Alan Cheung

Professor Venkata Margapuri

CSC 3150 – Game Development

September 26, 2024

**Question 5a:**

The world coordinate system is the system that defines the position and orientation of game objects within a scene in terms of their x, y, and z components. For example, the rocket that is in the Project Rocket Boost project we did is in the scene. The position of the rocket is defined using the world coordinate system. If we use the tool in Unity to change its position, its coordinates relative to the world’s origin at (0, 0, 0) will have changed.

**Question 5b:**

The local coordinate system is a coordinate system wherein it is defined in relation to each individual GameObject. The center of the local coordinate system is located at the pivot point of the game object. For example, in the Project Rocket Boost project, the origin of the rocket’s local coordinate system is different from the origin of the ground’s local coordinate system. The local origin is centered at the rocket’s pivot point.

**Question 5c:**

Vector3 is a construct that represents 3D vectors in space. They are how we can manipulate the positions and orientations of GameObjects within Unity. For example, Vector3.up can be used to move a rocket game object up along the y-axis. Similarly, Vector3.left can be used to move a rocket game object to the left along the x-axis. The direction of a game object’s movement can be determined by which instance of Vector3 is used.

**Question 5d:**

The Rigidbody.AddRelativeForce function is used to apply movement on a game object with the RigidBody component relative to its local coordinate system. For example, the rocket in Project Rocket Boost is a rigid body. In conjunction with Vector3 to specify a direction, the rocket can be moved using this function, such as moving it up. Note, however, that this direction is relative to the rocket’s own local coordinate system. If the rocket’s orientation were such that its positive y-axis is slightly tilted to the right, applying an upward force would have the rocket continue in that direction and not straight upwards when taken from the perspective of the entire scene.

**Question 5e:**

Input.GetKey is a function that allows Unity to record input when pressing a certain key. KeyCode enums are used to specify these keys. For example, KeyCode.H refers to the H key, and KeyCode.C refers to the C key. When passing these enums to the GetKey function, such as Input.GetKey(KeyCode.C), it will return true if that key has been pressed. This allows Unity to perform certain actions whenever these keys have been pressed. Relating back to the rocket again, Unity can detect whenever the W key is pressed and in turn, play an audio clip or move the position of the rocket.