

REU Modeling Course - Part 3

Blender

More Modeling

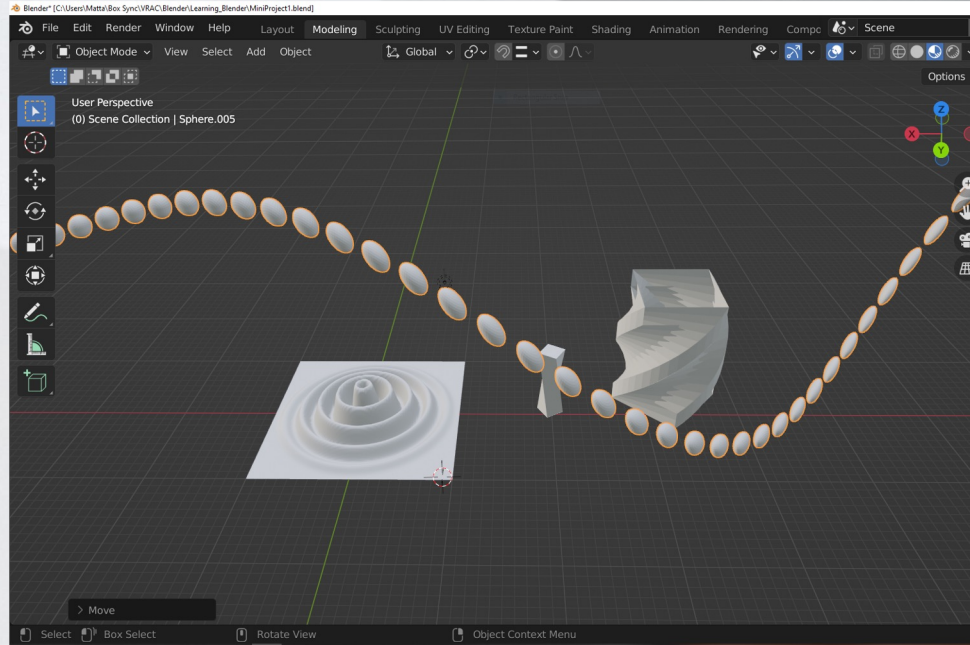


Workshop Workflow

- Review
- Creating & Applying Materials
- Rendering
- Mini Creation

Review

- What are modifiers?
- How do you add modifiers?



Review

- How would you create this:

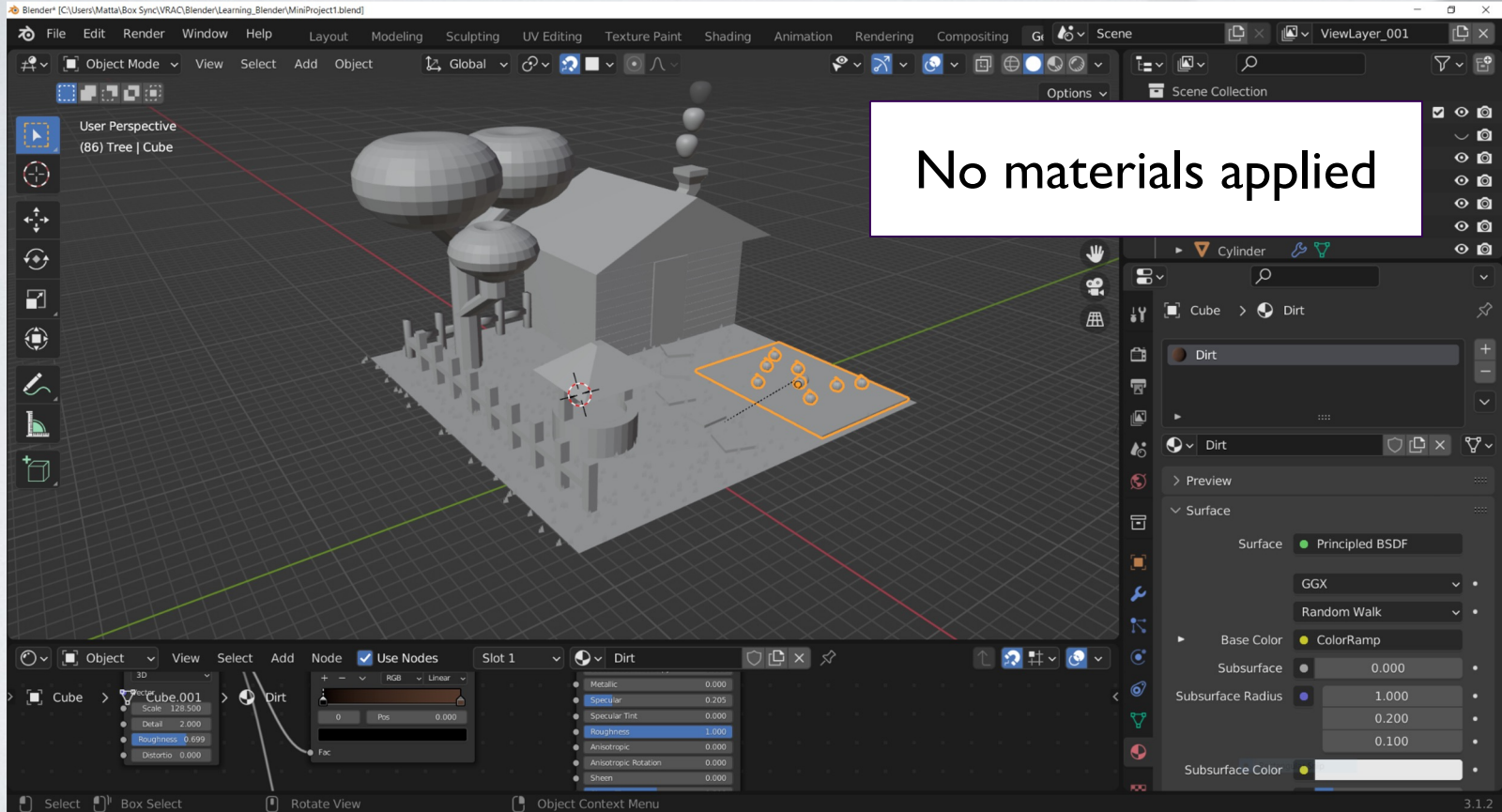


Basic Lighting Types:

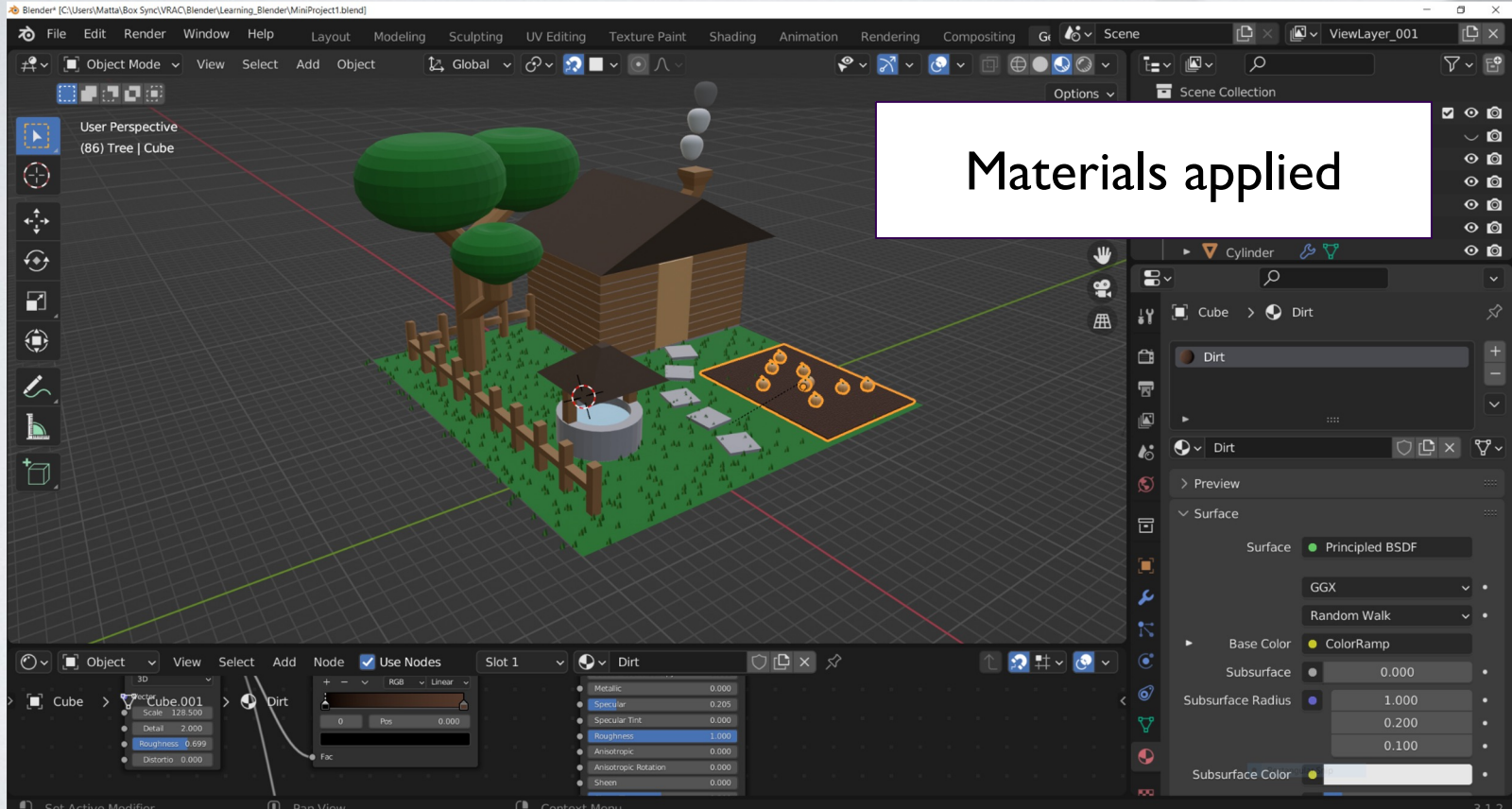


The light on objects in a scene is made up of a combination of these light types.

Shaders/Materials

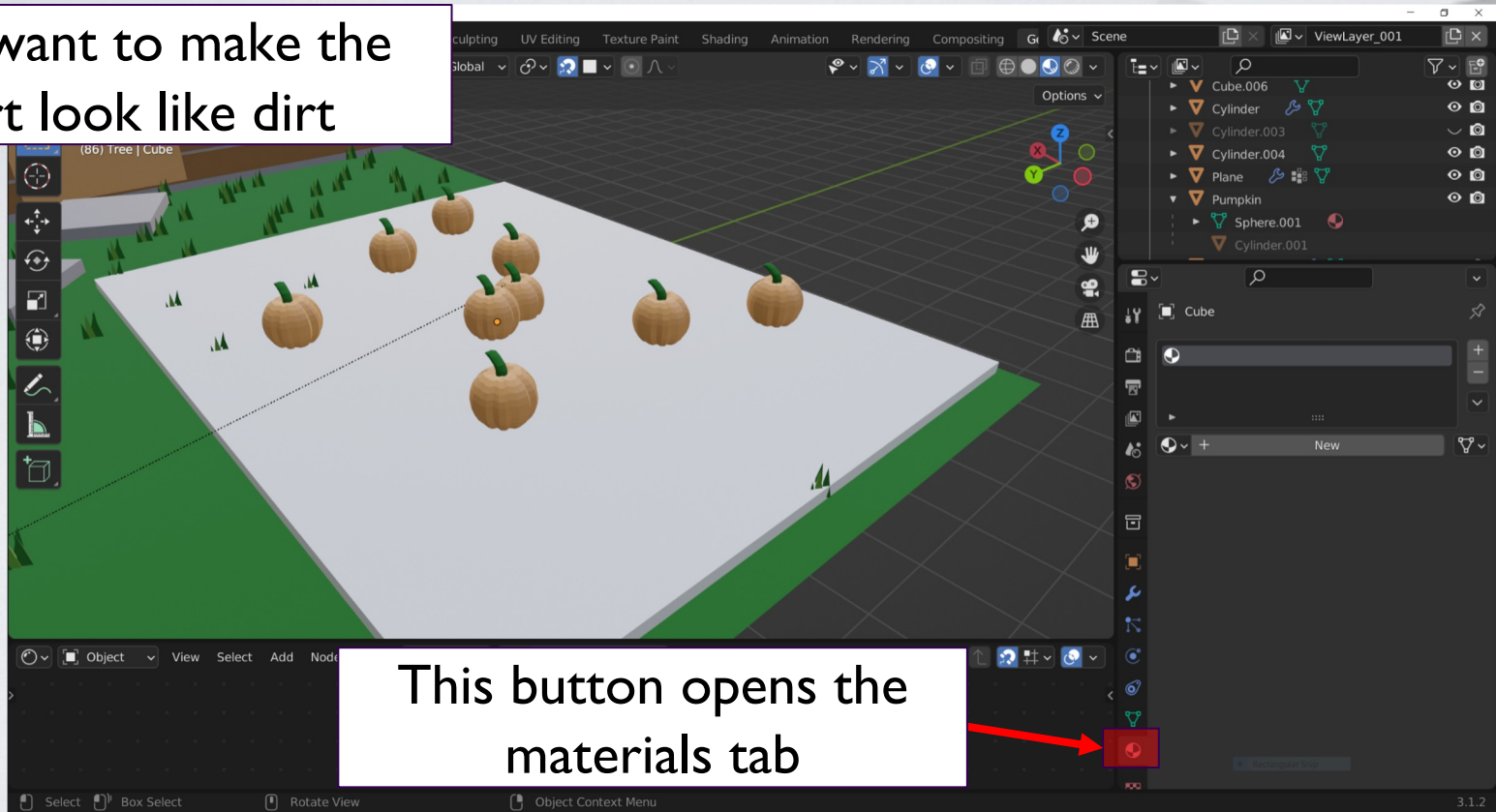


Shaders/Materials



Adding Basic Materials

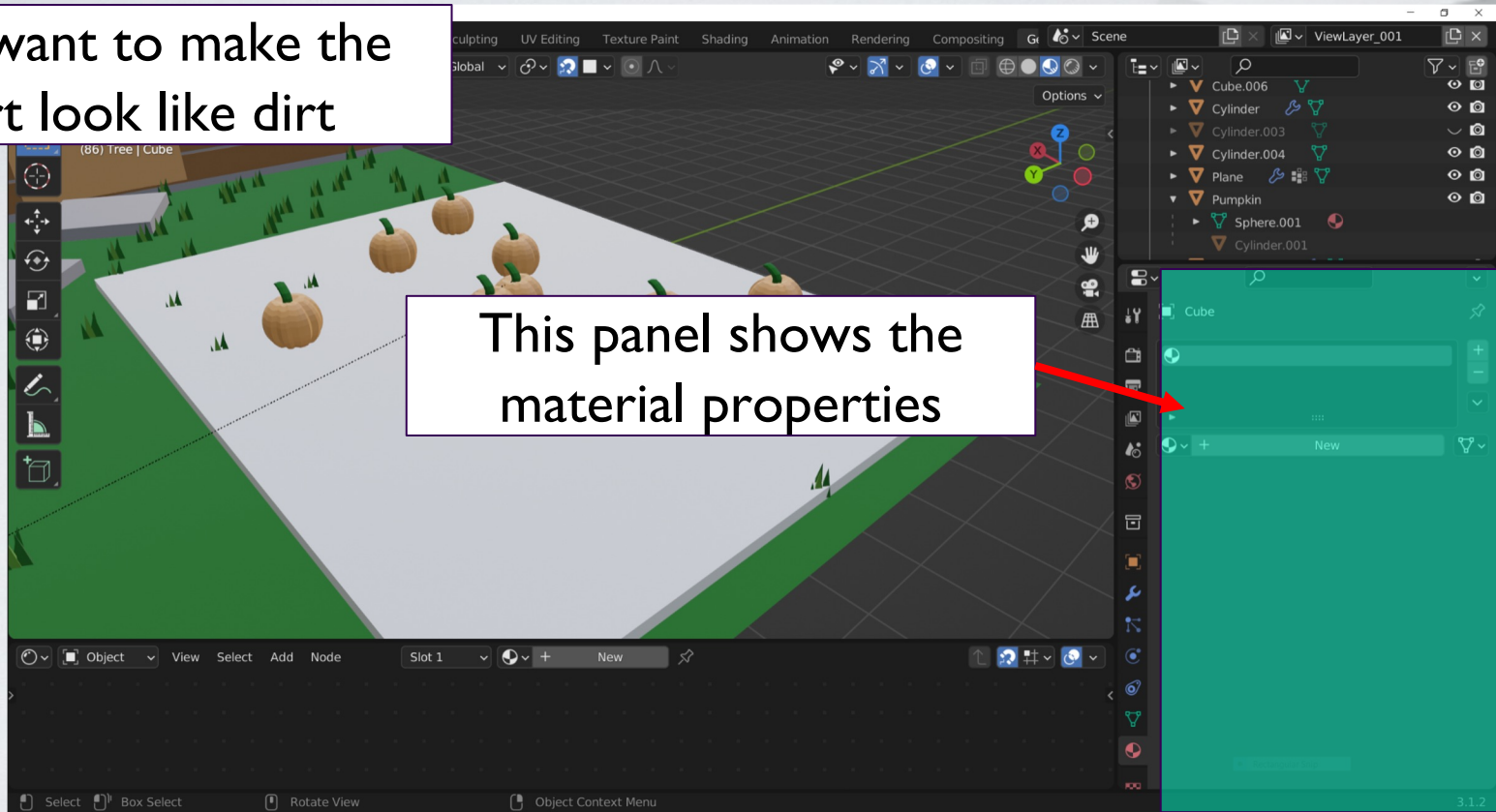
We want to make the dirt look like dirt



Adding Basic Materials

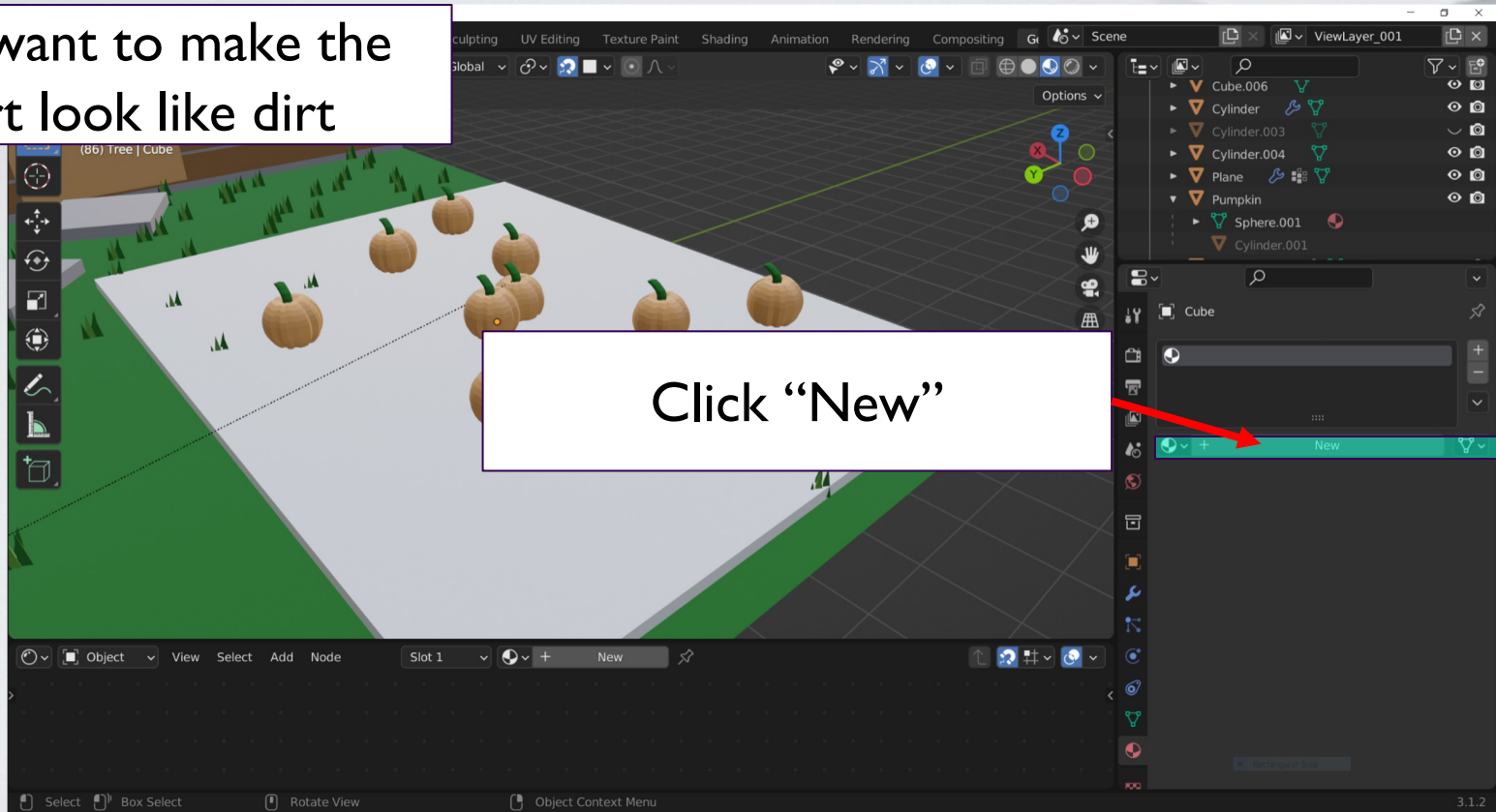
We want to make the dirt look like dirt

This panel shows the material properties



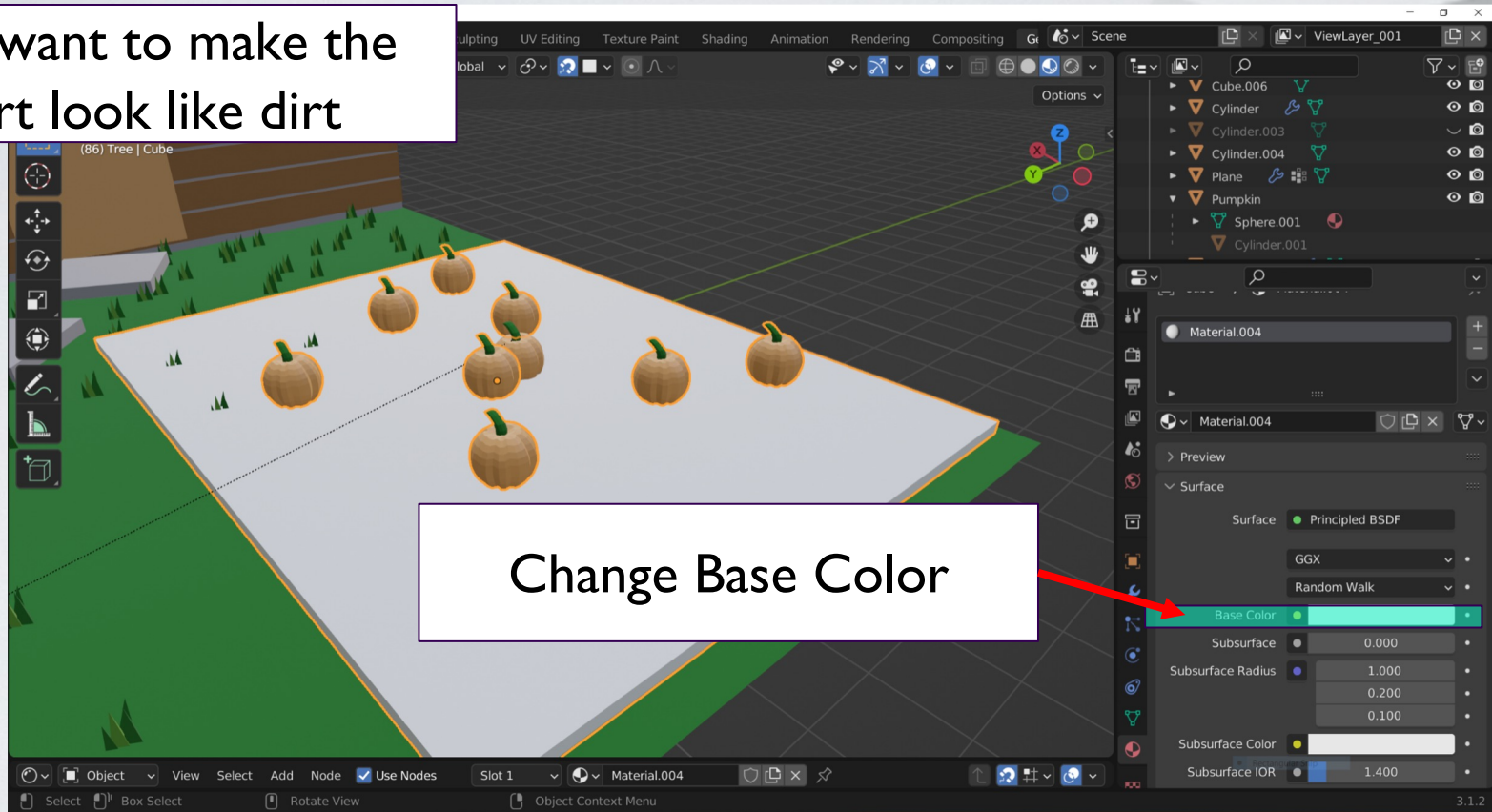
Adding Basic Materials

We want to make the dirt look like dirt



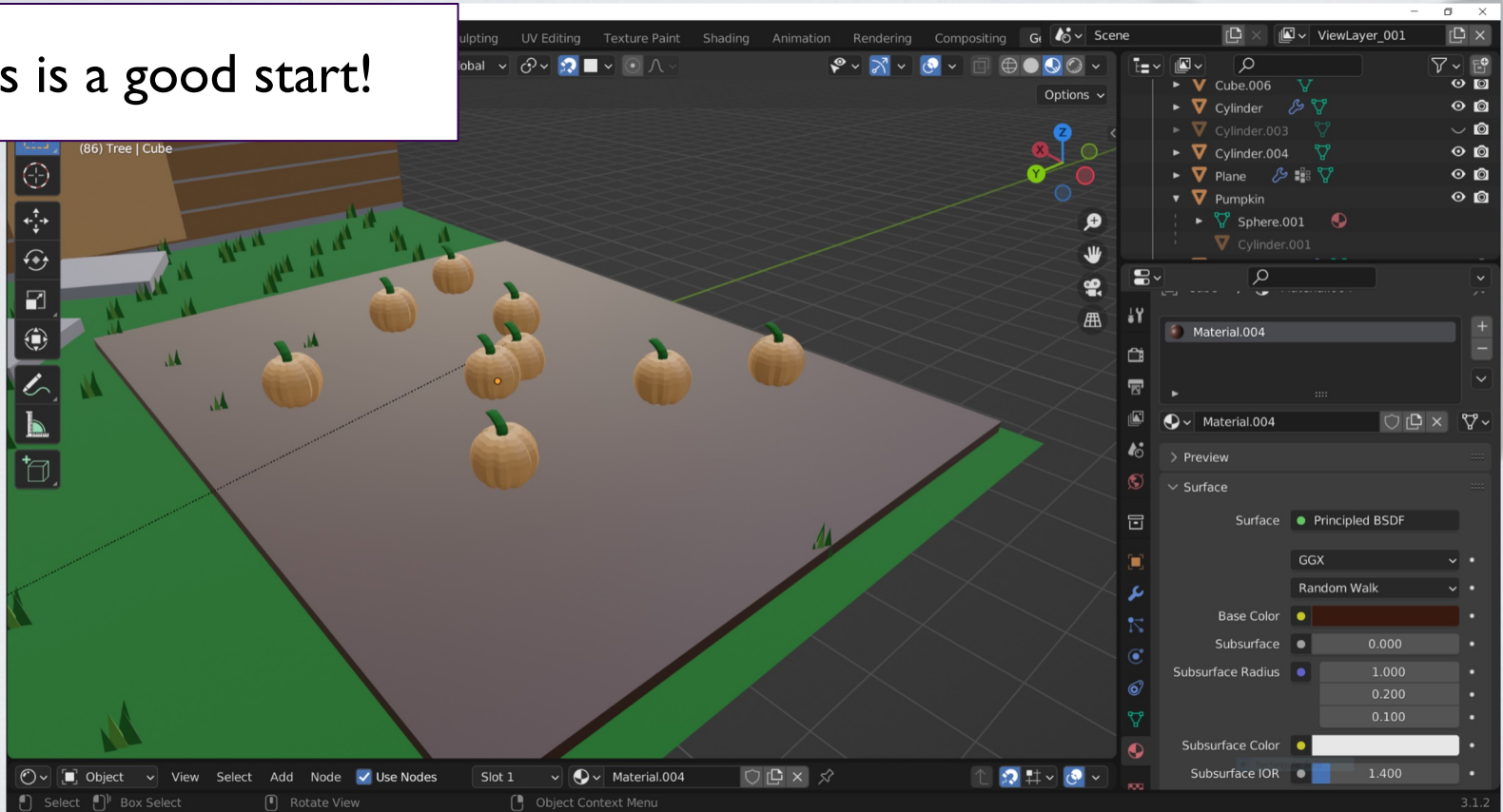
Adding Basic Materials

We want to make the dirt look like dirt



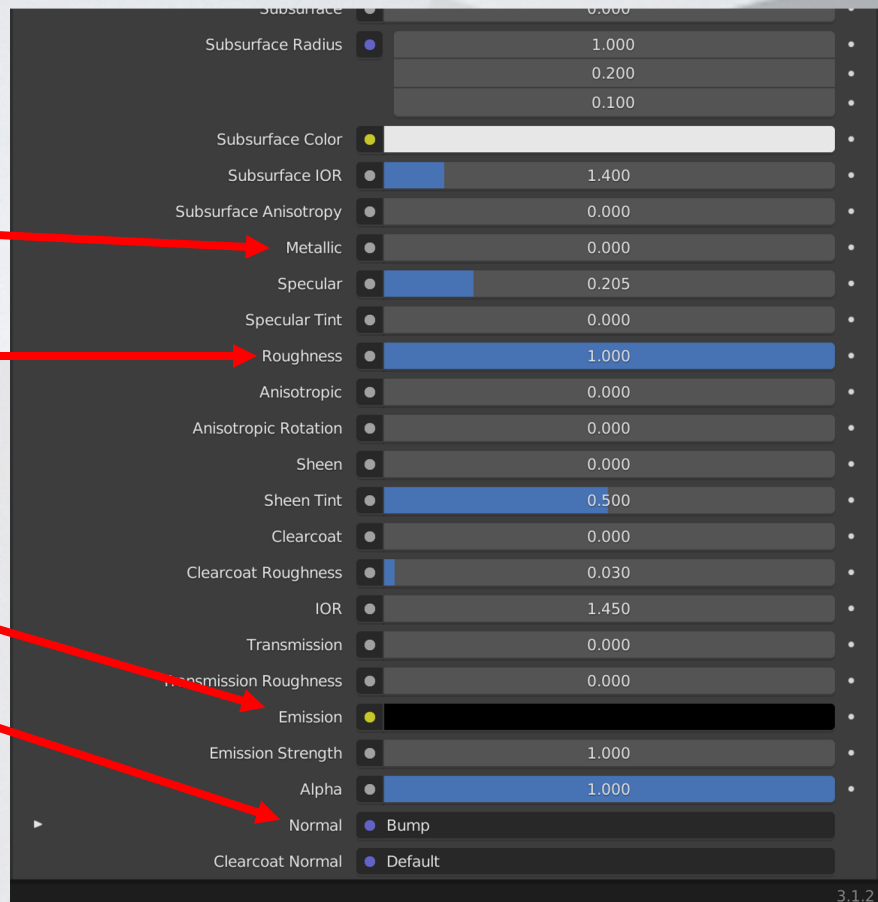
Adding Basic Materials

This is a good start!



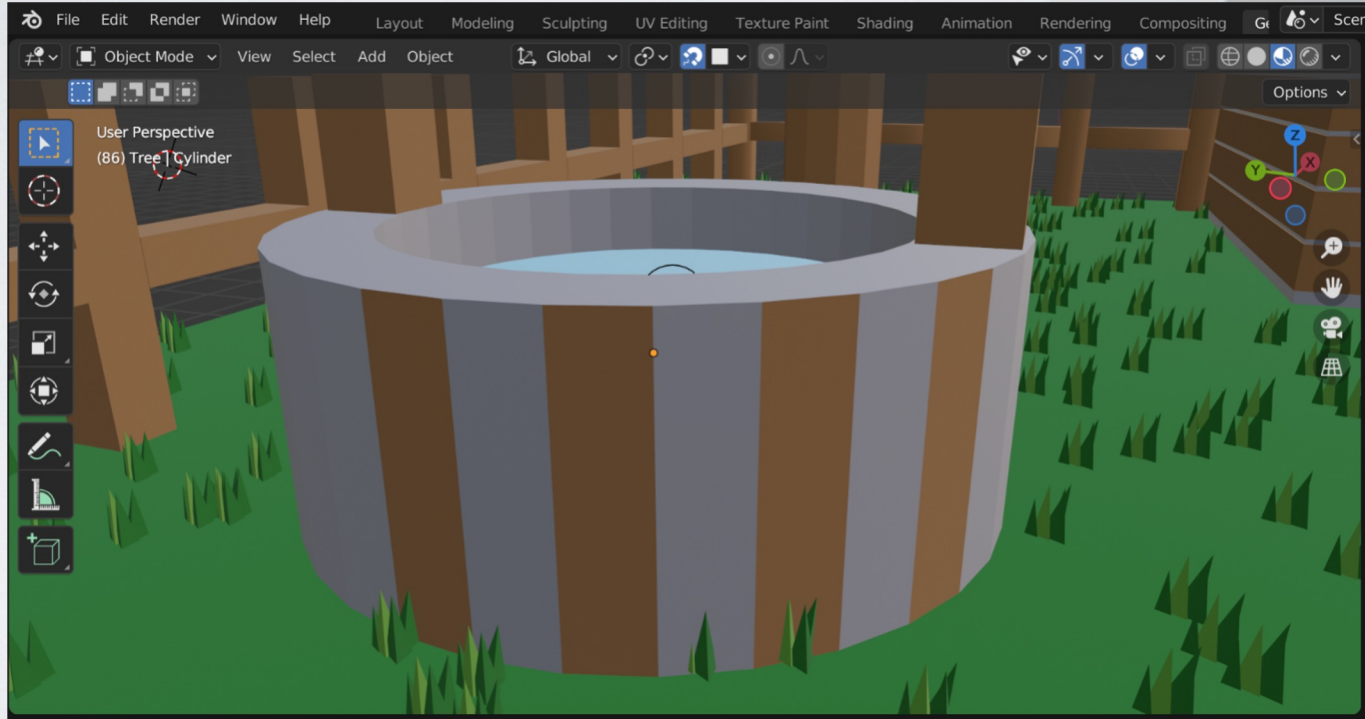
More Material Properties

- **Metallic:**
 - As the name implies, makes objects look like metal
- **Roughness:**
 - Less rough = glassy looking
 - More rough = matte
- **Emission:**
 - High value = glowing
- **Normal:**
 - (More on this later)



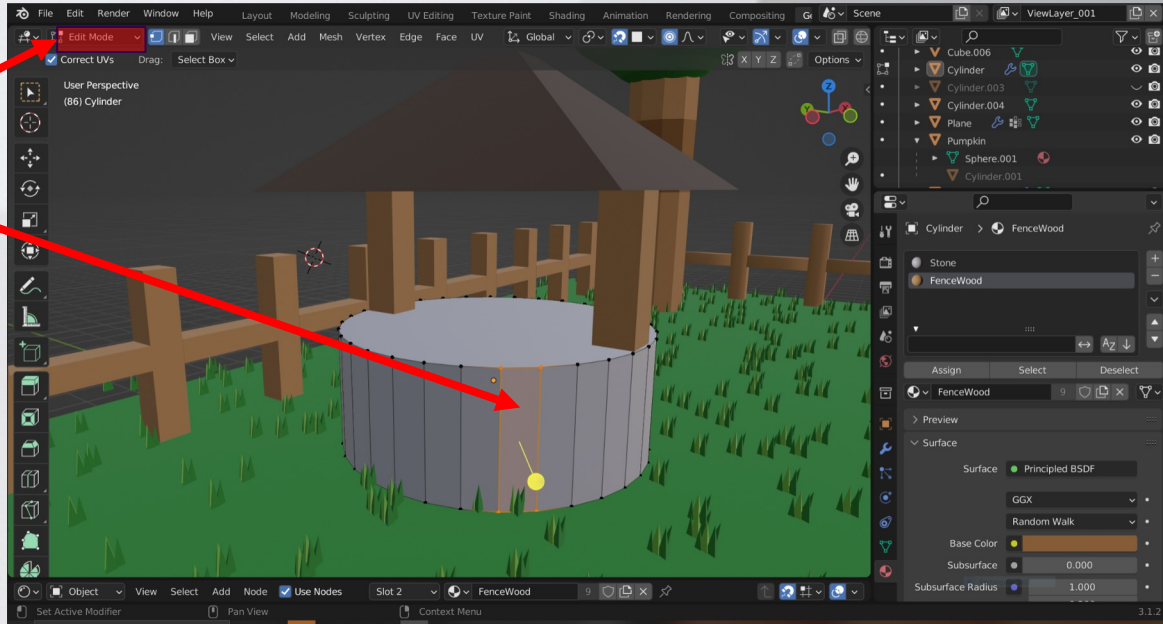
Multiple Materials

An object can have multiple materials



Multiple Materials

- Enter “Edit Mode” (Tab)
- Select vertices of desired face



Multiple Materials

The image shows the Blender 3.1.2 interface with a 3D scene of a barn and a field. A white callout box in the center contains a list of instructions. Red arrows point from these instructions to specific UI elements: one points to a '+' button in the material list, another points to the 'Assign' button, and a third points to the 'Base Color' property in the material editor.

- Click “+”
- Click “New”
- Select desired base color

Click “Assign”

3.1.2

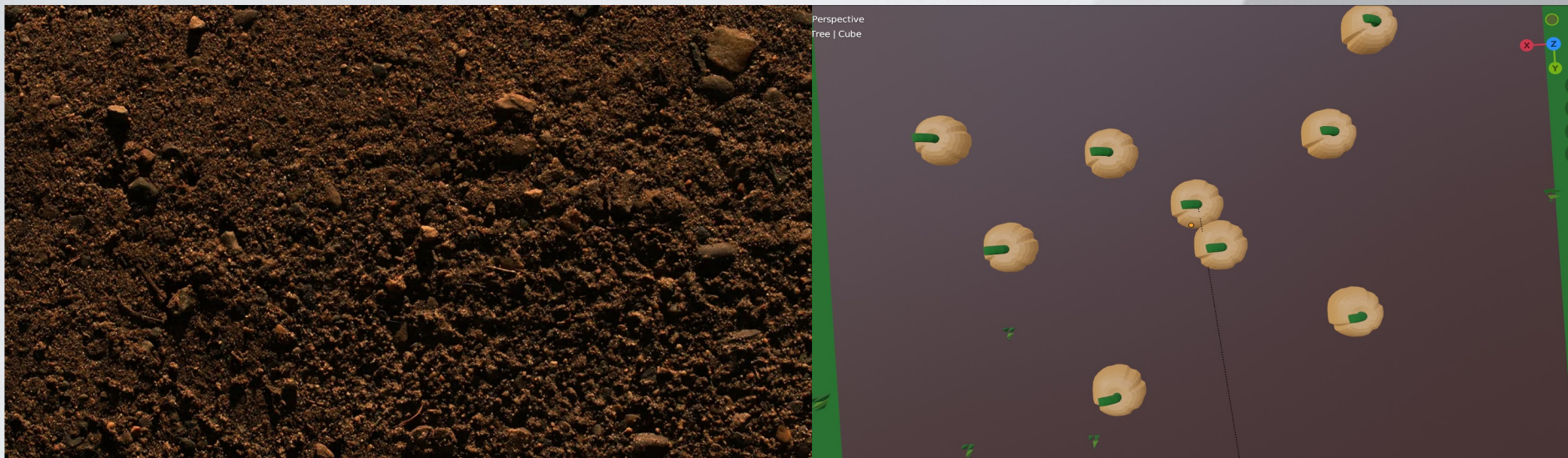
Break Time!



Shader Nodes

Real Dirt

Our Dirt



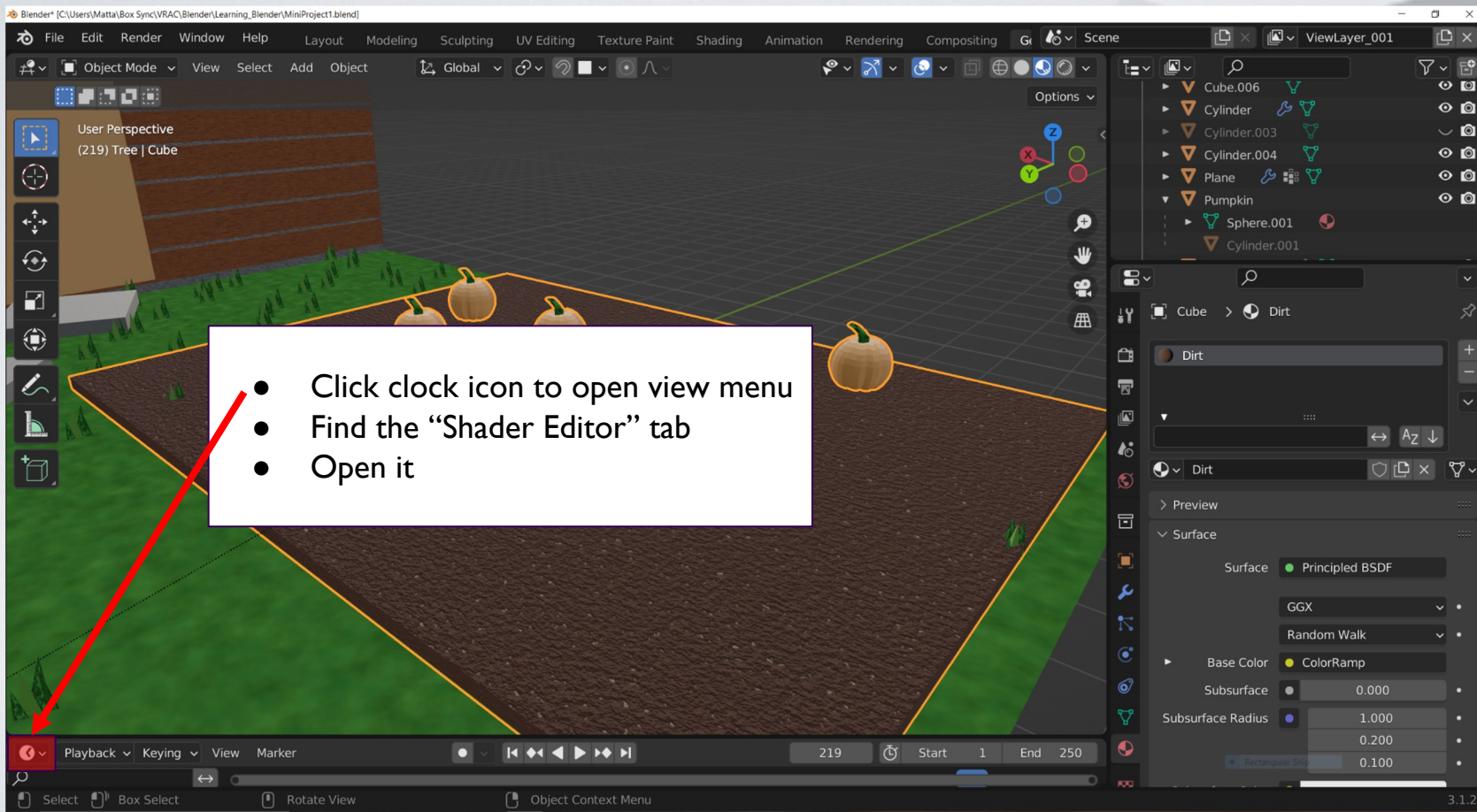
What if we wanted to make our dirt look more realistic?

Shader Nodes

With Shader Nodes we can make the dirt more realistic



Shader Nodes



Shader Nodes

The image displays the Blender 3.1.2 interface. The top menu bar includes File, Edit, Render, Window, Help, Layout, Modeling, Sculpting, UV Editing, Texture Paint, Shading, Animation, Rendering, Compositing, and Scene. The main 3D viewport shows a scene with several pumpkins on a flat ground plane. The left sidebar contains the Outliner and Properties panels. The right sidebar contains the Properties panel, which is currently showing the material settings for Material.002. The Shader Editor is open, showing a Principled BSDF node with various parameters. A red arrow points from a text box to the Principled BSDF node in the Shader Editor, and another red arrow points from the same text box to the Principled BSDF node in the Properties panel. The text box contains the following text:

- These two panels are the same:

The Properties panel shows the following settings for Material.002:

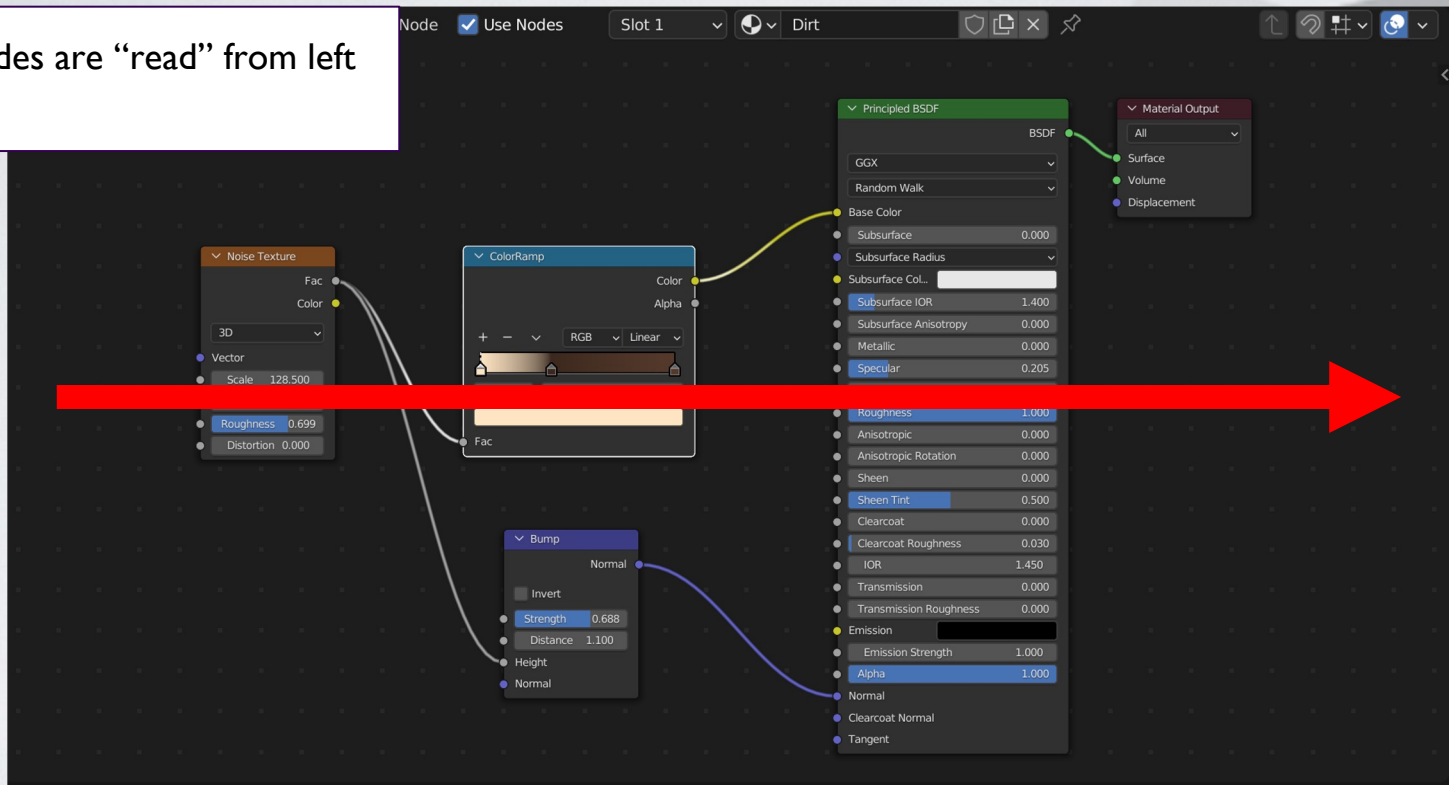
- Surface: Principled BSDF
- GGX
- Random Walk
- Base Color: [Green]
- Subsurface: 0.000
- Subsurface Radius: 1.000
- Subsurface Color: [Cyan]
- Subsurface IOR: 1.400
- Subsurface Anisotropic: 0.000
- Metallic: 0.000
- Specular: 0.500
- Specular Iridescence: 0.000
- Refract Index: 1.450
- Transmission: 0.000
- Transmission Roughness: 0.000
- Emission: 0.000
- Emission Strength: 1.000
- Normal: 1.000
- Clearcoat Normal
- Clearcoat

The Shader Editor shows the following settings for the Principled BSDF node:

- Material Output: All
- GGX
- Random Walk
- Base Color: [Green]
- Subsurface: 0.000
- Subsurface Radius: 1.000
- Subsurface Color: [Cyan]
- Subsurface IOR: 1.400
- Subsurface Anisotropic: 0.000
- Metallic: 0.000
- Specular: 0.500
- Specular Iridescence: 0.000
- Refract Index: 1.450
- Transmission: 0.000
- Transmission Roughness: 0.000
- Emission: 0.000
- Emission Strength: 1.000
- Normal: 1.000
- Clearcoat Normal
- Clearcoat

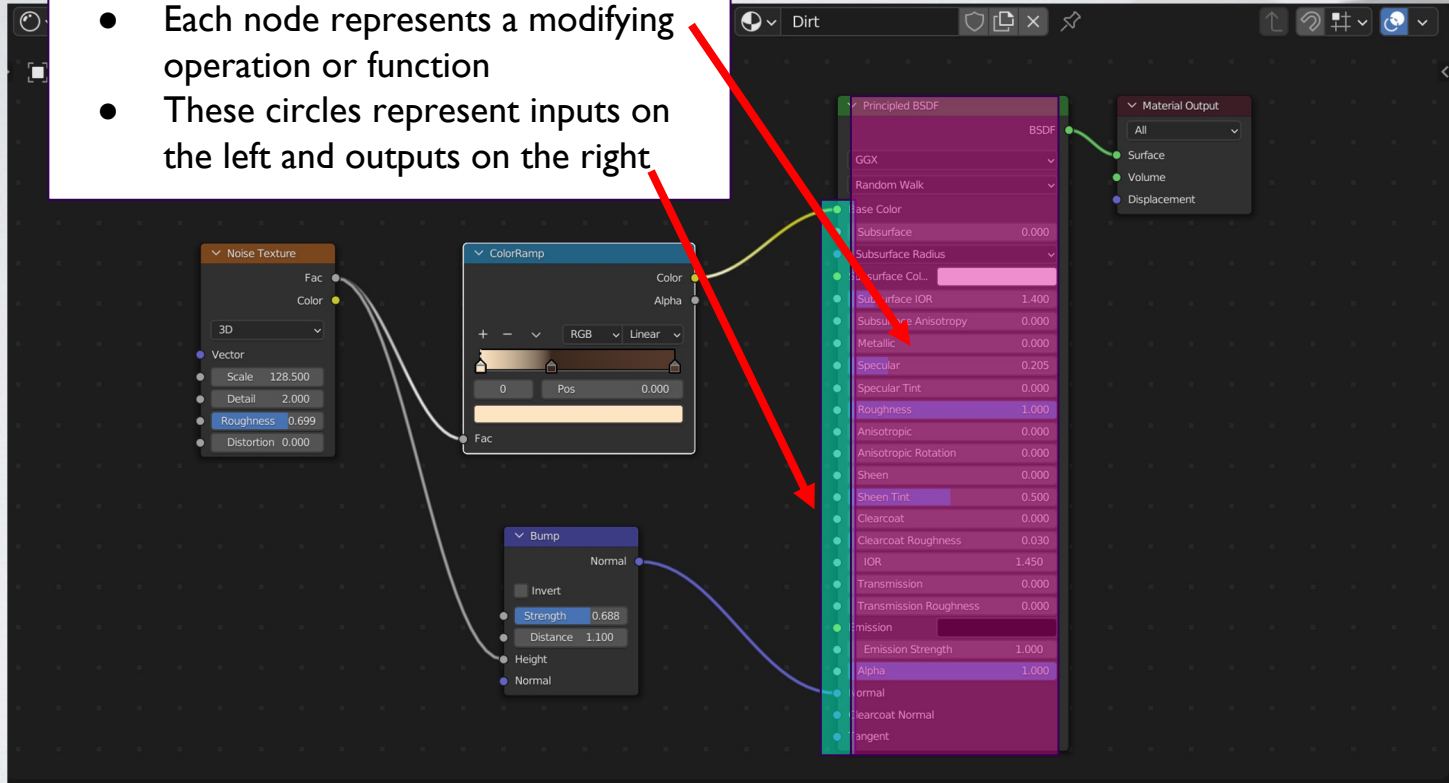
How Do Nodes Work?

- The nodes are “read” from left to right



How Do Nodes Work?

- Each node represents a modifying operation or function
- These circles represent inputs on the left and outputs on the right



Adding Nodes

The screenshot displays the Blender 3.1.2 interface. A white callout box with a black border contains the text: "● Shift + A to open Add Node Menu". A red arrow points from this box to the "Add" button in the top-left corner of the 3D Viewport. The "Add" menu is open, showing a search bar and a list of categories: Input, Output, Shader, Texture, Color, Vector, Converter, Script, Group, and Layout. The "Texture" category is highlighted. In the background, the 3D Viewport shows a scene with pumpkins on a table. The Properties panel on the right shows the "Material.002" properties, with the "Surface" section expanded to show the "Principled BSDF" node settings. The "Material Output" node is also visible in the Node Editor.

- Shift + A to open Add Node Menu

Material.002

Surface

Principled BSDF

GGX

Random Walk

Base Color

Subsurface

Subsurface Radius

Subsurface Color

Subsurface IOR

Subsurface Anisot...

Metallic

Specular

0.000

0.200

0.100

1.000

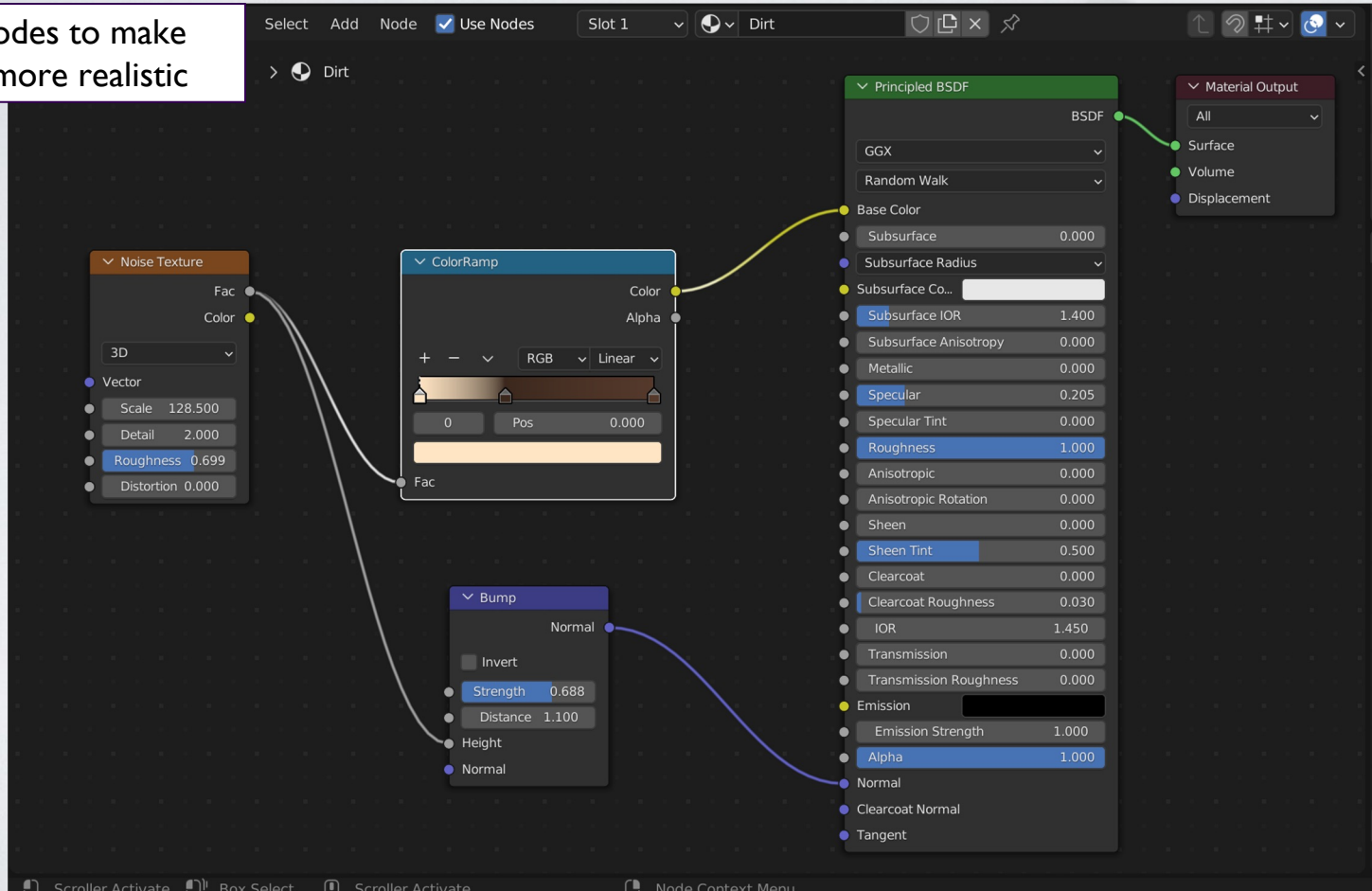
1.400

0.000

0.500

Practice:

Copy these nodes to make the dirt look more realistic



Without Nodes

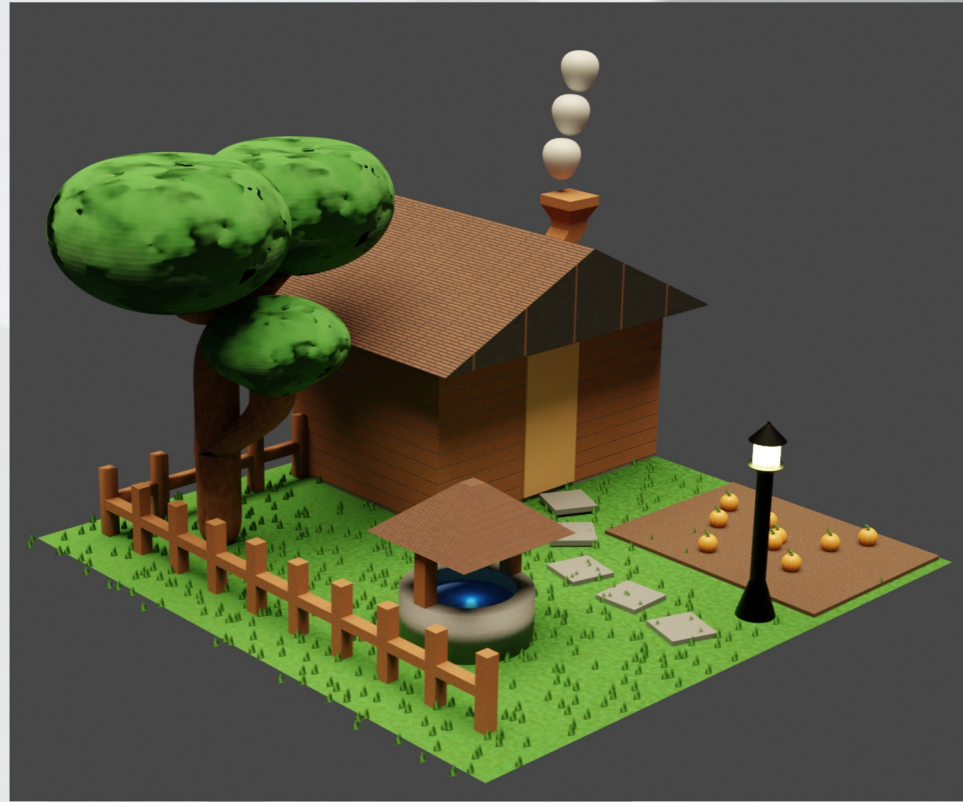


With Nodes

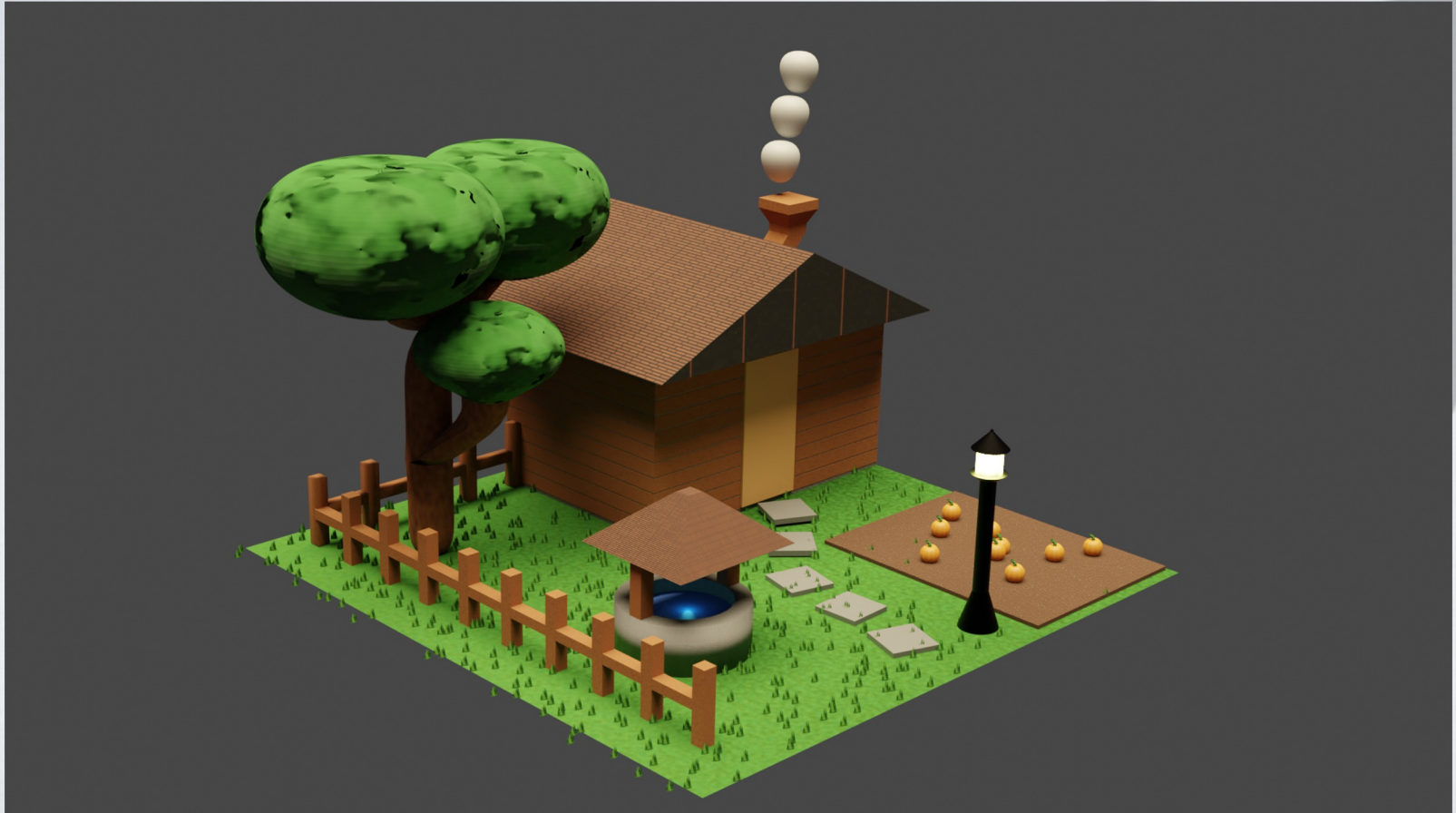


Mini Creation

- **Add materials to all of the objects from session 2**
 - **Start with simple materials (colors)**
 - **Then try one with the Node Editor**



Mini Creation



Break Time



BREAK TIME

Lights and Rendering



Adding a Light

Blender [C:\Users\Matta\Box Sync\VRAC\Blender\Learning_Blender\MiniProject1.blend]

File Edit Render Window Help Layout Modeling Sculpting UV Editing Texture Paint Shading Animation Rendering Compositing Gr Scene

Object Mode View Select Add Object Global

User Perspective

- To add a light to a scene:
- Shift + A > Light
- There are 4 types

- Lights appear in Hierarchy

Add

- Mesh
- Curve
- Surface
- Metaball
- Text
- Volume
- Grease Pencil
- Armature
- Lattice
- Empty
- Image
- Light**
 - Point
 - Sun
 - Spot
 - Area
- Light Probe
- Camera
- Speaker
- Force Field
- Collection Instance

Object View Select Add Node

Select Box Select Rotate View Context Menu

Scene Collection

- Collection
 - Camera
 - Cube.003
 - Cube.004
 - Cube.005
 - Cube.006
 - Cylinder
 - Cylinder.003
 - Cylinder.004
 - Plane
 - Pumpkin
 - Sphere.002
- Collection 2
 - Fence
 - WalkWay
 - Tree
 - lass
 - Point.001**

Depth of Field

Focus Object

Distance 10 m

Aperture

F-Stop 2.8

Blades 0

Rotation 0°

Ratio 1.000

Custom Properties

3.1.2

Types of lights

Point

- Emits light from all directions
- Used for lamps or items that light up

Sun

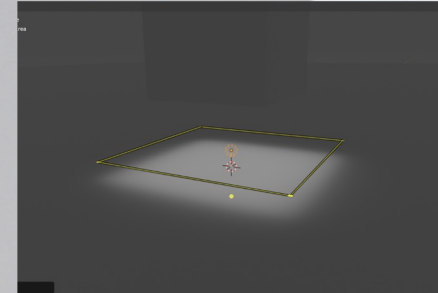
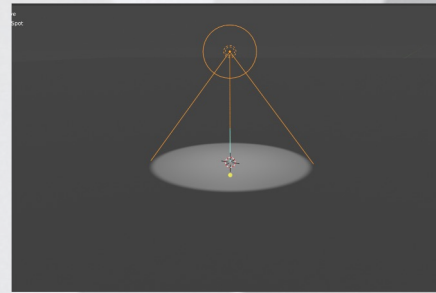
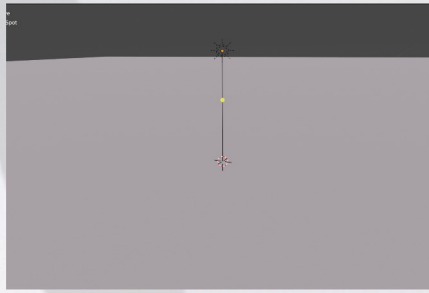
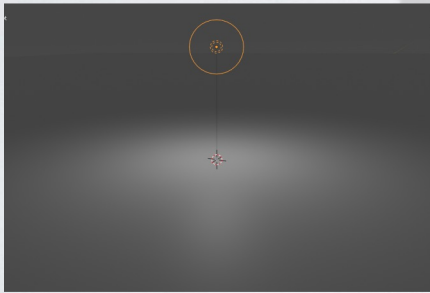
- Emits light with parallel rays, so position does not matter
- Used for outdoor/large spaces

Spot

- Emits light in a cone shape
- Used for “moody” lighting

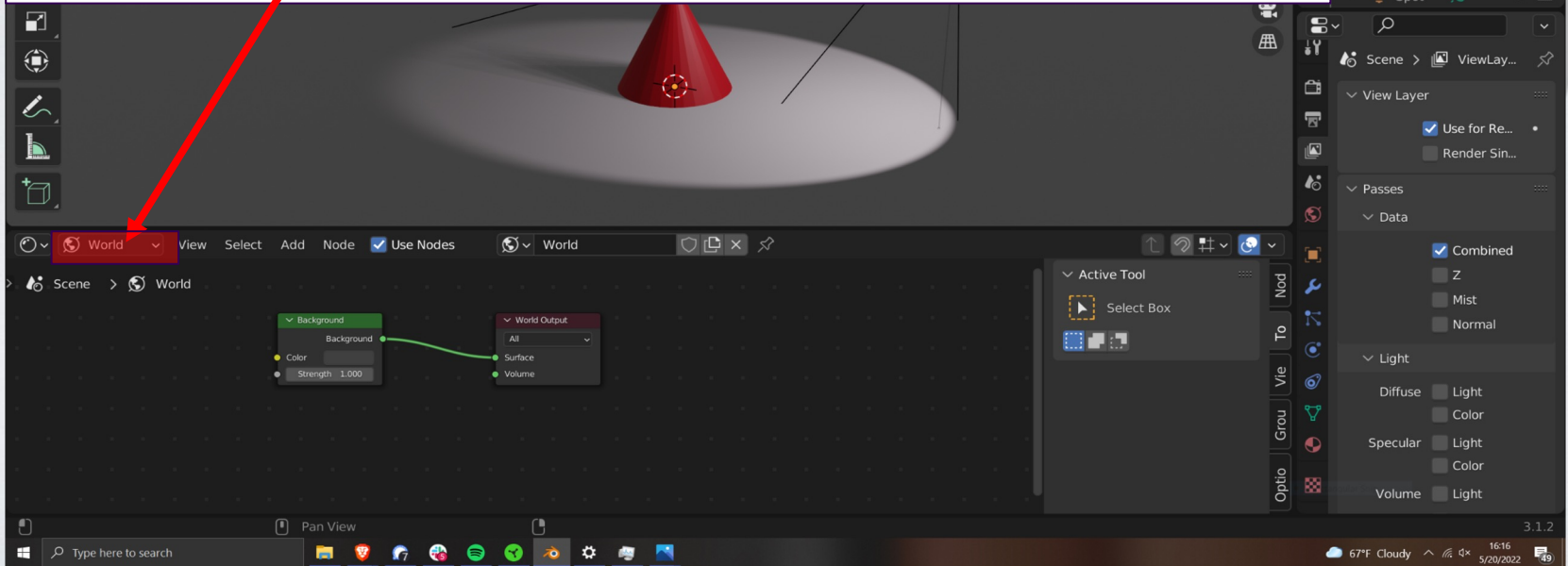
Area

- Emits light in one direction from a square
- Used for indoor spaces

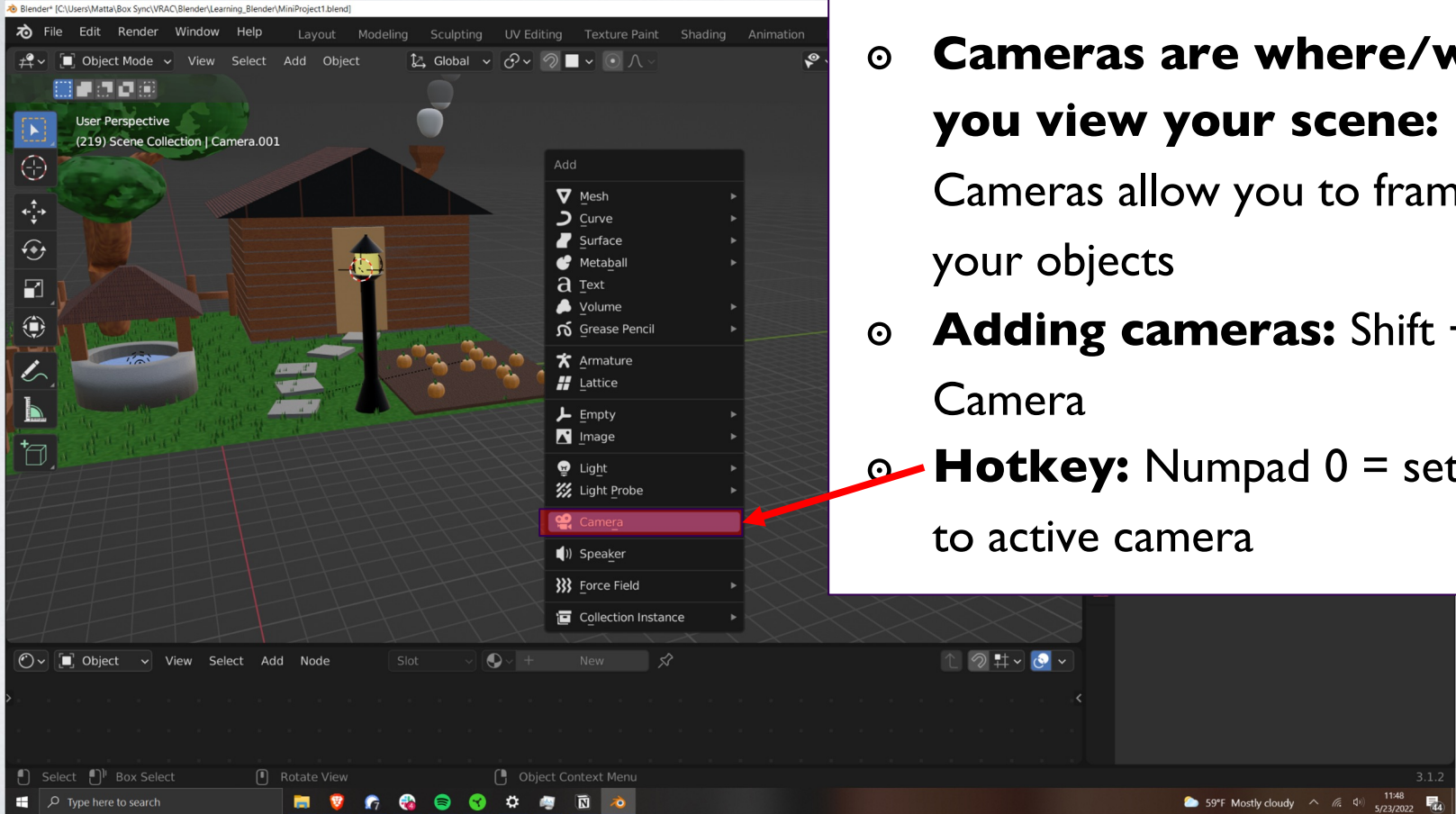


Environment

- Every Blender scene has an environment
- This Environment has lighting
- This is why even with NO LIGHTS objects can still be seen
- The Environment can be edited in the “Shader Editor” panel
- Select “World” in this drop down menu



Camera Basics



- **Cameras are where/what you view your scene:**
Cameras allow you to frame up your objects
- **Adding cameras:** Shift + A > Camera
- **Hotkey:** Numpad 0 = set view to active camera

Camera Properties

The screenshot displays a 3D environment with a green ground plane. On the left, a white cube is shown with a red dashed circle and arrows indicating its rotation. In the center, a camera is positioned, with a red cone representing its field of view and a yellow rectangle representing its sensor plane. The camera's orientation is indicated by a black circle with a red dot and a yellow arrow.

At the bottom of the interface, a timeline is visible with a play button and various navigation icons. The timeline has markers at 0, 80, 100, 120, 140, and 240. The text "End 163" is visible on the right side of the timeline.

On the right side, a properties panel is open, showing the "Camera" properties. The panel includes a search bar, a "Camera" header, and a "Lens" section with the following settings:

- Type: Perspective
- Focal Len...: 50 mm
- Lens Unit: Millimeters
- Shift X: 0.000
- Y: 0.000
- Clip Start: 0.1 m
- End: 100 m

Below the "Lens" section, there are several expandable sections: "Camera", "Safe Areas", "Background Images", "Viewport Display", and "Depth of Field".

A white box with a black border is overlaid on the timeline, containing the following text:

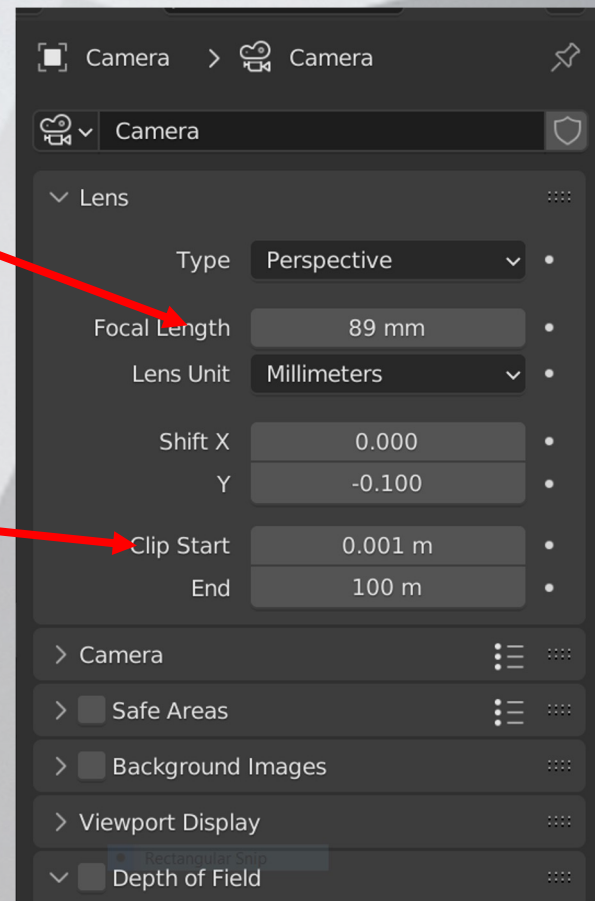
- Camera Constraints:
- Camera Properties:

Two red arrows point from the text in the white box to the "Camera Constraints" and "Camera Properties" icons in the bottom right corner of the interface.

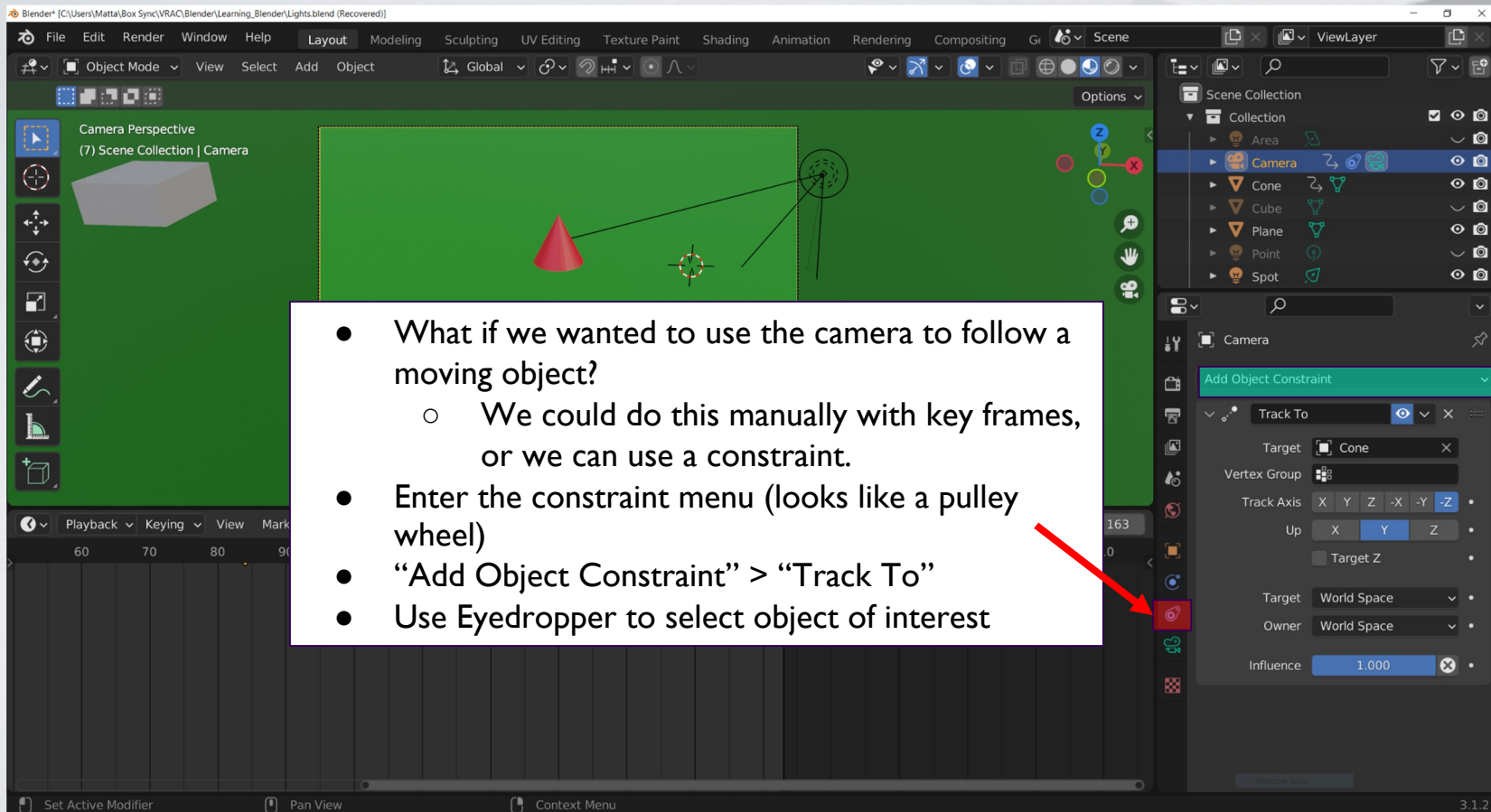
At the bottom left, the text "view" is visible. At the bottom center, the text "Region Context Menu" is visible. At the bottom right, the version number "3.1.2" is visible.

Camera properties

- Focal Length
 - Corresponds to the “Zoom” of the camera
 - Bigger numbers = tighter shot
 - Smaller number = wider shot
- Clip Start/End
 - How far can the camera see



Camera Tracking



Blender* [C:\Users\Matta\Box Sync\VRAC\Blender\Learning_Blender\Lights.blend (Recovered)]

File Edit Render Window Help Layout Modeling Sculpting UV Editing Texture Paint Shading Animation Rendering Compositing Gr Scene ViewLayer

Object Mode View Select Add Object Global

Camera Perspective
(7) Scene Collection | Camera

- What if we wanted to use the camera to follow a moving object?
 - We could do this manually with key frames, or we can use a constraint.
- Enter the constraint menu (looks like a pulley wheel)
- “Add Object Constraint” > “Track To”
- Use Eyedropper to select object of interest

Scene Collection

- Collection
 - Area
 - Camera
 - Cone
 - Cube
 - Plane
 - Point
 - Spot

Camera

Add Object Constraint

Track To

Target Cone

Vertex Group

Track Axis X Y Z -X -Y -Z

Up X Y Z

Target Z

Target World Space

Owner World Space

Influence 1.000

163
0

Playback Keying View Mark

60 70 80 90

Set Active Modifier Pan View Context Menu

3.1.2

Render Settings

The image shows the Blender 3.1.2 interface in Object Mode. The main viewport displays a red cone on a grey plane. The Properties panel on the right is open to the 'Scene' tab, showing the 'Render Engine' set to 'Eevee'. A white callout box with a red arrow points to the camera icon in the Properties panel, which is used to access render settings.

- To access render settings select the back of the camera icon:

Scene Collection

- Collection
- Area
- Camera
- Cone
- Cube
- Plane
- Point
- Spot

Scene

Render Engi... Eevee

Sampling

- Render 64
- Viewport 16
- Viewport Den...

Ambient Occlusion

Bloom

Depth of Field

Subsurface Scattering

Screen Space Reflections

Motion Blur

Volumetrics

Performance

Hair

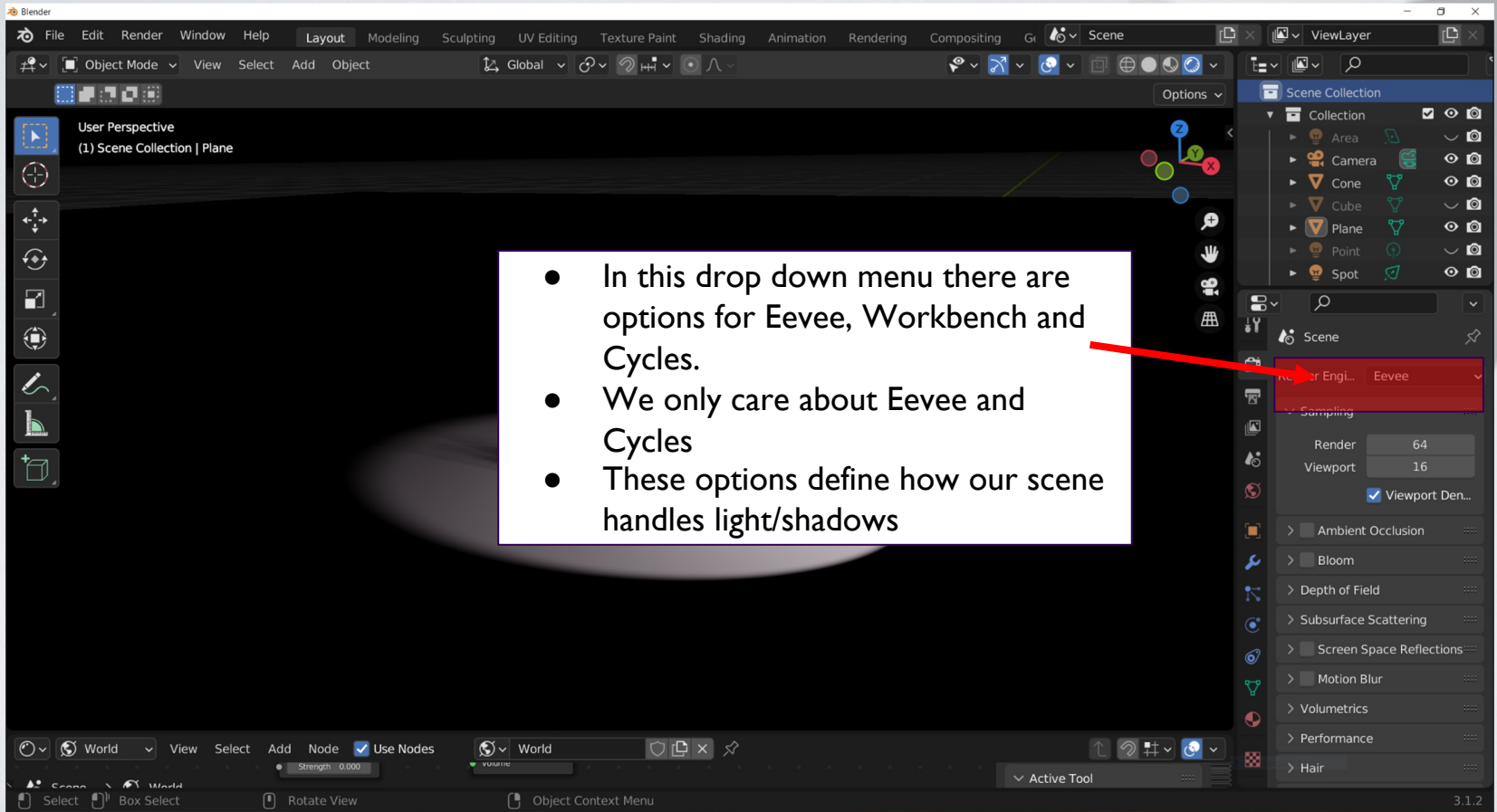
World View Select Add Node Use Nodes World

Strength: 0.000

Active Tool

3.1.2

Shadows

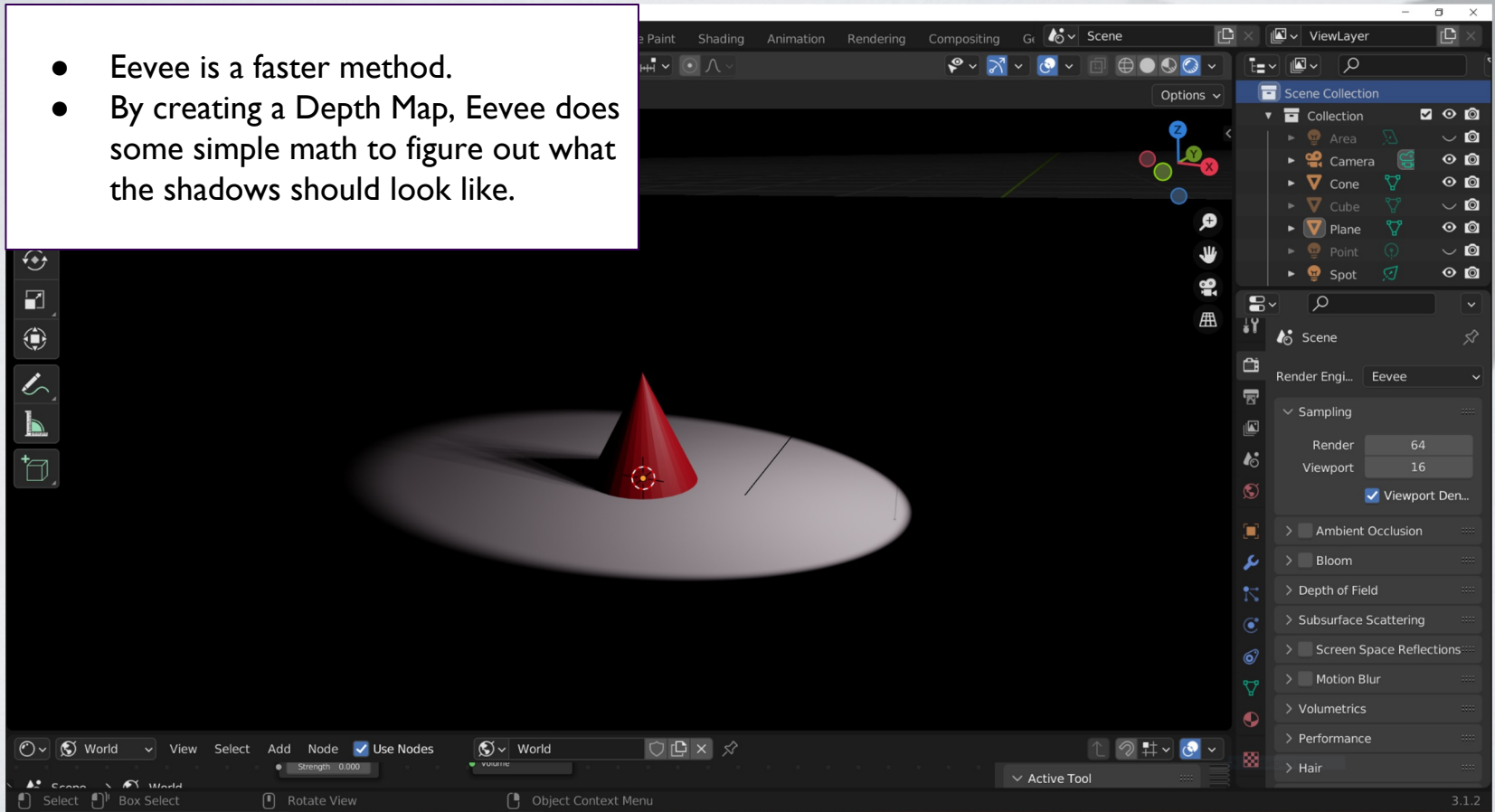


The image shows the Blender 3.1.2 interface. The main viewport is in Object Mode, showing a plane in a perspective view. The right sidebar is open to the Properties panel for the active scene. The 'Render' engine dropdown menu is expanded, showing 'Eevee' as the selected option. A red arrow points from the text box to this dropdown menu.

- In this drop down menu there are options for Eevee, Workbench and Cycles.
- We only care about Eevee and Cycles
- These options define how our scene handles light/shadows

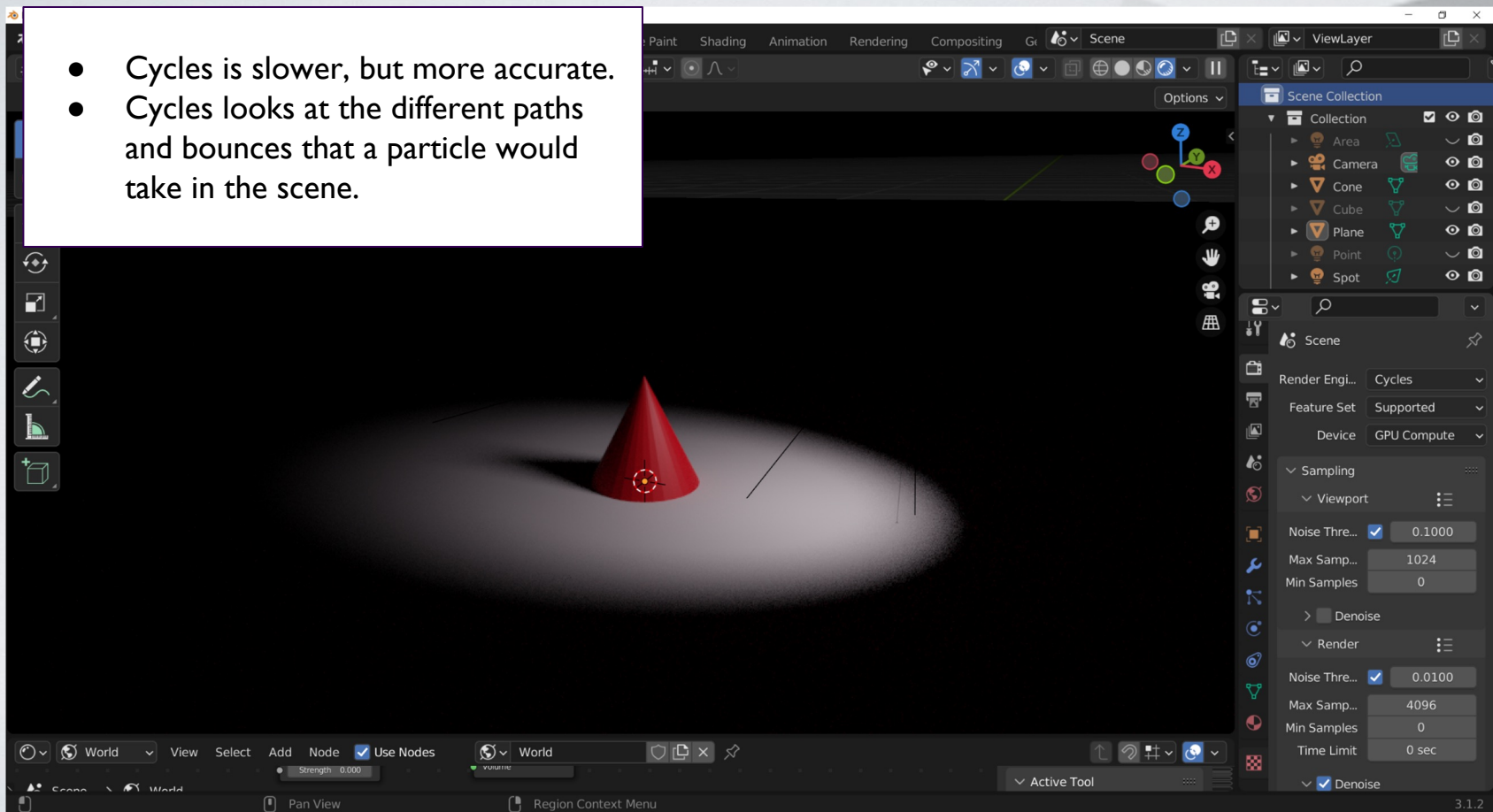
Eevee: Depth Map

- Eevee is a faster method.
- By creating a Depth Map, Eevee does some simple math to figure out what the shadows should look like.

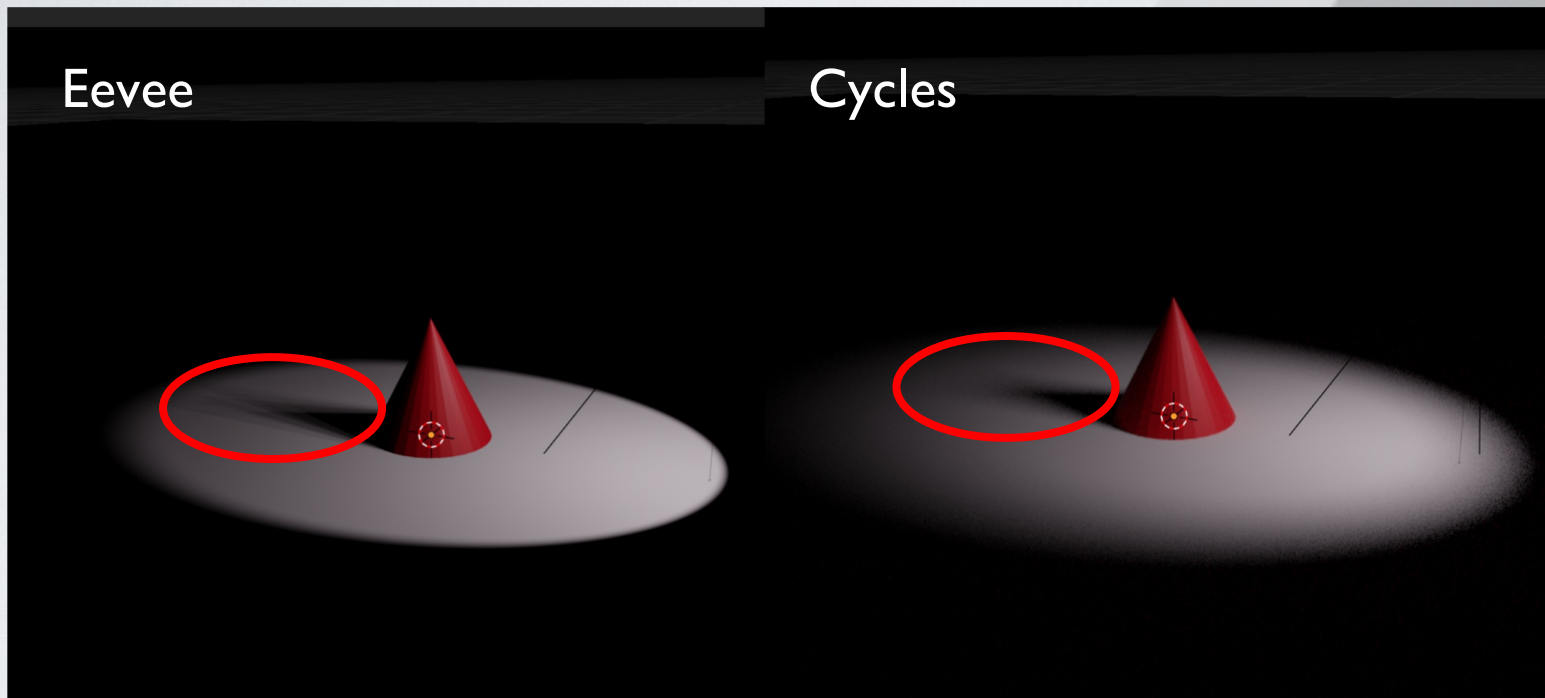


Cycles: Ray Tracing

- Cycles is slower, but more accurate.
- Cycles looks at the different paths and bounces that a particle would take in the scene.

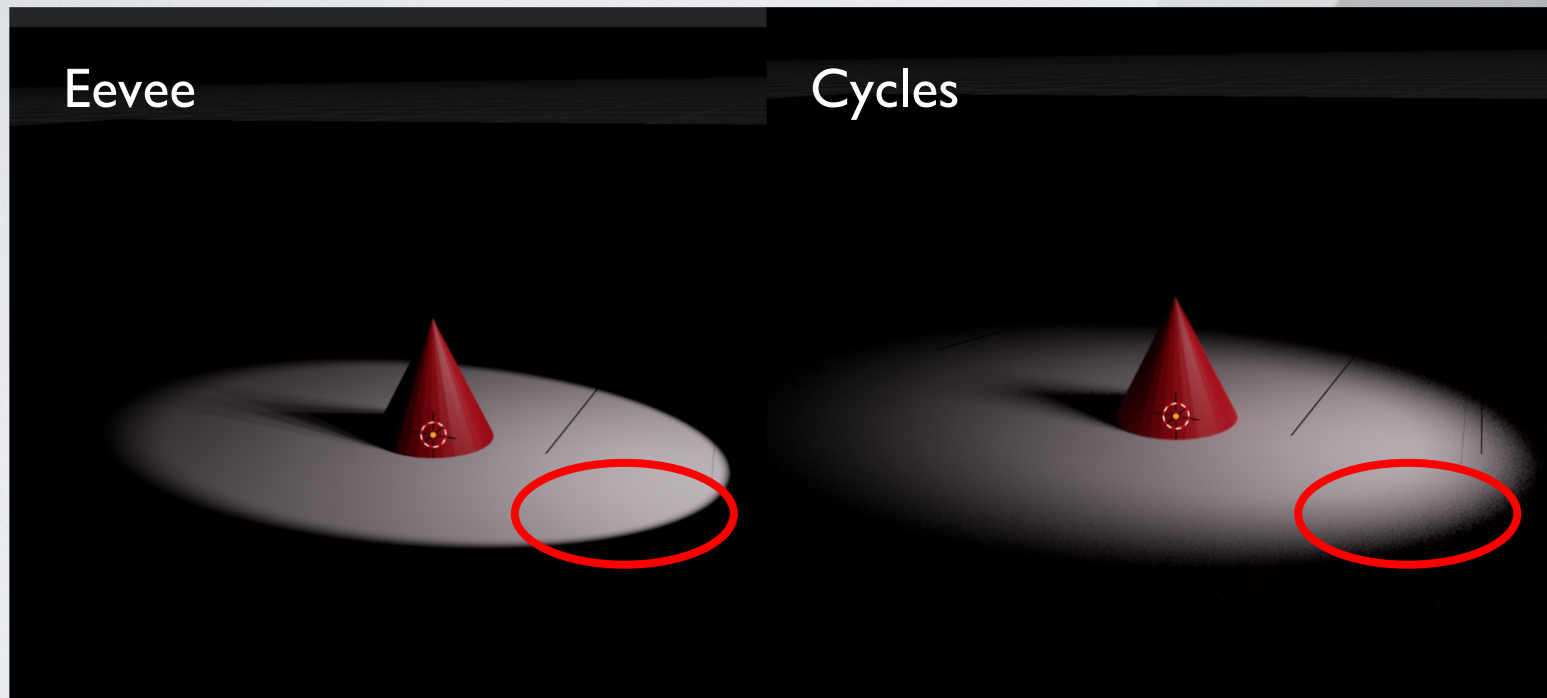


Cycles: Ray Tracing



Cycles has less aliasing at the top of the cone

Cycles: Ray Tracing

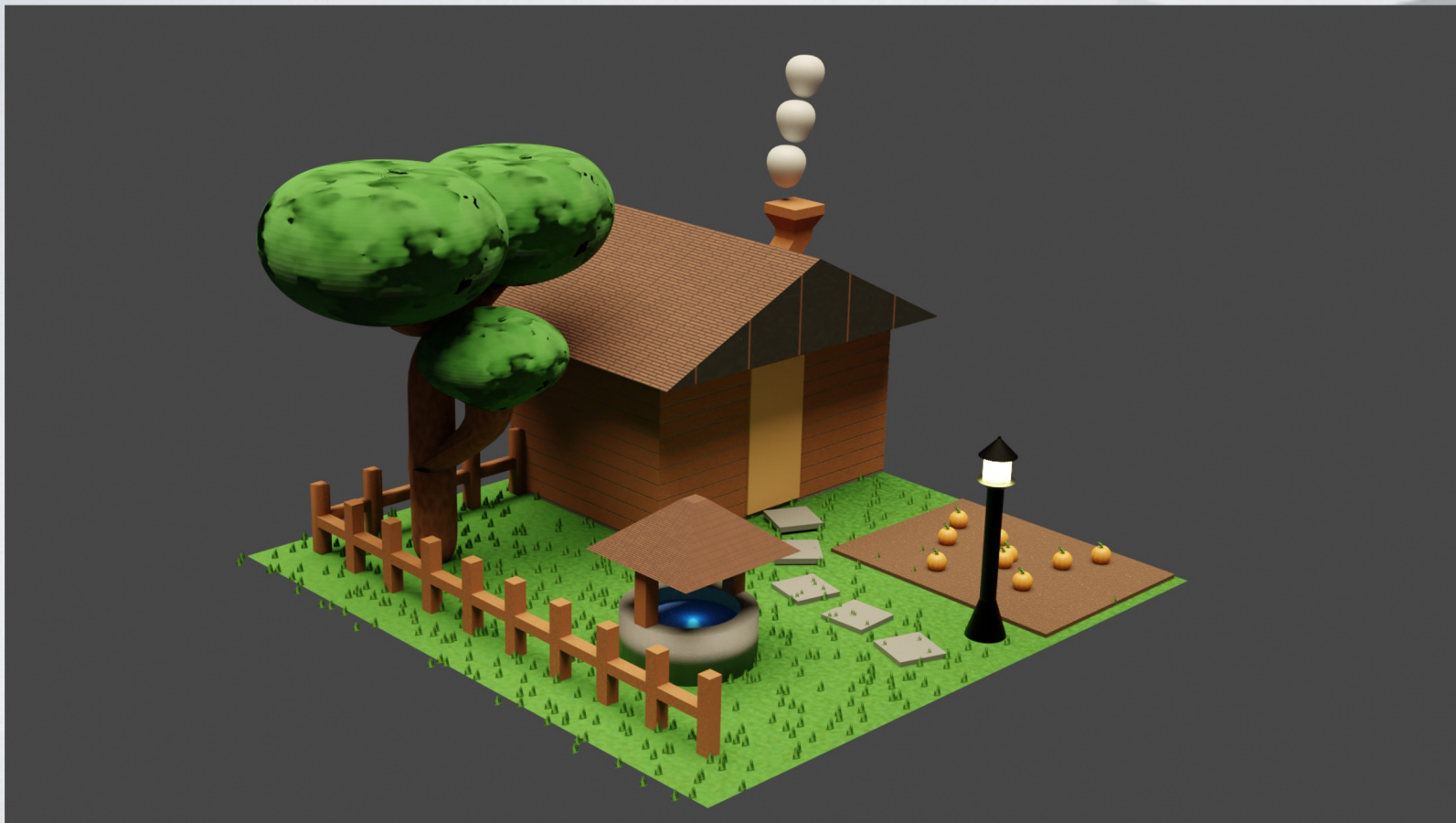


The shadow drop off is more accurate

Today's Mini Creation

**Apply 1 or more lights in your scene from
Mini Creation 2 and render**

Render



Final Blender Task: Export for Unity

