Course: Introduction to Virtual Reality | Module: Animation

Lesson 3.1: Animation

https://codehs.com/course/2182/lesson/3.1

Description	In this lesson, students will learn how to add animations to the shapes in a VR world. Students will learn how to program shapes to move, change color, change size, and rotate.
Objective	Students will be able to: • Use animations to move shapes • Program animations to change shapes' colors • Use animations to rotate shapes • Understand where to find resources to program advanced animations
Activities	3.1.1 Check for Understanding: Animation Tag 3.1.2 Quiz: Animation Tag 3.1.3 Example: Cube Sliding 3.1.4 Example: Ball Drop 3.1.5 Exercise: Sliding Cylinder 3.1.6 Video: What Can We Animate? 3.1.7 Check for Understanding: What Can We Animate? 3.1.8 Example: Rolling Ball 3.1.9 Example: Types of Animation 3.1.10 Exercise: Radioactive 3.1.11 Video: How Can We Animate? 3.1.12 Check for Understanding: How Can We Animate? 3.1.13 Example: Starburst 3.1.14 Exercise: Wormhole 3.1.15 Exercise: Catapult 3.1.16 Exercise: Light Speed Ahead! 3.1.17 Notes: Advanced Options 3.1.18 Example: Starburst on a Timer 3.1.19 Challenge: Animate a Scene! 3.1.20 Badge: Animation Badge
Prior Knowledge	• Students should be able to create boxes, cylinders, spheres, and planes in A-Frame • Students should be familiar with the 3D Cartesian Plane and using 3D coordinates

	• Students should be familiar with the idea of rotating an object about an axis
Planning Notes	• This lesson was written with A-Frame version 0.9.2. In version 0.9.0, the way animation is handled changed considerably. If you have previously used this course. make sure you take time to look through the lessons to understand these changes. If students are looking online for code, make sure they are only looking at version 0.9.0 or later. There is a lot of code using the old animation tag which will not work in this version. • This is a longer lesson that will span multiple classes. Plan out which parts you want to cover in each class period. • The exercises in this lesson do not have autograders due to the complexity of the problems. Be sure to plan some extra time to check student programs for accuracy and style. • 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.
Standards Addressed	

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:
	• Watch the Animation Tag video and complete the corresponding quiz. This quiz is a quick check for understanding [5-6 mins]
	• Explore the *Cube Sliding* example. [5-7 mins]
	  ◦ Have students try changing the to and from parameters.
	  ◦ Notice what happens when you change the from parameter without changing the initial position.
	• Explore the *Ball Drop* example. [5-7 mins]
	  ◦ Have students try changing the parameters like time and loop.
	• Complete the *Sliding Cylinder* exercise. [3-5 mins]
	  ◦ Students can look back to the Cube Sliding example for help.
	• Watch the What Can We Animate video and complete the corresponding quiz. This quiz is a quick check for understanding [7-9 mins]
	• Explore the *Rolling Ball* example. [5-7 mins]
	  ◦ Have students try changing the color of the floor as the scene progresses.
	• Explore the *Types of Animation* example. [5-7 mins]
	  ◦ Have students try changing the parameters in the animation, in particular, dur and dir.
	• Complete the *Radioactive* exercise. [3-5 mins]

	◦ If students are stuck, have them look at the green cylinder as a template. • Watch the How Can We Animate video and complete the corresponding quiz. This quiz is a quick check for understanding [5-7 mins] • Explore the *Starburst* example. [5-7 mins] ◦ Have students try changing the to paramters and the dur parameter to see the impact. • Complete the *Wormhole* exercise. [5-7 mins] ◦ Students are given the template for this exercise. They only need to fill in parameters but remind them to use rgb values for the color. • Complete the *Catapult* exercise. [5-7 mins] ◦ If students are stuck, have them refer back to the Rolling Ball example. • Complete the *Light Speed Ahead!* exercise. [5-7 mins] ◦ Student answers will vary, but you should look to make sure the lights stay on the same side of the camera. In other words, a start that is placed with a negative x value should go to a negative x value. • Explore the *Advanced Options* on the Aframe wedsite. [5-7 mins] ◦ Have students find the animation section on the A-Frame site. Make sure they are using documentation for version 0.9.0. • Explore the *Starburst on a Timer* example. [3-5 mins] ◦ Have students try different delay and dur times. • Complete the *Animate a Scene!* challenge. [40-50 mins] ◦ This activity can be scaled up and down, depending on the available time. ◦ Students can also build off their previous scene or start a new scene. • Complete the handout associated with this lesson. [10-15 mins] ◦ This can be completed in class or as homework, but it makes a good recap to the lesson. **Lesson Closer:** • Have students reflect and discuss their responses to the end of class discussion questions. [5 mins]
Discussion Questions	**Beginning of Class:** • Predict what animations you can create using A-Frame. ◦ *Answers will vary. Some of the animations we will see are position, rotation, color, and visibility.* • What are some uses of animating a scene? ◦ *Answers will vary, but in general, students should talk about how it helps make a scene more interesting or realistic.* • Which attribute do you think is the hardest to animate? Why? ◦ *Answers will vary.* **End of class:** • Explain the properties of the animation parameter that are required.

	◦ *The property and from are required because we need to have a new state for the object to go to* • What happens when we don't specify a property in the animation parameter? Why do you think it is designed this way? ◦ *The default value is used for that property. It is designed this way so that we don't need to specify every property to use the animation tag.* • What is one attribute you learned to animate in this lesson? What kind of values do `from` and `to` need? ◦ *Answers will vary.*
Resources/Handouts	Guided Notes: Animation (teacher) Guided Notes: Animation (student)

Vocabulary

Term	Definition

Modification: Advanced	Modification: Students Needing Additional Support	Modification: English Language Learners
Have students create and animate at least 6 objects in their scene for the *Animate a Scene!* challenge.	In the *Animate a Scene* challenge, have students create a draft of their scene on paper and then write out a timeline with all of the animations that will occur.	