

Patterns in Nature		Grade 1 and 2	
Lesson Plan	Coding Tool	Scratch Jr	
	Time Required	Two periods	
Math Curriculum Connections	Science Curriculum Connections		
<p>Algebra</p> <p>Overall Expectations</p> <p>C1. Identify, describe, extend, create and make predictions about a variety of patterns, including those found in real-life contexts</p> <p>C3. Solve problems and create computational representations of mathematical situations using coding concepts and skills</p> <p>Specific Expectations</p> <p>C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in patterns</p> <p>C3.1 solve problems and create computational representations of mathematical situations by writing and executing code, including code that involves sequential events</p>	<p>Grade 1</p> <p>Daily and Seasonal Changes</p> <ul style="list-style-type: none"> Changes in daily and seasonal cycles affect living things <p>Overall Expectations</p> <p>3. Demonstrate an understanding of what daily and seasonal changes are and of how these changes affect living things</p> <p>Specific Expectations</p> <p>3.5 Describe changes in appearance or behaviour of living things that are adaptations to seasonal changes</p> <p>Grade 2</p> <p>Growth and Changes in Animals</p> <ul style="list-style-type: none"> Animals have distinct characteristics <p>Overall Expectations</p> <p>2. Investigate similarities and differences in characteristics of various animals</p> <p>Specific Expectations</p> <p>2.5 Investigate the ways in which a variety of animals adapt to their environment or to changes in their environment</p>		
Description			
Using a series of activities, this lesson will talk about seasons and how we can represent them with a mathematical model because they follow a pattern. Students will learn about conditional statements and then use them to illustrate seasonal changes.			

<p>Success Criteria</p> <ul style="list-style-type: none"> • The 1st and 2nd grade students will be able to identify that seasons follow a pattern by recognizing their cycle • The 1st and 2nd grade students will be able to demonstrate how animals change with the seasons by creating conditional statements both offline and using ScratchJr 	<p>Materials and Media</p> <ul style="list-style-type: none"> • Conditional Statement Handout • Coding Handout • Ideas Handout • Pencils, crayons • Devices with ScratchJr
<p>Computational Thinking Skills</p> <p>This lesson introduces coding in two ways. At its simplest, students will be able to strengthen their knowledge of patterns by recognizing that blocks of code can often represent a pattern. Often times programmers will repeat the same thing many times using a loop, just like the seasons repeat many times in a cycle. The second coding skill that students will use are conditional statements. Conditional statements are used in coding to execute a condition if a statement is true. Conditions help computers make decisions but we can also look at them as they shape decisions in our day to day lives.</p> <p>Students will look at loops and conditional statements in an offline setting and also have the opportunity to use them with ScratchJr. ScratchJr is available as a free app geared to students aged 5-7. It uses an introductory block-based language that allows students to design and code their ideas. The ‘Coding Handout’ for this lesson includes a step by step procedure.</p>	
<p>Introduction</p> <p>Patterns are a series or sequence that repeats itself. In math, sequences repeat based on rules and we can use those rules to predict what will happen next or to solve a problem. Patterns are very common in nature and consequently we can say that math exists all around us. We can find patterns on animals like a butterfly or a jaguar, in the leaves of trees, the shapes of snowflakes, the spirals of shells and so much more. Another common place that we can see a pattern is with the seasons.</p> <p>The four seasons are spring, summer, autumn (fall), and winter. We always move from one season into the next and the seasons stay in the same order, meaning they are a sequence that repeats itself, hence a pattern. All animals, including humans, change depending on the seasons. For example, humans will need to wear snowsuits in the winter but can wear shorts in the summer. Similarly, a hare can have a white coat during the winter to camouflage with the snow and a brown coat in the summer to camouflage with the ground. Since the seasons follow a known pattern, we can use this to predict how animals will change at different times of the year as well. Here are some other examples of what ways nature changes with the seasons</p> <ul style="list-style-type: none"> • Bears: During the summer, and especially the fall, bears spend a great deal of time eating. During the winter however, they hibernate and they don’t wake up until the spring. • Geese: Geese also spend their summers eating but migrate during the fall. In the winter they stay somewhere warm before returning in the spring. • Apple Tree: During the spring apple trees have buds that are pollinated by bees. In the summer the apples grow and, in the fall, they ripen and fall to the ground. When the winter arrives, the tree is dormant until the following spring. 	

Action

Offline Activity

During this lesson, students will explore seasonal changes as a pattern as well as how humans and animals adapt to those changes.

To start the lesson, you can look at some basic mathematic patterns using shapes. Have students predict what shape they think will come next. Do this a few times and once they start to recognize that they can guess what comes next, talk about patterns being a sequence that repeats itself. With this in mind, ask students if they can find math outside (in nature). You can build off students answers and also show them some images of patterns that we find in nature (shells, waves, leopard spots, etc.).

We can also experience patterns in nature with the seasons. To introduce the seasons as a mathematical model, show a graphic of average temperatures by month. Have students observe and then guess what they are looking at. Group the months by season to show that seasons have different temperatures. We can see that seasons happen every year in a cycle. The top of the cycle or peak temperatures occur in the summer and the bottom of the cycle or lowest temperatures occur in the winter.

Have students choose an action for each of the seasons. For example:

- Spring: rain falling, plants growing, etc.
- Summer: swimming, fanning themselves, etc.
- Autumn: Raking leaves, trick or treating, etc.
- Winter: Shaking with cold, skating, throwing snowballs, etc.

Once you have one gesture decided for each season, play Simon Says with the different seasons. For example, if you say “Simon says its winter” students should pretend to shake with cold. Introduce other aspects to the game such as temperatures, holidays or seasonal activities. While you should start by calling the seasons at random eventually start saying them in a pattern. Ask students to predict which season will come next.

Coding Activity

The seasons and how animals, including humans, adapt to them is a great way to introduce coding concepts.

The first concept that students can look at is how loops can be used to repeat a pattern many times. Ask students to tell you the order of the seasons as a pattern, then ask what happens once that pattern finishes? It continues! You can show this in code using a loop similar to this one:



In this loop the arrow says that we are repeating the seasons ten times. Ask students to think about what this repeat represents. Would it be days, months, or years? If we repeat the seasons ten times, we have shown ten years. This is because one year has each of the seasons one time. Of course, the seasons don't stop repeating after ten years. They keep going forever! This is what we call a forever loop in coding. A forever loop tells us that something is going to repeat itself non-stop. This is what a forever loop of the seasons could look like with code: Pa



The other coding concept that applies to this lesson is a conditional statement. Conditional statements are also known as If/Then statements because something happens IF a stated condition is true. We've already looked at this with our warm up activity. If it was a season, students did an action. Next, have students generate examples of conditionals into an If/Then format. Encourage them to use situations and 'rules' from daily life to illustrate the If/Then logic. ex: If my alarm goes off, then I wake up. If it is winter, then I wear a snowsuit. If I roll a 2, then I move 2 places in my game. If the traffic light turns green, then we can drive.

For the next activity, we're going to go back to animals and seasons. As described in the introduction, not only do the seasons follow patterns, but animals do as well. This pattern is in response to the seasons so we can consider it as a conditional statement inside a loop. If we were to consider a bear for example we would say:

Start

If it is spring; then wake up

If it is summer; then eat

If it is fall; then add weight

If it is winter; then hibernate

Repeat forever

This is a pattern that repeats itself and we can use code to make it easier to understand.

Students will be able to create their own conditional statements that are part of a loop using the 'Conditional Statement Handout'.

Using the template, students will draw an image to represent one of the four seasons. This is the If part of the statement. Underneath the If statement is a space for them to draw the action of an animal in that season. This is the Then part of the statement. They can draw this as a scene and you can assess them based on the accuracy. Ensure they have an animal that they will see in that season and that the action is appropriate for that time.

Math Activity

In the full math activity there are two coding activities that students can do to demonstrate their understanding of patterns, seasons and animal adaptations. Both these activities can be done using ScratchJr. The desktop version of ScratchJr lets you use a smartboard to do this activity together, or students can do it independently using the iPad versions. To download the desktop version: <https://jfo8000.github.io/ScratchJr-Desktop/>

The first activity is to show the pattern of the seasons using ScratchJr. For this activity, you can make the program cycle through the different backgrounds, showing how they move from one to the other and repeat forever in this pattern. For a guide on how to do this, refer to the ‘Coding Handout’.

The other activity is to depict a conditional statement with respect to a seasonal change. Have students code a scene on ScratchJr to show how animals react to a season of their choice. Students will need to pick a season as well as an animal appropriate for that seasons. The students can then code the animal react according to the season. Examples of how to do this are including with the ‘Coding Handout’. The ‘Ideas Handout’ includes a list of actions that animals found on ScratchJr can do, which can be used to help students choose an idea to code.

Closure and Assessment

By the end of the lesson, students should be able to recognize seasons as a repeating pattern as well as the adaptations of animals in response to each season. These adaptations were treated as conditional statements with animals changing If it is a certain season.

To end the lesson, you can return to the Simon Says game and exclusively use conditional statements. Remind the students what the actions for the four seasons are and see if they remember the orders of the seasons. Once you have the order of the seasons determined, use conditional statements to reinforce the idea of conditional statements. If it is winter... etc. Make it fun and call it a speed round to see how quickly students can go! Since it is a pattern, students can guess what comes next and should be able to do this quite quickly. This is why patterns are useful in math, we can use them to make predictions and solve problems!

For assessment, collect the Conditional Block templates from the students. Review their work to ensure that they matched an appropriate animal and action to the season that they chose.

<p>Adaptations</p> <ul style="list-style-type: none"> • When playing Simon Says, choose actions that can be done sitting down or with minimal arm and leg movements • To simplify the Conditional Block activity, choose a season and animal for the students. Alternatively, do this for humans since students know some things they do in each season. • The ScratchJr code can be done independently on iPads or together on the smartboard using the desktop version. You can start students with the code and let them take turns choosing what blocks should be used. 	<p>Extensions</p> <ul style="list-style-type: none"> • Students can explore the different code blocks in ScratchJr to animate and add story elements to their scene. • Challenge students to think of daily changes and how animals (including humans) adapt to those. Get them to think of the pattern that we see every day. Discuss how we measure that pattern using a clock. Have students draw what they do at different times of the day in the form of conditional statements.
<p>Additional Resources</p> <ul style="list-style-type: none"> • Scratch Jr (iPad or Desktop version) • https://jfo8000.github.io/ScratchJr-Desktop/ 	