



Animation (with Blender)

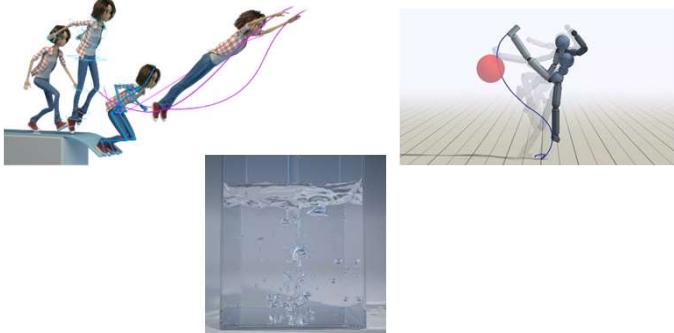
Multimedia Techniques & Applications
Yu-Ting Wu

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Recap.

- **The goal of animation:**
 - Describe how do geometry/objects change/move with time

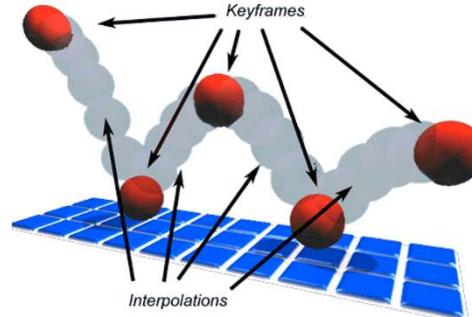


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Recap.

- **Keyframe Interpolation**



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This Week's Course

- We will introduce the minimal knowledges for creating an animation in **Blender**
 - Remember it is better to add “virtual objects” in your final project
 - We will introduce:
 - Basic operations
 - 3D models loading
 - Materials and lighting
 - Keyframes insertion
 - Animation rendering
 - There are lots of resources on the internet !

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blender

- One of the most popular professional **modeling tool**
- Most important, it is **free!**

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Installation

- The newest version: 3.1
- However, I suggested to install **ver. 2.80** because it is guaranteed to work for **Matchmove**, which will be taught next week
 - <https://download.blender.org/release/Blender2.80/>
- TA has also installed Blender ver. 2.80 on the computers in the classroom (B1F-04)

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Blender Editor Overview

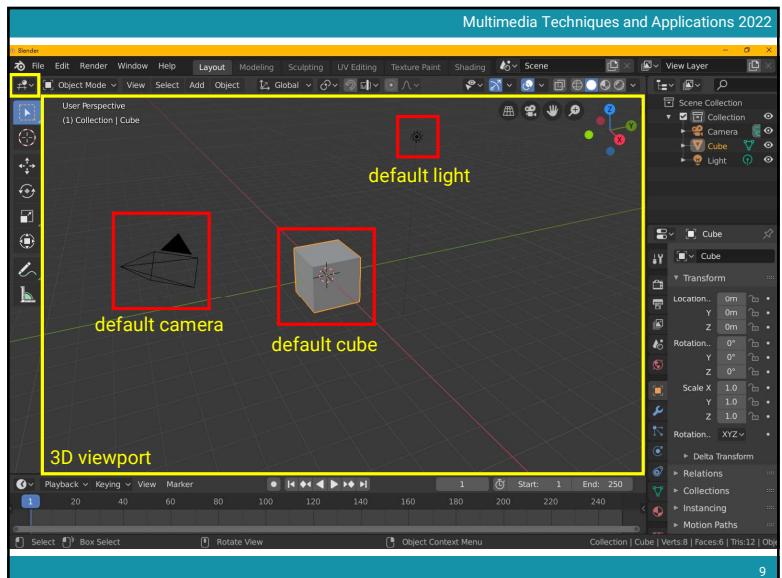
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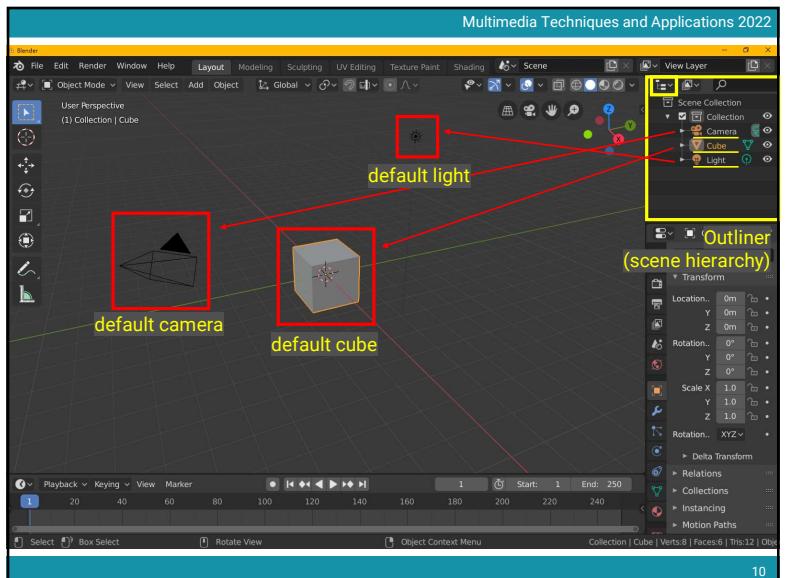
The first screen you will see

You can just skip choosing now

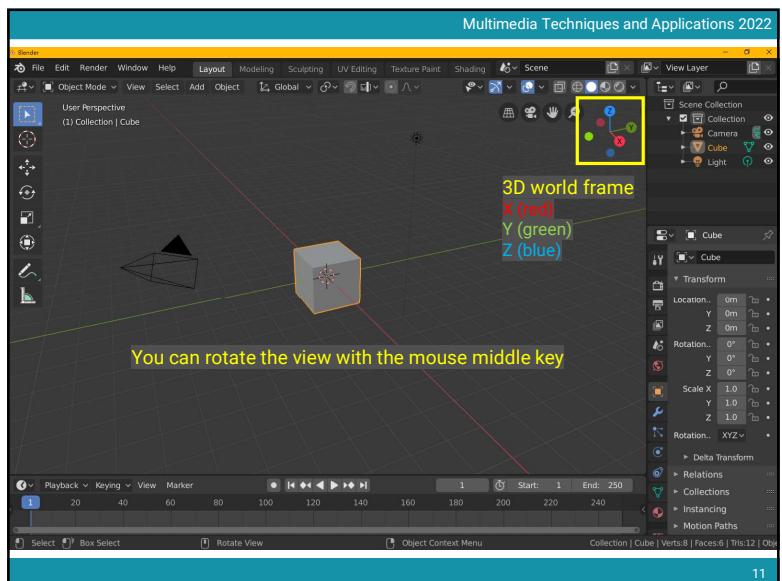
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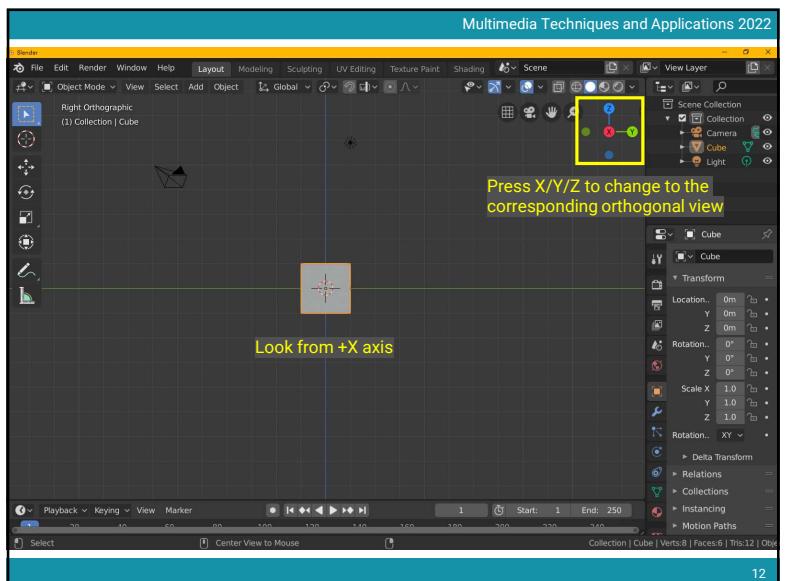
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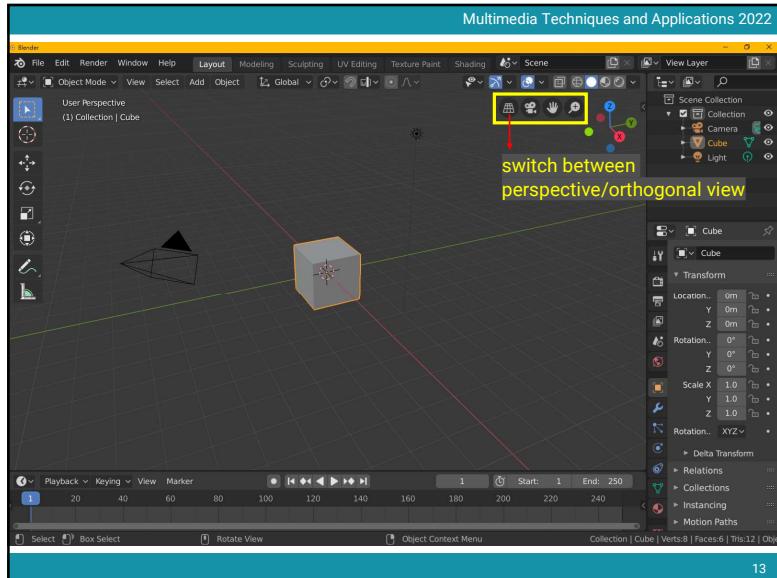


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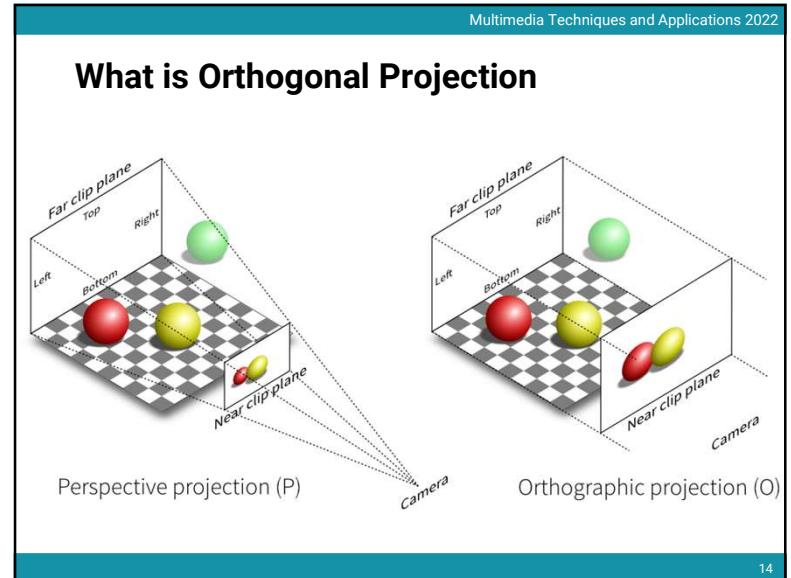


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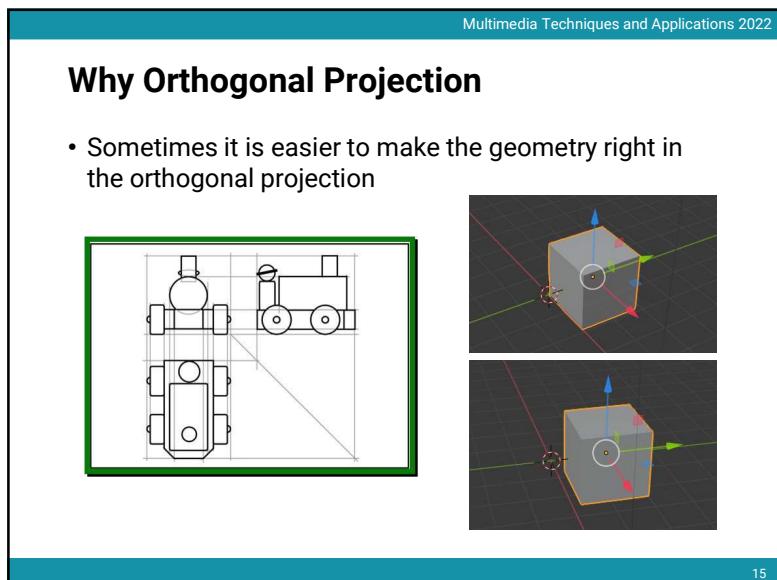
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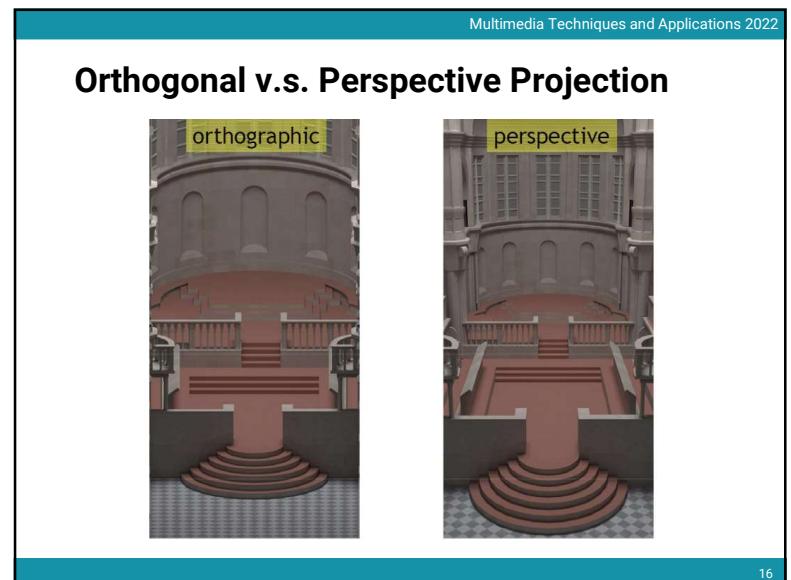
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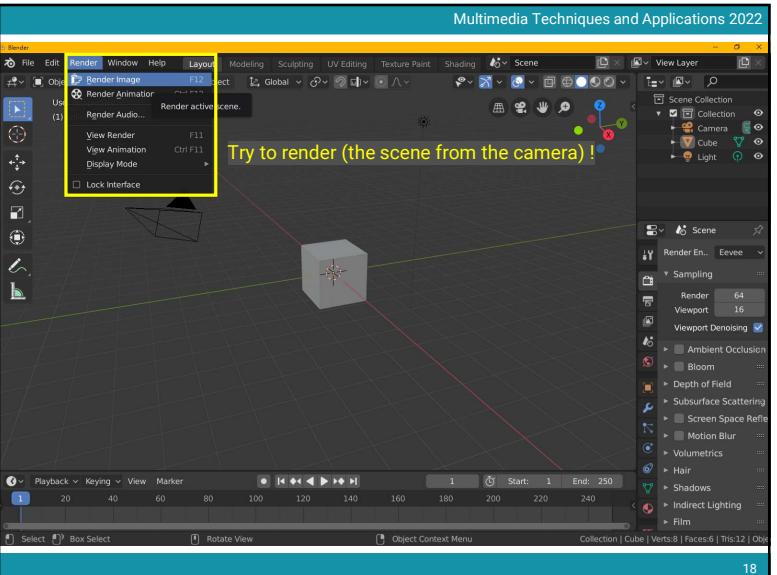
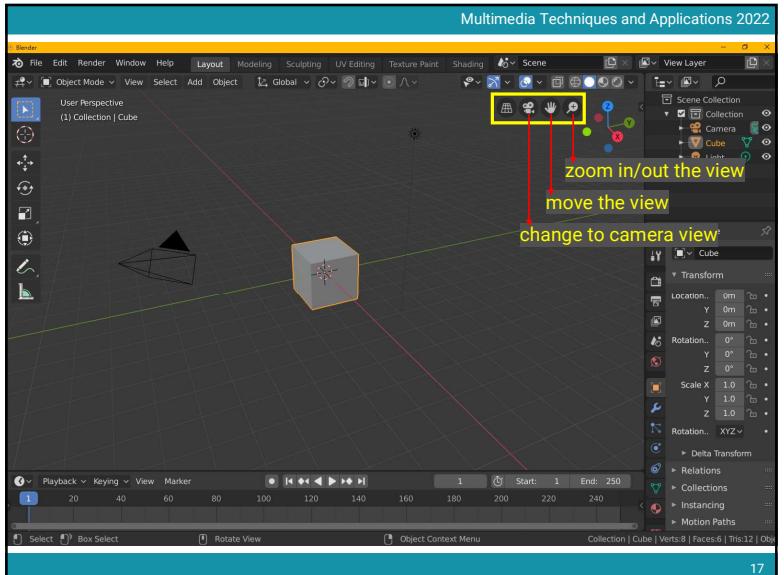
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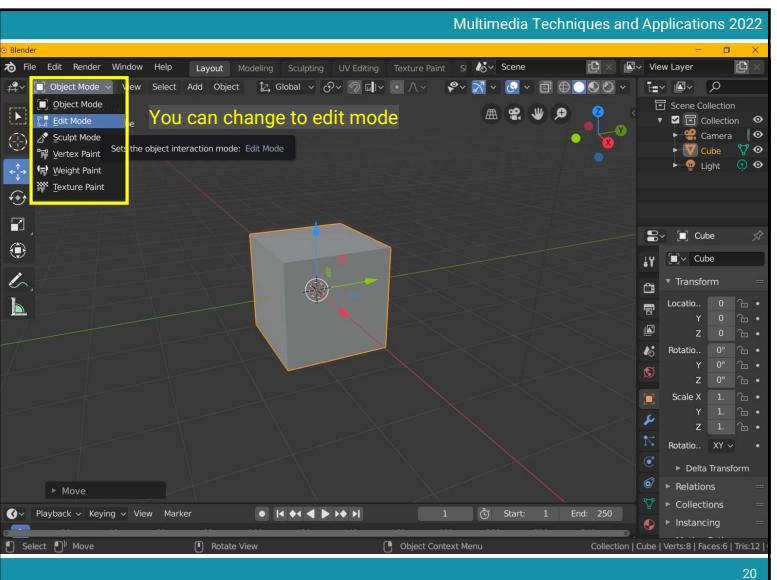
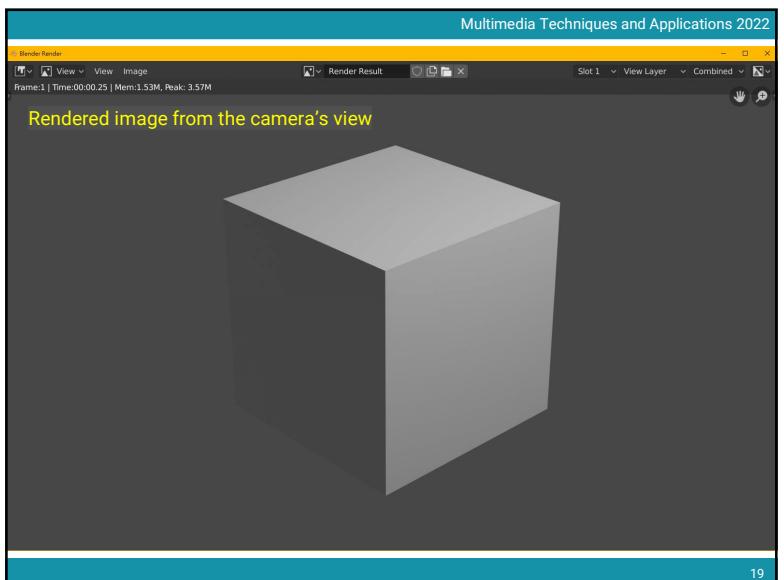


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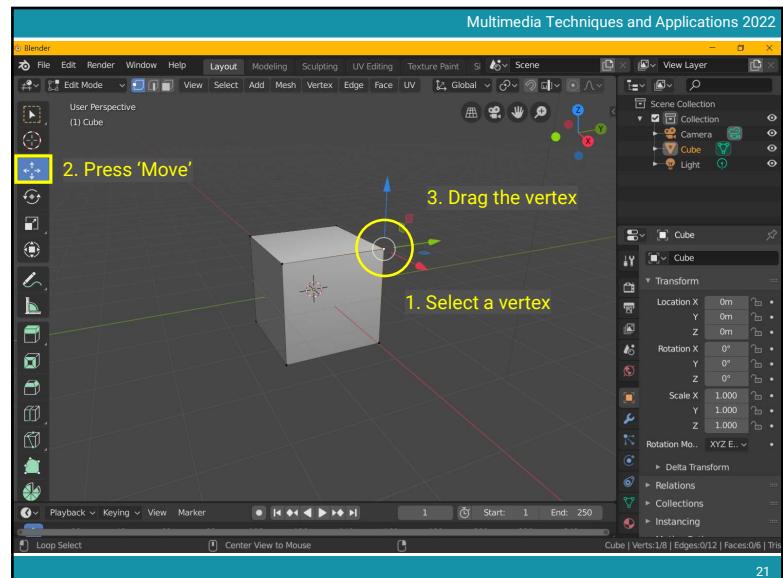
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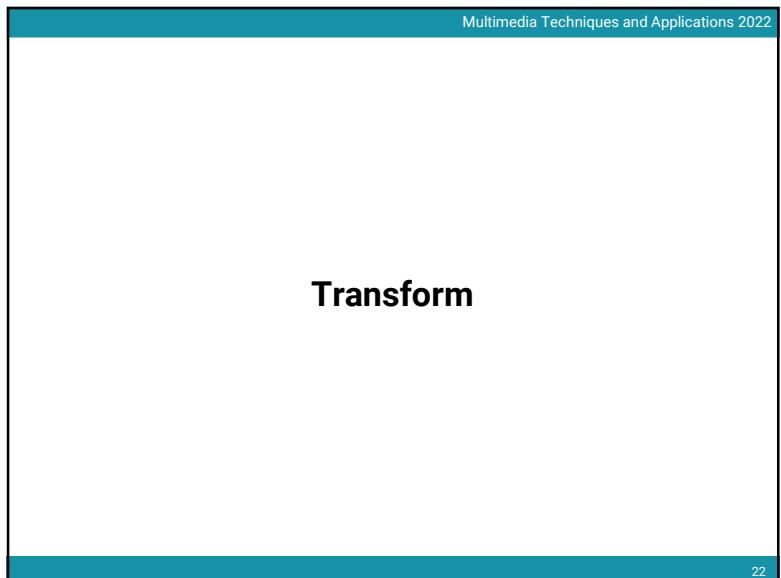


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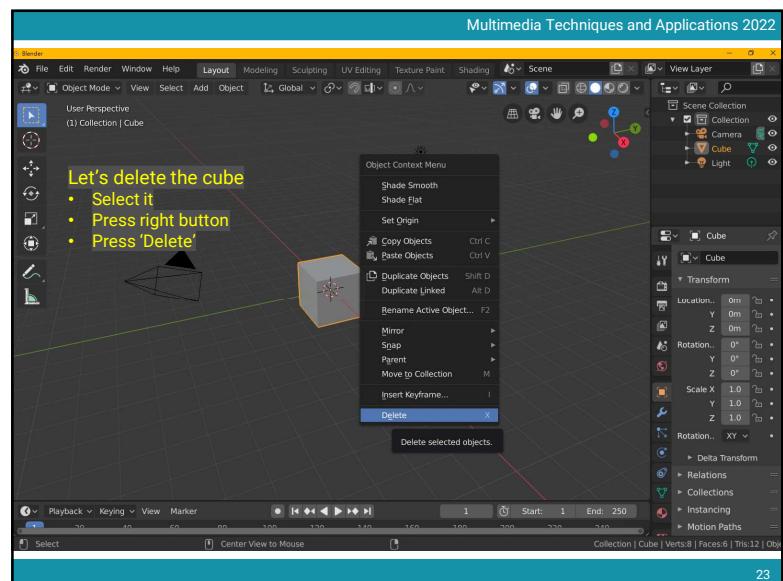
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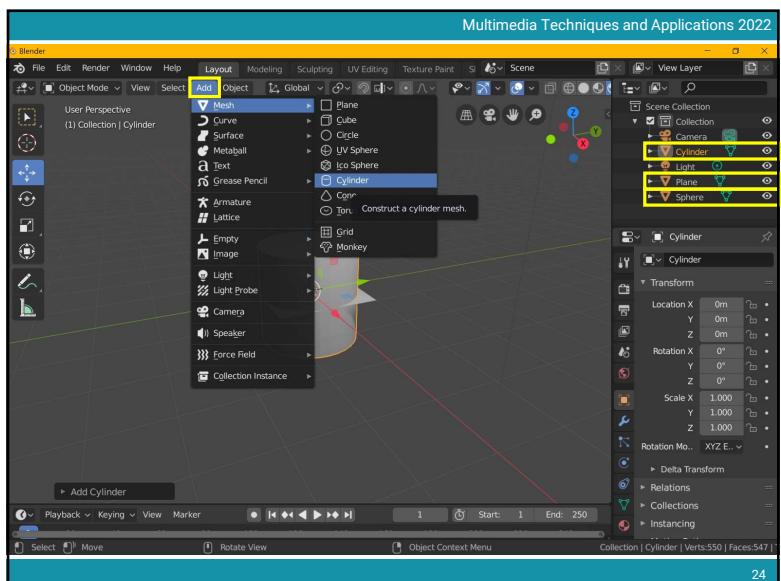
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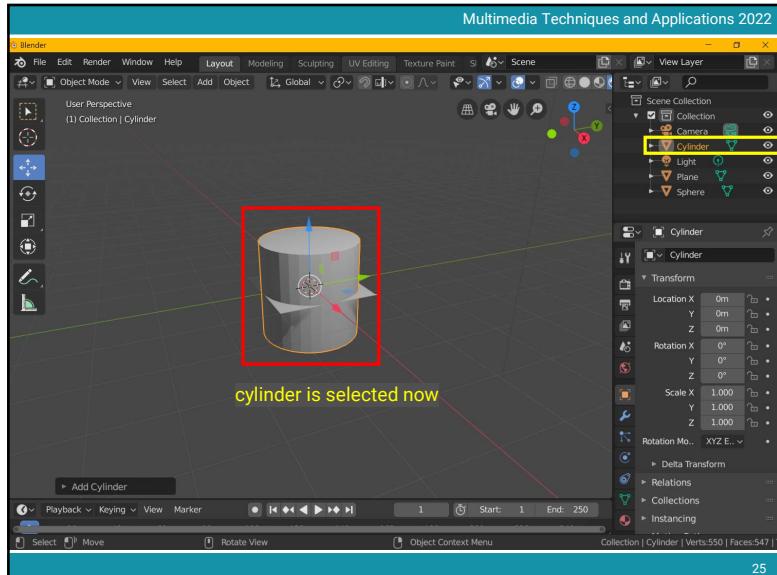


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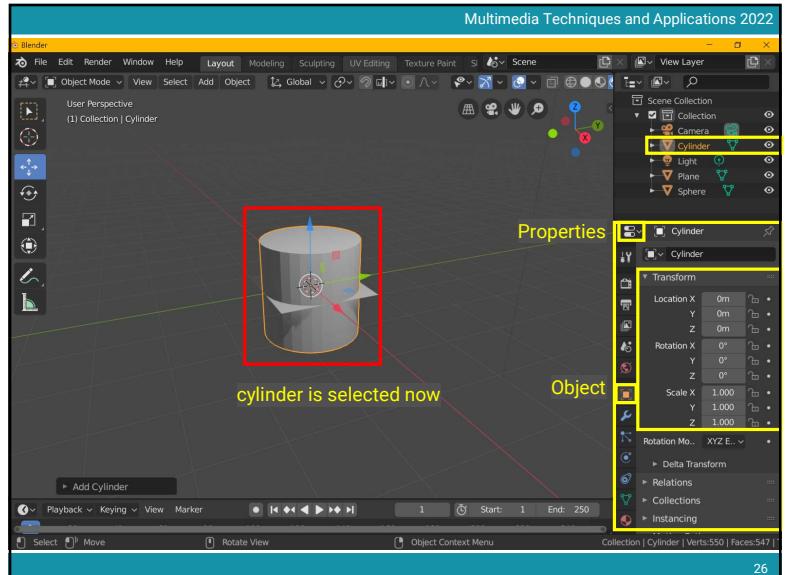


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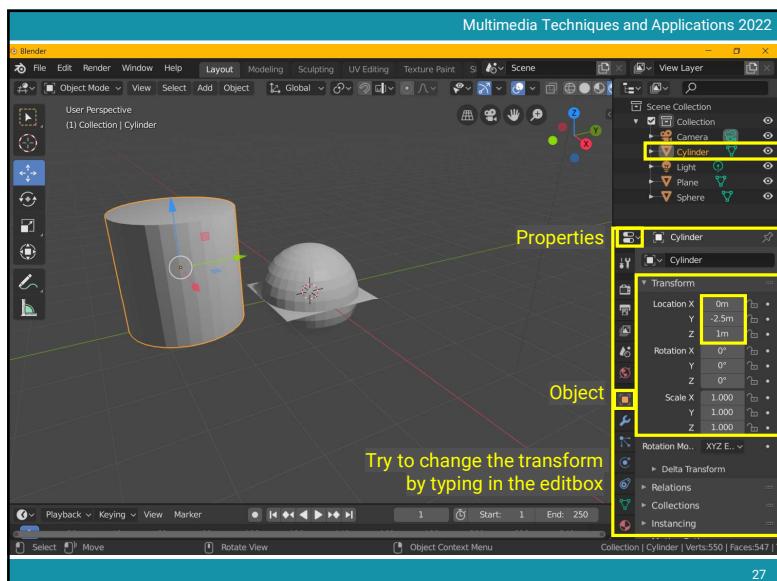
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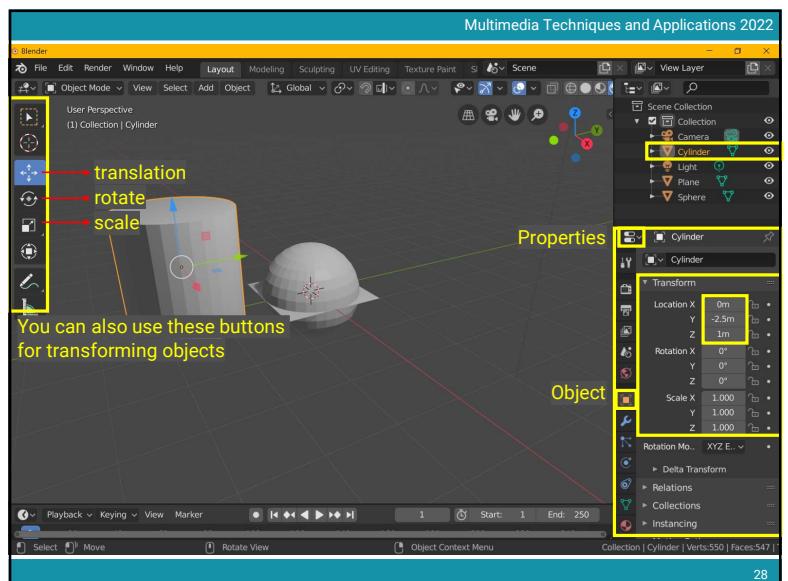
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Recap: Object Space and World Space

- Shapes (or objects) are defined in **object space** and transformed to **world space**
- Why?
 - Reuse model
 - Object instancing

Store a 4x4 matrix instead of an entire model

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Materials

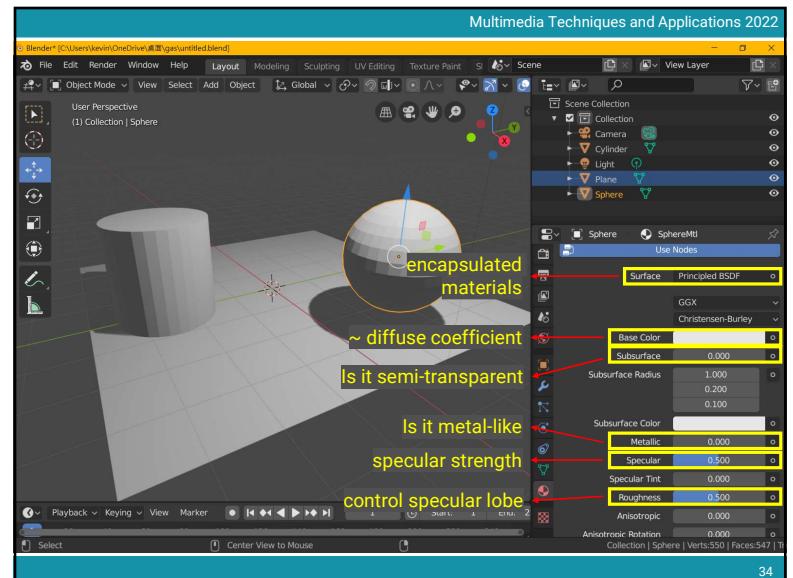
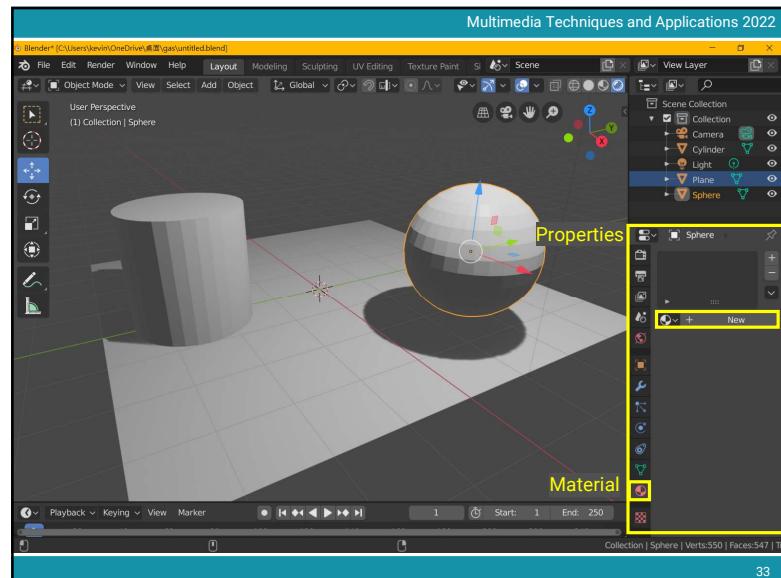
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Recap: Basics of Local Shading

- Diffuse reflection**
 - Light goes everywhere; colored by object color
- Specular reflection**
 - Happens only near mirror configuration; usually white
- Ambient reflection**
 - Constant accounted for other source of illumination

ambient diffuse specular

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Recap: Diffuse Shading

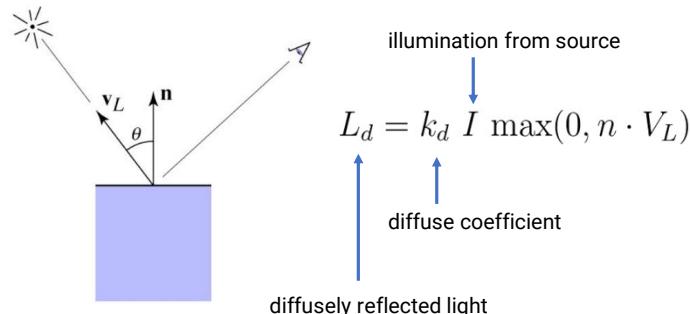
- Assume light reflects **equally in all directions**
 - The surface is rough with lots of tiny microfacets
- Therefore, surface looks same color from all views (**view independent**)

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Recap: Diffuse Shading (cont.)

- Applies to diffuse, Lambertian or matte surface



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Recap: Specular Shading

- Some surfaces have highlights, mirror-like reflection
- View direction dependent**
- Especially obvious for smooth shiny surfaces



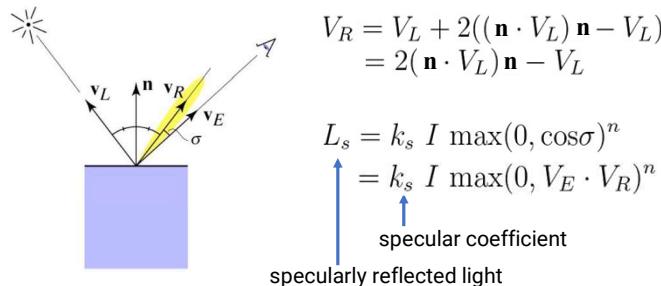
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Recap: Specular Shading (cont.)

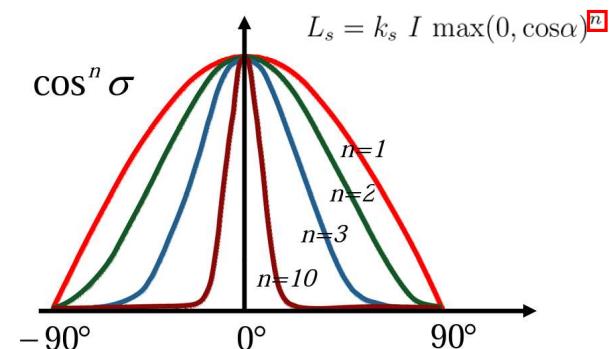
- Also known as glossy
- Phong specular model [1975]
 - Fall off gradually from the perfect reflection direction



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Recap: Specular Shading (cont.)

- Increase n narrows the lobe

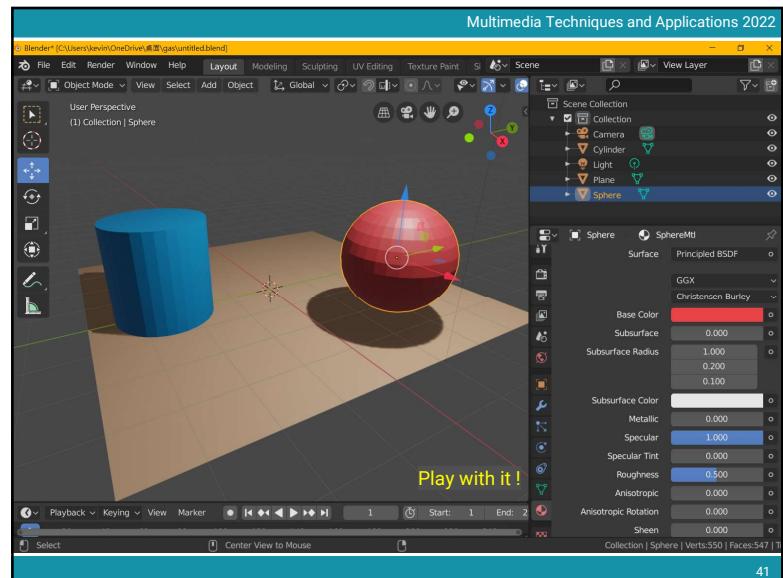


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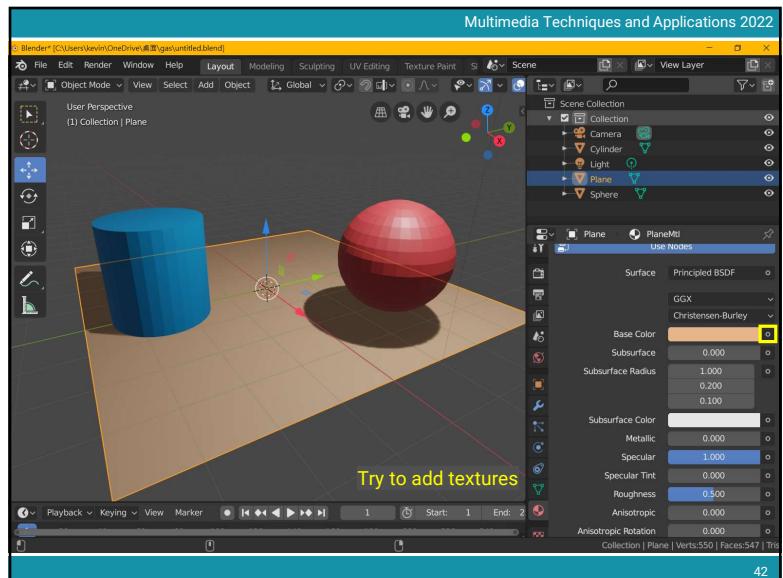
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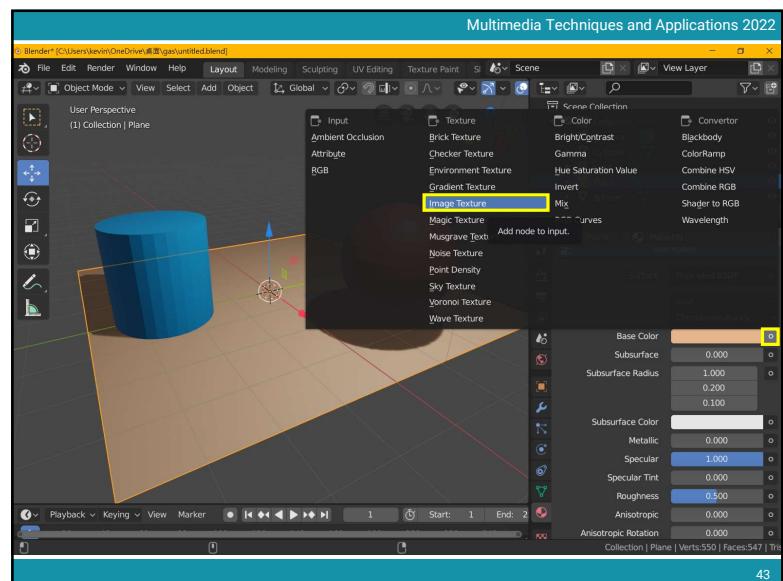
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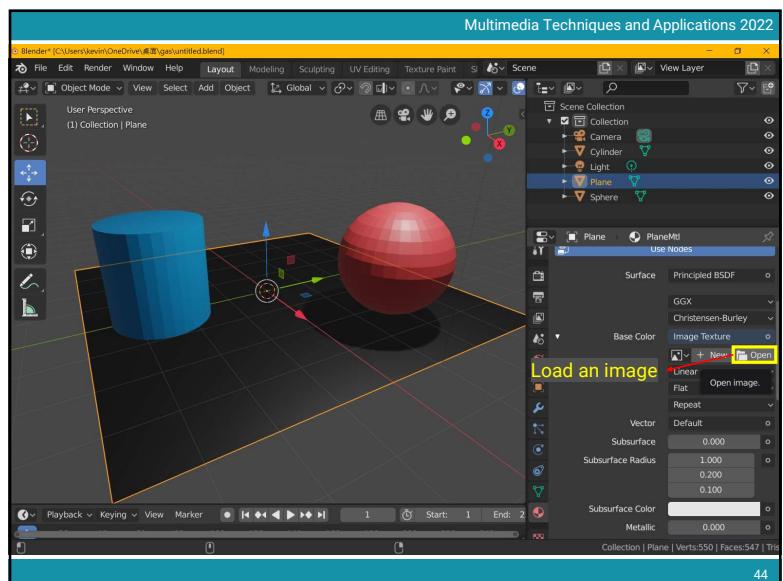
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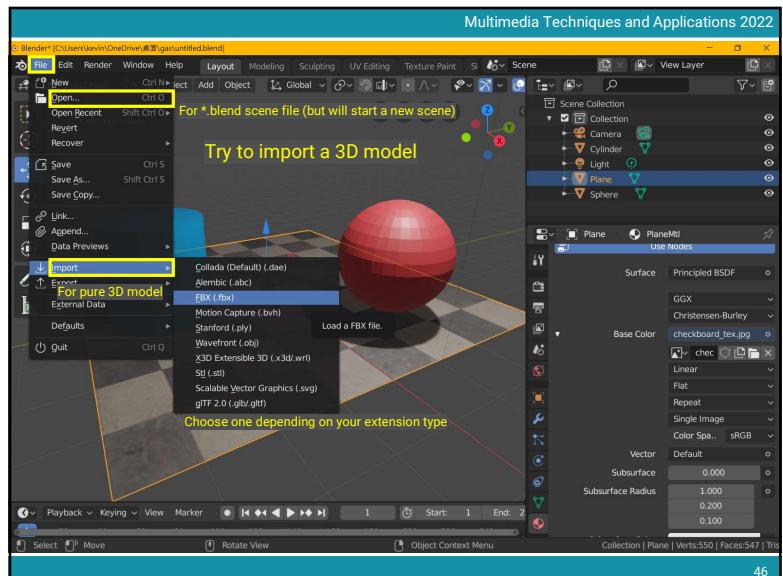
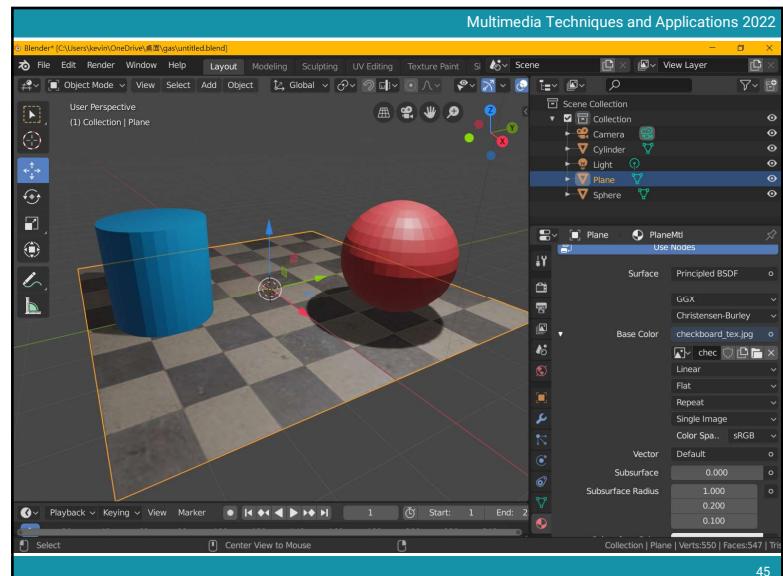
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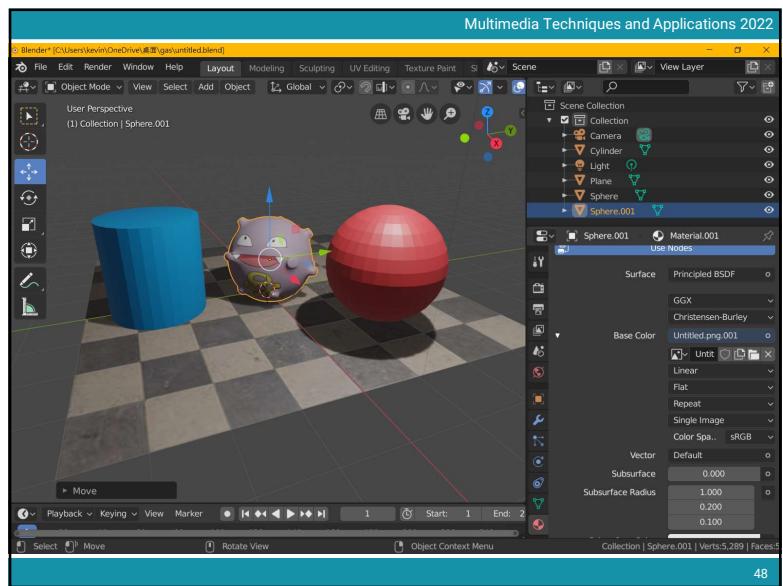
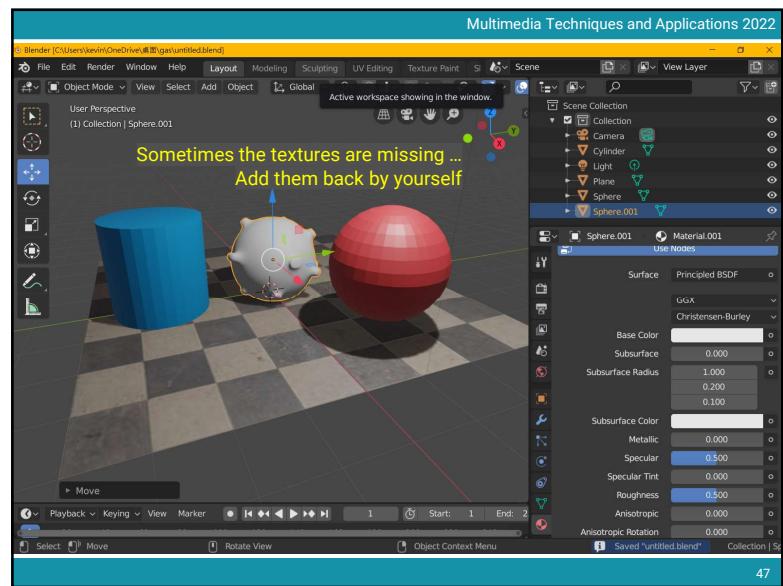


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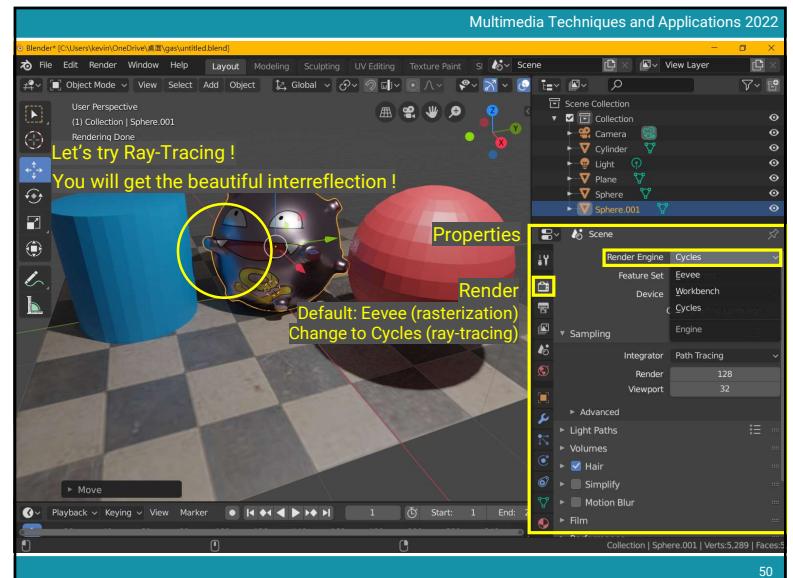
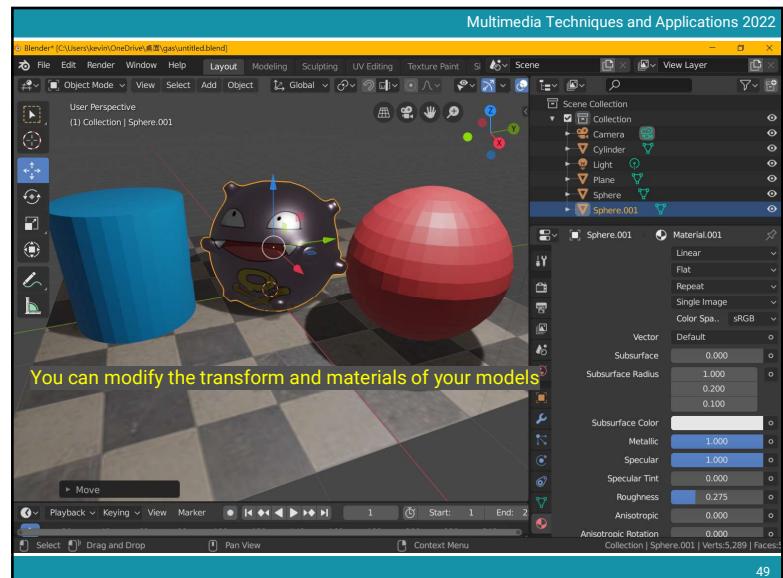
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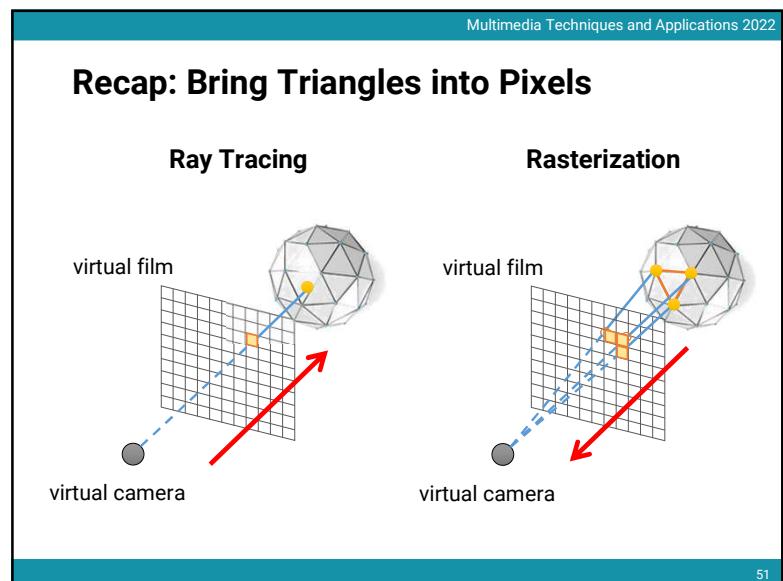
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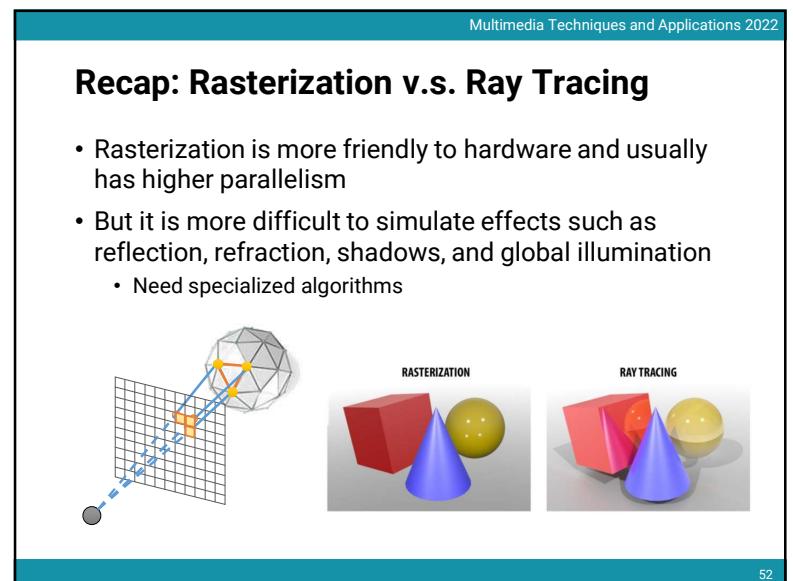


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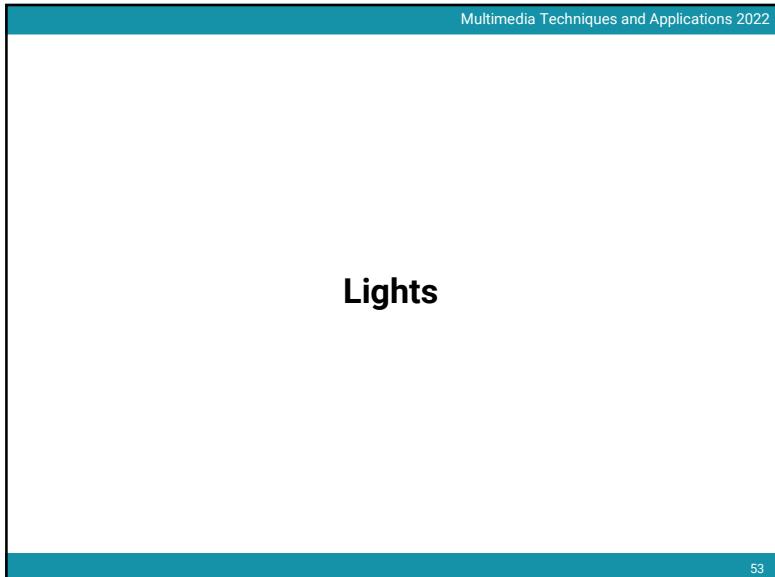
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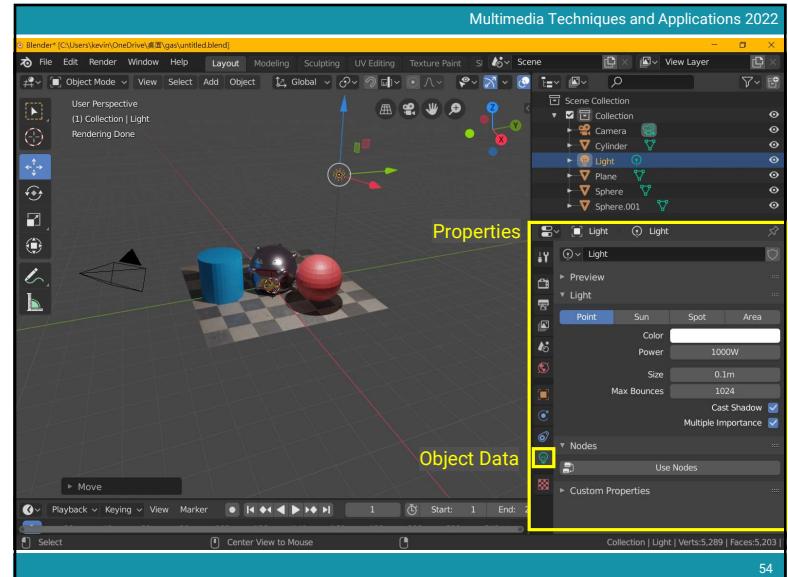
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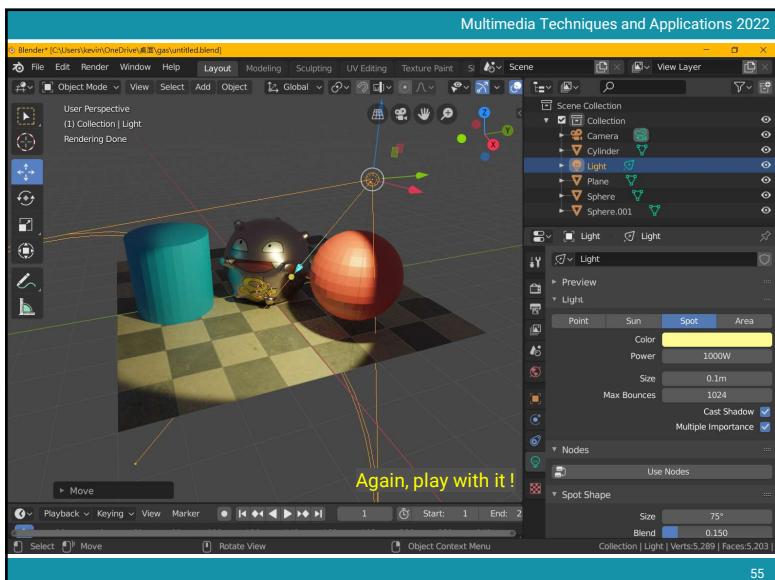
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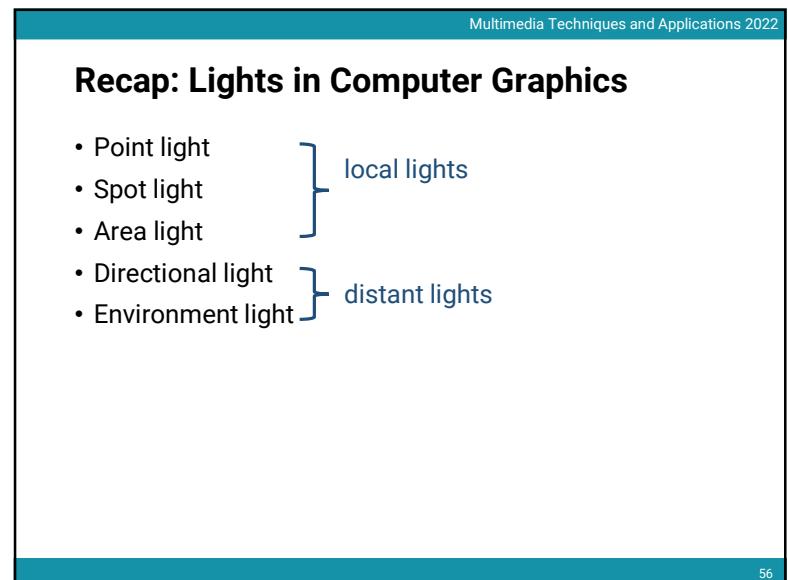
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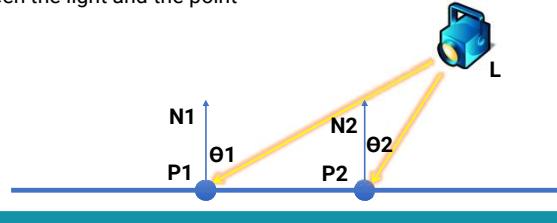


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Recap: Local Lights

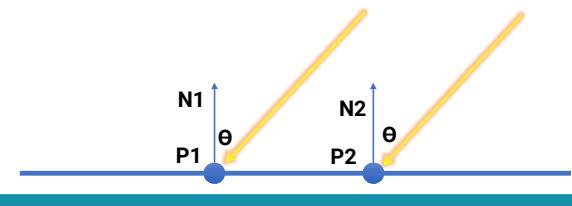
- The distance between a light and a surface is **not** long enough compared to the scene scale
- The position of a light need to be taken into account during shading
 - Lighting direction** = $|L - P|$
 - Lighting attenuation** is proportional to the square of distance between the light and the point



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Recap: Distant Lights

- The distance between a light and a surface is long enough compared to the scene scale and **can be ignored**
 - Lighting direction is **fixed**
 - No lighting attenuation
- Directional light (sun)** is the most common distant light

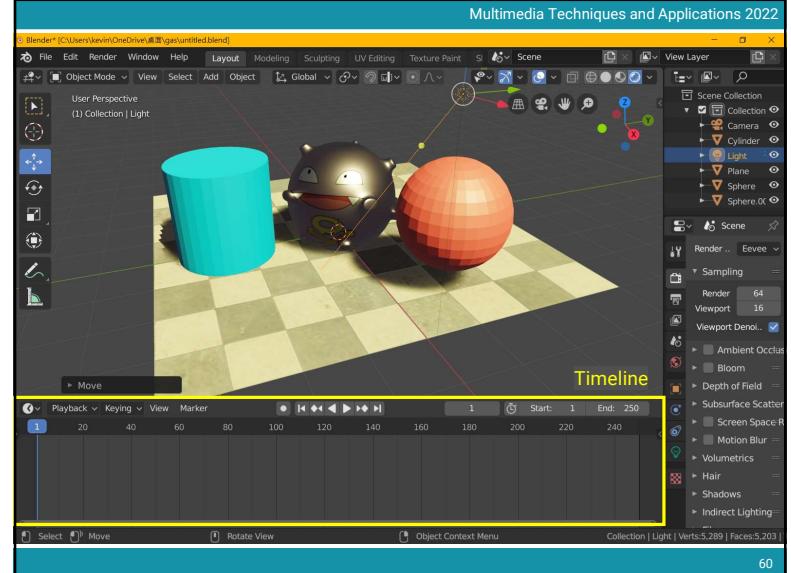


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Animation

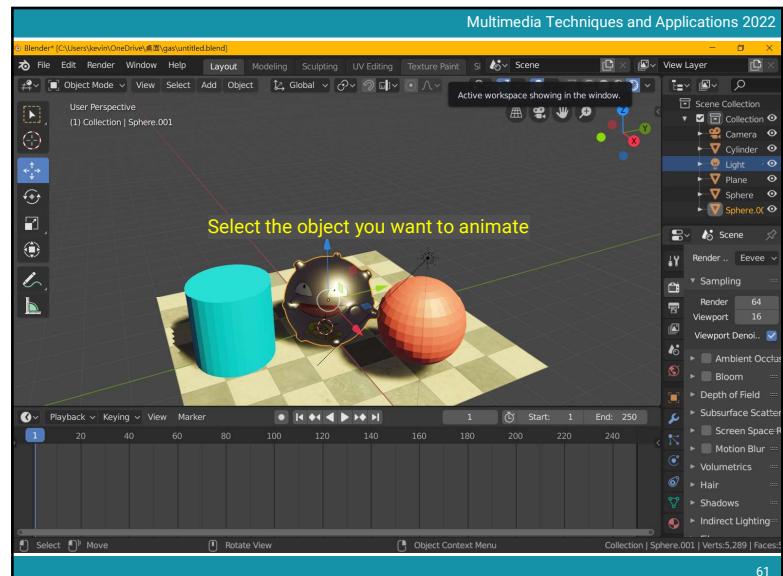
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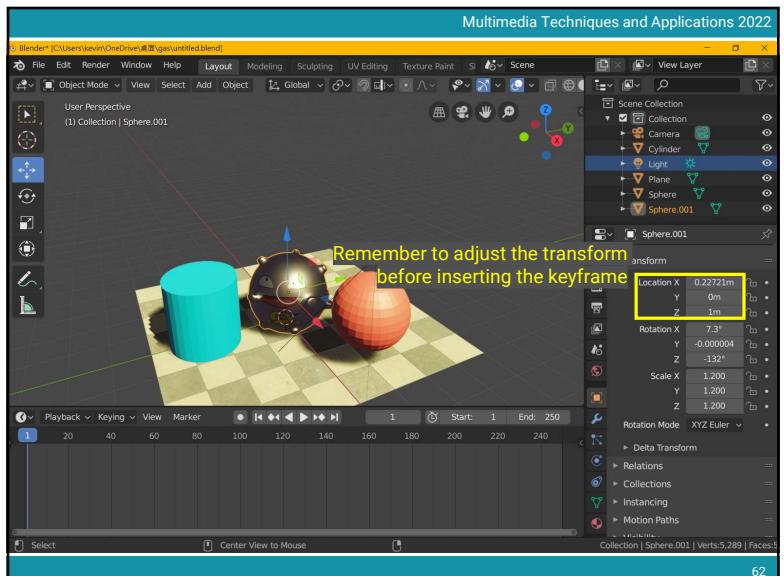
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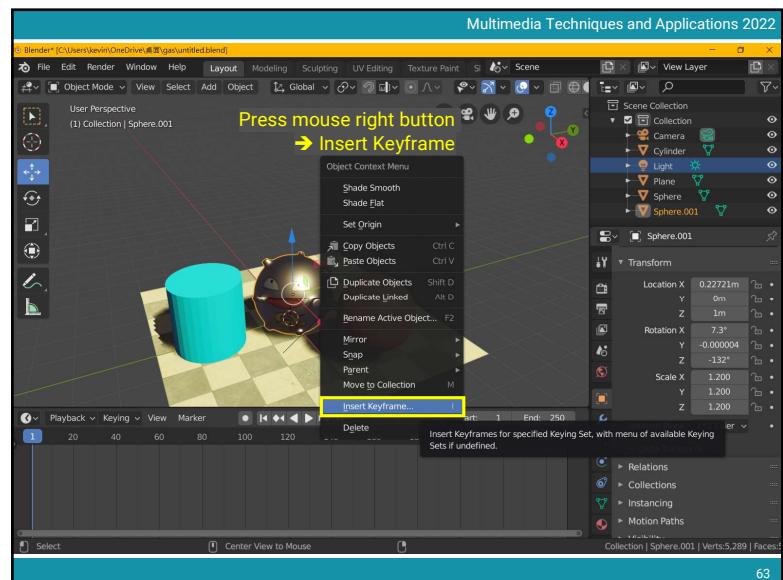
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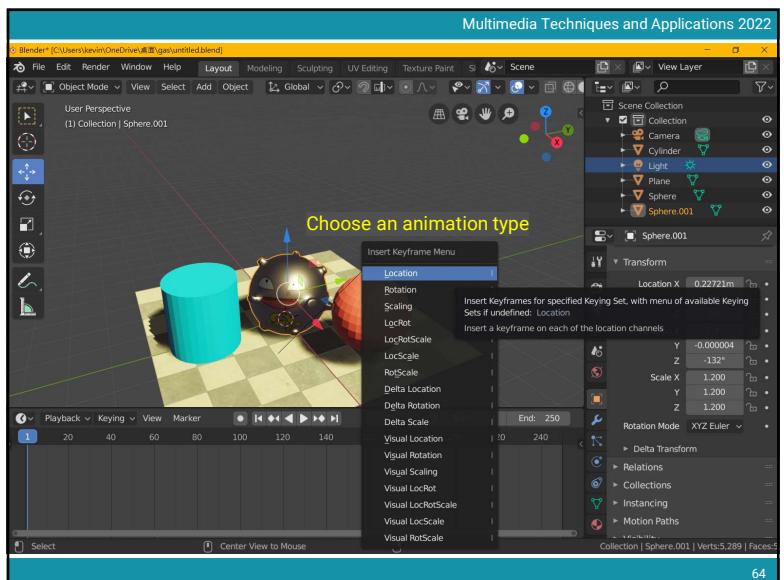
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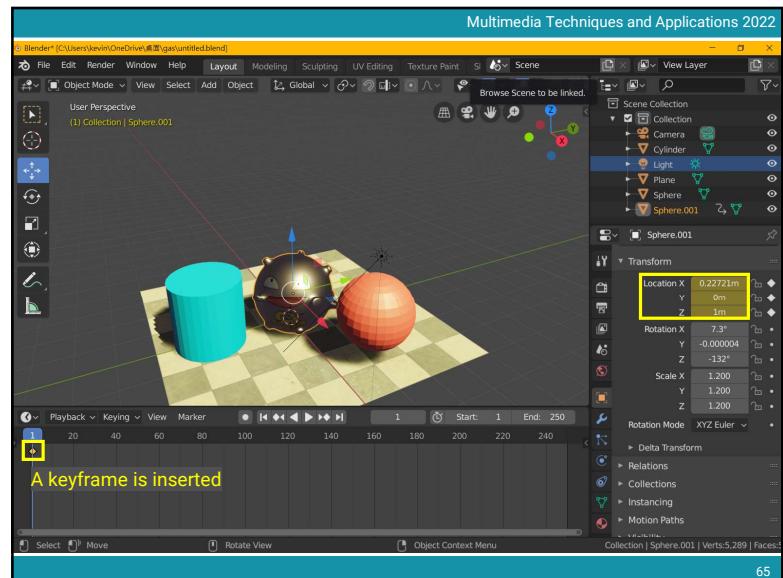
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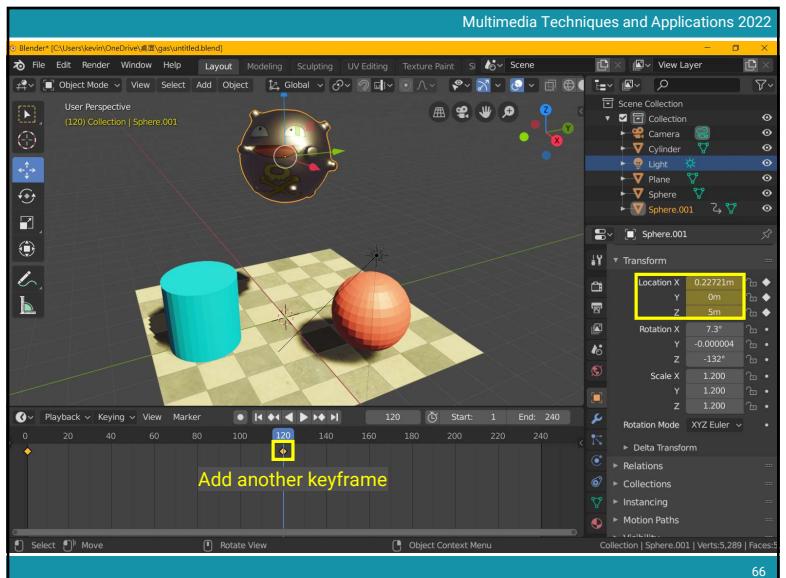
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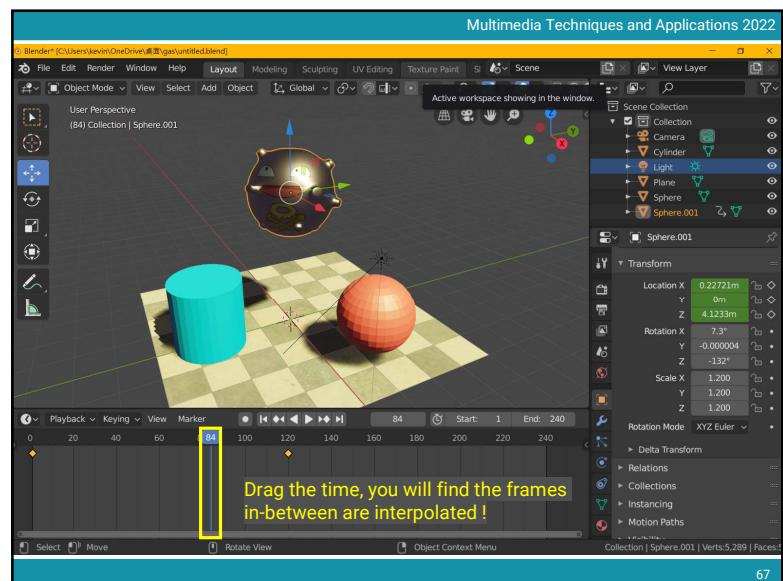
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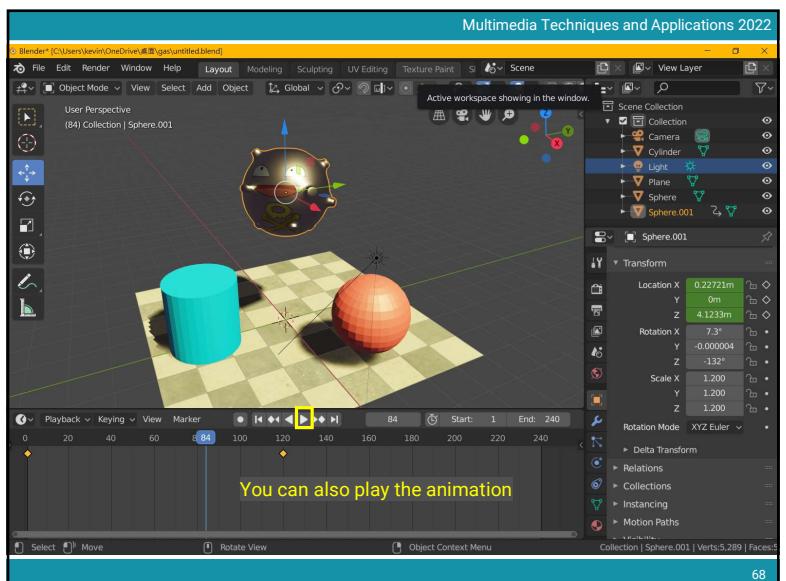
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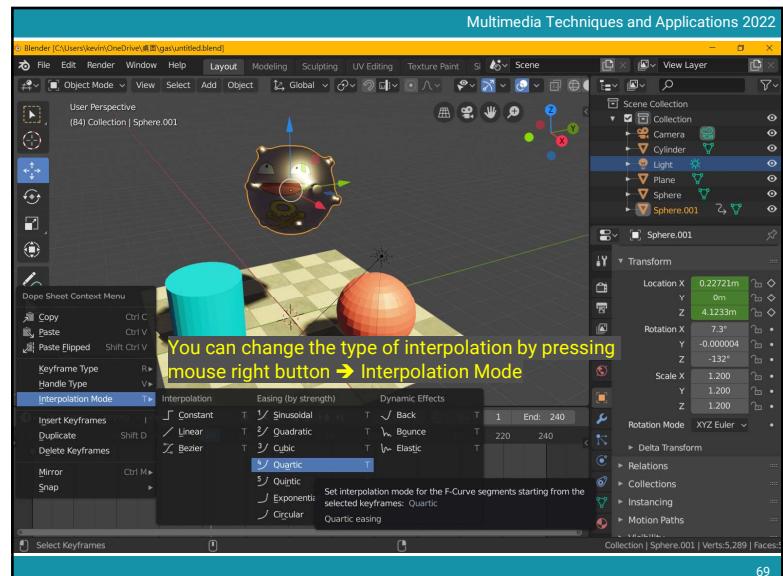
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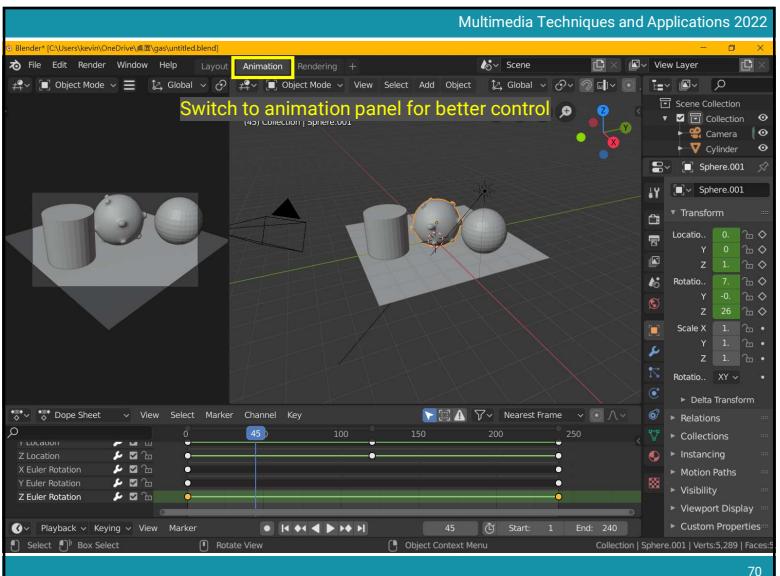
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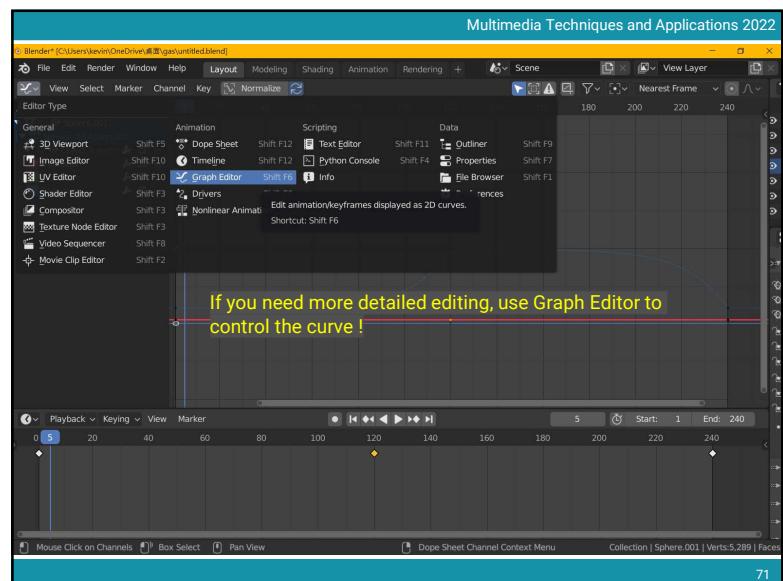
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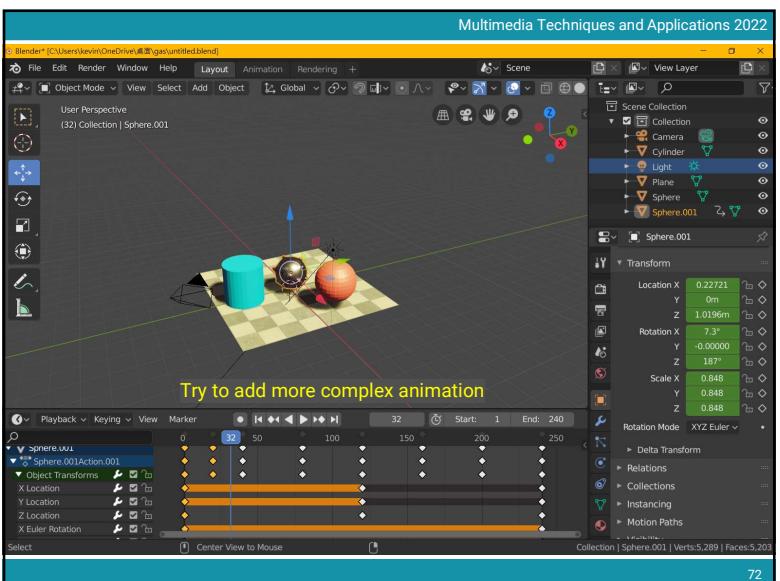
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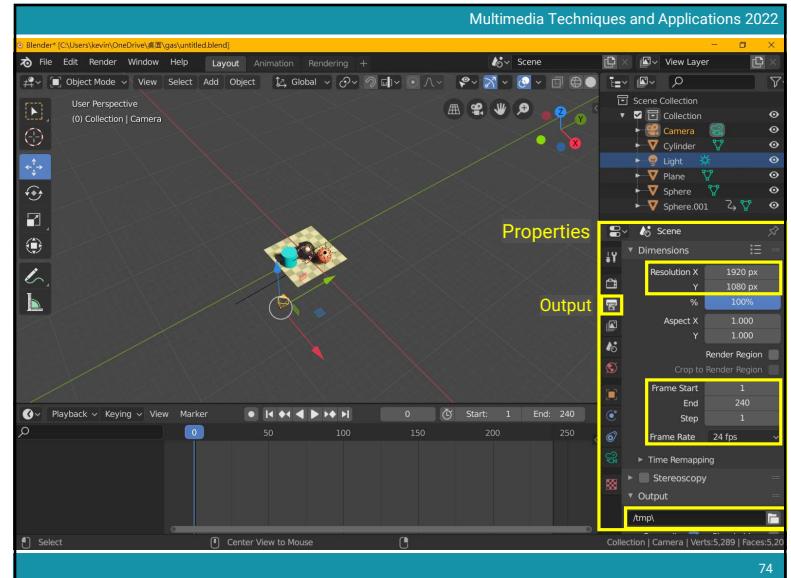
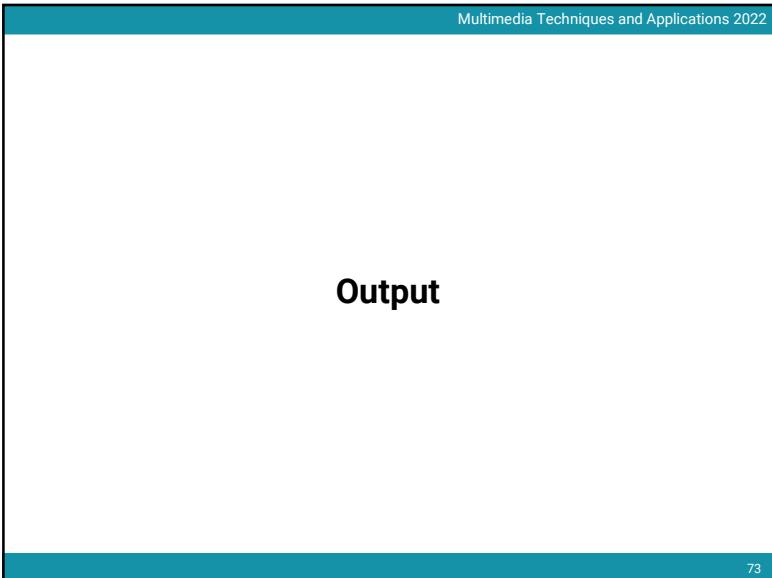
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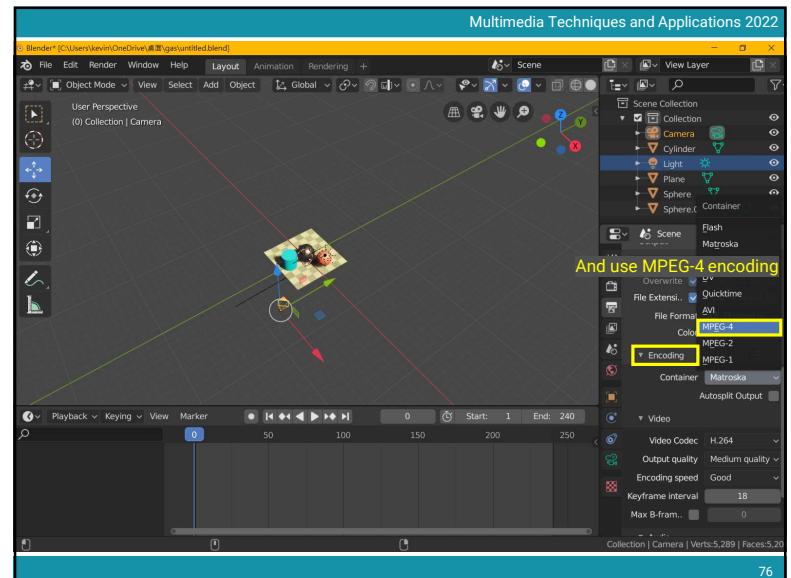
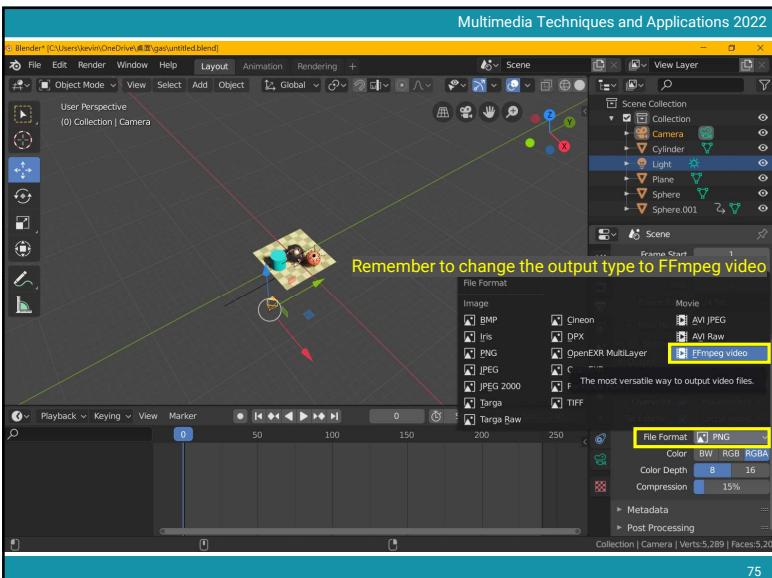


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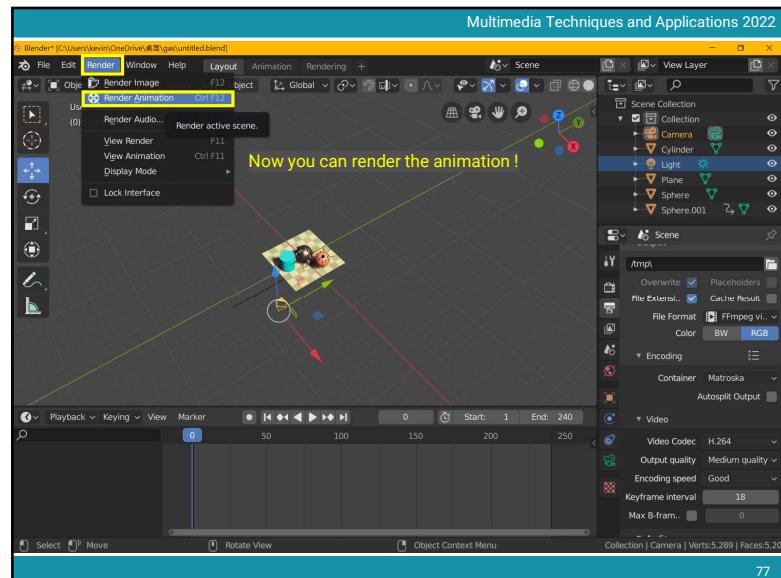
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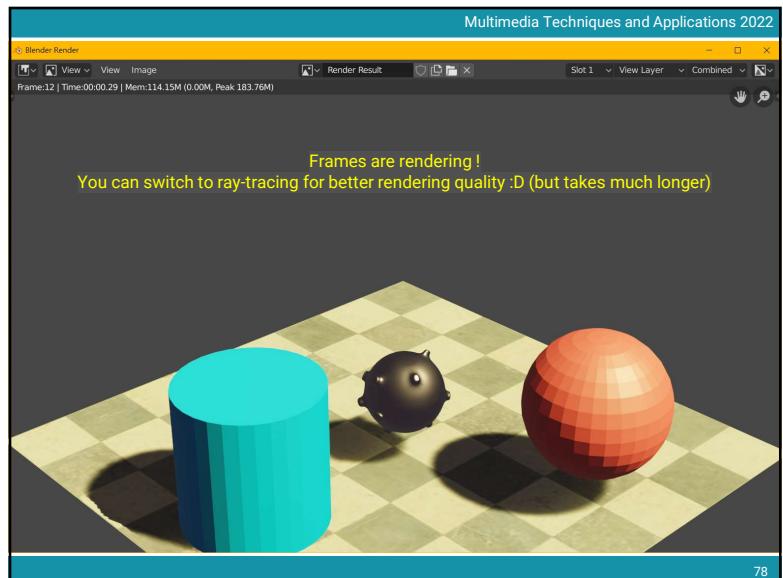
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Homework #2

- Create a **short animation** using blender
 - Find 3D models on the internet and load them in blender (20%)
 - Add animation of translation (20%)
 - Add animation of rotation (20%)
 - Add animation of scaling (20%)
 - A short one-page report for describing your work (10%)
 - Creativity and quality (10%)
- Personal work
- Due date: 5/29
- 15% for the final grading
- Hand in your *.blend file and the output *.mp4 video
 - 1920 x 1080, 24fps

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Homework #2

- Where to download the 3D models?
 - Google is your best friend
 - Search "free 3D models"
 - Some example websites:
 - Free3D: <https://free3d.com/3d-models/blender>
 - CgTrader: <https://www.cgtrader.com/free-3d-models>
 - TurboSquid: <https://www.turbosquid.com/Search/3D-Models/free>
 - A collection: <https://tw.eagle.cool/blog/post/best-websites-to-download-free-3d-model-with-high-quality>
 - You can restrict the file types to *.blend, *.obj, *.fbx

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