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## Activity - A-Frame: Virtual Reality Programming

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## A-Frame Activity: VIRTUAL REALITY PROGRAMMING

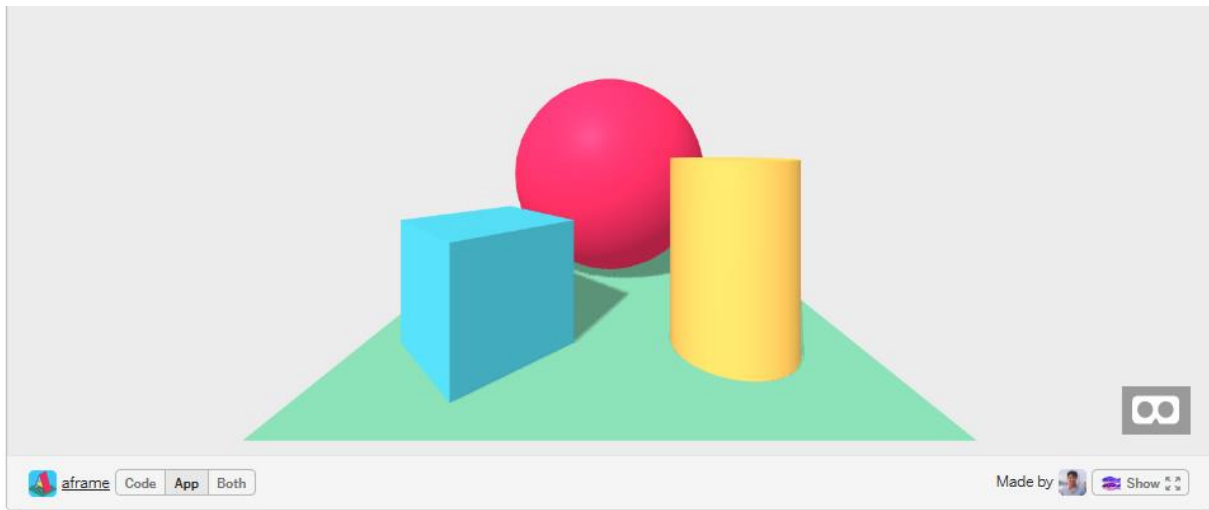
### Learning Objectives

Students will be able to:

- Interpret, edit, and add to existing HTML and A-Frame code
- Use online documentation to implement more of the framework's capabilities
- Demonstrate debugging skills

A-Frame is a web framework for building Virtual Reality (VR) 3D experiences. A-Frame is based on top of HTML, making it a simple and fun introduction to coding. A-Frame can also be used for Augmented Reality programming, and it supports most VR headsets.

To get started, go to: <https://glitch.com/~aframe>. Slightly down the web page you will see a 3D image that looks like the following. Drag your mouse around the image to view the full VR effect. You can also use the up and down arrows on the keyboard to move forward and backward.



Notice the options on the bottom-left. When you are viewing the image above you are in “App” mode. However, we want to edit this VR world, so to view its code, click on the “Code” option, then on the left sidebar click “index.html”. You should see code that looks like this:

```
<!DOCTYPE html>
<html>
  <head>
    <meta charset="utf-8">
    <title>Hello, WebVR! • A-Frame</title>
    <meta name="description" content="Hello, WebVR! • A-Frame">
```



```

<script src="https://aframe.io/releases/0.9.0/aframe.min.js"></script>
</head>

<body>
  <a-scene background="color: #ECECEC">
    <a-box position="-1 0.5 -3" rotation="0 45 0" color="#4CC3D9" shadow></a-box>
    <a-sphere position="0 1.25 -5" radius="1.25" color="#EF2D5E" shadow></a-sphere>
    <a-cylinder position="1 0.75 -3" radius="0.5" height="1.5" color="#FFC65D" shadow></a-cylinder>
    <a-plane position="0 0 -4" rotation="-90 0 0" width="4" height="4" color="#7BC8A4" shadow></a-plane>
  </a-scene>
</body>

</html>

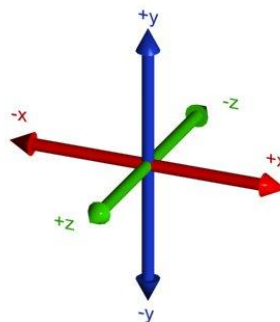
```

This code is written in HTML – the language used to make web pages. Inside the **<head>** tag, can you identify which line of code “points to” A-Frame on the web?

The only A-Frame code that we need to pay attention to is located within the **<body>** tag. You’ll notice code indicating the background color of the VR world, and details for how a box, a sphere, and a cylinder should appear within it.

To be able to edit the code, click “Remix to edit” in the top-right of the window.

1. ASSIGNMENT: Change the background color. In the starter code, the background color is “#ECECEC” (which is a shade of gray). Pick a different color of your choosing using the codes at [https://www.immigration-usa.com/html\\_colors.html](https://www.immigration-usa.com/html_colors.html). Insert your new color code in the appropriate place in the A-Frame code, then click the “App” button on the bottom-left of the window.
2. ASSIGNMENT: Change the size of the sphere. In the starter code, the radius of the sphere is 1.25. Make it twice as large.
3. ASSIGNMENT: Change the position of each object. The positions of the box, sphere, and cylinder are all determined by three numbers known as their **x**, **y**, and **z** coordinates. This three-dimensional coordinate system can be visualized like this:



Move the box to the left, move the cylinder to the right, and move the sphere higher up.



4. ASSIGNMENT: Add new types of objects. View A-Frame's documentation by going to <https://aframe.io>, then click on the link for "DOCS" on the top-right. Then, on the left navbar, scroll all the way down to the section labeled "Primitives". These are other types of objects you can insert into your world. Click on any of them to view the code necessary to copy-and-paste into your world's code.  
Can you insert a cone and position it underneath your sphere? You will have to add a "position" for each new object. Can you add a ring? Can you add your name? Experiment and play with as many new objects as possible to fill your world.
5. CHALLENGE ASSIGNMENT: Create a snowman! Make it as detailed as possible.
6. CHALLENGE ASSIGNMENT: It is possible to import 3D models of objects that others have created like cars, animals, buildings, and more, into your world. These are known as GBlocks. Go to <https://poly.google.com> and select an object to add to your world. You'll need to copy-and-paste the URL to the object. The code will resemble this:

```
<a-entity position="1 0 7.5" rotation="0 -90 0" gblock="https://poly.google.com/view/e21CdAtBXEd">  
</a-entity>
```

7. CHALLENGE ASSIGNMENT: Thus far you have created your VR world in Glitch - an online code editor that instantly hosts and deploys for free. However, in order to really make your project your own, when your world is complete, save your code to your computer's hard drive as an **.html** file. Then, view the local file in your browser.

