Lesson 4.2: Classes vs. Objects

CodeHS

https://codehs.com/course/53/lesson/4.2

Description	In this lesson, students will dive deeper into the relationship between classes, objects, and instances (generally instances and objects refer to the same thing). Students will get more practice identifying classes and objects, creating objects from classes, and calling methods on objects.

Objective	Students will be able to:
	
	• Describe the relationship between classes, objects, and instances
	    ○ An object is something that has both state and behavior. An object is an instance of a class
	    ○ A class is a template for creating objects. Objects are instantiated from classes
	    ○ Objects and instances generally refer to the same thing
	• Identify if a given thing is an object or a class
	• Create multiple objects of a given class
	• Call methods on an object to access the object's state and behavior

Activities	4.2.1 Video: Classes and Objects 4.2.2 Check for Understanding: Classes vs. Objects vs. Instances 4.2.3 Example: Classes, Objects, and Instances 4.2.4 Example: Creating Rectangle Objects 4.2.5 Exercise: Text Messages

Prior Knowledge	• Describe the relationship between classes and objects
	    ○ An object is something that has both state and behavior
	    ○ A class is a template for creating objects
	• Proficiency creating multiple objects of a class
	• Proficiency calling methods on an object and printing out the result

Planning Notes	• Review student programs from earlier to check for understanding. Identify any opportunities for one on one instruction, small group discussion, class discussion. Identify any student progress goals reached and opportunities for celebration. • There is a handout that accompanies this lesson. It can be used as an in-class activity or a homework assignment. Determine how and if this handout will be used and make the appropriate number of printouts prior to the class period.

	- This lesson is mainly more practice identifying objects vs classes, describing the relationship between objects and classes, and creating objects from classes. - We also introduce the term **instance**. Instance and Object generally refer to the same thing, an object is an instance of a class. - This is a shorter lesson with time available for review, enrichment or to move ahead to the next lesson. This would be an opportunity to observe and gauge how each student is progressing with the material. - This lesson continues with some new vocabulary. Students should start to understand the terms class, object, instance, but you should still take time to write new vocabulary on the board or on an anchor chart that hangs in your class.
Standards Addressed	CR1: Teaches students to design and implement computer-based solutions to problems. CR4: Teaches students to code fluently in an object-oriented paradigm using the programming language Java. CR5: Teaches students to use elements of the standard Java library from the AP Java subset in Appendix A of the AP Computer Science A Course Description. CR6: Includes a structured-lab component composed of a minimum of 20 hours of hands-on lab experiences.

Teaching and Learning Strategies	**Lesson Opener:**
	
	- Have students brainstorm and write down answers to the discussion questions listed below. Students can work individually or in groups/pairs. Have them share their responses. [5 mins]
	
	Activities:
	
	- Describe in your own words the relationship between classes and objects. List out things you know about classes and objects. List out questions you have about classes and objects.
	- Watch the lesson video and complete the corresponding quiz. This quiz is a quick check for understanding [7-10 mins]
	- Explore the *Classes, Objects, and Instances* example. [5-10 mins]
	  - Have students create an object using their name.
	- Complete the *Creating Rectangle Objects* example. [5-10 mins]
	  - Have students add a statement to print the height of a rectangle.
	  - Have students create a new rectangle.
	- Complete the *Text Messages* exercise. [15 mins]
	  - If students are stuck, have them refer back to the Creating Rectangle Objects example.
	
	Lesson Closer:

	• Have students reflect and discuss their responses to the end of class discussion questions. [5 mins]

Discussion Questions	**Beginning of Class:**
	
	• Describe in your own words the relationship between classes and objects. List out things you know about classes and objects. List out questions you have about classes and objects.
	    ◦ *A class is a template for an object, it is the blueprint that defines what an object's state and behavior should be. An object is one specific instance of a class. It has its own state and its own behavior, separate from other objects of the same class. We can create multiple objects from the same class.*
	• Why are objects and classes important for programming in Java?
	    ◦ *Classes and objects allow us to structure data and organize behaviors around common structures. They allow us to write clean, flexible code that is easier to maintain.*
	• Objects have both state and behavior. If we created a Student object, what is an example of the state? What is an example of a behavior?
	    ◦ *Answers will vary. The state can be something like name, grade, etc. The behavior can be things like getName, change grades, etc.*
	
	End of Class:
	
	• What is the relationship between objects and classes?
	    ◦ *Classes are the templates that we use to create objects. Objects are the specific instances of a class.*
	• Classes are often described as a blueprint. Explain why you think this is the case.
	    ◦ *Classes describe how an object is created in a similar way that a blueprint may describe how to make a physical object.*
	• What is meant by the term *Instance* of an Object.
	    ◦ *An instance of a class is one particular creating of the class. It is another word for an object. We often say that we instantiate an object, which means we create the object from the class.*

Resources/Handouts	[Classes and Objects (student)](#) [Classes and Objects (teacher)](#)

Vocabulary

Term	Definition
[Class](#)	A class is a template, or a blueprint, from which Java objects are created. All Java programs start with a class.

[Object](#)	An object is a single instance of a Java class. An object has both state and behavior.
[Instance](#)	Instance is what you call a specific object constructed from a class. Instance and object generally refer to the same thing. An object is a specific instance of a class.

Modification: Advanced	Modification: Special Education	Modification: English Language Learners