UNIT 1 LESSON 1

INTRODUCTION TO PATTERNS, SEQUENCING, AND CODING

3RD & 4TH GRADE

Lesson created by the GMU-ODU CSforAll Team. For more information about this lesson and our CSforAll initiative, contact Dr. Amy Hutchison at achutchison1@ua.edu

SUMMARY AND STANDARDS

Summary:

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

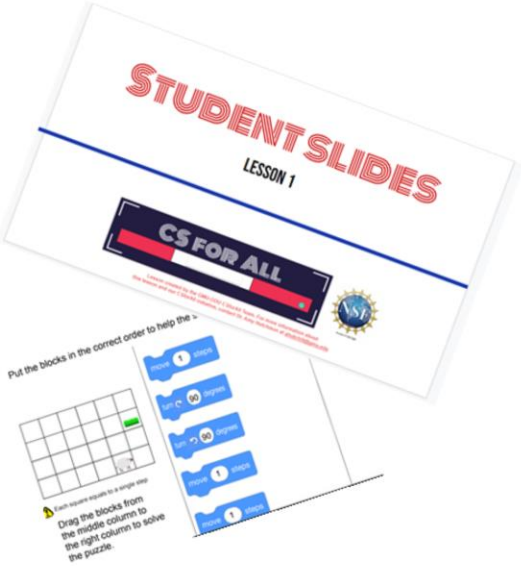
Content Standards:
The student will use effective communication skills in group activities.
a) Listen attentively by making eye contact, facing the speaker, asking questions, and summarizing what is said.
b) Ask and respond to questions from teachers and other group members.
c) Explain what has been 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 slides deck
- Scratch blocks:
  hard copy or digital copy in student slides
- Coding Activity

- *Teachers: Remember to create a new Scratch Studio for CoCo projects!*
  (Instructions for students on slides 38-39)



WARM UP

LET'S GET STARTED: WARM-UP

We are going to create a **pattern** with these fun blocks.

Remember, a **pattern i**s something that repeats, like a design or sequence.

Consider designing your pattern around: the color of the blocks, the shape and size of the blocks, or the words in the blocks.

For the teacher: you may choose to print and cut hard copies of the Scratch block handout or allow students to manipulate the blocks directly in the student version of this lesson.

TURN & TALK: SHARE YOUR PATTERNS

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

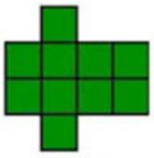


Figure 2

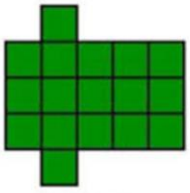


Figure 3

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

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

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!

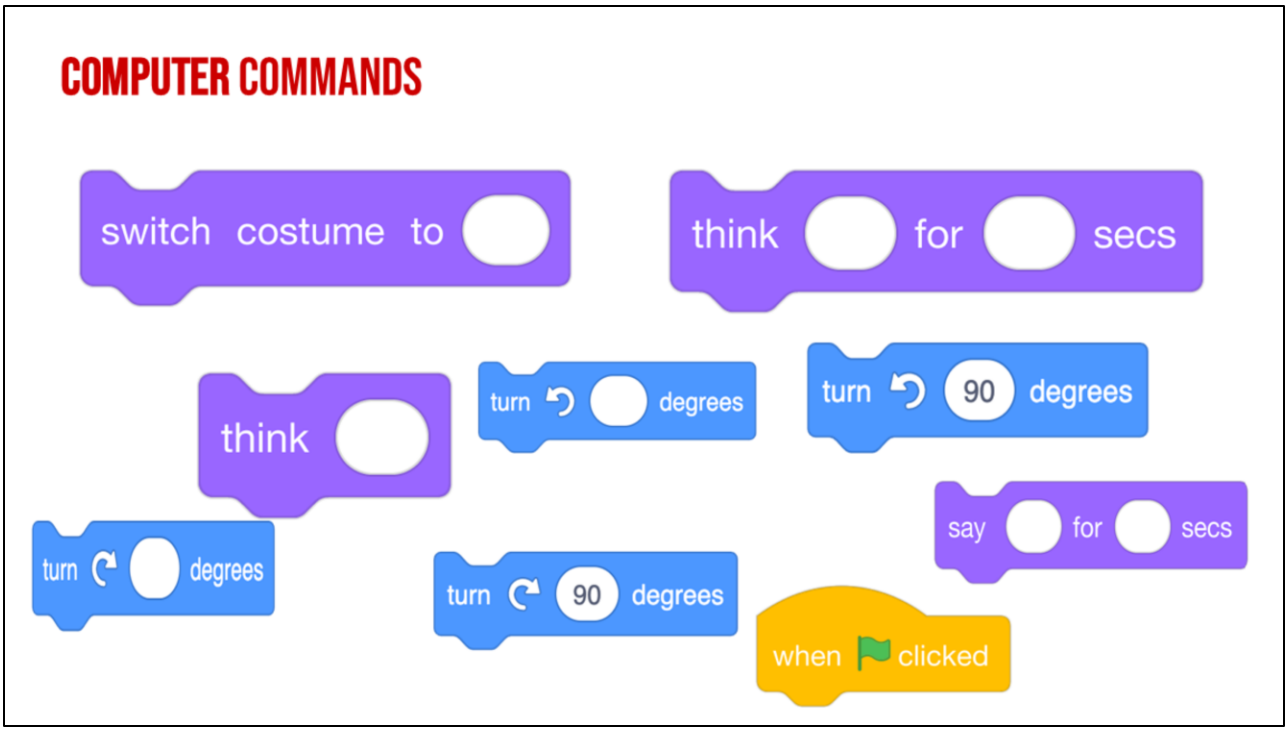
LESSON OBJECTIVES: I CAN...

- ❑ 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)

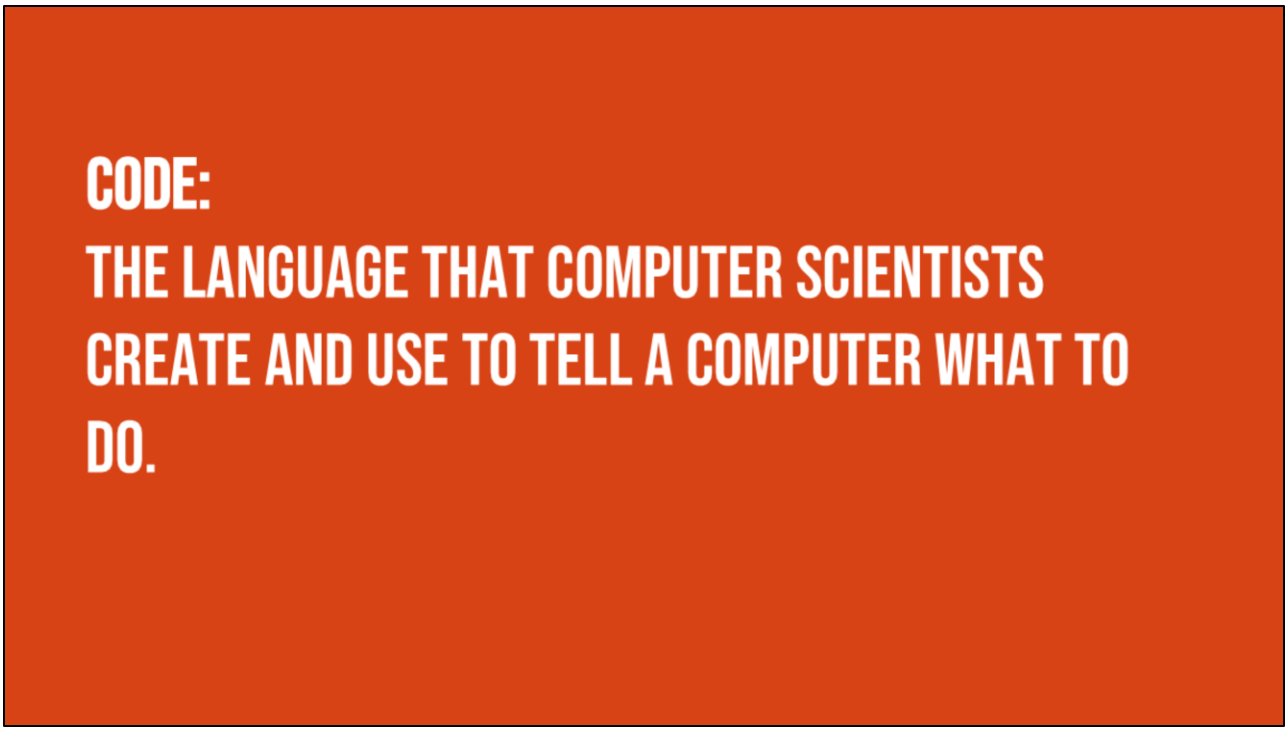
Read slide

VOCABULARY

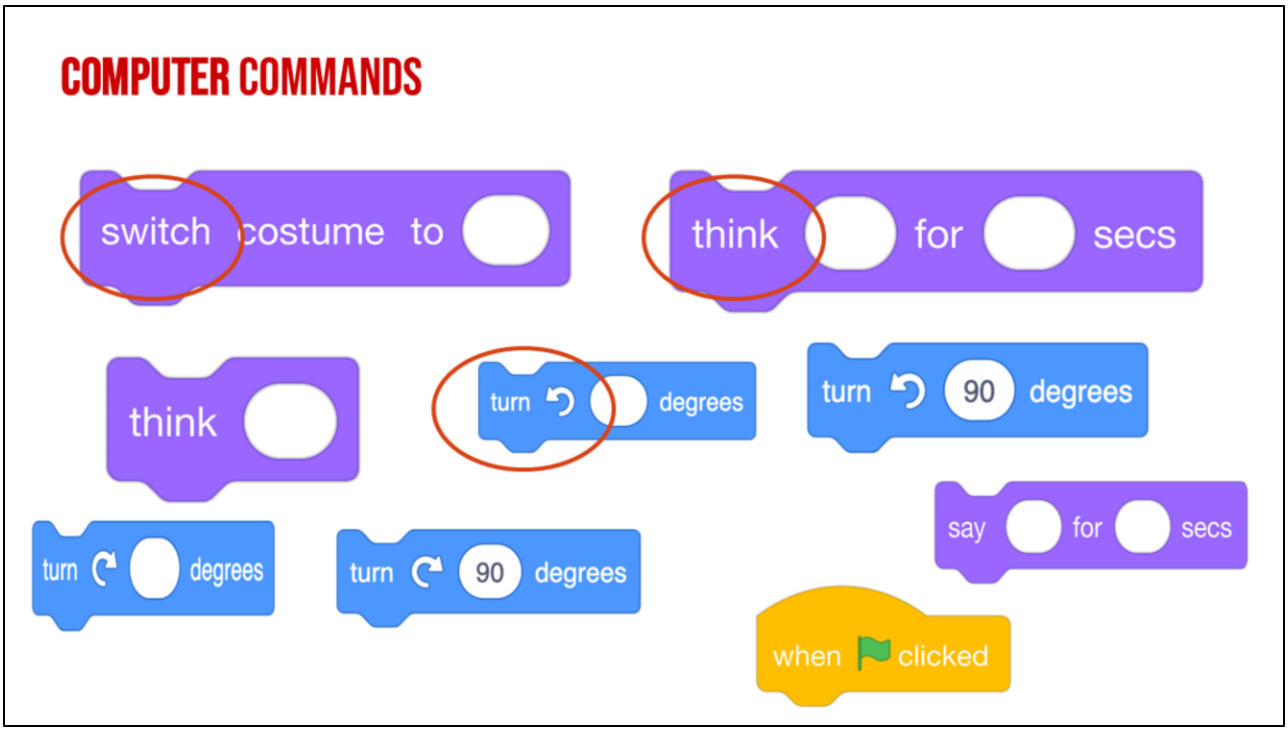
Ok, we have some vocabulary we need to make sure we understand:
Commands tell a person or a computer what to do. “I command you to give yourself a pat on the back” (pat my own back).



"*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 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.



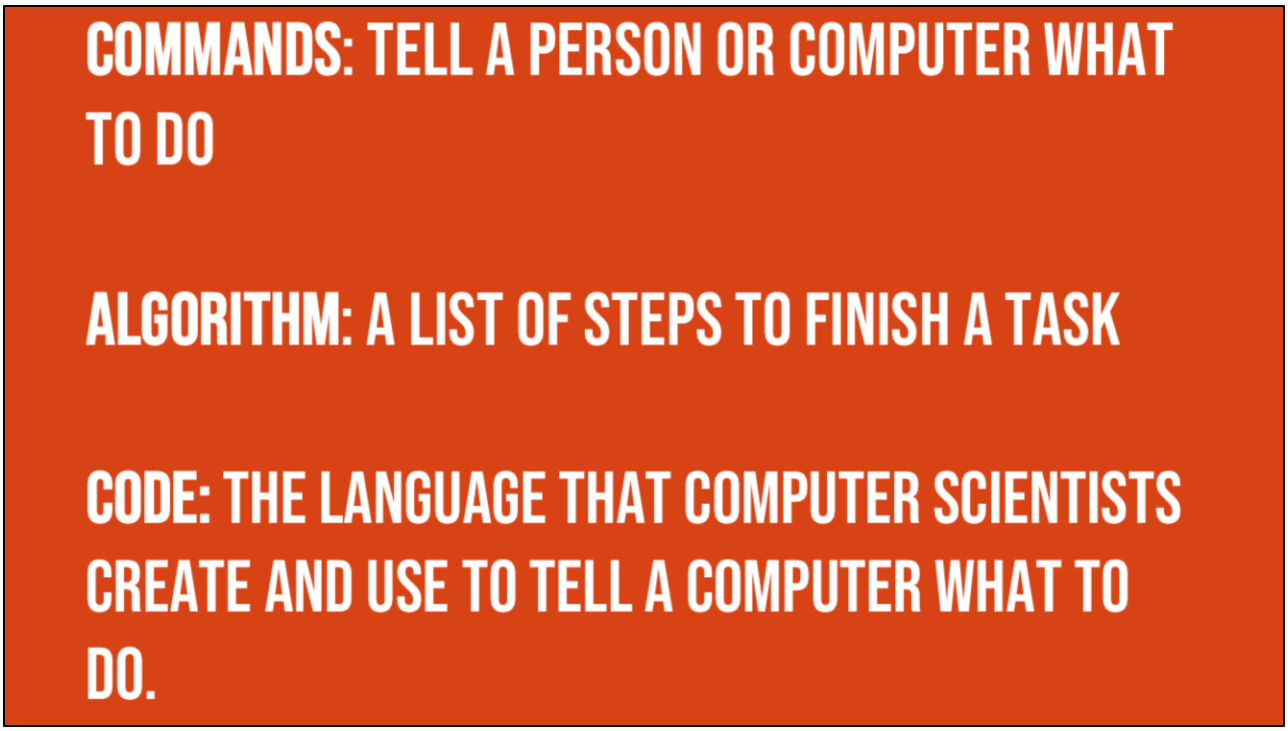
Lets look closely at these blocks again and what they say-
Click "switch,
Click “think,
Click “turn
“these are commands" written in Scratch code, which is the kind we will be working with.
When we put commands together and give the computer a set of instructions, that is called an “**algorithm**.”

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

CODING AN ALGORITHM

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.



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!"*

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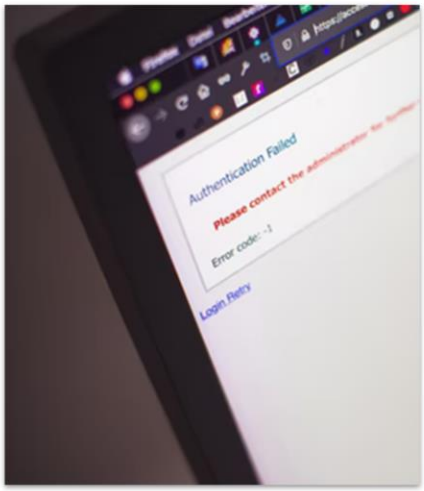
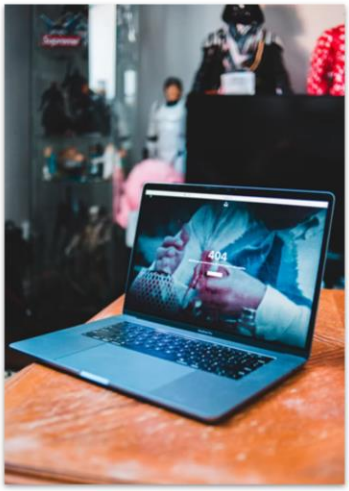
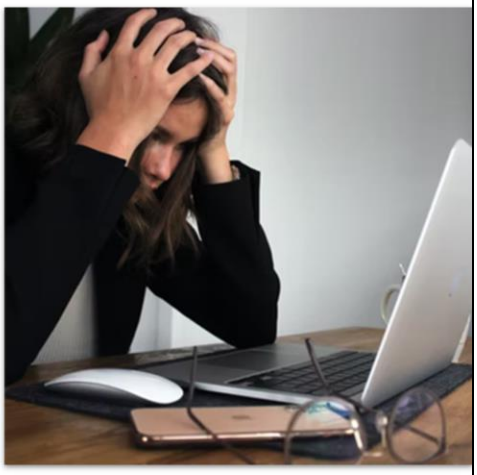
WHY DO PATTERNS AND SEQUENCES MATTER IN COMPUTER SCIENCE (CS)?

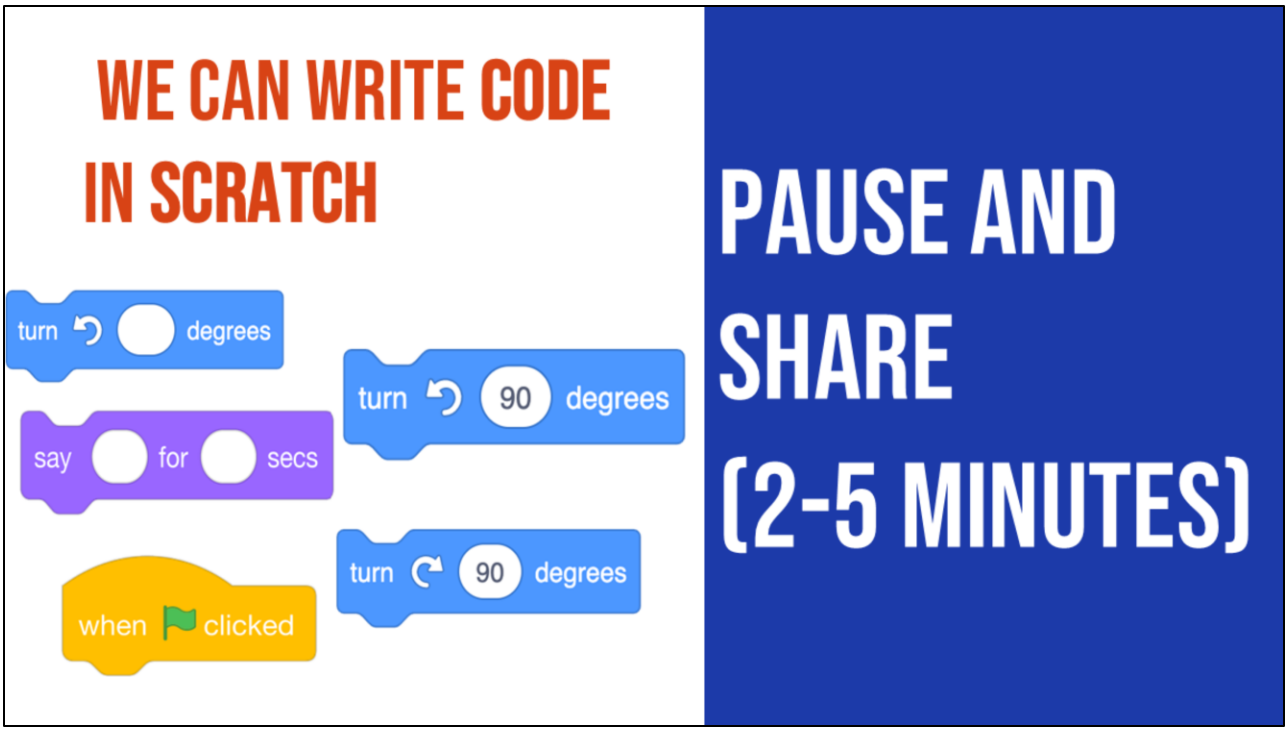






"If you do not follow the correct sequence of commands, your recipe will not turn out correct.
The same thing happens when you don't identify patterns and follow the correct sequence when writing a code...things will not turn out like you wanted them to!

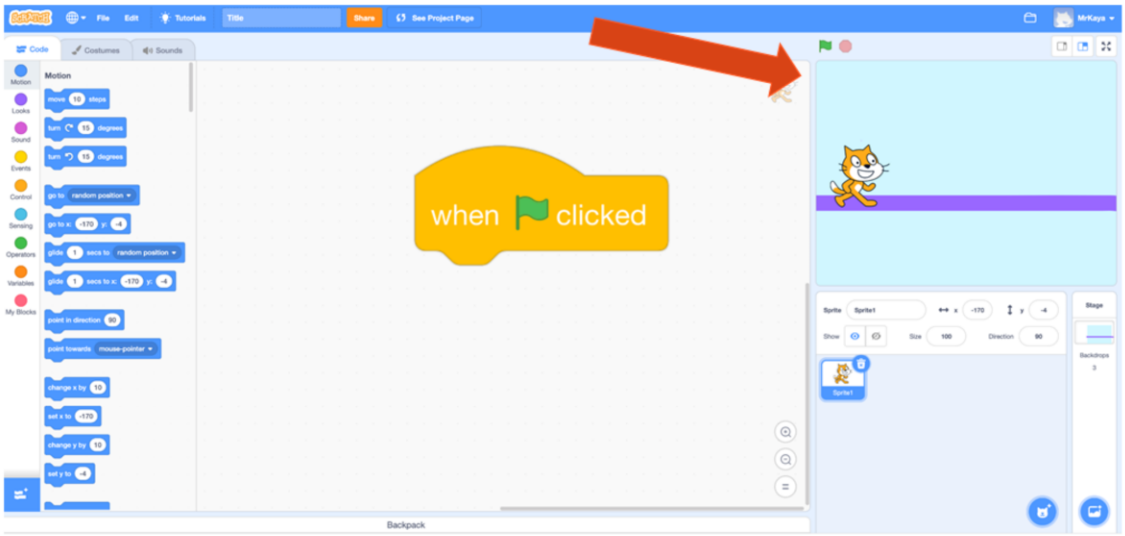
When you write a set of instructions or a procedure, you have to be very clear so that others can follow your instructions without getting confused. This is a lot like what computer scientists do: they write instructions for computers. They have to be very clear and careful, because a computer is just a machine and will do exactly 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.

START BLOCK (EXPLAINER VIDEO)

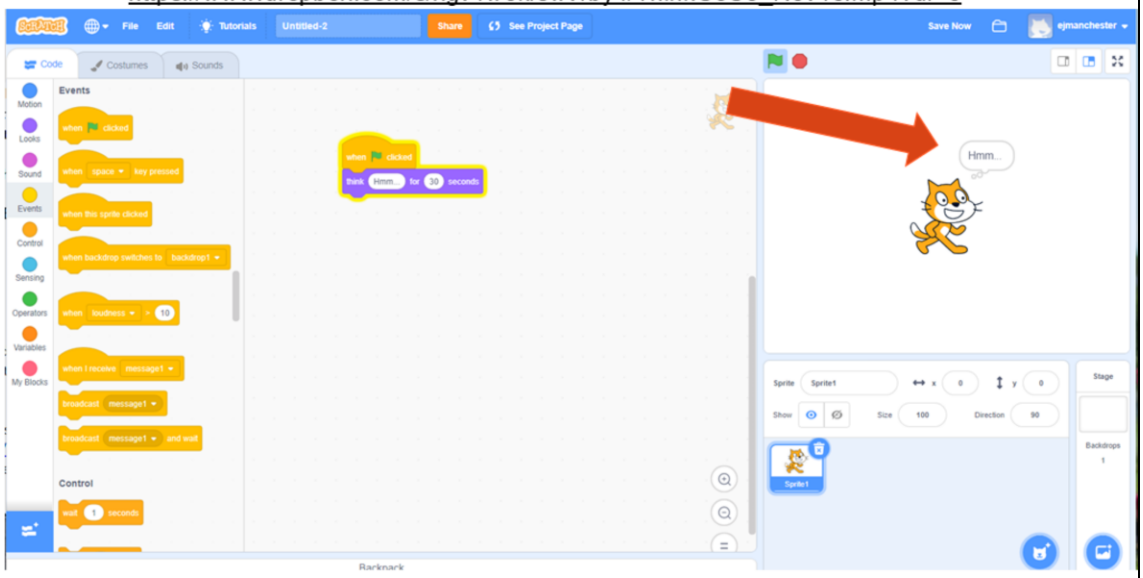


Tells your code to run when you click the green flag in Scratch.

Video link: https://www.dropbox.com/s/n1flwnn68llvrku/greenflag.mp4?dl=0

THINK BLOCK (EXPLAINER VIDEO)

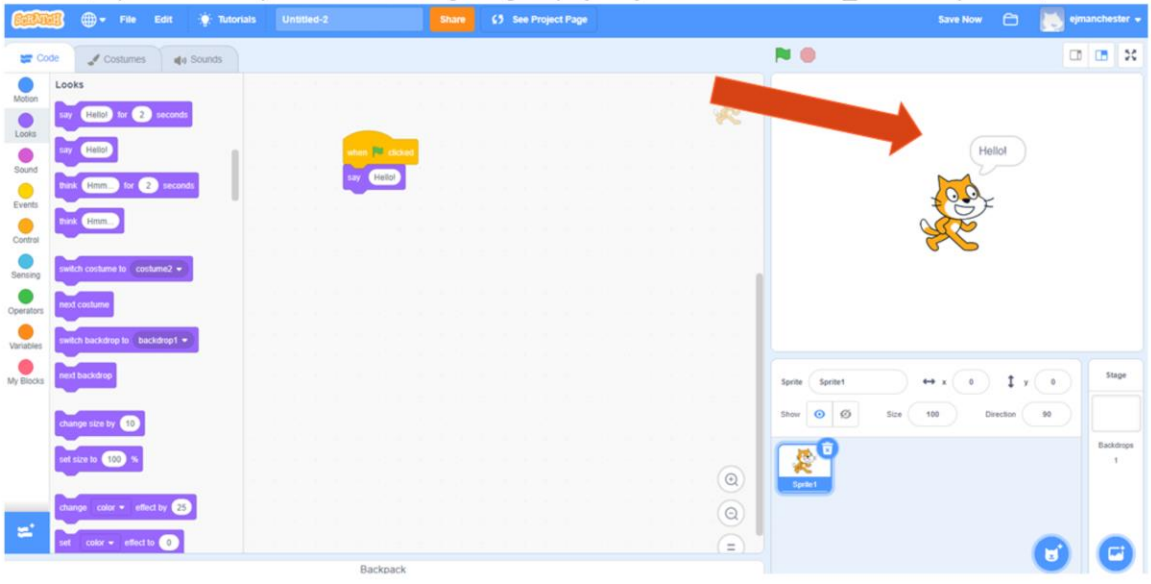
https://www.dropbox.com/s/xgv1w5kl8wvrby4/ThinkCoCo_Nov16.mp4?dl=0



Makes your sprite “think” something

https://www.dropbox.com/s/1xakgwx6g8lwp3y/SayForSecondsCoCo_Nov16.mp4?dl=0

SPEAK/SAY BLOCK (EXPLAINER VIDEO)



Codes your sprite to say something

TRY IT OUT!

- ❑ Navigate to Scratch for CS First at scratch.mit.edu
- ❑ Click the Blue "+" sign to start a new project
- ❑ Make a sprite
- ❑ Find the **"when green flag clicked"** block
- ❑ Make the sprite **think** something
- ❑ Make the sprite **say** something

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.

INDEPENDENT PRACTICE

INDEPENDENT PRACTICE: CODING ACTIVITY

- Click on the link below and complete the coding puzzles on your computer (or paper)
- https://www.dropbox.com/scl/fi/kg68grx79webbgz81kpzo/U1D2Unplugged-Activity2.pptx?dl=0&rlkey=owayduqmso0favrx9ghj1f8yf#slide=id.p1

Note to teacher: either push out the link to the activity directly or you may wish to push out the unit 1 student slides, which have the activity directly embedded.

Alright, in just a moment you are going to get started with your coding activity. There are few options for working on these. You can complete these activities on your computer in the slides by clicking and dragging or you may have a printed version that you can write on.

You may work by yourself or with a partner. If you are working with a partner, be sure to watch the next video about pair programming, which is how computer scientists work together. If you are working alone, you can skip that video for now. When you are done, check your answers to see if they make sense. We will talk about our answers after we are all don!

Your teacher will let you know what do next.

More on Pair Programming

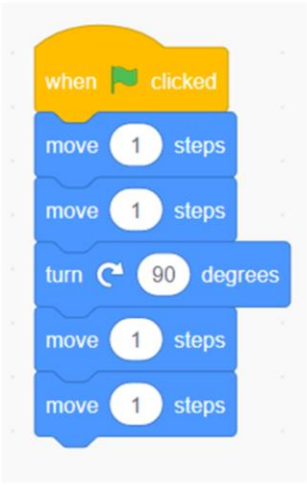
https://www.dropbox.com/scl/fi/mbqb1i88iulbi5pbl18ih/Pair-Programming-1080p.mp4?rlkey=bdnmsj9rwfu2p81qsxwg9n2vw&st=rj6ki4sl&dl=0

https://www.dropbox.com/s/dfwgj39b5xyyhj6/Pair%20Programming-%281080p%29.mp4?dl=0

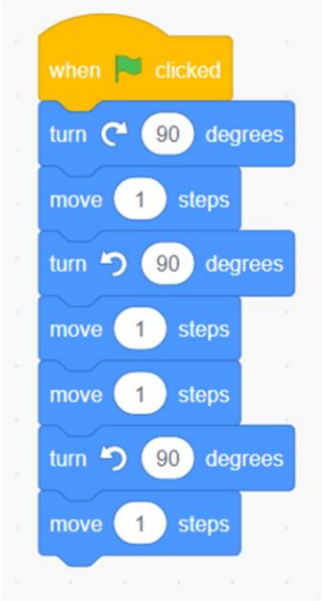
Pause the video to discuss some of your answers.

ANSWER KEY

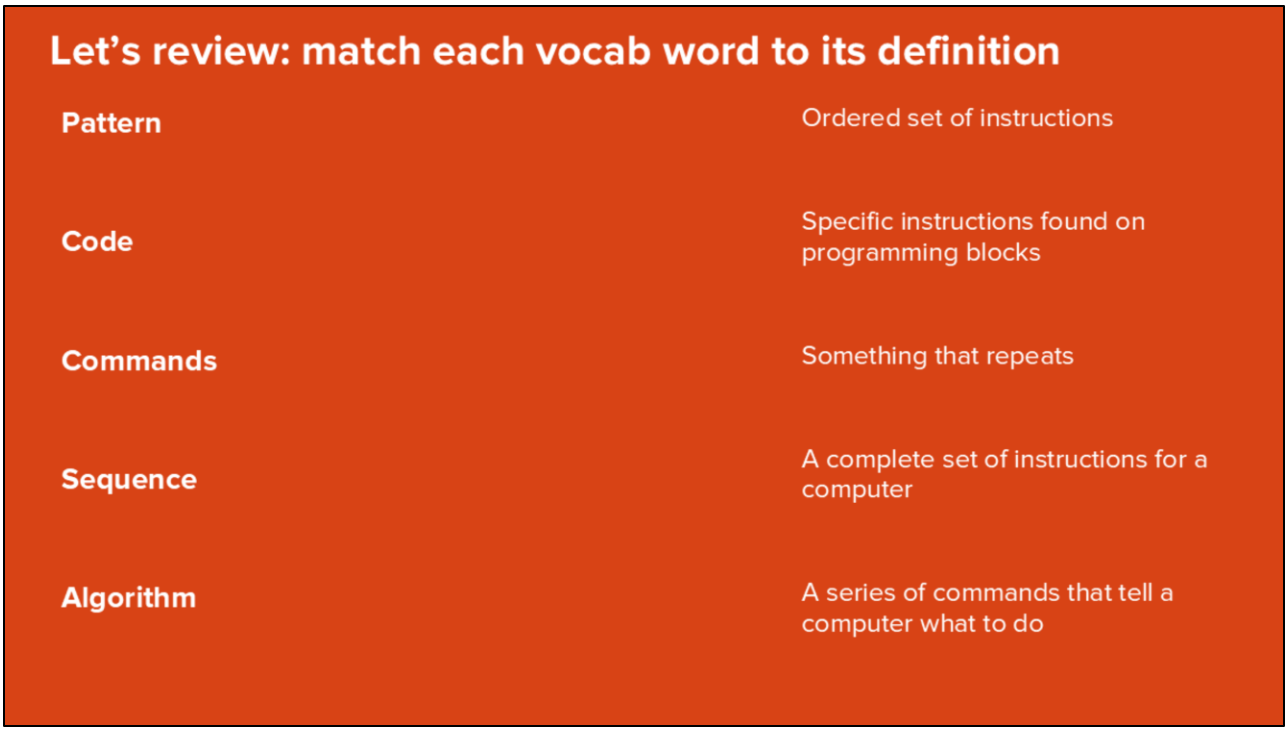
Puzzle on slide 2



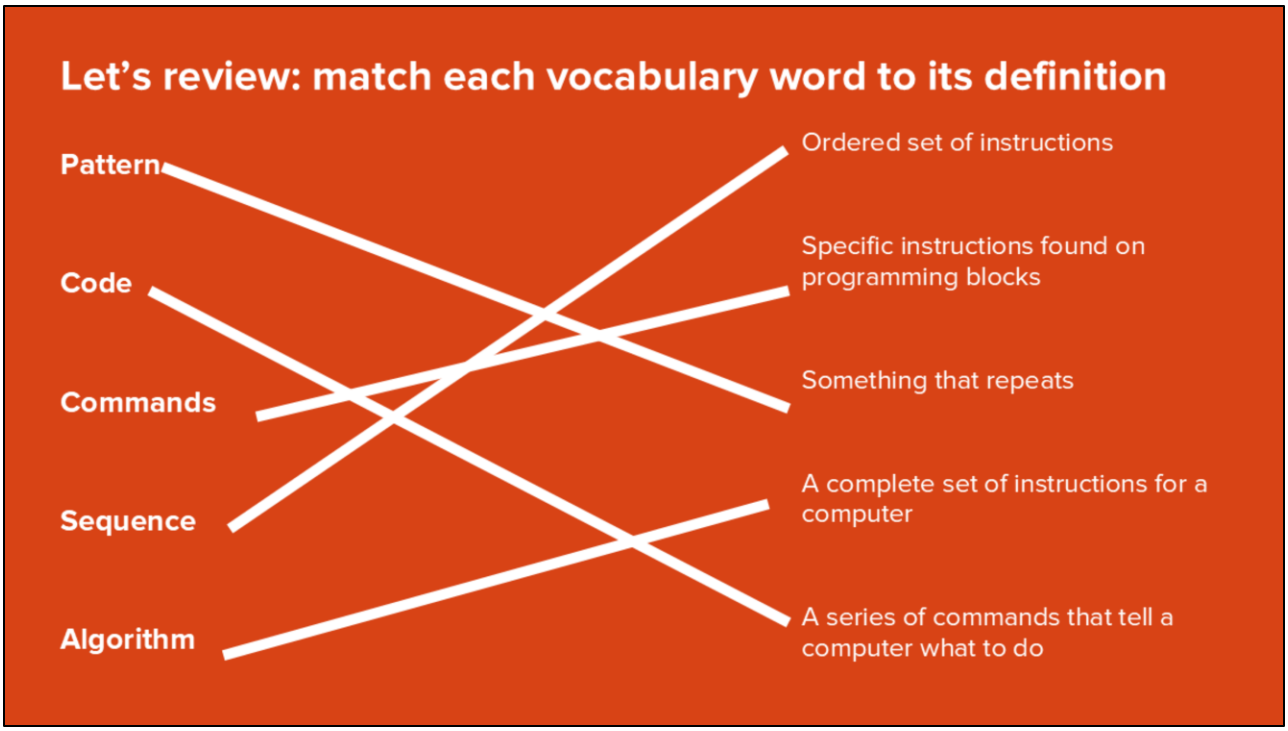
Puzzle on slide 3



Puzzle on slide 4



Before we begin let's review some important vocabulary from our previous lesson. Work together to match the vocabulary term to its definition. We will share the answers next.

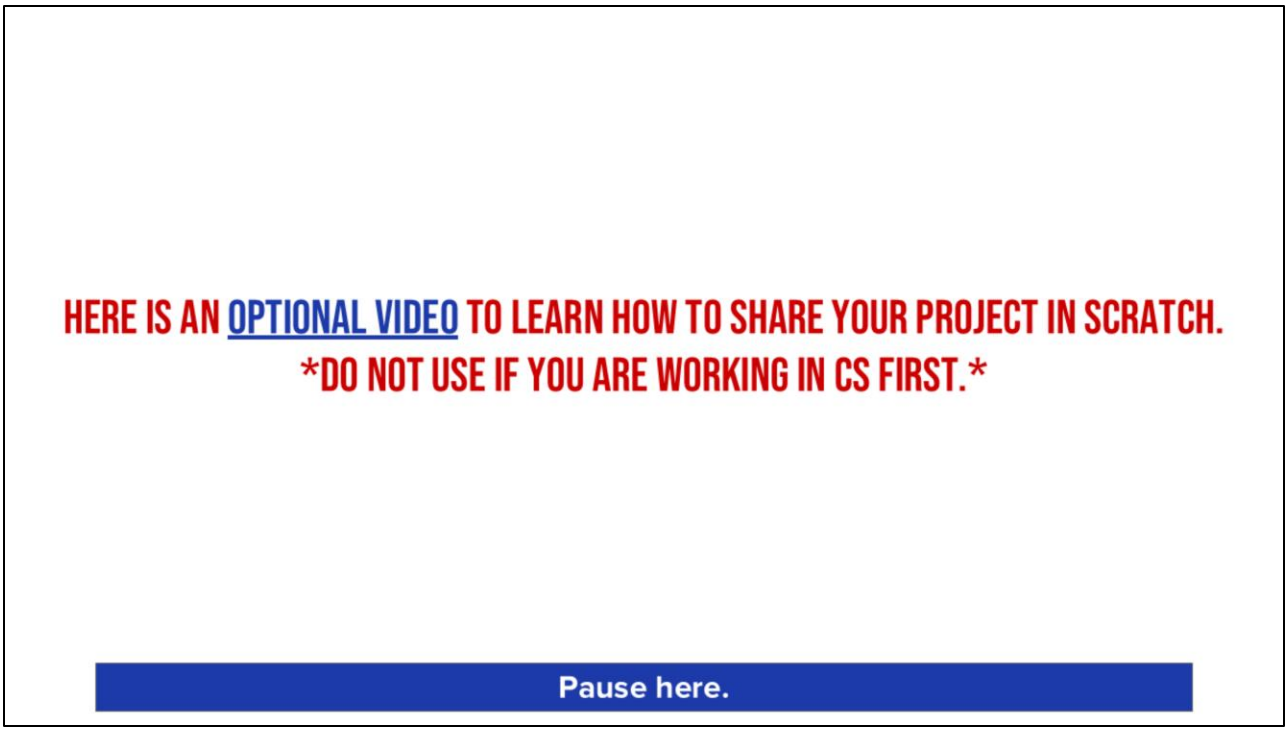


How did you do matching the vocabulary to the proper term? A pattern is something that repeats code is a series of commands that tell a computer what to do. Command are Specific Instructions found on programming box, like in scratch. A sequence is an ordered set of instructions. And an algorithm is a complete set of instructions for a computer. Great job!

TODAY'S CAREER IN TECH: MEET TESS

Play video

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



Video modeling how students can share Scratch creations to their teacher's studio
Video link: https://www.dropbox.com/scl/fi/k2t7ydsi6sdans7gohpft/Student-How-To-Add-A-Project-To-A-Studio-In-Scratch.mp4?rlkey=6jmehhmfutgb3jiirjxynvf29&st=cifroqna&dl=0

Scratch - Imagine, Program, Share

OPTIONAL SCRATCH CHECKLIST

- [x] I LOGGED INTO SCRATCH
- [x] I SHARED MY PROJECT
- [x] I ADDED MY PROJECT TO MY TEACHER'S STUDIO