LESSON 3

DECOMPOSITION AND ABSTRACTION

1ST GRADE

Award #1837380

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 learn about abstraction and decomposition. They will be able to explain how to decompose a story and abstract a story sequence. They will practice abstraction and decomposition by following steps for drawing a monster.

ELA Standards:

Communication and Multimodal Literacies:

1.1 The student will use oral communication skills.
i) Retell information shared by others.

Reading:

1.9 The student will read and demonstrate comprehension of fictional texts.
g) Summarize stories and events with beginning, middle, and end in the correct sequence.

CS Standards:

1.1 The student will construct sets of step-by-step instructions (algorithms) both independently and collaboratively a. using sequencing;

1.3 The student will analyze, correct, and improve (debug) an algorithm that includes sequencing and simple loops, with or without a computing device.

MATERIALS AND RESOURCES NEEDED FOR THIS LESSON:

- Teacher Slide Deck
- First Grade Word Wall Cards

LESSON OBJECTIVES: I CAN...

- ❑ Define and give examples of abstraction
- ❑ Define and give examples of decomposition
- ❑ Follow steps to draw a monster
- ❑ Use abstraction to identify the most important features of my monster

Vocab:

- Decomposition
- Abstraction

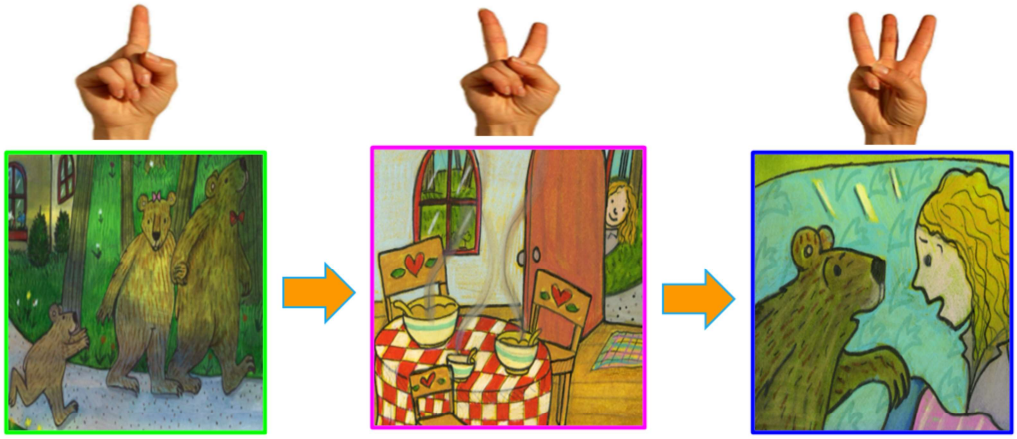
WARM UP

Computer Science

Review Vocabulary with Emphasis on Patterns: computer science, sequence, debug

Welcome back to thinking like computer scientists!

LET'S THINK ABOUT OUR LAST COMPUTER SCIENCE LESSON...



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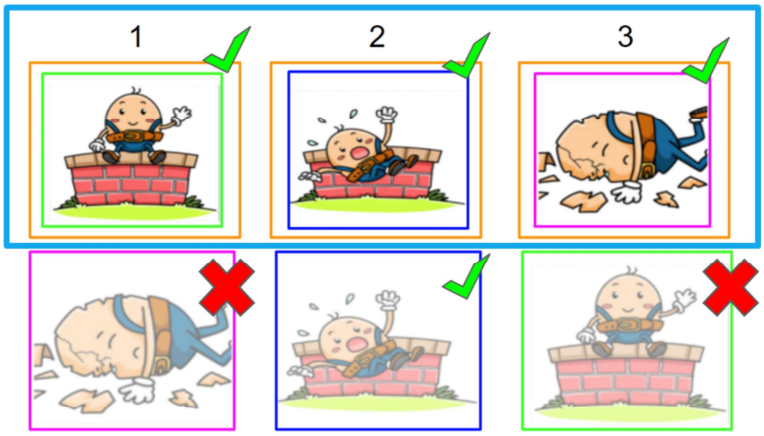
sequence

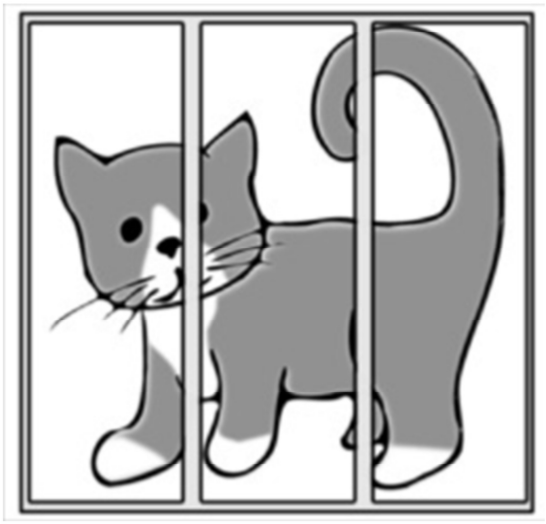
Last time, we learned that computer scientists put code in the correct **sequences** to tell the computer what to do.



debug

We also learned that if there's a problem in the sequence, we can **debug** it by finding the problem and fixing it.

DIRECT INSTRUCTION



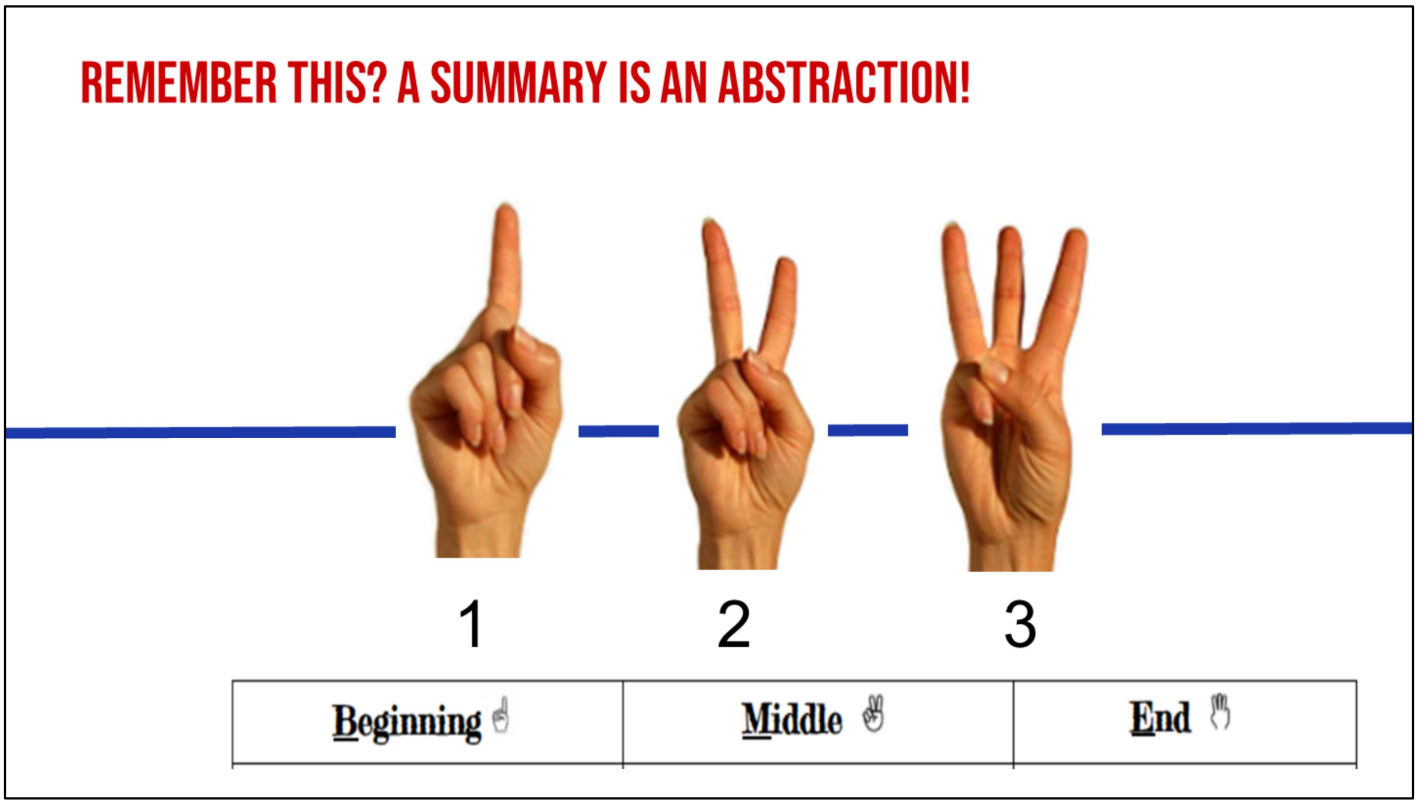
abstraction

Today, we're going to learn two new vocabulary words. The first one is "abstraction."

ABSTRACTION (AB-STRAC-SHUN) IS FILTERING OUT UNNECESSARY INFORMATION.

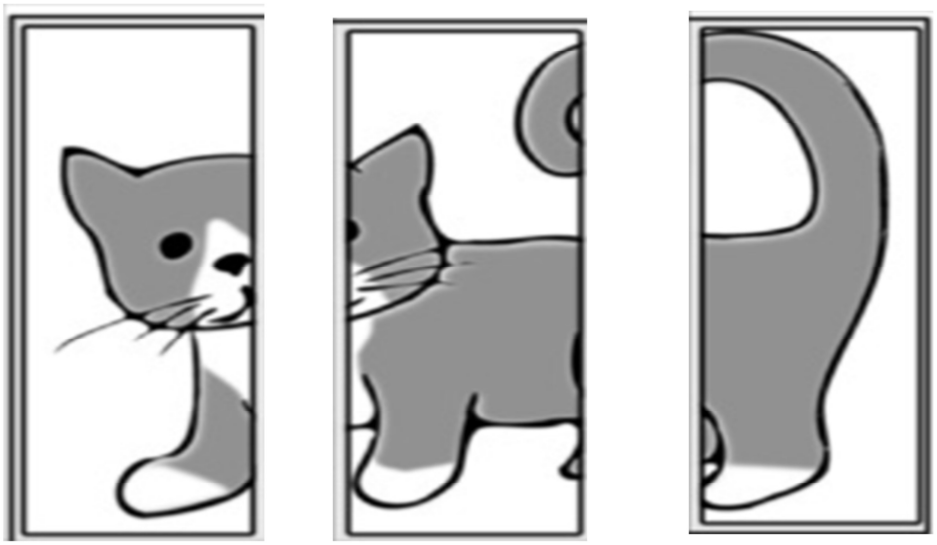
Play video: https://www.dropbox.com/s/6nkvpaowwwok268/Abstraction.mp4?dl=0

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



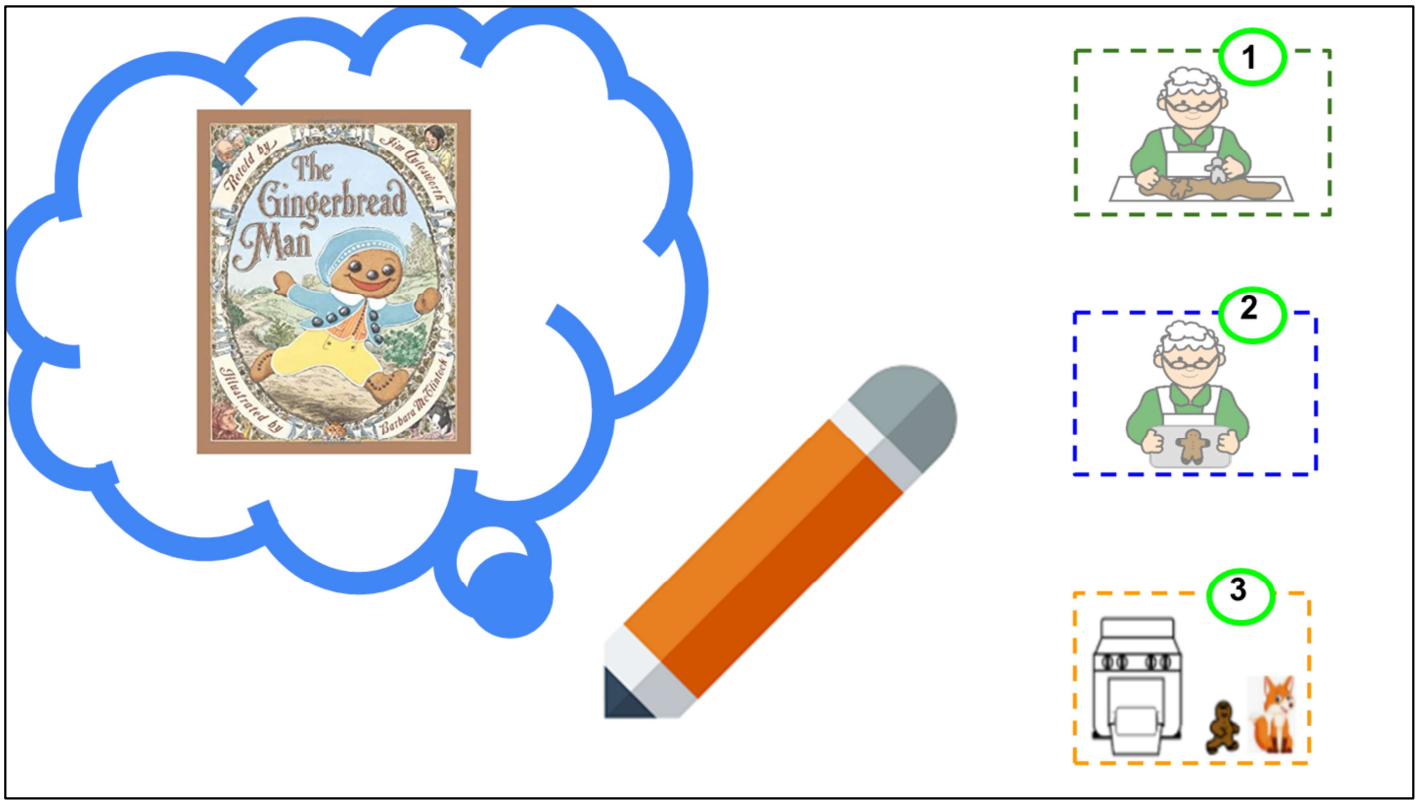
When we summarized our stories last time, we actually used abstraction! It would not be efficient to retell the entire story to someone. So when they ask you what a story or movie was about, you pick out the most important details.

Computer scientists are like this, too! They want the most efficient code that only tells the computer the necessary information. That means that they find *the most important parts.* This helps computer scientists focus on finding a solution that can help fix more than just a single problem.



decomposition

In abstraction, you filter out unnecessary information. You make decisions about all the details and decide which ones are the most important. Decomposition is a problem-solving strategy that simply means “breaking a problem or process down into smaller parts.”



So a great example of decomposition in class is when we try to write paragraphs of our own! It can be overwhelming to write a full paragraph all at once so we break it down into our topic sentence and main idea. If we were going to WRITE our own story we'd have to plan the beginning, middle, and end separately rather than writing it all at once.

Jim Aylesworth, the author of The Gingerbread Man, didn't come up with the idea for his story all at once! He had to write it in multiple parts.

Computer scientists don't always tell stories or decompose problems across their fingers, but they use the same idea of **decomposition** that we used for the Gingerbread Man, by thinking about breaking their code down into smaller projects.

GUIDED PRACTICE

HOW COULD WE DECOMPOSE "MAKING A PEANUT BUTTER AND JELLY SANDWICH"?

Remember: to decompose a process, we break it down into steps.

You can see here that the process of making a peanut butter and jelly sandwich has been DECOMPOSED so that someone else could follow these instructions and make a sandwich. What do you think would happen if we left out any of these steps? That's right, the sandwich may not have jelly! That would be no good at all!

INDEPENDENT PRACTICE

MONSTER MAKER!

Our goal is to draw a monster. How do we achieve that? First, we are going to **decompose** the task into a series of steps.

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MONSTER MAKER!

Our goal is to draw a monster. How do we achieve that? First, we are going to **decompose** the task into a series of steps.

1. Take out a blank sheet of paper
2. Take out a pencil
3. Draw your monster
4. Color your monster

today, I'm going to help you decompose this task. You should [read instructions]

MONSTER MAKER!

Second, we're going to use **abstraction** to pick out the most important characteristics.

Each monster needs to have these body parts:

- Head
- Eyes
- Nose
- Ears
- Mouth

[read slide] then say: Don't worry though –they will all still turn out different! We're using the same characteristics but the details can be different. It just wouldn't be efficient for us to list allllll the different types of heads, eyes, nose, ears, and mouth variations we can imagine. You all know many to choose from and understand what we mean when we use these terms!

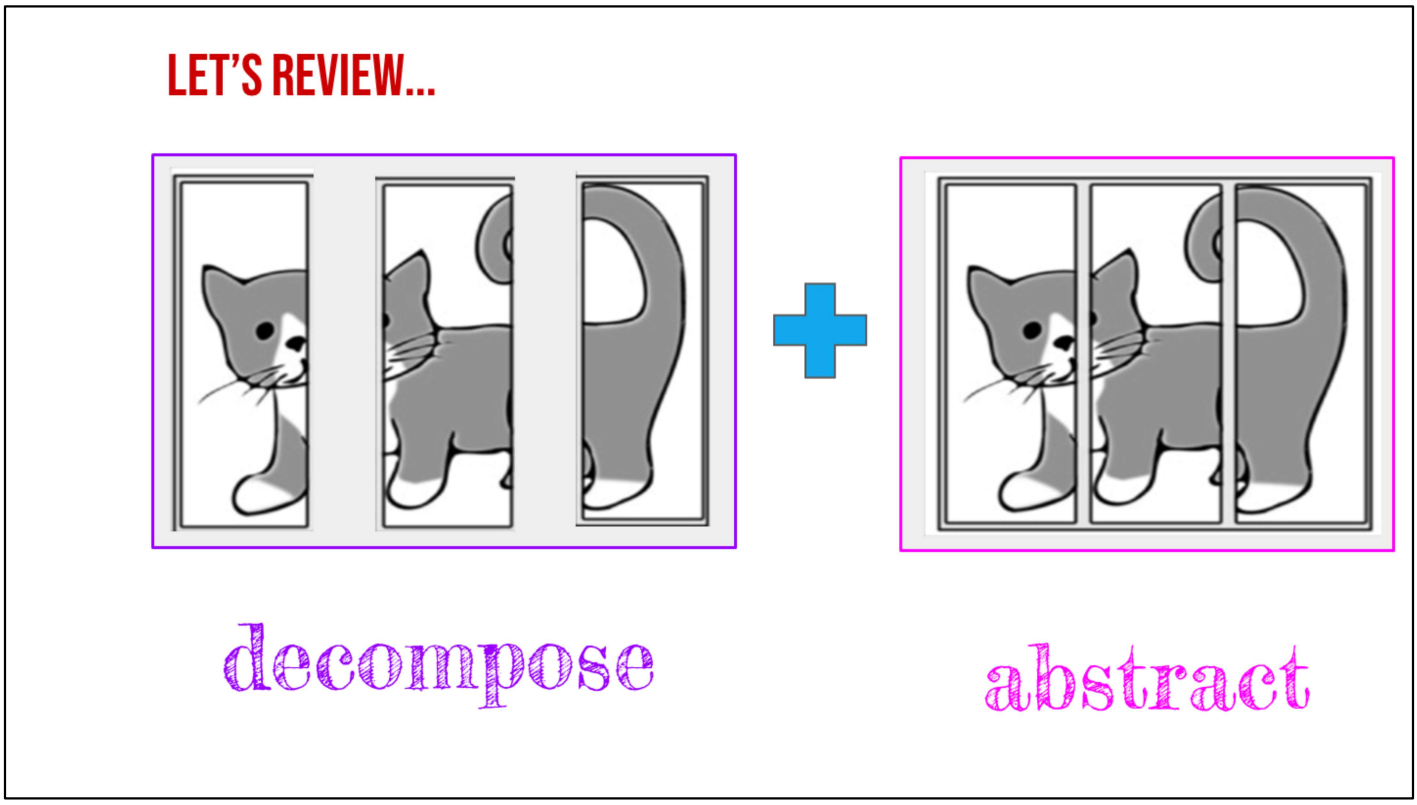
MONSTER MAKER!

Draw your monster!

Underneath, fill in the following sentence: **"My monster has a _____ head, _____ eyes, a _____nose, _____ ears, and a _____ mouth."**

[read slide] then say: Don't worry though –they will all still turn out different! We're using the same characteristics but the details can be different. It just wouldn't be efficient for us to list allllll the different types of heads, eyes, nose, ears, and mouth variations we can imagine. You all know many to choose from and understand what we mean when we use these terms!

WRAP UP



Review Concepts and Vocabulary