

# Lesson 6: Static Methods

45 minutes

## Overview

### Why would I use a static method?

Students have written methods that require an object to be created before the method can be called. In this lesson, students revisit the `static` keyword and learn to write and call static methods. Students explore their functionality and identify scenarios for their use. Students then practice writing and calling static methods to solve problems.

## Standards

Full Course Alignment

### CSA Conceptual Framework

- **MOD-1** - Some objects or concepts are so frequently represented that programmers can draw upon existing code that has already been tested, enabling them to write solutions more quickly and with a greater degree of confidence
- **MOD-2** - Programmers use code to represent a physical object or nonphysical concept, real or imagined, by defining a class based on the attributes and/or behaviors of the object or concept

## Agenda

### Warm Up (10 minutes)

#### Choosing a Dataset

### Activity (30 minutes)

#### Instance and Static Methods

#### Using Static Methods

### Wrap Up (5 minutes)

#### Generating Questions

#### Assessment: Check for Understanding

#### AP Classroom Topic Questions

## Objectives

Students will be able to:

- Explain the purpose and functionality of a static method
- Write and call a static method

## Preparation

- Print copies of the Dataset Summaries handout (one for each student)
- Create code review groups if you are not reusing the same groups
- Check the **Teacher's Lounge** for verified teachers on the CSA Forum to find additional strategies or resources shared by fellow teachers

## Links

**Heads Up!** Please make a copy of any documents you plan to share with students.

For the students

- **Dataset Summaries** - Handout
- **U4L6 Extra Practice** - Handout

## Vocabulary

- **instance method** - a method that requires an object of the class to be created before it can be called
- **static method** - a method that can be called without creating an object of the class

## Teaching Guide

# Warm Up (10 minutes)


## Choosing a Dataset

### Remarks

For the unit project, you will use The Theater to create visuals to tell the story of a dataset you choose. This can be the same dataset you used for the project in the previous unit, or you can choose a new dataset to work with. Let's look at some options we can use for the project to start planning what dataset we will work with and the story we want to tell about the data.

**Group:** Place students in pairs.

 **Distribute:** Give each student a copy of the Dataset Summaries handout.

 **Do This:** Have students work with their partners to review the datasets and identify one they want to use for their unit project. Direct students to individually respond to the prompts on the Dataset Summaries handout.

 **Discuss:** Use the Hold That Thought strategy to discuss the prompt.

- *Which dataset did you choose? What story would you like to communicate visually with your dataset?*


**Discussion Goal:** Students share the datasets they chose to work with for their unit project and the story they want to visually portray about the dataset using The Theater.

## Activity (30 minutes)

### Instance and Static Methods (15 minutes)

### Remarks


We previously learned about static variables to establish shared values for all objects of a class.


 **Do This:** Review the lesson objectives.

 *\*Discuss:* Use the Retrieve-Pair-Share strategy to discuss the prompt.

- *What do you recall about the `static` keyword?*

**Discussion Goal:** Students recall using the `static` keyword to create static variables and constants. Students note they accessed the static variables and constants through the class instead of with an object.

 **Do This:** Review the `static` keyword and static variables.

 **Do This:** Direct students to Level 1 on Code Studio to investigate the program with a partner. Students make the changes to the program as prompted.





### Investigate: Static Methods


 **Discuss:** Click through the animated slide to display the prompts.

- *What do you notice about the code in this program?*
- *What do you wonder about the code in this program?*

**Discussion Goal:** Students notice that the `static` keyword is used in the method signature and that the method is called through the class instead of on an object. Students may wonder about scenarios where they would use a static method instead of methods they call on an object.

 **Display:** Show the video – *Static Methods*.

 **Do This:** Click through the animated slide to define *instance method* and *static method*.


 **Do This:** Explain the rules and syntax for a static method.

 **Do This:** Click through the animated slide to demonstrate calling a static method.


## Using Static Methods (15 minutes)


### Remarks


We have used static methods with The Theater to play scenes. We are able to call the `playScenes()` method without needing to create a `Theater` object. The Theater also has a static method to extract audio samples from a sound file into an array of `double` values.

 **Do This:** Introduce the classes in the `org.code.media` package.

 **Do This:** Explain the functionality of the `read()` method in the `SoundLoader` class.

 **Do This:** Click through the animated slide to explain the components of sound.

 **Do This:** Explain the range of values that stored in the `double` array.

 **Do This:** Direct students to Level 2 on Code Studio to complete Levels 2, 3, and 4. Students debug the program on Level 2, then write and call a static method on Level 3. Students then complete a choice level on Level 4.




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### Using Static Methods

2

3

4

 **Do This:** Click through the animated slide to have students participate in the Code Review Call and Response.

 **Do This:** Direct students to complete a code review on Level 5.

 5

### Code Review: Using Static Methods

## Wrap Up (5 minutes)

### Generating Questions

### Remarks

At the beginning of the lesson, we chose datasets that we will use for our upcoming unit project. Let's start generating some questions we want to answer and visualize about our datasets.

 **Do This:** Have students generate questions they want to answer about their dataset on the Dataset

Summaries handout.

 **Do This:** Have students share the questions they generated with a neighbor.

 **Do This:** Review the concepts covered in this lesson.

 **Display:** Key Vocabulary

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## Assessment: Check for Understanding

*Check For Understanding Question(s) and solutions can be found in each lesson on Code Studio. These questions can be used for an exit ticket.*



Check for Understanding

## AP Classroom Topic Questions

To assign questions from the AP Classroom Question Bank that align with this lesson, create a custom quiz in AP Classroom by searching the Question Bank for the Essential Knowledge statements listed at the top of this lesson plan. You can find instructions and video demonstrations to do this on **AP Central**.

The following Topic Questions in AP Classroom can be assigned as a formative assessment for this lesson:

- Topic Questions 5.7

**Note:** *Some Learning Objectives and Essential Knowledge statements in the suggested Topic Questions are covered in later units.*



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