



# CodeHS

## Introduction to Virtual Reality

### Mini-Course for High School (20 contact hours)

#### Course Overview and Goals

Introduction to Virtual Reality is a mini-course that introduces students to the basics of building virtual reality worlds using HTML and the A-Frame JavaScript Library. Through this course, students will build their own virtual reality worlds that are compatible with VR devices, including smartphone VR headsets!.

**Learning Environment:** The entirely web-based curriculum is made up of a series of learning modules that cover the basics of creating virtual reality worlds in A-Frame. Classes can complete the entire mini-course, or individual lessons in the form of playlists. Each lesson should take a single one-hour class period. Every lesson is made up of short video tutorials, example programs, quizzes, programming exercises, challenge problems, and unit tests. Students write and run programs in the browser using the CodeHS editor.

**Programming Environment:** Students write and run virtual reality programs in the browser using the CodeHS editor. They will use Mozilla's A-Frame library to build VR experiences in HTML. These experiences will be hosted on the CodeHS website so that they can keep a running portfolio of their creative projects, and easily share their programs with the world.

**Prerequisites:** This course is meant to be a first time introduction to virtual reality, and does not require students to come in with any programming experience. This course involves some content with 3D coordinates, so it is more suitable for high school students who have had geometry. Middle school students can complete the earlier lessons, and should continue on to the full course if they feel comfortable.

This mini-course can be taught as a standalone course or alongside one of our other computer science courses.

**More information:** Browse the content of this course at <https://codehs.com/course/2182>

#### Course Breakdown

##### Unit 1: Getting Started (3 hours)

Browse the full content of this unit at [codehs.com/library/course/2182/module/3156](https://codehs.com/library/course/2182/module/3156)

This unit introduces students to virtual reality and the A-Frame library. Students will create their first virtual reality world!

Objectives / Topics Covered

- What is VR?
  - Applications of VR
- Your First VR World
  - Intro to A-Frame
  - Spheres and Planes

### Unit 2: Advanced Shapes (2 hours)

Browse the full content of this unit at [codehs.com/library/course/2182/module/3157](https://codehs.com/library/course/2182/module/3157)

In this unit, students are introduced to boxes, cones, and cylinders. Students will also learn where to find out more information about the shapes that A-Frame provides.

Objectives / Topics Covered

- Advanced Shapes in A-Frame
  - Spheres, Boxes, Cylinders

### Unit 3: Animation (2 hours)

Browse the full content of this unit at [codehs.com/library/course/2182/module/3158](https://codehs.com/library/course/2182/module/3158)

In this unit, students will learn how to add animations to the objects in their VR worlds. They will learn how to program shapes to move, change color, rotate, and disappear.

Objectives / Topics Covered

- Animation syntax
- What can we animate?
- How can we animate?
- Advanced Options

### Unit 4: Interaction (3 hours)

Browse the full content of this unit at [codehs.com/library/course/2182/module/3159](https://codehs.com/library/course/2182/module/3159)

In this unit students will learn how to add interactions so that viewers can interact with objects in virtual reality.

Objectives / Topics Covered

- Click-based Interaction
- Gaze-based Interaction
- Animation and Interaction

### Unit 5: 360° Images (1 hours)

Browse the full content of this unit at [codehs.com/library/course/2182/module/3160](https://codehs.com/library/course/2182/module/3160)

In this unit students will learn how to add 360 images and videos as well as other media to

their virtual reality projects.	
Objectives / Topics Covered	<ul style="list-style-type: none"> <li>● Using 360° Images</li> <li>● Using 360° Videos</li> <li>● Animation and Interaction</li> </ul>

**Unit 6: Next Steps (4 hours)**

Browse the full content of this unit at [codehs.com/library/course/2182/module/3161](https://codehs.com/library/course/2182/module/3161)

This unit discusses next steps students can take to further explore virtual reality development with a A-Frame. Topics include viewing your creation in a VR device, using the A-Frame documentation and inspector to keep learning, as well as links to more tutorials and training.	
Objectives / Topics Covered	<ul style="list-style-type: none"> <li>● Using a VR device</li> <li>● Using A-Frame Docs</li> <li>● Using A-Frame Inspector Tool</li> <li>● Extra Components</li> <li>● Further practice</li> </ul>

**Unit 7: Final Project (2-5 hours)**

Browse the full content of this unit at [codehs.com/library/course/2182/module/3162](https://codehs.com/library/course/2182/module/3162)

In this unit, students will combine the skills they've learned to brainstorm and create their own virtual reality final project.	
Objectives / Topics Covered	<ul style="list-style-type: none"> <li>● Brainstorm</li> <li>● Sketch</li> <li>● Plan Milestones</li> <li>● Build project</li> </ul>