UNIVERSITY OF WOLVERHAMPTON
KNOWLEDGE ▪ INNOVATION ▪ ENTERPRISE

Unity Game Engine Practical Activity

Student Workbook

Workbook Title:

Introduction to the Unity Game Engine.

Workbook Description:

In this workbook, you will learn the basics of the Unity games engine and be able to prototype simple game elements.

This workbook is based on two key sources and makes use of standard and free assets. Key sources:

- Learning the Interface. https://docs.unity3d.com/Manual/UsingTheEditor.html
- Will Goldstone. Unity 3.x Game Development Essentials. ISBN: 978-1-84969-144-4.

Please Read:

- This student workbook will check that you have understood and can apply the knowledge you have gained during this week's talks.
- Please read each workbook section carefully and when required please type out all code. Attempting to copy and paste code *may* cause errors during compilation. Also writing out the code helps you understand how to program C# for Unity.

Document Version:

V4.0.

Game Engine Version:

This student workbook was checked using **Unity 2022.-.--f1**.

1. Start the Unity Hub and Create a New Project

Start the **Unity Hub** by clicking on the “Unity Hub” shortcut in the Windows start menu.

Do this by clicking the start menu and typing **Unity Hub** into the search box. Click on the Unity Hub icon. Below is a screenshot of the windows start menu and the “Unity Hub” shortcut icon.

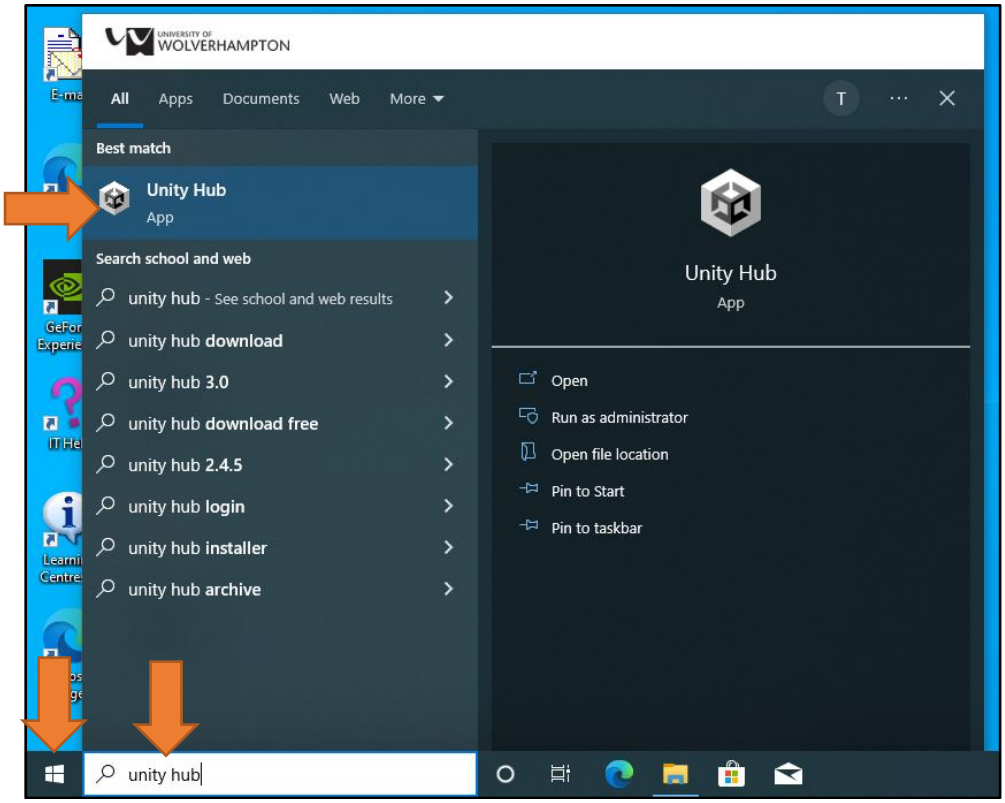


Image description: *The windows start menu and the “Unity Hub” shortcut. Click the start menu and type Unity Hub into the search box. Click on the Unity Hub icon.*

The Unity Hub icon looks like the screenshot below.

Image description: *The Unity hub Windows icon.*

When the Unity Hub loads, you will probably need to sign in if you have not used Unity on the university PC you are currently using.

See the screenshot below for an example of what you might see when the Unity Hub loads on a university PC.

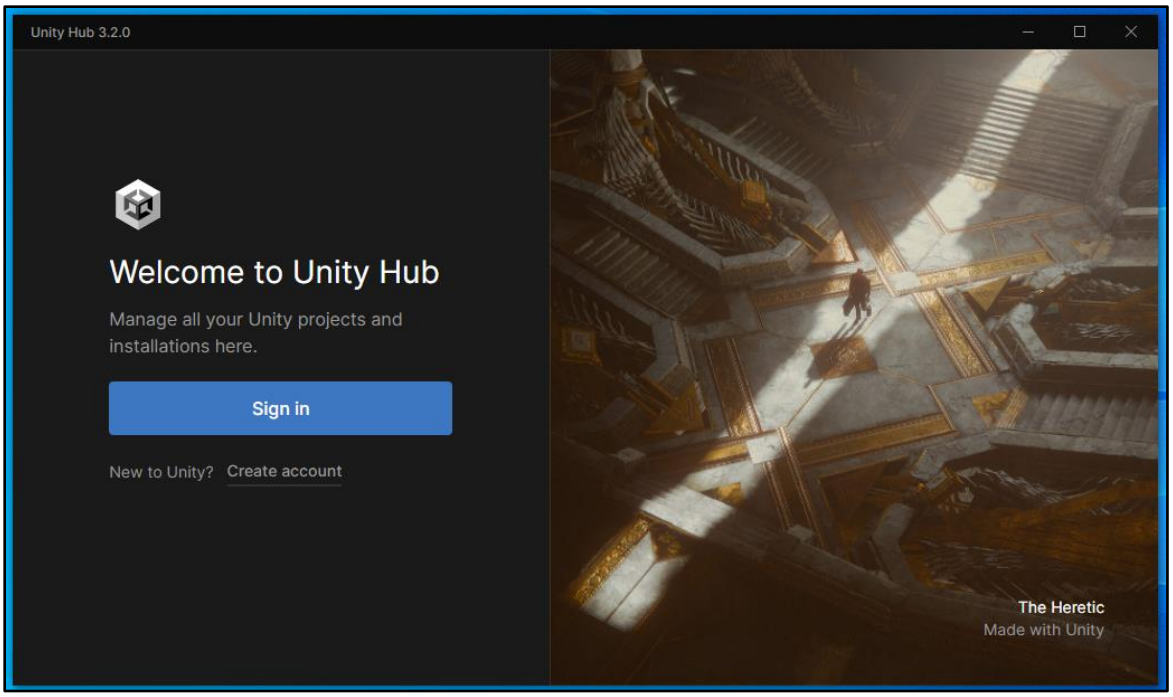


Image description: *The Unity Hub window when it first loads, and you have not used Unity on the university PC you are currently using. Click Sign in if you have a Unity account OR click Create account if you do not.*

If needed, click the Sign in button. A webpage will load. Sign in with your free Unity account OR if needed, create a free Unity account. If you do not have a free Unity account, you need to create one. You can use your university email address or a personal one.

Once you have signed in, you might see a message like this. Just click “Got it”.

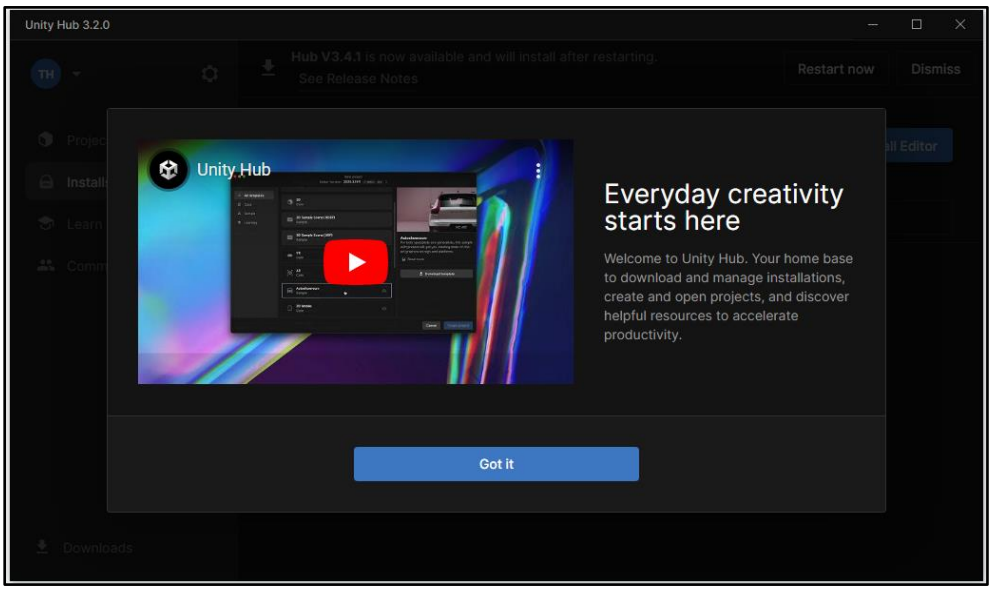


Image description: *The Unity Hub window when you have signed in for the first time. Just click “Got it”.*

Next, you might see a message like the screenshot below if you have not used Unity on this particular University PC before.

- Unfortunately, the University PCs do not automatically know the location of Unity the first time you use it on that PC.

We first need to locate the existing installation of Unity.

- Remember, we cannot install any software on University PCs; therefore, we cannot install the Editor on University PCs. However, it is installed. We just need to locate it.

Click on the "Locate existing installation" button.

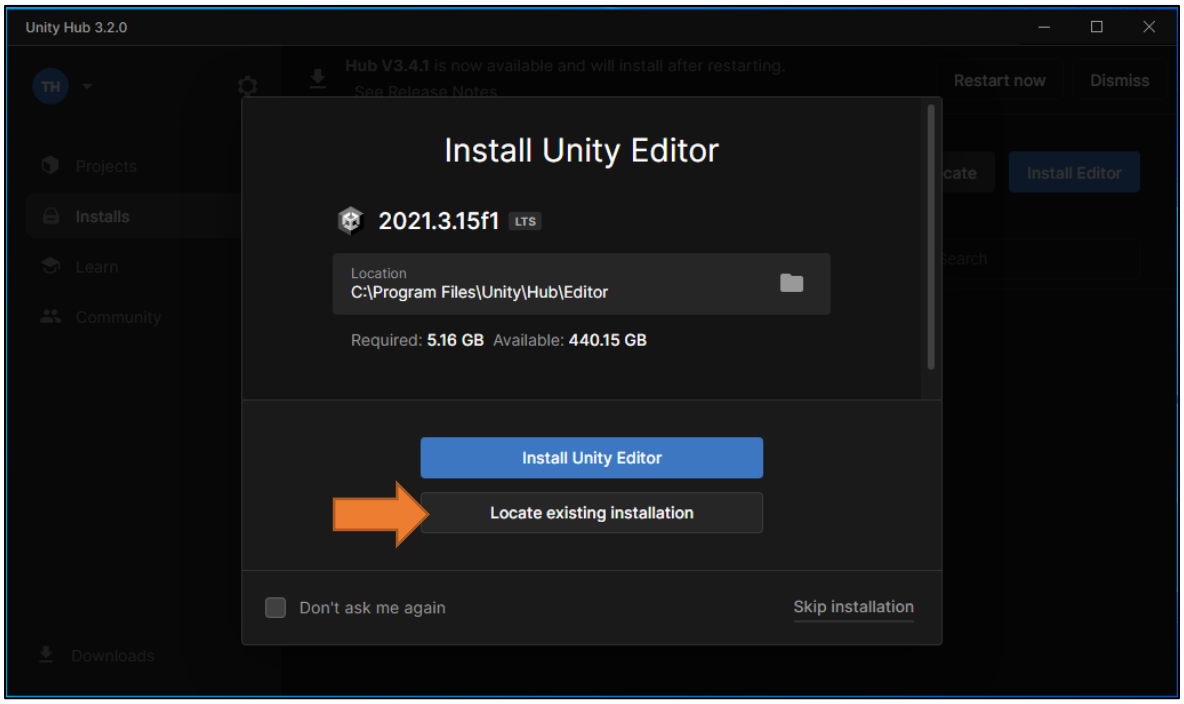


Image description: *The Unity Hub window asking for the location of the Unity Editor. Click on the "Locate existing installation" button to find the existing install.*

Next, navigate to the folder c:\Program Files\Unity\Editor

…and Select Unity from the list. Click the "Select Editor" button.

See the screenshot below for an example of what this looks like.

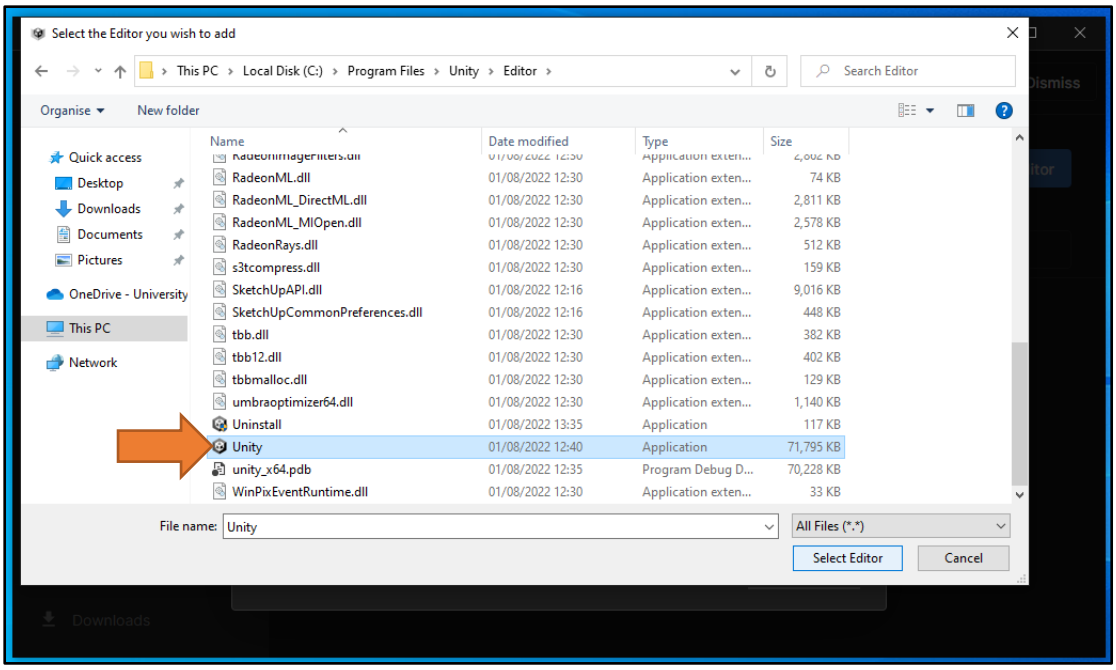


Image description: *The Unity Hub window asking for the location of the Unity Editor. Next, navigate to the folder c:\Program Files\Unity\Editor and Select Unity from the list. Click the "Select Editor" button.*

When you click the "Select Editor" button the "Select the Editor you wish to add" window should disappear. We now need to check the Unity Editor has been added.

In the Unity Hub, click the Installs tab to confirm the correct version of Unity has been added. See the screenshot below for an example.

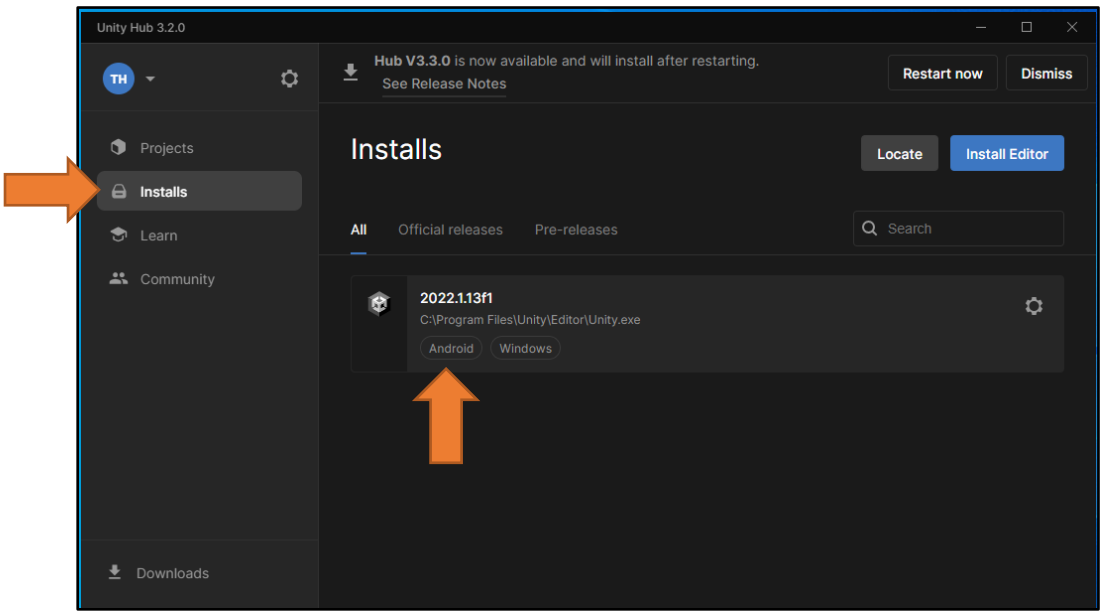


Image description: *The Unity Hub window. The Installs tab has been selected. We can see a version of the engine has been added to the installs tab.*

We can see in the screen shot above that a version of the engine has been added to the installs tab. Therefore, we can now use Unity.

<u>Top Tip</u>:

When you load Unity on a University PC you should always click the Installs tab to confirm the correct version of Unity has been added to the Unity Hub.

Sometimes the "Install Unity Editor" window with the "Locate existing installation" button does not appear. But you still might need to add a version of the Unity editor.

If there is no version of Unity in the Installs list, then click the "Locate" button in the Unity Hub to locate the Unity Editor. See the screenshot below for an example.

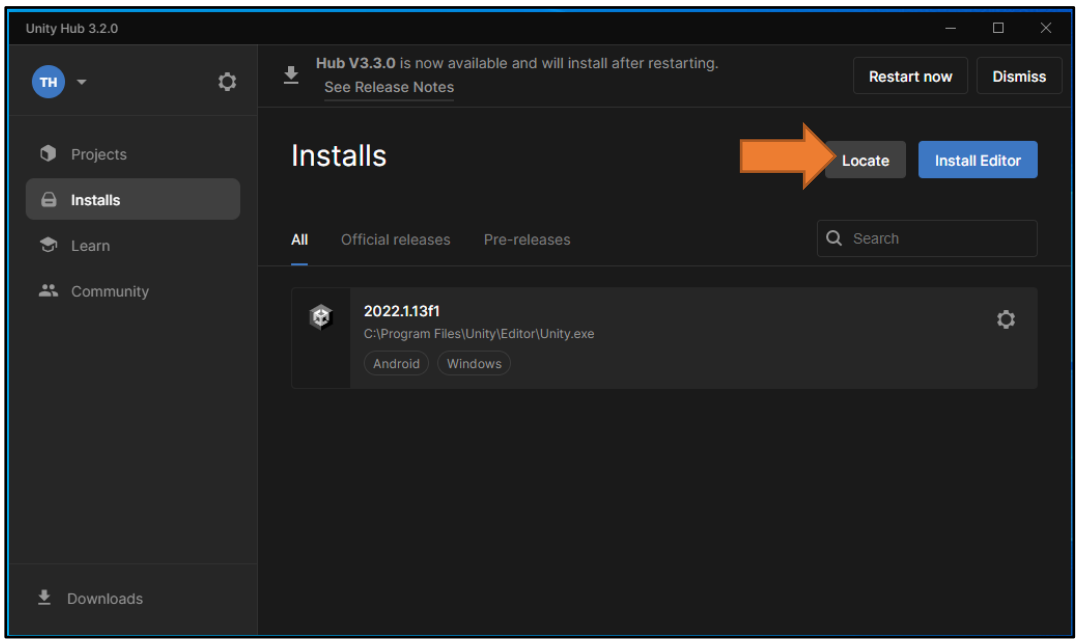


Image description: *The Unity Hub window. If an installation of the Unity Editor is missing, click the "Locate" button to locate the Unity Editor*

Once the correct version of Unity has been added to the Unity Hub (see installs tab), you are ready to use Unity.

In the Unity Hub, go to the Projects tab and click the (blue) New Project button

The Unity Hub window should look like the screenshot below. The blue New Project button is on the top right of the window.

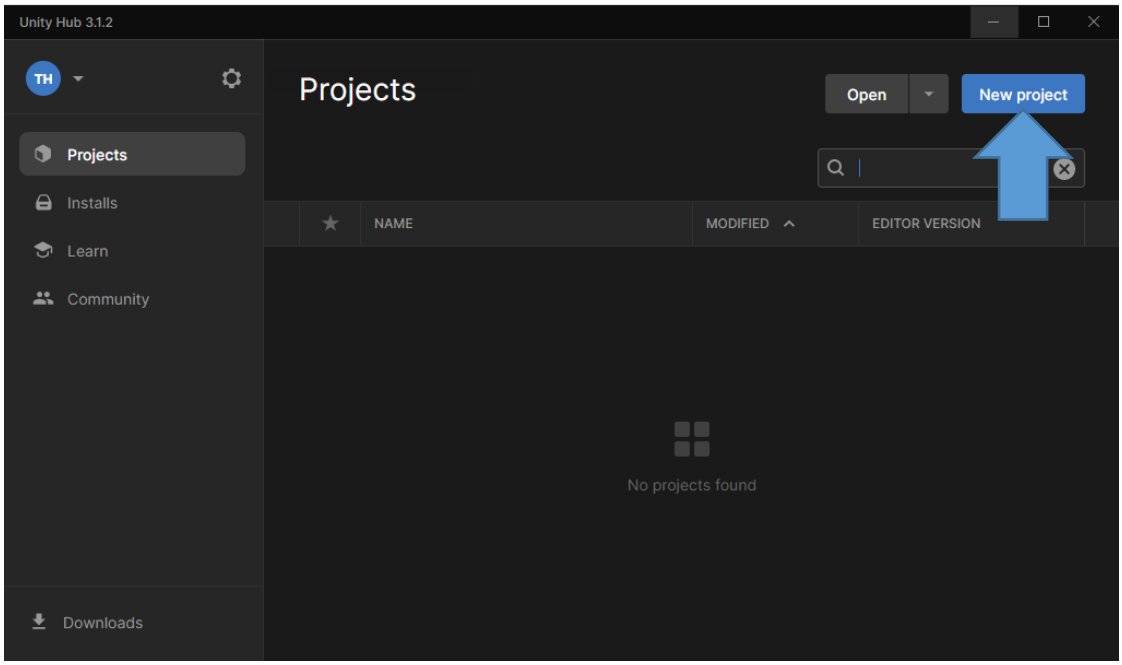


Image description: *The Unity hub with an arrow pointing to the New Project button.*

When you click the New Project button a “New project” screen will appear.

The window looks like the screenshot below.

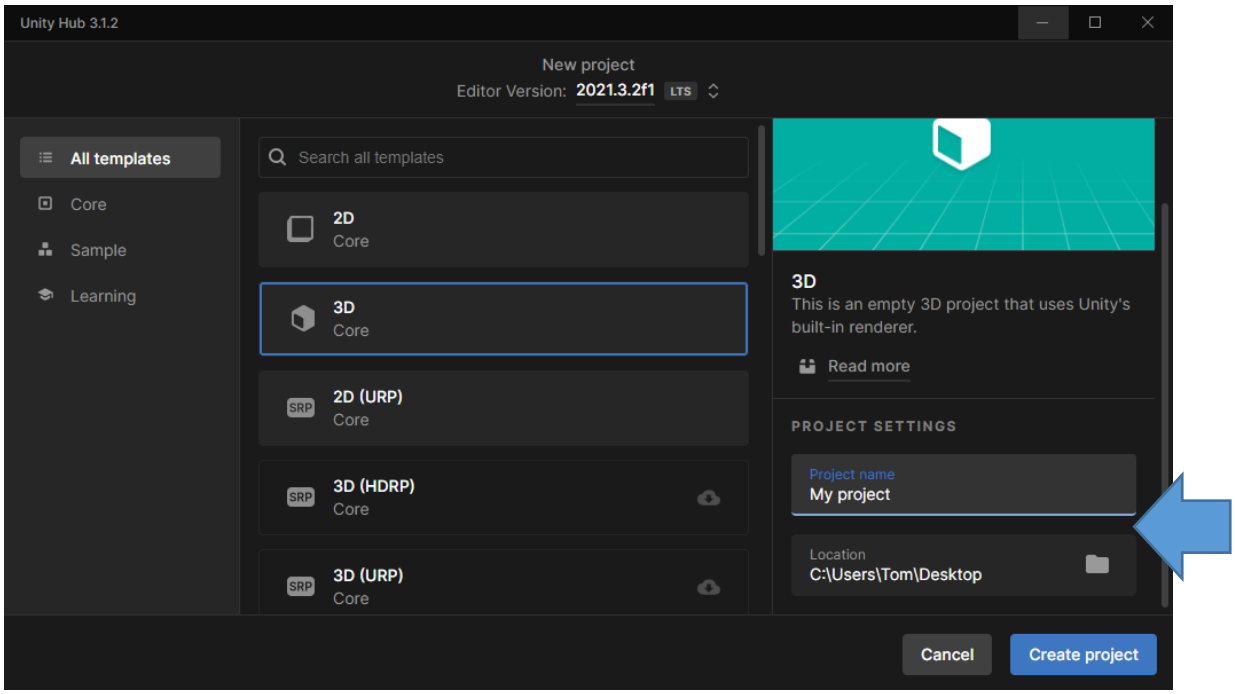


Image description: *The Unity hub “New project” screen.*

Make sure you are creating a project in the correct version of the game engine. You can see the game engine version next to the "Editor Version:" text at the top of the Unity hub "New project" screen. **See the main Canvas page or the module assessment for the version of the game engine we are using.**

Set the following settings in the Unity hub "New project" screen.

Template: Select the 3D Core template. This is a basic empty 3D template.

Project Name: Give your project the name **MyFirstProject**.

Location: Select a location to store your project. Below is some additional information about where to store your projects.

PLEASE READ - Important Unity Project Save Location Information

In general, Unity projects are large (e.g., over 500 mb). Therefore, you need to think about where you are going to store the projects and develop a workflow to manage your Unity projects. This is especially important when working with Unity projects on university PCs.

In general, I would recommend storing your Unity projects on a USB3 memory stick OR USB3 hard drive. You can then load your Unity projects from your memory stick.

- **To add a Unity project to the Unity Hub simply click the drop-down menu next to the open button and click "Add Project from disk".**

If you **do not** have a USB3 memory stick OR USB3 hard drive, I would recommend you save your Unity projects in your user area, which is **C:\Users\<yourStudentNumber>\.**

When you have finished working on your Unity project, I would recommend you close Unity (and Visual Studio), zip up your Unity project Using 7zip and then copy the Unity project to OneDrive when you have finished.

- The 7zip software is available via Apps Anywhere on university computers.

If you are confident, you could also consider using source control, such as Plastic SCM. However, I do not recommend it if you are new to Unity and source control.

Further general tips:

- Do not use USB2 or USB memory sticks OR hard drives. They are too slow.
- **Don't forget to back-up your Unity projects.** I would recommend keeping at least one USB memory stick or USB hard drive with a backup of all your university work. It would be better if you could maintain two backup devices.

We are now ready to create the project. Click the "Create project" button.

2. Exploring the Unity Editor

After you have clicked the “Create project” button the project will be created, and the Unity Editor will load.

When the Unity Editor has loaded it should look like the screenshot below.

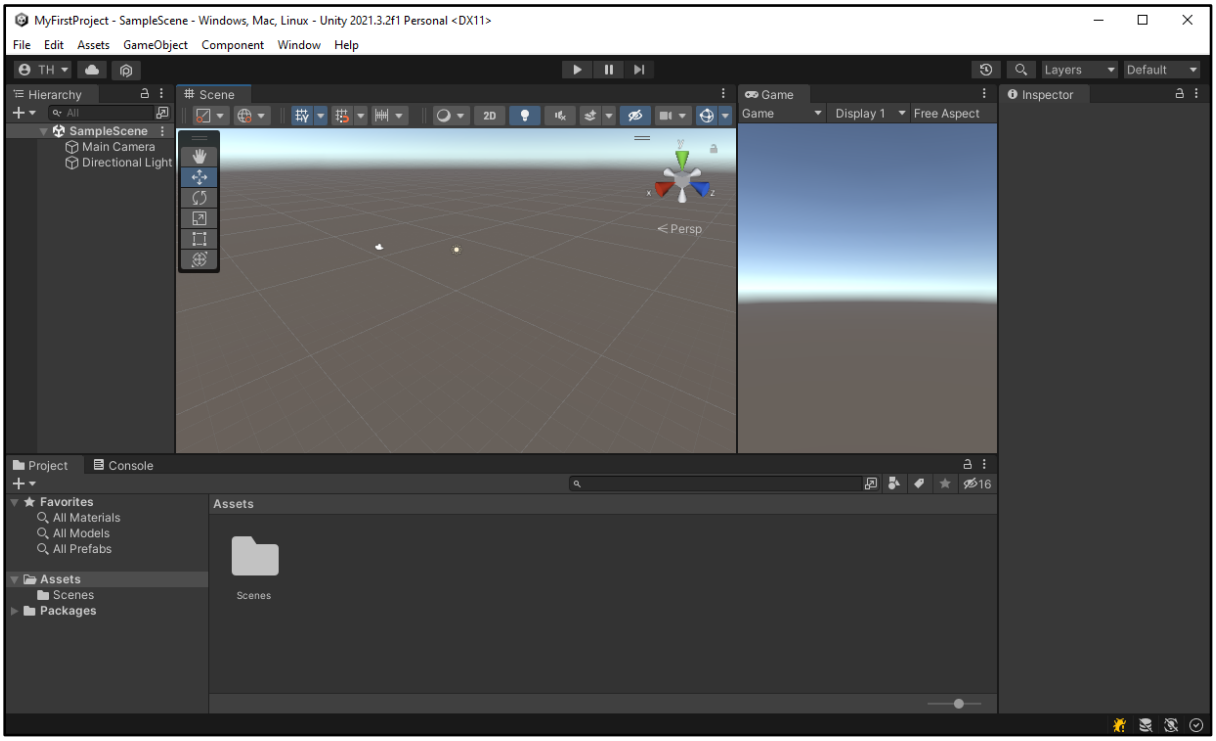


Image description: *The Unity Editor when an empty project has been loaded.*

The Unity interface is made up of five main windows:

- Scene view.
- Game view.
- Hierarchy window.
- Inspector window.
- Project window.

There is also a toolbar at the top left of the scene view.

See the screenshot below for each of the Unity Editor Windows.

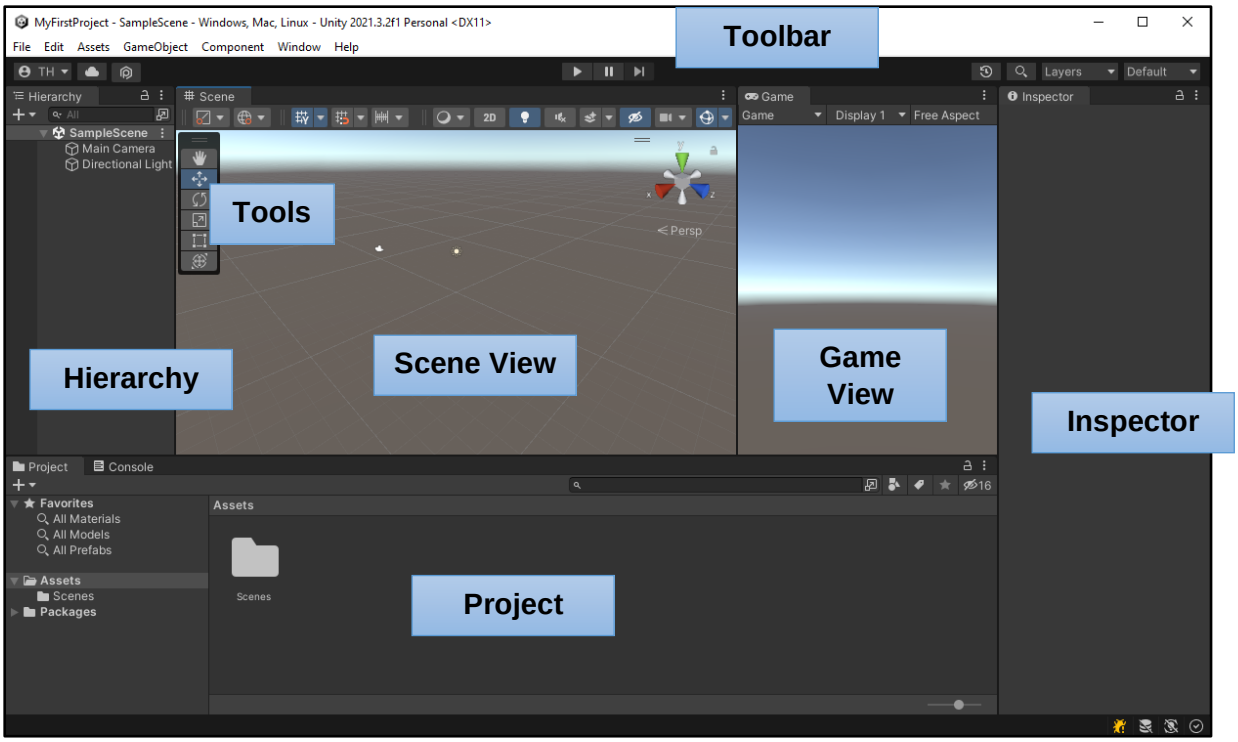


Image description: *The Unity Editor with its windows and some components highlighted.*

The tools toolbar, in the top left of the scene view, has several useful control tools:

- The hand tool.
- The move tool.
- The rotate tool.
- The scale tool.
- The Rect tool.
- The move, rotate, scale tool.

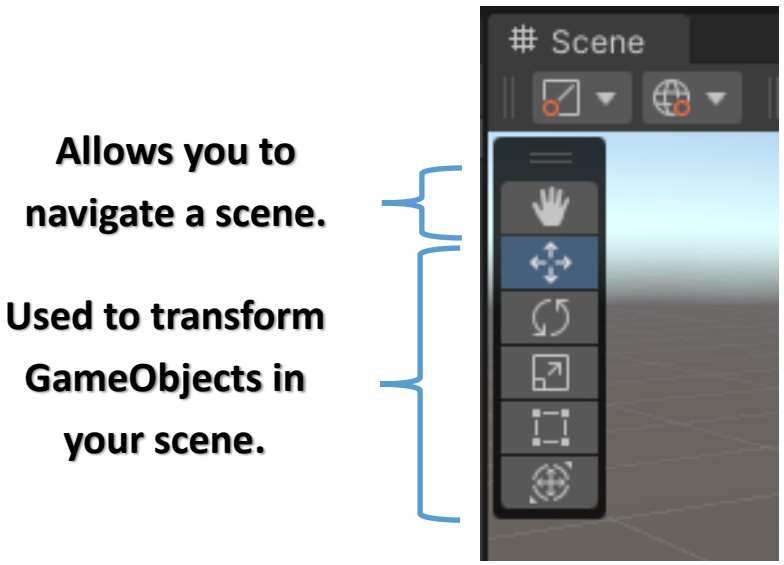


Image description: *The tools toolbar in at the top left of the scene view.*

Before we start creating something let's explore the basics of navigating in the Scene View.

Use the mouse and keyboard to move through the scene view.

Arrow movement:

- Use arrow keys to move.
- Use the shift key to move quicker.

<u>Flythrough mode:</u>

- Let's you navigate the Scene View by flying around in first person similar to how you would navigate in many games.
- **How to activate:**
- Click and hold the right mouse button.
- Now you can move the view around using the mouse and use the WASD keys to move left/right forward/backward and the Q and E keys to move up and down.
- Holding down Shift will make you move faster.

To focus on an object. Select it in the hierarchy, move your mouse over the scene, press the F key.

When the hand tool is selected (shortcut: Q), the following mouse controls are available to move the scene view camera:

- **Move:** To move the camera around, click and hold the left mouse button. Then move the mouse to move the scene view camera.
- **Orbit:** Hold Alt and click-drag to orbit the camera around the current pivot point.
- **Zoom:** Hold Alt and right click-drag to zoom the camera.

In the upper right-hand corner of the Scene view is the scene Gizmo.

- Allows you to quickly change your view.

The Gizmo looks like the screenshot below.

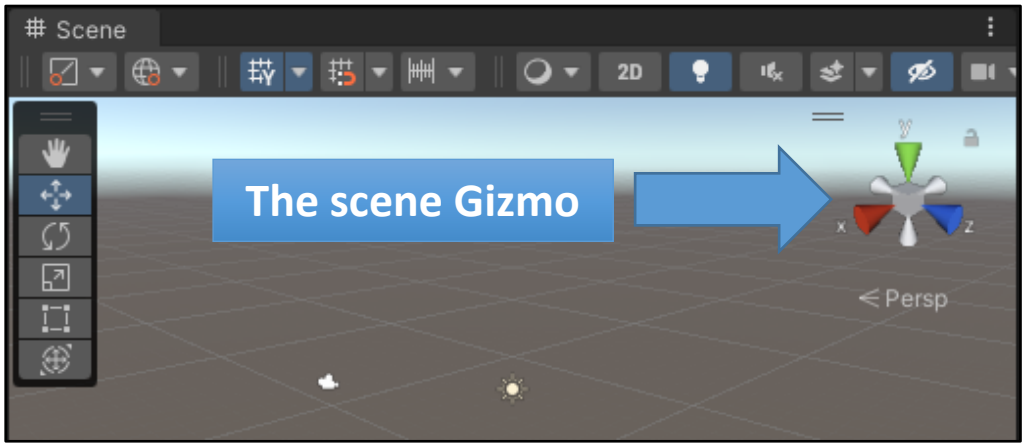


Image description: *The scene Gizmo at the top right of the scene view.*

3. Adding a Cube and Moving Through the Scene in Scene View

Let's start by adding a cube to the Unity scene. Go the Hierarchy view and **click the plus button (+)**. Then go to 3D object and select cube. See the screenshot below for an example.

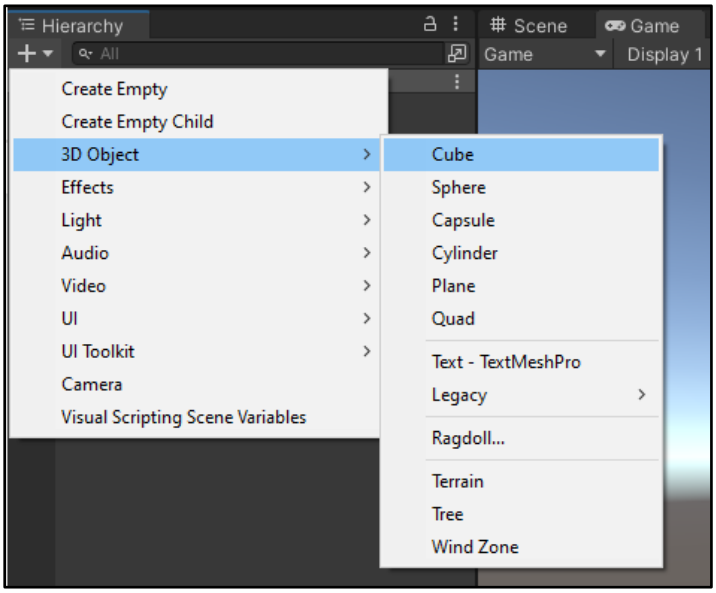


Image description: *An image of the Hierarchy add menu with Cube selected.*

A cube should now have been added to your scene. You should also see the cube in the Hierarchy window. See the screenshot below for an example.

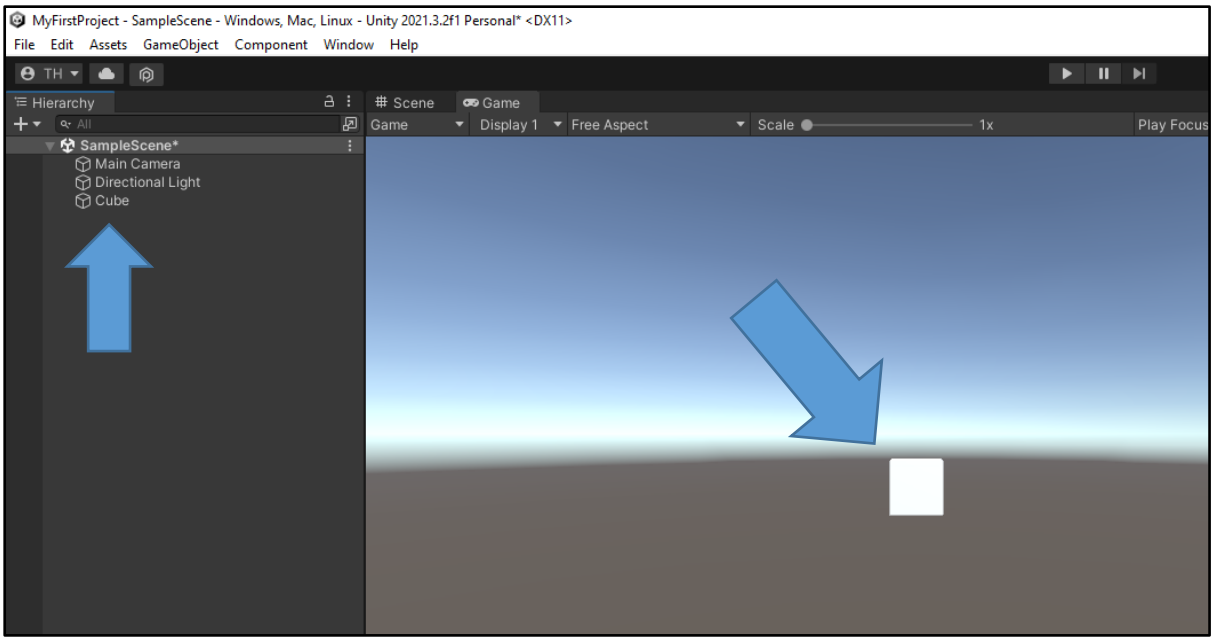


Image description: *A cube in a scene and listed in the hierarchy.*

Select the move tool on the Unity tools toolbar, in the scene view and move the cube to position – x: 2, y: 2.

This is the move tool:

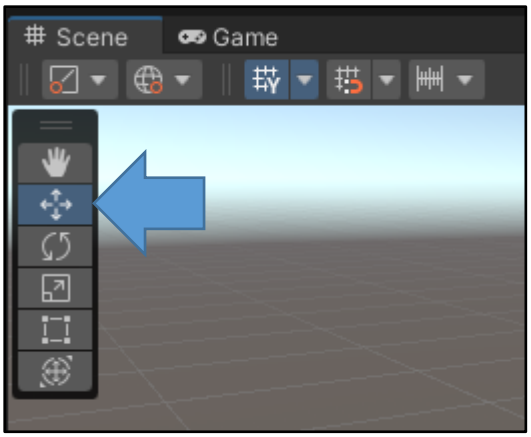


Image description: *The Unity tools toolbar with the move tool highlighted.*

Note, you can move this tools toolbar to the top of the scene view. To do this, click and drag the two lines at the top of the tools toolbar to the toolbar at the top of the scene view. **Your tools toolbar should now look like the screenshot below.**

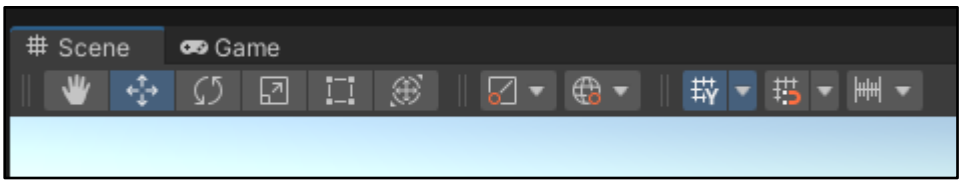


Image description: *The Unity tools toolbar. The toolbar has been moved to the top of the scene view.*

First, try and drag the cube in the scene view. When you have done that try and set the exact position in the Inspector Transform component.

If you click the scene background or another game object your cube will not be selected. If this is the case, you will need to click the cube in the scene view or the Hierarchy window to select it and edit its properties.

Next, rotate the cube in any way you like. Select the rotate tool on the Unity toolbar.

Now, try and make the cube bigger by adjusting its scale. Select the scale tool on the Unity tools toolbar. First, try and scale the cube in the scene view. When you have done that try and set the exact scale in the Inspector Transform component. Set the scale to x: 2, y: 2, z: 2.

Finally, fly around your cube in scene view. Click and hold the right mouse button. Move the mouse to look around your scene. Use the W, A, S and D keys to move through the scene. Use the shift key to move quicker.

Your cube should look like the screenshot below.

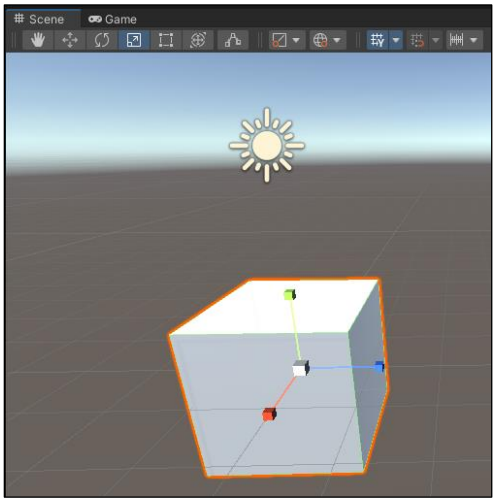


Image description: *A cube in scene view. The scale tool has been selected. The green, red, and blue scale widgets are visible.*

Before you move on, please delete the cube from the scene. To do this, select it in the Hierarchy window, right click and select delete.

4. Importing Assets into your Project

We will now import some assets that we will use in this workbook.

Assets are the name game developers use for game content, such as 3D models of humanoids and buildings. It can also refer to sounds, images (e.g., textures) and code scripts.

Unity has an Asset Store that is home to thousands of free and priced assets. We will use **free** assets on the Unity Asset Store to help us create games or interactive 3D applications.

We are going to add the following free assets to our project:

- Starter Assets - First Person Character Controller

We are also going to import assets from a **Unity Asset package** file.

> **More information:**
> *"Asset packages are collections of files and data from Unity projects, or elements of projects, which Unity compresses and stores in one file with the .unitypackage extension. Like a zip file, an asset package maintains its original directory structure when it is unpacked, as well as metadata about assets (such as import settings and links to other assets)."*
> Source: https://docs.unity3d.com/Manual/AssetPackages.html

Before you can add assets to your Unity project you need to first add them to your Unity account.

Step 1: Adding Assets to Your Unity Account

In a web browser, go to the web site: https://assetstore.unity.com/

Log into your Unity account. If you do not have a Unity account, you need to create one.

Search for the "**Starter Assets - First Person Character Controller**".

Select the "**Starter Assets - First Person Character Controller**" to view details about it.

Then click the "Add to My Assets" button (it is a big blue button near the top right of the web page). Make sure you have logged into your Unity account at this point. See the screenshot below for an example.

Image description: *A Unity Asset store web page showing the Starter Assets - First Person Character Controller assets. The "Add to My Assets" button is also visible.*

When you have added the asset to your account, you can close the web browser.

Step 2: Importing Assets into Your Unity Project

In Unity you can import assets that have been added to your account. If you have not added the assets to your account, you need to add them before you proceed. See the previous step for more information.

In the Unity Editor, go to the Window menu and select Package Manager.

Select "My Assets" from the drop-down menu. See the screenshot below for an example.

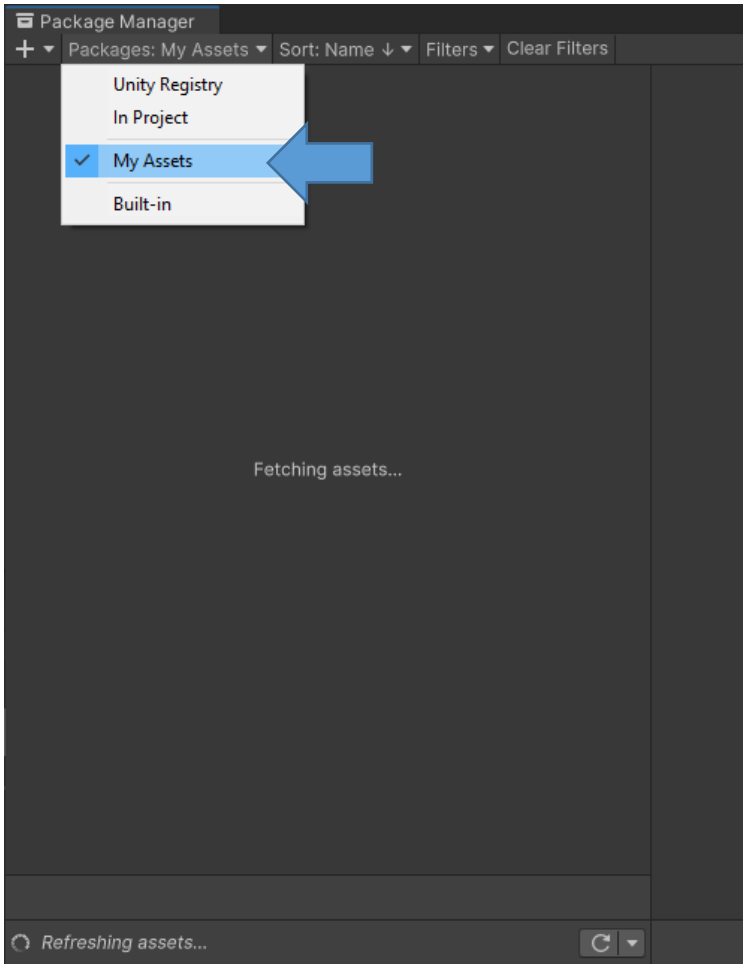


Image description: *The Unity Package Manager. My Assets have been selected from the drop-down menu.*

You may need to sign in with your Unity account to view your assets. If you are not signed-in, you should have the option to sign-in on the left panel of the Package Manager. Sign-in if needed.

A list of all your assets should appear. We will now import the assets.

Step 2.1: Importing - Starter Assets - First Person Character Controller

Select the **Starter Assets - First Person Character Controller** from the list. If you have a lot of assets, you may need to click the **Load Next** button at the bottom of the assets list. Your Package Manager window should look like the screenshot below.

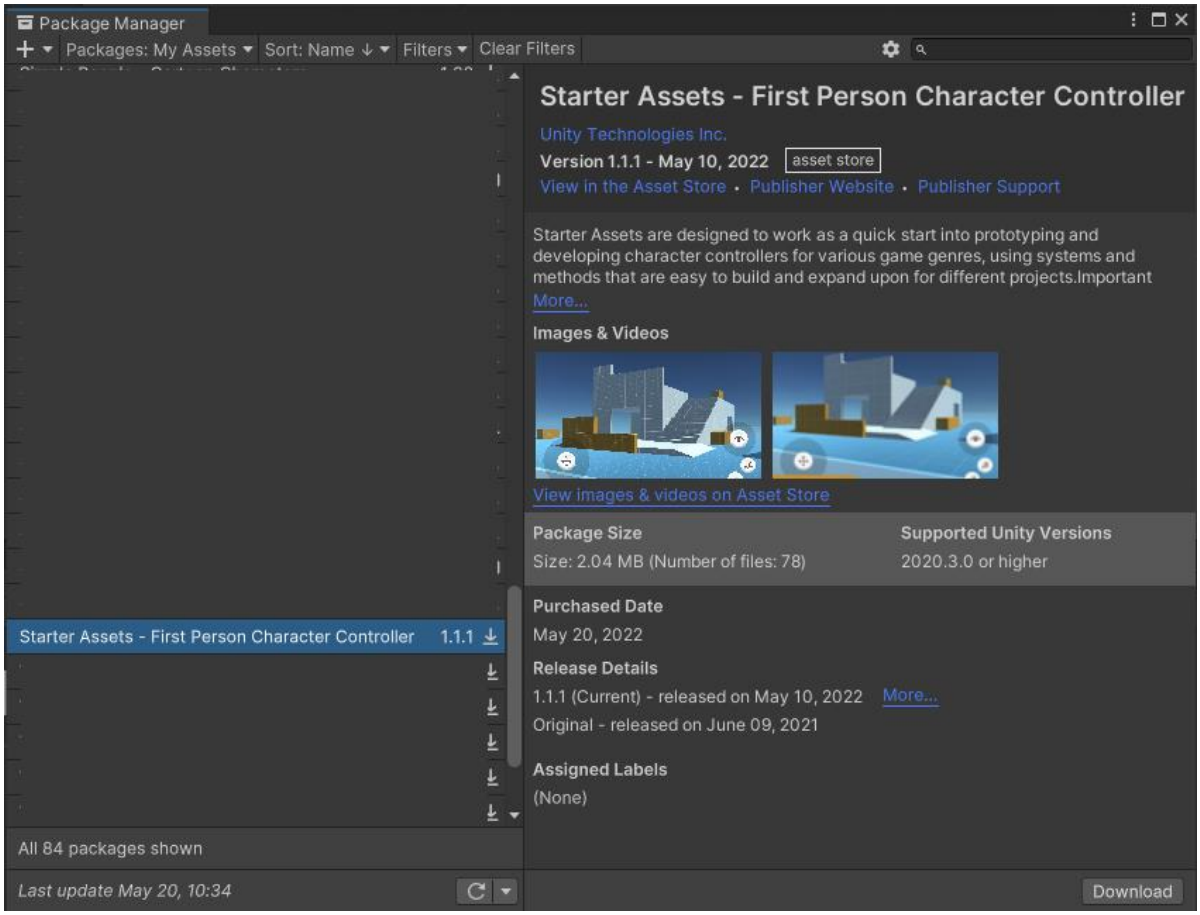


Image description: *The Unity Package Manager. An asset pack has been selected. TA description of the asset pack and the Download button for the asset pack are visible.*

Next, you may need to click the **Download** button to download the asset to your computer.

Then, click the <u>import</u> button to import the asset.

- When the assets have been downloaded an Import button will appear.

When you click the Import button a small "Import Unity Package" window will appear. See the screenshot below for an example.

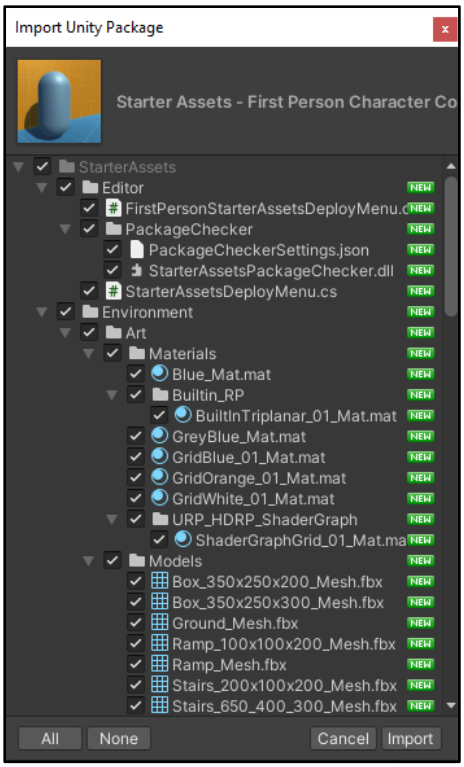


Image description: *The "Import Unity Package" window. Click Import.*

Simply, click the <u>Import</u> button on the "Import Unity Package" window.

When you click the Import button the assets will be added to your project.

As part of the process, the message in the screenshot below will be displayed. <u>Click No</u>.

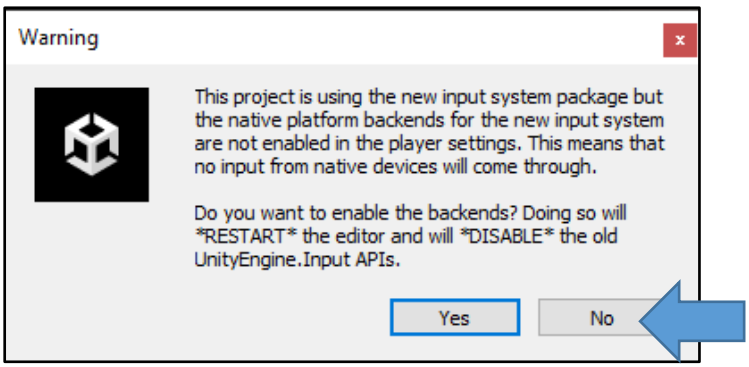


Image description: *A warning message stating that the assets being imported use the new input system package. <u>Click no</u>.*

<u>Now, close the Package Manager.</u>

In the Unity Editor, go to the Edit drop down menu and select <u>Project Settings</u>. See the screenshot below for an example.

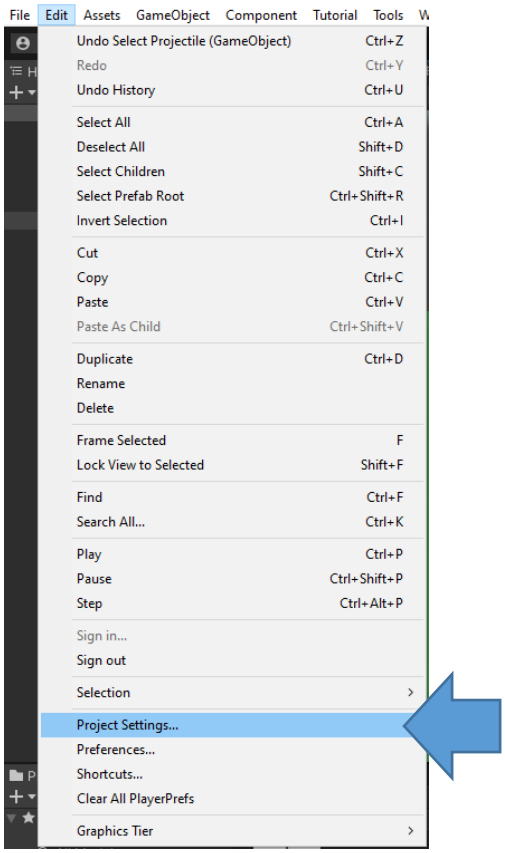


Image description: *Open the Project Settings window to set Unity project input type.*

Select Player from the list on the left and expand the “Other Settings” option. See the screenshot below for an example.

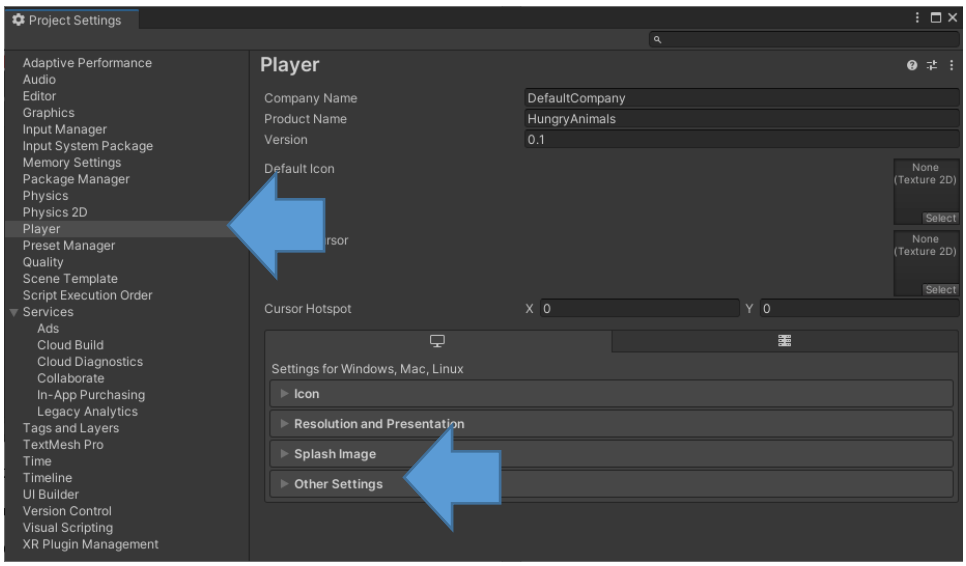


Image description: *Select Player from the list on the left and expand the “Other Settings” option.*

Scroll down "Other Settings" until you find the "Active Input Handling" option. Click the drop-down menu and select <u>Both</u>. See the screenshot below for an example.

Note: there are two input systems in Unity. An old one and a new one. In our workbooks we will use both because the old input system is very quick to get up and running.

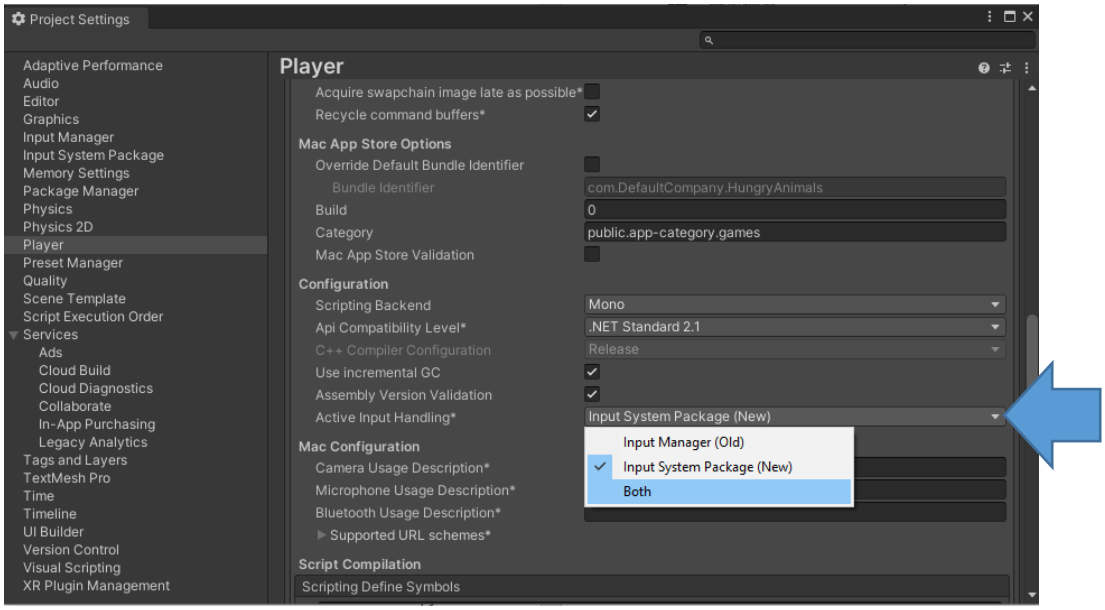


Image description: *Scroll down "Other Settings" until you find the "Active Input Handling" option. Click the drop-down menu and select <u>Both</u>.*

A "Unity editor restart required" message box will apear. Click Apply.

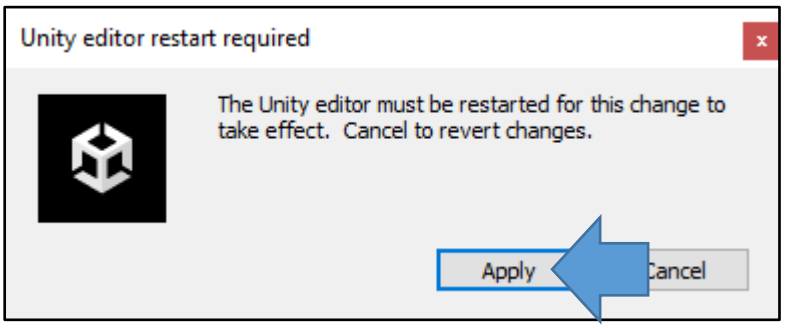


Image description: *A warning message stating that Unity must restart. <u>Click Apply</u>.*

Note, at this point Unity will restart. This is fine. If needed, click Save to save your scene. Unity will now restart.

When Unity restarts, close the "Project Settings" window (if needed).

When Unity has restarted we can continue to import asset packs.

Step 2.2: Importing - Assets from a Unity Asset Package File

Next, we will import some environmental assets from a Unity asset package file.

First, open a web browser and go to this workshops page on this modules Canvas topic.

You should find a download link for a Unity asset package. The download link will look like the screenshot below.

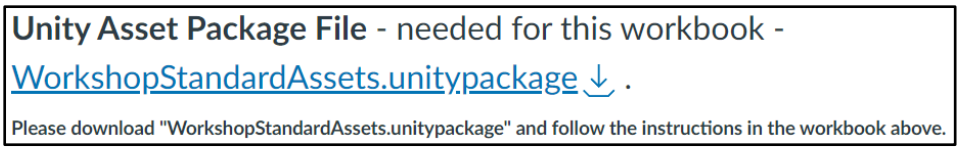


Image description: *An example of what the download link will look like for the Unity asset package.*

Download the Unity asset package to your computer.

When the Unity asset package has downloaded to your computer, we need to double click on it to add the assets to our Unity project. Your Unity project should be still open in the Unity editor.

Double click on the Unity asset package to import it into your Unity project. The Unity asset package file should look like the screenshot below.

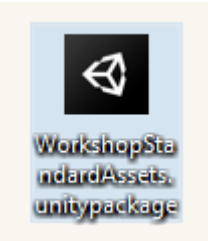


Image description: *The Unity asset package file. Double click on the Unity asset package to import it into your Unity project. Your Unity project should be still open in the Unity editor.*

At this point Windows might ask which application you would like to open the Unity asset package with. It should default to the Unity Editor. So, you should just need to click yes.

Next, the Unity editor should maximise and start loading the assets. Once the assets have loaded you should see a standard Unity Import Window. See the screenshot below for an example.

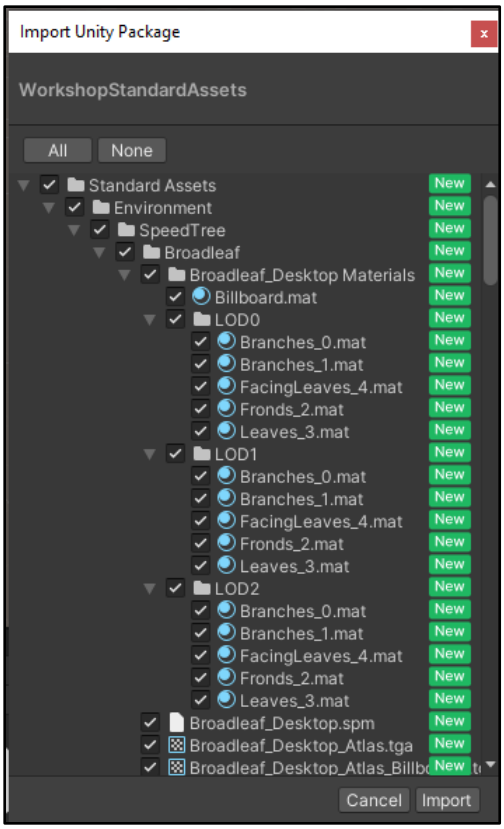


Image description: *"Import Unity Package" window with the Environment asses from the Unity asset package. Click Import.*

Click the Import button on the "Import Unity Package" window.

Unity should import the assets into your Unity project. You should now be ready to create a terrain and an island.

5. Creating a Terrain

We are now going to create an island, with a coastline using the terrain tool in Unity.

In Unity terms a terrain is a GameObject with a terrain component applied to it.

To create a terrain, go to the dropdown menu **GameObject->3D Object->Terrain**. This will add a Terrain to your project. See the screenshot below for guidance on where to find the Terrain menu item.

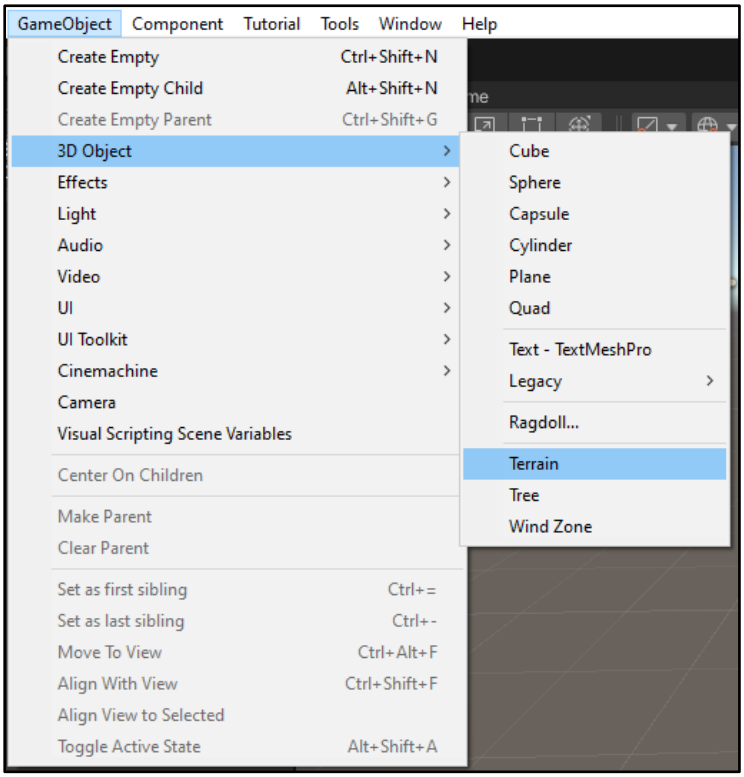


Image description: *An image of the Terrain dropdown menu.*

A terrain object should now have been created.

It should be selected in the Hierarchy window. At this point you can give it an appropriate name. For this workbook we will leave it as Terrain. However, it is good practise to give your GameObjects appropriate names.

If the terrain is not selected, you can select it by clicking on its name (e.g., Terrain) in the Hierarchy window. When selected its properties are shown in the Inspector.

The terrain component in the Inspector gives you a terrain toolset and some settings.

The terrain component has several sections. They are accessed via the icon buttons.

- Create Neighbour Terrains – Create more terrains around this one.
- Paint Terrain – used to manipulate the terrain and add textures to the terrain.

- Paint trees – used to paint trees onto the terrain.
- Paint details – used to paint detail, such as rocks, flowers, plants, etc.
- Terrain settings – settings for drawing the terrain.

The screenshot below shows you the terrain toolset.

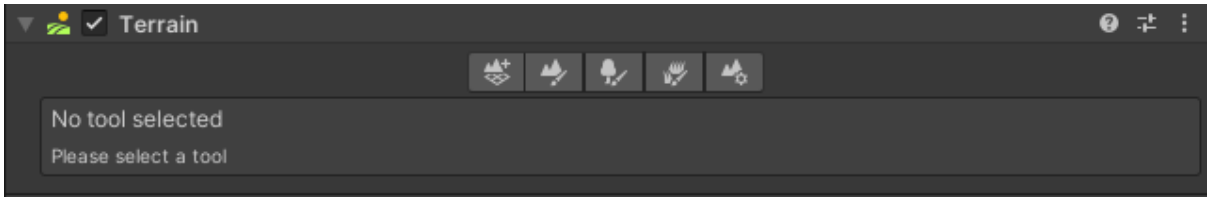


Image description: *The terrain toolset.*

If you select the “Paint Terrain” button you will see a dropdown menu below it. This dropdown menu gives you access to several terrain features. See the screenshot below for an example of the dropdown menu.

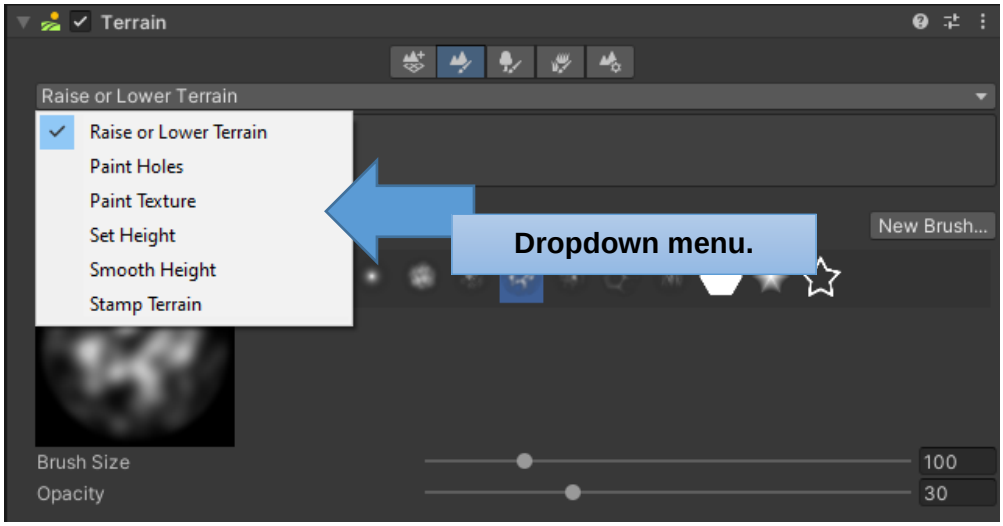


Image description: *The “Paint Terrain” dropdown menu.*

Now let’s setup our terrain.

Ensure that the terrain is still selected in the hierarchy. Your new Terrain will look like the screenshot below in the Scene window.

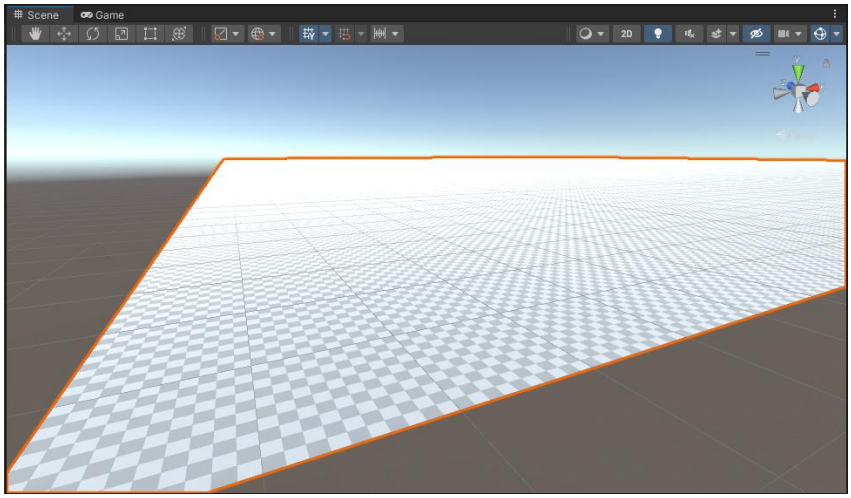


Image description: *The terrain you added in the scene view.*

First, we want to check the size of the Terrain.

Select the **Terrain Settings** tools from the Terrain Inspector. The button looks like the screenshot below.

Image description: *The terrain setting button on the terrain component in the inspector.*

Check the terrain **width** and **length** is **1,000**.

If the terrain is not this size enter the values and press the enter key after typing.

See the screenshot below for an example.

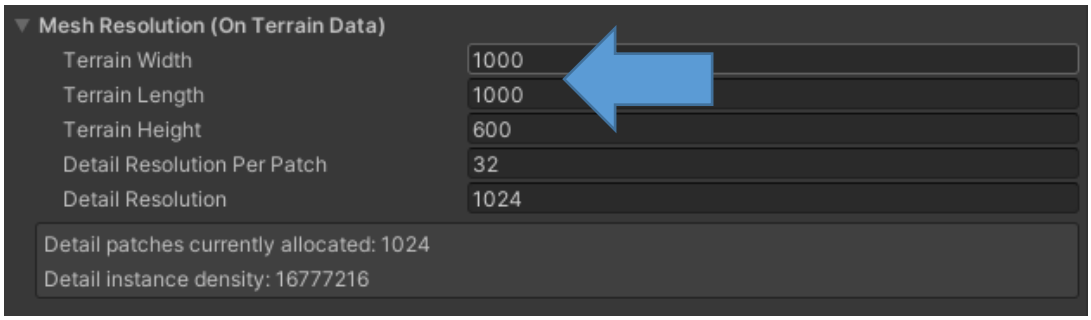


Image description: *The terrain resolution settings.*

Next, we want to raise the height of our ground so that when we create a seabed that will be at height zero.

Select the **Paint Terrain tool** from the Terrain Inspector. The button looks like the screenshot below.

Image description: *The paint terrain tool button on the terrain component in the inspector.*

In the dropdown menu below the toolbar select the “Set Height” option. See the screenshot below for an example.

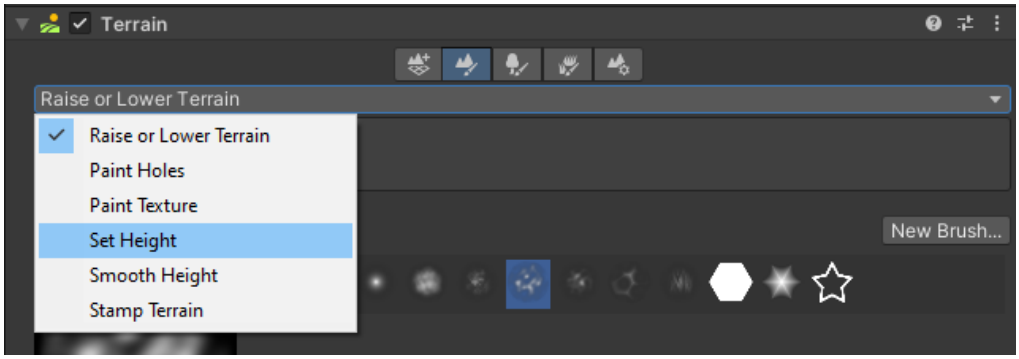
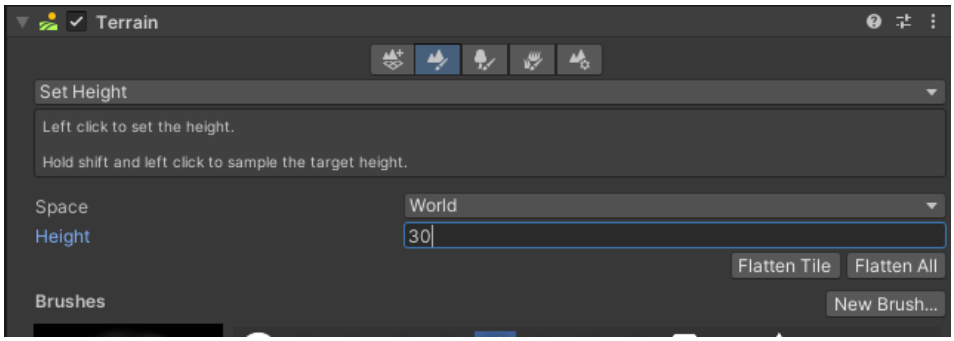


Image description: *The set height option is selected in the “Paint Terrain” tools dropdown menu.*

Enter 30 in the Height text box and <u>click the Flatten Tile button</u>.



When you click the Flatten Tile button your terrain should be raised up 30 units.

Use the fly controls to position your view of the scene so that you can see the terrain again. **You view of the scene should be like the screenshot below.**

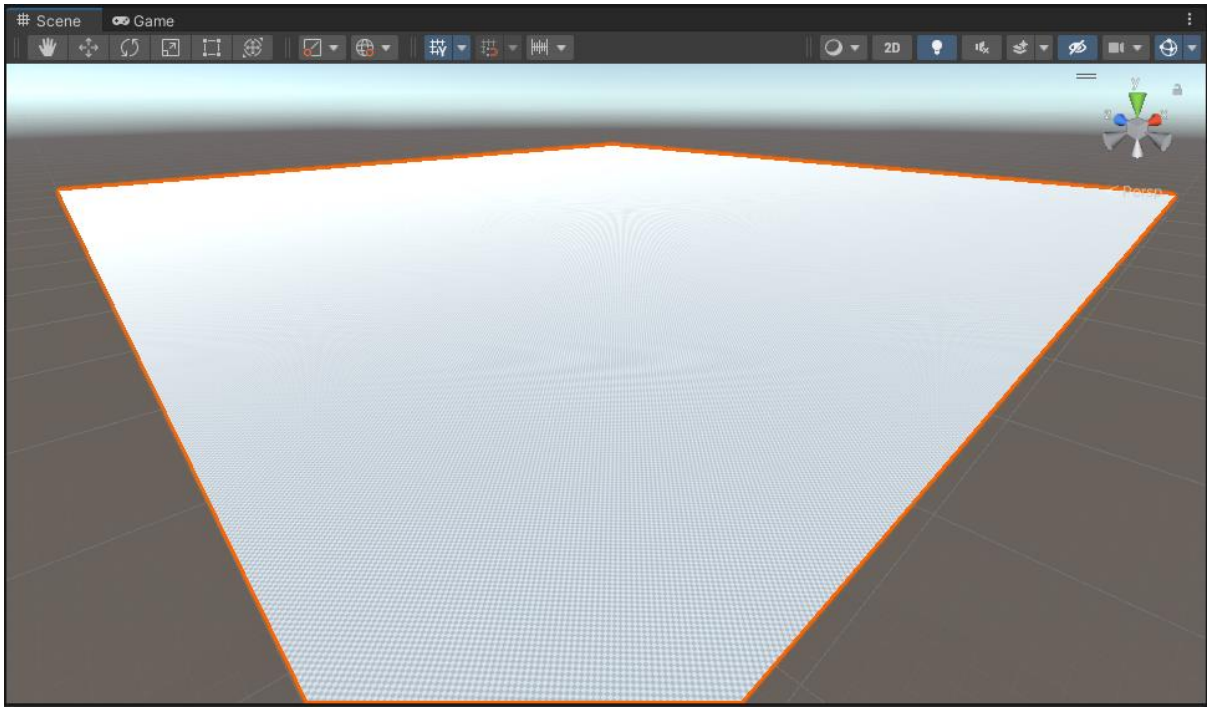


Image description: *The terrain in the scene view after the height has been set to 30.*

In the inspector, go to the dropdown menu below the terrain toolbar select the "Raise or Lower Terrain" option. See the screenshot below for an example.

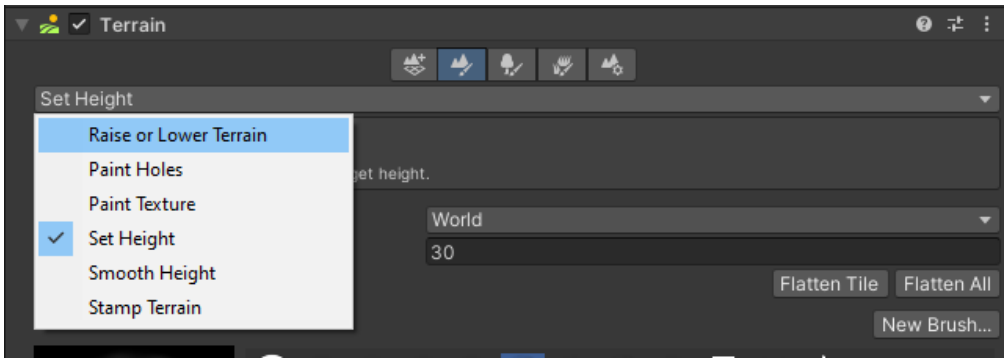


Image description: *The "Raise or Lower Terrain" option is selected in the "Paint Terrain" tool dropdown menu. Click on the "Raise or Lower Terrain" option.*

Select the **second brush** in the palette and set its **Brush size** to 100.

Set **opacity** to 75.

Then select the second brush in the Brushes list.

See the screenshot below for an example.

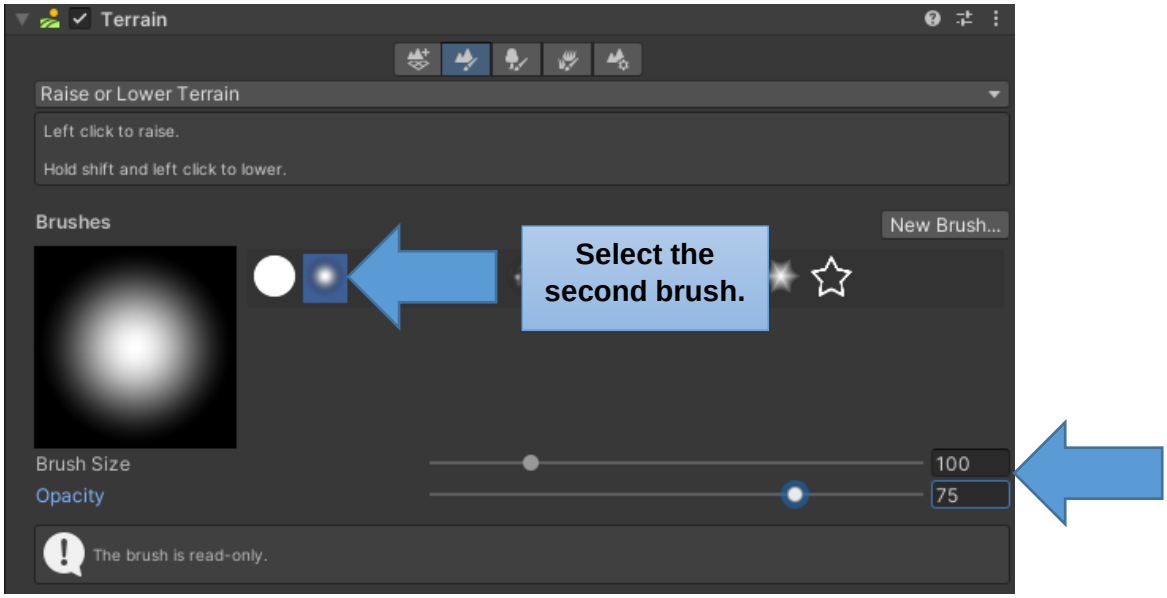


Image description: *The "Raise or Lower Terrain" setting have been entered.*

Change your scene view to a top-down view using the view gizmo.

Click the Y-axis (green axis) on the view gizmo to change to a top-down view.

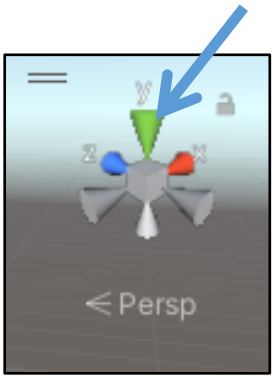


Image description: *The Scene gizmo with the Y axis highlighted.*

You should now have a top-down view of the terrain. Your view should be like the screenshot below.

Using the shift key to lower height, paint around the outline of the terrain to create a coastline.

When you have finished it should look something like the screenshot below.

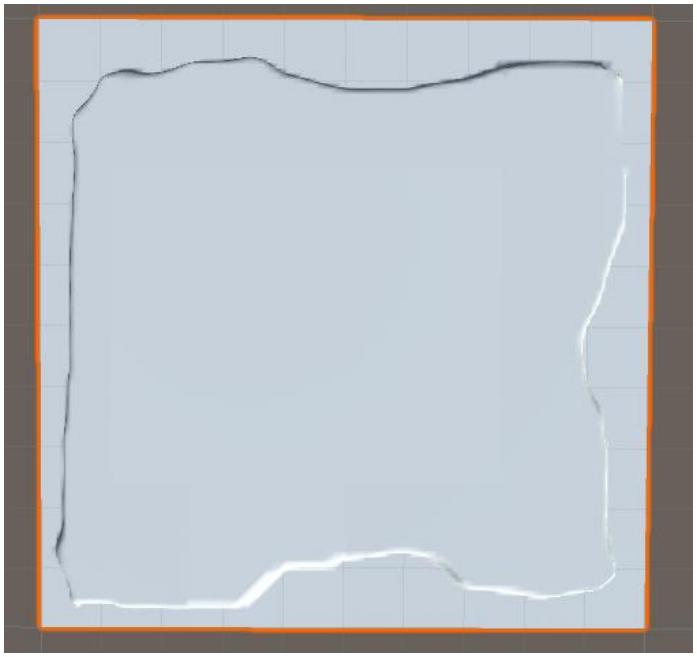


Image description: *The terrain" setting have been entered.*

Now switch to a side on perspective. Press the right mouse button and hold it down. Then move the mouse forward to rotate the scene view camera. Then press the Q key to lower the camera in the scene view. You must keep pressing the right mouse button while you are doing this. You can hold down the shift key to make the camera move more quickly.

You should stop moving the camera when your scene view looks like the screenshot below.

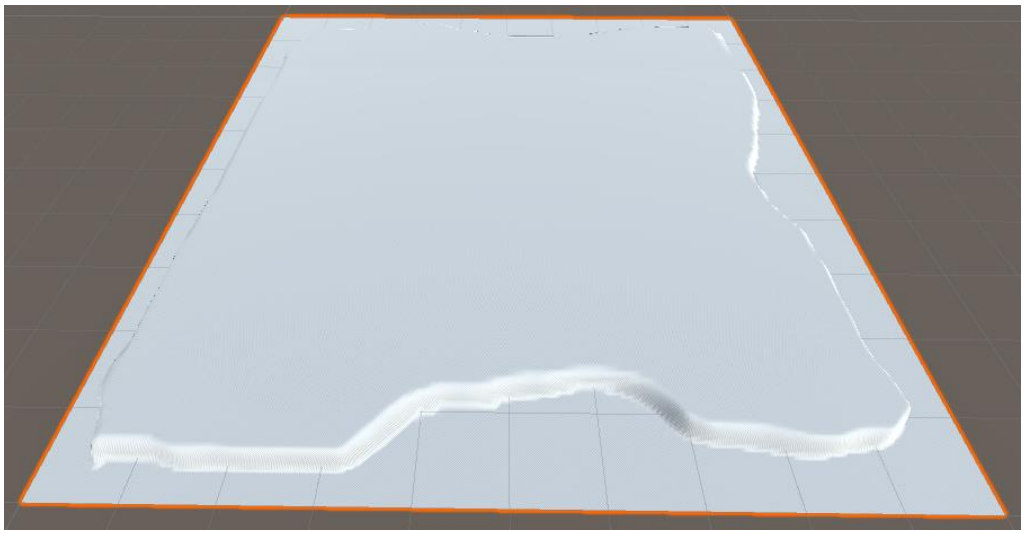


Image description: *The terrain in your scene view. I have moved the camera from a top-down (i.e., birds-eye view) to a side on view.*

If you wish you can now go over the island and create hills using the **Raise or Lower Terrain tool**. You can also create valleys using **Shift** and the **Raise or Lower Terrain tool**.

For example, to create a hill you simply make sure the **"Raise or Lower Terrain"** option is still selected. Then left click the mouse button over the terrain. You can drag the mouse, whilst still left clicking the mouse to create hill / mountain ranges.

Your world should look something like the screenshot below. As you can see, I have created a mountain and some hills.

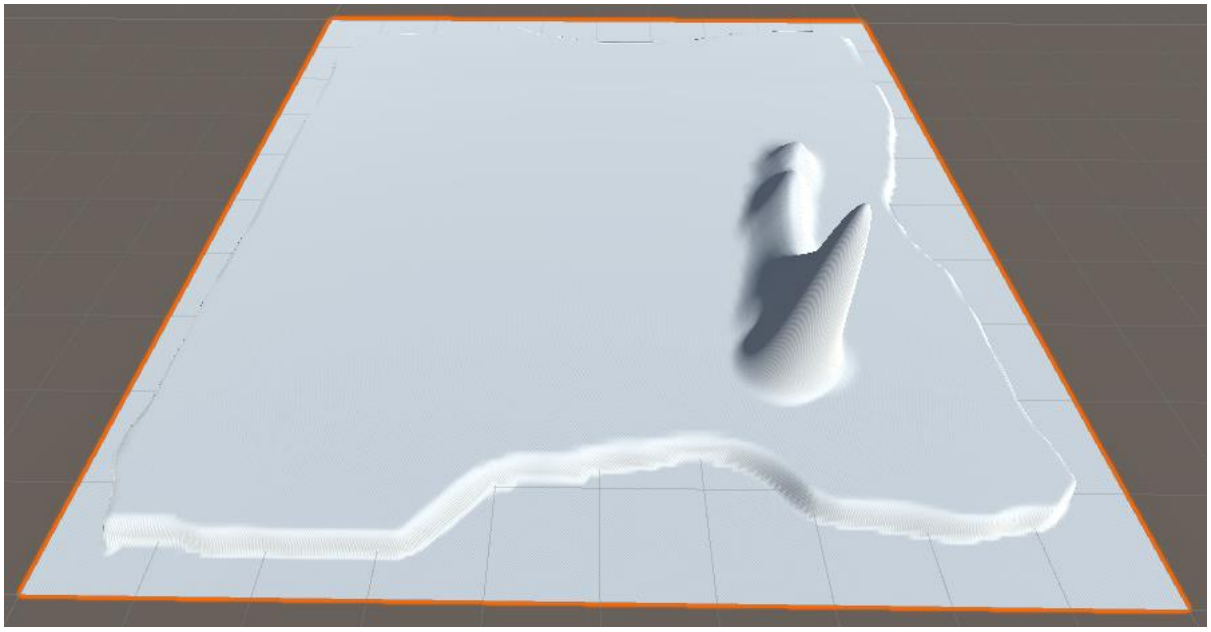


Image description: *The terrain in your scene view. I have created some hills and a mountain.*

6. Adding Textures to the Terrain

Currently, the terrain does not look very realistic.

We will add textures to our terrain to make it look more realistic.

A texture is simply an image. We apply it to the surface of the terrain to make the terrain more interesting and realistic.

The first texture layer you add to the terrain will cover all the terrain, therefore it should represent the background to all/most of your terrain.

We will add textures from the standard assets. These textures are located within our Asset folder. **You do not need to navigate to them**; however, if you want to find the textures: Go to the project window. Then go to the Standard Assets folder -> Environment -> TerrainAssets -> SurfaceTextures.

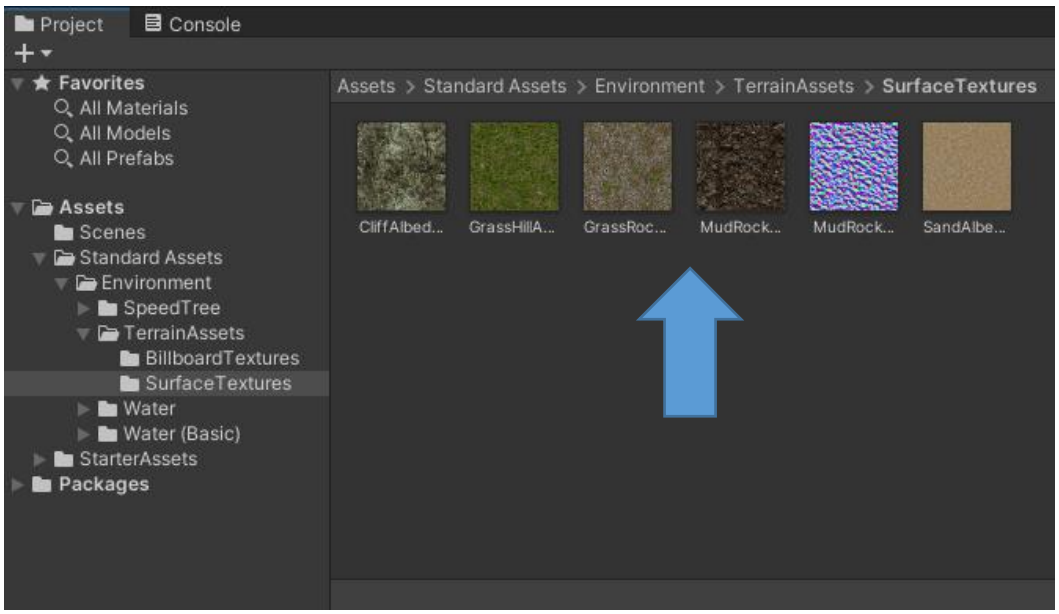


Image description: *The Project window showing the location of the surface textures we are going to apply to our terrain.*

Adding the textures. First, ensure the terrain is selected in the hierarchy.

Select the **Paint Terrain tool** from the Terrain Inspector. The button looks like the screenshot below.

Image description: *The paint terrain tool button on the terrain component in the inspector.*

In the dropdown menu below the toolbar select the **“Paint Texture”** option. See the screenshot below for an example.

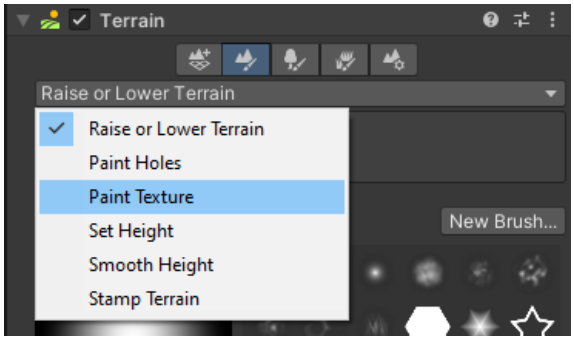


Image description: *The Paint texture option is selected in the “Paint Terrain” tool dropdown menu.*

To add the textures, click the “Edit Terrain Layers” button and select “Create Layer”. See the screenshots below for an example.

Remember, the first texture layer you add to the terrain will cover all the terrain, therefore it should represent the background to all/most of your terrain.

First, click the “Edit Terrain Layers” button. See the screenshot below for an example.

Image description: *The “Edit Terrain Layers” button.*

Then select “Create Layer”. See the screenshots below for an example.

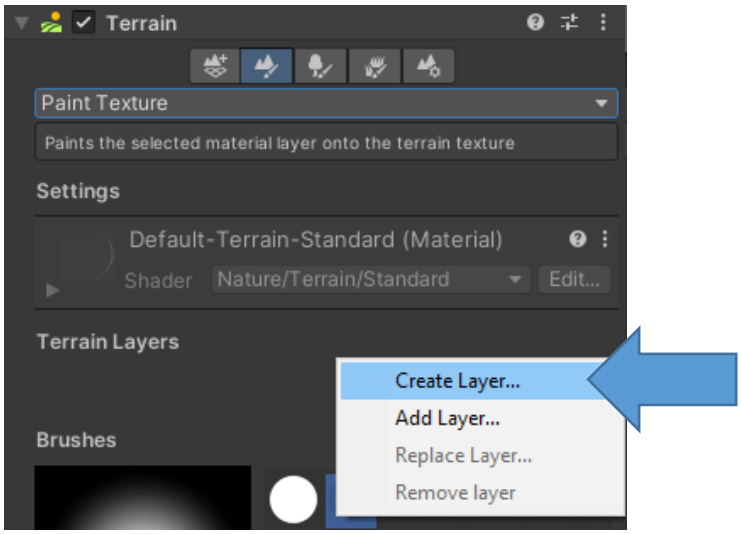


Image description: *After you click the “Edit Terrain Layers” button, select the “Create Layer” option.*

A “Select Texture” window will appear. Search for the texture **GrassHillAlbedo** and double click on it. The “Select Texture” window will look like the screenshot below.

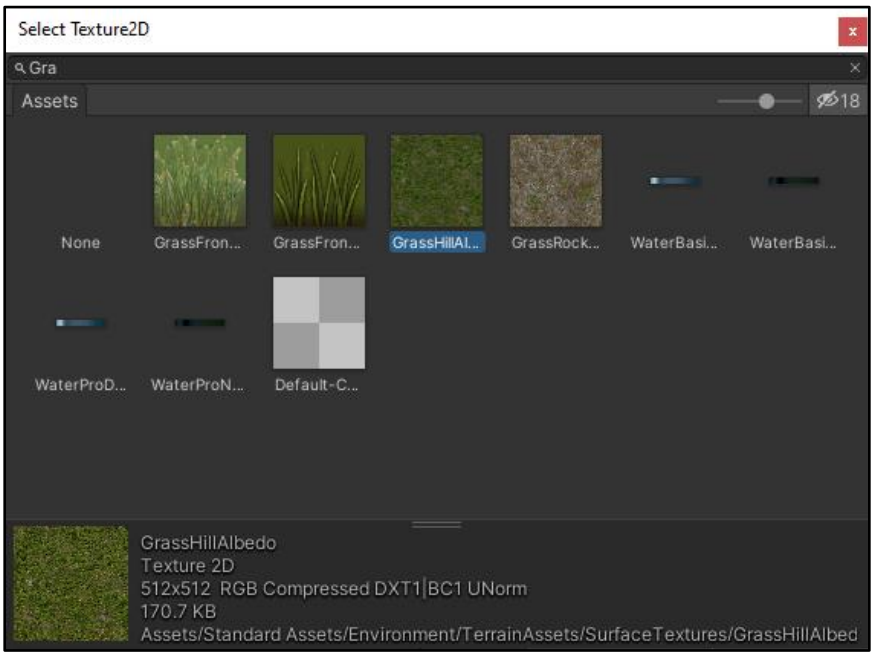


Image description: *The “Select Texture” window. The search “Gra” has been entered in the search bar at the top of the windo. The GrassHillAlbedo texture is selected.*

Double click on the **GrassHillAlbedo** texture in the “Select Texture” window.

The terrain layer should be added. It will cover all the terrain with the grass texture. See the screenshot below for an example.

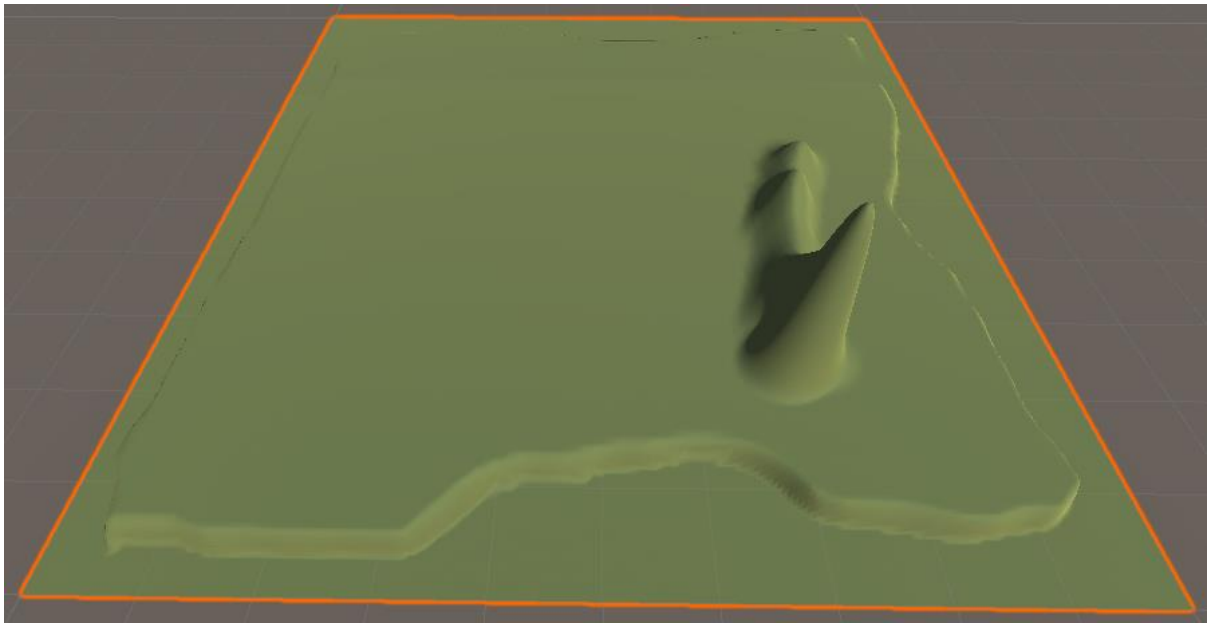


Image description: *The terrain in your scene view. I have added a grass texture. It has been applied to the whole terrain.*

Next, we will add two more textures. These textures will need to be painted onto the terrain manually.

Repeat the process/steps above to create two further texture layers.

You need to create texture layers with the following textures:

- **GrassRockyAlbedo**.
- **SandAlbedo**.

Your Terrain Layers section should now look like the screenshot below.

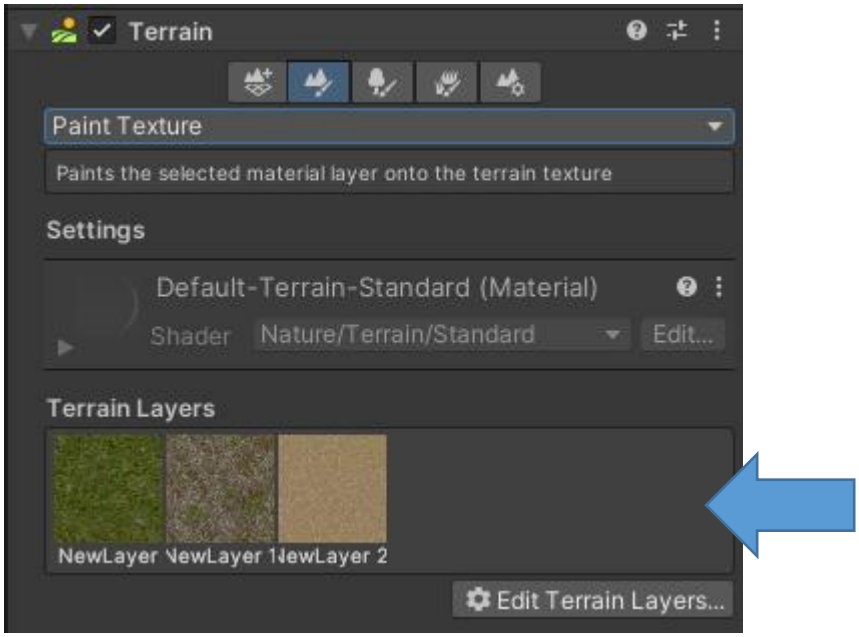


Image description: *The Terrain Layers section after the GrassRockyAlbedo and SandAlbedo texture layers have been created.*

We will now add some sand to the edge of the island we are creating.

Select the texture called **SandAlbedo** in the Terrain Layers section. Do this by clicking on it once.

Select the second brush in the brushes section in the Terrain Layers section of the Paint Texture in the Terrain component.

Set **Brush Size** to 60 and **Opacity** to 50.

See the screenshot below for an example.

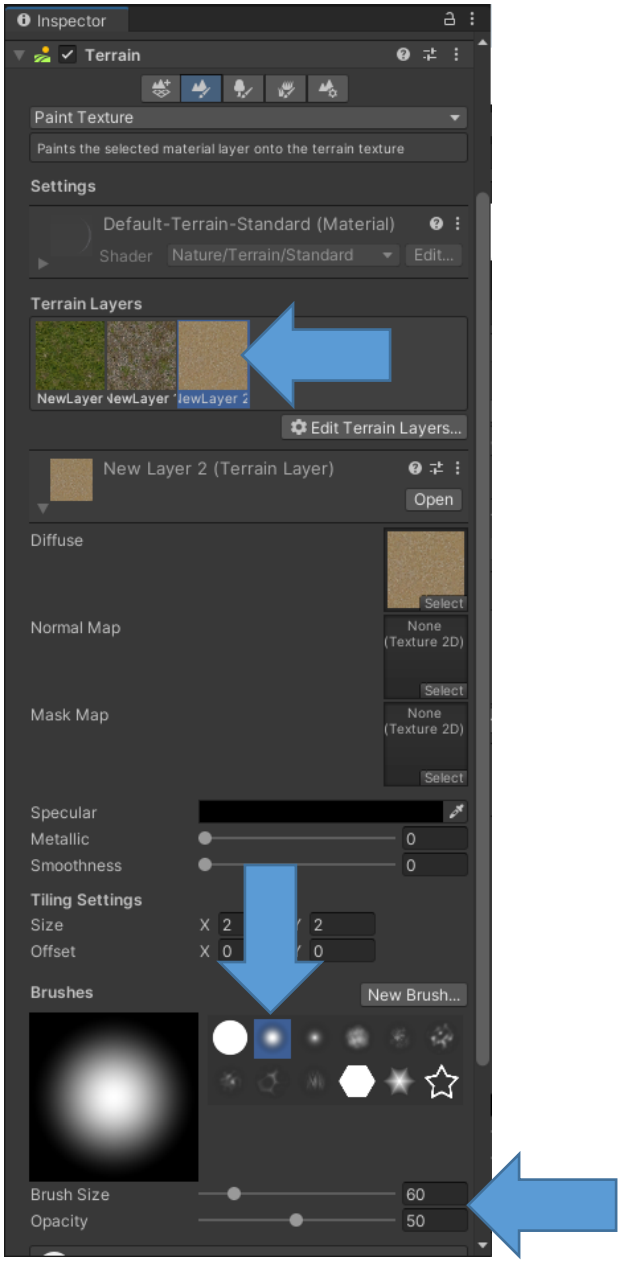


Image description: *The SandAlbedo texture in the Terrain Layers section has been selected. The second brush in the brushes section has been selected and the Brush Size and Opacity have been set.*

Now paint around the coast of the island. You do this by clicking the left mouse button on to the terrain. You can use a side or top-down view of the terrain.

If you make a mistake, you can click Edit -> Undo.

Your finished terrain should look like the screenshot below.

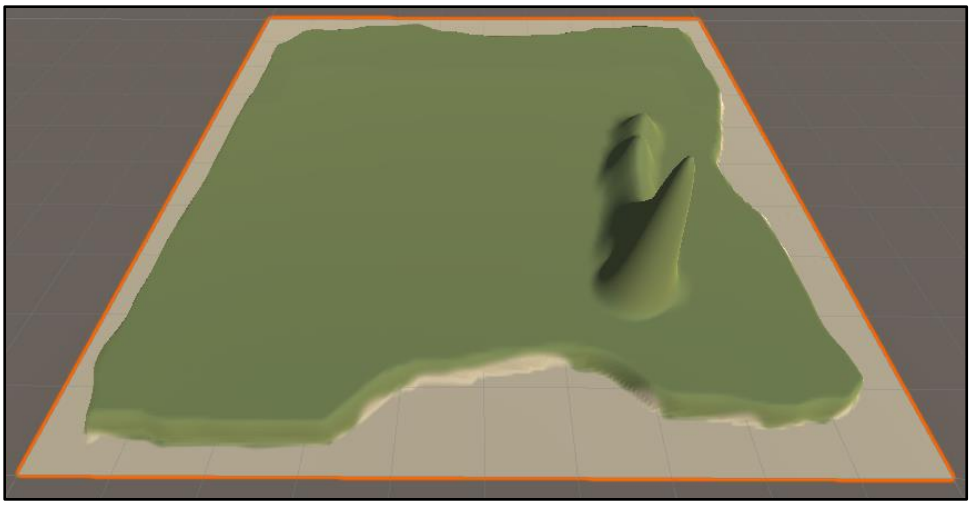


Image description: *The terrain in your scene view. I have added a sand texture to the coast of the island.*

Select the texture called **GrassRockyAlbedo** in the Terrain Layers section. Do this by clicking on it once.

Select the second brush in the brushes section in the Terrain Layers section of the Paint Texture in the Terrain component.

Set **Brush Size** to 25 and **Opacity** to 30.

Now paint over the hilly areas.

Your final island should look like to the screenshot below.

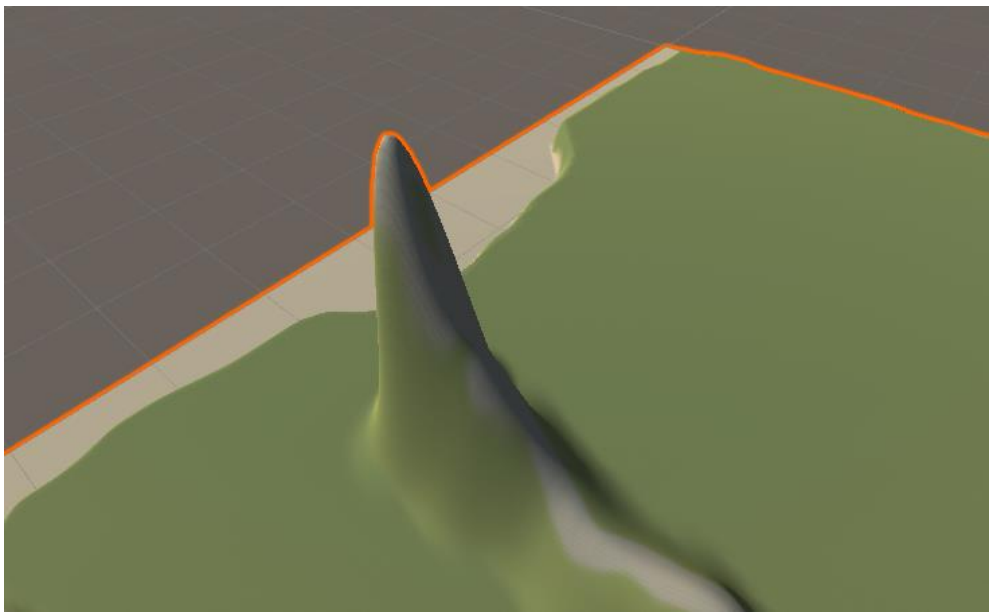


Image description: *The terrain in your scene view. I have added some grassy rock texture to the top of the mountains.*

7. Adding Trees to the Terrain

Select the Paint Trees tool of the terrain script component. See the screenshot below for an example of the Paint Trees button.

Image description: *The "Paint Trees" button.*

First, click the "Edit Trees" button. See the screenshot below for an example.

Image description: *The "Edit Trees" button.*

Select **Add Tree** from the drop-down list. See the screenshot below for an example.

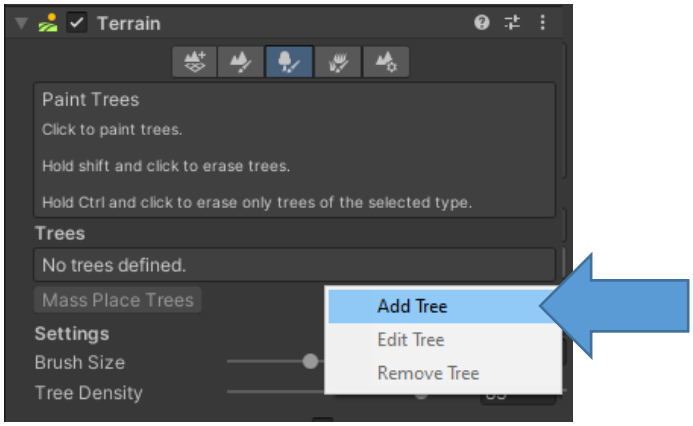


Image description: *The "Add Tree" option when the "Edit Trees" button is clicked.*

An Add Tree dialog window will appear. **Click on the circle selection button next to the "Tree Prefab" option.** See the screenshot below for an example.

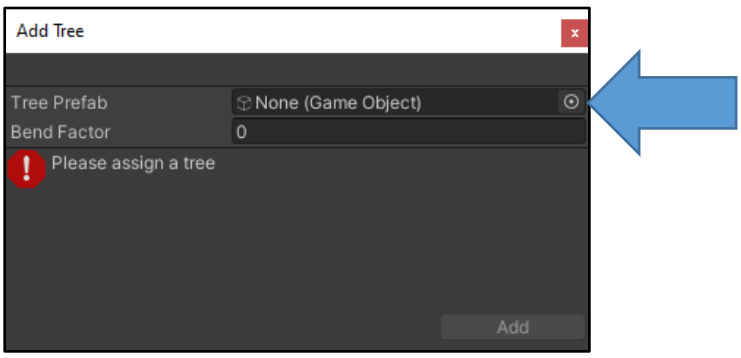


Image description: *The "Add Tree" window. Click on the circle selection button next to the "Tree Prefab" option.*

In the “Select GameObject” window choose **Palm_Desktop** by double clicking on it.

Then click the Add button in the Add Tree window.

See the screenshot below for an example.

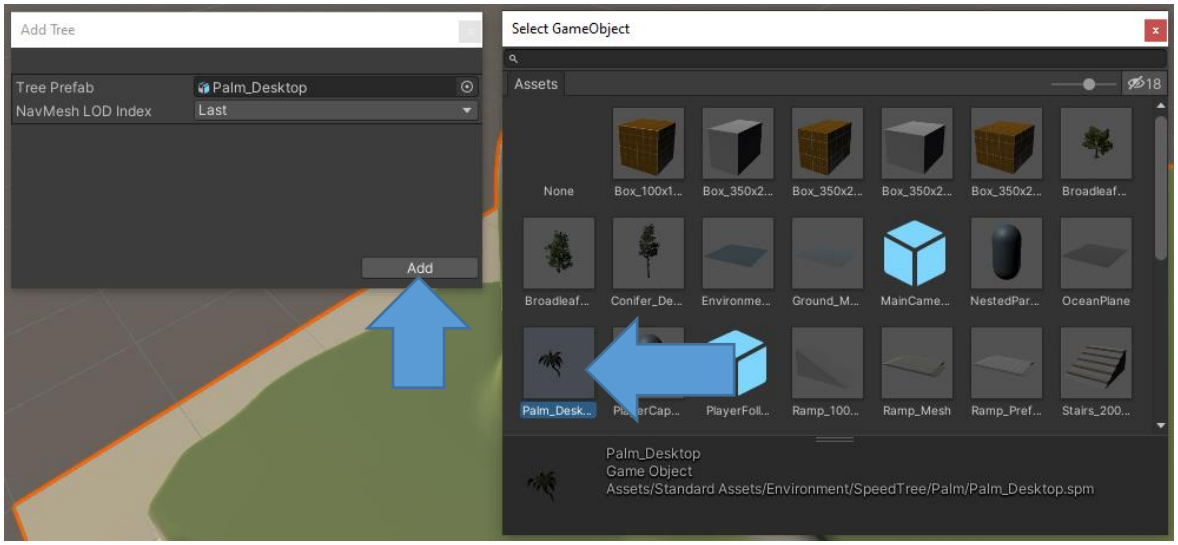


Image description: *The “Add Tree” window and the “Select GameObject” window. Double click on Palm_Desktop to select it. Then click the Add button on the “Add Tree” window.*

Click the **Palm_Desktop** tree in the Trees palette.

Set the **Brush size** to 200 and the **tree density** to 10.

See the screenshot below for an example.

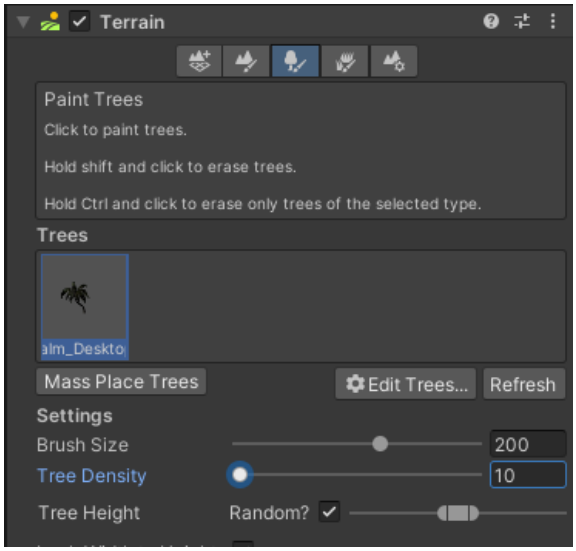


Image description: *The Palm_Desktop tree in the Trees section has been selected. The Brush Size and Opacity have been set.*

Use single left clicks to place trees around the coast of the island.

Your island with trees should look like the screenshot below.

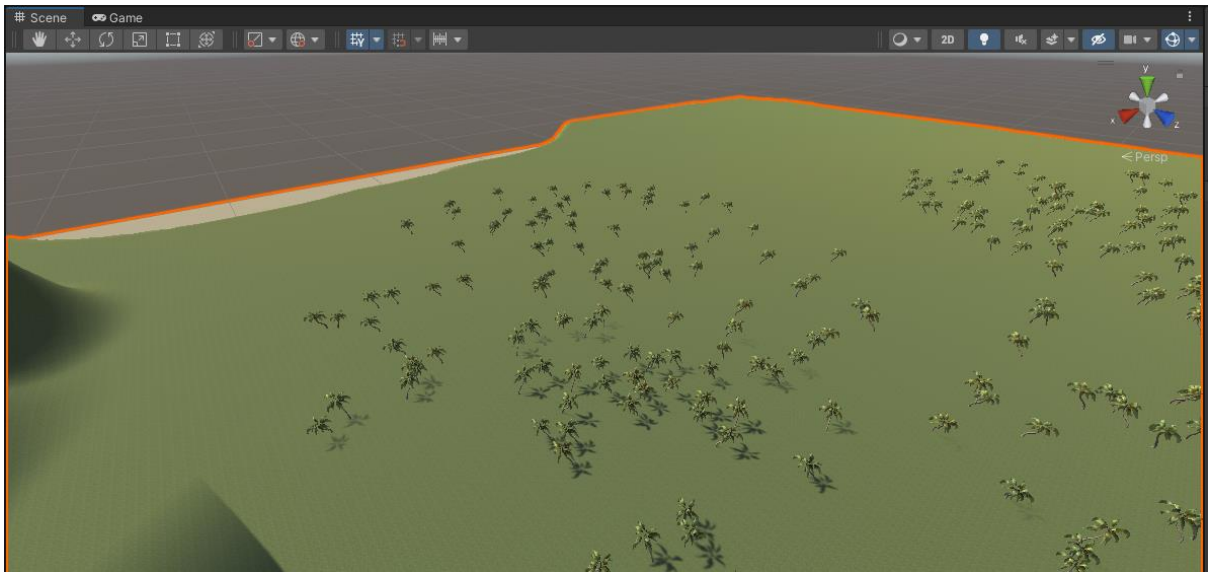


Image description: *The terrain in your scene view. I have added some trees to the island.*

8. Adding Grass to the Terrain

Select the Paint details section of the terrain script component. See the screenshot below for an example of the Paint Trees button.

Image description: *The "Paint Details" button.*

First, click the "Edit Details" button. See the screenshot below for an example.

Image description: *The "Edit Details" button.*

Select **Add Grass Texture** from the drop-down menu. See the screenshot below for an example.

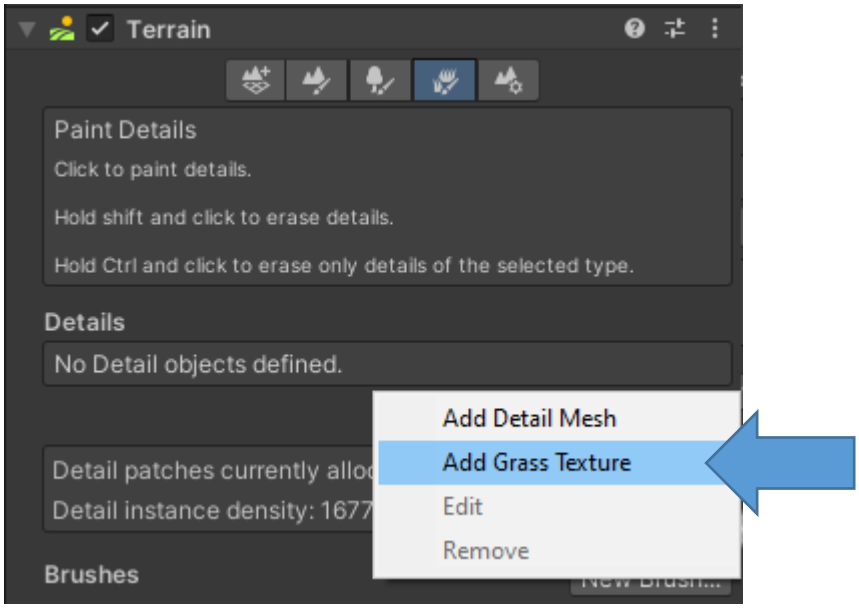


Image description: *The "Add Grass Texture" option when the "Edit Details" button is clicked.*

In the Add Grass dialog click on the circle selection button next to the Detail Texture option. See the screenshot below for an example.

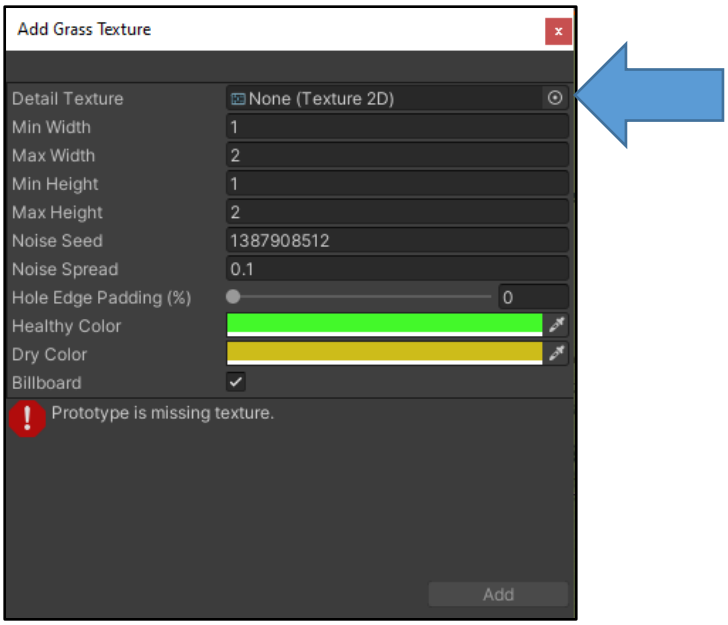


Image description: *The "Add Grass Texture" window. Click on the circle selection button next to the "Detail Texture" option.*

Click on the circle selection button next to the Detail Texture option.

In asset selection window choose the **GrassFrond01AlbedoAlpha** texture by double clicking on it. See the screenshot below for an example.

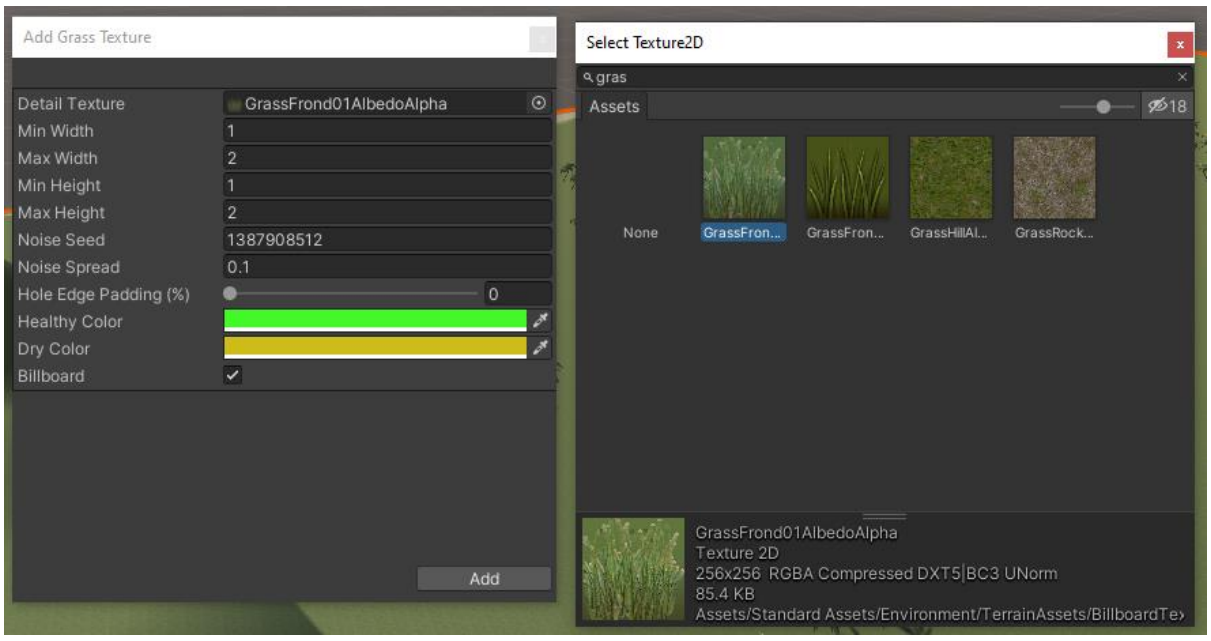


Image description: *The "Add Grass Texture" window and the "Select Texture2D" window. Double click on GrassFrond01AlbedoAlpha to select it. Then click the Add button on the "Add Grass Texture" window.*

In the “Add Grass Texture” dialog window:

- Leave min and max height and width values at default.
- Select Billboard.
- Set healthy and dry grass to similar shades of green.

Click the Add button to add the grass texture to your palette.

Move the scene view camera so that you are close to the terrain surface.

Reselect the paint details for your terrain.

Click the **GrassFrond01AlbedoAlpha** grass in the Details palette.

Select the 6th brush along the top in the brushes section.

Set **brush size** to 100, **opacity** to 0.1, **target strength** to 0.3.

See the screenshot below for an example.

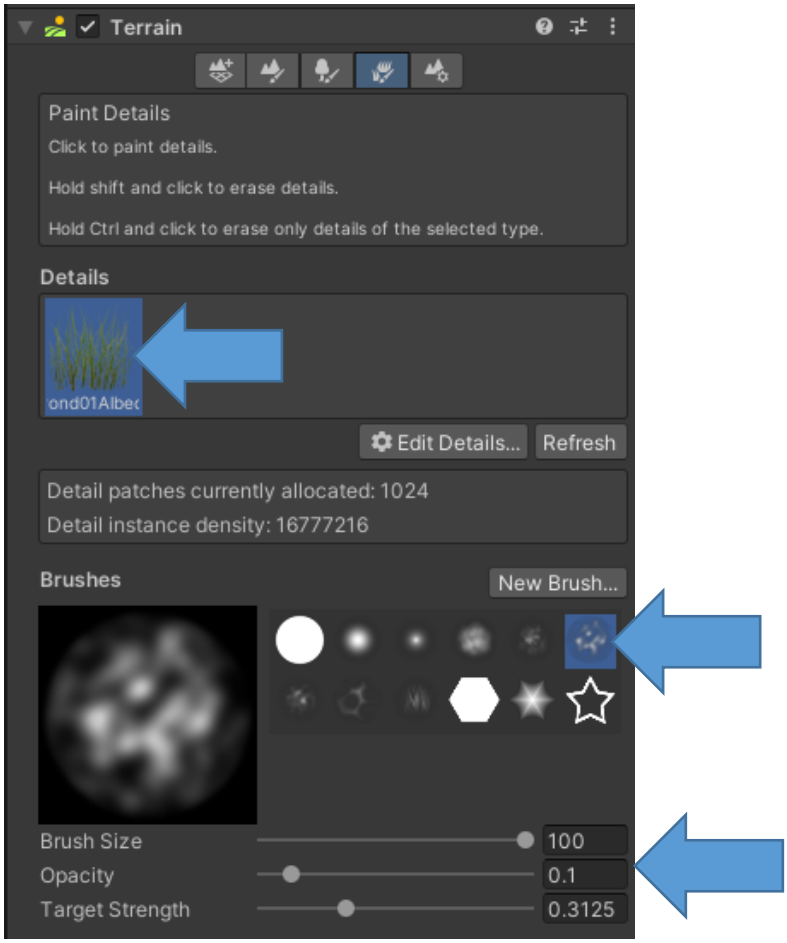


Image description: *The GrassFrond01AlbedoAlpha grass in the Details section has been selected. The sixth brush in the brushes section has been selected. The Brush Size, Opacity and Target Strength have been set.*

Left click the mouse button on the terrain to add some grass.

Your grass should look like the screenshot below.

Sometimes you cannot see the grass in the editor when you add it to your scene. This is because you are too far away. You may need to move the scene view camera closer to your island's ground.

The reason this happens is because the Unity Editor does not draw small details that are far away from the scene view camera. You can adjust this draw distance if you want. Follow these steps to change the draw distance:

- Go to the "Terrain Settings".
- Go to the Tree & Detail Objects section.
- Check Detail Density is set to 1.
- Increase Detail Distance. For example, set it to 250.
- This should allow you to see the detail in the editor from a distance.

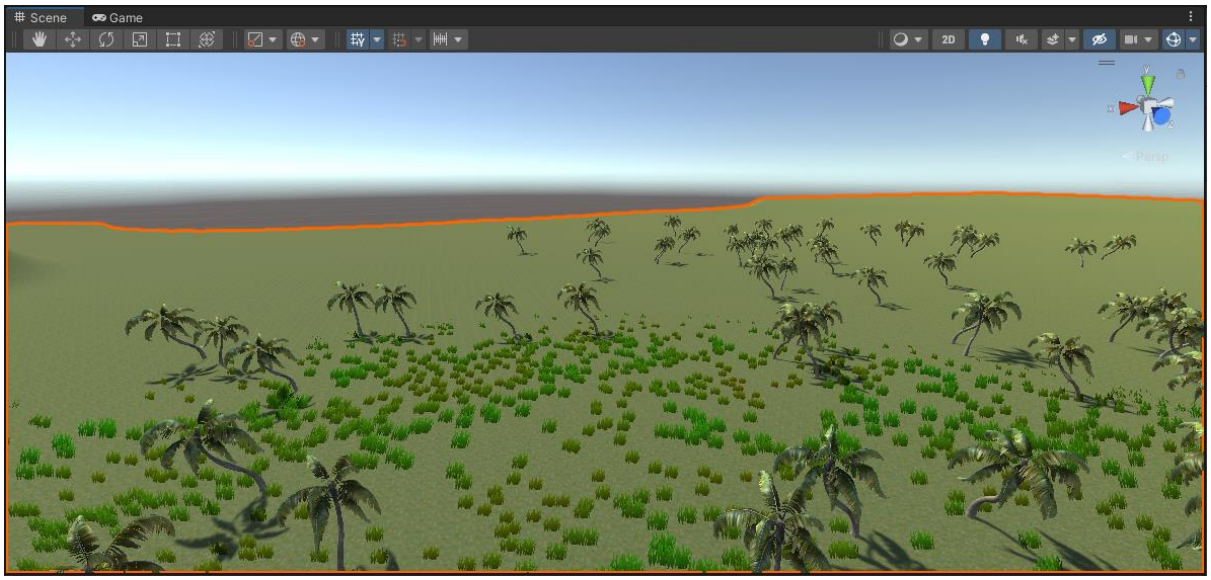


Image description: *The terrain in your scene view. I have added some trees and grass to the island.*

9. Adding Water to your Environment

In this section we will create water using an animated material applied to a surface.

In the Project window, go to the folder Standard Assets -> Environment -> **Water (Basic)** -> Prefabs. See the screenshot below for an example.

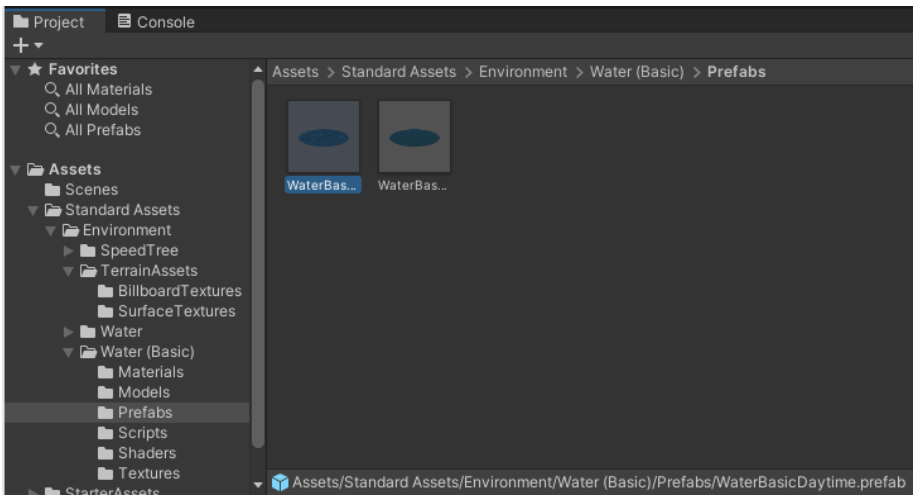


Image description: *The Project window showing the location of the WaterBasicDaytime prefab we are going to apply to our scene.*

Drag the "**WaterBasicDaytime**" prefab into the scene view.

Go to the hierarchy and select the "WaterBasicDaytime" prefab.

In the inspector, set the transform component **position** to (500, 2, 500).

Set the **scale** to X and Z to 4000.

Your scene should look like the screenshot below.

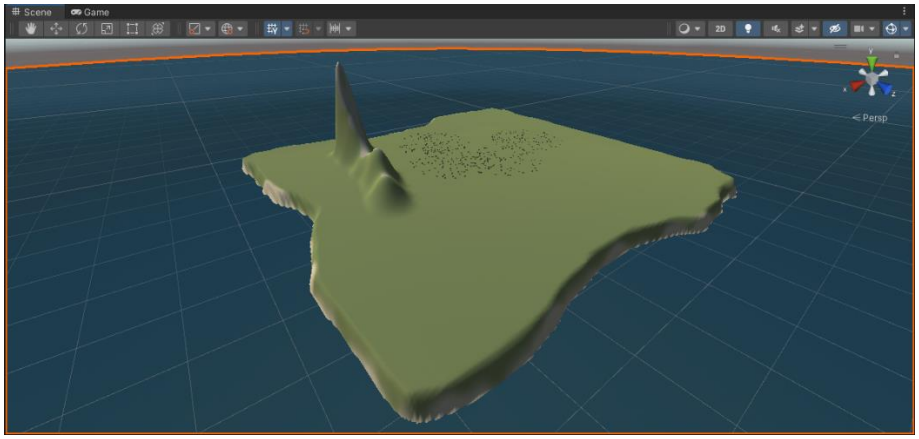


Image description: *The terrain in your scene view. I have added some trees and grass to the island. I have also added a water texture around the island.*

10. Adding a First-Person Camera to the Environment

We will now add a first-person camera to our scene. This camera will allow a player or user to move around our scene.

By default, Unity includes a camera in our scene. Go to the hierarchy, find the Main camera, right click on it, and select delete from the menu. See the screenshot below for an example.

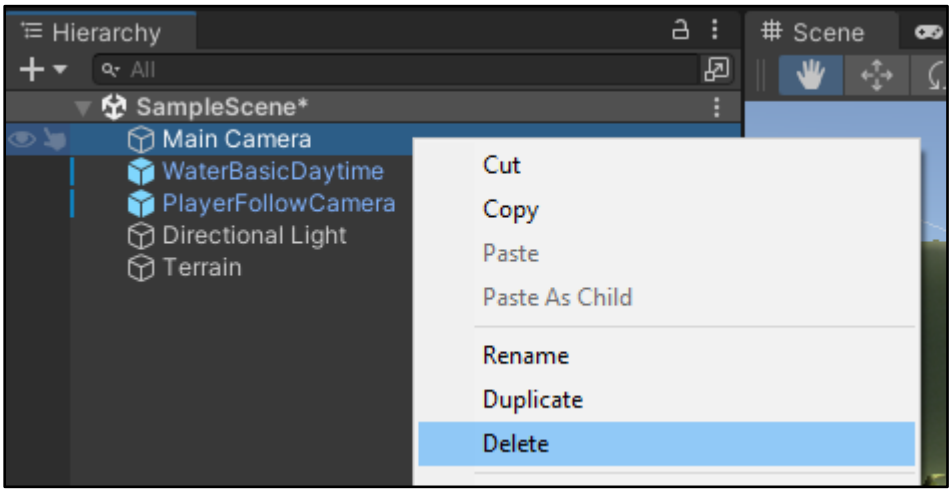


Image description: *Example of how to delete the "Main Camera" from the scene.*

Once you have deleted the main camera from the scene you can add a first-person camera.

Go to the Tools drop-down menu, select Starter Assets, then <u>select Reset First Person Controller</u>. See the screenshot below for an example.

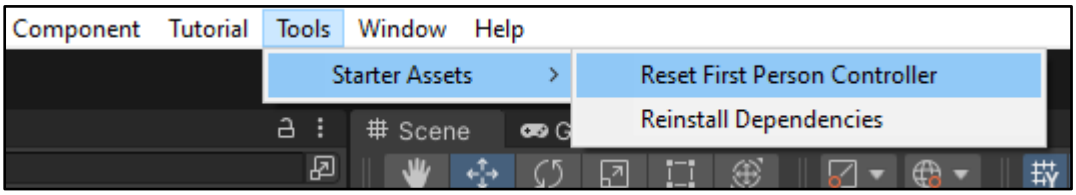


Image description: *To add a first-person camera, go to the Tools drop-down menu, select Starter Assets, then select Reset First Person Controller.*

Unity should add all the assets you need to your scene.

The first thing with need to do is move the first-person camera to a good starting position.

Go to the Hierarchy and select **PlayerCapsule** in the list.

You can now use the move tool to move the first-person camera to a good starting position. Its default position is x: 0, y: 0, z: 0. However, we can move it more quickly by entering a position in the position part of the transform component.

Select the **PlayerCapsule** in the hierarchy.

Go to the inspector, set the position of the **PlayerCapsule** to:

X: 500,
Y: 35,
Z: 500.

This should move the **PlayerCapsule** (which includes the camera) to a good starting location (e.g., over land). If the location is not good for you, use to move tool to drag the camera in the scene to a good position.

See the screenshot below for an example.

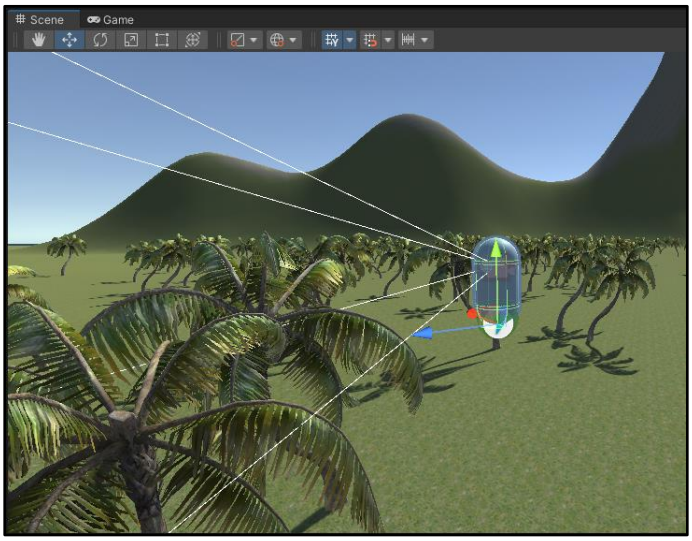


Image description: *The PlayerCapsule after it has been moved to a* good starting location.

Save the scene. Go to the File menu and find the save option.

🎮 **We are now ready to playtest the scene.**

Press the play button to playtest your scene. See the screenshot below for an example.

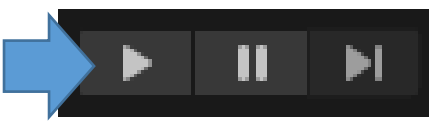


Image description: *The game / scene play controls on the main toolbar. Click the play button.*

Play Mode is a realistic test of your game.

- Note, when in Play mode you can adjust GameObjects via the Scene window. However, all adjustments made to GameObjects will be temporary and undone when play mode is stopped.

If the game view is behind the scenes view, click the Game view tab to select the Game view window.

You should be able to walk around the terrain.

The default controls:

- Arrow keys or WASD to move. Spacebar to jump. Hold down shift to sprint.
- Mouse look.

To stop playtesting the game, click the play button again.

Note, when you play the game in the editor you can also interact with the scene via scene view. This is very useful if you want to test things and adjust properties. However, be aware that any changes made to game objects in the scene view will be reverted when the screen finishes (e.g., you stop playing the game). Remember to stop playing the game when you want to make permanent changes.

See the screenshot below for an example. Note, in my setup I have the Scene and Game view side-by-side.

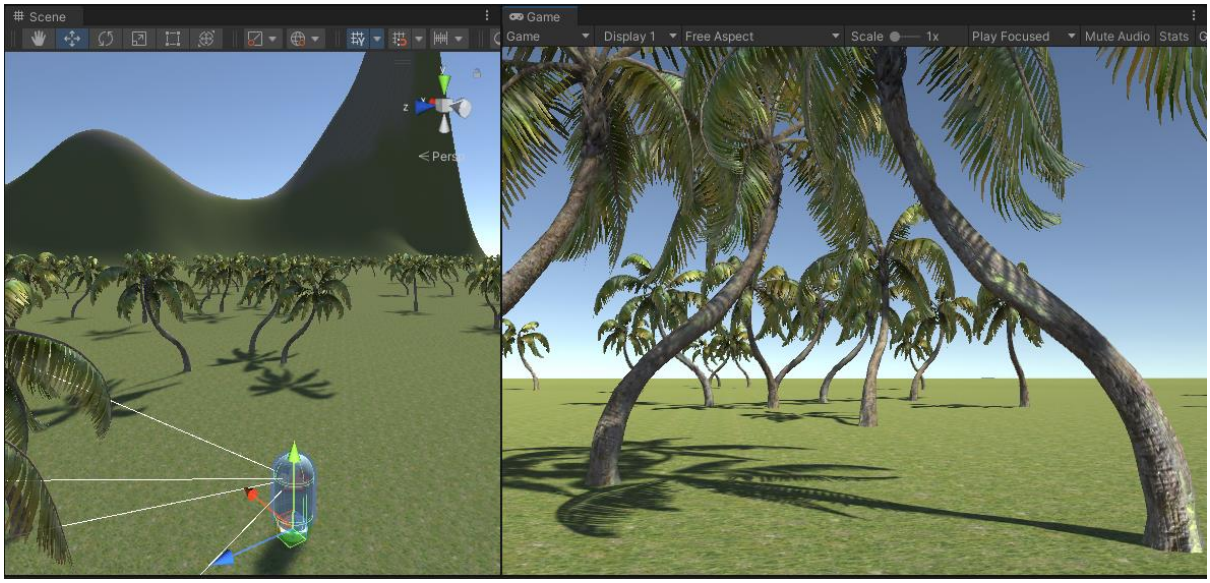


Image description: *A playtest of the scene using the first-person controller. Note, in my setup I have the Scene and Game view side-by-side.*

We can adjust the settings of the first-person camera. For example, we can adjust the speed.

To do this, select the **PlayerCapsule** in the hierarchy.

Go to the inspector and fine the “First Person Controller (Script)” component. In the player section you should be able to see a move speed and sprint speed. **Increase these values.** See the screenshot below for an example.

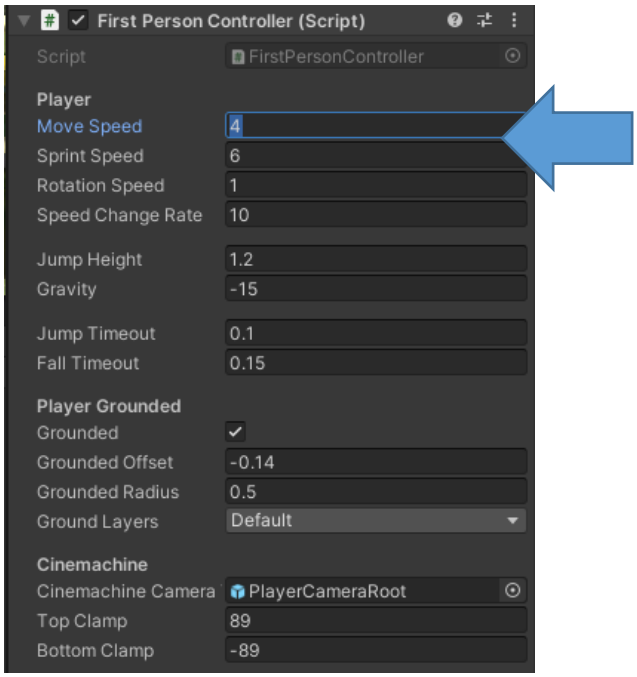


Image description: *The “First Person Controller (Script)” component. To change the move and sprint speed of the first-person camera change the values for the move speed and sprint speed properties.*

For example, you could change the move speed to 12 and the sprint speed to 16. Try this and playtest the scene to see what happens. The player character should speed up.

After you have done this, you can keep your new move speeds or change them back to the defaults of – move speed 5 and sprint speed 6.

11. Exploring Unity Further – Adding a Third Person Camera

Let's explore Unity further. In this section you will add a third person camera to your project and your scene.

The section builds on the things we have covered in previous sections, so you will be given less guidance to complete tasks. If you have unsure how to do something, please refer to previous sections.

Step 1: Add the "Starter Assets - Third Person Character Controller" assets to your account and your Unity project.

In a web browser, go to the web site: https://assetstore.unity.com/

Add the "Starter Assets - Third Person Character Controller" assets to your account.

In the Unity Editor, go to the Window menu and select Package Manager.

Select "My Assets" from the drop-down menu.

Select **"Starter Assets - Third Person Character Controller"** from the list.

Next, you may need to click the Download button to download the asset to your computer.

Then, click the import button to import the asset.

- When the assets have been downloaded an Import button will appear.

When you click the Import button a small "Import Unity Package" window will appear.

Simply, click the Import button on the "Import Unity Package" window.

When you click the Import button the assets will be added to your project.

Close the Package Manager window.

Step 2: Add a third-person character and camera to your scene.

First, let's delete the first-person camera from our scene.

Go to the hierarchy and select the PlayerCapsule, PlayerFollowCamera and MainCamera GameObjects. You select multiple objects in the hierarchy by holding down the ctrl key while clicking on the GameObjects.

Then, right click on the game objects and select delete. See the screenshot below for an example.

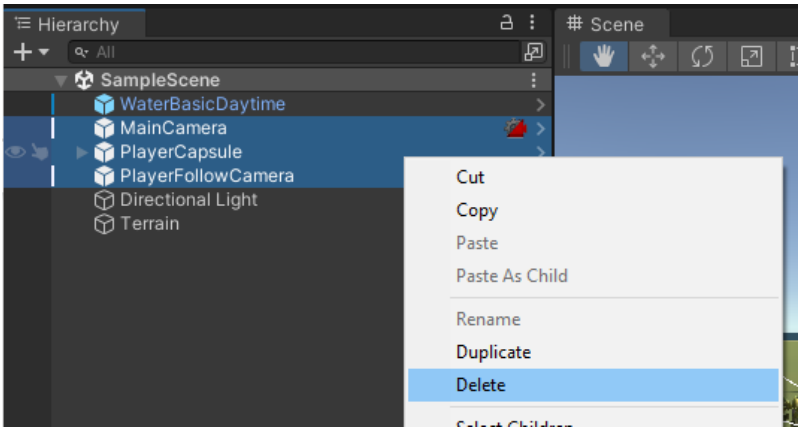


Image description: *The PlayerCapsule, PlayerFollowCamera and MainCamera GameObjects have been selected. The right mouse button has been clicked and delete has been selected.*

When the three GameObjects have been deleted, **go to the Tools drop-down menu, select Starter Assets, then <u>select Reset Third Person Controller Armature</u>.** See the screenshot below for an example.

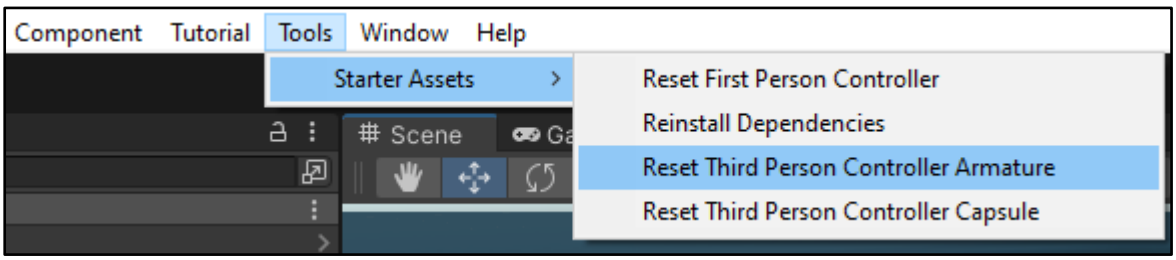


Image description: *To add a third-person camera, go to the Tools drop-down menu, select Starter Assets, then select Reset Third Person Controller Armature.*

Unity should add all the assets you need to your scene.

The first thing with need to do is move the third-person camera to a good starting position.

Go to the Hierarchy and select **PlayerArmature** in the list.

You can now use the move tool to move the first-person camera to a good starting position. Its default position is x: 0, y: 0, z: 0. However, we can move it more quickly by entering a position in the position part of the transform component.

Select the **PlayerArmature** in the hierarchy.

Go to the inspector, set the position of the **PlayerCapsule** to:

X: 500,
Y: 35,
Z: 500.

This should move the **PlayerArmature** (which includes the camera) to a good starting location (e.g., over land). If the location is not good for you, use to move tool to drag the camera in the scene to a good position.

See the screenshot below for an example.

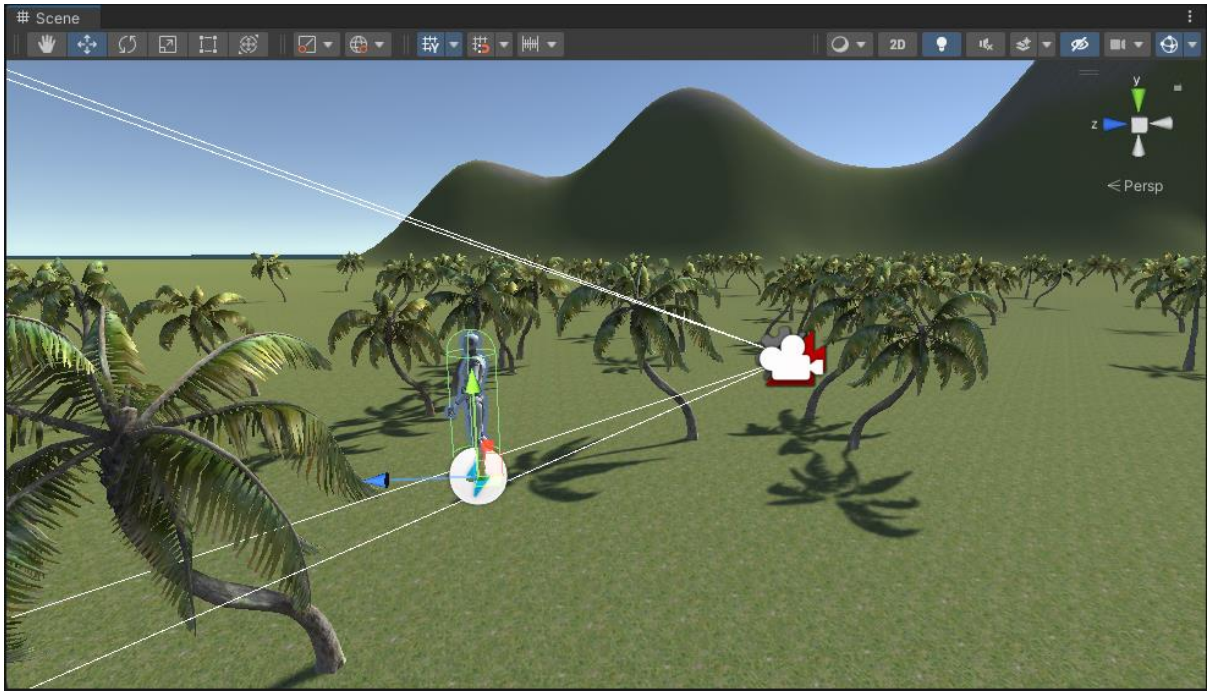


Image description: *The PlayerArmature after it has been moved to a* good starting location.

Save the scene. Go to the File menu and find the save option.

🎮 We are now ready to playtest the scene.

Press the play button to playtest your scene.

Play Mode is a realistic test of your game.

- Note, when in Play mode you can adjust GameObjects via the Scene window. However, all adjustments made to GameObjects will be temporary and undone when play mode is stopped.

If the game view is behind the scenes view, click the Game view tab to select the Game view window.

You should be able to walk around the terrain.

The default controls:

- Arrow keys or WASD to move. Spacebar to jump. Hold down shift to sprint.
- Mouse look.

<u>To stop playtesting the game, click the play button again.</u>

See the screenshot below for an example. Note, in my setup I have the Scene and Game view side-by-side.

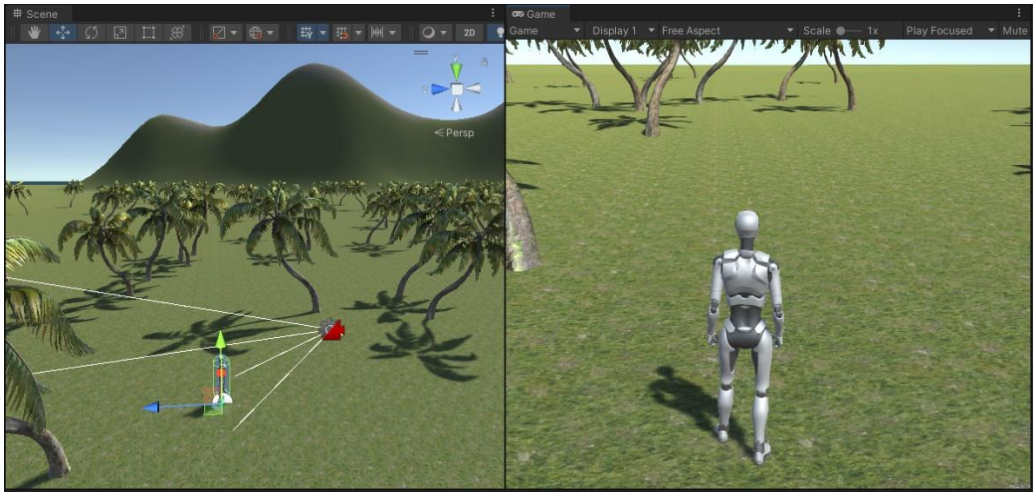


Image description: *A playtest of the scene using the third-person controller. Note, in my setup I have the Scene and Game view side-by-side.*

To stop testing the game click the play button.

12. Further Tasks

⚠ **ALERT - Useful Tip** ⚠ **These tasks and any tasks beyond this point can be considered optional if you are running behind with things (e.g., it has taken you over a week to complete this workbook). If you are behind, I would recommend you stop this workbook here and move onto the next workbook. If you are not behind, I recommend you complete the remaining tasks as they will help improve your knowledge. Please speak to a member of the module team if you have any questions.**

🚀 **Please complete these further tasks:**

1. Change the move and sprint speed for the third-person character.

2. Change the Jump Height and Gravity for the third-person character.

3. Explore the island you have created. For example, go to the coastline and walk up a hill.

4. Add another hill to the island you have created.

> END OF STUDENT WORKBOOK ▉