PennState College of Engineering

Research Experience for Teachers

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ARCHITECTURAL ENGINEERING

Developing a 3D Model of Earth's Atmosphere Using the Unity Interface

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Introduction / Question

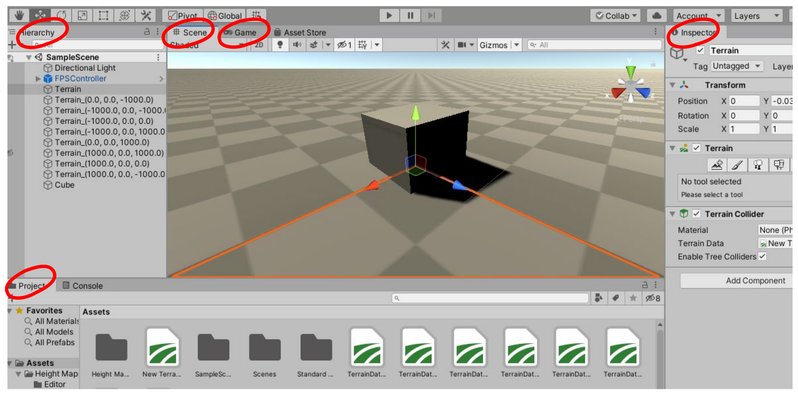
- Augmented Reality and Virtual Reality (AR/VR) immerse users in ways that other forms of multimedia cannot. There is untapped potential and a wide variety of uses for AR/VR for learning purposes.
- How can I use Unity engine to create a digital 3D model of Earth's atmosphere?

Creating 3D Elements in Unity Engine

Interface:

Hierarchy window / Scene view / Game view

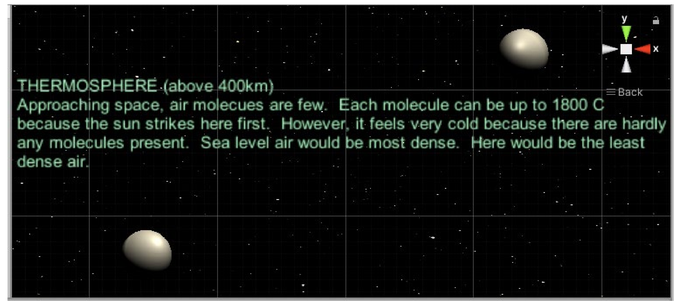
Project Widow / Inspector Window

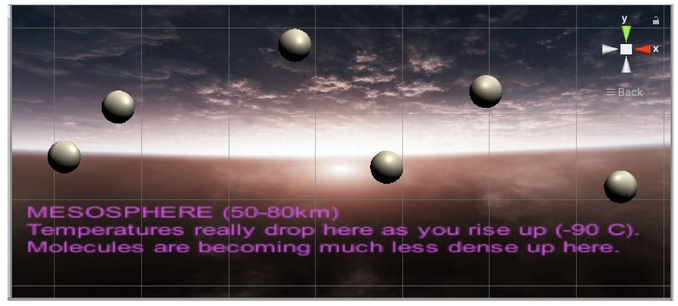


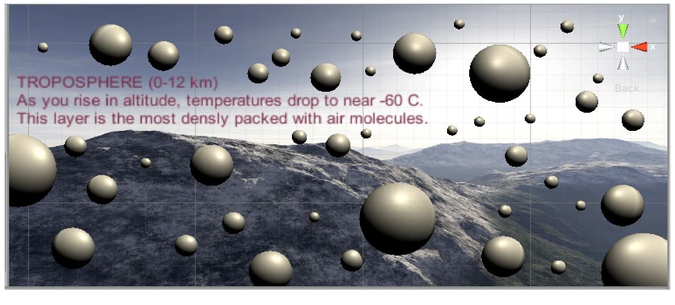
Objectives

1. To create a 3D model of Earth's atmosphere that will demonstrate science phenomena in a more impactful way.
2. To better understand science phenomena by using 3D environments that can be viewed in Augmented Reality/Virtual Reality (AR/VR).

Earth's Atmosphere Experience







Results

- Learning the Unity engine interface is complex.
- Web-based tutorials are helpful tools to learn the *"how to"* of many different tasks you want to accomplish when making your creation.
- Several tasks I learned to do on Unity engine include how to add a: skybox, 3D object, terrain, camera, FPS controller and how to delete the main camera.

Evaluation / Analysis

1. To evaluate the past methods of learning about the Earth's atmosphere compared to learning about the atmosphere with the created 3D environment.
2. Hardware challenges at West Branch Middle School
   a. Virtual Reality (VR) headset cost is high
   b. Few computers built to properly run Unity engine at school
   c. Specs to run VR
      - Graphics Card (NVIDIA GTX 1060 / AMD Radeon RX 480 or greater)
      - CPU (Intel i5-4590 / AMD Ryzen 5 1500X or greater)
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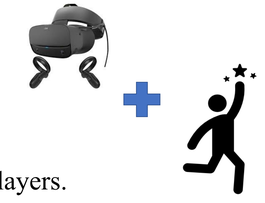
Future Research

- To add a working thermometer that shows temperature changes as you progress upwards through Earth's atmosphere layers.
- To add a FPS controller so the user sees the environment from a first-person perspective.



- To stack the four scenes of the Atmosphere layers.

References

- Unity Asset Store, *AllSky Free – 10 Sky / skybox set [Digital Images] Retrieved July 27,*
- https://assetstore.unity.com/packages/2d/textures-materials/sky/allsky-free-10-sky-skybox-set-146014
- Unity Asset Store, *Real Stars Skybox Lite [Digital Images] Retrieved July 27,*
- https://assetstore.unity.com/packages/3d/environments/sci-fi/real-stars-skybox-lite-116333
- Unity Asset Store, *Cope! Free Skybox Pack [Digital Images] Retrieved July 27,*
- https://assetstore.unity.com/packages/2d/textures-materials/sky/cope-free-skybox-pack-22252

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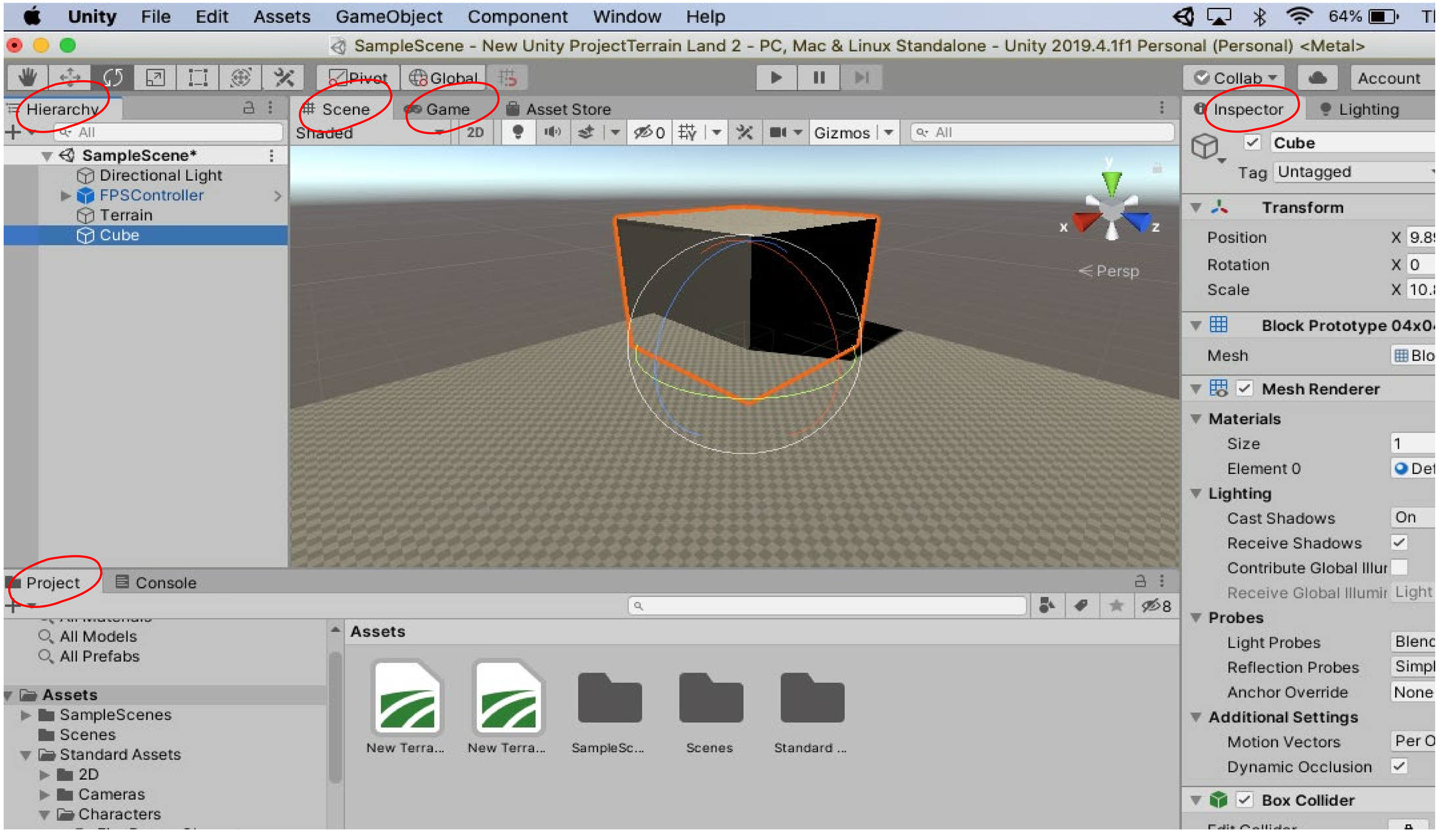

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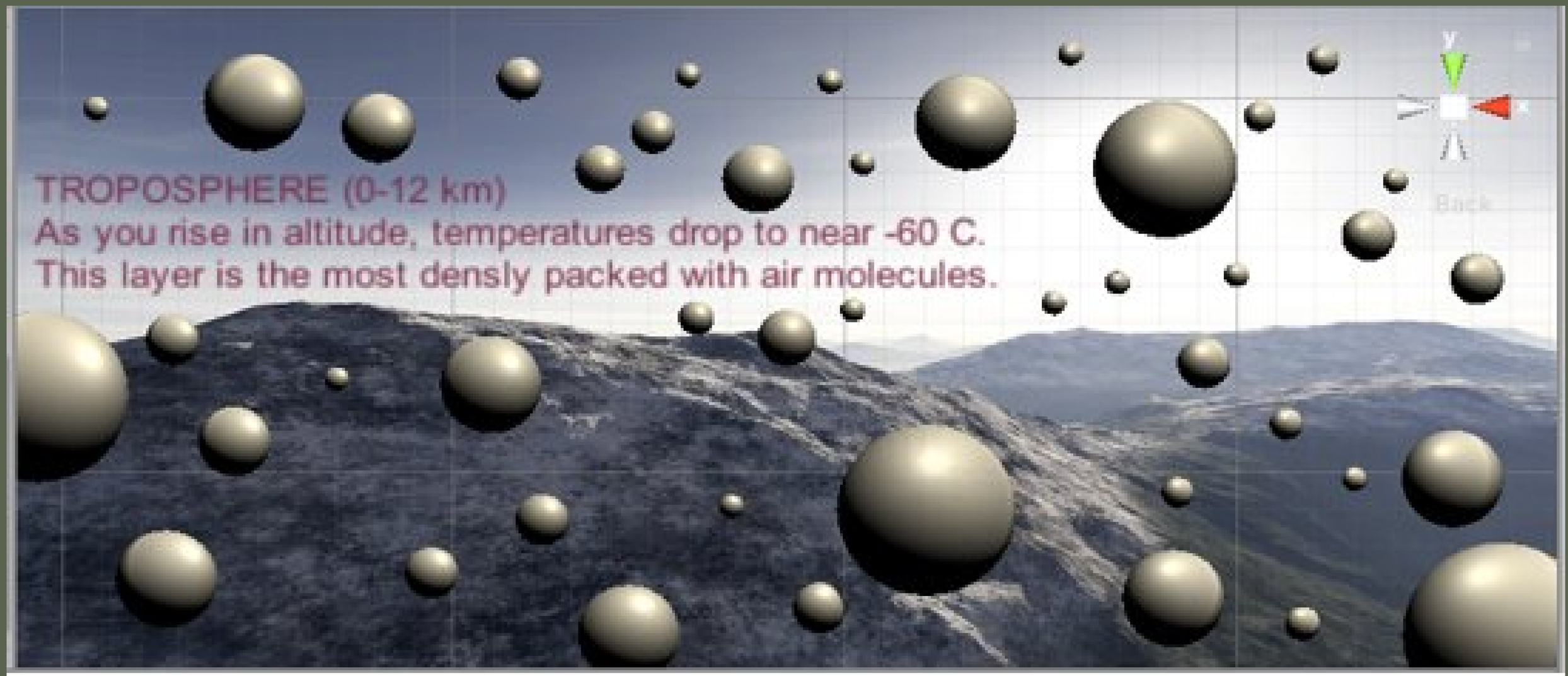
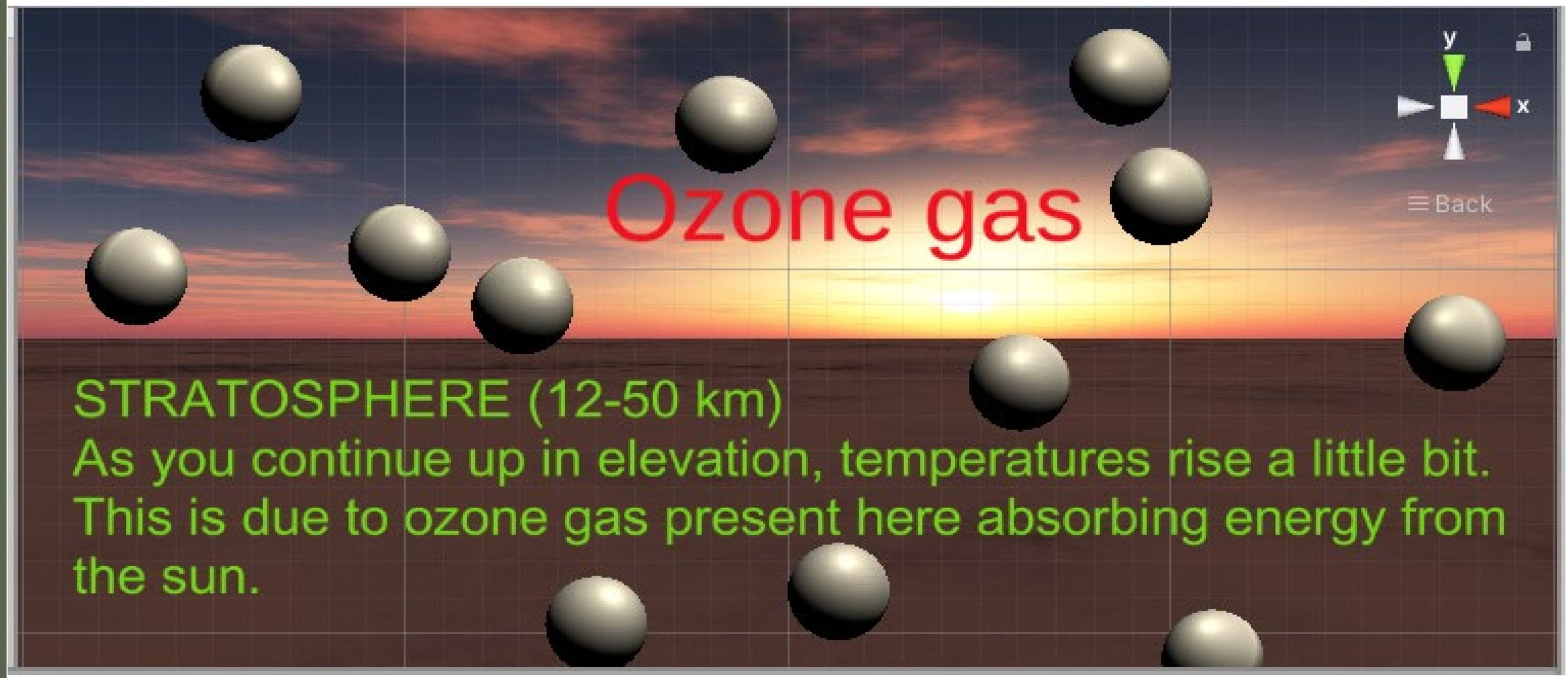


Example
add: skybox, 3D text, 3D object



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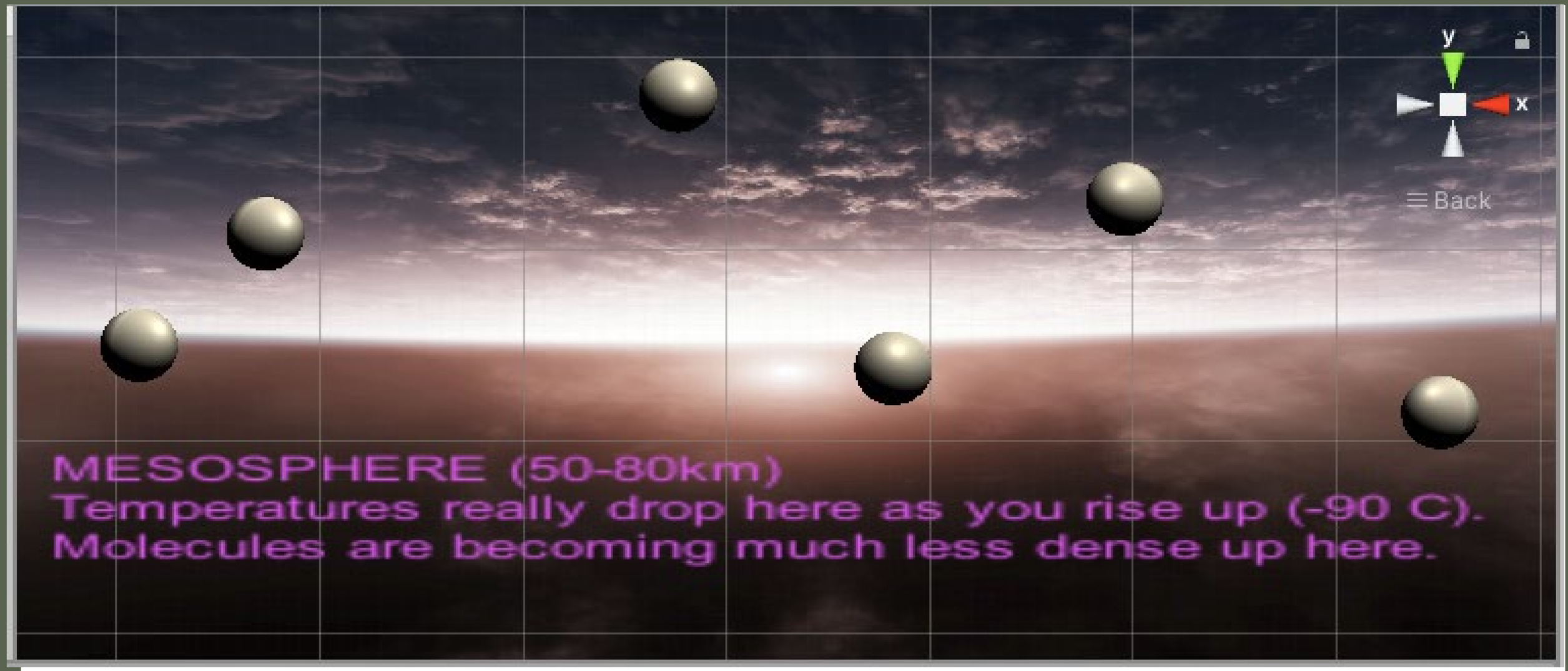

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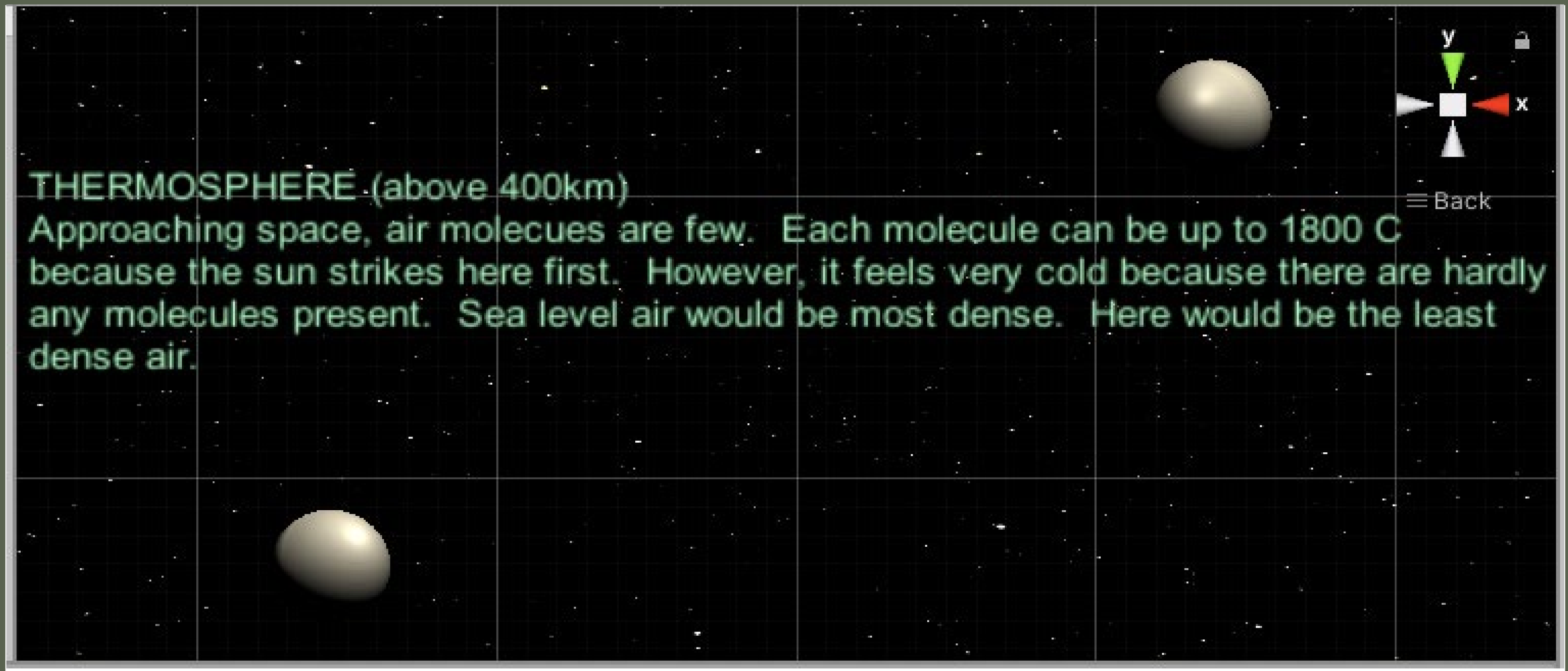

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