Unit 1 Lesson 1

INTRODUCTION TO PATTERNS, SEQUENCING, AND CODING

5TH & 6TH GRADE

CS FOR ALL

NSF
Award #1937380

SUMMARY AND STANDARDS

Summary:

In this lesson, students will be introduced to the basic commands of Scratch and sequencing a code.

Content Standards:
The student will use effective communication skills in group activities.
a) Listen attentively by making eye contact, facing the speaker, asking questions, and summarizing what is said.
b) Ask and respond to questions from teachers and other group members.
c) Explain what has been learned.
d) Use language appropriate for context.
e) Increase listening and speaking vocabularies.

CS Standards:
The student will construct sets of step-by-step instructions (algorithms), both independently and collaboratively
a) using sequencing;
b) using events.

MATERIALS AND RESOURCES NEEDED FOR THIS LESSON:

- Teacher slide deck
- Student slide deck

- *Teachers: Remember to create a new Scratch Studio for CoCo projects!* (Instructions for students on slides 32-33)
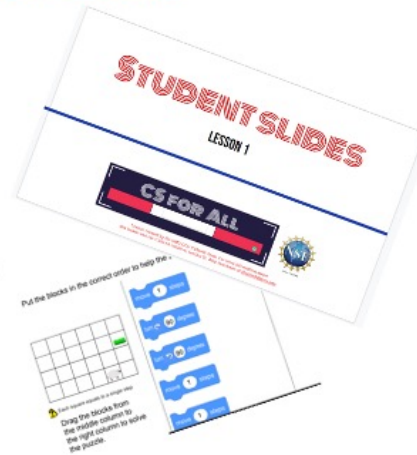
Turn & Talk: what do the words "pattern" and "sequence" mean? In computer science or in other contexts?

Pattern: a repeated way in which something happens
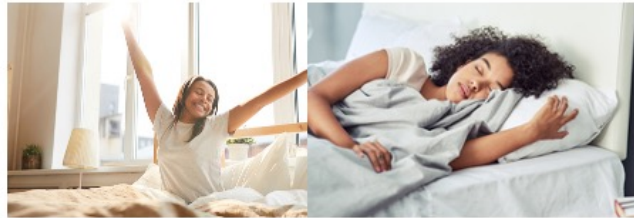
Roses are red.   A

Violets are blue.   B

I'm out of my head   A

With thinking of you.   B

What is the next
number in this pattern?

10, 12, 15, 19, 24, ____
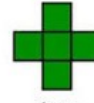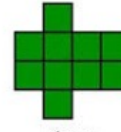
A. 25   B. 27
C. 29   D. 30
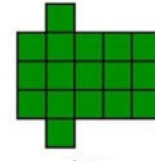
Figure 1   Figure 2   Figure 3

Today we are going to learn more about how patterns are used in nearly everything we do. A pattern is a thing that repeats, or a repeated way in which something happens.

Patterns can be found in many places in our lives. For example, there are patterns in weather such as seasons, days of the week, months of the year, moon cycle, and patterns on a leaf. [You can provide familiar everyday patterns that YOUR students may be familiar with!]. We even use patterns in our writing.

INTRODUCTION: EXAMPLES OF PATTERNS --THINGS THAT REPEAT--IN REAL LIFE
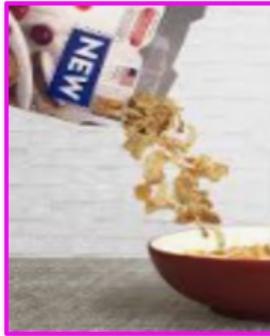
Read slide

SEQUENCE: AN ORDERED SET OF INSTRUCTIONS

Another new vocabulary word is sequence: it refers to an ordered set of instructions.
In order for a pattern to make sense, it must be in the correct sequence.

SEQUENCE FOR MAKING A BOWL OF CEREAL

1

2

3

For example, here's a sequence for making a bowl of cereal. If we did these steps out of order, we would not be happy!

# LET'S MAKE A RHYTHMIC PATTERN

CREATE A RHYTHMIC PATTERN!

1. Find a partner
2. Create a musical pattern using only sounds your body can make! (Optional: see examples on next slide)
   a. Stomp your feet
   b. Clap your hands
   c. Snap your fingers
   d. Pat your stomach
   e. Click your tongue
3. The pattern must have **three steps** and repeat **at least twice.**
   a. Example: clap-snap-clap clap-snap-clap
4. (Optional) Find another partner group. Learn their dance and teach them yours!

EXAMPLES OF RHYTHMIC AND DANCE PATTERNS:

Tutting
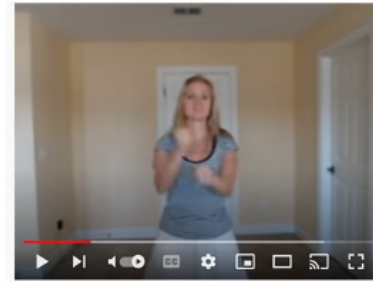
Hand jive

LESSON OBJECTIVES: I CAN...

❏ Review familiar patterns and sequences

❏ Review Scratch objects and blocks

❏ Identify and use the start block, speak block, think block

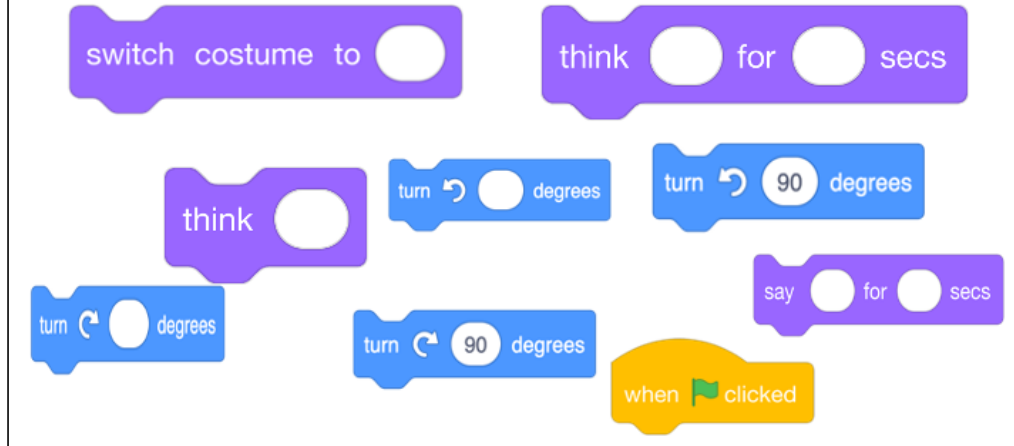❏ Select and drag Scratch blocks to sequence a code (unplugged)

VOCABULARY

COMMANDS: TELL A PERSON OR COMPUTER WHAT TO DO

Ok, we have some vocabulary we need to make sure we understand:
Commands tell a person or a computer what to do. "I command you to give yourself a pat on the back" (pat my own back).

COMPUTER COMMANDS

switch costume to ◯

think ◯ for ◯ secs

think ◯

turn ↺ ◯ degrees

turn ↺ 90 degrees

say ◯ for ◯ secs

turn ↻ ◯ degrees

turn ↻ 90 degrees

when 🚩 clicked

*"Has anyone seen these types of pieces anywhere before? (from warm up) These pieces are actually computer "commands." **Command**s tell a person or a computer what to do.*

CODE:
THE LANGUAGE THAT COMPUTER SCIENTISTS CREATE AND USE TO TELL A COMPUTER WHAT TO DO.

Code is the language that computer scientists create and use to tell a computer what to do. Code is how we can give instructions to a computer.

COMPUTER COMMANDS
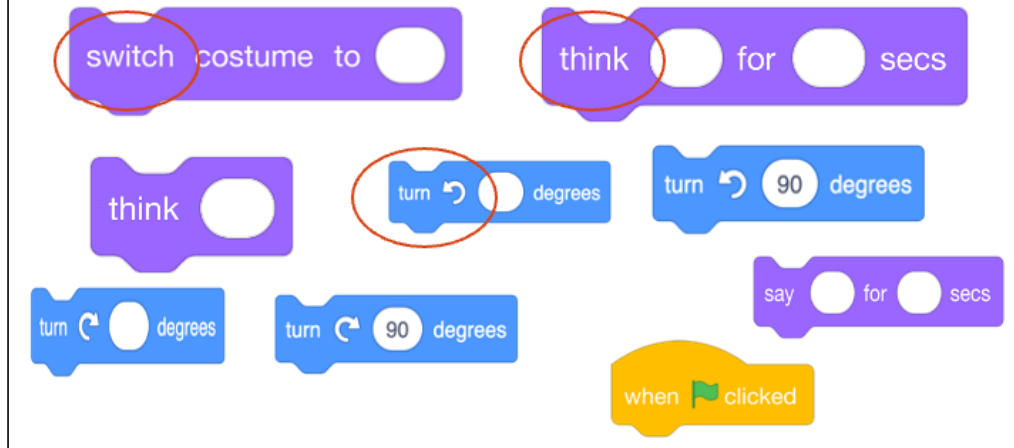
Lets look closely at these blocks again and what they say-
Click "switch,
Click "think,
Click "turn

"these are commands" written in Scratch code, which is the kind we will be working with.

When we put commands together and give the computer a set of instructions, that is called an "**algorithm**."

ALGORITHM: A LIST OF STEPS TO FINISH A TASK

An Algorithm is a list of steps or commands to finish a task.

CODING AN ALGORITHM

when 🚩 clicked

say Hi! for 2 secs

turn ↻ 90 degrees

This algorithm tells the computer to make the sprite say "Hi!" for 2 seconds then turn right 90 degrees.

Here's an example of an algorithm. We've taken Scratch commands and put them in the correct order from top to bottom you have created a sequence of instructions. This would tell the computer to say Hi for 2 seconds then turn right 90 degrees.

COMMANDS: TELL A PERSON OR COMPUTER WHAT TO DO

ALGORITHM: A LIST OF STEPS TO FINISH A TASK

CODE: THE LANGUAGE THAT COMPUTER SCIENTISTS CREATE AND USE TO TELL A COMPUTER WHAT TO DO.

Ok, let's review...
Commands tell a person or a computer what to do. "I command you to give yourself a pat on the back" (pat my own back).

An Algorithm is a list of steps or commands to finish a task. So if I told you to pat yourself on the back, then wiggle your ears, I am putting two commands together in a particular **sequence** I want you to follow. This is a really simple example of an **algorithm**. (Model, pat back, wiggle ears)

So a command is an instruction and we can create commands for the computer. When you put commands together you create an algorithm or a list of steps just like Pearl did. But how do you give computers instructions?

We use code! Code is the instruction that computer scientist create and use to tell a computer what to do.
Writing code is like writing the commands for a computer. When you know how to write code, you can tell computers what to do. We'll learn how to write code in Scratch.
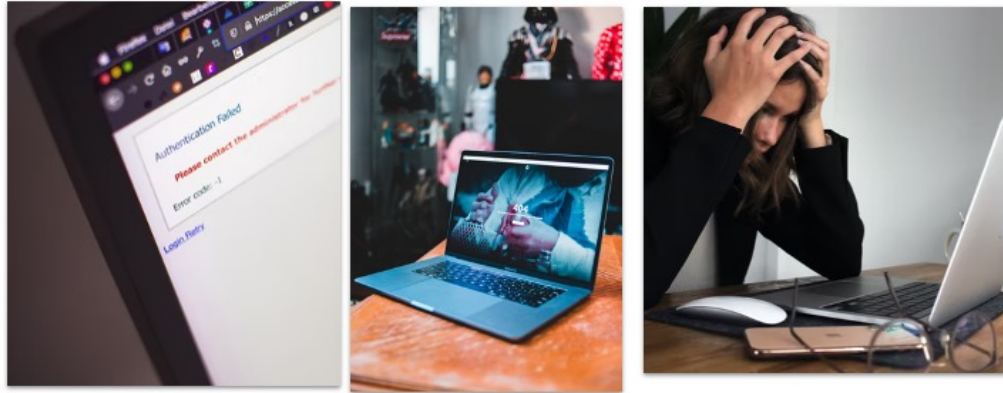
COMMANDS MUST BE IN THE CORRECT SEQUENCE

*So remember: When we write instructions or when we write code, the **order** in which we put the commands is called the **sequence**. It is important that you put your commands in the correct order. Just like when you get ready for school. It is important that you put on your socks BEFORE you put on your shoes. It would not look quite right (and be very uncomfortable) if you put your shoes on THEN put on your socks! The same is true when we give computers commands in code. Putting commands in the correct sequence is VERY IMPORTANT!"*

COMMANDS MUST BE IN THE CORRECT SEQUENCE

*So remember: When we write instructions or when we write code, the **order** in which we put the commands is called the **sequence**. It is important that you put your commands in the correct order. Just like when you get ready for school. It is important that you put on your socks BEFORE you put on your shoes. It would not look quite right (and be very* uncomfortable*) if you put your shoes on THEN put on your socks! The same is true when we give computers commands in code. Putting commands in the correct sequence is VERY IMPORTANT!"*

So remember: When we write instructions or when we write code, the **order** in which we put the commands is called the **sequence**. It is important that you put your commands in the correct order. Just like when you get ready for school. It is important that you put on your socks BEFORE you put on your shoes. It would not look quite right (and be very uncomfortable) if you put your shoes on THEN put on your socks! The same is true when we give computers commands in code. Putting commands in the correct sequence is VERY IMPORTANT!"

WHY DO PATTERNS AND SEQUENCES MATTER IN COMPUTER SCIENCE (CS)?

"If you do not follow the correct sequence of commands, your recipe will not turn out correct.
The same thing happens when you don't identify patterns and follow the correct sequence when writing a code...things will not turn out like you wanted them to!

When you write a set of instructions or a procedure, you have to be very clear so that others can follow your instructions without getting confused. This is a lot like what computer scientists do: they write instructions for computers. They have to be very clear and careful, because a computer is just a machine and will do <u>exactly</u> *what it is told. No matter if you're writing for a human or a computer, the instructions have to be in the right order, or the right* **sequence**, *or else they would make no sense!*
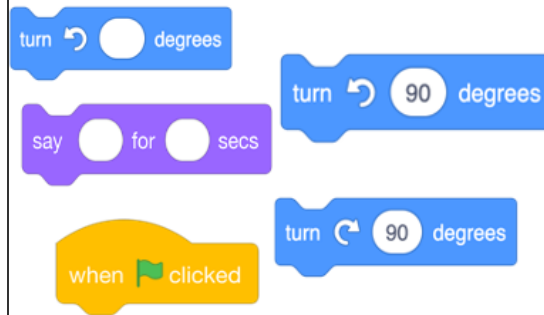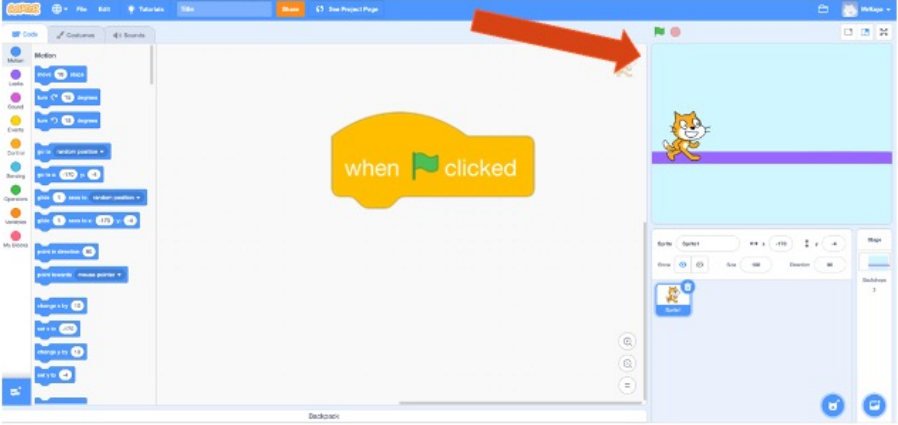
We can use a program called Scratch to write code and tell our computer what to do.

Scratch uses these command blocks to create an algorithm or list of instructions. This is what some of the command blocks look like, what do you think these blocks might do? Pause here and share with your teacher.
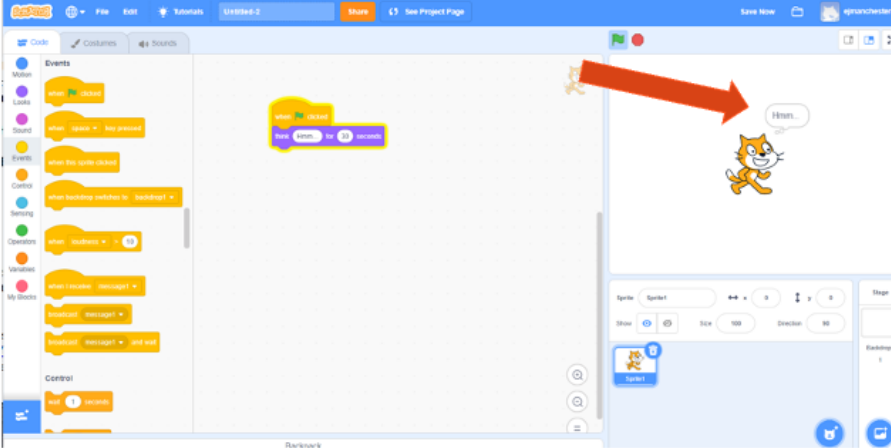
Tells your code to run when you click the green flag in Scratch.

Play the video and click "see inside" to show students how the start block initiates actions in Scratch.
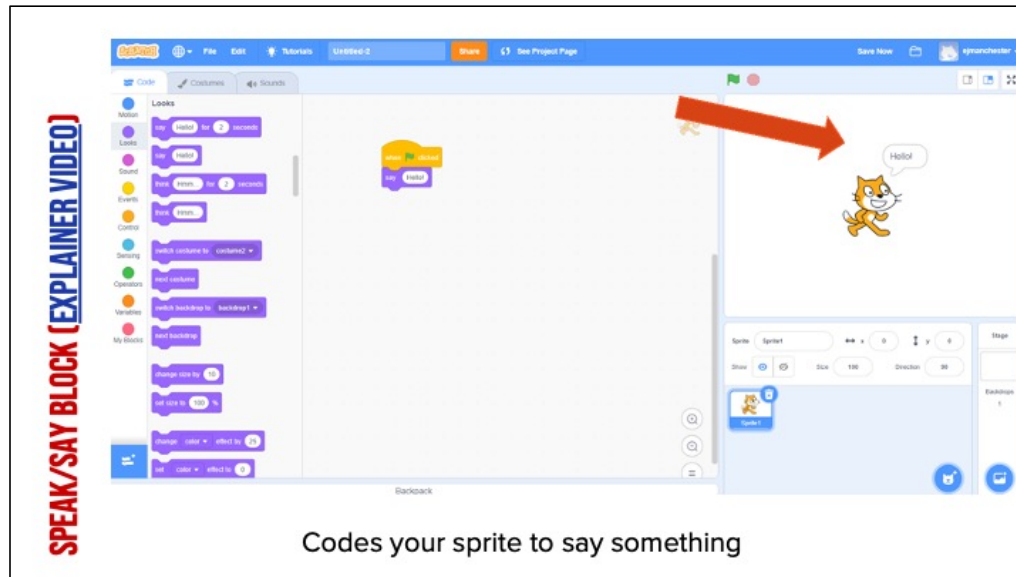
THINK BLOCK (EXPLAINER VIDEO)

Makes your sprite "think" something

Play the video to show students how the think block works:
https://www.dropbox.com/s/xgv1w5kl8wvrby4/ThinkCoCo_Nov16.mp4?dl=0

SPEAK/SAY BLOCK (EXPLAINER VIDEO)
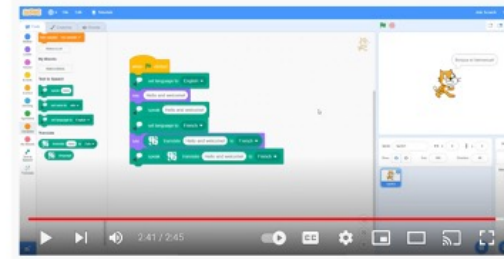
Codes your sprite to say something

Play the video to show students how the say block works:
https://www.dropbox.com/s/1xakgwx6g8lwp3y/SayForSecondsCoCo_Nov16.mp4?dl=0

ADDING THE TEXT TO SPEECH EXTENSION
(VIDEO HERE)
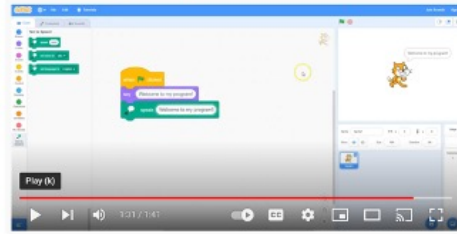
ADDING THE TRANSLATE EXTENSION AND SET LANGUAGE TO BLOCK
(VIDEO HERE)

INDEPENDENT PRACTICE

SCRATCH INTRODUCTIONS

- ❏ Navigate to Scratch at <mark>scratch.mit.edu</mark>
- ❏ Code a short animation introducing yourself
- ❏ Please include (at minimum):
    - ○ a **sprite** to represent yourself,
    - ○ a fitting **backdrop,**
    - ○ An explanation of your **name, age, and hobbies.**
- ❏ Get creative with the Scratch blocks and play around with new ones to see what they do!
- ❏ When you're done, share your scratch project with a partner who has also finished and to our class Scratch studio.

PAUSE AND WORK (10-15 MINUTES)

Ok, let's get started. Pause here and leave this screen up so that you can check on your goals. Please navigate to Scartch.mit.edu in your web browser.
This is just to get familiar with scratch, so don't worry about making mistakes. Just try a few things and see what happens! If you get stuck, take a deep breath and try again. You can do it!

Note to teacher: as students are working, Review how Scratch blocks can be used to create a pattern and sequence.

SHARING YOUR .SB3 FILE FROM CS FIRST TO COCO

1. Create the file in CS First

2. In the Scratch editor, find the word "File" in the top-left corner.
3. Click on "File" menu and you'll see some choices pop down.

1. Choose "Save to your computer." This will download your Scratch project.

1. Look in your "Downloads" folder. That's where your saved project might be.

1. Go to the CoCo website and log in to your account. https://wego.gmu.edu/scratchgo/login.php

1. Click proceed on the correct story in CoCo.

1. Navigate to the section of CoCo where you can upload your project. (only sb3 type and 10Mb max).

1. Click "Save".

Model how students can share Scratch creations to their teacher's studio

HERE IS AN OPTIONAL VIDEO TO LEARN HOW TO SHARE YOUR PROJECT IN SCRATCH.

Pause here.

Video modeling how students can share Scratch creations to their teacher's studio

Scratch - Imagine, Program, Share

TODAY'S CAREER IN TECH: MEET TESS

Play video

AND REMEMBER....ANYONE IN THE WORLD CAN BE A COMPUTER SCIENTIST!