

# Coordinate Systems

- Cartesian

# Cartesian

As a technical artist, the coordinate systems you encounter may depend on the specific domain and industry you work in. However, certain coordinate systems are commonly used in computer graphics, game development, and related fields. Here are some coordinate systems that you should be familiar with as a technical artist:

## 1. **Cartesian Coordinate System:**

- The Cartesian coordinate system is fundamental and widely used in computer graphics and game development. It uses three axes (x, y, and z) to represent points in three-dimensional space.

## 2. **Screen/Viewport Coordinates:**

- In 2D graphics and game development, screen or viewport coordinates represent points on the 2D screen or display. This system typically has its origin at the top-left corner of the screen.

## 3. **Texture Coordinates:**

- Texture coordinates are used in texture mapping to specify how textures are mapped onto 3D models. They are often represented in normalized coordinates (u, v) ranging from 0 to 1.

## 4. **UV Coordinates:**

- Similar to texture coordinates, UV coordinates are commonly used in computer graphics for mapping textures onto 3D models. UV coordinates can be thought of as 2D coordinates on a texture map.

## 5. **Polar Coordinates:**

- Polar coordinates might be encountered when dealing with circular or radial symmetry. Some artistic effects or procedural generation techniques may use polar coordinates.

## 6. **World and Local Coordinates:**

- Understanding world coordinates (global space) and local coordinates (object or model space) is crucial when working with transformations and hierarchies in 3D graphics.

## 7. **Homogeneous Coordinates:**

- In computer graphics and transformations, homogeneous coordinates are used for operations like perspective projection. It involves using a four-dimensional vector to represent points in 3D space.

## 8. **Camera Coordinates:**

- In 3D graphics and game development, camera coordinates are important for understanding the view from a camera's perspective. Transformations often involve converting between world and camera coordinates.

## 9. **Normalized Device Coordinates (NDC):**

- NDC is a coordinate system used in the rendering pipeline after perspective projection. It represents the coordinates on the screen after the perspective divide.

## 10. **Screen Space Coordinates:**

- Screen space coordinates are often used for post-processing effects or screen space shaders. They represent the pixel positions on the final rendered image.

While you don't need to be an expert in all coordinate systems, having a good understanding of these coordinate systems and their transformations will be valuable in your role as a technical artist, especially when working with 3D graphics, shaders, and visual effects in games or other interactive media.