

# UNIT 2, LESSON 1

## ABSTRACTION

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 [ahutchison1@ua.edu](mailto:ahutchison1@ua.edu)

## SUMMARY AND STANDARDS

### Summary:

In this lesson, students will be introduced to abstraction in computer science and instructional writing. They will practice abstraction in writing by filling in a graphic organizer.

#### 2017 VDOE ELA Standards

The student will use effective communication skills in a variety of settings.

- a) Use active listening strategies including but not limited to making eye contact, facing the speaker, asking questions, and summarizing.
- b) Orally summarize information expressing ideas clearly.

The student will read and demonstrate comprehension of nonfiction texts

The student will write in a variety of forms to include narrative, descriptive, opinion, and expository

#### CS Standards:

The student will construct sets of step-by-step instructions (algorithms), both independently and collaboratively

- a) using sequencing;
- b) using events.

Today, we are moving on to Unit 2, where we will learn about something called abstraction, a key process you will use in both computer science and writing.

## MATERIALS AND RESOURCES NEEDED FOR THIS LESSON:

- Chromebook/Laptop
- Internet Access
- [Teacher Slide Deck](#)
- [Student Slide Deck](#)
- [Explanatory text graphic organizer](#)



### UNIT 2, LESSON 1

ABSTRACTION



You will need....[read slide]

## **REVIEW:** SEQUENCE PUZZLES

1. Open your student slides
2. Solve the puzzles by dragging the Scratch blocks in the correct order **while AVOIDING any black boxes!**
3. When you're done, switch with a partner and check each other's work
4. Raise your hand if you have any questions!

**PAUSE HERE (10 MINUTES)**

Before we learn about our new vocabulary word for this lesson, we need to review what we've already learned. In a moment, you are going to open your student copy of the slides and work through some coding puzzles in your slide deck, these are going to look similar to ones you have done before. But this time, when you are done, you are going to look at another student's puzzle and check each other's work.

Pause the video here to work through your sequence puzzles. We recommend about 10 minutes.

# GREAT JOB!


Video explanation of solution 1:

<https://www.dropbox.com/s/yyfy614h2fyu3w2/DogPuzzleVideo.mp4?st=qfblxu3&dl=0>

Great job working on those sequence puzzles, now let's look at the answers.

PUT THE BLOCKS IN THE CORRECT ORDER TO HELP THE DOG FIND THE FIRST AID BOX.



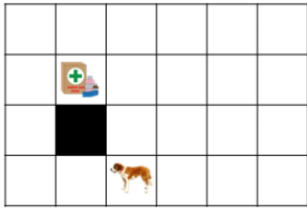
 Each square equals to a single step


Drag the blocks from the middle column to the right column to solve the puzzle.



Ok, for the first puzzle, your block should look like this. You need to move your dog 1 step forward, turn 90 degrees, move 1 step forward, move 1 step forward. Remember, that is our sequence!

PUT THE BLOCKS IN THE CORRECT ORDER TO HELP THE DOG FIND THE FIRST AID BOX.



 Each square equals to a single step

Drag the blocks from the middle column to the right column to solve the puzzle.

when  clicked

turn  90 degrees

move 1 steps

move 1 steps

turn  90 degrees

move 1 steps

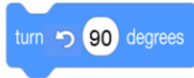
For this second puzzle, you must turn your dog first! Then move 1 step, 1 step, turn again to the left and move 1 step. That was our sequence of instructions.

PUT THE BLOCKS IN THE CORRECT ORDER TO HELP THE DOG FIND THE FIRST AID BOX.



⚠ Each square equals to a single step

Drag the blocks from the middle column to the right column to solve the puzzle (Only use the provided blocks).



There is an extra block that is not needed in the solution.



Now, for puzzle 3 there was a tricky block in there that you didn't need! Our sequence was...



PUT THE BLOCKS IN THE CORRECT ORDER TO HELP THE DOG FIND THE FIRST AID BOX.



⚠ Each square equals to a single step

Drag the blocks from the middle column to the right column to solve the puzzle.



⚠ There are extra blocks that are not needed in a correct solution.



For the last puzzle, there were two blocks. Our final sequence was:

Whether we are writing a sequence of instructions for a person or an algorithm for a computer, we have to make sure we are clear and put things in the right order!

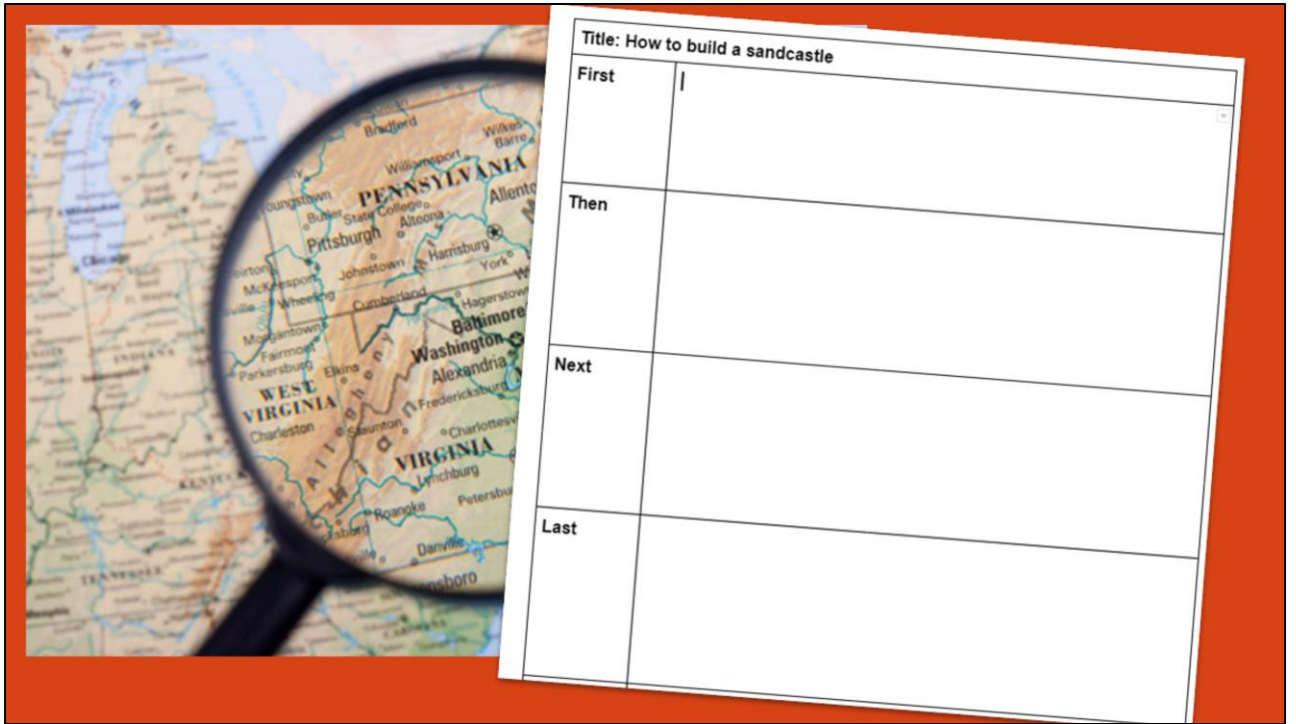
# Abstraction

Now that we have reviewed sequencing and coding, let's learn about a new word in computer science. Abstraction!

"now that we have reviewed sequencing and coding, we can learn how to be smart at making and using our codes. Let's work smarter!"

**ABSTRACTION (AB-STRAC-SHUN) IS IDENTIFYING WHAT IS IMPORTANT AND LEAVING OUT INFORMATION WE DO NOT NEED.**

Abstraction sounds like a really big word, but it just means identifying what is important and leaving out information that we do not need. Computer scientists are efficient, which means they look for the simplest solutions to problems.



Another common example of abstraction is in our writing when we plan our writing with an outline or a graphic organizer. In order to write clearly, we have to identify the most important details BEFORE we start writing.

**Play Video on Abstraction  
Found [HERE](#)**

Video link:

<https://www.dropbox.com/scl/fi/0l160n4qly9w04oefcd9v/Abstraction.mp4?rlkey=oas8j0ldwuvrcq76q1jnxpaww&st=xeljx1246&dl=0>

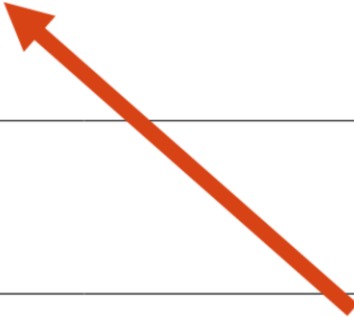

Title: How to build a sandcastle	
First	
Then	
Next	
Last	



Remember that graphic organizers are examples of abstraction. Graphic organizers are templates we often use to help us **organize our writing**. This helps us to plan our writing more efficiently. We can use these words for a variety of different types of writing and purposes. This helps us be more efficient.

For example, even though we filled in this graphic organizer for “how to build a sandcastle” we could use it to write a set of instructions for.....

Title: How to build a <b>Lego starship</b>	
First	
Then	
Next	
Last	



How to build something **OTHER** than a sandcastle. Like a Lego star ship! Nothing else about the graphic organizer needs to change but your instructions would be very different.

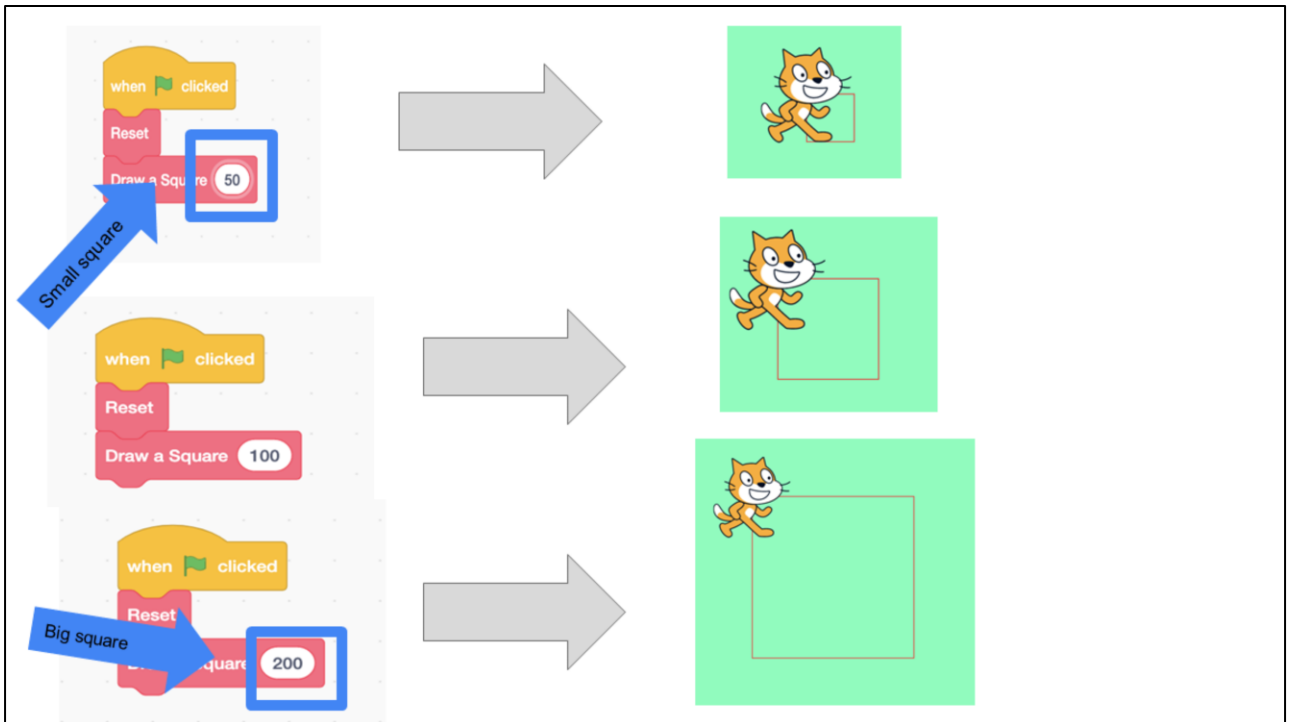
My Ideas:	What I Want to Do:
<p>1 First First, get all your materials. You will need - list your materials here.</p>	<p>1 Do I need to add a start block? No <input checked="" type="checkbox"/> Yes</p> <p>1 Do I need to add a character or object? No <input checked="" type="checkbox"/> Yes</p> <p>1 Do I need to add or change a background? No <input checked="" type="checkbox"/> Yes</p> <p>1 Do I need to make my character talk? No <input checked="" type="checkbox"/> Yes</p>
<p>2 Then Then, list the first step in your process.</p>	<p>1 Do I need to add or change a background? No <input type="checkbox"/> Yes</p> <p>1 Do I need to make my character talk? No <input type="checkbox"/> Yes</p> <p>1 Do I need to make my character think something? No <input type="checkbox"/> Yes</p> <p>1 Do I need to create a costume? No <input type="checkbox"/> Yes</p> <p>1 Do I need to switch a costume? No <input type="checkbox"/> Yes</p>
<p>3 Next Next, list the next step in your process.</p>	<p>1 Do I need to add or change a background? No <input type="checkbox"/> Yes</p> <p>1 Do I need to make my character talk? No <input type="checkbox"/> Yes</p> <p>1 Do I need to make my character think something? No <input type="checkbox"/> Yes</p> <p>1 Do I need to create a costume? No <input type="checkbox"/> Yes</p> <p>1 Do I need to switch a costume? No <input type="checkbox"/> Yes</p>
<p>4 Last Last, list the last step in your process.</p>	<p>1 Do I need to add or change a background? No <input type="checkbox"/> Yes</p> <p>1 Do I need to make my character talk? No <input type="checkbox"/> Yes</p> <p>1 Do I need to make my character think something? No <input type="checkbox"/> Yes</p> <p>1 Do I need to create a costume? No <input type="checkbox"/> Yes</p> <p>1 Do I need to switch a costume? No <input type="checkbox"/> Yes</p>
<p>5 Finally Great job!</p>	<p>1 Do I need to create a costume? No <input checked="" type="checkbox"/> Yes</p> <p>1 Do I need to switch a costume? No <input checked="" type="checkbox"/> Yes</p> <p>1 Do I need to make my character think something? No <input checked="" type="checkbox"/> Yes</p>



Does anyone recognize this?

That's right--CoCo is also an example of abstraction in action! Hot Cocoa is made efficiently with 4 steps. Could CoCo be used to make other things? Yes! As we go through our lessons, you'll see that you can use or...reuse CoCo to write instructions for more than just how to make hot chocolate. When you do this, you're applying abstraction.





In computer science, we use abstraction when we create code that we can reuse and when that code is written in the most efficient way possible. Remember when we tried to draw a square? We had your classmate take two steps each time. Well, we can use abstraction to reuse that pattern efficiently. We can just change the number of steps and create different size squares.

The same is true in Scratch. Do you see how the first the first square says 50, 100, and then 200. This would create different size squares using the same sequence. We only have to change the number of steps and our square can change size!

Scratch link: <https://scratch.mit.edu/projects/599143669>

## INDEPENDENT PRACTICE

Open your student slides.

Write a set of instructions for how to do anything you choose by using the [template](#).

*Note: you will continue working with this set of instructions, so be creative!*

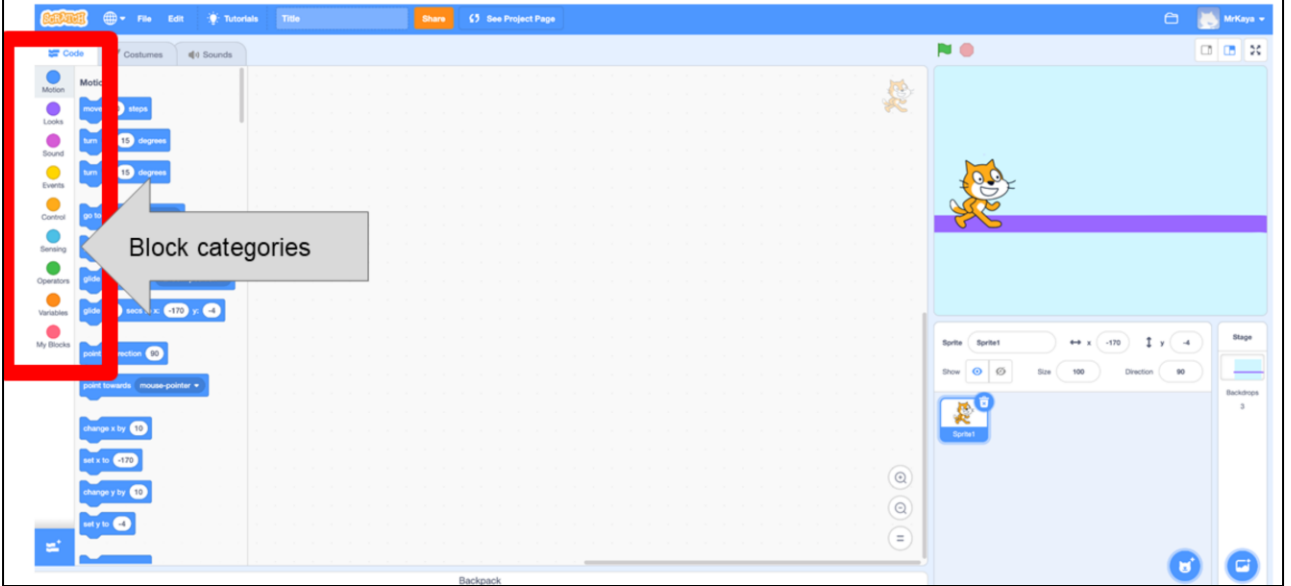
In a moment, you will navigate to your student slide deck. In the deck is an outline for you. You can write a set of instructions for anything you want. It could be a recipe, how to play your favorite game, or how to get ready for school. Type your instructions into the graphic organizer.

There is also a link to this document in the handouts, for the option to hand write your instructions. Your teacher will let you know what to do next.

**PAUSE HERE TO COMPLETE YOUR INDEPENDENT  
PRACTICE (15-20 MINUTES).**

# **INTRODUCING SCRATCH SOUND BLOCKS**

# INTRODUCING SCRATCH SOUND BLOCKS



Remember that on the far lefthand side of our page, we see a color palette. Each color corresponds to a different type of block. Today, we'll focus on sound blocks, which are PINK.

# SOUND BLOCKS

Do I need to play a sound?

Do I need to choose or upload a sound?

Do I need to change the pitch effect of the sound?

Do I need to stop all sounds?

For today, I am going to show you how to use two types of blocks you will see in level 4. You will see these questions in Coco{Read questions}. These are all related to the pink sound blocks in scratch. Let me show you how to use these blocks!

## SOUND BLOCKS:

Do I need to play a sound?

play sound Meow until done

Do I need to choose or upload a sound?



Do I need to change the pitch effect of the sound?

change pitch effect by 10

Do I need to stop all sounds?

stop all sounds

For these questions, you will use these blocks...read slide.

## SOUND BLOCKS: Do I need to choose or upload a sound?

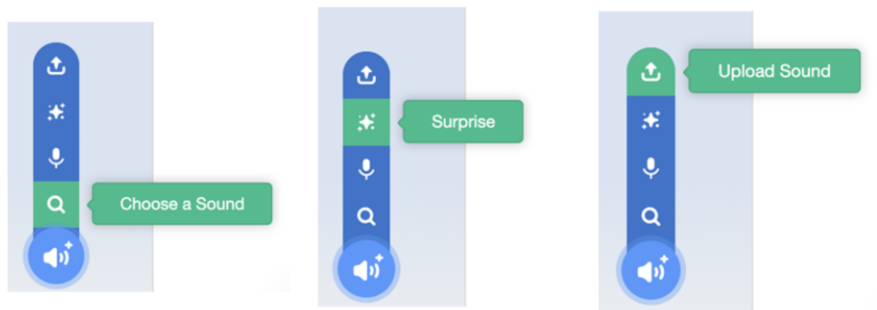
### How to choose a sound:

- 1. Screenshot of the Scratch interface. The 'Sounds' tab is selected and circled in blue. A sound block is visible with the sound 'Meow' selected. The sound block has a volume icon and a plus sign.
- 2. Close-up of the blue speaker icon with a plus sign, which is used to open the sound selection menu.
- 3. Close-up of the sound selection menu. The 'Choose a Sound' button is highlighted in green.

But for this question, you will need to choose WHAT sound you are using. You can choose from a lot of different sounds to match your story!  
In Scratch you will click on the Sounds tab at the top, then click the blue speaker with a plus sign, this will allow you to choose a sound.



## **SOUND BLOCKS:** Do I need to choose, upload, or record a sound?



p.s.: Please note that the colors and options of the sound blocks may vary slightly depending on the Scratch platform you are using.

Then you can decide how you want to choose your sound. Choose from the options in Scratch, let scratch choose randomly, or you can upload a sound. Let me show you!

## **YOUR TURN: PRACTICE USING SCRATCH SOUND BLOCKS**

### **Steps:**

- 1. Choose a new sprite (any animal that is not a cat!)**
- 2. Choose a sound for your sprite**
- 3. Use a purple look block to make your sprite say at least one line of your written instructions**

Now you will practice using these new sound blocks (read instructions on slide).

**PAUSE TO WORK IN**

**SCRATCH ONLINE**


**OR**

## WHEN FINISHED: SHARE 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](https://wego.gmu.edu/scratchgo/login.php)
1. Click proceed on the correct story in CoCo.

Ready To Work on Your Story?	
first story	(Locked) View 2
second story	Proceed
Story 3	Proceed
1. Navigate to the section of CoCo where you can upload your project. (only sb3 type and 10Mb max).

Uploading your coding file (only sb3 type and 10Mb max):

Choose File No file chosen Save Uploaded file: [g3a](#)
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 ON THE SCRATCH WEBSITE.**

**Pause here.**

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

[Scratch - Imagine, Program, Share](#)

# WRAP UP

- I FINISHED MY INSTRUCTIONS
- I SHARED MY PROJECT

Review lesson activities and