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HW 4 Written Questions – Game Development

Explain the following in a few sentences and give an example in your own words (or

research the internet to find one. If researched, please cite your source):

a) World coordinate system:

It’s the global coordinate system that defines the positions and orientations of GameObjects. The origin is always (0,0,0) in the world space. It’s used when dealing with a GameObject’s position, scale, and rotation within the entire scene.

Example: It can be used to see how far a GameObject is from the origin. A GameObject positioned at (1, 2, 3), is 1 unit to the right, 2 units up, and 3 units forward from the world origin. A game developer can write a code so that every time a ‘player’ dies they respawn at the world origin.

b) Local coordinate system:

It’s the coordinate system relative to each GameObject’s transform. The origin is centered at the GameObject’s pivot point. Each GameObject has its own local origin and axes. The GameObject’s rotation determines where the axes are oriented.

Example: If a GameObject called ‘Ferris Wheel’ which previously wasn’t rotated is then rotated 45 degrees along the Y axis, its local right and left will be different from the global right and left. This caused a change just in the orientation of the X axis for that particular GameObject.

c) Vector3. Also, explain any two vectors in Unity of your choice:

It represents the 3D vectors in space. They are used to change the position and direction. Vector3.right moves GameObjects along the X axis. It moves things in the ‘right’ direction. It is defined as Vector3(1, 0, 0). Vector3.up moves GameObjects along the Y axis. It moves things in the ‘up’ direction. It is defined as Vector3(0, 1, 0).

Example: A game developer can write a code that causes a GameObject called ‘rocket’ to rotate forward and backwards. It’ll use the transform.Rotate method and vector3.forward and vector3.back to achieve this. It applies its forces along the local coordinates of the GameObject. Being able to rotate the rocket forwards and back allows the rocket to change direction so its trajectory can change.

d) Rigidbody.AddRelativeForce function:

This method applies on a rigidbody relative to its local coordinate system. Its purpose is to move GameObjects relative to their orientation.

Example: A game developer can write a code that causes a GameObject called ‘rocket’, that has the rigidbody component, to thrust up when a certain key is pressed. This’ll add a force that’ll make the rocket move in an upwards direction relative to its local coordinates as long as the key is pressed.

e) Input.GetKey function:

It binds a key to an input that is recorded by Unity. It checks if a specific key is being pressed down.

Example: A game developer can write code that causes a GameObject to move in the ‘right’ direction when the A key is pressed down and in the ‘left’ direction when the D key is pressed down. A GameObject called ‘car’ could use being able to move side to side to avoid obstacles in the road.