appearing as she reads it.**

**Jessica:** Through explicit instruction (I do, We do, You do) and deliberate practice, students can develop the foundations of coding skills: patterning and spatial reasoning skills.

Leverage the Arts, play and inquiry for students to develop these skills.

Use coding as a way for students to communicate their understanding of texts. Differentiate the narrative by having students retell a story using a blank grid (coding from start to end of the story) and a grid with objects/events to collect or avoid.

Provide students with large arrows to create their own path to treasures, whether indoors or out. Support students with writing their code using arrows, words or symbols and gradually release the task to them.

Integrate critical thinking into the coding learning experience. One way is to set a weekly activity with an error-filled code, which students then have the opportunity to debug.

**An educator guides children as they sort brightly coloured wooden blocks of various shapes into their corresponding place on a puzzle board. She claps her hands as the child solves the puzzle.**

**Jessica:** With the 2026 Kindergarten Curriculum, students are being exposed to fractions, patterns and coding sooner.

**An educator watches on as a child sorts coloured beads into rows on a grid. She gets a "High-five" when she completes her task.**

**Jessica:** This early exposure helps them build the knowledge and skills that lead toward STEM disciplines as well as skilled trades and architecture.

**Split screen with Jessica and text.**

**Text on screen: Fundamental knowledge for early coding skills**

**Jessica:** The foundational knowledge of coding begins in Kindergarten for a skill that will serve students not just in the future but right now.

**Animated graphics sweep away to reveal text.**

**Text on screen: We hope you enjoyed this video, which is part of a series developed to support Ontario's kindergarten teachers in STEM education.**

**Be sure to check out other videos in this series along with additional classroom-ready resources and professional learning resources at OntarioScienceCentre.ca.**

**Animated graphics sweep away to reveal text.**

**Text on screen: Ontario Science Centre; An Agency of the Government of Ontario**